Independent Review
of
Basement Impact Assessment for planning application 2015/0862/P (SECOND UPDATE)
at

1 Ranulf Road
London
NW2 2BT

for
London Borough of Camden

LBH 4334

August 2015

LBH WEMBLEY

Geotechnical & Environmental

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Foreword-Guidance Notes

GENERAL

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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 deepen the existing basement by 1.5m and to extend this basement laterally in two directions so that it will occupy the entire footprint of the existing house and garage and also extend beyond this, forwards in front of the garage and rearwards into the area of an existing rear terrace/patio.

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 Taylor Whalley Spyra, dated December 2014, Ref: UM/8776-BIA-Version 1.1
2. Planning Statement by Boyer Planning, dated 12th March 2015, Ref: 14.449/4.02
3. Drawings of Existing by Daniel Smith Architect LLP, dated October 2014, Refs: B100, B101, B102, B200, B300 and B301
4. Drawings of Proposed by Daniel Smith Architect LLP, dated February 2015, Refs: C100, C101, C102, C200, C300 and C301
5. Sections by Taylor Whalley Spyra, dated 8th May 2015, Ref: 8776 06C, 8776 07C
6. Basement Impact Assessment Summary by Taylor Whalley Spyra, dated June 2015, Ref: UM/PC/8776-Version 1.0
7. Hydrogeological Assessment Letter by Geotechnical Consulting Group dated 15th July 2015
8. Ground Movement Assessment Letter by Geotechnical Consulting Group dated 15th July 2015

9. Drawing showing trial pit information by Taylor Whalley Spyra, dated 20th July 2015, Ref: 8776-TH01-A
10. Drawing showing comparison of hard and soft landscaping by Daniel Smith Architect LLP, dated July 2015, Ref: A105

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 no potential issues of concern.

3.1.1.2 Stability

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

This identifies the following potential issues of concern:

- **London Clay is the shallowest strata at the site.**
- **The site is within 5m of a highway or pedestrian right of way.**

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:

- **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 no scoping stage described in the BIA, nevertheless, the issues identified from the screening checklists as being of concern have been assigned bold text in the previous sections and are as follows:

- **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).

- **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 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).

A geotechnical investigation has not been undertaken. The records of three structural trial pits to expose the existing foundations were provided in the initial submission, and these records have now been supplemented by a photograph of a fourth trial pit that was excavated at an external position to the rear of the property to expose the London Clay Formation.

Document 8 asserts “*The ground conditions at the site include Made Ground over London Clay, which extends to a depth probably in excess of 80m. It should be noted that the nature of the clay is siltier and sandier than is typical of London Clay in Central London*.”

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 original submission did not include an Impact Assessment stage but Document 6 does now include comments with regards to potential impacts. Statements made with regards to potential issues include the following:

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

"The nature of the London Clay in the area of the site is siltier and sandier than the clay generally encountered in Central London, but its permeability is still low and therefore limited water flow could be expected within the clay. Minor horizontal flow could occur within siltier lenses, but this is likely to be localised."

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

"…the proposed works at No. 1 Ranulf Road could induce limited ground movements that are unlikely to exceed Smm and would be limited to the area of the property (i.e. underneath and in the front pathway at the north-western corner of the property)."

- **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 conclusion is that the depth of excavation is low and there is no detrimental influence on the new basement area and neighbouring properties in respect of groundwater."

"Surface flow and flooding are substantially unaffected by the proposed development as the new basement area and the rear extension with its paved areas will have a similar site coverage as the existing house."

"Ranulf Road is not a street at risk of surface water flooding. It is noted that within Camden Flood Risk Management Strategy that works by Thames Water have been undertaken to alleviate flood risks within this area."

"… the property is in an area at low to medium risk of flooding from surface water. Finchley Road and Platts Lane, nearby, have been affected by floods in 1975 and 2002. Measured [sic] *have been taken as part of the Camden Flood Risk Management Strategy to alleviate risks in the area."*

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 original report did not meet the requirements, but it is noted that Document 6 has been authored by a Member of the Institution of Civil Engineers.

Subterranean (groundwater) flow: The original report did not meet the requirements, but it is noted that Document 7 has been countersigned by a Chartered Geologist.

Land stability: The original report did not meet the requirements. It is noted that Document 6 has been authored by a Member of the Institution of Civil Engineers but it is noted that Document 8 has **not** been countersigned by a Chartered Geologist. The submission therefore **does not** appear to meet the requirements.

3.2.2 BIA Scope

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

The site does not appear to be at the indicated geological location and may lie immediately below a potential spring line at the feather edge of the Claygate Beds.

