Addendum to Basement Impact Assessment Report

Site	31 St Marks Crescent, London, NW1 7TT
Client	London Basement
Date	March 2019
Our Ref	ADDBIA/8084A

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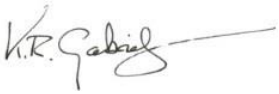
Addendum to
Basement Impact Assessment

Site: **31 St Mark's Crescent, London, NW1 7TT**

Client: **London Basement**

Report Status: DRAFT		
Role	**By**	**Signature**
Factual reporting and Impact Assessments by:	Heather Baker MSci FGS	
Slope/ground stability aspects approved by: Surface flow and flooding aspects approved by:	Mike Summersgill MSc CEng MICE C.WEM FCIWEM	
Factual report and Impact Assessments checked by: Subterranean (Groundwater) flow aspects approved by:	Keith Gabriel MSc DIC CGeol FGS UK Registered Ground Engineering Adviser	

Foreword

This report has been prepared in accordance with the scope and terms agreed with the Client, and the resources available, using all reasonable professional skill and care. The report is for the exclusive use of the Client and shall not be relied upon by any third party without explicit written agreement from Chelmer Global Ltd (CGL).

This report is specific to the proposed site use or development, as appropriate, and as described in the report; CGL accept no liability for any use of the report or its contents for any purpose other than the development or proposed site use described herein.

This assessment has involved consideration, using normal professional skill and care, of the findings of ground investigation data obtained from the Client and other sources. Ground investigations involve sampling a very small proportion of the ground of interest as a result of which it is inevitable that variations in ground conditions, including groundwater, will remain unrecorded around and between the exploratory hole locations; groundwater levels/pressures will also vary seasonally and with other man-induced influences; no liability can be accepted for any adverse consequences of such variations.

This report must be read in its entirety in order to obtain a full understanding of our recommendations and conclusions.

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1. INTRODUCTION

1.1 This Addendum Basement Impact Assessment (BIA) report has been prepared in support of a non-material amendment application to be submitted to the London Borough of Camden (LBC), for a minor change in the footprint of the rear end of the approved basement at No.31 St Mark's Crescent, NW1 7TT. Works including the excavation of a single storey, full footprint basement, creation of rear lightwell, construction of a rear single-storey extension and associated rear garden alterations have already been approved by LBC (Applications 2017/1534/P and 2016/7071/P). This report is an addendum to, and must be read in conjunction with, the BIA undertaken by Chelmer Consultancy Services (CCS, Report Ref: BIA/8084A). The addendum assessment is in accordance with the requirements of the LBC Local Plan 2017, Policy A5 in relation to basement construction, and follows the requirements set out in LBC's guidance document 'CPG Basements' (March 2018).

1.2 Preparation of this assessment has been overseen and approved by Keith Gabriel, a Chartered Geologist with an MSc degree in Engineering Geology (who has specialised in slope stability and hydrogeology), and Mike Summersgill, a Chartered Civil Engineer and Chartered Water and Environmental Manager with an MSc degree in Soil Mechanics (geotechnical and hydrology specialist). Both authors have previously undertaken assessments of basements in several London Boroughs.

1.3 Desk study data were previously provided in the full BIA by CCS. Similarly, the findings from the ground investigations undertaken by CCS on 30th November 2016 & 4th January 2017 were presented in Appendix F of the full BIA and are not repeated here. The screening and scoping have been reviewed in relation to the proposed revision to the basement and no changes were considered to be warranted. Commentaries on the implications of the proposed basement revision on the impact assessments are presented in Sections 4 – 6.

1.4 The following site-specific documents in relation to the proposed basement and planning application have been considered:

Farrell Design Studio (Approved):

- Drg No. IND-1114-P01 Rev.D Approved Basement Floor Plan
- Drg No. IND-1114-P02 Rev.A Proposed Lower Ground Floor Plan
- Drg No. IND-1114-P03 Rev.A Proposed Ground Floor Plan
- Drg No. IND-1114-P04 Rev.A Proposed First Floor Plan
- Drg No. IND-1114-P05 Rev.A Proposed Second Floor Plan
- Drg No. IND-1114-P06 Rev.A Proposed Loft Floor Plan
- Drg No. IND-1114-P07 Rev.A Proposed Front Elevation
- Drg No. IND-1114-P08 Rev.A Proposed Rear Elevation
- Drg No. IND-1114-P09 Rev.A Proposed Left Flank Elevation

