CampbellReith
consulting engineers

46 Agamemnon Road, NW6 1EN

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 13398-78
Revision: F1

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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 46 Agamemnon Road, NW6 1EN (planning reference 2020/3897/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) has been carried out by Gabriel GeoConsulting Limited and the individuals concerned in its production have suitable qualifications.

1.5. The proposed basement consists of construction of a single storey basement using underpinning founded beneath the entire footprint of the building, inclusive of a front lightwell.

1.6. A ground investigation and an interpretation of soil parameters are included in the BIA. Groundwater monitoring has to be undertaken during summer months.

1.7. The hydrogeology screening establishes that the site is beyond the zone of influence of surface water features, water courses and spring lines. It is also accepted that the proposal will not result in a change in the proportion of hard surfaced/ paved area. Further clarification was sought on the impact the development may have on subterranean flows. Satisfactory explanation was provided to support the conclusion that there are no adverse impacts to the local and wider hydrogeology. This is discussed in Section 4.

1.8. The hydrology screening identifies the site to be beyond the catchment of the pond chains on Hampstead Heath. There is a 'Low' to 'Medium' risk of flooding from surface water in the southern (downslope) part of the carriageway to Agamemnon Road. A flood risk assessment is included with the BIA and it is accepted there are no adverse impacts to surface water.

1.9. The land stability screening establishes that the only potential impacts to stability are that the basement excavation is within 5m of a highway and that the proposal will increase the differential depth of foundations.

1.10. A ground movement assessment has been undertaken. The damage category assessment concludes that damage to neighbouring properties arising out of the proposal can be limited to Category 1 impact (on Burland Scale).

1.11. Proposals are provided for a movement monitoring strategy during excavation and construction.

1.12. The BIA complies with the requirements of CPG: Basements.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 19th January 2021 to carry out a Category B audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 46 Agamemnon Road, NW6 1EN.

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.

2.4. The BIA should demonstrate that schemes:

a) maintain the structural stability of the building and neighbouring properties;

b) avoid adversely affecting drainage and run off or causing other damage to the water environment;

c) avoid cumulative impacts upon structural stability or the water environment in the local area;

and evaluate the impacts of the proposed basement considering the issues of hydrology, hydrogeology and land stability via the process described by the GSD and to make recommendations for the detailed design.

2.5. LBC's Audit Instruction described the planning proposal as "Erection of a basement level extension and the formation of a front lightwell".

2.6. CampbellReith accessed LBC's Planning Portal on 8th February 2021 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment Report (Reference: GGC20807/R1.1) dated July 2020, by GabrielGeo Consulting;
- Design and Access Statement dated July 2020, by Dkdesign Ltd;
- Planning Application Drawings consisting of

Existing Plans, Section and Elevation: Dwg Reference Ro.01.101;

Proposed Plans, Section and Elevation: Dwg Reference Ro.01.201.

- Planning Consultation Responses.

2.7. The following additional information was forwarded to CampbellReith on 18th March 2021 via email by Gabriel Geoconsulting Ltd;

- Addendum to Basement Impact Assessment by Gabriel Geoconsulting Ltd (Reference: GGC20807/r1.1/Add), dated March 2021.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	Section 1.2 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	
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Is a conceptual model presented?	Yes	Section 10.1 of BIA.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA notes the possible need for mitigation measures and contains a description of same.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Is factual ground investigation data provided?	Yes	
Is monitoring data presented?	Yes	Section 9.7 of BIA.
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	Except for No.48 to the north, all other properties are understood to have a single storey cellar.
Is a geotechnical interpretation presented?	Yes	Section 10.4.11 to 10.4.12 and 10.5.6 of BIA
Does the geotechnical interpretation include information on retaining wall design?	Yes	
Are reports on other investigations required by screening and scoping presented?	Yes	Ground Investigation Report.
Are the baseline conditions described, based on the GSD?	No	Range of seasonal fluctuation of groundwater levels not presented. Conservative assumptions made for design.
Do the base line conditions consider adjacent or nearby basements?	Yes	
Is an Impact Assessment provided?	Yes	

Item	Yes/No/NA	Comment
Are estimates of ground movement and structural impact presented?	Yes	
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	BIA addendum notes that mitigation measures for hydrogeology related impacts will be implemented if the need for such requirements arises during excavation and construction.
Has the need for monitoring during construction been considered?	Yes	Section 10.7.4 of 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	
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	
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been carried out by Gabriel GeoConsulting Limited and the individuals concerned in its production have suitable qualifications.

4.2. The existing three storey terraced house has a single storey cellar (c. 1.30m bgl) beneath the southern quarter of the building footprint. The proposed basement consists of a single storey basement construction founded at 3.20m bgl beneath the entire footprint of the building, inclusive of a front lightwell extending 2.10m from the front wall founded at c.2.98m bgl.

4.3. The proposal also includes the removal of a temporary pad foundation underneath the building footprint and located centrally along the boundary of the cellar wall. It is stated in the BIA that the pad along with a beam and column arrangement, currently supports the party walls, but that the beam has been designed to allow the temporary pad foundation to be removed.

