Independent Review
of
Basement Impact Assessment for planning application 2014/2514/P (UPDATED)
at

62 Mansfield Road
London
NW3 2HU

for
London Borough of Camden

LBH 4295

April 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 6

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 Stability 10

3.1.1.3 Surface Flow and Flooding 10

3.1.2 Stage 2: Scoping 11

3.1.3 Stage 3: Site Investigation and Study 12

3.1.4 Stage 4: Impact Assessment 12

3.2 The Audit Process 15

3.2.1 Qualifications / Credentials of authors 15

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**

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

The proposal is for an existing car parking area in the garden of this property to be replaced with a new house with a single storey basement.

1.1 Brief

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

1.2 Report Structure

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

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

1.3 Information Provided

The information studied comprises the following:

1. Basement Impact Assessment by Ashton Bennett Consultancy, dated October 2014, Ref: AP 3135 Issue 2
2. Revised Design and Access Statement by Barbara Weiss Architects, undated, unreferenced
3. Planning Statement by Turley, dated 4th April 2014, unreferenced
4. Development Site Tree Report by Bartlett Consulting, dated 21st January 2014, Ref: JPL/R2080/R/dlm
5. Structural Methodology/Construction Management Plan by Aleck Associates Ltd, dated 24th October 2014, Ref: 2710 (Appendix E of BIA)
6. Drawings of Existing Site by Barbara Weiss Architects, dated April 2014, Refs: Job number 1312 drawings EX(00)00 Rev A to EX(00)03 Rev A, EX(00)01 Rev B and PH-01 Rev B
7. Drawings of Proposed Site by Barbara Weiss Architects, dated April 2014, Refs: Job number 1312 drawings PL(01)02 Rev C, PL(02)00 Rev D, PL(03)00 Rev C, PL(03)01 Rev A, PL(03)02 Rev A, PL(01)00 Rev B, PL(01)01 Rev C and PH-02 Rev A
8. Structural Report by Constant Structural Design, dated 30th March 2015, Ref: SEN-38

9. Addendum to Basement Impact Assessment by Ashton Bennett Consultancy, dated March 2015, Ref: AP 3135A

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 a potential spring line.**

3.1.1.2 Stability

A screening checklist for the impact of the proposed basement on stability is included in the BIA (Document 1). In some cases a “No” response has been given despite there not being supporting evidence and these issues have therefore also been treated as if an “Unknown” response had been properly returned.

This procedure 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 5m of a highway or pedestrian right of way.**
- **The proposed basement will significantly increase the differential depth of foundations relative to neighbouring properties.**
- **The site is over (or within the exclusion zone of) tunnels?**

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). In some cases a “No” response has been given despite there being apparent uncertainty and these potential issues have therefore also been carried forward.

This procedure identifies the following potential issues of concern:

- **The site is within the catchment of the ponds chain on Hampstead Heath.**
- **The site is in an area known to be at risk from surface water flooding, or is it at risk from flooding, for example because the proposed basement is below the static water level of a nearby surface water feature.**

3.1.2 Stage 2: Scoping

Where the checklist is answered with a "yes" or "unknown" to any of the questions posed in the flowcharts, these matters are carried forward to the scoping stage of the BIA process.

The scoping produces a statement which defines further the matters of concern identified in the screening stage. This defining should be in terms of ground processes, in order that a site specific BIA can be designed and executed (Section 6.3 of the CGHSS).

There is an identified scoping stage described in the BIA, but this does not progress beyond the issues identified in the initial screening, which 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. Seasonal spring lines and changes to groundwater regimes within slopes can affect slope stability.

- **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.

- **The site is within the catchment area of the pond chains on Hampstead Heath.**
  The guidance advises that with regard to the pond chains on Hampstead Heath, in particular the bathing ponds, changes in quality would be of concern; in particular the risk of contamination. This may potentially lead to the bathing ponds not attaining the required Bathing Water Directive water quality standards. Any reduction in the surface water inflow to the ponds would reduce the overall flow through the ponds, which in turn could allow an increased build-up of contaminants. Any increase in surface water inflow to the ponds could result in an increase in contaminants (e.g. animal faeces and organic matter) being washed into the ponds. Any increase in surface water inflow to the ponds could also result in an increase in the "normal" volume of water in the ponds. With more water in the ponds on a day-today basis, the available spare capacity in the ponds for receiving storm rainfall would be reduced, thus increasing the risk of the ponds over-topping when, in the event of a storm, that spare capacity is needed. If overtopping were to occur, this could cause inundation of land and properties downstream.

