CampbellReith
consulting engineers

6 Albert Terrace Mews
London, NW1 7TA

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12985-14
Revision: F1

January 2019

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Project Number	12985-14
Project Name	6 Albert Terrace Mews
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Appendix

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 6 Albert Terrace Mews, NW1 7TA (Camden planning reference 2018/3222/P). 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 impacts 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 qualifications of the individuals involved meet the LBC guidance requirements.

1.5. The current Camden Planning Guidance: Basements (2018) is now referenced.

1.6. The proposed development is indicated to comprise lowering of the existing ground floor slab within the footprint of the house and excavation of a basement by underpinning.

1.7. The overall depth of excavation and underpinning has now been clarified. Outline retaining wall calculations are included.

1.8. An arboricultural assessment is provided under a separate cover. This includes a tree protection plan.

1.9. It is stated there will be no change in the hardstanding area and surface water run-off will be discharged into the sewer system as existing.

1.10. Groundwater was recorded within the basement depth during the site works and subsequent monitoring and measures to control this during construction are proposed.

1.11. Clarification has been provided on the recommendations for groundwater control and geotechnical design as requested following the initial audit.

1.12. The absence of basements beneath the immediate neighbouring properties is now confirmed, however, the depth to the foundations beneath No 5 Albert Terrace Mews should be investigated prior to construction.

1.13. The queries on the ground movement assessment have now been addressed as discussed in Section 4.

1.14. The cumulative impacts of the proposals at No 6 Albert Terrace and the subject site on No 5 Albert Terrace have been assessed, as previously requested.

1.15. Appropriate protection and mitigation of damage to each asset beneath the pavements should be agreed with the asset owners.

1.16. An outline structural monitoring strategy is now presented. A detailed proposal should be agreed with the relevant parties prior to construction.

1.17. An indicative works programme has been provided. A detailed programme may be provided by the appointed contractor at a later date.

1.18. It is accepted that there are no slope stability concerns and wider hydrogeological impacts regarding the proposed development and it is not in an area prone to flooding.

1.19. On the basis of the additional information presented, the BIA meets the requirements of Camden Planning Guidance: Basements.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 18 September 2018 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 6 Albert Terrace Mews, NW1 7TA, (2018/3222/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 Basements. March 2018.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water.
- Local Plan Policy A5 Basements.

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;

c) avoid cumulative impacts upon structural stability or the water environment in the local area, and;

d) 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 *"Excavation of a basement; the installation of air handling units at ground floor level; the blocking up of a side door; the lowering of a rear window sill to create a doorway; lowering the ground floor to provide level access; and conversion of the property to ancillary guest accommodation to 6 Albert Terrace".*

2.6. The Audit Instruction also confirmed 6 Albert Terrace Mews did not involve, nor was it a neighbour to listed buildings.

2.7. CampbellReith accessed LBC's Planning Portal on 4 October 2018 and gained access to the following relevant documents for audit purposes:

- Structural Engineering Proposal & Basement Impact Assessment, Alan Baxter Ltd, dated July 2018 which includes the following appendices:
    i. Geotechnical Site Assessment, RSK Environmental Ltd, dated June 2018
    ii. Basement Impact Assessment, RSK Environmental Ltd, dated July 2018
- Tree Survey, Arboricultural Impact Assessment and Tree Protection Plan, Martin Dobson Associates, dated 24 May 2018.
- Construction Management Plan, Blue Sky Building, dated June 2018.
- The Planning and Heritage Statement & Design and Access Statement, Humphrey Kelsey Architecture, dated June 2018.
- Humphrey Kelsey Architecture Planning Application drawings comprising:
    i. Site plan – 181 (M).1250.L
    ii. Existing ground floor plan – 181 (M).50.E2
    iii. Existing front elevation (A - A) – 181 (M).50.P6
    iv. Existing rear elevation (B – B) – 181 (M).50.P7
    v. Existing side elevation (C – C) – 181 (M).50.P8
    vi. Existing section D – D – 181 (M).50.E9
    vii. Existing section E – E – 181 (M).50.E10
    viii. Proposed basement plan – 181 (B).50.P1
    ix. Proposed ground floor plan – 181 (B).50.P2
    x. Proposed front elevation (A - A) – 181 (B).50.P6
    xi. Proposed rear elevation (B – B) – 181 (B).50.P7
    xii. Proposed side elevation (C – C) – 181 (B).50.P8
    xiii. Proposed section D – D – 181 (B).50.P9
    xiv. Proposed section E – E – 181 (B).50.P10
- 2 No. relevant consultation comments

2.8. Responses to the queries raised in the initial audit were received from the applicant's architect via email on 26 November 2018. Responses to further queries were received on 14 December 2018. The updated BIA and Geotechnical Site Assessment by RSK and the revised Structural Engineering Proposal by Alan Baxter were received via Wetranfer. These reports are not included on Appendix 3 due to file size but may be accessed on the Camden Panning portal. The email responses and the monitoring proposal are appended to this report.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	Section 1.0 of the Alan Baxter Structural Engineering Proposals & Basement Impact Assessment (SEP & BIA).
Is data required by Cl.233 of the GSD presented?	Yes	Alan Baxter SEP&BIA and supporting documents. Works programme included in construction management plan (see Audit paragraph 4.29). Plan indicating utilities beneath pavements along Albert Terrace Mews and Regents Park Road provided (see Audit paragraph 4.27).
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	Provided in the updated SEP & revised BIA (see Audit paragraphs 4.4 to 4.7).
Are suitable plan/maps included?	No	Relevant maps with site location indicated to support screening responses not presented.
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	N/A	As above.
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Relevant Arup GSD maps not referenced or provided with site location indicated, however, responses considered to be valid and current guidance now referenced (see Audit paragraphs 4.2 and 4.8).
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Relevant Arup GSD maps not referenced or provided with site location indicated, however, responses considered to be valid and current guidance now referenced (see Audit paragraphs 4.2 and 4.8).

