

**Independent Review  
of  
Basement Impact Assessment for  
planning application 2014/1938/P  
at**

**35 South Hill Park  
London  
NW3 2ST**

**for  
London Borough of Camden**

**LBH 4280b  
January 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 construct a basement under the footprint of the existing semi-detached house and to excavate the front garden to form a lightwell..

### 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 Ecologia, dated 5<sup>th</sup> March 2014, Ref: 13.032.3
2. Design and Access Statement by David Mikhail Architects, dated March 2014, unreferenced
3. Construction Method Statement by David Mikhail Architects, dated February 2014, Ref: 940/SJS
4. Proposed Drawings by David Mikhail Architects, dated 10<sup>th</sup> January 2014, Refs: AL(1) 100, 200 – 204
5. Basement Structural Drawings by BTA Structural Design, dated January 20014, Ref 940
6. Objecting Letter from First Steps to Ms A Gailey, dated 23<sup>rd</sup> April 2014
7. Objecting Review Report by Eldred Geotechnics, dated 23<sup>rd</sup> April 2014, Ref: G1406-RP-01-E1
8. Response Letter from BTA Structural Design to Camden, dated 2<sup>nd</sup> May 2014, Ref:940/JGBB
9. Response Letter from Ecologia to Ms C Markey, undated.

## 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 within 100m of a watercourse, well (used/disused) or potential spring line.**
- **The proposed development will result in a change in the area of hard-surfaced/paved areas.**

##### 3.1.1.2 Slope Stability

A screening checklist for the impact of the proposed basement on land stability is included in the BIA (Document 1).

This identifies the following potential issues of concern:

- **London Clay is the shallowest strata at the site.**
- **There is a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site.**
- **The site is within 100m of a watercourse of a potential spring line.**
- **The site is within 50m of the Hampstead Heath ponds.**
- **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 included in the BIA (Document 1).

This identifies the following potential issues of concern:

- **As part of the site drainage, surface water flows (e.g. rainfall and run-off) will be materially changed from the existing route.**
- **The proposed basement 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).

Checklists have been provided in the BIA and there is scoping stage described in the BIA.

The issues identified from the checklists as being of concern have been assigned bold text in the previous sections and are as follows:

- **The site is within 100m of a watercourse, well (used/disused) or potential spring line.**

*The guidance advises The flow from a spring, well or watercourse may increase or decrease if the groundwater flow regime which supports that water feature is affected by a proposed basement. If the flow is diverted, it may result in the groundwater flow finding another location to issue from with new springs forming or old springs being reactivated. A secondary impact is on the quality of the water issuing or abstracted from the spring or water well respectively.*

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

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

*The guidance advises that of the at-surface soil strata present in LB Camden, the London Clay is the most prone to seasonal shrink-swell (subsidence and heave).*

- **There is a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site.**

*The guidance advises that there are multiple potential impacts depending on the specific setting of the basement development. For example, in terraced properties, the implications of a deepened basement/foundation system on neighbouring properties should be considered.*

- **The site is within 50m of the Hampstead Heath ponds.**  
*The guidance advises that the Panel Engineer for the reservoirs would require details of excavations in the vicinity of the reservoirs.*
- **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.*
- **The site is over (or within the exclusion zone of) tunnels, e.g. railway lines.**  
*The guidance advises that excavation for a basement may result in damage to the tunnel.*
- **As part of the site drainage, surface water flows (e.g. rainfall and run-off) will be materially changed from the existing route.**  
*The guidance advises that basement development may increase the load on the sewer and drainage systems if it leads to increased occupancy of dwellings. In turn this may increase the risk of flooding should the sewer and drainage systems become overwhelmed. Constructing a basement, either beneath or adjacent to an existing building will typically remove the permeable shallow ground that previously occupied the site footprint. This reduces the capacity of the ground to allow rainfall to be stored in the ground (which in essence acts as a natural SUDS, or sustainable urban drainage system). This runoff must then be managed by other means (eg through construction of SUDS), to ensure that it doesn't impact on adjoining properties or downstream watercourses. For sites in the catchments of the pond chains the potential impacts listed above under (1) apply if the resulting changes in drainage affect the flow to the ponds.*

### 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 for both this property and the adjacent attached property, No. 33, was undertaken in November 2013. Within this property two boreholes were completed to 6m depth by hand augering and three trial pits were constructed to expose the existing foundations

Within the adjacent property a continuous flight auger borehole was sunk to 10m depth within the rear of the garden and two further trial pits were constructed to expose the existing foundations.

