

47d Netherhall Gardens, London,  
NW3 5RJ

Basement Impact Assessment  
Audit

For  
London Borough of Camden

Project Number: 12985-81

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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 47d Netherhall Gardens, London NW3 5RJ (planning reference 2019/3948/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 has been carried out by individuals with appropriate qualifications. However, the BIA should consider the current guidance provided by LBC.
- 1.5. The proposed development comprises the construction of a single-storey basement beneath the full footprint of the existing house and extending into the garden. The property shares a party wall with neighbouring building 47c.
- 1.6. A Screening assessment has been undertaken. However, a number of responses are considered to be incorrect or requiring further review / evidence to confirm responses, as outlined in Section 4.
- 1.7. A site investigation indicates the ground conditions to comprise Made Ground over the Bagshot Formation and Claygate Member. However, as outlined in Section 4, the site investigation undertaken is considered inadequate.
- 1.8. The BIA indicates that groundwater may be encountered during construction and control of groundwater may be required. Further groundwater monitoring should be undertaken.
- 1.9. Insufficient interpretative geotechnical assessment is presented, as outlined in Section 4.
- 1.10. It is accepted that there will be negligible impact to the wider hydrological environment.
- 1.11. The ground movement assessment should be revised in accordance with the comments of Section 4.
- 1.12. Discussion and requests for information are presented in Section 4 and summarised in Appendix 2. The BIA does not meet the requirements of the CPG Basements.

## 2.0 INTRODUCTION

- 2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 11 October 2019 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 47d Netherhall Gardens, London NW3 5RJ, Camden Reference 2019/3948/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): Basements.
  - Camden Development Policy (DP) 27: Basements and Lightwells.
  - Camden Development Policy (DP) 23: Water.
  - The Local Plan (2017): Policy A5 (Basements).
- 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.

LBC's Planning Portal described the planning proposal as: *"Excavation of a new basement level with 3 x lightwells to front and rear and 2 x walk-on skylights within front garden; alterations to front elevation fenestration and installation of new glass canopy to front door; enlargement and re-location of 2 x rear rooflights."*

LBC's Planning Portal confirmed that the property is not a Listed building and the site does not neighbour any listed buildings.

2.5. CampbellReith accessed LBC's Planning Portal on 23 October 2019 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment (BIA) dated July 2019 (ref 491846, version V0) by CET Infrastructure
- Proposed and Existing Drawings by William Tozer Associates.
- Structural Engineer's Construction Method Statement (CMS) dated 25 June 2019 (ref 2018-540, rev 01) by Elite Designers Ltd.
- Parsons Tree Care, Arboricultural Report, dated 13 September 2019
- William Tozer Associates, Tree Constrains Plan, drawing reference A/02/101, rev H, dated 13/09/2019
- Comments and objections to the proposed development from local residents, including:
  - Eldred Geotechnics Ltd Letter reference G1903/19K14/RH1, dated 14 October 2019

### 3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	
Is data required by Cl.233 of the GSD presented?	No	Underground utility plans; outline construction programme.
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?	No	BIA report (July 2019), Section 4.1. Responses queried.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	BIA report (July 2019), Section 4.2. Responses queried.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA report (July 2019), Section 4.3.
Is a conceptual model presented?	Yes	Described textually in Section 3.6, and again in Section 9.3
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes/No	BIA report (July 2019), Section 5.1. Responses queried.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes/No	BIA report (July 2019), Section 5.2. Responses queried.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	N/A	No hydrology impacts identified as requiring further consideration in the screening stage.
Is factual ground investigation data provided?	Yes	BIA report (July 2019), Section 6 and Appendix D. Considered insufficient.
Is monitoring data presented?	Yes	Only one monitoring visit carried out. Results presented in Section 6 and discussed throughout BIA Considered insufficient.
Is the ground investigation informed by a desk study?	Yes	BIA report (July 2019), Section 3
Has a site walkover been undertaken?	Yes	Not prior to the site investigation
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Lower ground floor identified in one neighbouring property.
Is a geotechnical interpretation presented?	Yes	BIA report, Section 6; SI report; calculations. However, inconsistently adopted.
Does the geotechnical interpretation include information on retaining wall design?	Yes	SI report; calculations. However, inconsistently adopted.
Are reports on other investigations required by screening and scoping presented?	Yes	Arboricultural Impact Assessment and Damage Category assessment provided.
Are baseline conditions described, based on the GSD?	Yes	
Do the base line conditions consider adjacent or nearby basements?	Yes	



Item	Yes/No/NA	Comment
Is an Impact Assessment provided?	Yes	BIA report, Section 5.
Are estimates of ground movement and structural impact presented?	Yes	BIA report, Section 7 and 8. Assessment queried.
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	No	Screening responses queried.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	Need for monitoring identified in BIA Section 8.5 and in the CMS Section 10.0. Screening / scoping / assessment to be reviewed.
Has the need for monitoring during construction been considered?	Yes	BIA Report, Section 8.5. Strategy to be reviewed.
Have the residual (after mitigation) impacts been clearly identified?	No	No discussion provided
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	GMA queried. Category 2 damage predicted.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	No	Potential hydrogeological impacts.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	GMA queried. Category 2 damage predicted.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	No	Category 2 identified for adjoining property.
Are non-technical summaries provided?	Yes	