Item	Yes/No/NA	Comment
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	Relevant Arup GSD maps not referenced or provided with site location indicated, however, responses considered to be valid and current guidance now referenced (see Audit paragraphs 4.2 and 4.8).
Is a conceptual model presented?	Yes	Section 5 of the RSK geotechnical site assessment.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4.2 of the RSK BIA.
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	Section 4.1 of the RSK BIA.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	N/A	No potential issues carried forward from screening.
Is factual ground investigation data provided?	Yes	Appendix C of the RSK geotechnical site assessment report.
Is monitoring data presented?	Yes	Appendix C of the RSK geotechnical site assessment report.
Is the ground investigation informed by a desk study?	Yes	RSK geotechnical site assessment report.
Has a site walkover been undertaken?	Yes	Section 1.0 of the RSK geotechnical site assessment report.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	Section 6.4.3 of the revised BIA.
Is a geotechnical interpretation presented?	Yes	Section 6 of the revised RSK geotechnical site assessment report (see Audit paragraphs 4.13 to 4.15).
Does the geotechnical interpretation include information on retaining wall design?	Yes	As above.

Item	Yes/No/NA	Comment
Are reports on other investigations required by screening and scoping presented?	Yes	Ground movement assessment (GMA) presented. Ground investigation/geotechnical site assessment report also presented although this appears to have been undertaken prior to the BIA.
Are the baseline conditions described, based on the GSD?	Yes	Information provided in revised SEP & BIA and supporting documents (see Audit paragraphs 4.10 and 4.11).
Do the base line conditions consider adjacent or nearby basements?	Yes	Section 6.4.3 of the revised BIA (see Audit paragraph 4.10 and 4.11).
Is an Impact Assessment provided?	Yes	Section 6 of the RSK BIA.
Are estimates of ground movement and structural impact presented?	Yes	Section 6 of the revised RSK BIA and Section 5 of the revised SEP & BIA (see Audit paragraphs 4.12 to 4.20).
Is the Impact Assessment appropriate to the matters identified by screening and scoping?	Yes	Section 6 of the RSK BIA.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Section 7.3.1 of the RSK BIA (see Section 4).
Has the need for monitoring during construction been considered?	Yes	Outline proposals now presented (see Audit paragraph 4.28 and Appendix 3).
Have the residual (after mitigation) impacts been clearly identified?	N/A	None identified.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Section 6 of the RSK BIA. Scheme has been revised to address previous queries (see Audit paragraphs 4.16 to 4.25).
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	BIA and supporting documents (see Audit paragraph 4.12).

Item	Yes/No/NA	Comment
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	As above.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	Yes	Category 1 (very slight) damage predicted (see Audit paragraphs 4.16 to 4.25).
Are non-technical summaries provided?	Yes	Summary provided in RSK BIA.

4.0 DISCUSSION

4.1. The Structural Engineering Proposal (SEP) and a summary of the BIA findings was prepared by Alan Baxter Ltd. The BIA which includes a ground movement assessment (GMA) and the Geotechnical Site Assessment were undertaken by RSK Environmental Ltd. These were included as appendices to the Alan Baxter Report. The individuals involved hold CEng MIStructE and CGeol and MICE qualifications respectively.

4.2. The RSK BIA made reference to '*CPG4 March 2018*'. The current LBC guidance document is Camden Planning Guidance: Basements (2018) and it was requested that this be referred to. This has been addressed in the revised BIA.

4.3. The site is an end of mews property comprising a two storey building with a single storey side extension which is indicated to have been a later addition. The property and its neighbours along Albert Terrace Mews are not listed but fall within the Primrose Hill Conservation Area.

4.4. The proposed development is indicated to be the lowering of the existing ground floor slab by approximately 300mm to the level of the rear garden and a 4m excavation beneath the entire footprint of the main building to form a ground floor level swimming pool and basement level pool plant room and storage respectively. An underpinning depth of 6m and an excavation of c.5.50m was however assumed in the RSK ground movement analysis and clarification was requested.

4.5. Clarification was received from RSK in response to the above query. The proposed excavation and underpinning depths have now been confirmed to be 4 and c.4.40m respectively.

4.6. The basement was to be formed using reinforced concrete underpinning in two stages. It was stated in Section 2 of the Alan Baxter SEP and BIA that propping at three levels as the ground is lowered will be utilised. There were further comments on the construction sequence and methodology related to the ground movement assessment. Outline retaining wall calculations were provided in the appendices.

4.7. The construction methodology has been revised to a single lift underpinning in response to queries raised following the initial audit relating to ground movements and potential damage to the neighbouring properties which is discussed in more detail below.

