Independent Review
of
Basement Impact Assessment for planning application 2014/4531/P
at

50 Redington Road
London
NW3 7RS

for
London Borough of Camden

LBH4277

September 2014

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 lower ground floor extending 0.4m below the lowest ground level with a two level basement extending a maximum of 6.2m below this level. This development will extend beneath the existing house footprint and into the rear garden. It should be noted that the existing house is to be demolished during redevelopment.

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.

An independent assessment of the developer's BIA has been requested due to the scale of the basement development and concern that the development proposals involve a basement which would be located on land which sits on Bagshot Beds.

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 Michael Alexander, dated 24th May 2014, Ref: P2092/ IH/ Issue 2.1
2. Desk Study and Ground Investigation Report by Geotechnical & Environmental Associates (GEA), dated May 2014, Ref: J12045
3. Design & Access Statement by Osel architects & development consultants, undated, Ref: E10-030/DAS.3
4. GEA Ground Movement Analysis by GEA, dated 12th May 2014, Ref: J12045A/HD/01

5. Planning Statement by Montagu Evans, dated July 2014, unreferenced
6. Heritage Statement by Montagu Evans, dated July 2014, unreferenced
7. Arboricultural Report by Crown Consultants, dated 14th July 2014, Ref: 09162
8. Proposed Drawings by Osel architects & development consultants, dated February 2014, Refs: E10-030/P10 (Section A-A' Rev A), E10-030/P11 (Section B-B' Rev A), E10-030/P12 (Section C-C' Rev A), E10-030/P13 (Section D-D' Rev A), E10-030/P14 (Section E-E' Rev A), E10-030/P15 (Section F-F' Rev A), E10-030/P01 (Lower Ground Floor Plan Rev E), E10-030/P00 (Basement Level 1 Plan Rev B), E10-030/P0B (Basement Level 2 Plan Rev A), E10-030/P05 (Front Elevation (From Street) Rev D), E10-030/P09 (Front Elevation (From Drive) Rev D), E10-030/P07 (Rear Elevation Rev D), E10-030/P06 (Side Elevation B (North West) Rev D), E10-030/P08 (Side Elevation D (South East) Rev D),

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 site is located directly above an aquifer.**
- **The proposed basement will extend beneath the water table surface.**
- **The site is within 100m of a watercourse, well (used/disused) or potential spring line.**

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:

- **The site is within a wider hillside setting in which the general slope is greater than 7 degrees.**
- **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 100m of a watercourse of a potential spring line.**
- **The site is within an aquifer.**
- **The proposed basement will extend beneath the water table such that dewatering may be required during construction.**
- **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 no potential issues of concern.

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 are scoping stages 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 site is located directly above an aquifer.**
  The guidance advises that the basement may extend into the underlying aquifer and thus affect the groundwater flow regime.

- **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 site is within 100m of a watercourse, well (used/disused) or potential spring line.**

  The guidance advises that the flow from a spring, well or watercourse may increase or decrease if the groundwater flow regime which supports that water feature is affected by a proposed basement. If the flow is diverted, it may result in the groundwater flow finding another location to issue from with new springs forming or old springs being reactivated. A secondary impact is on the quality of the water issuing or abstracted from the spring or water well respectively. Seasonal springlines and changes to groundwater regimes within slopes can affect slope stability

- **The site is within a wider hillside setting in which the general slope is greater than 7 degrees.**
  The guidance advises that there may be potential for a larger slope failure system including re-activation of a pre-existing slide.

- **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 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.

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).

Document 2 reports two phases of investigations, one in 2012 that comprised a cable percussion borehole to 20m and five percussive boreholes to between 4m and 8m depth. A second cable percussion borehole was undertaken to 25m depth in March 2014.

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 Impact Assessment stages with the following comments.

