

47 Doughty Street,
London, WC1N 2LW

Basement Impact Assessment
Audit

For
London Borough of Camden

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1.0 NON-TECHNICAL SUMMARY

- 1.1. CampbellReith was instructed by London Borough of Camden, (LBC) ON 3 March 2016 to carry out an audit on the Basement Impact Assessment submitted as part of the Planning Submission documentation for 47 Doughty Street, WC1N 2LW (Camden Planning reference 2016/1027/P and 2016/1183/L). The basement is considered to fall within 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 reviewed it against an agreed audit check list.
- 1.4. The BIA reviewer has CEng FICE and IStructE qualifications, however, the input of a Chartered Geologist is required with respect to the appraisal of groundwater flow.
- 1.5. The majority of properties on Doughty Street are Grade II listed, including 47 Doughty Street. 48-49 Doughty Street which has a party wall with 47 Doughty Street is Grade I listed and houses the 'Dickens House Museum'.
- 1.6. No site specific ground investigation has been undertaken and it is not accepted that the proposed basement is unlikely to reach groundwater as stated.
- 1.7. Given that an extended thickness of Made Ground is anticipated, together with possible shallow groundwater level, the proposed underpinning may need to be reconsidered.
- 1.8. It is recommended that further investigation of the below ground soils is carried out, together with groundwater monitoring to allow a decision to be taken on construction methodology. A detailed description and plans to indicate the construction sequence and any temporary propping details are requested once a suitable construction method is determined.
- 1.9. The depth and nature of the neighbouring property foundations have been not been determined and the BIA assumes they are likely to be similar to the foundations to No 47. Unless further information is forthcoming or an investigation undertaken to determine these, the maximum differential depth should be assumed.
- 1.10. It is recommended that the impact from the basement excavation and construction on the neighbouring properties be reassessed in more detail, in particular the property at 48 Doughty Street which shares a party wall with the proposed construction and is Grade 1 listed. Supporting analysis considering vertical and horizontal movements from the underpinning,

piling (if undertaken) and heave from the excavation together with resulting estimated movements and damage category for the neighbouring properties and infrastructure, in particular No 48, the roadway and the sewer running beneath it are requested.

- 1.11. An outline monitoring proposal has not been provided and this is requested. Details and trigger levels may be agreed as part of the Party Wall awards.
- 1.12. A works programme has not been provided and this is requested.
- 1.13. A construction management plan is included and details should be agreed with the Council.
- 1.14. Queries and requests for further information are discussed in Section 4 and summarised in Appendix 2.

2.0 INTRODUCTION

- 2.1. CampbellReith was instructed by London Borough of Camden (LBC) to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 47 Doughty Street, WC1N 2LW (Camden Planning reference 2016/1027/P & 2016/1183/L).
- 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 *"Replacement of 3 storey rear extension (following demolition of existing rear closet wing); single story rear extension at ground floor level (following demolition of existing structure); lowering of floor level in front vaults; construction of basement below rear garden; internal alterations."*
- 2.6. The Audit Instruction also confirmed that 47 Doughty Street involved, or was a neighbour to, listed buildings. The Design & Access Statement identifies that the property is located in the

Bloomsbury Conservation Area and is Grade II listed. 48-49 Doughty Street which has a party wall with 47 Doughty Street is Grade I listed and houses the 'Dickens House Museum'

2.7. CampbellReith accessed LBC's Planning Portal on 31/03/2016 and gained access to the following relevant documents for audit purposes:

- Basement Impact Assessment Report (BIA): Eastwood and Partners, dated March 2016
- Planning Application Drawings consisting of
 - Location Plan dated February 2016
 - Existing Plans dated February 2016
 - Proposed Plans dated February 2016
- Design & Access Statement dated February 2016
- Construction Management Plan dated February 2016
- Consultation comments and response dated 31/03/2016 & 15/04/2015

