

47d Netherhall Gardens, London,
NW3 5RJ

Basement Impact Assessment
Audit

For
London Borough of Camden

Project Number: 12985-81

Revision: F1

June 2021

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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.
- 1.5. Additional site investigation has been undertaken to provide a suitable ground model and soil parameters for the site.
- 1.6. Based on the revised submission, it is accepted that the proposed development will not significantly impact the hydrology, hydrogeology or slope stability of the surrounding area.
- 1.7. The revised submission indicates that ground movements to neighbouring properties will result in damage not exceeding Burland Category 1 (Very Slight). The Supplementary BIA also confirms a negligible impact to the adjacent highway and utilities therein.
- 1.8. Monitoring of adjacent structures has been recommended and associated trigger levels will be updated to reflect the revised BIA.
- 1.9. Based on the revised submission, the BIA is considered to 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

2.6. Additional supplementary information was provided to CampbellReith in response to the queries raised in Appendix 2 of the initial audit, as follows:

- Basement Impact Assessment by CGL, ref CG/38801, rev 0, dated April 2021.
- Geotechnical Report on Ground Investigation by CET, ref. 491846, rev 2, dated April 2021.

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?	Yes	Appropriate consideration in revised submission.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Appropriate consideration in revised submission.
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	Appropriate assessment provided in revised submission

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Appropriate assessment provided in revised submission
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	Two groundwater monitoring visits carried out.
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	Supplementary BIA report
Does the geotechnical interpretation include information on retaining wall design?	Yes	
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	
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.

Item	Yes/No/NA	Comment
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	Based on revised submission.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Updated in revised submissions. Revisions to trigger values to be undertaken prior to construction, as Appendix 3.
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?	Yes	Updated in revised submissions.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Updated in revised submissions.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Updated in revised submissions.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	Updated in revised submissions.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Updated in revised submissions. Category 0 damage predicted for neighbouring structures.
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. The Supplementary BIA provides additional detail regarding neighbouring foundations in Plates 3 and 4.
- 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.
- 4.6. 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. Additional SI comprising one cable percussive borehole within the footprint of the basement, to 12.45m depth, was subsequently undertaken and presented in the Geotechnical Report provided as part of the revised submission. The borehole includes in situ testing and laboratory testing that provide a reliable strength profile of the ground. An allowable bearing pressure of 90kPa is indicated at 3.3m depth, the depth of the new basement foundations.
- 4.7. The Geotechnical Report indicates that the site is underlain by Made Ground the Claygate Member and the London Clay Formation. Groundwater was encountered within the Claygate Member, a Secondary Aquifer, at 5.00m bgl. Two subsequent monitoring visits carried out in June 2019 and December 2020, encountered standing groundwater level at 2.65m and 2.13m bgl respectively.
- 4.8. In the initial BIA submission, a number of responses in the Screening exercise were considered to be incorrect or require further review/evidence to support the responses. While a new screening exercise has not been included in the Supplementary BIA, these issues are addressed within the report.
- 4.9. Section 5.8 of the Supplementary BIA discusses the groundwater in the context of the proposed development. It is indicated that, due to the recharge rate between groundwater strike and subsequent monitoring, groundwater flow within the Claygate Member is considered to be slow and limited to silt/sand laminae within the Claygate Member. A rise in groundwater level of 10mm to 15mm is predicted following construction of the basement and groundwater ingress during construction will be managed through pumping. Based on the groundwater depth encountered and subsequent monitoring, it is indicated that the risk of ground settlement due to loss of fines

from the Claygate Member soils during pumping is considered to be low. On this basis it is accepted that the basement will not significantly impact the wider hydrogeological environment.

