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23 West Heath Road, London, NW3 7UU

Basement Impact Assessment Audit

For

London Borough of Camden

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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 23 West Heath Road, London, NW3 7UU (planning reference 2018/0853/P and 2018/1114/L). The basement is considered to fall within Category C 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 and the Structural Engineering Method Statement have been carried out by well established firms of engineering consultants using individuals who possess suitable qualifications.

1.5. The basement proposal involves Grade II listed building namely Sarum Chase and it sits within the Redington and Frognal Conservation Area.

1.6. An appropriate site specific SI has been carried out.

1.7. The proposed basement will be founded partly within Bagshot Formation and Claygate Member.

1.8. It is accepted that the excavation level is unlikely to be below groundwater level or impact on groundwater flows.

1.9. The proposed development consists of the excavation of a new basement beneath the entire footprint of the existing garage located at the eastern side of the property, under a part of the main Sarum Chase house and a subterranean extension beneath the rear with a new light-well.

1.10. An appropriate construction methodology has been proposed which indicates the basement is to be constructed in accordance with good practise construction principles using common techniques.

1.11. Category 1 damage is predicted to the neighbouring properties and Serum Chase, which is within the limits of the maximum permitted category allowed by LBC.

1.12. The Ground Movement Monitoring has been recommended to the surrounding properties during construction with set limits to the vertical and horizontal movements.

1.13. A Construction Management Plan (CMP) has been provided.

1.14. It is accepted that the impermeable area is not changing.

1.15. It is accepted that nearby rail assets are outside of the zone of influence of the proposed site.

1.16. It is accepted that the surrounding slopes to the development site are stable.

1.17. It is accepted that the development will not impact on the wider hydrogeology of the area and is not in an area subject to flooding.

1.18. Outline structural calculations for the basement retaining walls are required.

1.19. A number of queries for additional information are listed in appendix 2.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 18/04/2018 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 23 West Heath Road, London, NW3 7UU.

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 Basements: Basements and Lightwells.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water.
- Local Plan 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;

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 *"Excavation of a new basement beneath the existing garage/plant rooms in order to provide additional ancillary staff quarters and utility space; and partial excavation beneath the main house in order to provide access. With a subterranean extension beneath the rear garden in order to create a games room, with installation of a light-well with metal grille to the rear."*

The Audit Instruction also confirmed 23 West Heath Road involved listed buildings.

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

- Design & Access Statement
- JCH000056 Sarum Chase, Heritage Statement CgMs
- 191-000 Block Plan
- 191-001 OS Location Plan
- 191-011-Existing Plans
- 191-021-Existing Elevations
- 191-031-Existing Section AA & BB
- 191-032-Existing Section CC & DD
- 191-101-Proposed Basement
- 191-102-Proposed Lower Ground Floor
- 191-103-Proposed Raised Ground Floor
- 191-201-Proposed Elevations
- 191-301-Proposed Section AA & BB
- 191-302-Proposed Section CC & DD
- TGC_SCH_AIA_01 Arboricultural Impact Assessment Report
- Sarum Chase_CMS
- CMS APPENDIX A 171026 760-SK-S-008TO 017 - STRUCTURAL SCHEME
- CMS APPENDIX B 3849 - J16233 - Ground Investigation, Basement Impact Assessment & Ground Movement Assessment Report

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?	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	
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	

Item	Yes/No/NA	Comment
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	No	No potential issues to be assessed.
Is factual ground investigation data provided?	Yes	
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	
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?		
Are the 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	
Are estimates of ground movement and structural impact presented?	Yes	
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	

Item	Yes/No/NA	Comment
Has the need for monitoring during construction been considered?	Yes	
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	Mitigation measures reduced Damage Category 2 to 1 by introducing props during excavation.
Are non-technical summaries provided?	Yes	

4.0 DISCUSSION

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

4.2. The Structural Engineering Method Statement has similarly been carried out by an established firm of engineering consultants, Engenuity. The author and reviewer are both chartered structural engineers.

4.3. The LBC Instruction to proceed with the audit identified that the basement proposal involves Grade II listed building namely Sarum Chase. It sits within the Redington and Frognal Conservation Area.

4.4. The BIA submissions include land Stability, Hydrogeology and Hydrology screening and scoping, relevant site investigations and impact assessment as defined and required in the LBC `Camden Planning Guidance Basements`.

4.5. The ground is sloping across the site, with a ground level of approximately 115.2m AOD at the rear of the property, and 111.1m AOD at the front.

4.6. The proposed development consists of the excavation of a new basement beneath the entire footprint of the existing garage to the depth of 3.0m to 4.0m bgl located at the eastern side of the property, and under a part of the main Sarum Chase house. A subterranean extension beneath the rear garden is also proposed to the depth of 5.0m bgl at the southern side of the property with a new light-well.

