Independent Review
of
Basement Impact Assessment for planning application 2014/5958/P (UPDATED)
at

Flat 1A
73 Sherriff Road
London
NW6 2AS

for
London Borough of Camden

LBH 4305

March 2015

LBH WEMBLEY

Geotechnical & Environmental

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Foreword-Guidance Notes

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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 deepen the existing basement beneath the main part of the house at this property and to create an additional basement beneath the rear extensions, extending into the rear garden at a level approximately 1.5m lower. Maximum excavation depths are recorded at 4.2m. It would appear that the applicant has tenure of only the ground floor of the building and that there is another resident in Flat B, which is presumed to comprise the existing upper storeys. It is also noted that the rear garden of the property is set approximately 1.1m lower than the ground at the front of the property, and rises up towards the adjacent railway embankment.

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 Gabriel GeoConsulting Limited, dated September 2014, Ref: 15333/R1
2. Planning Brochure by Kyson, dated July 2014, unreferenced
3. Design Data Sheets & Structural Calculations by Alan Baxter Partnership LLP, dated February 2015, unreferenced

4. Construction Method Statement by by Alan Baxter Partnership LLP, dated March 2015, Ref: L311
5. Basement Construction Methodology drawings by Alan Baxter Partnership LLP, dated November 2014, Refs: L311-A1-01 B, L311-A1-02 C, L311-A1-03 - and L311-A1-10 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 the BIA (Document 1).

This identifies the following potential issues of concern:

- **More surface water (e.g. rainfall and run-off) than at present will be discharged to the ground (e.g. via soakaways and/or SUDS).**

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

- **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 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).

The site investigation submitted comprised two 8m boreholes, one at the front one at the rear of the property, using the continuous flight auger method and two hand dug trial pits to reveal the foundations. Standpipes were installed to the base of both boreholes and subsequent monitoring was undertaken on two occasions after the initial ground investigation over a short period of time.

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.

- **The proposed development will result in a change in the area of hard-surfaced/paved areas.**
  Document 1 states *"The proposed extension to the Ground Floor and the proposed new basement will increase the area of hard surfacing by only approximately 15m^2 because the rear courtyard was mainly surfaced with concrete and most of the area for the front lightwell is already paved. In order to avoid creating an increase in surface water run-off, one or more appropriate*

types of Sustainable Drainage System (SuDS) should be included in the scheme for mitigation, such as:

- *Installing a green (sedum) roof on the enlarged roof area to the ground floor extension, although these offer no additional storage once they become fully saturated in a storm situation*
- *Intervention storage (water butts and/or other temporary storage)*
- *Rainwater harvesting.*

Consideration could also be given to creating another area of soft landscaping within the front amenity area/garden, which would reduce the net increase in hard surfacing."

- **The development neighbours land, including railway cuttings and the like, with a slope greater than 7 degrees.**
  Document 1 states "*The rear wall of the basement/lightwell will be several metres from the steep section of the embankment, so, provided that the relatively gentle rise of the ground away from the rear wall of the basement/lightwell up to the end of the garden is allowed for in the design of both the permanent works and the temporary support, and best practices are followed when constructing the rear walls, then the proposed scheme should not be detrimental to the stability of the slope.*"

- **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.**
  Document 1 states "*The basement slab will need to be designed so as to enable it to accommodate the swelling displacements/pressures developed underneath it. Quantitative analysis of potential heave in response to construction of the proposed basement could be undertaken during the detailed design phase, once the construction methods and sequence have been finalised*."

