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Basement Impact Assessment Audit

1 Templewood Avenue, London NW3 7UY

For
London Borough of Camden

Project No.
14006-23

Date
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APPENDICES

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 1 Templewood Avenue, London NW3 7UY (planning reference 2023/2134/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 Basement Impact Assessment (BIA) and Construction Method Statement (CMS) have been prepared by individuals who possess suitable qualifications.

1.5 Development proposals comprise the construction of a new 2-storey residential house with a partial basement. This site is located in part of the garden at 1 Templewood Avenue.

1.6 Localised ground water seepages maybe encountered within during basement foundation excavation. Groundwater seepages were identified in the Claygate Member. The BIA advises traditional sump pumping will likely be adequate although notes the chosen contractor must have a contingency plan in place.

1.7 It is accepted that the surrounding slopes to the development site are stable. The existing sloping driving way is to be removed to accommodate the development proposals.

1.8 It is accepted that the development will not impact on the wider hydrogeology of the area and will not increase the risk of flooding.

1.9 The CMS confirms the proposed basement will utilise a contiguous pile retaining wall with a reinforced concrete beam to provide support during excavation for the proposed new house. Additional temporary support is proposed during construction.

1.10 The GMA states that damage occurring to neighbouring properties will be within Category 0 – negligible of the Burland Scale. Email correspondence confirms GMA predictions follow the correct application of the software.

1.11 It can be confirmed that the BIA complies with the requirements of CPG: Basements.

2.0 INTRODUCTION

2.1 CampbellReith was instructed by London Borough of Camden (LBC) on 13th July 2023 to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 1 Templewood Avenue, London NW3 7UY (planning reference 2023/2134/P). The site is within the Redington Frognal Neighbourhood Area.

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

- Camden Local Plan 2017 - Policy A5 Basements.
- Camden Planning Guidance (CPG): Basements. January 2021.
- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.
- Redington Frognal Neighbourhood Plan
- 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.

2.4 LBC's Audit Instruction described the planning proposal as *"Demolish existing garage and erect a 2-storey house, including the erection of associated cycle storage and refuse enclosures, set behind the front boundary wall to be extended and to incorporate a new pedestrian entrance with a metal gate."*

2.5 The Audit Instructions indicates 1 Templewood Avenue does not involve, nor is a neighbour to, listed buildings.

2.6 CampbellReith accessed LBC's Planning Portal on 17th July 2023 and gained access to the following relevant documents for audit purposes:

- Construction Method Statement (CMS) by Conisbee Consulting Engineers, ref. 220779, Version 2 dated February 2023.
- Ground Investigation & Basement Impact Assessment (BIA) Report by Geotechnical and Environmental Associates, ref. J22354, rev 0, dated 13/02/2023 (presented as Appendix

D of the above). This document includes existing and proposed development plans in appendix a.

- Flood Risk Assessment and Surface Water Drainage Strategy by Conisbee Consulting Engineers, ref. 220779/A Prais, Version 2 dated May 2023.
- Arboricultural Impact Assessment by Elemental Consulting, ref: 220402_AIA, rev 2, dated May 2023.
- Land adjacent to 1 Templewood Avenue, Planning Statement by Montague Evans, dated May 2023.

2.7 Additional information submitted in response to queries raised during the initial audit consists of the following documents:

- Email correspondence from Montagu Evans providing outline calculations for the piled retaining wall and clarification regarding the Ground Movement Assessment (see Appendix 3).
- Combined Movements – Displacement plots for nearby structures (WITHOUT PDisp) by Geotechnical and Environmental Associates, ref. J22354, dated 18th September 2023.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	Section 1.3.2 of the BIA
Is data required by Cl.233 of the GSD presented?	Yes	
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	
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	Section 3.1.2 of the BIA
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3.1.1 of the BIA
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Section 3.1.3 of the BIA
Is a conceptual model presented?	Yes	