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	No	See Audit paragraph 4.1.
Is data required by Cl.233 of the GSD presented?	No	Proposal not sufficiently detailed and may need reconsideration (see Audit paragraph 4.9). Works programme not included.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	No	Description not sufficiently detailed and proposal may need reconsideration (see Audit paragraph 4.9).
Are suitable plan/maps included?	Yes	Included but inadequate. Scheme drawings not sufficiently detailed as required by Cl. 233 of the Arup GSD. Plans for each stage of the basement excavation and construction are not included (see Audit paragraph 4.9).
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	No	See Audit paragraph 4.9
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	The response to Q10 states the groundwater level is considered to be deep however this was not established (see Audit paragraph 4.5).
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	BIA Section 4.1
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	It is stated the basement will be not be below the water table however this was not established and contradicts the response to Q1b of the hydrogeology screening (see Audit paragraph 4.5).
Is a conceptual model presented?	No	No ground investigation undertaken. Anticipated sequence of strata from a nearby site are referenced, however, this could vary greatly on site.

Item	Yes/No/NA	Comment
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 4.4.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 4.4.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	BIA Section 4.4.
Is factual ground investigation data provided?	No	Limited site investigation in the form of foundation investigation pits has been carried out. No site specific investigation to confirm sequence and depth of strata.
Is monitoring data presented?	No	Groundwater level not established, however BIA states that site investigation will be undertaken and this will include monitoring of groundwater levels (see Audit paragraph 4.8).
Is the ground investigation informed by a desk study?	N/A	No ground investigation presented, however, desk study information is included in the heritage statement and BIA.
Has a site walkover been undertaken?	Yes	As part of the limited site investigation.
Is the presence/absence of adjacent or nearby basements confirmed?	No	Extent of basements to neighbouring properties not established and the BIA assumes they are similar to 47 Doughty Street.
Is a geotechnical interpretation presented?	No	Not presented.
Does the geotechnical interpretation include information on retaining wall design?	N/A	No ground investigation or interpretation.
Are reports on other investigations required by screening and scoping presented?	No	

Item	Yes/No/NA	Comment
Are the baseline conditions described, based on the GSD?	No	Nearby basement depths and extent not established and ground investigation not undertaken.
Do the base line conditions consider adjacent or nearby basements?	Yes	Considered but not confirmed.
Is an Impact Assessment provided?	Yes	BIA Section 7.
Are estimates of ground movement and structural impact presented?	No	Not provided (see Audit paragraph 4.).
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	Considered, however, as all the potential impacts of the proposed basement have not been identified, this is considered inadequate (see Audit paragraph 4.10).
Has the need for monitoring during construction been considered?	No	Not provided. Outline proposals required.
Have the residual (after mitigation) impacts been clearly identified?	No	Not possible to determine if these are needed as all the potential impacts have not been considered.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	See Audit paragraphs 4.10
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	See Audit paragraphs 4.10.
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	However, no supporting analysis presented and proposed construction method may need reconsideration.

Item	Yes/No/NA	Comment
Are non-technical summaries provided?	Yes	BIA Section 4.4, 5.2 and 7.4

