Independent Review
of
Basement Impact Assessment for planning application 2014/2833/P
UPDATED
at

51-53 Agar Grove
London
NW1 9UE

for
London Borough of Camden

LBH4268

November 2014

LBH WEMBLEY

Geotechnical & Environmental

Project No: LBH4268

Report Ref: **LBH4268 Ver 3.0**

Date: 10th November 2014

Report approved by: 

Digitally signed by Seamus Lefroy-Brooks
DN: cn=Seamus Lefroy-Brooks, o, ou=LBH WEMBLEY, email=seamus@LBHGEO.co.uk, c=GB
Date: 2014.11.10 12:01:13 Z

S R Lefroy-Brooks BSc MSc CEng MICE CGeol FGS CEnv MIEnvSc FRGS SiLC

Principal Engineer

LBH WEMBLEY Geotechnical & Environmental
Unit 12 Little Balmer
Buckingham Industrial Park
Buckingham
MK18 1TF

Tel: 01280 812310

email: enquiry@lbhgeo.co.uk

website: www.lbhgeo.co.uk

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 14

3.2.1 Qualifications / Credentials of authors 14

3.2.2 BIA Scope 14

3.2.3 Description of Works 15

3.2.4 Investigation of Issues 15

3.2.5 Mapping Detail 15

3.2.6 Assessment Methodology 15

3.2.7 Mitigation 15

3.2.8 Monitoring 15

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

It is proposed to demolish the remaining parts of buildings at 51 and 53 Agar Road and construct two new residential buildings each with an area of single level 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 Webb Yates Engineers Ltd, dated 28th October 2014, Ref: J1879 version X6
2. Basement Impact Assessment **Appendix A and B** by Webb Yates Engineers, dated 16th March 2014 and 5th March 2014, Refs: J1879-S-100 rev. P2 and J1879-S-101 rev.P2, and J1879-S-90 rev. P1
3. Stage 1: Desktop Study & Walkover Survey (Basement Impact Assessment **Appendix C Part 1)** by Constructive Evaluation, dated 18th December 2013, Ref: 13.7883
4. Basement Impact Assessment **Appendix C Part 2 and 9** by GroundSure, dated 13th December 2013, Refs: CMAPS-CM-282101-16146-131213EDR and CMAPS-CM-282101-16146-131213GEO
5. Stage 2: Site Investigation (Basement Impact **Assessment Appendix D**) by Constructive Evaluation, dated 10th March 2014, Ref: 13.7883 Rev 1

6. Basement Impact Assessment **Appendix E** by Micro Drainage, dated 7th March 2014, unreferenced
7. Non-technical Summary by Webbs Yates Engineers, undated, Ref: J1879-Doc-03 **Appendix F**
8. Annotated extract of NHBC 4.2 Building near trees undated, unreferenced **Appendix G**
9. Section Drawings by Webb Yates Engineers, dated October 2014, Refs: J1879-SK-0010 to -0012 **Appendix H**
10. EC7 Combination 1 and 2 by Oasys, dated October 2014, Ref: J1879 **Appendix H**
11. BIA Appraisal by CGeol, Crouch Waterfall Ltd, dated 3rd October 2014, Ref: 14208 **Appendix I**
12. Design & Access Statement by de Metz Forbes Knight Architects (dMFK), undated, unreferenced
13. Construction Management Plan by 3PM, dated 17th April 2014, Ref:
14. Location Plan by dMFK, dated November 2013, Ref: 1892-A5
15. Existing Drawings by dMFK, dated November 2013, Refs: 1892-A35 Rev A, 1892-A20 Rev A, 1892-A21 Rev A, 1892-A30 Rev A, 1892-A31 Rev A, 1892-A32 Rev A, 1892-A36 Rev A, 1892-A41 Rev A and 1892-A43 Rev A
16. Proposed Drawings by dMFK, dated January 2014, Refs: 1892-A101 Rev C and 1892-A110 Rev B
17. Tree Report by ACD Arboriculture, dated 8th January 2014, Ref: PR18839tr
18. Arboricultural Impact Assessment by ACD Arboriculture, dated 10th April 2014, Ref: PRI18839aia
19. Buried Services Searches, dated November 2013, **Appendix J**
20. Letter from Nathaniel Lichfield and partners to London Borough of Camden, dated 30th October 2014, Ref:13545/IRIFY/7717608v1

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 issues of potential concern:

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

3.1.1.2 Stability

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

This identifies the following issues of potential concern:

- **London Clay is the shallowest strata at the site.**
- **Trees will be felled as part of the proposed development and/or works are proposed within tree protection zones where trees are to be retained**
- **The site is within an area of previously worked ground.**
- **The site is within 5m of a highway or pedestrian right of way.**
- **The proposed basement may significantly increase the differential depth of foundations relative to the neighbouring properties**.

3.1.1.3 Surface Flow and Flooding

A screening checklist for the impact of the proposed basement on surface water flow and flooding is included in the BIA (Document 1).

This identifies the following issues of potential 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).

A list has been provided in the BIA and there is scoping stage described in the BIA.

The issues identified from the checklists as being of concern have been assigned bold text in the previous sections and are as follows:

- **The proposed 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.

- **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).

- **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.

- **The site is within an area of previously worked ground.**
  The guidance advises that previously worked ground may be less homogenous than natural strata, and may include relatively uncontrolled backfill zones.

- **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.