- **The site is within 5m of a highway or pedestrian right of way.**
  Document 1 states "*Ensure adequate temporary and permanent support by use of best practice underpinning methods.*"

- **The proposed basement will significantly increase the differential depth of foundations relative to the neighbouring properties.**
  Document 1 states "*Based on past experience of single storey basements constructed in stiff London Clay, and provided that best practice methods of construction and temporary support are used, then the resultant ground movements caused by the underpinning should not exceed 5mm in either horizontal or vertical directions. Calculations for the preliminary damage category assessment, for movements in the ground alongside the retaining walls, indicated that the damage, if any, could be expected to be close to the boundary between Burland Categories 0 and 1 – 'negligible' to 'very slight'*"

  Document 1 states *"Transitional underpins should therefore be considered for the adjoining load-bearing walls in No.71, subject to agreement under the Party Wall Award negotiations. The existing basement to No.75 will avoid the need for any such transition where that is present."*

- **The site is over (or within the exclusion zone of) tunnels, e.g. railway lines.**

  Document 1 states *"No railway tunnels are known to pass below or close to the site,"* but suggests that "*…an appropriate services search should be undertaken*"

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

  Document 1 states *"–New drainage route will be required from front lightwell (minor surface area compared to house footprint). Any other changes to the existing system are unlikely to require significant changes to the route."*

  "Provide appropriate flood resistance and mitigation measures for the lightwell and its drain as appropriate."

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 question of "Is the site within 100m of a watercourse" was answered no, but it has been stated that the site is "*50-60m east of a minor tributary to the Westbourne*".

> *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.*

However, given the circumstances of the site it is reasonably concluded that the proposed basement will not affect any groundwater flow regime.

It is apparent from the site investigation that the site lies in an area of worked ground.

> *The guidance advises that previously worked ground may be less homogenous than natural strata, and may include relatively uncontrolled backfill zones.*

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?

Document 4 provides a suggested sequence for the construction of the proposed basement and Document 3 provides engineering design calculations.

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. Document 1 states "*Precise movement monitoring should be undertaken weekly throughout the period during which the basement walls and slab are constructed with initial readings taken before excavation of the basement starts. Readings may revert to fortnightly once all the perimeter walls and the basement slab have been completed.*"

"*If any undue movements are recorded, the frequency of readings should be increased as appropriate to the severity of the movement and consideration should be given to installing additional targets.*"

3.2.9 Residual Impacts after Mitigation

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

Yes. Document 1 states "*damage, if any, could be expected to be close to the boundary between Burland Categories 0 and 1 – 'negligible' to 'very slight'* "

4. Assessment of Acceptability of Residual Impacts

4.1 Proposed Construction Methodology

The suggested methodology appears reasonable provided that the soils conditions are as anticipated.

4.2 Soundness of Evidence Presented

The evidence appears to be reasonably sound.

4.3 Reasonableness of Assessments

The assessments appear reasonable.

4.4 Robustness of Conclusions and Proposed Mitigation Measures

The conclusions made regarding potential impacts appear robust.

5. Conclusions

Although the original BIA submission did largely reflect the processes and procedures set out in DP27 and CPG4 in the absence of a definitive construction methodology and sequence the assessment could not be regarded as complete.

It was considered that in order to satisfy the requirements of DP27, the following further information was required:

- A construction sequence and methodology detailing how the host building and neighbouring structures are to be protected in the temporary and permanent situations, including the appointment of a suitably experienced and qualified engineer to take responsibility for the design, supervision and control of the temporary works.

The site is unusual in that it is intended to found the new basement within Made Ground rather than natural soils and hence the founding medium will be of an inherently uncertain composition and strength.

In view of concerns about the unpredictability of the proposed founding material it is considered to be essential, for the protection of both the host building and the neighbouring buildings, that the intended works are approached with an appropriately heightened level of expert geotechnical supervision.

A suggested construction sequence and methodology has now been provided and it considered that this is satisfactory provided that

- a suitably experienced and qualified engineer with the “CEng” (Chartered Engineer) qualification from the Engineering Council is appointed to take responsibility for the design, supervision and control of the temporary works and that
- a suitably experienced and qualified geotechnical specialist with the “CGeol” (Chartered Geologist) qualification from the Geological Society of London is appointed to inspect and approve the excavations prior to concreting

It is envisaged the above two conditions can be secured either as a condition of planning or by a Section 106 agreement and that subject to these conditions the proposal can be considered 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