of Basement Impact Assessment for planning application 2014/6068/P UPDATED

**Independent Review** 

at

20 Guilford Street London WC1N 1DZ

for

London Borough of Camden

LBH 4310

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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.

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# 1. Introduction

Following the demolition of the existing buildings at the site it is proposed to construct a new building that is slightly larger in plan than the existing buildings. Below ground the proposed building will extend the existing basement area in plan and deepen it significantly from a predominantly single to a double 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 Pell Frischmann, ref: PF-12692-RP-002 Revision C, dated 22<sup>nd</sup> August 2014.
- 2. Construction Management Plan by Gardiner & Theobald LLP, dated 5<sup>th</sup> September 2014, unreferenced
- 3. Design & Access Statement by Stanton Williams, dated 5<sup>th</sup> September 2014, unreferenced.
- Arboricultural Assessment, by Simon Jones Associated Ltd, ref: SJA air 13012-02b, dated 5<sup>th</sup> September 2014.
- 5. Drawings and sections by Stanton Williams, 464-PL-200, 464-PL-201, 464-PL-252
- Revised Drawings and sections by Stanton Williams, refs: 464-PL-202 (revision 1), 464-PL-250 (revision 1) and 464-PL-251 (revision 1) all dated 22<sup>nd</sup> December 2014
- 7. Factual Geo-Environmental Site Assessment by RSK Environment Limited, ref: 26772-R01(02), dated July 2014.
- 8. Predicted Ground Movement Report by Pell Frischmann, ref PF-12692-RP-0012, dated 6<sup>th</sup> February 2015.

# 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

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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.

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# 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

# 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:

- 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 is a history of shrink/swell subsidence in the local area and/or there is evidence of such at the site
- The site is within an aquifer and 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 neighbouring properties

# 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).

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This 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).

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 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 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.

• 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 an aquifer and 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.

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• 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.

# 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 7 details an intrusive ground investigation undertaken in February and March 2014 that comprised 4 cable percussion boreholes extended to 30m depth, including the installation of groundwater and ground gas monitoring standpipes. A further 5 trial pits were hand excavated 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:

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

".. two trees are proposed to be removed and .. the remaining trees would have no incursion on the Root Protection Area although some pruning is planned."

• 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 investigations undertaken confirmed that the site is underlain by London Clay which is commonly recognised as having a high plasticity index and this has been verified by soil testing. As a result the clay will be susceptible to seasonal shrink-swell as is much of central London. While no specific damage has been identified to surrounding buildings the soil properties have been identified and design will be accounted for in foundation design".

"The basement depth ... avoids season's shrink-swell effects on the new building as this phenomenon is limited to shallow soils".

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

"..as part of the basement construction the relatively shallow 1m thick layer of Hackney Gravel will be excavated away from within the plan area of the basement. As the proposed development is located at the western extent of the Hackney Gravel (see Figure 6: Superficial Geological map of site.) the introduction of the basement will locally reduce the western boundary of the aquifer to that of the east wall of the basement. This will only affect a small localised volume of gravel at the very perimeter of the aquifer."

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"... the local groundwater flow in the aquifer is likely to be towards the south east and away from the proposed development site. Based on this groundwater flow direction, the orientation of the proposed basement and the minor relocation of the aquifer boundary that will occur with the introduction of the basement it is considered that both the local groundwater flow regime and groundwater levels around the perimeter of the basement are unlikely to change significantly."

"During construction, localised and limited dewatering will be required on site due to the excavation of the water bearing Hackney Gravel. To limit this incursion construction will take place within a sheet piled cofferdam which will be toed into the London Clay to cut off the perched groundwater from flowing into the basement excavation."

"In the permanent building a significant head of water risks building up and floating the building as groundwater slowly seeps through the clay. To prevent this, a subbasement change system has been schemed to remove the slow ingress of groundwater in the long term".