- **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 (Document 5, Appendix D within the BIA) submitted and undertaken in January 2014 comprised a cable percussion borehole to a depth of 25m together with two small diameter percussive driven sampler holes to a maximum depth of 4.5m and dynamic probing at one position to a depth of 6m. In addition, two hand-dug trial pits were constructed to expose the foundations of the boundary garden walls. A groundwater monitoring standpipe was installed and two subsequent monitoring visits were made in February 2014.

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) includes an Impact Assessment stage.

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

The BIA (Document 1) states that "… *a larger proportion of the precipitation is transmitted to the sewerage system and so the risk of flooding is diminished both to the property and the neighbouring properties.*"

The BIA (Document 1) also states that "*the site is also located in impermeable unproductive ground, the works poses no significant threat to any heritage of Camden that might be vulnerable to a reduction in the volume of surface flow resulting from either the increased impermeable surfaces or adaptations to the transmission of the remaining surface flow."*

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

The BIA (Document 1) states that *"…a smaller proportion of the precipitation falling on the site will be transmitted as surface water or otherwise, the risk of flooding due to surface water flow will be reduced. Therefore there is no problematic impact on the surface water flows and flooding."*

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

The BIA (Document 1) states that ***"****The design will take into account any shrink/ swelling of the clay with reinforcement or void formers where necessary and the basements will be adequately propped during construction to ensure stability."*

- **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 submitted BIA (Document 1) states *"A 10m lime tree is to be removed, the tree is greater than 10m away from the nearest building. Using NHBC guidance it is found that based on the size of the tree and its distance from adjacent properties that special foundation design would not need to be undertaken. From this it can be concluded that the adjacent properties are outside the zone of influence of the tree and no distress will be caused by its removal."*

- **The site is within an area of previously worked ground.**

The BIA (Document 1) states that *"The new development is to be on an area of previously worked or made ground. However the site investigation has proved the depth of this strata and new foundations of the building will be founded below this level on the London Clay. Furthermore the basement retaining wall will be designed using conservative soil properties for the made ground. Therefore the made ground will have no adverse affect on the development."*

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

The BIA (Document 1) states that *"One wall of one basement is adjacent to a minor access road. The basement will be designed to resist any additional loads from this access road and will ensure that movement is kept within acceptable limits. The stiffness of the retaining wall and any temporary propping will be checked to ensure that soil movements are within acceptable limits."*

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

The BIA (Document 1) states *"The foundation levels of the neighbouring properties are not known and therefore a worst-case scenario must be adopted in design. The diagram in Appendix H displays a worst case scenario and shows that the distance of the neighbouring properties to the basement is such that they are outside the zone of influence of the basement. "*

The BIA (Document 1) concludes that *"…the basement construction has no adverse effect on the surface and subterranean water regimes and has no impact on slope stability."*

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 appear to meet the requirements.

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

Land stability: The report does appear to meet the requirements.

3.2.2 BIA Scope

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

The scope of issues of potential concern has been checked against the flowcharts it is considered that they have been identified in section 3.1.2 above.

3.2.3 Description of Works

Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?

Yes.

3.2.4 Investigation of Issues

Have the appropriate issues been investigated? This includes assessment of impacts with respect to DP27 including land stability, hydrology, hydrogeology.

Yes, albeit no information appears to be available as to the reasons for the reported collapse of previously attempted basement excavations beneath No.51 Agar Grove.

Although there appeared in the initial submission to be some uncertainty regarding the possible presence of groundwater either in the made ground or in the underlying soil, the revised Document 1 states "*It is thought that the water encountered was local perched water and not indicative of the water on the site which will have no cumulative effects on the water environment."*

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 *"…measures should be put in place to monitor the positional movement of the garden wall to the North of the site on the boundary with No. 19 St. Pauls Crescent and also the corner of the building nearest to the excavation and a length of wall 3m either side of this corner."*

3.2.9 Residual Impacts after Mitigation

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

Yes.

4. Assessment of Acceptability of Residual Impacts

4.1 Proposed Construction Methodology

A proposed construction methodology utilising basement cofferdams formed by interlocking steel sheet piling is considered appropriate, albeit great care will be required to adopt an installation technique that does not cause damage to neighbouring structures.

4.2 Soundness of Evidence Presented

Although the groundwater evidence may be considered inconclusive, the proposed construction method appears to be sufficiently robust to deal with water ingress.

The BIA (Document 1) appears to make an erroneous reference to a party wall at 500mm distance from the sheet pile wall (section 7.4 Retaining Wall).

4.3 Reasonableness of Assessments

The property at 19 St Paul's Crescent, and the adjoining highway, appear to fall within the zone of potential influence of the proposed "mews" basement. However, the ground movements associated with the proposed interlocking sheet piling have been assessed as minimal.

4.4 Robustness of Conclusions and Proposed Mitigation Measures

The proposed basement construction by means of propped sheet pile retaining walls is considered a suitably robust technique. It has been confirmed (Document 10) that contrary to the labelling on Webb Yates Drawing J1879-S-90 Rev P1, (Document 2) the sheet piling is not temporary and is to be left in situ.

5. Conclusions

The submitted BIA does not wholly reflect the processes and procedures set out in DP27 and CPG4 and it was considered that the original submission did not demonstrate sufficient detail and certainty to ensure accordance with DP27.

A revised BIA was subsequently submitted but it was considered that this also did not demonstrate sufficient detail and certainty to meet DP27 and that additional information and clarification was required in order to address residual concerns.

Further revisions were made and it is considered that the present submission is now sufficient to 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.
c. Avoiding cumulative impacts on structural stability or the water environment.