CampbellReith
consulting engineers

# 4 Wedderburn Road
# London NW3 5QE

## Basement Impact Assessment
## Audit

For

London Borough of Camden

Project Number: 12066-01

June 2015

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## Document History and Status

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| D1 | May 2015 | Comment | AJMemb12066-01-220515-D1.doc | A Marlow | A Marlow | E Brown |
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## Document Details

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| Project Partner | E M Brown, BSc MSc CGeol FGS |
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| Project Name | 4 Wedderburn Road, London NW3 5QE |
| Planning Reference | 2014/7292/P |

## Contents



## Appendices

## 1.0 NON-TECHNICAL SUMMARY

1.1. CampbellReith was instructed by London Borough of Camden (LBC) to carry out an audit on the Basement Impact Assessment submitted as part of the Planning Submission documentation for No. 4 Wedderburn Road (planning reference 2014/7292/P). The basement is considered to fall with Category B as defined by the Terms of Reference.

1.2. The Audit reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development in accordance with LBC's policies and technical procedures.

1.3. CampbellReith was able to access LBC's Planning Portal and gain access to the latest revision of submitted documentation and review it against an agreed audit check list.

1.4. Supplementary information has been received following the initial draft of this audit to enable the following conclusions to be drawn.

1.5. Additional confirmation has been received to verify that the BIA has been prepared by authors and reviewers having suitable qualifications.

1.6. Although no further information has been provided regarding the presence and size of basements in the vicinity of the development, the direction of groundwater flow and the flow rate have now been determined. The conclusion that the proposed basement will not impact on local groundwater movement is accepted.

1.7. Investigation of the reported open conduit carrying groundwater through the existing basement has been investigated and found to be inaccurate.

1.8. The additional groundwater investigations have confirmed that the alternative construction sequence offered in the original BIA is unnecessary due to the minimal groundwater flow rates encountered.

1.9. It has not been possible to confirm whether the conclusions of the ground movement analysis with respect to potential damage are correct.

1.10. The BIA states that an attenuation system will be required to cater for increased surface water run-off flows.

1.11. The supplementary information provides better and further details of a set of monitoring targets to be installed bearing in mind the minimal anticipated movements.

1.12. In conclusion, the submitted GMA is not adequate to confirm that the BIA is sufficiently robust and comprehensive.

## 2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 7 May 2015 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for No. 4 Wedderburn Road, Camden Reference 2014/7292/P.

2.2. The Audit was carried out in accordance with the Terms of Reference set by LBC. It reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development.

2.3. A BIA is required for all planning applications with basements in Camden in general accordance with policies and technical procedures contained within

- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.
- Camden Planning Guidance (CPG) 4: Basements and Lightwells.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water

2.4. The BIA should demonstrate 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; and,

c) avoid cumulative impacts upon structural stability or the water environment in the local area.

and evaluate the impacts of the proposed basement considering the issues of hydrology, hydrogeology and land stability via the process described by the GSD and to make recommendations for the detailed design.

2.5. LBC's Audit Instruction described the planning proposal as the "*Excavation at basement floor level below footprint of house and part rear garden with associated front and rear lightwells, erection of single storey rear extension, enlarge side dormers to main roof and associated elevational alterations.*"

and confirmed that the basement proposals did not involve a listed building nor did the site neighbour any listed buildings.

2.6. CampbellReith accessed LBC's Planning Portal on 13 May 2015 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment – Revised
- BIA Revised – Appendix C, Proposed Structure Full Rev B
- BIA Revised – Appendix F, Retaining Wall Calc
- BIA Revised – Appendix G, Existing Site Plan
- BIA Revised – Appendix H, CTMP
- BIA Revised – Appendix I, Trial Pit Info Full
- BIA Revised – Appendix D, GEA Geotechnical Report
- BIA Revised – Appendix E, Thames Water Asset
- Plans, elevations and sections – Proposed drawings

2.7. CampbellReith accessed LBC's Planning Portal on 22 May 2015 and identified a number of residents' consultation comments as being pertinent to the audit of the BIA. The comments reviewed are summarised in Appendix A.