4.4. The new basement construction shall be facilitated by underpinning the party walls using a hit and miss sequence, with panels not exceeding 1m in width. The front lightwell and the rear wall of the basement will have a similar construction sequence (with 0.9m wide panels), however the walls will be acting as cantilever retaining walls.

4.5. Based on the exploratory holes, the geology on site is Made Ground to a depth of 0.55m bgl below which lies weathered London Clay to 7.30m bgl, although the BIA author notes that the presence of occasional gravel suggests the upper layers could comprise Head Deposits. Unweathered London Clay is present below 7.30m bgl. The highest standing groundwater was recorded at 2.57m bgl based on two rounds of monitoring in May 2020 and June 2020. Interpretation of soil parameters is included in the BIA, and accepted.

4.6. The hydrogeology screening establishes that the site is not within 100m of a watercourse and that it is beyond the zone of influence of surface water features and spring lines. It is also accepted that the proposal will not result in a change in the proportion of hard surfaced/paved area.

4.7. Due to local concerns about groundwater flooding, the BIA determined that around twenty-four groundwater flooding incidents have been reported in the entire borough, the closest of which was around 60m to the west of the site, on the south side of Gondar Gardens. It is stated in the BIA that, bearing in mind the absence of an aquifer, the incident probably involved the percolation of surface water through more permeable upper layers (such as Made Ground and backfill to services trenches) rather than groundwater. The low permeability of the underlying clays prevented the water from dissipating quickly.

4.8. The BIA acknowledges the limited groundwater monitoring and that groundwater levels maybe shallower in winter months. Further details of proposed measures to mitigate any hydrogeological impacts due to development was requested in the previous audit report (D1). It is understood from the BIA and the BIA addendum that if significant groundwater is encountered during excavation and construction of the basement, then a suitable bypass would be installed on site. Outline details of the bypass is provided in Section 3.3 of the BIA addendum (Appendix 3). The mitigation measure is accepted.

4.9. The hydrology screening identifies the site to be beyond the catchment of the pond chains on Hampstead Heath and confirms that the extent impermeable areas are not changing. The BIA identifies that Agamemnon Road flooded in 2002.

4.10. Based on the Environment Agency modelling, the BIA notes that there is a 'Low' to 'Medium' risk of flooding from surface water in the southern (downslope) part of the Agamemnon Road carriageway. This supports the likelihood that the 2002 flood affected only the lowest part of the road.

4.11. The land stability screening establishes that the site does not include slopes greater than 7 degrees. Although there is a history of subsidence in the area related to seasonal shrink/swell, the works are not within the zone of influence of trees. The site is not within the exclusion zone of tunnels or railway lines. The site is within 5m of a highway and the proposal will increase the differential depth of foundations.

4.12. Structural engineering information is presented in a Basement Impact Statement. An indicative design of the cantilever retaining wall proposed as the rear wall of the basement and front wall of lightwell is provided and the assumptions are acceptable. A construction methodology with sequencing and temporary works is also presented. If there is a potential need for a groundwater bypass, this should be included in the construction methodology.

4.13. A ground movement assessment has been undertaken which concludes that damage to neighbouring properties may be limited to Category 1 impact (on Burland Scale), the greatest impact being on the party wall to No. 46. It is noted that Δ is estimated perpendicular to the chord of the settlement curve rather than vertically as described by Burland, however it is accepted that this does not alter the damage classification.

4.14. Although the above assessment does not explicitly include consideration of the impact on the highway, which is within 5m of the proposed excavation, it is accepted that ground movements at the edge of the property are small.

4.15. Proposals are provided for a movement monitoring strategy during excavation and construction.

4.16. A preliminary outline construction sequence is available and is accepted.

5.0 CONCLUSIONS

5.1. The BIA has been prepared by GabrielGeo Consulting using individuals who possess suitable qualifications.

5.2. The proposed basement will be founded within weathered London Clay.

5.3. The basement will be constructed using underpinning technique.

5.4. Further clarification as to the impact of the basement proposals on subterranean flows was requested to confirm that the proposal will not impact local hydrogeology. A satisfactory explanation was provided on 18th March 2021.

5.5. It is accepted that the development will not impact on the land stability and hydrogeology of the local and wider area.

5.6. A GMA, inclusive of damage assessment, indicating damage to neighbouring properties no worse than Category 1 on the Burland Scale is presented.

5.7. A flood risk assessment is included within BIA. It is accepted that the basement will not adversely affect surface water.

5.8. The outline design of retaining wall, along with construction methodology and sequence for underpinning is presented. A movement monitoring strategy during excavation and construction is provided.