4.8. The relevant figures/maps from the Arup GSD and other guidance documents with the site location indicated are not provided to support the responses to the screening questions. The responses are however considered to be largely valid.

4.9. It is stated on the land stability screening that no trees are to be removed as part of the proposed development. This is also stated on an arboricultural assessment which is provided

under a separate cover but not referenced in the RSK BIA. Tree protection details are included in the arboricultural assessment.

4.10. It was stated in the RSK BIA that it is unknown whether the adjacent No 5 Albert Terrace Mews comprises a basement and therefore as '*a conservative approach it is considered that this structure is with a similar configuration as the site*'. The foundation level (c.0.75m bgl) of this property used in the ground movement assessment appears to be assumed, however, it is noted the party wall foundation (the side extension) is not proposed to be underpinned. The presence or absence of basements beneath the remaining properties along Albert Terrace Mews and Albert Terrace was not confirmed. It was however noted from the planning application for 6 Albert Terrace which is under the same ownership as the subject site and is currently being considered for planning that No 5 Albert Terrace Mews, the other property within the zone of influence, comprises a basement.

4.11. It is stated in the revised BIA that '*the absence of a basement beneath No 5 Albert Terrace Mews is confirmed by Humphrey Kelsey Architecture and …….it is considered the structure at 4 Albert Terrace Mews is with a similar configuration. Foundation depths to No 5 and No 4 ABT are assumed to be similar to No 6 ABT……'*

4.12. It is stated on the surface water and flooding assessment that there will be no change in the hardstanding area as part of the proposed development hence volume of surface water run-off will be as existing and is to be discharged into the sewer system as present. The Camden SFRA map and Figure 15 of the Arup GSD indicates areas of medium to high surface water flood risk on Primrose Hill to the west. A low risk of flooding is indicated for areas to the south of the site, however, no risk of flooding is indicated for the property itself. The site is not indicated to be in an area at risk of flooding from any other sources.

4.13. A site specific ground investigation which included a window sample hole in the rear garden of No 6 Albert Terrace and 3 foundation inspection pits to investigate the foundations of the existing building as undertaken. Made Ground was encountered to a maximum depth of 2.50m bgl underlain by London Clay in the window sample hole. The base of the Made Ground was not encountered in the inspection pits which only extended to 1m bgl. Groundwater was encountered during the site works at 3.80m bgl and monitored at 1.90m bgl during monitoring following the works which is within the depth of the proposed basement depth. It was stated in the geotechnical site assessment that dewatering is considered to be required to facilitate the basement excavation ('*pumping from open sumps will be sufficient to keep the excavations dry*') although there were confusing references to '*some form of closely interlocked sheet piles or a secant bored piled wall'* to overcome the presence of groundwater elsewhere in the report.

4.14. The geotechnical assessment in Section 6 of the RSK geotechnical assessment includes information for design of the retaining wall, foundations and floor slabs. Different undrained

shear strength values were given for the surface of the London Clay under recommendations for piled foundations and retaining walls.

4.15. Clarification on the above was received following the initial audit and it is stated that the different Cu values relate to the basement formation level and the top of the London Clay respectively. This is reflected in the updated report.

4.16. A ground movement and resulting damage assessment for the neighbouring properties was undertaken. Oasys Xdisp (based on CIRIA C580/C760) was used to estimate the movements (horizontal and vertical) due to underpinning and excavation. Curves for 'installation of planar diaphragm wall in stiff clay' were used to model the underpinning. The CIRIA guidance is intended for embedded retaining walls, but it is accepted that this may provide a basis for which to undertake an assessment of an underpinned construction, provided ground movements are within the range typically anticipated for underpinning techniques carried out with good control of workmanship.

4.17. Oasys Pdisp was used to estimate the vertical movements (heave/settlement) due to excavation and construction in the short and long term. It was stated that these were imported into the Xdisp analysis to undertake the damage analysis however imported displacements are not indicated on the Xdisp tabular input and output provided.

4.18. Horizontal and vertical movements of ~9mm and ~5m respectively during construction were predicted for the front of No 5 Albert Terrace reducing to ~4mm and ~2mm at the rear. Category 1 (very slight) damage was predicted for this property. A damage assessment was not undertaken for No 4 Albert Terrace Mews and although the statement in Section 6.4.3 of the RSK BIA which stated the property considered to be potentially most at risk is No 5 Albert Terrace was acknowledged, given the depth of the excavation, it was requested that No 4 Albert Terrace Mews and No 5 Albert Terrace be assessed as they are within the zone of influence.

4.19. The approach to the ground movement analysis and resulting damage assessment was not accepted given the site conditions and proposals. As noted above, the ground movement assessment was undertaken using CIRIA C760 curves for the installation for a planar diaphragm wall for the underpinning and excavation in front of a high stiffness wall for the excavation, however, these are indicated as 'reduced' on the Xdisp input. Section 6.4.4. of the RSK BIA stated that the predicted movements from the analysis are likely to be highly overestimated therefore reduced calculated displacements have been used in the damage assessment. The magnitude of the reduction was however unclear. Furthermore as stated above, the proposed construction methodology is underpinning undertaken in two lifts and this will result in greater movements than a single lift with the potential consequence of a higher than predicted category of damage to the neighbouring properties.

