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44 Gloucester Avenue
London NW1 8JD

Basement Impact Assessment Audit

For

London Borough of Camden

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Campbell Reith Hill LLP
Friars Bridge Court
41-45 Blackfriars Road
London
SE1 8NZ

T:+44 (0)20 7340 1700
F:+44 (0)20 7340 1777
E:london@campbellreith.com
W:www.campbellreith.com

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Author	E Brett, MEng ACGI
Project Partner	E Brown, BSc MSc CGeol FGS
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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 44 Gloucester Avenue (planning reference 2015/1243/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 the 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 checklist.

1.4. The BIA has been prepared and revised by personnel who have suitable qualifications.

1.5. The retaining walls of existing buildings on site will be underpinned and the new basements will be constructed as reinforced concrete boxes in order to construct the two proposed single storey basements.

1.6. There were discrepancies and conflicts with regards to the proposed development contained with the SEPR and original BIA. It was requested that the location and depths of the proposed basements were to be confirmed. Basement locations in a Ground Movement Assessment and updated BIA provided subsequently now agree with the SEPR in respect of proposed locations, although there are still discrepancies over the depths.

1.7. There were numerous queries over the screening process as noted in Sections 3 and 4 which resulted in the potential impacts not being fully considered. These have largely been addressed with the exception of changes to surface water flows and surrounding basement depth.

1.8. The site lies within the safeguarding zone for HS2 who are intending to compulsorily purchase the soil below 9m bgl. The SEPR notes that HS2 must be consulted on the proposals and any constraints they impose could affect the proposed basement design.

1.9. The BIA and SEPR make reference to surrounding basements, some of which are beneath buildings noted to be in poor condition, together with a listed 19th Century vault. Whilst there is still no definitive information on the depths and/or locations of these features, ground movement and damage assessments have subsequently been provided for potentially affected structures based on conservative assumptions. It is accepted that, assuming good workmanship, damage should not exceed Burland category 2 for structures in sound condition. It is

recommended that the GMA is updated for actual basement depths and construction methodology in a Basement Construction Plan prior to the commencement of works.

1.10. Network Rail require their own assessment with respect to the listed vault.

1.11. It is understood that the drainage network comprises a combined foul and surface water sewer and it is not clear whether the foul flows from the new development have been considered. Gloucester Avenue flooded in 1975 and there is no consideration of whether the sewer network has been improved although a CCTV survey is awaited. It is not possible to confirm that there are no impacts on surface water flows and the results of the CCTV survey and confirmation of the sewer capacity should be provided in the BCP.

1.12. Although there are inconsistencies in the screening stage, it is accepted that subterranean flows will not be affected by the proposals. However, the BIA recommends further groundwater monitoring and this should be reported in the Basement Construction Plan.

1.13. Proposals for condition surveys and movement monitoring should be provided in the Basement Construction Plan.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 9 July 2015 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 44 Gloucester Avenue, Camden Reference 2015/1243/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 the 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:

- maintain the structural stability of the building and neighbouring properties;
- avoid adversely affecting drainage and run off or causing other damage to the water environment; and,
- avoid cumulative impacts upon structural stability of 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 the

"Demolition of existing buildings identified as Number 2 at the northwest corner of the site to provide a new ground plus 5 upper storey building along the north west part of the site and a ground plus 2 storey building at the eastern corner and refurbishment of existing building on site to create 40 residential units, employment area (Class B1a), car parking and landscaping within the courtyard with ancillary works."

and confirmed that although the basement proposals did not involve a listed building, the neighbouring properties on site subject to refurbishment are listed and the site is located within the Primrose Hill Conservation Area.

2.6. CampbellReith access LBC's Planning Portal on 10 August 2015 and gained access to the following relevant documents for audit purposes:

- Structural Engineering Planning Report [SEPR] by Elliot Wood within which is contained a Desk Study and Basement Impact Assessment Report [BIA] by GEA
- Architect's plans: Existing plans of basement, ground floor and demolition (Revision A); Site location plan (Revision A); Proposed general sections, AA to DD (Revision B); and, Proposed plans of basement and ground floor (Revision F) and landscaping (Revision B).

2.7. LBC's Planning Department identified a consultation with Network Rail as being pertinent to the audit of the BIA. The comments have been reviewed and are summarised in Appendix 1.