Farrell Design Studio (Proposed):

- Drg No. IND-1114-C01 Approved/Proposed Basement Floor Plan Comparison
- Drg No. IND-1114-P100 Proposed Site Plan
- Drg No. IND-1114-P200 Proposed Lower Ground Floor Plan
- Drg No. IND-1114-P201 Proposed Ground Floor Plan
- Drg No. IND-1114-P301 Proposed Rear Elevation

Chelmer Consultancy Services:

- Report Ref: BIA/8084A Basement Impact Assessment Audit

Greenhatch Group Ltd:

- Drg No. 24742_01_P Topographical Survey (included in Appendix B of Chelmer's BIA)

Croft Structural Engineers:

- Drg No. 161202 SL-10 Structural Scheme Design ('marked up with loading')

This report should be read in conjunction with all the documents and drawings listed above.

1.5 Instructions to prepare this Addendum to the Basement Impact Assessment (BIA) report were confirmed by email on 25th February 2019.

2. THE PROPERTY & PLANNING SEARCHES

2.1 No.31 St Mark's Crescent is a four-storey (plus loft) end of terrace house, with an existing front lightwell and vaults at lower ground floor level, situated within the Primrose Hill Conservation Area of the London Borough of Camden (LBC). No.31 is located on the north-west side of St Mark's Crescent, between the adjoining No.1 to the south-west and the rear gardens of No's 57 and 59 Gloucester Road to the north-east. To the north-west, the site is bounded by the Grand Union Canal (Regent's Canal).

2.2 During a site inspection undertaken at the adjoining No.1 St Mark's Crescent on 24th July 2018, some evidence of crack repairs in the render was noted in both the front and rear walls of No.31, with minor re-opening on some of these. Whether they are of structural significance could not be assessed.

2.3 A search was made of planning applications on Camden Council's website on 4th March 2019 in order to check for any new applications in the vicinity of the property since the full BIA was prepared. The results are listed below:

- **No.31 St Mark's Crescent (the application site):**
  - Application (ref: 2018/5835/P) for "*Changes to design of rear fenestration and front lightwell to scheme of alterations approved including single storey rear extension and changes to window and lightwell, under planning permission 2016/7071/P…*" was registered on 19th December 2018. No documents are available with this application.
  - Application (ref: 2018/2645/P) for "*Submission of basement engineer appointment and canal wall survey/repairs details, as required by conditions 4 and 5 of planning permission 2017/1534/P…*" was granted on 11th June 2018.
  - Application (ref: 2017/2684/P) for "*Alteration to rear fenestrations of the closest wing of dwelling house (C3) to provide full height picture window*" was granted 19th May 2017.
  - Application (ref: 2017/1534/P) for the "*Excavation of a basement extension to single-family dwelling (Use Class C3) including no.1 rear lightwell and associated alterations to rear garden level"* was granted (subject to a Section 106 legal agreement) on 27th March 2017.
  - Application (ref: 2016/7071/P) for the "*Alterations to the single-family dwelling house (Use Class C3) including: the erection of single storey rear extension with terrace above…alterations to fenestrations and height of side annex as well as front lightwell*" was granted on 19th January 2017.
- **(Adjoining) No.1 St Mark's Crescent:** Application (ref: 2018/6105/P) for the "*Excavation of basement with front and rear lightwells and alterations to existing rear conservatory to dwelling house*" was registered on 15th January 2019. A Basement Impact Assessment with a ground investigation, building plans and an arboricultural report were all available with this application.

3. PROPOSED DEVELOPMENT

3.1 The approved application for No.31 St Mark's Crescent (ref:) is described on Camden's planning website as the "*excavation of a basement extension to single family dwelling including no.1 rear lightwell and associated alterations to garden level*"; this application was granted, subject to conditions, on 27th March 2017. The approved works, as shown on the scheme drawings by Farrell Design Studio (FDS, see paragraph 1.4), include the excavation and construction of a full footprint basement that extends partially beneath the rear garden, with a small rear lightwell. These plans also include reducing the level of the adjacent part of the rear garden by 1.0m, to create a new patio at the same level as the existing lower ground floor.