4.20. The depth to the first lift of underpinning was not indicated although Section 7.3.1 of the RSK report which provides recommendations to control ground movements states the first stage of underpinning should be taken into the '*competent strata (ideally the natural London Clay)'.* Based on the depth of the Made Ground encountered, this should be beyond 2.50m depth. Clarification was requested.

4.21. The construction methodology is now amended to address the above queries and it is proposed to undertake the underpinning in a single lift. Vertical and horizontal movements of ~8mm and ~7mm respectively are now predicted for the front of No 5 Albert Terrace Mews, reducing to ~2mm and ~3mm at the rear. The predicted movements for No 4 are vertical movements of ~1mm and horizontal movements of ~3mm at the front of the property, reducing to 0mm at the rear. Category 1 and 0 damage respectively are predicted for the two properties.

4.22. The depth of the underpinning is relatively deep although it has been confirmed to be feasible to undertake as a single lift by a reputable specialist subject to careful workmanship and control on site.

4.23. Cumulative impacts associated with the proposed basement development on the hydrogeology and hydrology of the area and stability of the neighbouring properties have been assessed in Section 7 of the RSK BIA. A number of consultation comments on the No 6 Albert Terrace basement application raise the issue of current or proposed works on properties on Regent's Park Road and Albert Terrace Mews.

4.24. The proposed basement excavation works beneath No 6 Albert Terrace located to the west of the site are under the same ownership as the subject site. A 5m deep excavation is proposed in the front and side garden (north western and western areas) of this property, however this is outside the zone of influence of the works at the subject site and its immediate neighbours, Nos 4 and 5 Albert Terrace Mews. As stated above, No 5 Albert Terrace, which shares a party wall with No 6 Albert Terrace proposed to be underpinned by ~600mm, is however within the zone of influence of these works. Category 0 damage is predicted for this property as a result of the works at No 6 Albert Terrace, although no assessment was made for the movements as a result of the works at the subject site, potential cumulative impacts and resulting predicted damage.

4.25. In response to the above query, it is stated in the RSK revised submission that the cumulative impact of the developments '*will not be significantly different from the ones calculated by each separate assessment*' due to the distance between the properties. This conclusion is accepted.

4.26. The consultation comments under this application indicate concerns relating to the water table, flooding and subsidence issues. As discussed above, the site is underlain by an unproductive stratum and whilst groundwater was encountered within the depth of the basement, measures to control this during the works are proposed and wider hydrogeological impacts are not anticipated. Effects on the hydrology are also accepted to be minimal as discussed above.

4.27. A plan indicating the utilities beneath the pavements along Albert Terrace Mews and Regents Park Road is included (Alan Baxter drawing no. 1808/21/05). The impact assessment concluded the predicted movements associated with the roads/pavements will have no damaging effects. Although the assets running beneath the pavements are subject to separate approvals, this statement was not accepted due to the previous queries on the ground movement analysis as discussed above. This issue is now considered to be appropriately addressed.

4.28. Section 7.3.1 of the RSK BIA recommends movement monitoring as part of proposals to control ground movements, however this is not mentioned in the Alan Baxter report which is the main document supporting this application. Outline proposals were not included and this was requested with trigger values based on the GMA to ensure damage impacts remain within the agreed limits. An outline monitoring proposal by Alan Baxter is included in the revised submission (see Appendix 3).

4.29. An indicative works programme as required by cl. 233 of the Arup GSD is included in the construction management plan. A detailed programme may be provided by the appointed contractor at a later date.

4.30. It is accepted that there are no slope stability concerns or wider hydrogeological impacts regarding the proposed development and the site is not in an area prone to flooding.

5.0 CONCLUSIONS

5.1. The qualifications of the individuals involved meet the LBC guidance requirements.

5.2. The current Camden Planning Guidance: Basements (2018) is now referenced.

5.3. The proposed development is indicated to comprise lowering of the existing ground floor slab within the footprint of the house and excavation of a basement by underpinning. The revised BIA states the underpinning is to be undertaken as a single lift.

5.4. The overall depth of excavation and underpinning has now been clarified. Outline retaining wall calculations to demonstrate structural stability are included.

5.5. An arboricultural assessment is provided under a separate cover. This includes a tree protection plan.

5.6. It is stated there will be no change in the hardstanding area and surface water run-off will be discharged into the sewer system as existing.

5.7. A site specific ground investigation which included foundation inspection pits was undertaken. Groundwater was recorded within the basement depth during the site works and subsequent monitoring and measures to control this during construction are proposed.

5.8. Clarification has been provided on the recommendations for groundwater control and foundations and retaining wall design provided in the initial geotechnical assessment report as requested following the initial audit.

5.9. The absence of basements beneath the immediate neighbouring properties is now confirmed, however, the depth to the foundations to No 5 Albert Terrace Mews should be confirmed prior to construction.

5.10. The queries on the ground movement assessment have now been addressed as discussed in Section 4.

5.11. The cumulative impacts of the proposals at No 6 Albert Terrace and the subject site on No 5 Albert Terrace have been assessed as requested.

5.12. The impact on the utilities beneath the surrounding pavements have been assessed. Appropriate protection and mitigation of damage to each asset should be agreed with the asset owners.

5.13. An outline structural monitoring strategy is now presented. A detailed proposal should be agreed with the relevant parties prior to construction.