2.8. CampbellReith received by email on 8 June 2015 Supplementary Information to the BIA Report in response to the first draft of the BIA Audit prepared by CampbellReith. The documentation consisted of the following:

- Supplementary Information in relation to CR BIA Audit.
- Appendix A – GEA BIA Rev. 3.
- Appendix D – HTS Statement on Movement Monitoring.
- Appendix D – Proposed Monitoring Positions.
- Appendix E – Ground Movement (Report) Analysis.
- Appendix F – Method Statement for Control of Groundwater

CampbellReith subsequently audited these additional documents.

## 3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

| Item | Yes/No/NA | Comment |
|---|---|---|
| Are BIA Author(s) credentials satisfactory? | No/Yes | No details of author credentials provided, see 4.1 and 4.2, but subsequently provided, see Appendix and 4.3. |
| Is data required by Cl.233 of the GSD presented? | Yes | BIA Appendix E. |
| Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology? | Yes | BIA Section 6 & Appendix D. |
| Are suitable plan/maps included? | Yes | BIA Section 2 & Appendix D. |
| Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail? | Yes | |
| Land Stability Screening:<br>Have appropriate data sources been consulted?<br>Is justification provided for 'No' answers? | Yes | BIA & Appendix D. |
| Hydrogeology Screening:<br>Have appropriate data sources been consulted?<br>Is justification provided for 'No' answers? | Yes | Direction of groundwater flow not determined, see 4.4, but subsequently provided in Supplementary Information. |
| Hydrology Screening:<br>Have appropriate data sources been consulted?<br>Is justification provided for 'No' answers? | Yes | BIA & Appendix D |
| Is a conceptual model presented? | Yes | BIA & Appendix D |
| Land Stability Scoping Provided?<br>Is scoping consistent with screening outcome? | Yes | |
| Hydrogeology Scoping Provided? | Yes | |

| Item | Yes/No/NA | Comment |
|---|---|---|
| Is scoping consistent with screening outcome? | | |
| Hydrology Scoping Provided?<br>Is scoping consistent with screening outcome? | Yes | |
| Is factual ground investigation data provided? | Yes | BIA & Appendix D |
| Is monitoring data presented? | Yes | Standpipes monitored twice, see 4.7, and a third time within Supplementary Information. |
| Is the ground investigation informed by a desk study? | Yes | BIA Appendix D, Cl. 1.3. |
| Has a site walkover been undertaken? | Yes | BIA Appendix D, Cl. 1.3. |
| Is the presence/absence of adjacent or nearby basements confirmed? | No | BIA Cl. 2.1 states "... the majority of which appear to have basements", see 4.6. |
| Is a geotechnical interpretation presented? | Yes | BIA & Appendix D, see 4.7. |
| Does the geotechnical interpretation include information on retaining wall design? | Yes | BIA Appendix F, see 4.9. |
| Are reports on other investigations required by screening and scoping presented? | na | |
| Are baseline conditions described, based on the GSD? | Yes | BIA Cl. 4.2 states "The results of subsequent (groundwater) monitoring will be reported as an addendum letter", included in Supplementary Information. |
| Do the base line conditions consider adjacent or nearby basements? | No | |
| Is an Impact Assessment provided? | Yes | BIA |
| Are estimates of ground movement and structural impact presented? | Yes | Additional ground movement analysis provided in Supplementary Information. |

| Item | Yes/No/NA | Comment |
|---|---|---|
| Is the Impact Assessment appropriate to the matters identified by screen and scoping? | Yes | Groundwater volume and flow direction to be confirmed and inadequate ground movement analysis, subsequently satisfied by Supplementary Information. |
| Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme? | Yes | Alternative construction sequence shown not to be necessary by Supplementary Information. |
| Has the need for monitoring during construction been considered? | Yes | A set of movement monitoring targets has been proposed within Supplementary Information. |
| Have the residual (after mitigation) impacts been clearly identified? | Yes | Impact on groundwater flow confirmed by Supplementary Information. |
| Has the scheme demonstrated that the structural stability of the building and neighbouring properties maintained? | No | Ground movement analysis within Supplementary Information requires clarification. |
| Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment? | Yes | The direction and volume of groundwater flow have been determined by Supplementary Information. |
| Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area? | Yes | The direction and volume of groundwater flow have been determined by Supplementary Information. |
| Does report state that damage to surrounding buildings will be no worse than Burland Category 2? | Yes | However ground movement assessment within Supplementary Information requires clarification. |
| Are non-technical summaries provided? | Yes | Provided within Supplementary Information. |