3.2 The current application (ref: 2018/5835/P) is for alterations to 2017/1534/P and a previous scheme (see paragraph 2.3), with the intention to combine two previous applications to develop a single scheme. The current application is described on the Camden Council website as "*changes to design of rear fenestration and front lightwell to scheme of alterations approved, including single storey rear extension with terrace and changes to windows and lightwell…*"; the application was registered on 19th December 2018.

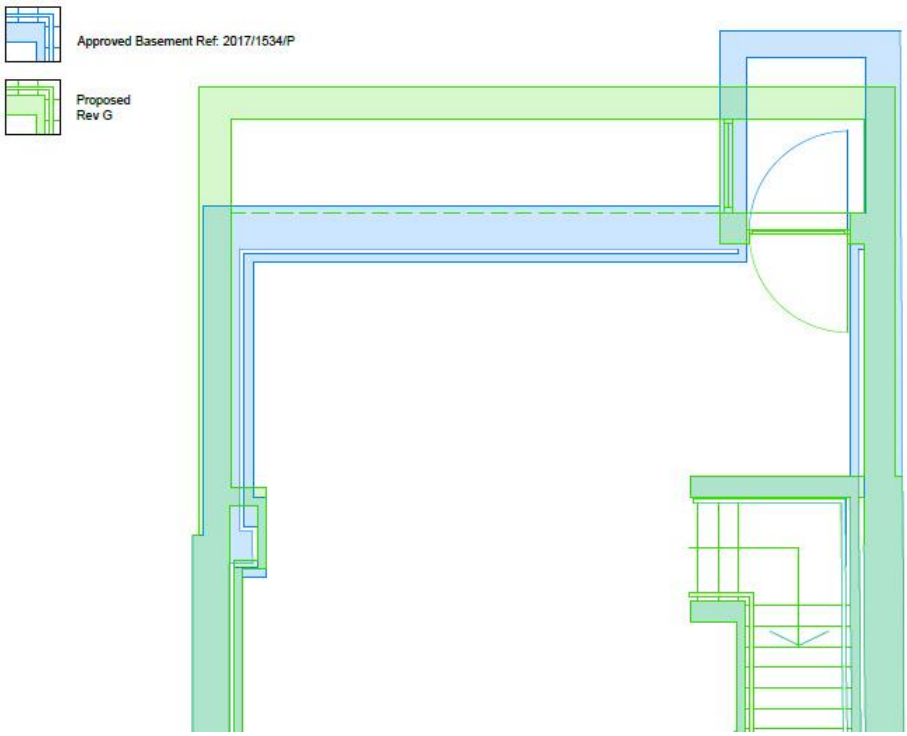

Figure 1: Extract from Farrell Design Studio's Drg No.IND-1114-C01 showing comparison of approved (blue) and proposed (green) basement outlines at the rear of the property.

3.3 The proposed alterations to the approved scheme, as shown in Farrell Design Studio's (FDS) drawings (see paragraph 1.4 and Figure 1 above), include:

- Full width extension of the proposed basement by 1.3m to the rear, giving a total basement length, from the front wall of the front bay to rear wall, of 15.6m.
- The rear lightwell reduced in size and aligned to rear wall of basement, so no longer projects beyond the rear wall of the basement.
- At lower ground floor level, construction of a single storey rear extension, extending 3.6m to the rear of the existing rear wall of No.31. This extension will have a rooflight and terrace above accessible from ground floor level.
- Removal of walls separating the three vaults at the front of the property at lower ground floor level, to create a single 'storage' area, and other minor internal alterations at lower ground floor level and above, none of which are significant to the basement.

The front of the approved basement and internal access staircase remain the same.

3.4 The excavation and floor levels for the proposed basement are understood to be the same as that previously approved and as modelled in CCS's full BIA, so excavation level (basement formation) will be 3.5m below lower ground floor level (from Croft, Structural Engineers' Drg No. 161202 SL-20). The existing lower ground floor level is at 30.7m AOD (as given in paragraph 2.4 of the full BIA, taken from Greenhatch Group's Topographical Survey), so basement formation level will be at 27.2m AOD. The structural drawings show a scheme of reinforced concrete (RC) underpinning and RC retaining walls around the rear lightwell.