5.14. An indicative works programme has been provided. A detailed programme may be provided by the appointed contractor at a later date.

5.15. It is accepted that there are no slope stability concerns and wider hydrogeological impacts regarding the proposed development and it is not in an area prone to flooding.

5.16. On the basis of the additional information presented, the BIA meets the requirements of Camden Planning Guidance: Basements.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Marks	Not provided	19 September 2018	'*Excavation of a basement would cause major flooding and subsidence'*	No risk of flooding identified (see Audit paragraph 4.12). Subsidence – Queries on ground movement assessment addressed (see Audit paragraphs 4.13 to 4.23).
Jarrold	Not provided	22 September 2018	'*...problems with flooding from Primrose Hill when we get heavy rain and excavating a basement with the water table so close will only exacerbate problems'*	No risk of flooding identified (see Audit paragraph 4.12) Wider hydrogeological impacts not anticipated (see Audit paragraphs 4.13 and 4.23).
Maclean	8A Chamberlain Street London NW1 8XB	9 October 2018	'*design heavily reliant on Arup's program for its validation*'. '*excavation of about 1.50m'* *'vertical movement has been overestimated...possible horizontal movement overlooked'*	BIA audit notes programme adopted is not intended for underpinned retaining walls. Reasonableness of assessment is reviewed against other sources of information. Excavation depth noted as 4m although underpin depths previously quoted as 5.50 or 6m. Query raised following initial audit adequately addressed (see Audit paragraph 4.4 and 4.5). Queries on predictions of vertical and horizontal movement now adequately addressed (see Audit paragraphs 4.16 to 4.25).

			'two stage underpinning may be unnecessarily time consuming'.	Single stage underpinning now proposed (see Section 4).

Appendix 2: Audit Query Tracker

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Audit Query Tracker*

Query No	Subject	Query	Status	Date closed out
1	BIA format	Superseded planning guidance referenced.	Closed – updated in revised BIA (see Audit paragraph 4.2 and 5.2).	15/01/19
2	BIA format/baseline conditions	Presence or absence of basements beneath neighbouring properties not confirmed. Foundation depth to No 5 Albert Terrace Mews not investigated.	Closed - Absence of basements beneath No 4 and 5 Albert Terrace Mews now confirmed. Assumptions made on foundation depths sufficient for analysis at this stage, however, this is to be confirmed prior to construction.	15/01/19 N/A
3	BIA format/ stability	Contradictory and confusing recommendations on retaining wall and foundation design and groundwater control measures.	Closed – clarification provided (see Audit paragraph 4.14 and 4.15).	15/01/19.
4	Stability	Contradictory information on the overall depth of excavation/underpinning. Depth of underpinning lifts not given.	Closed – queries adequately addressed (see Audit paragraphs 4.5 to 4.7).	15/01/19
5	Stability	Approach to ground movement assessment not accepted.	Closed – GMA revised and queries adequately accepted (see Section 4).	15/01/19
6	Stability	Ground movement and damage assessment to No 5 Albert Terrace and 4 Albert Terrace Mews not undertaken. Cumulative impacts of proposals at No 6 Albert Terrace and 6 Albert Terrace Mews on No 5 Albert Terrace to be assessed.	Closed – addressed in revised submission (see Section 4).	15/01/19
7	Stability	Queries on predicted impact to roads/pavements and utilities beneath.	Closed – See Section 4 Limits on impacts subject to separate approvals with asset owners.	15/01/19 N/A

8	Stability	Movement monitoring	Closed – see Audit paragraph 4.28 and Appendix 3. Detailed strategy to be agreed prior to construction with relevant parties.	15/01/19 N/A

Appendix 3: Supplementary Supporting Documents

Email responses
Monitoring proposal

London

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6 Albert Terrace Mews(2018/3222/P) - Concluding Responses to BIA Audit QueriesHumphrey Kelsey to: FatimaDrammeh 14/12/2018 17:44
Cc: "Adrian Tucker", camdenaudit, "Quigley, Elaine", "Svetislav Trajkovski"
From: "Humphrey Kelsey" <humphrey_kelsey@icloud.com>
To: FatimaDrammeh@campbellreith.com
Cc: "Adrian Tucker" <atucker@alanbaxter.co.uk>, camdenaudit@campbellreith.com, "Quigley, Elaine" <Elaine.Quigley@camden.gov.uk>, "Svetislav Trajkovski" <STrajkovski@rsk.co.uk>
History:This message has been replied to.

Hi Fatima

6 Albert Terrace Mews(2018/3222/P) - Concluding Responses to BIA Audit Queries

I hope you are well.

Further to the initial audits comments and the subsequent telephone conversations with Svetislav Trajkovski (RSK) and myself I have pleasure in issuing the concluding responses to the BIA audit queries which are contained within the following documents:

1. Revised Geotechnical Site Assessment, 29841-R01(02)
2. Revised Basement Impact Assessment, 29841-R02(03)
3. Structural Engineering Proposals Rev A

These documents have been issued to the relevant addressee's of this email via WeTransfer. Please let me know once you have received the documents safely and please let me know if there is anything that is not as you would have assumed. If there is - please advise and we can immediately address!