4.0 DISCUSSION

- 4.1. The BIA has been carried out by Eastwood & Partners Consulting Engineers and the reviewer has CEng FICE and IStructE qualifications. However, preparation of a BIA also requires the involvement of a Chartered Geologist (C. Geol) with respect to appraisal of groundwater flow and this does not appear to be the case.
- 4.2. The LBC Instruction to proceed with the audit identified that the basement proposal either involved a listed building or was adjacent to listed buildings but gave no details. The Design & Access Statement identified that 47 Doughty Street is located in the Bloomsbury Conservation Area and is Grade II listed. The majority of properties on Doughty Street are Grade II listed. 48-49 Doughty Street which has a party wall with 47 Doughty Street is Grade I listed and houses the 'Dickens House Museum'.
- 4.3. 47 Doughty Street is a mid-terrace house of 5 storeys including a basement. The property dates from the early 19th Century and is constructed from traditional load bearing brick walls and timber floors. At the rear of the property there is a closet wing, which includes a basement and to the front there are large basement vaults beneath the pavement.
- 4.4. Although it is evident that a thorough screening process has been largely undertaken, it would be beneficial if the requirements of CPG4 were followed accurately by the inclusion of the questions on the flowcharts in the Arup GSD and answers which include a definitive 'Yes' or 'No' as this will make it clear if the issues are to be carried forward or not.
- 4.5. The response to Question 6 of the surface flow and flooding screening states the proposed basement will not be below the water table, however, the groundwater level has not been established and this is contradictory to the response to Question 1b of the hydrogeology screening which states it is unknown whether the basement will intrude into the water table.
- 4.6. The proposal is to extend the existing basement to the rear of the property, both in plan size and depth. The existing basement beneath the property is to be extended beneath the garden to reach the rear boundary of the site. It is not proposed to develop the basement under any part of the original listed building. The proposal also involves demolition of the existing conservatory and part of the existing closet wing and to replace it with a light weight extension which will be supported by the new basement structure. The proposed basement consists of an area with a small retention height of approximately 1.20m adjacent to the rear of the house and a larger area with approximately 3.30m of retained height to surrounding properties on three sides. It is also proposed to lower the floor levels to the vaults at the front of the property, however this has previously been approved in a separate planning application and no information has been provided in the BIA.

- 4.7. Limited ground investigation in the form of foundation investigation pits have been carried out to a maximum depth of 3.00m. The BIA states that Made Ground was encountered in all pits to full depth. It is stated that this is in line with local Geological maps and British Geological Survey boreholes records for the area. The BIA states that BGS boreholes in the area record Made Ground to approximately 3.50m, over sand and gravel to 11m underlain by Clay.
- 4.8. The trial pits undertaken did not encounter any groundwater. Groundwater monitoring has not been carried out. The BIA states that further site investigations including groundwater monitoring will be carried out. It is stated in Section 6.2.3 of the BIA that *'the underlying sands and gravels are expected to allow water to drain away from the surface relatively freely'* and as such together with the absence of groundwater in the trial pits, *'it is concluded that the proposed basement is unlikely to reach groundwater'*. It should be noted that not encountering groundwater in the trial pits does not indicate the absence of groundwater and given that sands and gravels which are water bearing are indicated beneath the Made Ground, we would suggest leaving matters associated with groundwater level unresolved at this stage is unacceptable. A suitable ground investigation establishing the sequence and depth of strata with a programme of monitoring needs to have been completed as part of the design stage.
- 4.9. The BIA identifies underpinning or retaining walls (contiguous piled wall for the deeper rear area) as the preferred method of construction for the basement box although it is stated the construction method will be finalised after the award of the contract. No further details such as underpinning type (mass concrete or reinforced) or depth is provided. It is considered unacceptable to leave such matters for a later date and given that the sequence and depth of strata especially the Made Ground and the groundwater level has not been established, underpinning may require reconsideration. It is stated in Section 7.3.1 that the details of the neighbouring property foundations have not been established although Section 6.2.1 gives details of the party wall foundations which were investigated in the limited ground investigation. Plans indicating the construction sequence have not been provided and this is requested. An indicative structural design and temporary works proposal have not been provided and this is requested.
- 4.10. *'Negligible amount of movement'* is predicted, however, no estimated vertical or horizontal movement from the underpinning, piling or heave from the excavation is presented. This is contradictory to the discussion on Page 13 of the BIA which states damage may be limited to Category 1 (very slight) on the Burland Scale. Movement resulting from underpinning is almost entirely due to workmanship and whilst it may be possible to limit damage to Category 1 provided the works are properly controlled and the affected structures are in sound condition, stability of the neighbouring properties and infrastructure still needs to be demonstrated by indicating anticipated movements (vertical and horizontal movements from the underpinning and heave movements from the excavation) and damage category. This is particularly

important given that 47 Doughty Street and the adjacent properties are all listed buildings. The impact to the roadway and the sewer identified as running beneath it also needs to be considered.

