Independent Review
of
Basement Impact Assessment for planning application 2014/4851/P
at

25 Oakhill Avenue
London
NW3 7RD

for
London Borough of Camden

LBH4285

November 2014

LBH WEMBLEY

Geotechnical & Environmental

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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 level of basement beneath part of the rear footprint of the Grade 2 listed semi-detached property at 25 Oakhill Avenue and extending beneath an existing single storey extension and conservatory to the rear of property that are to be demolished and replaced by a new single storey extension with a similar footprint

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 Croft Structural Engineers, dated 23rd June 2014, revised 10th July 2014, Ref: 140407
2. Construction management plan by Teddington Architecture & Design Ltd, dated 29th August 2014, unreferenced
3. Design & heritage statement by Teddington Architecture & Design Ltd, dated 21st April 2014, unreferenced
4. Structural Monitoring Statement by Croft Structural Engineers, dated 23rd June 2014, Ref: 140407
5. Existing Drawings by The Teddington Architect, undated , Refs: 050-10-01 to -03, 050-13-01 to -05
6. Proposed Drawings by The Teddington Architect, undated , Refs: 050-20-00 to -03, 050-30-01 to -04

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 may extend beneath the water table surface.**
- **The site may lie within 100m of a watercourse, well (used/disused) or potential spring line.**

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.**
- **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).

There is scoping stage described in the BIA, but it contains several errors and inconsistencies. Nevertheless, the issues identified from the screening checklists as being of concern (assigned bold text in the previous sections) are as follows:

- **The proposed basement may 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 site may lie within 100m of a watercourse, well (used/disused) or potential spring line.**
  The guidance advises 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 spring lines and changes to groundwater regimes within slopes can affect slope 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).

- **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).

A ground investigation is included in Appendix D of Document 1 and comprised two small diameter percussive boreholes, one to almost 8m depth at the front of the property and one to 5m at the rear, and two trial pits to expose the existing foundations. No groundwater monitoring was 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 includes the following statements:

- **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.**

"The site investigation indicated that the water was encountered at 6.4m below ground. This is below the level of the basement, but was also taken in the summer. It is possible that the ground water may rise in the coming months and fluctuate throughout the year."

"The local affect (sic) of the basement will be to divert any flowing ground water away from the foot print of the building. To the front side and rear of the property large areas over 10m wide are present. With a large dispersal area for the flow to be diverted around the affects (sic) on the surrounding area will be minimal."

"Without field testing in the neighbouring properties or along the road there is a low residual risk that the ground wall (sic) flow may affect the external ground".

"The basement design must allow for variants in ground water. The retaining walls must be designed to provide lateral resistance to water up to 1m from the top of the wall."

"As no water was found in the bores a full hydrology report is not suitable."

"The investigations have highlight (sic) that water is a (sic) present"

"To allow for through flow of ground water the drawings SS03 shows a 150mm compacted Type (i) under the central slab. This will help though (sic) flow of any ground water that may build up around the edge of the building."

It has been stated within the Ground Investigation Report (Appendix D of Document 1) that *"If the construction works take place during the winter months, when the groundwater level is expected to be at its higher elevation, perched water could accumulate thus dewatering could be required to facilitate the construction and prevent the base of the excavation blowing before the slab was cast. The advice of a reputable dewatering contractor, familiar with the type of ground and groundwater conditions encountered on this site, should be sought prior to finalising the design of the excavation for the basement."*

"Dewatering from sumps introduced into the floor of the excavation is likely to be required if perched groundwater is encountered within the Made Ground or sand horizons of the Claygate Member of the London Clay Formation, especially after a period of excessive rainfall. Consideration should be given to creating a coffer dam using contiguous piled or sheet piled walls to aid basement construction below the perched water table."

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

It has been stated within the Ground Investigation Report (Appendix D of Document 1) that:

"The soils of the Claygate Member of the London Clay Formation were shown to have a medium potential for volume change in accordance both BRE240 and NHBC Standards Chapter 4.2".

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

"The party wall is to be underpinned. Underpinning the party wall will remove the risk of the movement to the adjacent property."

"It is not expected that any cracking will occurring (sic) during the works. However, our experience informs us that there is a risk of movement to the neighbours"

"To reduce the risk(sic) the development:

- *Employ a reputable firm for extensive knowledge of basement works.*
- *Employ suitably qualified consultants…*
- *Design the underpins to be stable without the need for elaborate temporary propping or needing the floor slab to be present.*
- *Provide method statements for the contractors to follow.*
- *Investigate the ground…*
- *Record and monitor the external properties…*
- *Allow for unforeseen ground conditions: Loose ground is always a concern…."*

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 appear to meet the requirements.

Subterranean (groundwater) flow: The report does not meet the requirements.

Land stability: The report does not meet the requirements.

3.2.2 BIA Scope

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

It appears that the screenings for subterranean flow and land stability have not been undertaken by or in conjunction with persons holding the required qualifications and there appear to be numerous inconsistencies and errors in the screening that has been undertaken.

It is considered that the following additional potential issues should be identified:

- **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.

- **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.

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?

No. For example the text states *"The cantilever pins are designed to be inherently stable during the construction stage without temporary propping to the head."*, but the design calculations appear to show prop forces.

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.

No. For example it is not clear whether or not the proposed excavation will encounter groundwater and it not clear what effect the underpinning of the property's main rear walls and party wall may have on the remainder of this property and the adjoining property.

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?

No. More information is required in regard to the existing surfacing and drainage and the proposed surfacing and drainage. The text states that *"the flow of surface water above the basement (top 1m of soil) will need to be considered"* but it is not clear where this concern applies.

3.2.6 Assessment Methodology

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

It is not clear how the predicted damage assessment of *"hairline"* cracking, "*slight*" and "*aesthetic*" damage has been arrived at.

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)

No. There is insufficient evidence that the potential for movement to the existing and neighbouring properties will be mitigated by the proposed scheme.

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)

A monitoring scheme is included in Document 4.

3.2.9 Residual Impacts after Mitigation

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

No discussion is provided of potential residual impacts.

4. Assessment of Acceptability of Residual Impacts

4.1 Proposed Construction Methodology

The proposed construction methodology may not be appropriate if groundwater is present and there is uncertainty that this methodology will not lead to unacceptable damage in either the short or the longer term to both the existing and the neighbouring structures.

4.2 Soundness of Evidence Presented

No groundwater monitoring has been undertaken.

4.3 Reasonableness of Assessments

The assessments appear to assume that:

- Groundwater will either not be encountered or not pose a threat to the proposed scheme.
- Minimal short term movements will result from conventional underpinning.
- No significant long term distress will occur as a result of the rear wall of the building being underpinned.

Each of these assessments would potentially be reasonable if supported by demonstrable evidence. Collectively they are questionable, and given the heightened sensitivity of a listed building context it is not be considered reasonable to make these assumptions on the basis of the evidence presented.

4.4 Robustness of Conclusions and Proposed Mitigation Measures

Given the intention to underpin the main rear walls of the existing listed structure it is considered that a significantly greater level of confidence is required that the works can be completed successfully.

5. Conclusions

The submitted BIA does not appear to comply with the processes and procedures set out in DP27 and CPG4. The present submission does not demonstrate sufficient certainty to ensure accordance with 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.

It is suggested that the concerns about the submission raised in sections 3 and 4 of this document will need to be addressed by the applicant by way the submission of a BIA that conforms with the author requirements.