## **4.0 DISCUSSION**

- 4.1. The BIA has been prepared by CET Infrastructure with supporting documents provided by Elite Designers Ltd. The authors' qualifications are in accordance with CPG guidelines.
- 4.2. The proposed development will comprise the construction of a single-storey basement below the footprint of the existing building and extending into the front garden area by approximately 5.3m. The property shares a party wall with neighbouring property 47c.
- 4.3. No basements have been identified in the adjoining property 47c or the adjacent 47b to the northwest. Property 49 is confirmed to have a lower ground floor level extending approximately 1.5m below ground level.
- 4.4. The Hampstead Heath Tunnel has been identified underlying Netherhall Gardens and the proposed basement has been identified as falling within a 15m 'Zone of Influence' above the tunnel profile. The need for liaison with Network Rail and securing an asset protection agreement has been identified.
- 4.5. The site investigation and BIA have been informed by a desk study broadly in accordance with the GSD Appendix G1. Further consideration of the wider hillside environment, local watercourses and proximity to the highway is required, as outlined in 4.6 and 4.14.
- 4.6. Further to 4.5, a Screening assessment has been undertaken. However, a number of responses are considered to be incorrect or require further review / evidence to confirm responses (4.1- Q3 slope; Q8 watercourses; Q12 highway; 4.2 – Q2 watercourses).
- 4.7. A site investigation (SI) was undertaken comprising one window sampler borehole to 6.0m below ground level (bgl) and three foundation inspection trial pits to a maximum depth of 1.7m bgl. The window sampler borehole was carried out at the rear of the property, outside the footprint of the proposed basement. The CMS includes figures in Appendix D that allude to a proposed cable percussive borehole located in the front garden of the property, within the footprint of the proposed basement.
- 4.8. It is noted that the existing strength testing of the soils has been undertaken by methods that are not considered to be reliable. The scatter of results presented does not provide consistent or robust evidence of insitu strength / density of soils sufficient to derive geotechnical design parameters on a reasonably conservative basis. It is recommended that the additional borehole proposed within the CMS is undertaken, including SPTs at appropriate centres.
- 4.9. The SI report is presented as part of the Construction Method Statement (CMS) and the findings are discussed in the BIA. Laboratory testing is indicated to have been carried out but the data is absent from the associated Appendix B within the SI report. Similarly, soil strength data is discussed within the site investigation report but data is absent from Appendix C of the SI report. Retaining wall parameters are provided in the SI report; however, the preliminary retaining wall calculations provided in Appendix B of the CMS use soil parameters that differ from the recommended values.

- 4.10. Further to 4.8 and 4.9, the additional SI and testing (insitu and laboratory) should be undertaken and the interpretative geotechnical information updated and adopted in the assessments consistently, sufficient to provide a reasonably conservative basis of design.
- 4.11. The site investigation indicates that the site is underlain by Made Ground, Bagshot Formation and the Claygate Member of the London Clay Formation. It's noted that BGS mapping data indicates the Bagshot Formation is not anticipated to be present within the vicinity of the site. Groundwater was encountered within the Claygate Member, a Secondary Aquifer, at 5.00m bgl. One subsequent monitoring visit was carried out and standing groundwater level was measured at 2.65m bgl. The BIA indicates the proposed basement will extend below the groundwater table and identifies a requirement for further groundwater monitoring prior to construction. Further site investigation and groundwater monitoring would establish if the shallow soils are Bagshot Formation or local Head Deposits, and clarify whether the proposed basement would impact the local hydrogeological environment. Additionally, it would inform temporary works strategies for managing groundwater during construction, to ensure stability.
- 4.12. The BIA indicates that the proposed basement will not have a significant impact on groundwater flows, on the basis that the geology underlying the site has a relatively low permeability. However, further to 4.11 and 4.13, this has not been demonstrated.
- 4.13. The head of a stream is shown to originate near the site on the 'Lost Rivers of London' maps, and the 1870-1879 historic Ordnance Survey map shows this stream originating on the site itself. The stream is shown to flow in the down gradient direction to the south and then southwest. The BIA states "The stream head was likely to have been a shallow feature and is probably now non-existent due to the residential developments undertaken since 1879". Given the shallow ground water encountered on site and the differing ground conditions to those expected from the Desk Study (i.e. Bagshot Formation soils encountered), further consideration of the implication of the development on the wider hydrogeological environment should be undertaken.
- 4.14. A basic conceptual site model is presented. It is noted that the site is within a wider hillside setting although the BIA indicates these are <7 degrees. The BIA should review slope angles and impact assessments and update the responses to Screening / Scoping / Assessment, if required. It should be confirmed whether the boundary wall between the property and 49 Netherhall Gardens is a retaining wall supporting the neighbouring site and, if so, how this will be impacted by the proposed works and whether additional mitigation is required.
- 4.15. The construction methodology indicates use of reinforced concrete underpinning for the construction of the basement. A construction sequence including proposed propping arrangements is presented in the CMS.
- 4.16. A ground movement assessment (GMA) has been undertaken using PDisp to analyse vertical movements arising from the development. Young's modulus values of 500 x undrained shear strength were adopted, and a global Poisson's ratio of 0.5 was used.
- 4.17. The GMA also adopted the CIRIA C760 methodology, which is intended for embedded retaining walls; however, it is accepted that this approach can predict ground movements within the range typically anticipated for the proposed 'hit and miss' retaining wall techniques when carried out with good control of workmanship. The CMS provides a construction method (Section 9) detailing

