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28 Charlotte Street, London W1T 2NF

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12336-67

Revision: D1

July 2016

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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 28 Charlotte Street, London, W1T 2NF (planning reference 2016/1345/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 Chelmer Consultancy Services. The qualifications of the individuals who have prepared and reviewed the BIA are in accordance with the requirements of CPG4.

1.5. The Construction Method Statement, compiled by Anderson Consulting Engineers, was provided to CampbellReith separately on 13 July 2016.

1.6. The site is a six-storey terraced house within the Charlotte Street Conservation Area. Construction is intended to extend the single-storey basement beneath the rear part of 28 Charlotte Street. The rear of the site adjoins both the Crabtree Fields playground and the modern development at No's 7-15 Whitfield Street.

1.7. The site-specific ground investigation consisted of one continuous flight auger borehole and the excavation of two hand dug trial holes. Borehole logs, monitoring results and laboratory test results are presented with the BIA.

1.8. Options are proposed for the founding solution. However, they are not reflected in the Construction Method Statement. The founding solution should be confirmed and outline details provided with an assessment of the likely impacts.

1.9. It is accepted that the proposed construction will not have an impact on surrounding roads as the extension is to the rear of the property. Additionally, no railway tunnels are known to pass below or close to the site. A pedestrian right of way is located near the rear of the property, although this has been identified and proposed actions are considered adequate.

1.10. Other infrastructure for cables or communications might be present within the zone of influence of the proposed basement extension, so it is agreed that an appropriate services search should be undertaken. The potential influence should be investigated should such infrastructure be identified.

1.11. The site and its surrounding are relatively flat and raise no concerns in relation to the overall stability of the slope.

1.12. The site is, and will remain, fully paved. Additionally, no trees will be felled as part of the proposed development. 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.

1.13. Groundwater data indicates the groundwater level to be at least 1.0m below the basement slab, and it is therefore agreed that the proposed basement extension is acceptable in relation to

groundwater flow. However, the impact on the hydrogeology will need to be reassessed following the revised foundation solution.

1.14. Seepages of perched groundwater may occur into the excavations. It is noted that pumping from sumps will be employed if groundwater is encountered. The Made Ground expected at/beneath formation level may be very susceptible to disturbance with the risk of drawing soil into the excavation. Although mitigation measures are proposed, all groundwater control measures should be supervised by an appropriately competent person.

1.15. The Ground Movement Assessment is based on underpins bearing on Made Ground, with a stiffness that is considered high. The GMA predicts damage no worse than slight (Burland Category 2), although the validity of bearing the Made Ground is questioned and the assumptions need to be revisited and resubmitted to address the proposed construction methodology.

1.16. It is agreed that condition surveys of the neighbouring properties should be commissioned and a programme of monitoring the adjoining structures should be established before the work starts.

1.17. Queries and requests for further information are described in Section 4 and summarised in Appendix 2.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 27 May 2016 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 28 Charlotte Street, London, W1T 2NF, Camden Reference 2016/1345/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 "*Conversion of existing single dwelling house to provide 4 self-contained flats, including the enlargement of existing basement, erection of a second floor extension and alterations to rear elevation and roof form.*"

The Audit Instruction also confirmed that the proposed development is within a Conservation Area, although the building itself is not listed.

2.6. CampbellReith accessed LBC's Planning Portal on 02 June 2016 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment Report (BIA) dated April 2016,
- Design and Access Statement,
- Draft Construction Management Plan,
- Daylight and Sunlight Study, and
- Planning application drawings consisting of:

Existing Plans

Proposed Plans

Site Plan

The Construction Method Statement, dated August 2015, was provided to CampbellReith on 13 July 2016.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	BIA Section 1.2
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 Sections 2, 3 4, 5 and 6
Are suitable plan/maps included?	Yes	BIA and supplementary drawings
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 Section 7.3
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Section 7.2
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Section 7.4

