Independent Review
of
Basement Impact Assessment for planning application 2014/5705/P
at

69 Redington Road
London
NW3 7RP

for
London Borough of Camden

LBH 4307

February 2015

LBH WEMBLEY

Geotechnical & Environmental

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Contents

Contents **3**

Foreword-Guidance Notes **5**

1. Introduction **6**

1.1 Brief 6

1.2 Report Structure 6

1.3 Information Provided 7

2. Policy DP27 – Basements and Lightwells **8**

3. Assessment of Adequacy of Information Provided **10**

3.1 Basement Impact Assessment Stages 10

3.1.1 Stage 1: Screening 10

3.1.1.1 Subterranean (Groundwater) Flow 10

3.1.1.2 Slope Stability 10

3.1.1.3 Surface Flow and Flooding 11

3.1.2 Stage 2: Scoping 11

3.1.3 Stage 3: Site Investigation and Study 12

3.1.4 Stage 4: Impact Assessment 13

3.2 The Audit Process 14

3.2.1 Qualifications / Credentials of authors 14

3.2.2 BIA Scope 15

3.2.3 Description of Works 15

3.2.4 Investigation of Issues 15

3.2.5 Mapping Detail 16

3.2.6 Assessment Methodology 16

3.2.7 Mitigation 16

3.2.8 Monitoring 16

3.2.9 Residual Impacts after Mitigation 16

4. Assessment of Acceptability of Residual Impacts **17**

4.1 Proposed Construction Methodology 17

4.2 Soundness of Evidence Presented 17

4.3 Reasonableness of Assessments 17

4.4 Robustness of Conclusions and Proposed Mitigation Measures 17

5. Conclusions **18**

5.1 Further Information Required 18

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

69 Redington Road is a detached four storey house built into the hillside with a lower ground floor emerging from the hillside beneath the rear section of the building.

Planning permission was granted on 08/10/2013 (ref: 2012/2548/P) for the excavation to extend the lower ground floor area forwards to form a basement beneath the front section of the property and for the construction of a swimming pool set at a lower level and extending into the rear garden. The maximum depth of excavation associated with approved development was approximately 3m below lower ground floor level.

It is now proposed to construct a deeper basement for the swimming pool, extending to almost 6m beneath the existing lower ground floor area and extending into the rear garden across the full width of the building.

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 Chelmer Consultancy Services, dated March 2013, Ref: BIA/3230
2. GroundSure EnviroInsight by GroundSure, dated 6th March 2013, Ref: HMD-641814
3. Method Statement for Basement Construction by Abbey Pynford, undated, unreferenced
4. Design and Access Statement by Turley, dated September 2014, unreferenced
5. Drawings of Existing by unknown, dated 21ST August and 3rd September 2014, Refs: 69RR_GA_EX_LGF, 69RR_GA_EX_GND, 69RR_GA_EX_RLV_01
6. Drawings of Existing by Kyson, dated January 2011, Refs: 182-09 1100 to 182-09 1103
7. Drawings of Proposed by unknown, dated 1st, 3rd and 4th September 2014, Refs: 69RR_GA_NLV_01, 69RR_GA_WLV_01, 69RR_GA_PR_BASE, 69RR_GA_PR_LGF Revision 2, 69RR_GA_ELV_01, 69RR PR-Section AA N-S, 69RR_PR_SLV_02, 69RR 2_10 D Revision 07
8. Construction Method Drawings by Hockley & Dawson Consulting Engineers, dated January 2013, Refs: 16279 1/103 to 16279 1/105
9. Demolition Drawings by unknown, dated 3rd September 2014, Refs: 69RR_DM_GF_01, 69RR_DM_LGF_01
10. Lower Ground Floor and Basement Sections with Adjacent Properties Drawing by Hockley & Dawson Consulting Engineers, dated January 2013, Refs: 16279 2/101
11. Construction Method Statement by Abbey Pynford, undated, Ref 69 Redington Rd.

It is noted that Document No.1 was prepared for the previous application and that Document Nos. 8 and 10 do not appear to relate to the current proposals.