Groundwater monitoring standpipes were installed in two of the boreholes, one on each property, and subsequent visits were carried out one, two and eight 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) includes an assessment of impacts and the following comments have been made:

- **The site is within 100m of a watercourse, well (used/disused) or potential spring line.**
- **The site is within 50m of the Hampstead Heath ponds.**

*“...no stability issues are envisaged at all, as site is ca.45m from Pond No.1 and at a higher elevation.”*

*“The Designer needs to inform the Panel Engineer for the Hampstead Ponds reservoir that these Works are to take place (no stability issues for the reservoir are envisaged)”*

*“...the site is not located within any of the specified relevant drainage catchment areas for the Hampstead Ponds”*

*“There are no springs or wells apparent in the vicinity, but evidence for these can be noted on Parliament Hill (just north of the end of the housing zone) some 250-300m away”*

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

*““The proposed front lightwell will result in a small increase in hard surfacing and a resultant minor increase in surface water being discharged to the drainage system; this should be mitigated by use of one or more appropriate SUDS system(s).”*

*“The proposed development will not change the extent of hard surfaced areas at the rear of the site, whereas the paved area of front garden will increase by only 5.6m<sup>2</sup> plus 2.7m<sup>2</sup> of sedum roof to the bike store. The scheme will therefore result in a very slight decrease in surface water infiltrating the ground.*

- **London Clay is the shallowest strata at the site.**
- **There is a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site.**

*“In intact stiff clay, such excavations will remain stable in the short term (for long enough to construct the underpin) with no additional support and minimal, purely elastic deformations. The presence of fissures in these clays means that intermittent support may be required, especially in excavations for corner pins where there are two rear faces.”*

*“According to the BGS Shrink/Swell potential map, the area is at Moderate risk, due to its London Clay geology. The site walkover revealed no mature trees in the front or rear gardens of Nos. 31-35.”*

*“...bulk ground movements caused by underpinning to this depth in London Clay should not exceed 5mm in either horizontal or vertical directions. This vertical settlement is likely to be partially offset by the anticipated heave caused by excavation of the basement (see section below).”*

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

*“Suitable temporary works, installed in accordance with best practice.”*

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

*“This Report assumes concurrent construction of a basement of similar size and depth at No. 35, so there would be no concern over stability of the attached property, assuming they have ‘balanced’ loading/wall details. The previous ground floor extension at rear of No.33 (some 15 years ago) would not seem to have changed the structural ‘continuity’ with No.35, but plans of the foundation details should be sought to aid/inform the structural designer. Should the basement at No.35 not be progressed, then construction of the proposed single storey basement under this property will need to take account of the foundations of No.35”*

*“Provision of transition underpins, stepping up in accordance with Building Regulations requirements should be considered by the Designer, in order to minimise the risk of structural damage from future differential foundation movements.”*

*“Ground movements associated with the construction of retaining walls have been shown to extend a distance up to 4 times the depth of the excavation, which, for this 2.3-3.3m deep excavation, would be 9m to 13m. Movements associated with the construction of No.33’s basement might therefore extend northwards to the 37/39 party wall and southwards to the south flank wall of No.29.”*

- **As part of the site drainage, surface water flows (e.g. rainfall and run-off) will be materially changed from the existing route.**

*“...it is not envisaged there is to be any significant change to on-site, or off-site, flows in that area; the rear garden catchments are individually ‘controlled’ by boundary walls and sloping topography.”*

### 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

<b>Surface flow and flooding</b>	A Hydrologist or a Civil Engineer specialising in flood risk management and surface water drainage, with either: <ul style="list-style-type: none"> <li>• The “CEng” (Chartered Engineer) qualification from the Engineering Council; or a Member of the Institution of Civil Engineers (“MICE”); or</li> <li>• The “C.WEM” (Chartered Water and Environmental Manager) qualification from the Chartered Institution of Water and Environmental Management.</li> </ul>
<b>Subterranean (groundwater) flow</b>	A Hydrogeologist with the “CGeol” (Chartered Geologist) qualification from the Geological Society of London.
<b>Land stability</b>	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 appears to meet the requirements.

**Subterranean (groundwater) flow:** The report appears to meet the requirements.

**Land stability:** The report appears to meet the requirements.

### 3.2.2 BIA Scope

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

The potential issues of concern appear to have been satisfactorily identified.

### 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. However, it is considered that a more detailed monitoring and contingency plan should be developed in due course in conjunction with all interested parties. This plan will need to be sufficiently robust to enable mitigation to be effectively implemented in the event of agreed trigger values for vertical and horizontal movement being exceeded at agreed monitoring positions. It is suggested that both start of shift and end of shift measurements will be necessary during excavation in order for a contingency plan to be potentially effected sufficiently quickly to prevent the excessive movement to either the host building or neighbouring properties. The plan should make it clear what emergency measures or mitigation would be available and implemented in the event of an exceedance and who would have the responsibility for implementing the plan. The plan should provide assurance to all that any movement will be detected within hours rather than days and that the response to any trigger level exceedance will be immediate mitigation.

### 3.2.9 **Residual Impacts after Mitigation**

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

Yes.

