Independent Review
of
Basement Impact Assessment for planning application 2014/4726/P (UPDATED)
at

85 Camden Mews
London
NW1 9BU

for
London Borough of Camden

LBH 4292

March 2015

LBH WEMBLEY

Geotechnical & Environmental

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Foreword-Guidance Notes

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The observations and conclusions described in this report are based solely upon the agreed scope of work. LBH WEMBLEY Geotechnical & Environmental has not performed any observations, investigations, studies or testing not specifically set out in the agreed scope of work and cannot accept any liability for the existence of any condition, the discovery of which would require performance of services beyond the agreed scope of work.

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Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances shall be at the client's sole and own risk. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should therefore not be relied upon in the future and any such reliance on the report in the future shall again be at the client's own and sole risk.

THIRD PARTY INFORMATION

The report may present an opinion on the disposition, configuration and composition of soils, strata and any contamination within or near the site based upon information received from third parties. However, no liability can be accepted for any inaccuracies or omissions in that information.

1. Introduction

It is proposed to construct a single level basement beneath the footprint of an existing two storey mews building and extending rearwards into the garden area.

1.1 Brief

LBH WEMBLEY Geotechnical & Environmental have been commissioned to provide an Independent assessment of information submitted against the requirements of LDF policy DP27 (but also including CS5, CS14, CS15, CS17, CS18, DP23, DP24, DP25 and DP26 – as stated at paragraphs 1.5 and 1.6 of CPG4) and with reference to the procedures, processes and recommendations of the Arup Report and CPG4 2013.

1.2 Report Structure

This report commences with a description of the LDF policy requirements, and then considers and comments on the submission made and details any concerns in regards to:

1. The level of information provided (including the completeness of the submission and the technical sufficiency of the work carried out)
2. The proposed methodologies in the context of the site and the development proposals
3. The soundness of the evidence presented and the reasonableness of the assessments made.
4. The robustness of the conclusions drawn and the mitigation measures proposed in regard to:
    a. maintaining the structural stability of the building and any neighbouring properties
    b. avoiding adversely affecting drainage and run-off or causing other damage to the water environment and
    c. avoiding cumulative impacts on structural stability or the water environment in the local area

1.3 Information Provided

The information studied comprises the following:

1. Basement Impact Assessment by Southern Testing, dated September 2014, Ref: J11954
2. Basement Impact on Structural Stability by John Romer, undated, unreferenced
3. Construction Method Statement by West Design & Build, dated October 2014, unreferenced
4. Design and Access Statement by Cullinan Studio, dated 18th July 2014, Ref: 85_CM_RP01, Rev P01
5. Existing Drawings by Cullinan Studio, dated 18th July 2014, Refs: 85_CM_P01 rev P01, 85_CM_P02a rev P01, 85_CM_P04 rev P01, 85_CM_P06 rev P01, 85_CM_P07 rev P01,
6. Proposed Drawings by Cullinan Studio, dated 18th July 2014, Refs: 85_CM_P10 rev P01, 85_CM_P02b rev P01, 85_CM_P11 rev P01, 85_CM_P12 rev P02, 85_CM_P30 rev P01
7. Drawings by Cullinan Studio, dated February 2015, Refs: 85_CM_BIA_07 85_CM_BIA_06A, 85_CM_BIA_05, 85_CM_BIA_03A, 85_CM_BIA_02A, 85_CM_BIA_01B
8. Determination of Loading on New Basement Walls by CS Ltd, dated March 2015, Ref: 512

9. Structural Engineer's Construction Method Statement by Axiom Structures Limited, dated 25th March 2015, Ref: 15005/CMS P2
10. Ground Movement Report by Geotechnical Consulting Group, dated 5th March 2015, unreferenced Initial issue
11. Assumed Construction Sequence by unknown, undated, unreferenced
12. Basement Impact Assessment by John Romer, undated, unreferenced
13. Basement Impact Assessment: Site Investigation Report by Southern Testing, dated January 2015, Ref: J12115

2. Policy DP27 – Basements and Lightwells

The CPG4 Planning Guidance on Basements and Lightwells refers primarily to Planning Policy DP27 on Basements and Lightwells.