Item	Yes/No/NA	Comment
Is a conceptual model presented?	Yes	BIA Section 10
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 8
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 8
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	NA	Not required as there will be no significant change in surface water run-off. Site is already fully paved.
Is factual ground investigation data provided?	Yes	Ground investigation conducted by Chelmer Site Investigations in January 2016 (Dates of January 2015 and September 2015 mentioned in report, incorrectly?).
Is monitoring data presented?	Yes	However, readings were only taken on 28 January 2016 (-4.93m) and 9 February 2016 (-4.77m)
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	Yes	Friday 12 February 2016
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	
Is a geotechnical interpretation presented?	Yes	BIA Section 10
Does the geotechnical interpretation include information on retaining wall design?	Yes	BIA Section 10

Item	Yes/No/NA	Comment
Are reports on other investigations required by screening and scoping presented?	Yes	Site investigation included within BIA
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	BIA Section 10
Are estimates of ground movement and structural impact presented?	Yes	BIA Section 10.5, 10.6
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?	No	Construction Method Statement does not reflect ground conditions revealed by mitigation.
Has the need for monitoring during construction been considered?	Yes	BIA Section 10.7
Have the residual (after mitigation) impacts been clearly identified?	No	Construction Method Statement does not reflect ground conditions revealed by mitigation.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	Construction Method Statement does not reflect ground conditions revealed by mitigation.
Has the scheme avoided adversely affecting drainage and run-off or	Yes	

Item	Yes/No/NA	Comment
causing other damage to the water environment?		
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	Construction Method Statement does not reflect ground conditions revealed by mitigation.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	BIA Section 10.6 although GMA requires to be revisited.
Are non-technical summaries provided?	Yes	BIA Section 11

4.0 DISCUSSION

4.1. The Building Impact Assessment (BIA) has been carried out by Chelmer Consultancy Services. The qualifications of the individuals who have prepared and reviewed the BIA are in accordance with the requirements of CPG4. Both authors have previously undertaken assessments of basements in several London Boroughs.

4.2. The existing building is a six-storey terraced house within the Charlotte Street Conservation Area, in the London Borough of Camden. No. 28 is situated on the east side of Charlotte Street, between No. 26 to the south and No. 30 to the north. The rear of the site adjoins both the Crabtree Fields playground and the modern development at No's 7-15 Whitfield Street.

4.3. The proposed basement works will comprise:

- Creation of a single-storey basement beneath the existing open-plan office/studio at the rear of No. 28's lightwell, with a finished floor level (FFL) 0.39m lower than the FFL in the existing basement.
- The existing lower ground floor and lightwell will not be altered.
- Two additional floors will be added above the basement, at 1st and 2nd floor levels.
- A lightwell extending one-storey below ground level will be created across the full width of the rear of the site.
- The existing two-storey high rear wall, including the chimney breast and all three external buttresses, will be taken down and a new wall will be built with large glazed window openings in both this rear wall and the south-east flank wall (at the end of the new lightwell).

4.4. The development at No's 7-15 Whitfield Street includes a lower ground floor approximately 1.15m from the wrap-around buttress at the east corner of No. 28. This floor level is approximately 0.7m below the proposed FFL in No. 28's basement. Additionally, a basement car park, the closest point of which is 3.8m from No. 28's wrap-around buttress, has an FFL approximately 2.9m below that of No. 28's.

4.5. It is stated in the Draft Management Construction Plan that the basement is to be built bottom-up with excavation commencing from above the front of the proposed basement through the existing basement progressing towards the rear. A conveyor belt will be set up through the existing basement to convey spoil from the excavation to a skip placed on the road for disposal. In this regard, the management of traffic along Admiral Walk has been proposed to prevent queueing and waiting of vehicles.

4.6. The ground investigation site work was carried out by Chelmer Site Investigations (CSI) in January 2016, and consisted of one continuous flight auger borehole drilled to a depth of 10.0m below ground level and two hand dug trial pits. The site's geology, as found by BH1, was summarised as:

- 0.0 – 5.3m comprised Made Ground.
- 5.3 – 7.7m comprised gravelly sand, considered to be the Lynch Hill Gravel formation.
- 7.7m+ comprised London Clay.

The Construction Method Statement by Anderson Consulting Engineers indicates that local boreholes show sand and gravel to between 7.0 and 8.5m below ground level, with the basement therefore being founded in this material with a ground bearing pressure of 150KN/m^2. This assumption needs to be revised based on the ground investigation conducted as Made Ground is generally not considered a suitable bearing stratum without some form of ground treatment.