The responses, within the BIA itself, can be summarised as follows:

Query 1 – Reference to the current planning guidance included in the BIA report;
Query 2 – The response of Question 13 in Table 3 (Section 3) Section 4.2.4, and Section 6.4.3 of the BIA report are updated to include the statement on the presence / absence of basements beneath No.5 and No.4 ATM;
Query 3 – Reference to the interlocking sheet pile wall has been removed from Section 6.3.1 of the SI report. Tables 9 and 10 in Sections 6.3.4 and 6.4 of the SI report updated with levels mAOD;
Query 4 – The analysis is updated with levels corresponding with the structural design and all relevant sections, tables, figures and appendices of the BIA report are updated;
Query 5 – No.4 ATM is included in the analysis. Further outstanding responses in this Query:
4.2 – Addressed as per Query 1;
4.4 – Addressed as per Query 4;
4.7 – The response of Question 6 in Table 3 (Section 3) in the BIA report has been updated;
4.8 – Addressed as per Query 2;
4.10 and 4.11 – Addressed as per Query 2;
4.13 – No further action;
4.14 – Addressed as per Query 4;
4.15 – The updated assessment was carried out for a single lift underpinning. Maximum movements of 7.88mm (vertical) and 7.16mm (horizontal) were calculated for No.5 ATM, which are within the range of movements anticipated for similar basement construction (5mm to 10mm). The resulting Damage Category for this structure is 1 (Very Slight). Para 2 of Section 6.4.4.1 of the BIA report is updated to reflect this. Appendix B of the updated BIA report shows the walls subjected to the assessment;
4.16 – No further action by RSK (addressed by ABA);
4.18 – Addressed as per Query 4;
4.20 – Addressed as per Items 4.8, 4.14 and 4.15;
4.21 – No further action by RSK (addressed by ABA);
Query 6 – The response is added in Section 7.3 and the Non-technical summary;
Query 7 – Last para of Section 6.4.4.1 of the BIA report updated following the completion of the revised assessment as per Queries 4 and 5;
Query 8 – The monitoring proposal by ABA indicate fortnightly monitoring during the underpinning and 6 weeks after completion. We have made no changes in the report assuming this will be covered by ABA structural design.

I look forward to hearing from you.

Have a lovely weekend!

Best

Humphrey

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On 5 Dec 2018, at 16:46, FatimaDrammeh@campbellreith.com wrote:

Hi Humphrey,
Please see attached our comments (in blue) to the responses for both properties. The queries on 6 Albert Terrace are largely addressed so once the relevant reports are updated and sent across, we would be able to finalise our audit report to confirm that.

For 6 Albert Terrace Mews, the queries related to the predicted ground movements are still open.

Kind regards
Fatima Drammeh
Senior Geotechnical Engineer

<Mail Attachment.jpeg>
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SE1 8NZ

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From: "Humphrey Kelsey" <humphrey_kelsey@icloud.com>
To: FatimaDrammeh@campbellreith.com, camdenaudit@campbellreith.com
Cc: "Quigley, Elaine" <Elaine.Quigley@camden.gov.uk>, "Svetislav Trajkovski" <STrajkovski@rsk.co.uk>, "Adrian Tucker" <atucker@alanbaxter.co.uk>, "Humphrey Kelsey" <humphrey_kelsey@icloud.com>
Date: 26/11/2018 15:39
Subject: 6 Albert Terrace (2018/2342/P) and 6 Albert Terrace Mews (2018/3222/P) - Responses to BIA Audit Queries

Dear Fatima

6 Albert Terrace (2018/2342/P) and 6 Albert Terrace Mews (2018/3222/P) - Responses to BIA Audit Queries

Thank you for all your recent advice.

Further to that advice please find below RSK's responses to the queries raised in both audits for 6 Albert Terrace and 6 Albert Terrace Mews.