## 4.0 DISCUSSION

4.1. Although the BIA has been carried out by a well known firm of structural consulting engineers, Heyne Tillett Steel (HTS), there is no indication that it has been completed by a Chartered Engineer, as there is no indication of author or reviewer.

Contact was made with HTS to gather this information for audit purposes, who provided confirmation of author and reviewer, who have suitable qualifications.

4.2. The current revised BIA, and its supporting documentation, appear thorough and include a Site Investigation carried out by Geotechnical & Environmental Associates (GEA). GEA's document does provide information on author and reviewer, who have suitable qualifications.

4.3. HTS's Supplementary Information subsequently provided confirmation that all authors and reviewers of documentation have suitable qualifications.

4.4. Although GEA's Geotechnical Report, BIA Appendix D, has a section 2.5 describing the Hydrology and Hydrogeology, they have not conclusively determined the direction of groundwater flow. Additionally, it is reported by the Heath and Hampstead Society (consultation response dated 18 December 2014) that groundwater flows through the existing basement via an open conduit. Without knowing the volume and direction of the groundwater flow in the Claygate Beds, it is not possible to conclude whether the proposed basement will impact on local groundwater movement.

4.5. GEA's revised BIA rev 3 has subsequently identified the direct of flow of ground water and assessed the anticipated speed of water ingress through additional testing within existing boreholes and the excavation of test underpins. The applicant's team have investigated the comments concerning groundwater flows in the existing basement (consultation response) and have found no indication of damp or water.

4.6. The BIA states at section 2.1 that "… *the majority of which* (adjacent properties) *appear to have basements.*" No further investigation has been carried out and no material to support this statement has been provided. The existing basement is shallower than that proposed and measures only approximately 10 metres by 6 metres on plan. Without knowing whether the majority of other local basements are similar in size to No. 4 or whether they have been previously developed in a similar manner to this proposal, it is difficult to conclude whether the proposed basement will impact on local groundwater movement.

4.7. Within its section 10, "Outstanding Risks and Issues", the Geotechnical Report identifies that *"groundwater inflows are likely to be encountered during the basement excavation although groundwater monitoring should be continued to further assess groundwater levels …."* To date,

only two sets of groundwater monitoring have been carried out. An additional third set of monitoring has now taken place, the results of which are included in GEA's revised BIA.

4.8. The BIA acknowledges that the underpins will be excavated within the Claygate Member of the underlying soils. GEA state that this material is likely to soften and lose strength during construction. Each pin location is likely to be open for some time to allow for excavation, placing of reinforcement and formwork, and concreting. GEA indicate that additional testing should be carried out prior to construction commencement to adequately identify the degree of water movement within the Claygate Member. This additional testing has now occurred, the results of which are included in GEA's revised BIA.

4.9. HTS acknowledge that "should adequate water control to allow initial underpinning not be possible it is proposed that the following sequence (of construction operations) be adopted". What follows is basically the secant piled rear garden basement would be constructed prior to the underpinned basement below the existing house. In this way, together with possible temporary pumping, potential damage to adjoining properties should be restricted. HTS acknowledge that "the benefit of the rear garden basement being installed first will be the reduction in any level of ground water ….. (which) will reduce or omit the need for any ground water control measures when underpinning."

4.10. The additional ground water testing within the Supplementary Information has shown that water ingress into underpins can be controlled by sump pumping and the proposed alternative sequence of construction operations is not required.

4.11. HTS have provided calculations for stability and reinforcement details of underpins below loadbearing walls to the existing property to form the front part of the new basement. They have assumed a nominal vertical settlement of 3mm to the underpinning with no justification and then made the statement within the BIA that the pins have been designed to limit any damage to Damage Category 1 – Very Slight, even though their unsubstantiated value of 3mm accounts for approximately 50% of total anticipated vertical movement. These calculations were superseded by the further submission of the ground movement analysis.