4. STAGE 4 – BASEMENT IMPACT ASSESSMENT

4.1 Subterranean (Groundwater) Flow

4.1.1 During the short period of groundwater monitoring at the site, the highest groundwater standing level recorded was 3.08m below the front lightwell (27.62m AOD). The recorded groundwater levels were rising progressively so possibly were not representative of the groundwater level (phreatic surface) in the surrounding soils, and as a result further monitoring was recommended in the original BIA. The adjacent site, No.1 St Mark's Crescent recorded more consistent groundwater levels during the short monitoring period between June and July 2018, with the highest water level recorded at 29.8m AOD, which maybe more reflective of the groundwater level/pressure in the surrounding soils.

4.1.2 However, current geotechnical design standards require use of a 'worst credible' approach to selection of groundwater pressures. Accordingly, as high plasticity clays are present close to the surface, a design groundwater level(s) equal to the surrounding ground level(s) should be used for both short-term and long-term situations (in accordance with Eurocode 7, BS EN 1997-1).

Existing Basements:

4.1.3 To our knowledge there are no existing basements beneath the adjoining No.1 St Mark's Crescent or the adjacent No.57 Gloucester Avenue. All properties along the terrace have original lower ground floors, similar to No.31's, which are sometimes referred to as "basements".

Other Proposed Basements:

4.1.4 The adjoining No.1 St Mark's Crescent is awaiting the Council's decision on a planning application for a single-storey full footprint basement. The proposed method of construction involves using RC underpinning methods beneath the perimeter walls of the property, similar to those proposed for No.31.

Proposed Basement at No.31:

4.1.5 The proposed revised basement will be founded at the same level as the approved basement (approximately 3.5m below existing lower ground floor level, at approximately 27.2m AOD, see paragraph 3.4), and will extend a slightly shorter distance to the rear of the property than the approved small lightwell (see Figure 1). The impact of the proposed basement on groundwater seepage/flow (if any) will therefore be no greater than that of the approved basement. Thus, the proposed basement remains acceptable in relation to groundwater flow.

4.1.6 The basement structure must be designed to resist the buoyant uplift pressures which would be generated by groundwater at ground level. For the founding depths currently estimated, the uplift pressures could be up to 35kPa (unfactored).

Cumulative Impact:

4.1.7 The naturally low permeability of the London Clay within which this basement will be founded means this basement will not create a cumulative impact on groundwater seepage/flows

4.2 Slope and Ground Stability

4.2.1 The perimeter retaining walls, for the newly proposed part of the basement which will project to the rear of the proposed single-storey extension, are expected to be constructed using the same techniques as were/are proposed for the approved lightwell and basement projection to the rear of the existing building. These techniques include 'L' shaped, cast-in-situ, reinforced concrete (RC) retaining walls which must be constructed in panels of limited width using the same 'hit and miss' methodology as will be used for the underpins. Thus, the assessment and recommendations in the full BIA by CCS remain valid in relation to ground stability.

4.2.2 CCS's full BIA identified the close proximity of the proposed 'HS2 Down Line' (now estimated to be approximately 27m to the north of No.31, at an estimated track level of 5m AOD; see HS2 Main Line, Sheet 3, Drg No. C221-MMD-CV-DPP-010-200500-FPD Rev.P02). The full BIA stated that "the proposed development is not expected to have any impact" (on the tunnel, see item 14 in the Slope Stability Screening chart). That remains valid, though HS2 should be contacted in order to determine whether they need to be consulted formally about this basement.

Trees

4.2.3 The basement will be founded sufficiently deep to be unaffected by the roots from the trees in the rear garden of No.31. Those trees are understood to be in the footprint of the approved basement, so are already scheduled for removal. As previously recommended in the full BIA, an arboriculturalist should be consulted about any further precautions in relation to trees.

4.3 PDISP Heave/Settlement Assessment

4.3.1 Analyses of vertical ground movements (heave or settlement) were undertaken by CCS as part of the full BIA for the previously approved scheme. The method and results from these analyses are detailed in Section 5 of said BIA (report ref: BIA/8084A).