5.9. The BIA complies with the requirements of CPG: Basements.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Russell, Lorna (Councillor)	-	27.11.20	Subsidence, damage to neighbouring properties, flooding issues.	Subsidence and damage addressed in BIA. Further information was requested in respect mitigation measures to prevent hydrogeological impact. Clarification was provided and is accepted.
Sunderland, Clare	-	05.11.20	Seasonal movements, flooding issues.	Seasonal movements are independent of basement construction. Further information was requested in respect mitigation measures to prevent hydrogeological impact. Clarification was provided and is accepted.
Coles, Peter	-	05.11.20	Shrink and Swell cracks, flooding.	Further information was requested in respect mitigation measures to prevent hydrogeological impact. Clarification was provided and is accepted.
Maher, David	-	20.11.20	Flooding and groundwater issues.	Further information was requested in respect mitigation measures to prevent hydrogeological impact. Clarification was provided and is accepted.
CRASH (Combined Residents' Association of South Hampstead)	-	20.11.20	Flooding.	Further information was requested in respect mitigation measures to prevent hydrogeological impact. Clarification was provided and is accepted.
FortuneGreen and West Hampstead NDF	-	27.11.20	Structural integrity of neighbouring terrace.	Subsidence and damage addressed in BIA
Back, Natasha	-	-	Ground Movement Impact on neighbouring properties.	Subsidence and damage addressed in BIA
Henry, Jill	-	-	Ground Movement Impact on neighbouring properties.	Subsidence and damage addressed in BIA

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Subterranean flows	Clarification required in respect impact on subterranean flows. Further information required on possible mitigation measures.	Closed	30.03.21

Appendix 3: Supplementary Supporting Documents

Addendum to Basement Impact Assessment (Reference GGC20807/R1.1/Add) by Gabriel Geo Consulting Ltd, dated March 2021

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Our Ref: GGC20807/R1.1/Add

18th March 2021

Addendum to Basement Impact Assessment

(Planning reference 2020/3897/P)

46 Agamemnon Road, London, NW6 1EN

1. Background

1.1 London Borough of Camden (LBC) appointed Campbell Reith LLP to audit our Basement Impact Assessment (BIA) report on the proposed basement at No.46 Agamemnon Road, NW6 1EN (Ref: GGC20807/R1.1, dated 29th July 2020). This addendum to our BIA responds to the requirement in Campbell Reith's audit report (Ref: RNemb13398-78-150221-46 Agamemnon Road_D1, dated 15/02/2021) for "*Clarification required in respect impact on subterranean flows. Further information required on possible mitigation measures*".

1.2 Paragraphs 4.7 and 4.8 Campbell Reith's audit report provide further details of the background to the required clarification, including noting that the period of groundwater monitoring was of limited duration.

2. Groundwater Regime and Monitoring

2.1 The site is underlain by London Clay, the upper part of which might have been reworked as a Head deposit (based on the presence of slightly gravelly CLAY at 2.70-3.05m). Only 0.4m of Made Ground was found beneath the front garden, while the Made Ground beneath the small cellar contained abundant brick and concrete fragments "where the lower part could be London Clay which has been disturbed in-situ" (BIA, paragraph 10.1.1). The existing footings are therefore expected already to block seepage through the thin layer of Made Ground. Typically, minimal seepage occurs through most London Clay and the associated Head deposits because of their high plasticity. If there had been any significant seepage through the strata intersected by borehole BH1 then we would have expected the groundwater level in the standpipe to rise close to surface; that did not happen during the 2.5 month monitoring period.

2.2 Owing to the presence of high plasticity clays beneath the site the BIA recommends "*use of a design groundwater level at ground level is recommended for the whole basement, for both short-term and long-term situations (in accordance with Eurocode 7, BS EN 1997-1)*" (paragraph 10.2.8). Further monitoring will not alter this 'worst case' recommendation, so no benefit would be obtained from further groundwater monitoring.

Continued…

3. Groundwater Seepage Mitigation Measures

3.1 As the existing footings are already likely to block any seepage through the Made Ground, no mitigation measures are required in that respect. Similarly, most seepage through backfill to service trenches (if any) is likely to follow the service routes down Agamemnon Road (water follows the path of least resistance) so once again no mitigation is anticipated in that respect other than being prepared to remove any minor local entries by sump pumping (BIA paragraph 10.3.1).

3.2 The unlikely need for a groundwater bypass only applies when the basement would "*completely obstruct, a local deposit of more permeable soils containing mobile groundwater which has remained undetected within the London Clay (or Head deposits), of sufficient thickness and extent to permit significant flow*" (BIA paragraph 10.2.7). So this applies only to very local channel fill deposits or relatively substantial sand lenses; it is not intended to apply to widespread diffuse flow or minor seepage in thin partings of silt or fine sand. (We have included a paragraph on this unlikely though possible requirement in most/all BIAs since 2012, where the proposed excavations pass through any significant thickness of London Clay; we have not been notified of the need for such a bypass in more than 200 basement projects that we have reported on since 2012).

3.3 The bypass would comprise a collector zone on the upstream side of the basement, an intact pipe passing beneath the basement slab (surrounded in concrete for protection) and a discharge zone on the downstream side of the basement. The collector and discharge zones could comprise either geosynthetic composite drainage materials or perforated pipes wrapped in non-woven geotextile. We did prepare detail drawings of suitable collector and discharge zones for one project back in 2012. They have to be dimensioned and located to suit the specific feature found in the excavations so it is not feasible to prepare such drawings in advance of excavating the basement.

- END -

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