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4.0 of the BIA
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Is factual ground investigation data provided?	Yes	BIA Appendix B
Is monitoring data presented?	Yes	
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	The planning statement identifies 1a Templewood Avenue has a basement.
Is a geotechnical interpretation presented?	Yes	
Does the geotechnical interpretation include information on retaining wall design?	Yes	
Are reports on other investigations required by screening and scoping presented?	NA	
Are the baseline conditions described, based on the GSD?	Yes	

Item	Yes/No/NA	Comment
Do the base line conditions consider adjacent or nearby basements?	No	Depth of adjacent foundations at No. 3 is unknown
Is an Impact Assessment provided?	Yes	
Are estimates of ground movement and structural impact presented?	Yes	Section 10.0 of the BIA
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	Section 13.1 of BIA
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	The BIA outlines potential impacts and reasonable engineering mitigation in Section 13.0.
Has the need for monitoring during construction been considered?	Yes	Detailed monitoring strategy to be developed at a later stage (Section 12.0 of the BIA).
Have the residual (after mitigation) impacts been clearly identified?	Yes	
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	The GMA includes the plots of horizontal and vertical displacement vs distance from basement.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	As above

Item	Yes/No/NA	Comment
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	The GMA demonstrates any predicted damage to neighbouring properties is within acceptable limits.
Are non-technical summaries provided?	Yes	CMS page 3 and BIA page 1

4.0 DISCUSSION

4.1 The Basement Impact Assessment (BIA) has been carried out by engineering consultants Geotechnical & Environmental Associates (GEA) and the individuals concerned in its production have suitable qualifications.

4.2 The site is a rectangular shape plot measuring approximately 11m by 22m and is located within the eastern part of the garden of no. 1 Templewood Avenue. The site features a garage, wooden shed, remains of a small outbuilding, and is accessed via a sloping driveway off Templewood Avenue.

4.3 Development proposals comprise the construction of a new two-storey residential property with a green roof in the North-Eastern end of the garden. Due to the sloping nature of the site, the proposed lower-ground level is designed as a partial basement. The proposed ground level around the structure and upper tier garden will be approximately 102m OD. The lower ground floor will have a finished floor level of 99m OD.

4.4 Plans provided in the CMS indicate a contiguous piled wall will be used on 3 sides of the structure tied with a reinforced concrete beam. According to the Ground Movement Assessment, the contiguous piled wall and retaining structure will retain approximately 5m height of ground at its highest, i.e. the north-western part of the site.

4.5 A desk top study and site-specific intrusive ground investigation have been undertaken prior to the BIA. The ground conditions encountered agree with those anticipated. Made Ground was found between 0.2m and 0.9m below ground level (bgl), over the Claygate Member which extends to depths of between 4m and 5m bgl, underlain by the London Clay Formation to the maximum depth of investigation, c.25m bgl (75.5m OD). Groundwater was not encountered in any of the trial pits or window sample boreholes, although it was encountered at 6.5m depth in BH1. Subsequent monitoring visits record groundwater between 3.5m to 3.9m bgl (c.97m OD).

4.6 The site is within an area where slopes are generally less than 7°. However, the land stability screening assessment indicates the existing driveway slopes greater than 7°. It is a manmade slope with hardstanding cover and is bound by the existing retaining walls. The BIA states this driveway will be removed as part of the development.

4.7 There is a history of shrink-swell subsidence in the area due to the volume change potential of the Claygate Member and London Clay Formation cohesive soils. The BIA states any new foundations must be deepened in the zone of influence of nearby trees in accordance with NHBC guidelines.

4.8 Land stability screening indicates a number of trees are likely to be felled as part of the proposed development, although the majority of the existing trees around the site perimeter will be retained. The BIA states whilst shrinkable soils are present at shallow depth, there are no critical slope angles that are dependent on the existing trees to aid long-term stability. The BIA states the tree felling is not expected to have any impact on the proposed development or nearby buildings.

4.9 Geotechnical parameters to be adopted in the design, including retaining wall design have been presented and generally accepted.