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.**
- **The proposed basement will extend beneath the water table surface.**

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:

- **The existing site includes slopes, natural or manmade, greater than 7 degrees.**
- **The development neighbours land, including railway cuttings and the like, with a slope greater than 7 degrees.**
- **The site is within a wider hillside setting in which the general slope is greater than 7 degrees.**
- **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 site is within 100m of a watercourse of a potential spring line.**
- **The site is within an aquifer.**
- **The proposed basement will extend beneath the water table such that dewatering may be required during construction.**

- **The proposed basement will significantly increase the differential depth of foundations relative to the neighbouring properties.**
- **The site is over (or within the exclusion zone of) tunnels, e.g. railway lines.**

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 no 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).

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 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.

- **The existing site includes slopes, natural or manmade, greater than 7 degrees.**
  The guidance advises that there may be local slope instability within the site.

- **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).

- **The site is within a wider hillside setting in which the general slope is greater than 7 degrees.**
  The guidance advises that there may be potential for a larger slope failure system including re-activation of a pre-existing slide.

- **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 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. Seasonal spring lines and changes to groundwater regimes within slopes can affect slope stability.

- **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.

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 site investigation submitted comprised two hand auger boreholes constructed in June 2012; one at the front of the property extending to a depth of approximately 2m below the existing lower ground floor level and one to the rear of the property extending to approximately 7m below the existing lower ground floor level. No groundwater monitoring appears to have been undertaken.

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 include an Impact Assessment stage and includes the following statements in relation to the identified potential issues.

- **The site is located directly above an aquifer.**
- **The proposed basement will extend beneath the water table surface.**
  "*The proposed basement is considered acceptable in relation to the likely limited subterranean (groundwater) flow in the natural strata based on the evidence from the two boreholes. In the unlikely event that significant continuous groundwater flow through permeable granular soils is encountered then a groundwater bypass below the basement would be required as a mitigation measure*"

  "*No multi-seasonal monitoring data are available so a conservative approach will be needed*"

  "*The basement will need to be fully waterproofed (10.2.4). Provisional design groundwater levels equal to ground level (short term) and 0.5m below ground level (long term) are proposed, which means that the basement must be able to resist buoyant uplift pressures*"

  "*Water entries into the basement excavations are likely to be manageable by sump pumping*"

- **The existing site includes slopes, natural or manmade, greater than 7 degrees.**
- **The development neighbours land, including railway cuttings and the like, with a slope greater than 7 degrees.**
- **The site is within a wider hillside setting in which the general slope is greater than 7 degrees.**
  "*Analyses of the overall stability of the slope, including the excavations for the basement and the retaining walls on the upslope side should be undertaken as part of the design and in accordance with current design standards*"

- **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 trees most likely to be significant are the large oak in the front garden to No.71 and the high conifer (Cypress?) and unidentified deciduous tree in No.69's front garden. The basement will be sufficiently deep that it is unlikely that any of the trees in the rear garden will have significant root growth below the basement.*"

- **There is a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site.**
  "*…a quantitative heave analysis using finite element methods is recommended as part of the design process in order to assess whether additional measures such as tension piles will be required to resist uplift.*"

  "*…it is possible to keep ground movements and the resultant structural distortions to within acceptable limits, typically within Burland Category 1*"

- **The site is within 100m of a watercourse, well (used/disused) or potential spring line.**
  "*The site is known to lie close to the former alignment of one of the Westbourne's tributaries which has been culverted (as described in Section 5 above) so it is no longer able to receive surface water run-off. Whether the culvert remains connected hydraulically to the perennial surrounding groundwater is unknown.*"

- **The proposed basement will significantly increase the differential depth of foundations relative to the neighbouring properties.**
  "*Best practice underpinning methods, especially in relation to the use of temporary support to the excavations, will be required in order to keep the inevitable ground movements within acceptable limits*"

  "*Full face support placed at the earliest opportunity will be required in such ground as the excavation progresses in order to minimise ground movements. This will be particularly important when the excavations are within the zone of influence of the footings to the adjoining houses, services or, indeed, other parts of No.69.*"