- **The site is in an area known to be at risk from surface water flooding, or is it at risk from flooding, for example because the proposed basement is below the static water level of a nearby surface water feature.**
  The guidance advises that the developer should undertake a Flood Risk Assessment (FRA).

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 three window sample boreholes to a maximum depth of 4.45m with a stand pipe installed in one borehole. Monitoring of water levels was subsequently carried out on three occasions.

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 the BIA includes the following comments in relation to the identified potential issues of concern:

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

"There are surface water features within 760m of the site, the closest being the ponds on Hampstead Heath to the immediate north and north west. An underground river flows from these ponds in the north west across Constantine Road and eastwards along Mansfield Road and turns south eastwards adjacent to and south of the site. This river adjoins an underground river from the eastern ponds on Hampstead Heath and becomes the River Fleet to the south of the site. The river is not culverted beneath the site and unlikely to be detrimentally affected or to detrimentally affect the development of the site."

"The site lies too distant from the River Fleet to the south to be detrimentally affected, any flood will flow south down gradient and not over the site."

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

"The London Clay has been tested to be prone to seasonal shrinkage and swelling that arises due to changing water content in the soil…. The most commonly used solution to the problem of subsidence on clay soils from shrinkage and swelling is to incorporate deeper foundations."

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

"The construction of the basements on the site will result in the new building foundations being taken deeper, which will therefore improve the stability of the new building and eliminate the risk of shrink and swelling of clay affecting foundations.

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

"Unavoidable lateral ground movements associated with the basement excavations must be controlled during temporary and permanent works so as not to impact adversely on the stability of the footpath and any associated services which lie adjacent to the building."

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

"Adjacent properties have basements. Depth to be confirmed."
"It is advised that a check is made on any adjacent basements to ensure that the proposed basement will not detrimentally affect adjacent basement foundations".
"It will be necessary to ensure that the basements…take due cognisance of the potential impacts highlighted above. This may be achieved by ensuring best practice engineering and design of the proposed scheme by competent persons and in full accordance with the Construction (Design and Management) Regulations. This will include:

- *Establishment of the likely ground movements arising from the temporary and permanent works and the mitigation of excessive movements;*
- *Assessment of the impact on any adjacent structures*
- *Determination of the most appropriate methods of construction of the proposed basements;*
- *Undertake pre-condition surveys of adjacent structures;*
- *Monitor any movements and pre-existing cracks during construction;*
- *Establishment of contingencies to deal with adverse performance;*
- *Ensuring quality of workmanship by competent persons.*

Full details of the suitable engineering design of the scheme in addition to an appropriate construction method statement should be submitted by the Developer to the London Borough of Camden."

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

"It will be necessary to undertake a full search of potential tunnels that may underlie the site. On the assumption that it is confirmed that the site is not within the "zone of influence" of any underlying tunnels then no further activities in this regard will be required (the zone of influence is normally defined as the strip of land present above a tunnel with boundaries defined from a line drawn at 45° from the invert level of the tunnel to the ground surface). Alternatively, it will be necessary to liaise with the tunnel owner and undertake further engineering analysis to determine the potential impacts that the proposed basements could have on the tunnel"

- **The site is within the catchment area of the pond chains on Hampstead Heath.**

It is clear that the site is not within the catchment area of the pond chains on Hampstead Heath.

- **The site is in an area known to be at risk from surface water flooding, or is it at risk from flooding, for example because the proposed basement is below the static water level of a nearby surface water feature.**

"In (the) *light of the surface flooding that occurred in 1975, subsequent investigations by the council on flood mitigation schemes for Gospel Oak identified that flood risk was significantly reduced for this area as a consequence of the construction of a flood relief sewer in 1987. While the council acknowledge there is still some residual flood risk in the area, it is not now as significant as was originally believed, and this was confirmed by the lack of flooding along Mansfield Road in 2002.*

The proposed development building is considered to be at low risk of flooding from other sources (i.e. groundwater, sewer flooding) apart from the possibility of some ponding. In this respect, it has been identified that there is a risk of ponding adjacent the proposed development site over the lower sections of Courthope Road, and that there is some uncertainty of the possible maximum depth of this ponding. It is therefore recommended that the level of the entry points to the proposed building and the relating ground floor level should be set at 300mm above the adjacent ground level.