4.10 The BIA states it is unlikely the proposed development will increase the foundation depths relative to the neighbouring properties because the proposed foundation level is similar to the ground floor level of the neighbouring 3 Templewood Avenue. The foundation depths of the neighbouring structures have not been proven.

4.11 A Ground Movement Assessment (GMA) was undertaken for the proposed lower ground floor and foundation scheme using XDisp and Pdisp software to predict ground movements due to proposed piling and excavation and to demonstrate damage to neighbouring properties and infrastructure is limited to Category 1 of the Burland Scale.

4.12 The approach reported in CIRIA C760 has been adopted and the software XDisp used to undertake the analysis. The 'installation of a contiguous bored pile wall' curve is used for the pile installation analysis, and 'excavations in front of a stiff wall in stiff clay' curve has been adopted for the subsequent excavation as the BIA confirms the embedded retaining wall will be propped in both temporary and permanent conditions.

4.13 A maximum excavation depth of 5m bgl has been assumed, while the embedded piled retaining wall depth is assumed to be 8.5m bgl. Section 8.1 of the BIA indicates the embedded retaining wall will be incorporated into permanent works and provide support for structural loads. Email correspondence following Query 1 provides outline calculations to confirm structural loadings do not exceed the overall bearing capacity of the contiguous pile wall. The email response justifies the pile length assumptions and confirms pile wall stability wall against overturning is adequate.

4.14 A Ground Movement Assessment (GMA) was undertaken for the proposed lower ground floor and foundation scheme using XDisp and Pdisp software to predict ground movements due to the proposed piling and excavation.

4.15 The email correspondence following Query 2 includes both the software input parameters and clarification as to how predicted movements have been combined to predict building damage. The BIA concludes that any damage to neighbouring properties (including boundary and garden walls) will be within Category 0 – negligible of the Burland Scale.

4.16 The GMA states the ground movement predictions should be checked by monitoring the adjacent properties and structures to ensure no excessive movements occur that would lead to damage. A detailed monitoring strategy will be developed at a later stage.

4.17 The site is within 5m of a highway and pedestrian right of way (Templewood Avenue), although the proposed structure is greater than 5m distance from this public footpath and road. No significant impact is anticipated on the infrastructure.

4.18 The site is located within the Redington Frognal Neighbourhood Plan area, known for localised rapid groundwater flow. The Redington Frognal Spring Line map by Arup indicates the site is located down gradient c.80m distance south of the spring line and is located within 100m of 2 former tributaries to the River Westbourne. The BIA indicates the nearby water features have been diverted to form part of the local surface water sewer system.

4.19 The hydrogeology screening indicates the Claygate Member is classified as a Secondary A Aquifer, and the London Clay Formation at depth is classified as an unproductive aquifer, although the Claygate Member aquifer is likely to have 'Unproductive Strata' characteristics The BIA suggests any localised perched water inflow can be dealt with through sump pumping although the contractor should make allowance for mitigation measures should this not be feasible. The BIA also recommends groundwater monitoring and/or trial excavations should be undertaken to further assess the groundwater inflow. Due to the limited extend of the development, its location and ground conditions, no significant impact on the wider hydrogeological environment is expected.

4.20 The CMS indicates the site is classed as being Flood Zone 1 and identified as a Critical Drainage Areas. The BIA surface flow and flooding screening assessment indicates there will be a slight increase in the hard surface area as part of the development. The FRA has been presented by Conisbee and states any additional surface water flow will be attenuated and discharged into the local sewer network therefore there will be no significant changes to the existing drainage routes. It is noted the drainage design will need to be validated by the local flood authority and public sewer owner to ensure the proposed development will not result in an increase of surface water flood risk in the area.

5.0 CONCLUSIONS

5.1 The BIA and CMS have been carried out by well-known firms of engineering consultants using individuals who possess suitable qualifications.

5.2 The BIA has confirmed that the proposed structure will comprise a partial basement with piled foundations extending into cohesive soils of the Claygate Member and London Clay Formation.