4.12. GEA have stated within their "Outstanding Risks and Issues" that *"A ground movement analysis is in hand and will be reported as an addendum"* although it does not appear to have been issued to date. A ground movement analysis should provide estimates of horizontal movement and its impact on adjoining properties, which has not been carried out to date, as well as an improved assessment of vertical settlement. This should then allow agreement to be reached on the potential category of damage to adjoining properties.

4.13. The Supplementary Information contains a Ground Movement Analysis, carried out by GEA, which predicts that damage to neighbouring properties will generally be Burland Damage

Category 0 – Negligible or Burland Damage Category 1 – Very Slight along part of the rear elevation of No. 2 Wedderburn Road in compliance with the requirements of CPG4. However, the assumptions behind this assessment have not been made clear and the predictions cannot be verified. Although the scale of the basement excavation is relatively modest and ground movements are likely to be small, the following clarifications are required with respect to the ground movement assessment to confirm the likely category of damage (full details are presented in Appendix 4):

- The assumptions behind the assessment are to be clearly stated including piled wall type and toe depth and justification for high stiffness wall.
- How Xdisp has been applied to proposed underpinning techniques.
- How corner effects and the "boundary" between the two modelled areas have been considered in Xdisp.
- The impact of long term heave on adjacent structures.

The full input and output data for Pdisp and Xdisp are required to allow the assessment to be audited.

4.14. The BIA identifies a nominal increase in impermeable area with resulting increases in surface water flows being dealt with by means of attenuation although no details are provided.

4.15. Within the BIA section 8 "Impacts of Subterranean Development on Existing & Neighbouring Structures", HTS acknowledges *"as a precautionary measure a set of monitoring targets may be installed onto the external walls with No 6 Wedderburn Road".* These should definitely be included within the building process to *"act as an early warning system to identify any unexpected movement allowing time for remedial action to be taken"* as identified in section 8.1.

4.16. HTS have now provided an additional Statement on Movement Monitoring within the Supplementary Information identifying that monitoring of adjoining properties will now definitely take place and in an acceptable manner bearing in mind the minimal anticipated movements.

4.17. Apart from the previous comments, HTS have provided a comprehensive overview of construction methodology although they have stated that final temporary works design, installation and maintenance to ensure the strength and stability of the building throughout the construction process will be the responsibility of the contractor, who has yet to be identified.

## 5.0 CONCLUSIONS

5.1. Supplementary information has been received following the initial draft of this audit to enable the following conclusions to be drawn.

5.2. Additional confirmation has been received to verify that the BIA has been prepared by authors and reviewers having suitable qualifications.

5.3. Although no further information has been provided regarding the presence and size of basements in the vicinity of the development, the direction of groundwater flow and the flow rate have now been determined. The conclusion that the proposed basement will not impact on local groundwater movement is accepted.

5.4. Investigation of the reported open conduit carrying groundwater through the existing basement has been investigated and found to be inaccurate.

5.5. The additional groundwater investigations have confirmed that the alternative construction sequence offered in the original BIA is unnecessary due to the minimal groundwater flow rates encountered.

5.6. A ground movement assessment has been provided within the supplementary information that predicts potential damage to adjoining properties as Damage Category 0 – Negligible other than the rear elevation of No. 2 Wedderburn Road which is shown to be potentially Damage Category 1 – Very Slight. However, it has not been possible to confirm whether these predictions have been arrived at correctly (refer to Appendix 4).

5.7. The BIA states that an attenuation system will be required to cater for increased surface water run-off flows.

5.8. The supplementary information provides better and further details of a set of monitoring targets to be installed bearing in mind the minimal anticipated movements.

5.9. In conclusion, the submitted material does not represent an acceptable BIA which is sufficiently robust and comprehensive, and clarifications are required to the ground movement assessment.

