Independent Review
of
Basement Impact Assessment for planning application 2014/2736/P
UPDATED

at
20 Brownlow Mews
London
WC1N 2LE

for
London Borough of Camden

LBH4257

November 2014

LBH WEMBLEY

Geotechnical & Environmental

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Foreword-Guidance Notes

GENERAL

This report has been prepared for a specific client and to meet a specific brief. The preparation of this report may have been affected by limitations of scope, resources or time scale required by the client. Should any part of this report be relied on by a third party, that party does so wholly at its own risk and LBH WEMBLEY Geotechnical & Environmental disclaims any liability to such parties.

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.

VALIDITY

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 extend the existing single level basement at this site laterally beneath the whole footprint of the existing building and to create a second basement level beneath this.

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 Price & Myers, dated October 2014, Ref: 22486 Ver. 2
2. Design and Access Statement by 6a Architects, dated April 2014, unreferenced
3. Desk study & Ground Investigation Report by Geotechnical & Environmental Associated, dated 2nd April 2014, Ref: J14028

4. Existing Floor Plans, Elevations & Sections by 6a Architects, dated 4th April 2014, Refs: (All Job 311), 0300, 0100, 0101, 0102, 0103, 0104, 0200 and 0201 (all revision A)
5. Proposed Floor Plans, Elevations & Sections by 6a Architects, dated 4th April 2014, Refs: (All Job 311), 0101 (Sub-Basement), 0101 (Basement, Revision A), 0101 (Ground Floor, Revision A), 0102 (First Floor, Revision A), 0102 (Revision A), 0103 (Revision A), 1105 (Revision A), 1201, 1202, 1204 (Section C, Revision A) 1204 (Section D), and 1300.
6. Site Block Plan by 6a Architects, dated 4th April 2014, Ref: (Job 311), 0001
7. Annotated Drawings by Price & Myers (Appendix A), dated 23rd September 2014, Refs: 22486/01. 22486/02 and 22486/10
8. Asset Location Search by Thames Water Utilities Ltd (Appendix A), dated 30th January 2014, Ref: 12997DM ALS/ALS Standard/2014_2675654
9. Hydrogeological Assessment by Geotechnical Consulting Group (GCG) (Appendix E), dated October 2014, Ref: 0037\10089 Rev. 0
10. Building Damage Assessment by Geotechnical Consulting Group (Appendix F), dated October 2014, Ref: 0037\10089 Rev. 0

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 **NOT** included in the BIA (Document 1). However it may be reasonably deduced from the document that:

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

3.1.1.2 Stability

A screening checklist for the impact of the proposed basement on land stability is **NOT** included in the BIA (Document 1). However it may be reasonably deduced from the document that:

- **The site is within an area of previously worked ground.**
- **The site is within an aquifer.**
- **The proposed basement will extend beneath the water table such that dewatering may be required during construction.**
- **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 **NOT** included in the BIA, (Document 1). However it may be reasonably deduced from the document that no potential issues have been identified.

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 is provided in the BIA (Document 1). However the issues reasonably identified from the document 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 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 basement will extend beneath the water table such that dewatering may be required during construction.**
  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 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.

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 site investigation has been submitted (Document 3) and comprised a series of three boreholes and two dynamic probes extended to depths of up to 9m below the ground level, together with four hand dug trial pits to expose the existing foundations. A groundwater monitoring standpipe was installed and a subsequent monitoring visit was undertaken three weeks later.

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 a formal Impact Assessment stage. However, discussion of some of the issues is provided within the document as follows:

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

A hydrological report (Document 9) is now included as Appendix E; this concludes that *"The calculated changes in hydraulic head are shown to be very small and are less than the typical seasonal variations in hydraulic head in this area of London. On this basis it can be said that the impact of the basement on the shallow aquifer is very minor."*

- **The proposed basement will extend beneath the water table such that dewatering may be required during construction.**

Document 9 states that "*Permeation grouting will be employed to facilitate the construction of underpins beneath the water table. The grouting works will limit groundwater flow both into underpin pits and into the main excavation*."

Document 1 states "*Where the excavation for the lower level of underpinning is required to extend below the water table an initial pin will be excavated to confirm how difficult it will be to provide temporary support to the excavation below the water level and if it may be possible to control the ground water by pumping. However it is expected that permeation grouting is likely to be required to control the water flow during the excavation below the water table until the basement concrete box has been completed. This work will be carried out by a suitably experienced sub-contractor*."

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

Document 1 states that "*The design and construction of the basement structure will be planned to ensure the continued stability of the adjacent highway..."*

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

Document 1 states *"This differential depth is considered acceptable – at present the front and southern part of the building are set one storey above the adjoining single storey basements; in this area the excavation will bring the site levels down to a level similar to that in the adjoining building."*

The document also states "*The construction of the basement works will be planned to minimise movement in the ground around the excavation and so avoid causing any damage to adjoining properties"* and "*The design and construction of the basement structure will be planned to ensure the continued stability of the adjacent highway and adjoining properties, and to protect the amenity of neighbours."*

Document 1 states that the Building Damage Assessment (Document 10) in Appendix F "*has considered the effort of the proposed construction on adjoining buildings due to both excavation movement and changes in vertical loading. The excavation movements are estimated but considered to be acceptable , while the ground movements due to changes in vertical loads as a result of excavation have been estimated using the OASYS program PDISP. Taken together the overall movements are expected to cause no more than very slight or slight damage to adjoining buildings. This is noted as being dependant on good standards of workmanship being maintained during the underpinning work."*

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: It is probable, but not certain, that the report meets the requirements.

Land stability: It is probable, but not certain, that the report meets the requirements.

3.2.2 BIA Scope

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

The scope of issues of concern has been checked against the flowcharts it is considered that they have been identified in section 3.1.2 above.

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 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)

Further consideration as to the method of construction has been given along with an assessment of the likely damage and groundwater impact.

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)

The BIA does not assess a need for monitoring but a draft construction management plan is included within the Design and Access Statement (Document 5) that states:

"Following the appointment of the contractor, a final plan will be drafted with more detailed provisions and proposals including:
- Provisions to ensure the stability of land and buildings during and after construction
- Provisions for monitoring movement and damage caused by construction"

Document 10 reiterates the need for monitoring, stating *"It is recommended that ground movements and buildings movements are monitored during the underpinning, grouting and excavation stages of the basement redevelopment."*

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 now involves an initial trial excavation and permeation grouting to exclude wall ingress. This appears reasonable.

4.2 Soundness of Evidence Presented

It appears the evidence presented is sound.

4.3 Reasonableness of Assessments

The assessments appear reasonable.

4.4 Robustness of Conclusions and Proposed Mitigation Measures

The conclusions and proposed mitigation provided appear sufficiently robust to stand the test of DP27.

5. Conclusions

The originally submitted BIA did not demonstrate sufficient certainty that the proposed construction methodology of traditional underpinning would be acceptable to ensure accordance with DP27.

A revised submission has now been provided that includes a specific requirement for the construction of monitored initial trial underpin excavations to full depth in advance of the proposed second stage, and the use of permeation grouting to control water ingress.

The revised submission also provides a detailed assessment of the extent of the possible movements and damage to the neighbouring structures to be expected during and after the works.

Although the revised BIA does not wholly reflect the processes and procedures set out in DP27 and CPG4 it is considered that the submission does now demonstrate sufficient certainty 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