The DP27 Policy reads as follows:

In determining proposals for basement and other underground development, the Council will require an assessment of the scheme's impact on drainage, flooding, groundwater conditions and structural stability, where appropriate. The Council will only permit basement and other underground development that does not cause harm to the built and natural environment and local amenity and does not result in flooding or ground instability. We will require developers to demonstrate by methodologies appropriate to the site 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 we will consider whether schemes:

d) harm the amenity of neighbours;
e) lead to the loss of open space or trees of townscape or amenity value;
f) provide satisfactory landscaping, including adequate soil depth;
g) harm the appearance or setting of the property or the established character of the surrounding area; and
h) protect important archaeological remains.

The Council will not permit basement schemes which include habitable rooms and other sensitive uses in areas prone to flooding. In determining applications for lightwells, the Council will consider whether:

i) the architectural character of the building is protected;
j) the character and appearance of the surrounding area is harmed; and
k) the development results in the loss of more than 50% of the front garden or amenity area.

In addition to DP27, the CPG4 Guidance on Basements and Lightwells also supports the following Local Development Framework policies:

Core Strategies:

- CS5 Managing the impact of growth and development
- CS14 Promoting high quality places and conserving our heritage
- CS15 Protecting and improving our parks and open spaces & encouraging biodiversity
- CS17 Making Camden a safer place
- CS18 Dealing with our waste and encouraging recycling

Development Policies:

- DP23 Water
- DP24 Securing high quality design
- DP25 Conserving Camden's heritage
- DP26 Managing the impact of development on occupiers and neighbours

This report makes some specific further reference to these policies but relies essentially upon the technical guidance provided by the Council in November 2010 to assist developers to ensure that they are meeting the requirements of DP27, which is known as the Camden Geological, Hydrogeological and Hydrological Study, Guidance for Subterranean Development (CGHHS), and was prepared by Arup.

3. Assessment of Adequacy of Information Provided

3.1 Basement Impact Assessment Stages

The methodology described for assessing the impact of a proposed basement with regard to the matters described in DP27 takes the form of a staged approach.

3.1.1 Stage 1: Screening

Screening uses checklists to identify whether there are matters of concern (with regard to hydrogeology, hydrology or ground stability) which should be investigated using a BIA (Section 6.2 and Appendix E of the CGHSS) and is the process for determining whether or not a BIA is required. There are three checklists as follows:

- subterranean (groundwater) flow
- slope stability
- surface flow and flooding

3.1.1.1 Subterranean (Groundwater) Flow

A screening checklist for the impact of the proposed basement on groundwater is included in the BIA (Document 1).

This identifies the following potential issues of concern:

- **The proposed basement will extend beneath the water table surface.**
- **The proposed development will result in a change in the area of hard-surfaced/paved areas.**

3.1.1.2 Slope Stability

A screening checklist for the impact of the proposed basement on land stability is included in the BIA (Document 1).

This identifies the following potential issues of concern:

- **London Clay is the shallowest strata at the site.**
- **There is a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site.**
- **The site is within 5m of a highway or pedestrian right of way.**
- **The proposed basement will significantly increase the differential depth of foundations relative to the neighbouring properties.**

3.1.1.3 Surface Flow and Flooding

A screening checklist for the impact of the proposed basement on surface water flow and flooding is included in the BIA (Document 1).

This identifies the following potential issues of concern:

- **As part of the site drainage, surface water flows (e.g. rainfall and run-off) will be materially changed from the existing route.**
- **The proposed basement development will result in a change in the proportion of hard-surfaced/paved areas.**
- **The proposed basement will result in changes to the profile of the inflows (instantaneous and long-term) of surface-water being received by adjacent properties or downstream watercourses.**

3.1.2 Stage 2: Scoping

Where the checklist is answered with a "yes" or "unknown" to any of the questions posed in the flowcharts, these matters are carried forward to the scoping stage of the BIA process.