- 4.11. Outline proposals for movement monitoring have not been provided and this is requested.
- 4.12. The BIA has shown that although the development is close to a culverted tributary of the River Fleet, it will not impact any other watercourses, springs or the Hampstead Heath Pond chain catchment area.
- 4.13. It is accepted that there are no slope stability concerns regarding the proposed development and it is not in an area prone to flooding.
- 4.14. A construction management plan is included and details should be agreed with the Council.
- 4.15. It is noted that a works programme has not been submitted as required by Cl.233 of the GSD.

5.0 CONCLUSIONS

- 5.1. The BIA reviewer has CEng FICE and IStructE qualifications, however, the input of a Chartered Geologist is required with respect to the appraisal of groundwater flow.
- 5.2. The majority of properties on Doughty Street are Grade II listed, including 47 Doughty Street. 48-49 Doughty Street which has a party wall with 47 Doughty Street is Grade I listed and houses the 'Dickens House Museum'.
- 5.3. No site specific ground investigation has been undertaken and it is not accepted that the proposed basement is unlikely to reach groundwater as stated.
- 5.4. Given that an extended thickness of Made Ground is anticipated, together with possible shallow groundwater level, the proposed underpinning may need to be reconsidered.
- 5.5. The depth and nature of the neighbouring property foundations have been not been determined and the BIA assumes they are likely to be similar to the foundations to No 47. Unless further information is forthcoming or an investigation undertaken to determine these, the maximum differential depth should be assumed.
- 5.6. It is recommended that further investigation of the below ground soils is carried out, together with groundwater monitoring to allow a decision to be taken on construction methodology. Plans to indicate the construction sequence and temporary propping details are requested once a suitable construction method is determined.
- 5.7. It is recommended that the impact from the basement excavation and construction on the neighbouring properties be assessed in further detail, in particular the property at 48 Doughty Street which shares a party wall with the proposed construction and is Grade 1 listed. Supporting analyses considering vertical and horizontal movements from the underpinning and piling (if undertaken) and heave from the excavation together with resulting estimated movements and damage category for the neighbouring properties and infrastructure, in particular No 48, the roadway and the sewer running beneath it are requested.
- 5.8. An outline monitoring proposal has not been provided and this is requested. Details and trigger levels may be agreed as part of the Party Wall awards.
- 5.9. A works programme has not been provided and this is requested.
- 5.10. A construction management plan is included and details should be agreed with the Council.
- 5.11. It is accepted that there are no slope stability concerns regarding the proposed development and it is not in an area prone to flooding.

Appendix 1: Residents Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Sughrue	48 Doughty Street, WC1N 2LX	30/03/2016	Excavations	See Audit paragraphs 5.6 and 5.7

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA format	Qualifications of individuals involved not in accordance with CPG4 requirements.	Open - Input of a Chartered Geologist (C.Geol) required.	
2	BIA format	Works programme not included	Open – Outline programme to be provided.	
3	BIA format/ Stability	No site specific ground investigation to confirm sequence of strata	Open – site specific ground investigation to be undertaken.	
4	Hydrogeology	Groundwater level not established	Open – to be established as part of the recommended ground investigation.	
5	Stability	Neighbouring property foundations not determined	Open – to be investigated or maximum differential depth assumed.	
6	Stability	Proposed construction method not sufficiently detailed and may need reconsideration. No temporary works proposal or construction sequence drawings	Open – Construction method to be reconsidered following ground investigation and construction sequence drawings together with any temporary works proposal to be provided.	
7	Stability	Contradictory damage category for neighbouring properties and no supporting analysis. No consideration of impact on roadway and sewer beneath	Open – Anticipated movements from all construction activities to be provided once method is established together with damage category for neighbouring properties and the property itself. Impact on roadway and any utilities running beneath to be considered.	
8	Stability	Movement monitoring proposal not provided	Open - Outline proposal to be provided. Details and trigger levels to be agreed as part of Party Wall awards.	

Appendix 3: Supplementary Supporting Documents

None

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