Independent Review
of
Basement Impact Assessment for planning application 2015/0483/P
UPDATED
at
Flat 1
27 Aberdare Gardens
London
NW6 3AJ

for
London Borough of Camden

LBH 4327

May 2015

LBH WEMBLEY

Geotechnical & Environmental

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Foreword-Guidance Notes

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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.

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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 storey basement beneath the entire footprint of the existing house and proposed ground floor extension along with associated lightwells and a linked basement extending beneath the rear garden by some 20m. This is understood to entail excavations extending to between 3.5m and 4m depth. It is presumed that the upper floors of the building contain further properties that are under different ownership to Flat 1.

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 Chelmer Consultancy Services, dated April 2015, Ref: BIA/4916 Rev 2
2. Engineering Method Statement by Green Structural Engineering (GSE), dated January 2015, Ref: 12575
3. Design and Access Statement by Metropolitan Development Consultancy (MDC), dated December 2014, Ref: 7393/D_A/JF Issue 1
4. Factual Report by Chelmer Consultancy Services, dated December 2014, Ref: FACT/4916
5. Report on the impact of trees by John Cromar's Arboricultural Company Limited, dated 27th January 2015, Ref 1-38-3544
6. Drawings of Existing by MDC, dated September 2014, Refs: 7393/20
7. Drawings of Proposed by MDC, dated September 2014, Refs: 7393/22B and 7393/21A

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

3.1.1.2 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.**
- **Trees will be felled as part of the proposed development and/or works are proposed within tree protection zones where trees are to be retained**
- **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.**
- **The site is over (or within the exclusion zone of) tunnels, e.g. railway lines.**

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:

- **The proposed basement development will result in a change in the proportion of hard-surfaced/paved areas.**
- **The site is in an area known to be at risk from surface water flooding, or is it at risk from flooding, for example because the proposed basement is below the static water level of a nearby surface water feature.**

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).

Checklists have been provided in the BIA and there is scoping stage described in the BIA.

The issues identified from the checklists as being of concern have been assigned bold text in the previous sections and are as follows:

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

- **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).

- **Trees will be felled as part of the proposed development and/or works are proposed within tree protection zones where trees are to be retained**
  The guidance advises that the soil moisture deficit associated with felled tree will gradually recover. In high plasticity clay soils (such as London Clay) this will lead to gradual swelling of the ground until it reaches a new value. This may reduce the soil strength which could affect the slope stability. Additionally the binding effect of tree roots can have a beneficial effect on stability and the loss of a tree may cause loss of stability.

- **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.

- **The site is over (or within the exclusion zone of) tunnels, e.g. railway lines.**
  The guidance advises that excavation for a basement may result in damage to the tunnel.

- **The site is in an area known to be at risk from surface water flooding, or is it at risk from flooding, for example because the proposed basement is below the static water level of a nearby surface water feature.**
  The guidance advises that the developer should undertake a Flood Risk Assessment (FRA).

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 submitted comprised three continuous flight auger boreholes to between 5m and 6m depth and a trial pit to expose existing foundations. Two groundwater monitoring visits were undertaken.

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 include an Impact Assessment stage and the following comments have been made:

- **The proposed development will result in a change in the area of hard-surfaced/paved areas.**
  "*The proposed new ground floor extension, with basement below, and the associated enlarged rear patio will increase the area of hard surfacing…. In order to avoid creating an increase in run-off, one or more appropriate types of Sustainable Drainage System (SuDS) should be included in the scheme, such as:*
    - *Installing a green (sedum) roof on the new rear extension, although these offer no additional storage once they become fully saturated in a storm situation;*
    - *Intervention storage: water butts and/or other holding tanks to provide temporary interception storage (see also 10.7.10) from roof or patio run-off;*

- *Rainwater harvesting.*

Consideration could also be given to creating new areas of soft landscaping within the paved areas, which would reduce the net increase in hard surfacing. These SuDS schemes will require formal design, including accurate quantification of the increased area of hard surfacing in the rear garden."

- **London Clay is the shallowest strata at the site.**
- **Trees will be felled as part of the proposed development and/or works are proposed within tree protection zones where trees are to be retained**

"*The potential impact of any planned tree removals must be considered during detailed design*"

"..the adjoining No.25 probably remains on its original, shallow foundations (unless it has been underpinned owing to past subsidence problems). Future growth of tree roots beneath No.25's foundations might therefore cause differential foundation movement between No's 25 & 27, so the design must consider the implications of, and for, any existing trees which have the potential to affect the ground beneath No.25's foundations (following guidance in NHBC Chapter 4.2)."