4.3.2 Figure 12 in CCS's full BIA illustrates the layout of the zones used to model the proposed basement in PDISP, and the table presented in Appendix G of that report presents the net changes in vertical pressure for each of these zones for the three major stages of stress changes resulting from excavation and construction of the basement. The layout modelled was an earlier, slightly different one to that which was subsequently approved, with a slightly larger rear lightwell at the rear left corner of the basement, alongside the 31/1 boundary, instead of at the rear right corner as in the approved scheme.

4.3.3 The formation level for the proposed basement will remain the same as that modelled in the previously approved application, meaning vertical unloading will remain unchanged. The slightly revised basement layout now proposed is closer to the modelled scheme than the approved scheme, so the heave/settlement values predicted in the original analysis are likely to be virtually unchanged, which predicted 1mm of (beneficial) heave beneath the rear lightwell and up to 4mm of settlement beneath the right flank wall (see Figures 13 - 15 of CCS's full BIA). Thus, the rear end of the basement, including the rear lightwell was not the critical location for the damage category assessments presented in Section 6 of the full BIA, as discussed further in Section 4.4 below.

4.3.4 The analysed and approved schemes did not include the now proposed single-storey rear extension at ground floor level, but did include 1.0m of soil above the basement roof slab to the rear of the house. As a result, is anticipated that there will be a slight reduction in net bearing pressures at the rear end of the basement in construction Stages 2 & 3, as modelled by the PDISP analyses, and an associated very slight increase in magnitude and extent of the predicted beneficial heave. On the basis of the anticipated likely minor and beneficial impact of these differences, it is not considered necessary to redo the PDISP analyses for the amended scheme.

4.4 Damage Category Assessment

4.4.1 Two damage category assessments were undertaken by CCS as part of the full BIA, the method and results from which were presented in Section 6 of that report (ref: BIA/8084A). Those assessments were carried out on the adjoining front wall of No.1 St Mark's Crescent and the adjacent southern flank wall of No.57 Gloucester Avenue, which were considered to reflect the worst-case scenarios for the basement development. Both were found to fall within a damage category of 'very slight' (Burland Category 1, ε_{lim} = 0.05-0.075%).

4.4.2 Both damage category assessments undertaken considered the front end of the basement. As the proposed changes to the basement all relate to the rear, the previous damage category assessments will not change, so do not require redoing for this addendum.

4.4.3 No new damage category assessment is warranted at the rear because:

1. The full width projection of the basement beyond the rear wall of the single-storey extension will extend less far than the previously analysed rear lightwell (which differed from the approved lightwell – see paragraph 4.3.2 above).
2. The anticipated slight reduction in net bearing pressures would result in a slight increase in the predicted beneficial heave, so this is a favourable change.

4.5 Surface Flow and Flooding

4.5.1 The full BIA (CCS report ref: BIA/8084A) concluded in paragraph 4.3.1 that: "*The very low risk of surface water flooding combined with no surface water features, except for the canal, can lead to the conclusion that conventional measures of managing surface water run-off should be sufficient to minimise any potential hydrological impacts*". This remains valid.

Change in Paved Surfacing & Surface Water Run-off:

4.5.2 Farrell Design Studios' 'Proposed Ground Floor Plan' (Drg No. IND-1114-P201) and 'Proposed Site Plan' (Drg No. IND-1114-P100) show a patio at lower ground floor level (30.70m AOD) with an area of approximately 25.6m^2, and access stairs from garden level with an approximate area of 7.4m^2. This is in addition to the lower ground floor rear extension, which has an approximate area of 27.4m^2. The rear projection of the basement across the full width of the site, including the lightwell, beyond the rear wall of the lower ground floor extension is not shown, however this will be within the area of the proposed patio. The existing property has a lower ground floor patio of approximately 16.0m^2, measured from FDS' 'Proposed Lower Ground Floor Plan (Drg No. IND-1114-P200) which shows the existing patio in red. This brings the area developed beyond the existing hardstanding to 44.4m^2. It is understood that 'permeable hardstanding over a void former' (the latter being sand?) is the intended surfacing above the projecting part of the basement, and it is assumed that will apply also to the patio and garden steps, which would bring the increase in impermeable surfacing down to 11.4m^2.

4.5.3 The approved 'Proposed Lower Ground Floor Plan' by Sher+White Architects (Drg No. 1701/PL.01_C) shows a 'Lower ground floor terrace area amended' which, including full width steps up to garden level, extends 9.69m from the rear wall of the house. This has a total area of approximately 71.3m^2, which compares with the 60.4m^2 total hardstanding of the current proposals.