the excavation, propping and construction sequence for the works. Section 10 of the CMS then discusses potential ground movement and indicates that expected damage to neighbouring structures will be between Category 0 or 1 (Negligible to Very Slight), in accordance with the Burland Scale.

- 4.18. In the BIA, a Damage Assessment is also provided, carried out using the method proposed by Burland and CIRIA C760. The assessment indicates damage to neighbouring properties will be a maximum of Category 2 (Slight). The maximum permitted damage category is Category 1, in accordance with LBC's guidance and policies. The GMA should be reviewed and sufficient mitigation provided to ensure that a maximum of Category 1 damage is sustained to neighbouring properties. The assessment should also include consideration of the highway and underlying utilities.
- 4.19. The BIA recommends that a pre-construction condition survey of neighbouring properties is carried out and identifies the need for a system of monitoring of adjoining structures to be established before the works commence. The CMS provides trigger values for the monitoring, with the 'Green' limit set at 8mm and the 'Amber' upper limit set at 12mm. The scheme should be reviewed, considering 4.18, to ensure that movements are limited such that a maximum of Category 1 damage is sustained.
- 4.20. The proposed scheme is not identified as increasing the proportion of hardstanding at the site as the basement area outside the building footprint is described as already comprising brick hardstanding.

## **5.0 CONCLUSIONS**

- 5.1. The qualifications of the authors are in accordance with LBC requirements.
- 5.2. Desk Study information within the BIA is broadly in line with aspects recommended in the GSD Appendix G1.
- 5.3. Further consideration of slopes, proximity to the highway and local watercourses should be undertaken, with assessments updated as required.
- 5.4. A site investigation has been undertaken. However, further investigation and geotechnical assessment is required.
- 5.5. Further investigation and assessment of the proposed development in the context of the wider hydrogeological environment is recommended.
- 5.6. The construction methodology, structural scheme and temporary works proposed are presented, including sequencing and propping arrangements.
- 5.7. The GMA indicates a maximum of Category 2 (Slight) damage will be sustained by neighbouring properties, in accordance with the Burland Scale. This is in excess of allowable limits and further assessment will be required. The assessment should include consideration of the highway and underlying utilities.
- 5.8. The submitted documents (BIA, SI Report, CMS, GMA etc) should be reviewed and updated so that assessments are consistently presented.
- 5.9. A number of queries have been raised, as summarised in Appendix 2. The BIA does not meet the requirements of CPG Basements.

## **Appendix 1: Residents' Consultation Comments**

Pertinent to the BIA

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Williams  (on behalf of Netherhall Neighbourhood Association)	N/A	1/10/2019	There are significant underground water courses in this area of land sloping down from Hampstead and Camden should satisfy itself that the BIA identifies that the proposals will not adversely affect their flow	This issue is queried further in this audit (Section 4).
Heath  (with Eldred Geotechnics letter report)	47C Netherhall Gardens	16/10/2019	<p>Groundwater levels were measured in May 2019 and do not represent a true picture of the water levels.</p> <p>BIA report states gradient on which house is built is below percentage threshold relevant to development. The property is on a hill that leads to the highest point in London (Whitestone Pond). The extent of the gradient is evident by just standing outside the front of the house. It seems that the gradient on which the development sits has been underplayed.</p> <p>At present the BIA concludes that your property will be affected by a risk of damage of category 2 magnitude. Camden require damage risk to neighbouring property to be no greater than category 1</p>	<p>This issue is queried further in this audit (Section 4).</p> <p>This issue is queried further in this audit (Section 4).</p> <p>This issue is queried further in this audit (Section 4).</p>

## **Appendix 2: Audit Query Tracker**



Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Stability	Further consideration of slopes (wider hillside slope as well as neighbouring retaining wall), proximity to the highway and local watercourses should be undertaken, with assessments updated as required.	Open	
2	Stability / Hydrogeology	Additional site investigation and groundwater monitoring required, to inform the ground model, geotechnical and hydrogeological assessments. Where impacts are identified, mitigation should be proposed.	Open	
3	BIA Format	The submitted documents (BIA, SI Report, CMS, GMA etc) should be reviewed and updated such that assessments are consistently presented.	Open	
4	Stability	The GMA indicates a maximum of Category 2 (Slight) damage will be sustained by neighbouring properties, in accordance with the Burland Scale. This is in excess of allowable limits and further assessment will be required. The assessment should include consideration of the highway and underlying utilities.	Open	

## **Appendix 3: Supplementary Supporting Documents**

None

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