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317 Finchley Road
London NW3 6EP

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12336-73
Rev: D1

July 2016

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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 317 Finchley Road (planning reference 2016/2910/P). 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 review it against an agreed audit check list.

1.4. The BIA has been prepared and revised by personnel who have suitable qualifications.

1.5. Following demolition of the existing building, the proposal deepens, and extends to the rear, its existing basement from 2.85m to 7.50m below Finchley Road. The site is bounded by Finchley & Frognal Overground railway station, Finchley Road, and the residential buildings adjacent to Billy Fury Way.

1.6. The ground investigations have identified that the site has varying depth of Made Ground overlying the London Clay to depth. Perched water was encountered within the Made Ground which will be removed during excavation.

1.7. It is proposed to install a secant bored pile retaining wall with the softer female piles terminated at just below basement level. An indicative temporary works propping solution is requested to validate ground movement analysis assumptions.

1.8. The proposals recognise that uplift forces due to heave and groundwater flotation effects will occur and proposes suitable mitigation measures.

1.9. Increases in areas of hard landscaping and roofs have been mitigated by the introduction of an attenuation storage tank and roof terrace container gardens to increase the rainfall interception storage compatibility.

1.10. The Drainage Strategy Report proposes an acceptable solution to restrict the surface water discharge from site to 5l/s which is a betterment of 50% from the existing situation.

1.11. Thames Water consultee comments requesting a condition be imposed upon the application, if successful, have been investigated with the BIA author who has confirmed his belief that Thames Water have not taken account of a Drainage Strategy Report contained in the BIA. An updated response from Thames Water has been requested via the applicant.

1.12. It is accepted that the surrounding slopes to the development are stable, that no known ponds, wells or aquifers are in close proximity and that the site is outside the Hampstead pond chain catchment area. The site is identified as being in Flood Zone 1 and it is accepted to be at low risk from surface water flooding.

1.13. A ground movement assessment has been undertaken using Oasys Frew, however, there are a number of queries on the analysis and these are summarised below:

- Confirmation is requested on whether the approach used in predicting movements behind the wall is appropriate
- The neighbouring property foundations are indicated to be at a depth of 4.50m bgl and clarification is requested on how these were determined
- Movements due to pile installation do not appear to be considered and it is requested the GMA is revised to account for this.

1.14. Movement monitoring is proposed, however, no details are given. It is understood a monitoring scheme is being agreed with Network Rail. Details of the monitoring and trigger values for the neighbouring residential properties are subject to agreement at the Party Wall award stage.

1.15. Queries and requests for further information are discussed in Section 4 and summarised in Appendix 2.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 14 June 2016 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 317 Finchley Road, Camden Reference 2016/2910/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) 4: Basements and Lightwells.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water

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.

2.5. LBC's Audit Instruction described the planning proposal as the *"Erection of a part 7 part 10 storey (above basement and low ground floor levels) building comprising 22 flats (Class C3) (4 x1 bed, 17 x 2 bed, 1 x 3 bed) and a flexible commercial unit (Use Classes A1/A2/A3) to the ground and lower ground floors, associated public realm improvements including a new footpath to the north of the site, landscaping and associated works, following demolition of existing public house, retail unit and associated structures."*

and confirmed that the basement proposals did not involve a listed building, nor did the site neighbour any listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 6 July 2016 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment Report (BIA) dated May 2016 by Webb Yates
- Construction Management Plan (CMP) dated May 2016 by Walter Lilly
- Architects Drawings:

  Drawing no. 240-101B - Existing Ground Flood Plan

  Drawing no. 240-400G – Proposed Basement Plan

  Drawing no. 240-401G – Proposed Lower Ground Floor Plan

  Drawing no. 240-402G – Proposed Ground Floor Plan

  Drawing no. 240-500G – Proposed Section A

  Drawing no. 240-501G – Proposed Section B

  By Amin Taha Architects Ltd

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	BIA Section 3.
Is data required by Cl.233 of the GSD presented?	Yes	BIA.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	BIA Section 5.
Are suitable plan/maps included?	Yes	BIA Appendices.
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	BIA Appendix B2.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Appendix B1.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Section B3.
Is a conceptual model presented?	Yes	BIA Section 9.1.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 7.2.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 7.1.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 7.3.
Is factual ground investigation data provided?	Yes	BIA Appendix E.
Is monitoring data presented?	Yes	Standpipes monitored once, see BIA Section 8.1.
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	BIA Section 9.2.4.
Is a geotechnical interpretation presented?	Yes	BIA Section 9.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Given on BIA Section 9.2.2 but incomplete, however, parameters provided in Frew analysis input.
Are reports on other investigations required by screening and scoping presented?	Yes	Network Rail, LOROL & LBC Highways Approval in Principle meetings held.
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 Sections 9.
Are estimates of ground movement and structural impact presented?	Yes	BIA Section 9.