4.5.4 The above calculations show that the proposed patio to the rear of the single-storey rear extension will extend less far into the rear garden, which is currently turfed, than the approved scheme, so the scheme currently proposed has a reduced increase in the area of hardstanding in the rear garden relative to the approved scheme. However, if the whole of that area would have been surfaced with permeable paving then the current scheme, with 27.4m^2 of impermeable roof, may be slightly less favourable. Thus the use of one or more Sustainable Drainage System (SuDS) as mitigation for this increase in impermeable surfacing, as recommended in the full BIA, remains applicable. Formal design calculations will be required.

5. NON-TECHNICAL SUMMARY – STAGE 4

5.1 This summary considers only the primary findings of the matters considered by this BIA addendum; the whole report should be read in conjunction with Chelmer Consultancy Services' Basement Impact Assessment (report ref: BIA/8084A) to obtain a full understanding of the matters considered.

5.2 The slightly revised basement geometry now proposed will not create any increase in impact on the likely negligible groundwater seepage/flow in the natural strata. In addition, no anticipated cumulative impact will be caused to groundwater flow due to the proposed construction of modern basements beneath both No.31 & No.1 so the proposed basement remains acceptable in relation to groundwater (Section 4.1).

5.3 The design groundwater level should be taken at external ground levels. This means that the basement must be able to resist buoyant uplift pressures (unfactored) of up to 35kPa (4.1.2, 4.1.6).

5.4 The extended section of the basement is expected to be constructed using the same design and methodology as previously planned for the part of the basement to the rear of the existing house, namely cast in-situ RC retaining walls constructed in panels not exceeding 1.0m width. Thus, the assessment and recommendations in the full BIA remain valid in relation to ground stability (4.2.1).

5.5 While, as previously, the proposed development is not expected to have any impact on the planned HS2 Down tunnel, HS2 should be contacted in order to determine whether they need to be consulted formally about this basement (4.2.2).

5.6 No revision of the heave/settlement assessment is considered warranted for the proposed slight change in basement geometry, because it affects the least sensitive area and the previous analysis did consider a lightwell alongside the 31/1 boundary (Section 4.3).

5.7 Damage category assessments were undertaken for both the front wall of No.1 St Mark's Crescent and the southern flank wall of No.57 Gloucester Avenue, because they were assessed to be critical structures for displacements, see Section 6 of CG's BIA. These assessments indicated that, provided best practice construction methods are employed, the worst case predicted deformation is likely to fall within Burland Category 1, termed 'very slight'. These assessments have not been redone for this BIA addendum because the front end of the basement scheme has not changed (Section 4.4).

5.8 No new damage category assessment is warranted at the rear because the proposed basement will extend less far than the previously analysed rear lightwell and it is anticipated that the current scheme will impose slightly lower net bearing pressures which represents a favourable change (4.4.3).

5.9 The full BIA found negligible risk of flooding from sea or river, or from surface water, so concluded that conventional measures of managing surface water run-off

should be sufficient to minimise any potential hydrological impact. These conclusions remain valid (4.5.1).

5.10 The proposed development will increase the area of hard surfacing, though by less than the approved scheme. Conversely, the proposed scheme does include more impermeable roof. Use of one or more simple SuDS systems will therefore be required as mitigation, as previously recommended in the full BIA; it is understood that use of permeable hardstanding is proposed, with temporary storage underneath. Formal design will be required (Section 4.5).

References

Arup (November 2010) Camden geological, hydrogeological and hydrological study – Guidance for subterranean development. Issue 01. London.

BS 8002 (1994) Code of Practice for Earth retaining structures. British Standards Institution.

BS 8102 (2009) Code of practice for protection of below ground structures against water from the ground. British Standards Institution, London.

BS EN 1997-1 (2004) Eurocode 7: Geotechnical Design – Part 1: General rules. British Standards Institution.

NHBC (2018) NHBC Standards, Chapter 4.2, Building Near Trees.

NHBC (2018) NHBC Standards, Chapter 5.4, Waterproofing of basements and other below ground structures.

URS (2014) London Borough of Camden SFRA – Strategic Flood Risk Assessment. Final report.