# Appendix 1: Residents' Consultation Comments

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Residents' Consultation Comments

| Surname | Address | Date | Issue raised | Response |
|---|---|---|---|---|
| Ungar | 6 Wedderburn Road, London NW3 5QE | 16.12.14 | Shallow groundwater flow | See 5.3 to 5.6 and 5.8. |
| The Heath and Hampstead Society | PO Box 38214, London NW3 1XD | 17.12.14 | Risk of structural damage due to ground and groundwater conditions | See 5.3 to 5.6. |
| Heath and Hampstead Society | | 18.12.14 | Shallow groundwater flow | See 5.3 to 5.6. |
| Ungar | 6 Wedderburn Road, London NW3 5QE | 16.12.14 | Shallow groundwater flow | See 5.3 to 5.6 and 5.8. |
| Andrew Court Ltd | 2 & 2a Wedderburn Road, London NW3 5QE | 19.12.14 | Risk of structural damage and shallow groundwater flow | See 5.3 to 5.6 and 5.8. |
| Kurzke | 4 Elim Mansions, 15 Lyndhurst Gdns, NW3 5NT | 04.01.15 | Shallow groundwater flow | See 5.3 to 5.6. |
| Banks | 3 Andrew Court, 2 Wedderburn Rd, NW3 5QE | 14.01.15 | Risk of structural damage | See 5.5, 5.6 and 5.8. |
| Banks | 3 Andrew Court, 2 Wedderburn Rd, NW3 5QE | Uploaded 02.04.15 | Shallow groundwater flow | See 5.3 to 5.6 and 5.8. |
| Finch | 8 Wedderburn Road, London NW3 5QG | 02.04.15 | Shallow groundwater flow | See 5.3 to 5.6 and 5.8. |
| Kurzke | 4 Elim Mansions, 15 Lyndhurst Gdns, NW3 5NT | 07.04.15 | Shallow groundwater flow | See 5.3 to 5.6. |

# Appendix 2: Audit Query Tracker

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Audit Query Tracker

| Query No | Subject | Query | Status | Date closed out |
|---|---|---|---|---|
| 1 | BIA Author Qualifications | BIA author and qualifications not presented in BIA | Information provided by email – see Appendix C and Supplementary Information | 19.05.15<br>08.06.15 |
| 2 | BIA format | Non technical summaries not provided | Provided in Supplementary Information. | 08.06.15 |
| 3 | Subterranean Flows | Direction of groundwater flow | Confirmed by further monitoring and impact assessed within Supplementary Information. | 08.06.15 |
| 4 | Subterranean Flows | It is reported by the Heath and Hampstead Society that groundwater flows through the existing basement via a culvert | Confirmed within Supplementary Information that water/damp not present. | 08.06.15 |
| 5 | Stability | No supporting evidence for Burland damage category assessment | Ground movement assessment provided within Supplementary Information requires further clarification. | |
| 6 | Stability | Impact of groundwater flow on construction method | Original construction method justified by Supplementary Information. | 08.06.15 |
| 7 | Stability | BIA offers monitoring of No 6 Wedderburn Road | Monitoring regime and trigger levels to be agreed with Party Wall Surveyor and Supplementary Information provides acceptable proposal. | 08.06.15 |
| | | | | |
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# Appendix 3: Supplementary Supporting Documents

Wedderburn Road
1220
May 2015

# Supplementary Information to BIA Report

## 1 Introduction

The following report has been prepared in response to the initial BIA Audit report produced by Campbell Reith dated May 2015. In this report the 7 Audit queries raised by Campbell Reith have been answered and the supplementary information required in these responses have been included. The query subjects have been used to clearly identify each point and noted response.

## 2 Response to Queries

### 2.1 BIA Author Qualifications – Closed out 19.05.15

Author qualification were submitted via email on 19.05.15 but included below for completeness.

| | HTS/GEA Qualifications |
|---|---|
| Surface Flow and Flooding | Rupert Evans MSc CEnv CWEM MCIWEM AIEMA, Martin Cooper BSc CEng MICE |
| Subterranean (groundwater flow) | John Evans MSc FGS CGeol, Steve Branch BSc MSc CGeol FGS FRGS MIEnvSc |
| Land Stability | Martin Cooper BSc CEng MICE<br>Steve Branch BSc MSc CGeol FGS FRGS MIEnvSc<br>Ben Woodwiss BEng MSc CEng MIStructE<br>Andy Heyne BEng (Hons) DIS CEng MIStructE |

### 2.2 BIA Format

Following the requirement for Non-technical summaries of each section of the BIA to be provided, these are provided below.