2.8. On 9 September 2015, LBC's Planning Department forwarded a Ground Movement Assessment [GMA] dated September 2015 and a revised Desk Study and Basement Impact Assessment Report [BIA] dated August 2015 by GEA in response to the initial findings of this audit.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	BIA section 1.3.2.
Is data required by Cl.233 of the GSD presented?	No	See Section 4 of BIA Audit.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	No	Confirmation of proposals for soft landscaping required Confirmation of capacity of sewer network to accept new flows required
Are suitable plan/maps included?	Yes	SEPR Appendix A and B. However, none given in BIA.
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	Yes	GMA and Revised BIA
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA section 3.1.2.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	BIA section 3.1.1. Proposals for hardstanding to be confirmed
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	BIA section 3.1.3. Proposals for hardstanding to be confirmed
Is a conceptual model presented?	Yes	BIA Section 7.
Land Stability Scoping Provided? Is consistent with screening outcome?	Yes	BIA Section 4.1.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is consistent with screening outcome?	No	BIA Section 4.1. Lack of clarity with respect to proposed soft landscaping, however, it is accepted that subterranean flows will not be affected.
Hydrology Scoping Provided? Is consistent with screening outcome?	No	BIA Section 4.1. Capacity of sewer network to be confirmed.
Is factual ground investigation data provided?	Yes	BIA Appendix.
Is monitoring data presented?	Yes	BIA sections 4.2 and 5.3. BIA recommends further monitoring to establish equilibrium groundwater levels and any seasonal variation. To be provided in BCP.
Is the ground investigation informed by a desk study?	Yes	BIA Section 1 and 2.
Has a site walkover been undertaken?	Yes	BIA Section 1.3.
Is the presence/absence of adjacent or nearby basements confirmed?	No	On site basements clarified in revised documentation. Surrounding basements not confirmed. Not significant for subterranean flows. GMA based on conservative assumptions.
Is a geotechnical interpretation presented?	Yes	BIA Section 8.
Does the geotechnical interpretation include information on retaining wall design?	Yes	BIA Section 8.1.1.
Are reports on other investigations required by screening and scoping presented? E.g. collection of rainfall data.	No	SEPR refers to need for CCTV survey of drainage network.
Are baseline conditions described, based on the GSD.	Yes	With exception of capacity/condition of sewer network.

Item	Yes/No/NA	Comment
Do the base line conditions consider adjacent or nearby basements?	Yes	On site basements clarified in revised documentation. Surrounding basements not confirmed. Not significant for subterranean flows. GMA based on conservative assumptions.
Is an Impact Assessment provided?	Yes	Section 9 of BIA.
Are estimates of ground movement and structural impact presented?	No	GMA to be submitted.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	With exception of inflows into ground and capacity/condition of sewer network.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	Clarification of drainage proposals to be provided in BCP.
Has the need for monitoring during construction been considered?	Yes	SEPR section 9.3.
Have the residual (after mitigation) impacts been clearly identified?	No	Clarification of drainage to be provided in BCP.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties been maintained?	Yes	However, Network Rail approval also required for their structures.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	No	Clarification of drainage to be provided in BCP.
Has the scheme avoided cumulative impact upon structural stability or the water environment in the local area?	No	Clarification of drainage to be provided in BCP.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	However, Network Rail approval also required for their structures
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1. The BIA and GMA provided subsequently have been carried out by established firms of consultants and the lead authors and reviewers have suitable qualifications.

Proposed Development

4.2. The proposed development comprises the refurbishment of existing locally listed buildings on site, and the demolition and re-construction of others. A new five to six storey building is proposed in the north west corner of the site, with a single storey basement. A new three storey building is proposed in the south east corner of the site, also with a single storey basement.

4.3. The existing basements will be locally deepened by approximately 1m by underpinning the existing basement walls. Within the original documentation, it was not clear which areas of the existing basements were to be deepened. This has now been clarified. The existing retaining walls will be propped in the temporary case and new reinforced concrete walls cast in front of the existing structures to act as permanent retaining walls. The new retaining walls in the centre of the site are to be constructed in open cut. Water will be collected into a sump and pumped to ground level to drain into the existing gravity drainage network. It is noted that the BIA recommends further groundwater monitoring.

4.4. The two new buildings are to be supported on 750mm thick ground bearing reinforced concrete rafts. Soil heave and hydrostatic pressures will be resisted by the raft in bending and tension piles.

