Independent Review
of
Basement Impact Assessment for planning application 2014/6987/P (UPDATED)
at

Capo Di Monte
Windmill Hill
Hampstead
London
NW3 6RJ
for
London Borough of Camden

LBH4304

April 2015

LBH WEMBLEY

Geotechnical & Environmental

Project No: LBH4304

Report Ref: **LBH4304 Ver 2.0**

Date: 8th April 2015

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Foreword-Guidance Notes

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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 deepen the existing basements that are present beneath parts of the Grade II Listed Building at this site. Additionally, a single level basement extending to around 3.5m depth is to be constructed below the present garden area and the rear extensions of the property. Part of the southern rear extension is to be demolished and rebuilt while the northern rear extension is to be preserved.

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 HR Wallingford, Ref: MAM7359-RT001-R01-00, dated November 2014.
2. Structural Engineer's Report by Michael Barclay Partnership, Ref: 6036, dated November 2014
3. Existing Plans, Elevations, Sections by Charlton Brown Architects, Refs 1249/S 01, 1249/S 02, 1249/S 03, 1249/S 06, 1249/S 07, 1249/S 08, 1249/S 09,1249/S 10 and 1249/S 11, undated.
4. Proposed Plans, Elevations and Sections by Charlton Brown Architects, Refs: 1249/AP 01, 1249/AP 02, 1249/AP 03, 1249/AP 06, 1249/AP 07, 1249/SK 04, undated.
5. Tree Survey and Arboricultural Method Statement, Ref: 1249, dated October 2014
6. Draft Construction Management Plan by Charlton Brown Architects, Ref: 1249, Revision 1, Dated October 2014
7. Specification for Underpinning by Michael Barclay Partnership Ref 6036, undated.

8. Engineering Drawings by Michael Barclay Partnership Ref 6036-301 to 311, 320,321,dated February 2015
9. Addendum to Structural Engineer's Report by Michael Barclay Partnership Ref 6036, dated 9th March 2015
10. Letter from HR Wallingford of 27th February 2015, Addendum to Structural Engineer's Report Appendix A Ref 6036
11. Appendix B Addendum to Structural Engineer's Report, Ref 6036, dated February 2015
12. Trial Pit Investigations, Addendum to Structural Engineer's Report Appendix C Ref 6036, dated February 2015
13. Ground Movements Assessment Addendum to Structural Engineer's Report Appendix D Ref 6036, dated February 2015
14. Monitoring Plans 6036-303, 308, Addendum to Structural Engineer's Report Appendix E , dated February 2015
15. Letter from Michael Barclay Partnership of 9th March 2015, Ref 6036AJB
16. Ground Investigation Report by Ground Engineering, Ref:C13361A, dated February 2015
17. Geotechnical Interpretive Report for 4 Upper Terrace by Geotechnical Consulting Group, unreferenced, Dated April 2013

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.**

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:

- **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 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 development neighbours land, including railway cuttings and the like, with a slope greater than 7 degrees.**

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).

The screening checklist does not identify any 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).

A specific scoping stage has not been provided in the BIA. However comments have been provided in the screening exercise which consider the issues raised, and the issues that require assessment can reasonably be identified 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 such that dewatering may be required during construction.**
  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 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.

- **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.

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

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 ground investigation submitted comprised a single window sample borehole to 6m depth together with four trial pits to expose the existing foundations.

The BIA also relies upon information from ground investigations at a neighbouring property, No. 4 Upper Terrace in 2013.

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 the supplied documents include the following comments in relation to the identified potential issues of concern:

- **The site is located directly above an aquifer.**
- **The proposed basement will extend beneath the water table such that dewatering may be required during construction.**

"The lowest point of the proposed Capo Di Monte basement (about 4m below the garden level) will therefore be above the groundwater level in the area. This means that the basement structure will not form a barrier within an area of groundwater flows and so will not have an impact on groundwater flows and / or levels"

"It is anticipated that the proposed basement will affect neither the amount of water nor where and how it flows through the ground. No impacts on the local aquifer are expected."

"Water level information from the borehole in the area suggest the slight possibility of a localised perched water table. If this is the case then dewatering requirements during construction should be quite limited"

- **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**

"*One tree (number 1) … in the rear garden will be felled – a 6m high Bay tree."*

"Tree number 10 – a 17m high Lime Heath tree – is well outside of the wall and about 5m from the closest part of the excavation – beyond Judges Walk."

"Incursions into Root Protection Areas are not anticipated. If they do occur they will be very minor – less than 1%."

"The project tree specialist has advised that there are no significant issues associated with trees within or near Capo Di Monte."

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

"Details of infrastructure have been obtained. However, nothing critical has been identified either within the site or in the surrounding area."

""The chosen method of construction minimises the plan extent of excavation and so minimises the impact on adjacent properties, trees and the highway. The new basement walls will require careful propping during excavation so as to minimise the risk of ground movement during excavation."

"The proposed design is to take full account of existing foundations and other structures. It will include temporary propping of the works and monitoring for movement."

- **The development neighbours land, including railway cuttings and the like, with a slope greater than 7 degrees.**

"There is a small area of land about 70m to the north of the site with a local slope greater than 7^{o}. It is at a lower elevation than the site. The excavation for the basement will not cause any slope stability problems in that area."

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 and 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. The Structural Engineers Report (Document 2) states that *"the cumulative effect of these three sources of movement will result in no more than 'slight' damage (ie Category 2 Burland Damage Chart) within the existing building and negligible damage to the adjacent buildings"*.

4. Assessment of Acceptability of Residual Impacts

4.1 Proposed Construction Methodology

The proposed methodology appears to be acceptable.

4.2 Soundness of Evidence Presented

The evidence presented appears to be sound.

4.3 Reasonableness of Assessments

The assessments appear to be reasonable.

4.4 Robustness of Conclusions and Proposed Mitigation Measures

The conclusions and proposed mitigation appear to be sufficiently robust to meet the requirements of DP27 and CPG4.

5. Conclusions

The originally submitted BIA did not wholly reflect the processes and procedures set out in DP27 and CPG4. It was considered that in order to meet the requirements of DP27 further information was required as follows:

- Additional ground investigation to confirm the ground and groundwater conditions around the property.
- Additional information on the structural configuration of the foundations to both the host building and those of the adjacent buildings.
- A more detailed assessment of ground movements.
- Additional structural assessment to assess the sensitivity of the host building and neighbouring buildings to accommodate the predicted movements.
- A more detailed construction sequence and methodology indicating in detail how the host building and neighbouring structures are to be protected in the temporary and permanent situations.
- A detailed monitoring and contingency plan.

Additional ground investigation has not been undertaken to confirm the ground and groundwater conditions around the property. However it is noted from the geotechnical report now submitted that the geotechnical consultant does not appear to be in any way dissatisfied with the amount of investigation undertaken.

Additional information on the structural configuration of the foundations to the host building has now been submitted. It is also noted that "*The configuration of the foundations of the neighbouring buildings has been studied by Charlton Brown Architects using historic records. The findings of this study are presented in Appendix F as drawings 150219-001-005*".

A more detailed assessment of ground movements has now been submitted including a damage category assessment for neighbouring structures.

A detailed construction sequence and methodology has now been submitted including details of the temporary works to be provided to protect the host building and neighbouring structures.

A detailed monitoring and contingency plan has now been submitted.

In the light of the additional submissions it is considered that the present submission now meets the requirements of DP27 and CPG4 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