The scoping produces a statement which defines further the matters of concern identified in the screening stage. This defining should be in terms of ground processes, in order that a site specific BIA can be designed and executed (Section 6.3 of the CGHSS).

No scoping stage has been described in the BIA and the screening concludes *"there is little that will need to be investigated further…aside from the impact of the basement construction on the foundation to adjoining structures, and consideration of the surface ware disposal design...."*:

Nevertheless, the potential issues of concern identified from the screening stage are as follows:

- **The proposed basement will extend beneath the water table surface.**
  The guidance advises that dewatering can cause ground settlement. The zone of settlement will extend for the dewatering zone, and thus could extend beyond a site boundary and affect neighbouring structures. Conversely, an increase in water levels can have a detrimental effect on stability. The groundwater flow regime may be altered by the proposed basement. Changes in flow regime could potentially cause the groundwater level within the zone encompassed by the new flow route to increase or decrease locally. For existing nearby structures then the degree of dampness or seepage may potentially increase as a result of changes in groundwater level.

- **The proposed development will result in a change in the area of hard-surfaced/paved areas.**
  The guidance advises that a change in the in proportion of hard surfaced or paved areas of a property will affect the way in which rainfall and surface water are transmitted away from a property. This includes changes to the surface water received by the underlying aquifers, adjacent properties and nearby watercourses. Changes could result in decreased flow, which may affect ecosystems or reduce amenity, or increased flow which may additionally increase the risk of flooding. The sealing off of the ground surface by pavements and buildings to rainfall will result in decreased recharge to the underlying ground. In areas underlain by an aquifer, this may impact upon the groundwater flow or levels. In areas of non-aquifer (i.e. on the London Clay), this may mean changes in the degree of wetness which in turn may affect stability.

- **London Clay is the shallowest strata at the site.**
  The guidance advises that of the at-surface soil strata present in LB Camden, the London Clay is the most prone to seasonal shrink-swell (subsidence and heave).

- **There is a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site.**
  The guidance advises that there are multiple potential impacts depending on the specific setting of the basement development. For example, in terraced properties, the implications of a deepened basement/foundation system on neighbouring properties should be considered.

- **The site is within 5m of a highway or pedestrian right of way.**
  The guidance advises that excavation for a basement may result in damage to the road, pathway or any underground services buried in trenches beneath the road or pathway.

- **The proposed basement will significantly increase the differential depth of foundations relative to the neighbouring properties.**
  The guidance advises that excavation for a basement may result in structural damage to neighbouring properties if there is a significant differential depth between adjacent foundations.

- **As part of the site drainage, surface water flows (e.g. rainfall and run-off) will be materially changed from the existing route.**
  The guidance advises that basement development may increase the load on the sewer and drainage systems if it leads to increased occupancy of dwellings. In turn this may increase the risk of flooding should the sewer and drainage systems become overwhelmed. Constructing a basement, either beneath or adjacent to an existing building will typically remove the permeable shallow ground that previously occupied the site footprint. This reduces the capacity of the ground to allow rainfall to be stored in the ground (which in essence acts as a natural SUDS, or sustainable urban drainage system). This runoff must then be managed by other means (eg through construction of SUDS), to ensure that it doesn't impact on adjoining properties or downstream watercourses. For sites in the catchments of the pond chains the potential impacts listed above under (1) apply if the resulting changes in drainage affect the flow to the ponds.

- **The proposed basement will result in changes to the profile of the inflows (instantaneous and long-term) of surface-water being received by adjacent properties or downstream watercourses.**
  The guidance advises that changes could result in decreased volume, which may affect ecosystems or reduce amenity, or increased flow which may additionally increase the risk of flooding.

3.1.3 Stage 3: Site Investigation and Study

Site investigation and study is undertaken to establish the baseline conditions. This can be done by utilising existing information and/or by collecting new information (Section 6.4 of the CGHSS).

The site investigation originally submitted comprised two 6m deep light percussion window sampler boreholes and three hand dug trial pits to expose the existing foundations. Document 13 outlines an additional two light percussion window sampler boreholes taken to around 6m depth in January 2015, together with additional groundwater monitoring.