4.7. The formation level of the proposed basement slab (approximately 2.9-2.98m below GL) is expected to comprise silts of the Made Ground. The basement is to be supported on underpinned foundations bearing into the in situ clays at depth. Two options are proposed in the BIA, namely (A) Designing for no net increase in stress in the Made Ground, which it is agreed is likely to be difficult to achieve, and (B) Supporting the basement and superstructure on piles. No justification for the suitability of the Made Ground to support the basement retaining walls has been provided nor for the stability of excavations. The construction methodology is to be confirmed and the associated impacts assessed based on the available ground investigation information. This should be reflected in the Construction Method Statement.

4.8. As it is unlikely that new foundations or retaining walls can be constructed to bear in the Made Ground, it is important to determine the level of the water table. A shallow water table might well preclude excavation beneath the existing foundation due to risk of collapse, and the difficulty and high cost of shoring in these conditions. During the monitoring period groundwater was encountered at 4.93m and 4.77m below GL indicating the groundwater level is likely to be below the FFL for the proposed basement. However, deepening the underpins to a competent bearing stratum may require excavation below the water table.

4.9. It is noted that pumping from sumps will be employed if groundwater is encountered. The Made Ground expected at/beneath formation level may be very susceptible to disturbance. It is therefore critical that the long-term groundwater level be determined as groundwater within granular strata can rapidly and continuously ingress into the excavated basement and result in ground settlement that which may extend beyond the site boundary and affect neighbouring structures.

4.10. In the design of retaining walls, a provisional groundwater level equal to one-third of the basement's depth was proposed in the BIA due to the uncertainty in predicting future groundwater levels. This assumption is considered acceptable although the long-term groundwater level should be confirmed by the monitoring proposed during the detailed design.

4.11. Geotechnical parameters for the Made Ground, Sands/Gravels and London Clay material encountered at the site are proposed in the BIA based on the investigation, laboratory results and previous experience. In the natural soils the parameters are considered reasonable, although these should be used in conjunction with appropriate partial factors dependent upon the design method selected. It is not considered that the stiffness recommended for the Made Ground is appropriately conservative. Once the construction method has been confirmed, outline calculations for the retaining walls and basement slab should be revised.

4.12. It is acknowledged that there is no concern about slope stability issues in this regard.

4.13. The site is, and will remain, fully paved so there is no change to impermeable area. Additionally, no trees will be felled as part of the proposed development.

4.14. It is accepted that the proposed construction will not have an impact on surrounding roads as the extension is to the rear of the property. Additionally, no railway tunnels are known to pass below or close to the site. A pedestrian right of way is located near the rear of the property, although this has been identified and proposed actions are considered adequate.

4.15. Other infrastructure for cables or communications might be present within the zone of influence of the proposed basement extension, so it is agreed that an appropriate services search should be undertaken. The potential influence should be investigated should such infrastructure be identified.

4.16. The site is located on the Lynch Hill Gravel Formation which is designated as a 'secondary A Aquifer' by the Environmental Agency. The construction of a basement across the flow of groundwater levels potentially can increase the groundwater flow immediately upstream of the development and change the local subterranean regime. This is also reflected in the Camden designated zone of groundwater vulnerability. As the groundwater level is located below the FFL of the basement, and the presence of the existing basement, the impact from the proposed basement is not considered to be significant. Should the proposed foundation be deepened, the impact will need to be revaluated.

4.17. The BIA notes that the site lies within the Environment Agency's Flood Zone 1, indicating negligible risk of fluvial flooding, and is not at risk of flooding from reservoirs as mapped by the Environment Agency. Additionally, the proposed basement and lightwells will not result in any change in paved surface area because the site is already fully developed with no soft landscaping. Thus, the proposed basement is not expected to cause any adverse effects on surface water run-off characteristics.

4.18. It is accepted that the site is not within the catchment of the ponds on Hampstead Heath, or in the vicinity of any watercourse, rivers, spring lines, or at risk of sea, reservoir, sewer or river flooding.