4.7. A site specific ground investigation was conducted by GEA in November 2016 and consists of two single cable percussion bore holes to the depth of 15 and 18m bgl, a single drive-in window sampler borehole to the depth of 5m, and three hand excavated trial pits to a maximum depth of 1.1m.

4.8. To the rear of the property the investigation has encountered 300mm of soft landscaping, then 2.5m (112.73 m OD) thick layer of Made Ground of orange-brown fine sand with clay partitions, overlaying 3.5m thick layer of dense orange-brown medium to fine grained sand with partings of greyish orange-brown clay indicating the Bagshot Formation. Variable Claygate Formation has been identified underneath and up to the depth of the borehole at 15.0 m (100.23 m OD). The 400mm thick layer of cobbled driveway and concrete screed to the front of the property is located directly over Bagshot Formation overlaying Claygate Formation to the depth of the bore hole at 18m (93.72m OD).

4.9. Groundwater was encountered at 13.0 m bgl (98.72 m OD) during drilling in Borehole No 1 to the front of the property. Three monitoring standpipes were installed on the 5th December 2016, to depths of between 5.10 m and 6.35 m and one return monitoring has been carried out over

the winter period. The return visit on the 19th December 2016 has found them to be dry. The report suggests that groundwater will not be encountered within the basement excavations, however despite this it is suggested the contractor needs to ensure he has an adequate strategy to deal with ground water should it be identified during construction.

4.10. Considering the ground condition, the formation level of the proposed rear basement is within the Bagshot Formation, whilst formation level of the basement beneath the eastern part of the house is within the Claygate Member.

4.11. CFA piled secant retaining walls with a capping beam is proposed to form three sides of the rear garden basement games room with the existing property forming the fourth side. Lining wall to the inner face of the basement is proposed with 450mm thick slab on heave protection is proposed with 450mm thick RC slab over the basement. Approx. 1m thick layer of soil is proposed to cover the box. The basement walls under the existing garage are proposed to be formed by series of 1.5m wide underpinning sections and similar slab construction at the base to the rest of the extension.

4.12. The Construction Management Statement (CMS) proposes sequential works to the basement construction taking into account propping works to the rear garden secant piled wall excavation. Slab supports and propping is proposed throughout all the process of underpinning of the existing garage foundation.

4.13. The interpretive report has shown net allowable bearing pressure of 150 kN/m2 in the medium dense silty sand of the Bagshot Formation and 125kN/m2 in the variable clay, silt and sands of the Claygate Member. In order to mitigate the effects of differential settlement it is recommended that suitable reinforcement is installed.

4.14. A site walkover survey confirmed there are no existing basements to the neighbouring properties.

4.15. A Ground Movement Analysis has been carried out by GEA which follows the method as described in CIRIA 760 for vertical and horizontal ground movements. The predicted movement have been calculated due to excavation and construction of the basement, with an estimated damage category to all internal and external walls to Sarum Chase and neighbouring properties (21A and 21B West Heath Road) be in general no higher than Category 1 ("very slight") and 0 ("very slight") on the Burland Scale. One wall to Sarum Chase is shown to be resulting in Category 2 ("slight") damage, and further assessment has shown that if total vertical movements can be restricted to 13 mm behind the piled wall then the unacceptable damage category is reduced to 1 (Very Slight). It is accepted that movements can likely be restricted given good workmanship and suitably applied designed temporary works, given the employment of a suitably experienced basement contractor. Whilst the CIRIA approach is

intended for embedded retaining walls, we accept that the predicted ground movements are within the range typically anticipated for underpinning techniques carried out with good control of workmanship.

4.16. The Ground Movement Monitoring during construction has been recommended to the Sarum Chase house and to the surrounding properties to ensure the predicted movements restricted to 13 mm (Vertical) and 6 mm (horizontal) are aligned with the analysis and that the propping scheme is working effectively.

4.17. The development is proposed beneath the existing garage at the eastern side of the property and the rear garden extension will be covered with 1m of soil to allow for natural filtration of water over the basement soffit slab. It is therefore accepted that the impact on surface water drainage is likely to be minimal.

4.18. Outline structural calculations for the basement retaining walls have not been provided. These should be submitted to demonstrate the feasibility of the proposed basement structure.

4.19. A Construction Management Plan (CMP) has been provided with an outline works construction programme covering key phases of work.

4.20. The proposed basement construction is not adjacent to any public highway and there are no London Underground or Network Rail Tunnels within 250 m of the site.

4.21. A hillside setting ranging from 7° to 10° has been observed to the south of the site, however it is accepted that the development will not affect the slope stability.