- **The site is within 100m of a watercourse, well (used/disused) 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 original scheme appeared to propose new excavation that would potentially remove support from No. 3 Ranulf Road. On the basis of photographs contained in Document 7 and the revised sections shown in Document 5 it is now assumed that this will not be the case as the existing garage wall clearly extends down to approximately the existing basement level.

The scheme also appears to propose excavation by some 1m that will potentially remove support from No. 9a Ardwick Road.

- **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.

There were statements made with regards to above additional potential issues as follows:

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

"Ground water & surface water flow will not be affected by the increased depth in basement or the rearfront [sic] *lightwell as the underpinning/foundations will not extend significantly below the existing building foundations"*

"Ground water flow will not be affected by the proposed basement reduced dig as the made ground is where any anticipated ground water would likely occur and as the existing surrounding building foundations extend into the London Clay, which has the effect of restricting ground water flow, any migration of water within the clay is negligible."

The revised submission also includes the following statements:

"The topography of the area suggests that a large proportion of the local rainfall would follow the natural gradient of the hill side running in the top soil across the top of the London Clay. A stream of the Westbourne River runs parallel to Heath Drive at about 500m to the east of the site and it is likely to represent the preferential path way of groundwater.

"The extension at the rear of the house would only locally extend the existing barrier to the most superficial water, but this is unlikely to have significant effects on the local hydrogeology."

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

"The design of the increased basement depth and lightwell walls is being undertaken to minimise any structural disturbance to the adjoining properties or infrastructure. It is envisaged that any structural disturbance to them will be negligible."

"The excavation for the basement wills not affect the depth of any adjoining building foundation, so adjoining buildings' structurally stability will not be affected by the works."

The revised submission does not directly address the potential removal of support to No. 9a Ardwick Road, but includes the following statements:

"*The engineers can predict the degree of cracking that will arise by assessing the degree to which the walls of the basement will deflect under load. However, as excavation is small and next door neighbours also have a basement, the degree of movement is expected to be "negligible".*"

"…most of the underpinning movements are likely to be due to construction effects resulting from the partial removal of support to the footings of the walls and compression of the ground. The depth of the proposed underpinning is approximately lm under the existing internal and perimeter walls of the house. Experience suggests that, for shallow underpinning carried out with good workmanship and in the dry, the ground movements can be controlled so that these do not exceed 5mm. These movements would be localised settlements under the underpinned walls only and could cause cracks at the wall junctions that should be capable of being repaired afterwards."

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?

The original description of the works that was given suggested only minor excavation:

"The proposed works are only to increase the depth of the existing basement area and to add side and rear extension to rear garden, which currently is the full depth and width of the main house, with the installation of shallow 1m deep concrete underpinning. This is a small construction and the sequencing of the installation of the RC walls and brick walls to the basement slab will form a rigid structure."

It was implied from the original submission that outside the areas of existing basement, excavations would be significantly greater and approaching 3m depth in some areas. While clear information has not been provided that the existing front walls of the house do indeed extend to the level as shown on the structural engineer's revised sectional drawings, and it is not clear that the *"next door neighbours also have a basement",* it is accepted from the additional information now provided that the risk of damage to the host building and neighbouring properties has been addressed and assessed as minimal.

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 original BIA stated *"The purpose of this Basement Impact Assessment document is to outline the key points for the method of safe excavation and construction for the increased basement depth and the front lightwell. It also sets out how the neighbouring buildings will be protected as well as local environment and amenity with details to clarify the design, ground stability and its feasibility for proposed construction.*

The topics covered within the appendices are Method of Construction, Structural Stability & Movement Assessment, Drainage & Surface Water Flow, Flood Risk, Temporary Works, during construction"

However the submitted appendices contained only the following information:

- Appendix A 8776_PA01 - Site Location Plan indicating Adjoining Properties
- Appendix B 8776_PA02 - Existing & Proposed Basement Layouts
- Appendix C 8776_PA03 - Geological Map of Local Area
- Appendix D 8776_PA04 - Proposed Sections A-A &B-B
- Appendix E 8776 –PA05 - Camden Geological, Hydrogeological and Hydrological Study Extracts

- Appendix F 8776_TH01 – Trial Holes and Details

and did **not** contain the following information:

- Method of Construction
- Structural Stability & Movement Assessment
- Drainage & Surface Water Flow
- Flood Risk
- Temporary Works, during construction

The revised submission has included information and statements that can be construed as addressing the above.

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?

There are discrepancies concerning the extent of the existing basement between some of the drawings. Details of the foundations to the neighbouring properties do not appear to have been ascertained.