4.5. The site is located within the High Speed 2 (HS2) safeguarding zone, and HS2 intend to serve a Compulsory Purchase Order for the soil below 9m bgl, which is currently a no build zone. Thus tension piles will terminate above 9m bgl. The SEPR report acknowledges that HS2 must be consulted on the proposals during the planning process.

4.6. The geology at the site comprises Made Ground, which was proven to be up to 4.30m thick in the ground investigation, over London Clay. It is proposed to remove the Made Ground and replace it with well compacted granular material beneath the base of the proposed basements. It is anticipated that this will be in the order of 400-500mm thick.

4.7. The SEPR and BIA note a number of surrounding buildings have a basement. Some were noted to be in a generally poor condition. A two storey detached house in the southern corner of the site also has a single level basement. Whilst no definitive information with respect to the basement or foundation depths has been provided, this is not critical with respect to subterranean water flows and the assumptions made in the GMA are conservative. Predicted

damage on the various surrounding structures is predicted to be in the range of Burland category 0 to category 2.

4.8. The site is bound to the north east by Network Rail land. Whilst the tracks are noted to be 10m from the site and overhead lines are 5m from the site, there is reference to a listed 19th century vaulted masonry structure. Its location, size and depth are unknown. The architect's basement plan shows it to be located directly adjacent to the new basement in the south east corner of the site, although notes it is to be confirmed. The GMA, which is based on conservative assumptions, suggests the vaults will experience little movement. The approval of Network Rail will be required with respect to possible impacts on this feature and their other structures.

4.9. The original BIA was written prior to the SEPR and the proposed developments conflict; this has largely been resolved in the revised BIA although the GMA refers to a proposed basement depth of 4.40m whilst the BIA states 3.00m. The assumptions in the GMA with respect to basements on site and around the site are conservative.

4.10. The original BIA only referred to the new building and basement in the northern corner of the site, no mention is made of the other new building in the south east corner. It conflicted with SEPR, stating that the basement extensions will match the existing and generally extend to a depth of three metres below ground level. This conflict has been resolved.

Screening and Scoping

Land stability

4.11. The revised BIA contains appropriate justification for 'No' answers.

4.12. In respect of Questions 13 and 14, the founding depths of adjacent properties off site are not known. It has been assumed that 42 Gloucester Avenue, which is directly adjacent to one of the proposed basements, is piled. Assumptions have been made for the purposes of the GMA with respect to other basements and Network Rail will require their own assessments for their assets.

4.13. A Construction Methodology is provided in Section 9 and Appendix D of the SEPR. Contained within this are discussions on temporary propping of neighbouring structures on site. However, no comment is made with respect to buildings neighbouring the site. Section 10 of the BIA recommends further trial excavations to determine the stability of the underlying soils and the rate of any inflows, particularly if traditional underpinning methods are considered. Monitoring of ground movements is confirmed as being necessary within Section 9 of the SEPR, both of structures on site and off site as well as Network Rail assets.

Hydrogeology

4.14. The revised BIA contains appropriate justification for 'No' answers. It is acknowledged that the basement is to be founded in a combination of compacted granular fill and the London Clay. It is accepted that minor seepages detected in the London Clay do not constitute a continuous water flow and that groundwater will not be affected by the excavation or the basement construction. Additionally, given the geology and the limited extent of soft landscaping proposed, it is not considered that any change in the groundwater will impact the London Clay, and thus a negligible effect on stability is expected.

Hydrology

4.15. The revised BIA contains appropriate justification for 'No' answers.

4.16. Errors and conflicts in the original BIA have been addressed. .

4.17. It is not possible to confirm any impact because it is not clear whether the BIA and SEPR consider both foul and surface water, nor whether the existing sewer system has been recently improved. This is potentially significant given that Gloucester Avenue flooded in 1975. The SEPR states that Thames Water will be consulted and the necessary agreements obtained for all drainage works. CCTV surveys are still outstanding.

5.0 CONCLUSIONS

5.1. The BIA has been carried out by an established firm of consultants and the lead authors and reviewers have suitable qualifications.

5.2. The retaining walls of existing buildings on site will be underpinned and the new basements will be constructed as enclosed stiff reinforced concrete boxes in order to construct the two proposed single storey basements. The existing basements will be temporarily propped to facilitate the new basement construction.