6 Albert Terrace Mews

Query No	Subject	Query	Status	Date closed out	RSK response
1	BIA format	Superseded planning guidance referenced.	Open – see Audit paragraphs 4.2 and 5.2.		Accepted. Reference to the current planning guidance will be included in the updated BIA report (ref:29841-R02(03))
2	BIA format/baseline conditions	Presence or absence of basements beneath neighbouring properties not confirmed. Foundation depth to No 5 Albert Terrace Mews not investigated.	Assumptions made sufficient for analysis at this stage, however, this is to be confirmed prior to construction.	N/A	Absence of basement beneath No.5 Albert Terrace Mews is confirmed by Humphrey Kelsey of Humphrey Kelsey Architecture. Foundation depth to No.5 ATM assumed to be similar to No.6 ATM, as there are no records of alterations to the super structure and sub-structure of the building at No.5 ATM. We will update Section 6.4.3 of the BIA report to clarify this
3	BIA format/ stability	Contradictory and confusing recommendations on retaining wall and foundation design and groundwater control measures.	Open – clarification requested (see Audit paragraph 4.10 and 4.11).		Comments related to the presence of groundwater (Audit paragraph 4.10) refer to Sections 6.3.1 and 6.3.2 of the SI report (ref: 29841-R01(01)). We will amend Section 6.3.1 to clarify this Comments related to the retaining wall design parameters (Audit paragraph 4.11) refer to Section 6.3.4 and Section 6.4 if the SI report. The difference between the undrained shear strength values recommended at the surface of the London Clay for pile design and retaining wall design is in that for the former, the Cu value provided is at the basement formation level, whereas for the retaining wall design this value is adopted at the actual surface of the London Clay, as encountered during the investigation
4	Stability	Contradictory information on the overall depth of excavation/underpinning. Depth of underpinning lifts not given.	Open – clarification requested (see Audit paragraphs 4.4 and 5.4).		We agree that the underpinning / excavation levels used in the assessment are some 0.7m deeper than the actual proposed levels, however, adopting these depths in the analyses results in greater movements, which is a more conservative approach in relation to the impact on the adjacent structures. Notwithstanding this, we have revised the analysis to reflect the correct levels as per the structural design (See response to Query No.5 – Item 4.15)
					The calculated movements at the rear of No.5 Albert Terrace Mews are relatively small (2.41mm – lateral and 0.72mm – vertical), and given that No.4 ATM is in the same terrace and further away from the development, the resulting movements across the footprint on this structure will be even lower, therefore it is considered that the impact to this property will be negligible. Further responses on BIA Audit comments (Section 4) are below: 4.1 – Noted (no further comments); 4.2 – See response in Query No. 2, above; 4.3 – Noted (no further comments); 4.4 – See response in Query No. 4, above; 4.5 – Noted (no further comments); 4.6 – Noted (these figures were not included in order to not overcomplicate the report); 4.7 – A paragraph will be included in the relevant section of the updated BIA report; 4.8 – It is unclear, where the BIA report states that the party wall foundation (the side extension) is not proposed to be underpinned, as all the proposed drawings show underpinning of the party walls and the analyses are based on underpinning of existing foundations. In relation to presence / absence of basements under No.5 ATM, see response in Query No. 2, above; 4.9 – Noted (no further comments); 4.10 – See response in Query No. 4 (first para.), above; 4.11 – See response in Query No. 4 (second para.), above; 4.12 – Noted (no further comments); 4.13 – As described in Table 6 in Section 6.4 of the BIA report, the displacements from basement construction in the short term were only calculated using Xdisp approach, hence there are no imported

5	Stability	Approach to ground movement assessment not accepted.	Open – (see Audit paragraph 5.10). To be reassessed as discussed in Section 4.		displacements from Pdisp in this stage. For the final stage (long term reloading), the vertical displacements calculated by Pdisp were imported in Xdisp and superimposed with the displacements from basement construction calculated previously, and these are shown on the tabular output for the "Reloading" stage; 4.14 – We agree that the buildings at No.4 Albert Terrace Mews and no No.5 Albert Terrace are within the zone of influence of the current development, however, as per the response in the first paragraph of this query, given their distance to the proposed basement, the impact to these structures is considered to be significantly lower than the calculated for No. 5 ATM, likely placing these structures into the negligible damage category; 4.15 – We have revised the damage category assessment using the amended excavation depths (as per Query No.4), combined with a different approach for the damage category assessment. The latter was carried out due to the fact that it is considered that the installation of the underpinning effectively forms a part of the basement excavation, and as such the majority of the displacements resulting from the excavation have already occurred during the pins installation, therefore using the standard Ciria C760 curves result in overestimated movements. On that basis, we have not included the movements from the wall installation in the analysis, whilst increasing the movements form the basement excavation for up to 10% to add extra confidence to the resulting damage category. The results are attached, and indicate damage Category 1 (Very Slight) for both construction stages. 4.16 – Correct, the BIA report recommends that the first lift of underpinning needs to be taken into competent ground, in this case at depth of around at least 2.60mbgl, however, the quality of the works is the most significant determining factor to reduce the settlements during the construction.The contractor appointed will have a proven track record in carrying out underpinning works, and will be a member of the Association of Specialist Underpinning Contractors (ASUC). The proposed underpinning sequence will be agreed with the project engineer, who will also make regular site visits when the works are undertaken to monitor quality of the underpinning works being carried out. Movement monitoring will also be carried out during the basement construction, with the results being shared with the adjoining owners Party Wall Surveyor and Party Wall Engineer within three days of them being recorded; 4.17 – Noted (no further comments); 4.18 – See response 4.14, above; 4.19 – Noted (no further comments); 4.20 – See response 4.8, 4.13, 4.14, 4.15 and 4.16, above; 4.21 – Noted (to be clarified by Alan Baxter); 4.22 – Noted (not applicable to the BIA – no further comments); 4.23 – Noted (no further comments)
6	Stability	Ground movement and damage assessment to No 5 Albert Terrace and 4 Albert Terrace Mews not undertaken. Cumulative impacts of proposals at No 6 Albert Terrace and 6 Albert Terrace Mews on No 5 Albert Terrace to be assessed.	Open – (see Audit paragraph 5.11). To be undertaken as discussed in Section 4.		The impact on the adjacent properties from the construction of basements beneath No. 6 Albert Terrace and No. 6 Albert Terrace Mews was undertaken under separate assessments. The assessments result in Categories 0 and 1 (Negligible and Very Slight) for the relevant adjacent properties and infrastructure. Given the distance between both developments (around 10m), it is considered that the cumulative impact from both developments on the adjacent properties will not be significantly different from the ones calculated by each separate assessment. All other responses in relation to BIA Audit comments (Section 4) are as per Query No. 5, above
7	Stability	Queries on predicted impact to roads/pavements and utilities beneath.	Open – to be reassessed as discussed in Section 4 Limits on impacts subject to separate approvals with asset owners.	N/A	See above responses in Query No. 5 and Query No. 6, above
8	Stability	Movement monitoring	Open – see Audit paragraphs 4.21 and 5.13		Noted