3.1.4 Stage 4: Impact Assessment

Impact assessment is undertaken to determine the impact of the proposed basement on the baseline conditions, taking into account any mitigation measures proposed (Section 6.5 of the CGHSS).

The submitted BIA (Document 1) does not include an Impact Assessment stage, but there are comments relating to some of the issues within the site investigation section as follows:

- **The proposed basement will extend beneath the water table surface.**

"… some groundwater ingress should be anticipated during construction and allowance should be made for dewatering. Flow rates may not be significant, in which case intermittent pumping from strategically placed collector sumps should be adequate"

"…bearing in mind the negligible permeability of the clay soils, there is minimal risk of the proposed basement construction causing a "damming effect" or mounding of water on the up-gradient side."

Document 10 states "*…the rate at which the monitored groundwater levels rose indicates that the permeability of the clay is low, and that if excavations are open for short periods, little groundwater inflow is to be expected. Due to the low permeability anticipated for the London Clay, lateral sub-surface flow through the clay is anticipated to be low, and the new basement construction should have no significant impact on groundwater conditions.*"

- **The proposed development will result in a change in the area of hard-surfaced/paved areas.**

- **London Clay is the shallowest strata at the site.**

"Due to stress relief following the removal of the existing soils to form the basement structure both immediate (undrained) and long term (drained) heave displacements can be expected to occur in the underlying clay"

"...This is normally overcome by installing appropriate void forming materials beneath the basement elements."

- **There is a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site.**

".. The Engineer should…make sure that the design caters for the potential effects of lateral pressure/heave from the trees in the future."

- **The site is within 5m of a highway or pedestrian right of way.**

- **The proposed basement will significantly increase the differential depth of foundations relative to the neighbouring properties.**

" It is anticipated that the basement will be formed by conventional underpinning techniques."

"Given the presence of the existing adjacent foundations, close attention in design of temporary and permanent propping is required at all times to prevent settlement or excessive lateral yielding of the excavations/foundations."

Document 10 states that "*It is predicted that the adjacent structures will experience damage category 1: Very Slight. Other nearby structures will experience category 0: negligible, damage.*"

- **As part of the site drainage, surface water flows (e.g. rainfall and run-off) will be materially changed from the existing route.**

- **The proposed basement will result in changes to the profile of the inflows (instantaneous and long-term) of surface-water being received by adjacent properties or downstream watercourses.**

3.2 The Audit Process

The audit process is based on reviewing the BIA against the criteria set out in Section 6 of the CGHSS and requires consideration of specific issues:

3.2.1 Qualifications / Credentials of authors

Check qualifications / credentials of author(s):

Qualifications required for assessments

Surface flow and flooding	A Hydrologist or a Civil Engineer specialising in flood risk management and surface water drainage, with either: • The "CEng" (Chartered Engineer) qualification from the Engineering Council; or a Member of the Institution of Civil Engineers ("MICE"); or • The "C.WEM" (Chartered Water and Environmental Manager) qualification from the Chartered Institution of Water and Environmental Management.
Subterranean (groundwater) flow	A Hydrogeologist with the "CGeol" (Chartered Geologist) qualification from the Geological Society of London.
Land stability	A Civil Engineer with the "CEng" (Chartered Engineer) qualification from the Engineering Council and specialising in ground engineering; or A Member of the Institution of Civil Engineers ("MICE") and a Geotechnical Specialist as defined by the Site Investigation Steering Group. With demonstrable evidence that the assessments have been made by them in conjunction with an Engineering Geologist with the "CGeol" (Chartered Geologist) qualification from the Geological Society of London.

Surface flow and flooding: The submission **does not** appear to meet the requirements.

Subterranean (groundwater) flow: The submission does appear to meet the requirements.

Land stability: The submission does appear to meet the requirements.

3.2.2 BIA Scope

Check BIA scope against flowcharts (Section 6.2.2 of the CGHSS).