Item	Yes/No/NA	Comment
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	
Has the need for monitoring during construction been considered?	Yes	BIA Section 9.2.2.
Have the residual (after mitigation) impacts been clearly identified?	Yes	BIA Section 9.2.3 & 9.4.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties maintained?	No	See Audit paragraphs 4.13 to 4.18.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	BIA Section 9.3.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	Structural stability not demonstrated.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	BIA Section 9.2.2, Table 2.
Are non-technical summaries provided?	Yes	BIA Section 2.

4.0 DISCUSSION

4.1. The BIA has been carried out by an established firm of consultants and the lead author possesses suitable qualifications.

4.2. It is proposed to demolish the existing building and retain part of the existing basement, which is approximately 2.85 metres below Finchley Road. The replacement building will consist of seven to ten storeys above ground and the basement will be deepened to approximately 7.50 metres below Finchley Road and extended to the rear of the site to obtain an additional lower ground storey opening out into the existing garden.

4.3. The development site is bounded by Finchley Road on its eastern front elevation, Billy Fury Way, a pedestrian access way, to the south and Finchley & Frognal Overground station, and associated rail tracks, to the north. Residential buildings occupy the sites adjacent to Billy Fury Way.

4.4. Two soils investigations have been undertaken which, together, comprise seven no. boreholes and four no. trial pits. These identified varying depths of Made Ground of up to 4.70m below ground underlain by London Clay to the 30m depth borehole investigation. Groundwater was monitored and seepages were noted to occur within the Made Ground. It is accepted that the variation in recorded groundwater levels is indicative of discrete and isolated pockets of perched water which will be controlled by pumping as basement excavation proceeds. The investigation has determined that the existing building is founded in the London Clay and that the existing basement retaining walls are of masonry construction with stepped brick foundations.

4.5. The BIA includes a construction sequence which assumes demolition of the existing building to ground level; installation of temporary propping followed by demolition of existing ground and basement slabs; installation of secant piled retaining wall with the softer, female piles stopping at just below the new basement level and the hard, male piles continuing to depth to support vertical and horizontal loads. The temporary works propping system will be developed by the Principle Contractor but assuming it is sufficiently stiff to meet the requirements of the ground movement analysis, it is accepted that the proposed piling solution minimises ground movements, and hence potential damage to neighbouring structures, whilst allowing any groundwater flow to remain unimpeded. It is requested that an indicative temporary works propping solution is provided.

4.6. The BIA recognises that the basement slab should be designed to resist flotation and void formers are proposed to be included below the 1000mm thick basement slab to resist uplift forces due to heave and groundwater.

4.7. The BIA includes a Drainage Strategy Report which identifies an increase in impermeable areas due to hard landscaping and roof proposals. Mitigation proposals include the installation of a

geocelluar storage tank and a pump chamber together with roof terrace container gardens to increase the rainfall interception storage capability. The surface water and foul water drainage systems will remain separated until they combine at the separated last manhole prior to entering the Thames Water combined sewer in Finchley Road.

4.8. The proposals presented in the Drainage Strategy Report reduce the surface water discharge to 5l/s (the lowest practicable rate). This provides 50% betterment from the existing surface water runoff from the site and an acceptable method of restricting the discharge

4.9. The LBC Planning Portal contains a consultee comment from Thames Water identifying "an inability of the existing wastewater infrastructure to accommodate the needs of this application" and requests a 'Grampian style' condition be imposed should the Local Planning Authority look to approve the application. CampbellReith contacted Webb Yates, the authors of the BIA and Drainage Strategy Report, regarding this letter dated 27th June 2016 who confirmed that TW's comments predated the availability of the DSR. An updated response from Thames Water, following their review of the DSR should be made available via Webb Yates or the Planning Condition should be invoked.

4.10. It is accepted that the BIA has shown that the surrounding slopes to the development are stable and that the installation of bored piles to a depth of 25 metres will minimise this potential impact.

4.11. It is accepted that no known ponds, wells or aquifers are in close proximity to the site and that the site is outside the Hampstead pond chain catchment area.

4.12. This BIA correctly identifies that Finchley Road flooded in 2002 but does not mention that Arkwright Road, on the opposite side of Finchley Road, flooded in both the 1975 and 2002 events. The BIA identifies the site as being in Flood Zone 1 and it is accepted to be at low risk from surface water flooding. The BIA suggests, that any flood water would be diverted down Billy Fury Way pedestrian footpath due to the site's topography.