  "*The depths of excavation required for the swimming pool is illustrated on Hockley & Dawson's drawing No.16279-2/101, which shows that they will extend into the potential zone of influence of the foundations to the flank wall of No.71. These depths of excavation are also greater than the "2900mm proposed" given on London Basement's 'Underpinning Stages' diagrams (Sheet 4 in their method statement). These excavations must therefore be provided with sufficient temporary support as they are excavated, to ensure ground movements are minimised.*"

- **The site is over (or within the exclusion zone of) tunnels, e.g. railway lines.**
  "*No railway tunnels are known to pass below or close to the site. Other infrastructure tunnels, for sewers, cables or communications might be present so an appropriate services search should be undertaken, and if any such tunnels are identified then their potential influence on the scheme must be assessed.*"

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 scope appears to be reasonable.

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?

A short construction method statement has been provided.

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.

It is noted that Document No.1 was prepared for the previous application. The present application is for a significantly deeper and larger basement to be constructed. The following issues do not yet appear to have been completed.

- Ground movement and damage category assessment for host building and neighbouring structures.
- Slope stability assessment.
- Arboricultural assessment.
- Additional ground investigation and groundwater monitoring

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?

The submission of a topographic survey would assist the identification of the relative levels of investigation and proposed excavation.

3.2.6 Assessment Methodology

Have the issues been investigated using appropriate assessment methodology? (Section 7.2 of the CGHSS).

A quantitative ground movement analysis is required in order to conclude the assessment of damage to the host and neighbouring buildings.

A slope stability assessment is required in order to check the potential effects of proposed development upon the stability of the site and adjoining areas.

An arboricultural assessment is required as the extended basement will undoubtedly affect the 18m high Oak tree in the rear garden.

Additional ground investigation is required to investigate the disposition of any sand seams or lenses within the Claygate Beds around the site. Groundwater monitoring is required to identify whether the new basement excavation will encounter groundwater within the Claygate Beds.

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)

In the absence of a more specific assessment of groundwater, ground movements and stability, the proposed mitigation methodology cannot be satisfactorily assessed.

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.

3.2.9 Residual Impacts after Mitigation

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

No.

4. Assessment of Acceptability of Residual Impacts

4.1 Proposed Construction Methodology

The assessment of the acceptability of the proposed construction methodology cannot be satisfactorily concluded on the basis of the present submission.

4.2 Soundness of Evidence Presented

There is insufficient information concerning the configuration of existing foundations to the host building and adjacent properties.

There is insufficient ground investigation and groundwater monitoring information to conclude the assessment of groundwater impacts.

The submitted BIA relates to an earlier scheme that was significantly smaller and shallower than is now proposed.

4.3 Reasonableness of Assessments

The submission does not provide sufficient confidence in regard to the likely degree of damage that may be expected to affect the host building and adjacent properties.

4.4 Robustness of Conclusions and Proposed Mitigation Measures

The present submission is considered to be insufficiently robust to meet the requirements of DP27.

5. Conclusions

The submitted BIA does not wholly reflect the processes and procedures set out in DP27 and CPG4 and does not address the present intention to form a significantly larger and deeper basement than was previously considered.

As a consequence it is considered that the present submission does not meet 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

It is suggested that the concerns about the submission that have been raised in sections 3 and 4 of this document can be addressed by the applicant by way of further submission.

5.1 Further Information Required

It is considered that in order to meet the requirements of DP27 further information is required as follows:

- Additional ground investigation and groundwater monitoring to enable a better assessment for the possible presence of water-bearing seams.
- Information concerning the configuration of existing foundations to the host building and adjacent properties.
- A quantitative ground movement and damage category assessment for host building and neighbouring structures.
- A slope stability assessment.
- An arboricultural assessment.

With the benefit of this further information, the BIA should then be updated and revised accordingly to reflect the current project and include an updated assessment of any groundwater impacts and stability impacts. The revised BIA should provide a detailed assessment of the extent of the possible movements and damage to be expected during and after the works. A detailed monitoring and contingency plan should also be presented that reflects the outcome of this further assessment.

It is envisaged that, at the discretion of the council, this further information and assessment might reasonably be sought by condition that it should be approved by Camden prior to the commencement of any work.