Stage 1 Screening

At screening stage several areas where identified as being required to be assessed further, these generally focused on the need to investigate the effect of the basement on the water both within the ground and above it, as well as the relative position of the basement in relation to trees, highways and neighbouring properties.

Stage 2 Scoping

Based on the screening stages the scope of the site investigations were defined to identify any possible impacts. These identified that separate assessments of the surface water flow and flooding and subterranean flow would need to be undertaken so the SI was designed to pay particular focus to these areas.

Stage 3 Site Investigation and Study

Following definition of the scope the SI was undertaken and the ground model confirmed as London Clay overlane by Claygate member and made ground. Necessary investigation of the ground water was undertaken including monitoring of water levels and rising head test to better assess the possible impacts noted within the scoping stage.

Stage 4 Impact Assessment
To conclude, a Basement Impact Assessment has been carried out following the information and guidance published by the London Borough of Camden. Information from a Site Investigation has been used to assess potential impacts identified by the screening process and it is concluded that the proposed development is unlikely to result in any specific land or slope stability issues, groundwater or surface water issues.

**2.3 Subterranean Flows 1**
Further information was requested with regards to the direction of water flow and the need for further monitoring beyond the previous results noted with in the initial GEA Report.

In response to this and included within Appendix A is the revised Basement Impact Assessment provided by GEA which includes a revised section describes that rising head tests were done within the boreholes and a further result of the monitoring visits. The section also contains a determination of the direction of the flows as well as the expected speed of water ingress. Please refer to section 2.5 and 5.4 for all of this information.

To further confirm whether the use of underpins was practical a series of test pins were undertaken by the contractor. Summary of these test pins and also a method statement confirming the adopted method of the forming of the underpin's is included within Appendix B, along with photos of the excavations/shoring used.

**2.4 Subterranean Flows 2**

The reported open conduit described in the consultation response from the Heath and Hampstead Society does not appear within the open existing basement space of No 4 Wedderburn Road, or within the voids beneath the current ground floor as shown in the photos included within Appendix C.

It is therefore asked that the consultee provide proof of the open conduit if the supporting documents included with Appendix C do not provide the necessary assurance that it does not exist.

Comments on the direction of flow and their impact are included in response to Subterranean Flow 1.

**2.5 Stability 1**

As requested Appendix E contains the Ground Movement Report which was noted as being submitted as an addendum to the original BIA Report issued by HTS.

In summary the report concludes that, following the analysis, the predicted damage to the neighbouring properties would generally be 'Negligible', with some limited areas of 'Very Slight' along part of the rear elevation of Building A of No 2 Wedderburn Road. On this basis, the damage that would inevitably occur as a result of such an excavation would fall well within the acceptable limits.

**2.6 Stability 2**

As noted within the response to subterranean flows 1 the impact of the ground water flow on the method of construction is confirmed by first establishing the direction and rate of flow and information on this is included In the revised GEA BIA included within Appendix A. Subsequent to this a method statement for dealing within the slow expected inflow of water is provided within Appendix F.

**2.7 Stability 3**

As agreed as part of the party wall award to No 6, monitoring of the party wall and agreed trigger levels have been established based on the information contained within Appendix D.

This information is now submitted in response to the query regarding the offer of monitoring mentioned in HTS' BIA.

1220 - Wedderburn Road - BIA Report
Ben Woodwiss
to:
andrewmarlow@campbellreith.com
19/05/2015 11:35
Cc:
Andy Heyne, Chris Eaton
Hide Details
From: Ben Woodwiss <BWoodwiss@hts.uk.com>
To: "andrewmarlow@campbellreith.com" <andrewmarlow@campbellreith.com>
Cc: Andy Heyne <AHeyne@hts.uk.com>, Chris Eaton <c.eaton@stiffandtrevillion.com>
History: This message has been forwarded.