5.3. Discrepancies and conflicts with regards to the proposed development contained with the original BIA and SEPR have largely been resolved, although the depths of the proposed basements remain to be confirmed.

5.4. There were numerous queries over the screening process as noted in Sections 3 and 4 which had resulted in the potential impacts not being fully considered. These have largely been resolved with the exceptions of the extent of soft landscaped area and the depths of surrounding basements.

5.5. The site lies within the safeguarding zone for HS2 who are intending to compulsorily purchase the soil below 9m bgl. The SEPR notes that HS2 must be consulted on the proposals and any constraints they impose could affect the proposed basement design.

5.6. The BIA and SEPR make reference to surrounding basements, some of which are beneath buildings noted to be in poor condition, together with a listed 19th Century vault. Although there is still no definitive information on the depths and/or locations of these features, ground movement and damage assessments have been carried out. The GMA is based on conservative assumptions with respect to the depths of existing and proposed basements. It is accepted that, assuming good workmanship, damage should not exceed Burland category 2 for structures in sound condition. It is recommended that the depth and condition of the foundations to the potentially affected structures are confirmed and the GMA updated for the actual existing and proposed basement depths. It is recommended that this is provided in a Basement Construction Plan prior to the commencement of works once the construction methodology has been finalised.

5.7. Ground movement around the listed vault is predicted to be small, although Network Rail will require their own assessment with respect to this and their other assets.

5.8. It is understood that the drainage network comprises a combined foul and surface water sewer and it is not clear whether the foul flows from the new development have been considered. Gloucester Avenue flooded in 1975 and there is no consideration of whether the sewer network

has been improved although a CCTV survey is awaited. Combined with the lack of clarity over the development proposals, it is therefore not possible to confirm that there are no impacts on surface water flows. It is recommended that the findings of the CCTV survey and confirmation of the adequacy of the network are provided within a Basement Construction Plan.

5.9. Although there are inconsistencies in the description of soft landscaped areas, it is accepted that subterranean flows will not be affected by the proposals. The BIA recommends further groundwater monitoring. This should be reported in the BCP.

5.10. The SEPR makes reference to monitoring during construction and it is recommended that detailed proposals are provided in a Basement Construction Plan with the results of condition surveys of potentially affected structures.

Appendix 1: Consultation Comments

Consultation Comments

Surname	Address	Date	Issue raised	Response
Network Rail	Adjacent to north eastern site boundary	20.04.15	Proximity to Network Rail infrastructure.	See 4.12 and 5.6.

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Proposed development description	Conflict between BIA and SEPR. Clarification of the proposed development as well as the finished floor levels of the existing and proposed basements is required.	Discrepancies remain with respect to proposed basement depths. To be confirmed in Basement Construction Plan (BCP).	24/09/2015
2	Screening and scoping	To be revised based on comments in BIA audit.	Justification for 'no' answers provided.	24/09/2015
3	Ground Movement Assessment (GMA)	GMA to be submitted with revised BIA.	GMA received 9/9/2015 predicts no damage greater than Burland Category 2. It is recommended that this is finalised in an updated GMA when basement depths and construction methodology have been confirmed.	24/09/2015
4	Temporary excavation of Made Ground	The effect of temporarily removing all of the Made Ground, up to 4.30m bgl, will also need to be considered in the GMA.	Covered in GMA. Further groundwater monitoring to be reported in BCP.	24/09/2015
5	Network Rail assets	Further clarification required with respect to the location, size and depth of the listed masonry vaulted structure. The impact of the proposed development on this structure is to be considered. Network Rail to be consulted to establish their assessment criteria.	To be agreed with Network Rail.	N/A
6	Neighbouring properties	Information on neighbouring properties is required, including whether they have basements. The relevant structures and infrastructure are to be assessed in the GMA to be submitted. Clarification is required as to whether the surcharge loads from neighbouring properties have been considered in the design of the new retaining walls and basement slabs contained in Appendix E of the	To be confirmed in BCP as described above. BCP to include proposals for conditions surveys and movement monitoring during construction.	24/09/2015

		SEPR.		
7	HS2 safeguarding zone	Constraints to design and construction exist.	Consultation with HS2 required as noted in SEPR.	N/A
8	Surface water	CCTV survey awaited and confirmation of capacity of sewer network to take flows off site.	To be confirmed in BCP once CCTV survey completed. Will also require approval of Thames Water.	24/09/2015