# • The site is within 5m of a highway or pedestrian right of way

"To ensure retention of the highways and to prevent excessive ground movement damaging utilities in the pavement we have considered not only the retaining wall design but also the construction sequence in order to control ground movement."

The Construction Management Plan (Document 2) includes detailed proposals by Pell Frischmann relating to the demolition of the existing building and the associated interfacing construction of the new basement substructure. Their report describes sequential phases of demolition and the construction of the new basement, including detail of the construction methodologies to be employed to minimise surface movements

# • The proposed basement will significantly increase the differential depth of foundations relative to neighbouring properties

"The new basement is intended to be founded on a raft foundation which will provide a basement 7m deeper than the existing building and lower than the likely foundation depth of the neighbouring building at 3 Guilford Street".<sup>1</sup>

"Formation of the new basement excavation will cause the base of the excavation to heave before the new building weighs the ground back down. Meanwhile the temporary works to the new retaining wall formation will lead to a slight relaxation of surrounding soil all of which will cause ground movements around the redevelopment. These effects are, however, calculable and well understood and with the aid of data collected during site investigations will be assessed for agreement with neighbours and highways before being monitored during site works for verification".

Document 8 concludes "The calculations presented herein demonstrate that No. 4 Guildford Place will be not be affected by horizontal or vertical ground movement associated excavation in front of the sheet pile wall for the construction of the basement structure at CRRDC.

From the assessment carried out, the potential building damage falls just within the CIRIA C580 Category 0 Damage Classification, with visible damage likely to be negligible."

<sup>&</sup>lt;sup>1</sup> It may be reasonably assumed that reference to No. 3 Guilford Street is intended to refer to No.4 Guilford Place.

# 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	<ul> <li>A Hydrologist or a Civil Engineer specialising in flood risk management and surface water drainage, with either:</li> <li>The "CEng" (Chartered Engineer) qualification from the Engineering Council; or a Member of the Institution of Civil Engineers ("MICE); or</li> </ul>
	• The C.WEW (Chartered Water and Environmental Manager) qualification from the Chartered Institution of Water and Environmental Management.
Subterranean	A Hydrogeologist with the "CGeol" (Chartered Geologist) qualification from the
(groundwater)	Geological Society of London.
flow	
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:** Authorship qualifications have not been provided. It is not clear whether the report meets the requirements.

**Subterranean (groundwater) flow:** Authorship qualifications have not been provided. It is not clear whether the report meets the requirements.

Land stability: Authorship qualifications have not been provided. It is not clear whether 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 appears to be satisfactory.

# 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.



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#### 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. Although no specific assessment has been presented, it may reasonably be assumed that the ground movement assessment for No.4 Guilford Place Street is a worst case scenario and that Millman Court will be affected to a lesser extent.

### 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)

No detailed monitoring or contingency plan has been submitted, but given the predicted lack of impact t neighbouring buildings this is not considered to be a critical issue.

# 3.2.9 Residual Impacts after Mitigation

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

Yes. Although no specific ground movement assessment has been presented for other than No.4 Guilford Place Street, this reflects a worst case scenario hence it is presumed that no residual impacts are envisaged.

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# 4. Assessment of Acceptability of Residual Impacts

# 4.1 Proposed Construction Methodology

The proposed methodology appears sound.

# 4.2 Soundness of Evidence Presented

The evidence that has been presented appears sound.

# 4.3 Reasonableness of Assessments

The assessments appear reasonable.

# 4.4 Robustness of Conclusions and Proposed Mitigation Measures

The proposed mitigation methods detailed in Document 2 appear robust.

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# 5. Conclusions

The submitted BIA reflects the processes and procedures set out in DP27 and CPG4 and it is considered that the submission accords 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 and

c. Avoiding cumulative impacts on structural stability or the water environment.

Hence, provided that evidence is supplied to confirm that the author qualifications meet the requirements of 3.2.1 above, the submission may be considered acceptable.