Document 5 concludes that "*… the construction proposed, subject to precautionary measures as outlined above and as per the recommendations outlined below, will not be injurious to trees to be retained, nor will require unreasonable numbers of trees to be removed.*"

Document 2 concludes that *"No existing trees will be felled during the construction of the proposed works and no trees are affected by the proposed works nor are any trees protected by Tree Preservation Orders in the vicinity of the proposed works that will be damaged by the construction works."*

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

"*Review potential impact of any planned vegetation removal and future growth. Designer and contractor to take account of any weakening of the structure caused by past movements.*"

"Cracks in load-bearing walls which have weakened their structural integrity should be fully repaired, in accordance with recommendations from the appointed structural engineers, before any underpinning is carried out"

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

"*Ensure adequate temporary and permanent support by use of best practice underpinning methods.*"

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

"*Normal good practice in foundation construction requires progressive stepping up between foundations of different depths beneath a single structure. Transitional underpins should therefore be considered for the load-bearing walls in No.25 which adjoin No.27, subject to agreement under the Party Wall Act negotiations.*"

"A preliminary damage category assessment indicated that, under the worst case scenario, damage to No.25 is likely to fall within Burland Category 0, 'negligible', because the heave in response to the vertical stress reduction is likely to be almost completely off-set by settlement as the ground relaxes alongside the basement excavations. The impact on No.29 is expected to be even less, owing to the separation between the two properties (10.5.12 to 10.5.19)."

"*Condition surveys of the neighbouring properties should be commissioned and a programme of monitoring the adjoining structures should be established before the works start*"

- **The site is over (or within the exclusion zone of) tunnels, e.g. railway lines.**
  "*No railway tunnels are known to pass below or close to the site, although the NW Storm Relief Sewer is understood (from Thames Water's drawings) to pass beneath No's 51/53 Aberdare Gardens. Other infrastructure (including tunnels) for cables or communications might be present within the zone of influence of the proposed basement, so an appropriate services search should be undertaken. If any such infrastructure is identified, then its potential influence on the proposed basement must be assessed. These searches will not identify any private services.*"

  "*A services search should be undertaken for any tunnelled/deep utilities*"

- **The site is in an area known to be at risk from surface water flooding, or is it at risk from flooding, for example because the proposed basement is below the static water level of a nearby surface water feature.**
  "*While part of Aberdare Gardens is recorded as having flooded during the 1975 event, it did not flood in 2002 (10.7.4). The latest flood modelling by the Environment Agency gave a 'Very Low' risk of flooding by surface water to No.27 and all the immediately surrounding area; this is the lowest, national background level of risk. Appropriate flood mitigation measures are recommended*"

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 report meets the requirements.

Subterranean (groundwater) flow: The report meets the requirements.

Land stability: The report meets the requirements.

3.2.2 BIA Scope

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

The provided scope appears appropriate.

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?

Yes. A construction method statement has also been included in Document 2.

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.

Yes.

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, albeit a topographical survey would assist an understanding of the present configuration of the rear garden.

3.2.6 Assessment Methodology

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

Yes.

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)

The proposed mitigation appears to be reasonable.

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)

Yes. Albeit more frequent monitoring is considered appropriate during the underpinning process.

3.2.9 Residual Impacts after Mitigation

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

No significant groundwater impacts are envisaged. A structural movement damage category of 'negligible' has been predicted.

Although recommendations for appropriate mitigation are included in the BIA, a detailed drainage assessment does not appear to be available at this stage.

4. Assessment of Acceptability of Residual Impacts

4.1 Proposed Construction Methodology

The proposed construction methodology appears reasonable.

4.2 Soundness of Evidence Presented

The evidence provided appears sound.

4.3 Reasonableness of Assessments

The assessments made appear reasonable, albeit structural damage of a ‘slight’ rather than a ‘negligible’ damage category should perhaps to be anticipated.

4.4 Robustness of Conclusions and Proposed Mitigation Measures

The conclusions and proposed mitigation appear to be reasonably robust.

5. Conclusions

The BIA originally submitted reflected the processes and procedures set out in DP27 and CPG4.

However, it was considered that, in the absence of a specific ground movement and damage category assessment, the submission did not demonstrate sufficient detail and certainty to ensure accordance with DP27, in respect of maintaining the structural stability of the host building and the neighbouring properties.

A revised BIA has now been submitted that includes a specific ground movement and damage category assessment.

It is considered that the revised submission demonstrates sufficient detail to 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 and
c. Avoiding cumulative impacts on structural stability or the water environment

As with any scheme, there may be some concern that the recommendations contained within the BIA submission will be implemented in due course by the basement contractor, and consideration may therefore be given to requiring the appointment of a suitably qualified engineer to take responsibility for the design of the temporary works either as a condition of planning approval or by means of a Basement Construction Plan (BCP) secured by a Section 106 agreement.