Andrew,

Thanks for taking my call earlier, as discussed I have included below the requested credentials for the author and checkers of the report both from within HTS and the previously included GEA credentials, these are inline with the Camden CPG4 document.

| | HTS/GEA Qualifications |
|---|---|
| Surface Flow and Flooding | Rupert Evans MSc CEnv CWEM MCIWEM AIEMA, Martin Cooper BSc CEng MICE |
| Subterranean (groundwater flow) | John Evans MSc FGS CGeol, Steve Branch BSc MSc CGeol FGS FRGS MIEnvSc |
| Land Stability | Martin Cooper BSc CEng MICE<br>Steve Branch BSc MSc CGeol FGS FRGS MIEnvSc<br>Ben Woodwiss BEng MSc CEng MIStructE<br>Andy Heyne BEng (Hons) DIS CEng MIStructE |

Also discussed was the ground movement report which was noted as "...currently in hand and will be reported as an addendum", this is being chased by HTS and we will report back on when this can be expected hopefully by the end of today.

In terms of the other points which may be included in the initial audit report we will be happy to deal with these once we have received this.

Regards

**Ben Woodwiss**
HEYNE TILLETT STEEL
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hts.uk.com

# Appendix 4: Comments on Ground Movement Assessment

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**Detailed Comments on Ground Movement Assessment**

**Assumptions**

Basement plan area – a check of the Camden Planning portal indicates the proposed basement plan measures approximately 51x10m. The plan on page 9, Section 6.0 indicates a basement area of approx. 35 x 12m based on the coordinates on the x and y axis.

The text indicates they have modelled the proposed basement shape as two rectangles: rectangle 1 to represent the basement footprint beneath the existing building footprint which the proposed construction sequence suggests would be underpinned and rectangle 2 to represent the area beneath the rear garden which is indicated to formed using a bored pile wall.

The xdisp output contour plans shows the two rectangles, however, the pdisp output plan shows several lines across the assumed basement footprint which could indicate different loaded areas although this is not clear.

The Xdisp analysis uses the ground movement curves for the installation of contiguous bored pile wall and a high stiffness wall in stiff clay. Heyne Tillett Steel's drawing 1220/100 indicates a secant piled wall. The toe depth of the piles is not stated.

**Neighbouring properties - No 2 Wedderburn Road to the east and No 6 to the west.**

A plan on page 9 shows the proposed basement together with the neighbouring properties on an x, y coordinate system which the text says were modelled into xdisp and pdisp, however, the output contour plans do not indicate the neighbouring buildings.

The text says the neighbouring properties have been modelled as lines however on the plan on page 9 they are shown as L- shaped grids.

The building damage assessment on page 10 on these properties was based on elevations referred to as 'far , rear, near and front ' which indicates the eastern, northern, western and southern boundaries of these properties. However as these were not labelled on the plan on page 9 and as the table does not show the coordinates, they are difficult to check.

The full pdisp and xdisp input and output are not provided. The last paragraph on 5.0 says the full output can be provided on request and samples were included in the appendix. The samples in the appendix are extracts from the xdisp output.

**Assessment of wall installation and excavation (XDisp)**

XDisp is intended to be used with embedded retaining walls. It is not clear how this assessment has been applied to the proposed underpinning scheme.

The input and output data are required to understand the assumptions made with respect to wall type and depth, the influence of corner effects and the assessment in the area where the two sections of basement abut.

**Assessment of basement excavation and building application (PDisp)**

The input and output data are required to check assumptions made with respect to soil strength and stiffness, and excavation depth and dimensions and loading/unloading assumptions.

**Building damage assessment**

The input and output data are required to confirm how the damage assessment has been carried out – i.e. assumptions with respect to lengths and height of neighbouring buildings and location/ orientation of foundations (not clear from presented information). Plans are required to demonstrate the relative locations of 4 Wedderburn Road and the neighbouring structures and the assumptions made with respect to foundations.

It is not clear how XDisp has been applied to the proposed underpinning in the ground movement/building damage assessment.

It should be confirmed whether there is any impact on neighbouring structures from the predicted long term heave.

## London

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