3.2.6 Assessment Methodology

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

No geotechnical investigation, ground movement assessment or damage category assessment was undertaken for the original submission. The revised submission includes details of an additional trial pit and an assessment of ground movement and damage category.

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 proposed scheme comprises conventional underpinning.

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 monitoring scheme was considered in the original submission. However, Document 7 asserts "*The BIA emphasises the need for continuous monitoring and observation of both land and buildings to ensure that all movement is controlled to within strict parameters.*"

3.2.9 Residual Impacts after Mitigation

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

It is reasonably clear that the submission concludes that there will not be any residual impacts beyond the damage effects of ground movement. These are not predicted to exceed Category 1 of the Burland Damage Category.

4. Assessment of Acceptability of Residual Impacts

4.1 Proposed Construction Methodology

The scheme presented in Appendix B of the BIA (Document 1) appeared to comprise conventional underpinning of only one section of wall adjacent to 3 Ranulf Road and to rely upon the existing depth of foundations elsewhere beneath the existing building. It would appear the existing rear extension of the property is to be demolished and supported on new mass concrete strip foundations. New trench fill foundations are also indicated for the new extension of the house in the existing terrace/patio area.

The additional information submitted appears to confirm that underpinning will be required beneath all the existing walls where the existing basement is to be deepened.

The proposed sequence of works is described as follows:

> *"1. A sequence of 1.0m wide bays is to be agreed with engineer and party wall surveyors to allow sequenced excavation prior to start of works on site.*
>
> *2. All brickwork walls of the main house are to be underpinned with stainless steel dowel bars between.*
>
> *3. All underpinning is to be undertaken from inside the property and underpins backfilled and compacted.*
>
> *4. Lower ground 1m below existing level, provide propping to underpins and existing side wall and excavate to the bottom of existing underpins level.*
>
> *5. Once the basement slab is completed the other works will commence.*
>
> *6. When all bays are installed remove remainder of spoil and install new lightwell lower ground floor RC slab.*
>
> *7. No adjoining underpinning bays are to be excavated until concrete has achieved its design strength confirmed by cube strength tests, minimum 72 hours concrete curing.*
>
> *8. No underpinning bays are to be excavated within 3m of each other."*

4.2 Soundness of Evidence Presented

The original submission was lacking a geotechnical investigation or assessment. A specialist has now been employed to provide the assessments contained in Documents 7 and 8.

4.3 Reasonableness of Assessments

Based upon the original submission it was considered that ground movement and damage category assessments would be required in order to enable the BIA to be satisfactorily concluded. These assessments have now been made.

4.4 Robustness of Conclusions and Proposed Mitigation Measures

The robustness of the assessments and the proposed construction methodology appears to be reasonable.

5. Conclusions

The original BIA submission did not wholly reflect the processes and procedures set out in DP27 and CPG4.

It was considered that in order to meet the requirements of DP27 further information should be submitted as follows:

- Clear information on the full extent of all proposed excavations including the garden area.
- A geotechnical investigation and a groundwater and stability assessment by a person holding the required qualifications
- A flood risk assessment by a person holding the required qualifications

With the benefit of this further information, it was requested that the BIA should then be revised and updated to include an assessment of all potential impacts and a specific construction sequence and methodology indicating in detail how the stability of the host building and the neighbouring structures is to be protected during the works. The revised BIA was requested to 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 was also requested to be presented that reflects the outcome of this further assessment.

The initially revised submission amounted to two sectional drawings and did not include any geotechnical investigation, groundwater, stability or flood risk assessments, or any monitoring and contingency plan. As a consequence it was considered that the revised BIA continued to fall short of the requirements of CPG4 and DP27. It was considered that in order to comply with DP27 further information was required as follows:

- Clear information on the vertical and lateral extent of all proposed excavations.
- A geotechnical investigation and a groundwater and stability assessment authored or reviewed by a person holding the required qualifications.
- A structural monitoring and contingency plan that reflects the outcome of the above.
- A surface water assessment authored or reviewed by a person holding the required qualifications.

The further revised submission now clarifies the anticipated extent of the proposed excavations and geotechnical, groundwater and stability assessments have been provided by a specialist consultant. It may be reasonably concluded from the latter that a structural monitoring and contingency plan is not considered to be warranted. A surface water assessment has now been submitted.

The further revised submission does still not wholly reflect the processes and procedures set out in DP27 and CPG4, and predicted damage exceeds the level that is deemed to be acceptable under the latest revisions to CPG4 (June 2015).

However, given the scale and specific details of the proposed scheme, it is considered that the BIA is now not so deficient as to not be determinable at the discretion of the council.