5.3 The existing driveway sloping c.10° is to be removed and it is accepted that the surrounding slopes to the development site are stable.

5.4 The BIA identifies no impacts to subterranean flows, and it is unlikely groundwater will be encountered during the excavation, although perched water within the Made Ground and Claygate Member must be accounted for. It notes traditional sump pumping should be adequate but that the contractor should prepare a contingency plan.

5.5 The BIA identifies no significant impacts to surface water although impermeable areas are increasing slightly. Surface water will be attenuated before it is discharged to the sewer network.

5.6 The BIA demonstrates the contiguous pile walls and retaining structure have been designed to maintain the stability of the surrounding ground. Temporary propping is proposed.

5.7 The BIA confirms the ground movement predictions and states that damage to neighbouring properties will be within Category 0 – negligible of the Burland Scale.

5.8 It can be confirmed that the BIA complies with the requirements of CPG: Basements.

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Appendix 1

Consultation Responses

None

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Appendix 2

Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Land stability	Outline calculations required to demonstrate stability of piled retaining wall.	Closed	25th August 2023
2	Land stability	GMA to be revised as per paragraphs 4.14 and 4.15.	Closed	28th September 2023

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Appendix 3

Supplementary Supporting Documents

E-mail dated 25/08/2023
E-mail dated 18/09/2023

----- Message from Gabriella Bexson <gabriella.bexson@montagu-evans.co.uk> on Fri, 25 Aug 2023 13:11:47 +0000 -----

To: Brendan Versluys <Brendan.Versluys@camden.gov.uk>

cc: Tim Miles <tim.miles@montagu-evans.co.uk>, Lauren Hawksworth <lauren.hawksworth@montagu-evans.co.uk>

Subject: RE: 2023/2134/P - 1 Templewood Avenue

Hi Brendan,

Thanks for confirming there are no other matters outstanding at this time. Please do let us know if you receive any further consultee comments.

Please find our response to the points raised within Section 5.0 of the BIA Audit from Campbell Reith set out below.

5.3 (see also comments in Section 4.13).

Whilst the comments provided in Section 8.1 of our report are intended for advice only, i.e., that a potential benefit of a bored pile wall would be its ability to be incorporated into the permanent works and have a load bearing function, it has been confirmed by Conisbee that the proposed contiguous wall on the upper part of the site will have a load bearing function. However, as the columns shown coming down onto the capping beam are only taking load from the external façade and roof, these loads are expected to be relatively light, with localised column loads of no more than 200 kN and a line load of 150 kN/m, and do not therefore exceed the overall capacity of the contiguous wall piles assumed for the purpose of the GMA, which from preliminary calculations (based on an embedment of 4.0 m and a factor of safety of 3) is expected to have a capacity of about 230 kN/m.

The higher loads within the structure will be supported on internal columns and bearing piles and should any higher-than-expected loads be applied to the columns along the proposed contiguous piles wall, then it is understood that this will be resolved by locally deepening specific piles below the individual column locations, which would not therefore impact on the overall behaviour of the wall.

With respect to stability, the required length for stability is likely to be much shorter than that needed to support the proposed loads, and as per the comments in Section 10.0, the analysis assumes a minimum embedment of 4 m, equivalent to 88% of the maximum retained height; which, as stability is likely to be achieved with an embedment of less than 50% to 60% of the retained height, is highly conservative and should not require any explicit check at this stage of the design process.

5.5 (see also comments in Section 4.14 and 4.15).

With respect to the comments made in 4.14, it is incorrect that X-Dips is able to predict all movements due to excavation, as it is not able to calculate any movements that result from loading or unloading of the soils, just those that occur behind a proposed retaining structure as a result of installation and deflection during excavation. For this analysis X-Disp has been used in the normal fashion to calculate the movements resulting from installation and excavation behind the proposed contiguous bored pile wall on the upper part of the site through the adoption of appropriate curves, as detailed in our report. However, it cannot by itself account for any additional movements that might occur on the lower part of the site, which is situated beyond the extent of the proposed piled wall and will be subject to a long-term increase in load as a result of the proposed development.