Safe access and exit to and from the site will be provided by Courthope Road which leads directly north from the proposed development site to Savernake Road and away from the CDA to the South of Mansfield Road.

The proposed development will not increase the impermeable area. Consequently there is thought to be no effect on surface water run-off.

It can be concluded therefore that the proposed development is appropriate for the flood risk and is not expected to increase the risk of flooding elsewhere."

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 does meet the requirements.

Subterranean (groundwater) flow: The report does meet the requirements.

Land stability: The report does meet the requirements.

3.2.2 BIA Scope

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

The BIA scope is considered appropriate.

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. It would appear that the previous building on the site was a simple lightweight structure of timber construction.

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.

The nature of the foundations to the existing property at 62 Mansfield Road has now been established by trial pitting to lie at some 300mm depth. A similar depth seems to be a reasonable assumption for the adjacent electricity sub-station.

Calculations have been undertaken for ground movements to the rear building of No 62 and also for the electricity substation. It is also considered possible that No. 64 Mansfield Road could be affected by the proposed basement excavation.

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?

No topographical survey has been provided but the area has been described as relatively flat.

Information on buried services in the adjacent highways has not been provided, but it is understood that further investigation has been undertaken as to the route of the River Fleet and it has been confirmed that it is not likely to affect the site.

3.2.6 Assessment Methodology

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

Calculations have been undertaken for ground movements to the rear building of No 62 and also for the electricity substation together with damage category assessments for both.

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)

The BIA addendum (Document 9) has predicted negligible damage to surrounding structures on the basis of the proposed construction methodology, but notes that *"Excavations for the proposed basement structure will require high stiffness temporary support to maintain stability of the surrounding structures and to prevent any excessive horizontal ground movements.*"

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)

A monitoring scheme is now presented, in Document 8.

3.2.9 Residual Impacts after Mitigation

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

The BIA addendum (Document 9) has predicted negligible damage to surrounding structures on the basis of the proposed construction methodology.

4. Assessment of Acceptability of Residual Impacts

4.1 Proposed Construction Methodology

Section 4 of Document 8 now sets out a specific proposed construction methodology and sequence.

4.2 Soundness of Evidence Presented

The presence of gravel at around 2m depth at each of the exploratory positions is not representative of the London Clay Formation and indicates that superficial soils are present, with an attendant increased risk of permeability.

4.3 Reasonableness of Assessments

The assessments made for surface flow appear reasonable as do those of subterranean flow. However, the results of the assessments made for stability appear to be optimistic in predicting negligible damage.

Although the calculations are not provided in sufficient detail to establish exactly how they have been progressed it would appear that they have been based upon the performance of diaphragm walls and piled walls that are embedded in stiff clay rather than upon experience of conventional underpinning with open excavations.

The BIA addendum (Document 9) states *"Ground movement could occur from heave of the ground following removal of overburden. Following the excavation of the basement, it is likely that the floor slab for the proposed basement will need to be suspended over a void to accommodate the anticipated heave, unless the slab can be suitably reinforced to cope with these movements. This should be reviewed once the levels and loads are known."* It is noted that no heave analysis has been undertaken, and as a result there is some residual uncertainty about the longer term movements of the new structure.

4.4 Robustness of Conclusions and Proposed Mitigation Measures

Although the BIA submission is still considered to be deficient in some respects, the proposed construction methodology appears to be reasonable.

5. Conclusions

The initial submission did not demonstrate sufficient detail and certainty to accord with DP27, in respect of maintaining the structural stability of adjacent structures.

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

- Information on the configuration of foundations to neighbouring structures.
- Confirmation that the site is not affected by tunnels.
- Confirmation of the position of buried services adjacent to the site.
- Additional groundwater monitoring.

Additional information has now been provided in relation to the above.

The additional BIA submission now includes a more detailed and specific construction sequence and methodology and a detailed assessment of the extent of the possible movements and damage. Monitoring has also been addressed.

As a result of the additional material submitted it is considered that, taking into consideration the specific circumstances of this application, the submission does now provide sufficient accordance with DP27 and CPG4, in respect of

a. Maintaining the structural stability of 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