Independent Review
of
Basement Impact Assessment for planning application 2014/6449/P (UPDATED)
at

Bartram's Convent Hostel
Rowland Hill Street
London
NW3 2AD

for
London Borough of Camden

LBH 4303

March 2015

LBH WEMBLEY

Geotechnical & Environmental

Project No: LBH 4303

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Report approved by:

Digitally signed by Seamus Lefroy-Brooks
DN: cn=Seamus Lefroy-Brooks, o, ou=LBH WEMBLEY, email=seamus@LBHGEO.co.uk, c=GB
Date: 2015.03.11 10:29:04 Z

S R Lefroy-Brooks BSc MSc CEng MICE CGeol FGS CEnv MIEnvSc FRGS SiLC

Principal Engineer

LBH WEMBLEY Geotechnical & Environmental
Unit 12 Little Balmer
Buckingham Industrial Park
Buckingham
MK18 1TF

Tel: 01280 812310

email: enquiry@lbhgeo.co.uk

website: www.lbhgeo.co.uk

Contents

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.

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

Following the demolition of the existing buildings at the site it is proposed to construct a new eleven storey building with a lower ground floor and basement.

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 Card Geotechnics Limited, dated February 2015, Ref: CG/08753 Rev 4
2. Construction Management Plan by AECOM, dated September 2014, unreferenced
3. Design and Access Statement by Tibbards planning and urban design, dated October 2014, unreferenced
4. Tree survey and Arboricultural statement by Tree Maintenance Limited, dated September 2014, Ref: 11099/47257
5. Existing Drawings by Duggan Morris: Ground Survey Plan Ref A213-A-P-(00)-101, Demolition plan Ref: 103, Elevation North Ref: 201, Elevation East Ref: 202, Elevation South Ref: 203, Elevation West Ref 204, Demolition North Ref: 205, Demolition East Ref: 206, Demolition South Ref: 207, Demolition West Ref: 208

6. Proposed Drawings by Duggan Morris , Basement Floor Plan Ref: A213-A-P-(01)-101, Lower Ground Floor Plan Ref: 102, Ground Floor Plan Ref:103, First Floor Plan Ref: 104, South Elevation Ref 201, East Elevation Ref: 202, North Elevation Ref: 203, West Elevation Ref: 204, Section A-A Ref: 301, Section B-B Ref 302
7. Proposed Below Ground Drainage Layout, by Elliot Wood, dated 10th February 2015, Ref: D/002 Revision P2
8. Email from Thames Water Development Planning Department regarding sewerage capacity, dated 16th February 2015 (12:09)

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 development will result in a change in the proportion of hard surfaced areas**

3.1.1.2 Stability

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 development neighbours land (including railway cuttings and the like) with a slope greater than 7 degrees (about 1 in 8).**
- **London Clay is the shallowest stratum at the site**
- **Trees will be felled as part of the development or works are proposed within tree root protection areas where trees are to be retained**
- **There may be a history of shrink/swell subsidence in the local area and/or there is evidence of such 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 neighbouring properties**
- **The site is over (or within the exclusion zone of) tunnels.**

3.1.1.3 Surface Flow and Flooding

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 proportion of hard surfaced/paved areas**

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 an identified scoping stage described in the BIA. The issues identified in the initial screening have been assigned bold text and are as follows:

- **The proposed development will result in a change in the proportion 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.

- **The development neighbours land (including railway cuttings and the like) with a slope greater than 7 degrees (about 1 in 8)**
  The guidance advises that there may be instability within the neighbouring site(s).

- **London Clay is the shallowest stratum 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 development or works are proposed within tree root protection areas 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 may be a history of shrink/swell subsidence in the local area and/or there is evidence of such 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 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 any) tunnels.**
  The guidance advises that excavation for a basement may result in damage to the tunnel.

The scoping stage identifies the following four objectives of the ground investigation required to adequately investigate the potential issues

1. Determine the ground conditions on site and their variability
2. Install groundwater monitoring standpipes to determine groundwater levels
3. Undertake in-situ testing to assess the strengths of the ground and to support geotechnical assessment
4. Obtain soil samples for geotechnical laboratory testing in order to classify the soils on site, to determine where desiccation is present on site, and to support geotechnical design.

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).

An intrusive ground investigation was undertaken in April 2014 and comprised five cable percussion boreholes to a maximum depth of 30m, all of which were fitted with groundwater monitoring standpipes to a maximum depth of 20m.

Eleven hand-dug trial puts were also dug to expose existing foundations.