4.13. A ground movement analysis has been undertaken using the Oasys software FREW. Movements behind the wall are based on the approach to *correlations between wall horizontal wall deflections and ground movements behind the wall* given in CIRIA C580, however, this was based on a top down sequence with a diaphragm wall embedded in stiff clay with a significant overlying thickness of coarse grained soils.

4.14. The movements from the FREW analysis were used in the assessment of building damage although this will only account for the excavation and it appears movements from pile installation have not been considered.

4.15. The movements used in the damage assessment are indicated to be the predicted movements at the level of the neighbouring property foundations (4.50m bgl) although it is unclear how the foundation depths were determined.

4.16. Negligible (Category 0) to Very Slight (Category 1) damage is predicted for the neighbouring residential properties located to the south. Very Slight (Category 1) damage is predicted for the Finchley and Frognal Overground Station with Slight (Category 2) indicated for the Network Rail retaining walls to the north. The impact on the roadway does not appear to have been considered

4.17. It is stated in the BIA that Network Rail have been advised of the predicted settlements, however, this is subject to a separate approval process.

4.18. Movement monitoring of the neighbouring properties and the Network Rail assets is proposed. It is stated a full monitoring scheme is being agreed with Network Rail. Details of the monitoring and trigger values may be agreed as part of the Party Wall awards for the neighbouring properties.

5.0 CONCLUSIONS

5.1. The BIA has been prepared and revised by personnel who have suitable qualifications.

5.2. Following demolition of the existing building, the proposal deepens and extends to the rear, its existing basement from 2.85m to 7.5m below Finchley Road. The site is bounded by Finchley & Frognal Overground railway station, Finchley Road, and the residential buildings adjacent to Billy Fury Way.

5.3. Soils investigations have identified that the site has varying depths of Made Ground overlying the London Clay to depth. Perched water was encountered within the Made Ground which will be removed during excavation.

5.4. It is proposed to install a secant bored pile retaining wall with the softer female piles terminated at just below basement level. An indicative temporary works propping solution is requested to validate ground movement analysis assumptions.

5.5. The proposals recognise that uplift forces due to heave and groundwater flotation effects will occur and proposes suitable mitigation measures.

5.6. Increases in areas of hard landscaping and roofs have been mitigated by the introduction of an attenuation storage tank and roof terrace container gardens to increase the rainfall interception storage capability.

5.7. The Drainage Strategy Report proposes an acceptable solution to restrict the surface water discharge from site to 5l/s which is a betterment of 50% from the existing situation.

5.8. Thames Water consultee comments requesting a condition be imposed upon the application, if successful, have been investigated with the BIA author who has confirmed his belief that Thames Water have not taken account of a Drainage Strategy Report contained in the BIA. An updated response from Thames Water has been requested via the applicant.

5.9. It is accepted that the surrounding slopes to the development are stable, that no known ponds, wells or aquifers are in close proximity and that the site is outside the Hampstead pond chain catchment area. The site is identified as being in Flood Zone 1 and it is accepted to be at low risk from surface water flooding.

5.10. A ground movement assessment has been undertaken using Oasys Frew, however, there are a number of queries on the analysis and these are summarised below:

- Confirmation is requested on whether the approach used in predicting movements behind the wall is appropriate.
- The neighbouring property foundations are indicated to be at a depth of 4.50m bgl and clarification is requested on how these were determined.

- Movements due to pile installation do not appear to be considered and it is requested the GMA is revised to account for this.

5.11. Movement monitoring is proposed, however, no details are given. It is understood a monitoring scheme is being agreed with Network Rail. Details of the monitoring and trigger values for the neighbouring residential properties are subject to agreement at the Party Wall award stage.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Thames Water	N/A	27.6.16	Waste Water – inability of existing infrastructure to accommodate application, Surface Water attenuation.	See Audit paragraphs 4.7 to 4.9.
Network Rail	N/A	28.6.16	Safe Operation of the railway.	See Audit paragraphs 4.13 to 4.18

Appendix 2: Audit Query Tracker

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Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Stability	Indicative temporary works propping solution.	Open – see Audit paragraph 4.5.	
2	Stability	Queries on the ground movement assessment	Open – to be revised taking into the account the comments in Section 5.	
3	Stability	Movement monitoring	Details and trigger values to be agreed with Network Rail and as part of Party Wall award for neighbouring residential properties	N/A
4	Drainage	Updated response from Thames Water	Open – see Audit paragraph 4.9	

Appendix 3: Supplementary Supporting Documents

None

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