As per the comments in the final paragraph of Section 10.1.1, selected outputs from P-Disp have therefore been imported into the relevant X-Disp model(s) to account for these additional movements, which has been done in a manner that ensures there is no detraction from the potential movements

predicted by X-Dips for the areas behind the proposed piled wall. In the final assessment, inclusion of the P-Dips results adds 2 mm to 3 mm of settlement at the appropriate level on the lower part of the site, which would otherwise be missed if reliance were placed on X-Disp alone. The analysis therefore provides a more complete and conservative assessment of the likely impact on the specific structures immediately adjacent to this part of the site.

In short, the additional movements from P-Disp can be removed from the analysis, if required. However, this would only serve to produce a less conservative model and a more favourable outcome in the subsequent damage assessment.

We trust the above comments are acceptable and sufficient for your present requirements. However, please do not hesitate to contact us if you require any additional information or clarification of any of the above points.

Kind regards
Gabriella

Gabriella Bexson
Planner

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Katharine Barker

From: Gabriella Bexson <gabriella.bexson@montagu-evans.co.uk>
Sent: 18 September 2023 15:58
To: Brendan Versluys
Cc: Tim Miles; Lauren Hawksworth
Subject: RE: 2023/2134/P - 1 Templewood Avenue
Attachments: J22354 - Combined Movements - Displacement plots for nearby structures (WITHOUT PDisp).pdf; J22354 - Combined Movements - Displacement plots for nearby structures (WITH PDisp).pdf

Hi Brendan,

In response to Campbell Reith, please find attached displacement plots and an updated table of damage assessment results for each of the sensitive structure included in the analysis, demonstrating the difference between an assessment with and without the additional movements from P-Disp.

Structure	Elevation	Max tensile strain (%)		Change in tensile stain	Category*
		With imported P-Disp movements	Without imported P-Disp movements		
No 3 Templewood Avenue	Wall A	0.0050753	0.0050753	No change	Negligible (0)
	Wall B	0.0013931	0.0013931	No Change	Negligible (0)
	Wall C	0.025103	0.025103	No Change	Negligible (0)
	Wall D	0.021461	0.021461	No Change	Negligible (0)
	Wall E	35.76E-9	35.76E-9	No Change	Negligible (0)
	Wall F	0.018793	0.018793	No Change	Negligible (0)
Boundary Wall	Wall a	0.024343	0.024343	No Change	Negligible (0)
	Wall b	0.037938	0.037938	No Change	Negligible (0)
	Wall c	35.76E-9	35.76E-9	No Change	Negligible (0)
	Wall d	0.034127	0.032052	Reduces	Negligible (0)
	Wall e	0.0023445	0.0054134	Increases	Negligible (0)
Garden Wall	Rear	0.037086	0.037086	No Change	Negligible (0)
	Front (No 1)	0.0077254	0.0019761	Reduces	Negligible (0)
	Front (No 3)	0.010827	0.0018865	Reduces	Negligible (0)
Templewood Avenue	Kerbline	559.65E-6	362.24E-6	Reduces	Negligible (0)

In general, the results for the structures adjacent to the upper part of the site, which will be affected by the proposed piling, remain unchanged. However, for those structures adjacent to the southern part of the site, i.e., beyond the extent of the proposed piling and where movements due to changes in loading will be more critical, the removal of the P-Disp results leads to a reduction in movement and a corresponding reduction in tensile strain. The only exception to this is the section of boundary wall (Boundary Wall – Wall e) where there is some overlap between the two models, which leads to a small increase in tensile strain due to a change in movements. However, this does not result in any change in the damage classification, nor does it impact on the overall conclusion that inclusion of the P-Disp results produces a more conservative model that is more appropriate for this assessment of the site.

I trust this now satisfies Campbell Reith's queries.

Regards

Gabriella

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