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) includes an Impact Assessment stage and the following comments are made in relation to the identified potential issues of concern:

- **The development neighbours land (including railway cuttings and the like) with a slope greater than 7 degrees (about 1 in 8)**

"It is considered that there is no significant risk to the northeastern slope towards the Royal Free Hospital, the Hospital buildings or the northwestern buildings of the Rosary Primary School due to the piled basement. However, placement of the piling rig on or near the crest of the slope may cause ground movements. The piling rig should therefore be placed away from the crest of the slope towards the Royal Free Hospital to limit its effect on the slope"

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

"It is assumed that the ground along the northern boundary will be held with a retaining wall limiting ground movements."
"It is understood a contiguous piled wall will be adopted to form the majority of the new basement wall.."

- **London Clay is the shallowest stratum at the site**
- **There may be a history of shrink/swell subsidence in the local area and/or there is evidence of such at the site**

"Heave protection will be provided below the basement slab and the ground floor slab outside of the basement footprint due to the unloading of the soils resulting from the excavation, and the potential for seasonal movement due to nearby trees".

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

"The construction of the basements will generate ground movements due to a variety of causes including heave, settlement, underpin and pile construction, and piled wall deflection during and after excavation. Calculations indicate that these will give rise to a damage category within 'Category 1' ('very slight') for the adjacent property (Rosary Primary School)."

- **The site is over (or within the exclusion zone of any) tunnels.**

"the historical Belsize Lane Deep Shelter, a Second World War air raid shelter … is present beneath the southeastern part of the site. An assessment has previously been undertaken by CGL to analyse the effect of the proposed development on this historical shelter. The assessment found that the stress increase calculated due to proposed pile loading fell well below the allowable limits set by LUL for existing tunnels. The assessment has been approved by LUL and no further analysis is therefore required".

- **Trees will be felled as part of the development or works are proposed within tree root protection areas where trees are to be retained**

"Existing trees are to be removed and new trees planted as part of the proposed development. Due to the high volume change potential of the underlying soils, trees of an appropriate water demand should be chosen for the site, based on current NHBC guidance".

"Heave protection will be provided below the basement slab and the ground floor slab outside of the basement footprint due to the unloading of the soils resulting from the excavation, and the potential for seasonal movement due to nearby trees".

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

"*..the proposed basement is likely to cause variations in surface water flow or flood risk as it will extend beneath existing soft landscaped areas. The proposed development aims to reduce peak surface water runoff by up to 50% of the existing rate.*"

The Drainage Strategy within BIA appendix J (Structural and Drainage Supplementary Information for Basement Impact Assessment) notes the following:

"*The existing onsite drainage network is unlikely to suit the requirements of the proposed development* [and] *… the majority of the existing network will be replaced. Current proposals will be to retain and reuse the existing connection to the Thames Water sewer.*"

"Proposals will aim to reduce surface water run off for the new development by up to 50% of the existing rate, in line with the London Plan".

"A Pre-Development enquiry has been submitted to Thames Water to assess the capacity of the offsite sewers. Thames Water have confirmed that if the total combined discharge from the site is no greater than the existing they would have no objections to the proposals".

A response from Thames Water following discussion between the applicant and Thames Water confirms that *"with regard to sewerage infrastructure capacity, we would not have any objection to the above planning application".* This accompanies a proposed below ground drainage layout (Document 7)

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 BIA scope is considered 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.

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.

3.2.9 Residual Impacts after Mitigation

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

Yes.

"Calculations indicate …. a damage category within 'Category 1' ('very slight') for the adjacent property (Rosary Primary School)"

"It is considered that there is no significant risk to the northeastern slope towards the Royal Free Hospital, the Hospital buildings or the northwestern buildings of the Rosary Primary School…"

4. Assessment of Acceptability of Residual Impacts

4.1 Proposed Construction Methodology

The submission does not include a full description and sequence of the proposed works, but there is sufficient information contained within the submission to conclude the construction methodologies that are intended.

4.2 Soundness of Evidence Presented

The presented evidence appears sound.

4.3 Reasonableness of Assessments

The assessments appear reasonable.

4.4 Robustness of Conclusions and Proposed Mitigation Measures

The conclusions and proposed mitigation measures appear to be sufficiently robust.

5. Conclusions

The submitted BIA does generally reflect the processes and procedures set out in DP27 and CPG4.

However, in order to demonstrate sufficient detail and certainty to ensure accordance with DP27 in respect of

a. Maintaining the structural stability of any neighbouring structures

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 council should, prior to the commencement of any development, require to approve by condition or by a Basement Construction Plan (BCP) secured through a Section 106 Agreement:

- **The appointment of a suitably qualified structural engineer to take responsibility for the temporary works design**
- **A definitive temporary works design and sequence**
- **A detailed monitoring and contingency plan**