- **The site is located directly above an aquifer.**
- **The proposed basement will extend beneath the water table surface.**

"It is however noted that there is ample space for any perched groundwater to pass around the proposed basement. In summary, the report concludes that the construction of the new house and basement is therefore unlikely to have any significant influence on the local hydrogeology. "

"…there are not expected to be any significant changes to the groundwater flow regime as ground water flows will be able to pass below the level of the excavation and hence should readily pass around the proposed basement"

- **The site is within 100m of a watercourse, well (used/disused) or potential spring line.**

"It was noted that local ground water flows from springs are likely to be towards the source of the Westbourne River."

- **The site is within a wider hillside setting in which the general slope is greater than 7 degrees.**

"There are slopes in the vicinity of the site which are greater than 7 degrees. However, with reference to figures 4.04.10/1 and 4.04.10/2, these slopes are downhill from the proposed basement, and hence their stability will not be impaired by the proposed works."

- **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**

"…Trees T12, T13 & T14 are proposed to be removed from the front garden. These are small trees so the impact of their removal on the soil is likely to be localised. Within 50 Redington Road their former root system will be removed as part of the basement works small trees so the impact of their removal on the soil is likely to be localised."

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

"We understand that parts of no. 48 Redington Road have previously had foundation problems, but it is not known whether this was attributable to shrink swell subsidence."

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

"… predicted damage to the neighbouring properties would be either 'Negligible' or 'Very Slight'. On this basis, the damage that would inevitably occur as a result of such an excavation would fall within the acceptable limits."

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 does meet the requirements.

Subterranean (groundwater) flow: The report does meet the requirements.

Land stability: The report does meet the requirements.

3.2.2 BIA Scope

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

The potential issues of concern have been reasonably identified.

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.

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.

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)

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)

Yes. The structural monitoring proposals have not been described in full detail at this stage. The proposals should be enhanced and supported by a robust contingency plan that will provide reasonable reassurance to neighbouring parties that the works will not be permitted to cause adverse effects. For example both start of shift and end of shift measurements would be necessary during excavation in order for a contingency plan to be potentially effected sufficiently quickly to prevent excessive movement to the neighbouring properties. It is not clear at present what emergency measures or mitigation would be implemented in the event of an exceedance and who would have the responsibility for implementing the plan. The plan should also identify what additional resources would be required for implementation and how these would be made available without delay.

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

The proposed construction methodology is considered appropriate.

4.2 Soundness of Evidence Presented

The evidence appears sound.

4.3 Reasonableness of Assessments

The diagrammatic assessments of ground movement appear to possibly include a set of spurious movements centred some distance some outside the basement on the boundary with No. 52 Redington Road. These merit some form of explanation.

4.4 Robustness of Conclusions and Proposed Mitigation Measures

The ground movement analysis (Document 4) has concluded that the predicted damage to the neighbouring properties would be either 'Negligible' or 'Very Slight' on the basis of assumed walls of high stiffness. However, as it is considered that a damage category of Slight to Moderate might perhaps be anticipated for this depth of basement and configuration of neighbouring foundations, there is considered to be a need for a high standard of monitoring.

Document 4 concludes that *"The two phases of work, piling and subsequent excavation will in practice be separated by a number of weeks during which time construction of capping beams and pile curing will take place. This will provide an opportunity for the ground movements during and immediately after piling to be measured and the data acquired can be fed back into the design and compared with the predicted values. Such a comparison will allow the ground model to be reviewed and the predicted wall movements to be reassessed prior to the main excavation taking place so that propping arrangements can be adjusted if required."*

5. Conclusions

The submitted BIA reflects the processes and procedures set out in DP27 and CPG4 and it is considered that overall the submission demonstrates accordance with 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

However, it is considered that there are two aspects that would merit adjustment of the submission to provide greater certainty and reassurance.

These two issues, set out below, are not considered sufficiently critical to prevent a planning determination to be made. Hence it is envisaged that, at the discretion of the council, if this further information cannot be provided prior to determination it might reasonably be sought by condition that it should be approved by Camden prior to the commencement of any work.

5.1 Further Information Required

- An explanation of the apparently anomalous prediction of larger movements centred on a position to the north of the basement or the submission of a revised ground movement analysis.
- Information to clarify that a monitoring and contingency plan is to be agreed by all interested parties.