4.19. Although surface water will continue to be discharged into the mains drainage system, any collected groundwater as a result of construction dewatering that is proposed to be discharged into the public sewers will likely require the prior permission of Thames Water.

4.20. The Ground Movement Assessment is based on underpins bearing on Made Ground, with a stiffness that is considered high. The GMA needs to be resubmitted having been revised to address the proposed construction methodology and adopting a reduced stiffness in the Made Ground, if still relevant. Furthermore, the Damage Category Assessment relies on Made Ground standing unsupported. Whilst this may be feasible above the water table, it has not been demonstrated that an underpinning scheme would not have to be deepened to below recorded foundation levels. CPG4 requires mitigation measures where Category 2 damage is predicted.

4.21. It is agreed that condition surveys of the neighbouring properties should be commissioned and a programme of monitoring the adjoining structures should be established before the work starts.

5.0 CONCLUSIONS

5.1. The Building Impact Assessment (BIA) has been carried out by Chelmer Consultancy Services. The qualifications of the individuals who have prepared and reviewed the BIA are in accordance with the requirements of CPG4.

5.2. The site is a six-storey terraced house within the Charlotte Street Conservation Area. Construction is intended to extend the single-storey basement beneath the rear part of 28 Charlotte Street. The rear of the site adjoins both the Crabtree Fields playground and the modern development at No's 7-15 Whitfield Street.

5.3. The BIA has confirmed that the proposed basement will be founded within Made Ground and its foundations will need to be deepened to encounter the Lynch Hill Gravel below. Supporting the basement on piled foundations bearing into the in situ gravels and clays at depth, as proposed in the BIA (Option B) is considered the preferred founding solution. Ground conditions used in the Construction Method Statement do not reflect those encountered during the ground investigation as reported in the BIA. The founding solution should be confirmed and outline details provided with an assessment of the likely impacts.

5.4. Groundwater data indicates the groundwater level to be at least 1.0m below the basement slab. It is stated that pumping from sumps will be employed if groundwater is encountered. The Made Ground expected at/beneath formation level may be very susceptible to disturbance with the risk of drawing soil into the excavation, although mitigation measures are proposed.

5.5. It is stated in the Draft Management Construction Plan that the basement is to be built bottom-up with excavation commencing from above the front of the proposed basement through the existing basement progressing towards the rear. The construction sequence, temporary works proposals and outline depths for retaining walls and slabs need to be revised.

5.6. It is accepted that the proposed construction will not have an impact on surrounding roads as the extension is to the rear of the property. Additionally, no railway tunnels are known to pass below or close to the site. A pedestrian right of way is located near the rear of the property, although this has been identified and proposed actions are considered adequate.

5.7. It is accepted that the site is not within the catchment of the ponds on Hampstead Heath, or in the vicinity of any watercourse, rivers, spring lines, or at risk of sea, reservoir, sewer or river flooding.

5.8. 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. Should the proposed foundations be deepened, the impact will need to be re-evaluated.

5.9. The site and its surrounding are relatively flat and raise no concerns in relation to the overall stability of the slope. Should the proposed foundations be deepened, the impact will need to be revaluated.

5.10. Ground Movement Assessment predicts damage no worse than slight (Burland Category 2), although the assumptions need to be revisited both with respect to the construction methodology and the parameters assumed.

5.11. Geotechnical parameters for the natural soils (Sands/Gravels and London Clay) encountered at the site are proposed in the BIA and are considered reasonable, based on the investigation

laboratory results and previous experience. It is not considered that the stiffness recommended for the Made Ground is appropriately conservative.

5.12. It is agreed that condition surveys of the neighbouring properties should be commissioned and a programme of monitoring the adjoining structures should be established before the work starts. The movement monitoring strategy should be continued during excavation and construction.

Appendix 1: Resident's Consultation Comments

None

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	Stability	Revised CMS required reflecting ground conditions encountered during the site investigation.	Open	
2	Stability	Revised GMA required reflecting revised CMS and reduced stiffness for Made Ground.	Open	
3	Hydrogeology	Impact of proposals on groundwater to be confirmed once construction methodology agreed.	Open	

Appendix 3: Supplementary Supporting Documents

None

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