The screening stage of the BIA identified a number of potential issues of concern that were not fully assessed. The revised submission documents have gone some way to addressing the issues of subterranean (groundwater) flow and land stability, but further discussion of the potential issues of concern in regard to surface flow and flooding does not appear to have been supplied.

3.2.3 Description of Works

Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?

An assumed construction sequence is now provided in Document 11 and Document 7.

3.2.4 Investigation of Issues

Have the appropriate issues been investigated? This includes assessment of impacts with respect to DP27 including land stability, hydrology, hydrogeology.

Additional ground investigation and groundwater monitoring has now been undertaken that suggests that the previously reported water-bearing gravelly layer may not exist and does not pose a large risk of water ingress to the excavation.

3.2.5 Mapping Detail

Is the scale of any included maps appropriate? That is, does the map show the whole of the relevant area of study and does it show sufficient detail?

Yes.

3.2.6 Assessment Methodology

Have the issues been investigated using appropriate assessment methodology? (Section 7.2 of the CGHSS).

A ground movement analysis has now been undertaken and is reported in Document 10.

3.2.7 Mitigation

Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme? (Section 5 of the CGHSS)

Yes.

3.2.8 Monitoring

Has the need for monitoring been addressed and is the proposed monitoring sufficient and adequate? (Section 7.2.3 of the CGHSS)

It is stated within the BIA (Document 1) that "*Throughout the construction phase the party walls would be monitored for both movements and vibration as appropriate, to ensure these are within acceptable limits*." However, a detailed monitoring and contingency plan does not appear to have been submitted.

3.2.9 Residual Impacts after Mitigation

Have the residual (after mitigation) impacts been clearly identified?

Yes.

4. Assessment of Acceptability of Residual Impacts

4.1 Proposed Construction Methodology

In the light of the additional ground information the proposed construction methodology appears to be reasonable.

4.2 Soundness of Evidence Presented

In the light of the additional ground information the evidence concerning the ground conditions appears to be reasonably sound.

4.3 Reasonableness of Assessments

The assessments provided appear reasonable. A discrete assessment of potential impacts in regard to surface flow and flooding has not been provided. However, while the site has been noted to be at some risk of flooding, there does not appear to be any meaningful scope for the development to increase flood risk elsewhere.

4.4 Robustness of Conclusions and Proposed Mitigation Measures

The proposed mitigation appears to be sufficient with regards to land stability and subterranean (groundwater) flow. Although the impact assessment for surface flow and flooding does not appear to have been documented the proposed drainage measures are reasonably evident from drawings contained in Document 7.

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5. Conclusions

The original BIA submission did not wholly reflect the processes and procedures set out in DP27 and CPG4.

It was considered that in order to meet the requirements of DP27 further information should be submitted as follows:

- Additional ground investigation, including further groundwater monitoring to establish the ground and groundwater conditions with greater certainty.
- Further details of proposed construction methodology and sequencing, including drawings and details of proposed temporary works and new foundations.
- Ground movement analysis and predicted neighbouring building damage assessment.

With the benefit of this further information, it was requested that the BIA should be revised and updated by persons holding the specified qualifications to include a detailed assessment of all potential impacts identified for groundwater flow, flooding and stability listed in section 3.1.2 above, together with a clear explanation of how these are to be mitigated. A detailed monitoring and contingency plan was also requested that reflected the outcome of this further assessment.

Additional ground investigation, including further groundwater monitoring has now been submitted that establishes the ground and groundwater conditions with greater certainty.

Further details of the proposed construction methodology and sequencing have been provided, together with a ground movement analysis and predicted neighbouring building damage assessment.

While the site may be at some risk of flooding, it does not appear that there is a significant potential for the proposed development to increase flood risk elsewhere.

It is therefore considered that the information now supplied, although deficient, does meet the requirements of DP27 in respect of:

a. Maintaining the structural stability of the building and any neighbouring properties

b. Avoiding adverse impact on drainage and run-off or causing other damage to the water environment

c. Avoiding cumulative impacts on structural stability or the water environment.