- 4.10. 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. This is also shown in Plate 1 of the Supplementary BIA, which is an extract of a topographic survey of the site. Based on the screening exercise it is accepted that the proposed basement will not significantly impact the wider hydrological environment.
- 4.11. Plate 1 in the Supplementary BIA and shows the topography of the adjacent No. 49, which indicates slope angles less than 7° in the wider area. Based on this survey, and the screening responses presented in the initial BIA submission, it is accepted that the basement will not adversely impact the slope stability of the area.
- 4.12. 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 Construction Method Statement (CMS) that formed part of the original submission.
- 4.13. Section 7 of the Supplementary BIA comprises a ground movement assessment (GMA), which has been undertaken using PDisp to analyse vertical movements arising from the development in the short and long term. A component of vertical movement relating to the construction of the underpins has been included in the assessment. The GMA considers vertical movements affecting three critical sections; two relating to No. 47c and one for No. 49.
- 4.14. The ground movements calculated in the GMA have been used in a Damage Category Assessment (DCA) for the three critical sections, carried out using the method proposed by Burland and CIRIA C760. The assessment indicates damage to neighbouring properties will be a maximum of Category 0 (negligible).
- 4.15. Horizontal movements have not been included as part of the GMA or DCA, as the BIA considers them to be negligible due to the temporary propping to be used during underpin construction and the subsequent rigidity of the underpin itself. It is a requirement of LBC that a cautious or moderately conservative approach be adopted throughout the BIA. As such, the assumption of negligible horizontal movement is not considered appropriate. This notwithstanding, the DCA provides limiting values for horizontal movement, beyond which the damage category for the critical section would exceed the predicted Category 0 and fall within Category 1 (very slight).
- 4.16. Section 9 of the Supplementary 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; however, these have not been updated to reflect the findings of the revised GMA and DCA. Subsequent e-mail correspondence (presented in Appendix 3) confirms that the trigger level values will be updated to reflect the values in the revised BIA.
- 4.17. For the avoidance of doubt, prior to construction commencing trigger values should be agreed under the Party Wall Award, sufficient to control construction works to within the predicted limits. Its noted that generally the range of predicted movements are within the typical range anticipated

for a basement of this scale, depth and construction methodology. For critical section CS1, horizontal movements are required to be limited to approximately 3mm to maintain damage to within Category 0, which is lower than the generally anticipated movements for basement construction. In this case, trigger values should also be provided to ensure movements are limited such that a maximum of Category 1 damage is sustained.

- 4.18. Section 8.2 of the Supplementary BIA considers the impact to the adjacent highway and any utilities therein. Based on the ground movements predicted, a negligible impact is anticipated.

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. Additional site investigation has been undertaken to provide a suitable ground model and soil parameters for the site.
- 5.4. Based on the revised submission, it is accepted that the proposed development will not significantly impact the hydrogeology or slope stability of the surrounding area.
- 5.5. The construction methodology, structural scheme and temporary works proposed are presented, including sequencing and propping arrangements.
- 5.6. The GMA indicates Category 0 (negligible) damage will be sustained by neighbouring properties, in accordance with the Burland Scale. The GMA is generally accepted and it is considered feasible that works controlled in accordance with best practice will result in damage within the allowable maximum of Category 1 (very slight). The Supplementary BIA also confirms a negligible impact to the adjacent highway and utilities therein.
- 5.7. Monitoring of adjacent structures has been recommended. Prior to construction commencing, trigger values should be agreed under the Party Wall Award, sufficient to control construction works to within the predicted limits.
- 5.8. Based on the revised submission, the BIA is considered to meet the requirements of the 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	Additional intrusive investigations have been presented in the revised submission and used to appropriately assess the impact to groundwater flow.
Heath (with Eldred Geotechnics letter report)	47C Netherhall Gardens	20/01/2021	<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 (Whitstone 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>Additional groundwater levels have been taken and used in the supplementary BIA assessment. Mitigation measures for water ingress during construction are provided and the assessment on groundwater flow is considered sufficient to confirm a negligible impact.</p> <p>Topographic data is provided to better illustrate the slope of the site and immediate surrounding area. In the context of the proposed development the slope stability is considered to have been appropriately assessed.</p> <p>The supplementary BIA provides an updated assessment and indicates damage will not exceed Category 1 (Very Slight).</p>
Lawrence	47B Netherhall Gardens	18/05/2021	Concerned about the surcharge loading of the basement / lightwell retaining walls due to car movements in close proximity.	Design calculations indicate typical surcharges for car loads have been considered.

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.	Closed	June 2021
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.	Closed	June 2021
3	BIA Format	The submitted documents (BIA, SI Report, CMS, GMA etc) should be reviewed and updated such that assessments are consistently presented.	Closed	June 2021
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.	Closed	June 2021

Appendix 3: Supplementary Supporting Documents

E-mail correspondence



Re: 216_Re: 47d Netherhall Gardens revised BIA
submission
WILLIAM TOZER associates to: KatharineBarker
04/05/2021 16:15
Cc: camdenaudit, "Hazelton, Laura"

Dear Katharine

CET / CGL have no further comment on this, so we can confirm that the ground movement monitoring trigger values referred to in the CMS will be updated to reflect the values calculated in the latest BIA.

Kind regards

Tom

Tom Shelswell
senior associate

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shortlist **RIBA President's Award for Research**
finalist **Restaurant & Bar Design Awards**
finalist **Grand Designs Awards**
'a fantastic space' **The Times**
'its airy interior trump[s] all the others in London' **Monocle**
'inspiring use of light and reflection throughout' **Elle Decoration**
'unpretentious design' **Grand Designs**

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