

**Independent Review  
of  
Basement Impact Assessment for  
planning application 2014/7413/P  
at**

**‘Phase 5’ – Studio 1 Redevelopment  
The Royal Central School of Speech and Drama  
Eton Avenue  
London  
NW3 3HY**

**For**

**London Borough of Camden**

LBH 4325

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**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 demolish the existing three storey structure and replace it with a new seven storey building with two levels of basement reaching a maximum depth of around 8m below existing ground level.

### 1.1 Brief

LBH WEMBLEY Geotechnical & Environmental have been commissioned to provide an Independent assessment of information submitted against the requirements of LDF policy DP27 (but also including CS5, CS14, CS15, CS17, CS18, DP23, DP24, DP25 and DP26 – as stated at paragraphs 1.5 and 1.6 of CPG4) and with reference to the procedures, processes and recommendations of the Arup Report and CPG4 2013.

### 1.2 Report Structure

This report commences with a description of the LDF policy requirements, and then considers and comments on the submission made and details any concerns in regards to:

1. The level of information provided (including the completeness of the submission and the technical sufficiency of the work carried out)
2. The proposed methodologies in the context of the site and the development proposals
3. The soundness of the evidence presented and the reasonableness of the assessments made.
4. The robustness of the conclusions drawn and the mitigation measures proposed in regard to:
  - a. maintaining the structural stability of the building and any neighbouring properties
  - b. avoiding adversely affecting drainage and run-off or causing other damage to the water environment and
  - c. avoiding cumulative impacts on structural stability or the water environment in the local area

### 1.3 Information Provided

The information studied comprises the following:

1. Basement Impact Assessment by Price & Myers, dated November 2014, Ref: 22479, Version 2
2. Basement Impact Assessment by CGL, dated March 2015, Ref: CG08798, Revision 2
3. Desk Study & Basement Impact Assessment Report, by GEA, dated 2<sup>nd</sup> May 2014, Ref: J14069, Issue No. 1, (included as Appendix C of Document 2)
4. Design and Access Statement, by Tim Ronalds Architects, dated November 2014, Ref: CSD 906RevA
5. Existing and Proposed Drawings and Sections, by Tim Ronalds Architects, dated 18<sup>th</sup> November 2014, Refs: CSD 001RevB, CSD 002RevB, CSD 003, CSD 005RevJ, CSD 006RevK, CSD 007RevK, CSD 008RevG, CSD 018RevH, CSD 019RevF,
6. Existing and Proposed Drawings and Sections, by Tim Ronalds Architects, dated 26<sup>th</sup> February 2015, Refs: CSD ex 018, CSD ex 025, CSD ex 026
7. Arboricultural Survey by Sylva Consultancy, Dated November 2014, Ref: 14103
8. Construction Method Statement, by Price and Myers, included as Appendix C of Document 1, dated October 2014, Ref: 22479, Version 1

9. Below ground drainage layout and drainage detail drawings by Price and Myers, included as Appendix D of Document 1, dated October 2014, Refs: 22479-600 (P1), 22479-601 (P1), 22479-610 (P1), 22479-611 (P1)
10. Stage D Structural sketches by Price and Myers, dated October 2014, Refs: SK25 Rev B, SK26 Rev B, SK27 Rev A, SK28 Rev A, SK29 Rev B, SK30 Rev B, SK36 Rev A, SK37 Rev A

## 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 Document 2.

This identifies the following potential issues of concern:

- **The proposed basement is within 100m of a watercourse, well or potential spring line.**
- **The proposed development will result in a change in the proportion of hard surfaced/paved areas**

##### 3.1.1.2 Stability

A screening checklist for the impact of the proposed basement on land stability is included in Document 2.

This identifies the following potential issues of concern:

- **London Clay is the shallowest stratum on site**
- **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**
- **There is a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site.**
- **The proposed basement is within 100m of a watercourse, well or potential spring line.**
- **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 Document 2.

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).

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 proposed basement is within 100m of a watercourse, well or potential spring line.**  
*The guidance advises that 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 proportion of hard surfaced/paved areas**  
*The guidance advises that 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 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 stratum on 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 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.*

- **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 5m of a highway or pedestrian right of way.**

*The guidance advises that excavation for a basement may result in damage to the road, pathway or any underground services buried in trenches beneath the road or pathway.*

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

*The guidance advises that excavation for a basement may result in structural damage to neighbouring properties if there is a significant differential depth between adjacent foundations.*

### 3.1.3 Stage 3: Site Investigation and Study

Site investigation and study is undertaken to establish the baseline conditions. This can be done by utilising existing information and/or by collecting new information (Section 6.4 of the CGHSS).

The findings of the intrusive ground investigation are presented in Document 3.

The site investigation submitted was undertaken between the 17<sup>th</sup> and 19<sup>th</sup> of March 2014 and comprised two cable percussion boreholes to depths of 20m and 25m. Groundwater monitoring wells were installed in both holes with response zones set between 0.5m depth and 8m depth.

Two window sample boreholes were drilled to depths of 5m and 6m and six trial pits were hand excavated to investigate the depths of the foundations to the neighbouring structures.

### 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 documents include an assessment of impacts and the following statements are provided:

- **The proposed basement is within 100m of a watercourse, well or potential spring line.**

*“As the London Clay Formation is identified below the site, it is assumed this forms an impermeable boundary and will form the base of an overlying groundwater table where any permeable superficial deposits permit the transit of groundwater.”*

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

*“A small green space approximately 9.5m by 4.5m on the site will not be retained. However it is considered this will have a minimal impact on infiltration characteristics as the underlying geology is impermeable.”*

- **London Clay is the shallowest stratum on site**

*“The London Clay is susceptible to short term elastic heave and time dependant swelling on unloading, which will occur as a result of basement excavation, generating upward ground movements.”*

- **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**

*“Two trees are proposed to be removed as part of the proposed works. A 11m tall sycamore... [and a] 7m tall birch.*

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

*“The removal of trees in these soils is likely to give rise to soil volume increase, which may result in heave and subsequent damage to the foundations of adjacent structures.”*

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

*An overall heave regime extends over adjacent pavement and into College Crescent and Buckland Crescent carriageway, decreasing from 15mm to 5mm over the 3m wide pavement, and reducing further to 1mm some 13m from the excavation. It is considered this will have negligible impact upon the carriageway and underlying infrastructure.*

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

*“For Critical Section A-A and B-B the maximum damage category predicted based on combined lateral and vertical ground movement profiles is Damage Category 1 (very slight damage).*

*Based on the results of the ground movement assessment, it is considered that no critical section is required to assess building damage to properties in Buckland Crescent other than Critical Section A-A due to the considerable dissipation of heave movements outwards from the excavation. It is further considered that other terrace properties along Buckland Crescent, positioned typically greater than 10m from the excavation are located outside the zone of influence from ground movements and are expected to be subjected to negligible damage (i.e. Category 0) from the proposed basement development...”*

### **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 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 sufficient.

**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. The ground movement assessment predicts no more than "*Damage Category 1 (very slight damage)*" to the adjoining properties and that construction of the proposals will have "*negligible impact upon the carriageway and underlying infrastructure*".

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

### **4.1 Proposed Construction Methodology**

The proposed construction methodology appears sound.

### **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 assessment conclusions and proposed mitigation measures appear robust.



## 5. Conclusions

The submitted BIA reflects the processes and procedures set out in DP27 and CPG4, and is considered to demonstrate sufficient detail and certainty to accord 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