4.22. The site is located within 50 m of the catchment area of the Golders Hill Pond and the site is underlain by Bagshot Formation sands considered as a Secondary 'A' Aquifer, however it is accepted that the proposed development will not have any effect on groundwater flow and is not in an area prone to flooding.

4.23. Given the above it cannot be confirmed that the proposal confirms to the requirements of CPG4. A number of queries have been summarised in appendix 2.

5.0 CONCLUSIONS

5.1. The BIA and the Structural Engineering Method Statement have been carried out by well established firms of engineering consultants using individuals who possess suitable qualifications.

5.2. The basement proposal involves Grade II listed building namely Sarum Chase and it sits within the Redington and Frognal Conservation Area.

5.3. The BIA submissions include land Stability, Hydrogeology and Hydrology screening and scoping, relevant site investigations and impact assessment as defined and required in the LBC Planning Guidance document 'Basement and Lightwells (CPG4).

5.4. An appropriate site specific SI has been carried out consisting of three boreholes and three trial pits.

5.5. The proposed development consists of the excavation of a new basement beneath the entire footprint of the existing garage located at the eastern side of the property, under a part of the main Sarum Chase house and a subterranean extension beneath the rear with a new light-well.

5.6. The site investigation has identified a moderate depth of Made Ground overlaying shallow depth of Bagshot Formation and variable layer of Claygate Formation to be the lowest strata. The proposed basement therefore will be founded partly within Bagshot Formation and Claygate Member. An appropriate reinforcement will be installed to mitigate effects of differential settlement.

5.7. Groundwater was encountered at the depth of the bore hole No. 1 to the front of the property and the return monitoring of three standpipes has confirmed them to be dry. The findings suggest that groundwater will not be encountered within the basement excavations, however it is suggested the contractor needs to ensure he has an adequate strategy to deal with ground water should it be identified during construction.

5.8. Secant piled retaining walls is proposed to form three sides for the subterranean basement attached to the existing property with linning wall, capping beam and RC slab at the top and bottom of the box. The basement under the garage is proposed to be built in the sequence of underpinning to the existing garage foundations with ground bearing blab.

5.9. System of propping has been proposed during the underpinning works to the garage and to the excavation of the secant piled wall of the rear garden.

5.10. Heave protection is proposed by way of compressible material beneath the basement slab.

5.11. 4.1m level difference between front and back of the property has been noted and the hillside setting is ranging between 7 and 10^0, however it is accepted that the development will not impact on the stability of the hillside and the surrounding slopes to the development site are stable.

5.12. It is stated that the impermeable area is not changing. It is accepted that the impact on surface water drainage is likely to be minimal, as the development on the eastern side of the property is within the footprints of the existing garage and the back garden basement will be covered with 1m of soil, which will allow for natural filtration of water over the basement soffit slab.

5.13. The predicted movement have been calculated due to excavation and construction of the basement, with an estimated damage category to the Sarum Chase and neighbouring properties be no higher than Category 1 ('very slight') and 0 ("very slight") on the Burland Scale. Adequate propping to the retining wall and vertical movement monitoring has been proposed to limit damage Category from 2 ("slight") to 1 for one of the Serum Chase walls. This mitigation method is acceptable, however good level of workmanship and adequate temporary propping needs to be ensured for this proposal.

5.14. The Ground Movement Monitoring has been recommended to the surrounding properties during construction with set limits to the vertical and horizontal movements.

5.15. It is accepted that nearby rail assets are outside of the zone of influence of the proposed site.

5.16. A Construction Management Plan (CMP) has been provided with an outline works construction programme covering key phases of work.

5.17. The site is located within 50 m of the catchment area of the Golders Hill Pond, however it is accepted that the development will not impact on the wider hydrogeology of the area and is not in an area subject to flooding.

5.18. Outline structural calculations for the basement retaining walls are required.

5.19. Given the above it cannot be confirmed that the proposal confirms to the requirements of CPG4. A number of queries have been summarised in appendix 2.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Not available	21,21A,21B West Heath Road	unspecified	Stability of excavations, damage to neighbouring property due to excavation.	A Ground Movement Analysis (GMA) has been carried out for neighbouring properties and the estimated damage category is estimated to be no higher than Category 1 ('very slight') on the Burland Scale. Also a construction monitoring scheme is proposed to be carried out throughout the construction stage to demonstrate that movements are within those predicted in the GMA.

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Stability	Outline structural calculations for retaining walls to be submitted to demonstrate feasibility of the proposed structure.	Open	
2	Stability	The applicants own property is to be monitored in accordance with the movement monitoring strategy during the basement construction works, given the listed status of the property.	To be applied as a planning condition	N/A

Appendix 3: Supplementary Supporting Documents

None

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