*“Damage category assessments for the properties to both the north (Nos 35/37) and south (Nos 29/31) indicated that the potential damage is likely to fall within Burland Category 1 (‘very slight’) to Burland Category 0 (‘negligible’) provided that best working practices are followed throughout the underpinning works, and in particular for the temporary support of the excavations and the completed underpins.”*

## **4. Assessment of Acceptability of Residual Impacts**

### **4.1 Proposed Construction Methodology**

The proposed construction methodology involves traditional underpinning techniques.

### **4.2 Soundness of Evidence Presented**

The evidence appears sound.

### **4.3 Reasonableness of Assessments**

The assessments presented appear reasonable.

### **4.4 Robustness of Conclusions and Proposed Mitigation Measures**

The conclusions and proposed mitigation measures are considered to be sufficiently robust.



## 5. Comments on Objections

During the consultation period, two technical reports were received in relation to No 37 South Hill Park which disagree with a number of the findings of the reports submitted by the applicants, to which the applicants specialists have responded.

The information studied comprises the following documents:

6. Objecting Letter from First Steps to Ms A Gailey, dated 23<sup>rd</sup> April 2014
7. Objecting Review Report by Eldred Geotechnics, dated 23<sup>rd</sup> April 2014, Ref: G1406-RP-01-E1
8. Response Letter from BTA Structural Design to Camden, dated 2<sup>nd</sup> May 2014, Ref:940/JGBB
9. Response Letter from Ecologia to Ms C Markey, undated.

The principal objections in each report are addressed objectively as follows:

### 5.1 Eldred Geotechnics (Mike Eldred)

(Document 7)

#### 5.1.1 Absence of sufficient design information

It is considered that sufficient information has been provided to judge that the proposal accords with DP27.

#### 5.1.2 Use of unsuitable ground investigation techniques

The investigations appear to have used a variety of techniques, some of less value than others. However, it is considered that the ground model appears to have been satisfactorily established.

#### 5.1.3 Lack of hydrostatic consideration in garden wall design

It has been clarified in Document 9 that the garden wall will be designed to avoid hydrostatic pressures.

#### 5.1.4 Enabling excavation could cause instability if groundwork contractor is not very carefully controlled

The proposed enabling excavation sequence is considered acceptable.

#### 5.1.5 Lack of precise temporary works design by the engineer

It is considered that sufficient information has been provided to judge that the proposal accords with DP27.

#### 5.1.6 Lack of strategy to ensure a high standard of construction

It is considered that sufficient assurance has been provided.

#### **5.1.7 Unjustified assessment of ground movement**

The assessment of ground movements associated with traditional underpinning is inevitably subjective and cannot be quantitatively predicted by modelling.

#### **5.1.8 Probability of significant damage where 35 and 37 join.**

Document 8 acknowledges that this junction is a sensitive position and that the works will have to be carried out with great care. It is accepted that there are almost always transitional junctions between walls that are being underpinned and those that are not.

#### **5.1.9 Conflict regarding construction of boundary retaining wall**

Document 8 clarifies that the wall is to be rebuilt.

### **5.2 First Steps (Mike De Freitas)**

(Document 6)

#### **5.2.1 Improper assessment of risk to No.37**

It is considered that the risks to No. 37 have been assessed sufficiently.

#### **5.2.2 Miscalculation of increase in paved area**

This appears to have been adequately refuted in Document 9.

#### **5.2.3 Unknown ground conditions beneath No. 37.**

This appears to have been adequately addressed in Document 9.

#### **5.2.4 Lack of calculations to support stability assessment of No. 37**

It is considered that the stability of No. 37 has been reasonably assessed.

#### **5.2.5 Lack of sufficient quality of expert geotechnical advice**

It is considered that the submission has been prepared by appropriately qualified geotechnical specialists of considerable experience and undeniable competence.

#### **5.2.6 Details of groundwater by-pass not provided**

Document 9 clarifies that the groundwater by-pass is a provisional option. It is considered that this can be designed and incorporated in the unexpected event that groundwater is encountered.

## 6. Conclusions

The submitted BIA reflects the processes and procedures set out in DP27 and CPG4.

While the objecting reports have without doubt been prepared as earnest criticisms and contain some very relevant discussion, the submission is to be judged on the basis of the published guidance.

Although there are of course areas of uncertainty that will only be resolved as the work proceeds, it is not considered that the submission (in its present state) is so technically deficient that it is not robust enough to stand the test of DP27. It is considered that the submission does demonstrate reasonable accordance with 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

However, if the council are not satisfied that a sufficiently robust plan will be secured by other means, it is considered that the monitoring and contingency plan referred to in section 3.2.8 above may be secured by condition.

*“Prior to the commencement of any development, a detailed structural monitoring and emergency contingency plan is to be submitted and approved in writing.*

*REASON: To prevent the excessive movement to either the host building or neighbouring properties.”*