6 Albert Terrace

Query No	Subject	Query	Status	Date closed out	RSK response
1	BIA format	Superseded planning guidance referenced.	Open – see Audit paragraphs 4.2 and 5.2.		Accepted. Reference to the current planning guidance will be included in the updated BIA report (ref:29123-R02(04))
2	BIA format	Contradictory information regarding tree planting given in RSK BIA and arboricultural report.	Open – BIA to be made consistent with arboricultural report (see Audit paragraphs 4.8 and 5.5)		Noted. At the time of completing the BIA report, no arboricultural report was available to RSK. RSK have now received a copy of the arboricultural report and will amend the BIA report to reflect the like for like replacement of the 3No. Grade C trees located to the north west of the property.

3	BIA format/ baseline conditions	Impact to utilities running beneath the pavements.	Open – impacts subject to separate approvals with asset owners.	N/A	Noted
4	BIA format/ retaining wall parameters	Stiffness parameters for detailed design.	Open – see Audit paragraph.		The soil stiffness parameters used in the ground movements assessments provided in Table 4 of the BIA report are applicable for the retaining wall design. We will amend the SI report accordingly
5	Stability	Pile embedment depth.	Open – see Audit paragraph 4.14.		The movements curves for secant piled wall were adopted as a conservative approach as higher lateral movements are expected during the installation of this type of wall. Regarding the embedment depth of the piled wall, we agree that the adopted 1.50m is not sufficient, however, a quick analysis indicate that an increased embedment depth of 1.5×supported depth will still result in damage category 0 (Negligible) for No.5 Albert Terrace. This will be included in updated version
6	Stability	Cumulative impacts of the proposed works at the subject site and No.6 Albert Terrace Mews on No.5 Albert Terrace not assessed.	Open – to be assessed as discussed on paragraphs 4.15 and 4.16.		The impact on the adjacent properties from the construction of basements beneath No. 6 Albert Terrace Mews was undertaken under separate assessment. The assessments result in Category 1 (Very Slight) for the relevant adjacent properties and infrastructure. Given the distance between the developments at No.6 Albert Terrace and No.6 Albert Terrace Mews (around 15m), it is considered that the cumulative impact from both developments on the adjacent properties will not be significantly different from the ones calculated by each separate assessment.
8	Stability	Movement monitoring	Open – see Audit paragraphs 4.17 and 5.13		Noted

With regards 6 Albert Terrace Mews, RSK have also issued the following documents which are attached:

1. C760 Damage Category Assessment Reloading (3 Pages)
2. C760 Damage Category Assessment Reloading Chart (1 Page)
3. C760 Damage Category Assessment Basement Construction (3 Pages)
4. C760 Damage Category Assessment Basement Construction Chart (1 Page)

In addition Alan Baxter Associates have provided the initial proposals for carrying out movement monitoring on both properties, subject to Party Wall approval. These proposals are attached below. Alan Baxter have also highlighted that the project engineer will be making regular site visits to monitor the works.

I hope that you find the above to your satisfaction but please feel free to call if you need any further clarification. Once we hear back from you, RSK can then update the text of both BIA reports accordingly, and issue the final approved documents.

I have copied in Elaine Quigley, the Planning Officer at Camden, in order that she has a record of the responses we have submitted.

I look forward to hearing from you

Best

Humphrey

Click hereto report this email as spam.[attachment "PastedGraphic-5.tiff" deleted by Fatima Drammeh/CRH]

[attachment "1808-21-M01 & M02.pdf" deleted by Fatima Drammeh/CRH] [attachment "02 Reloading_tab.pdf" deleted by Fatima Drammeh/CRH] [attachment "01 Basement Construction_tab.pdf" deleted by Fatima Drammeh/CRH]
[attachment "01 Basement Construction_graph.pdf" deleted by Fatima Drammeh/CRH] [attachment "02 Reloading_graph.pdf" deleted by Fatima Drammeh/CRH]

Begin forwarded message:

From: FatimaDrammeh@campbellreith.com
Subject: Fw: 6 Albert Terrace and 6 Albert Terrace Mews BIA Audits
Date: 15 November 2018 at 12:03:59 GMT
To: humphrey_kelsey@icloud.com
Cc: camdenaudit@campbellreith.com, "Quigley, Elaine" <Elaine.Quigley@camden.gov.uk>

Hi Humphrey,
Please see attached the report for 6 Albert Terrace which was previously issued as mentioned earlier.

Kind regards
Fatima Drammeh
Senior Geotechnical Engineer
[attachment "Mail Attachment.jpeg" deleted by Fatima Drammeh/CRH]
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London
SE1 8NZ

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----- Forwarded by Fatima Drammeh/CRH on 15/11/2018 11:40 -----

From: Grace White/CRH
To: Elaine.Quigley@camden.gov.uk
Cc: Fatima Drammeh/CRH@Campbellreith, Camden Audit/CRH@campbellreith, London Secretaries
Date: 25/10/2018 11:59
Subject: 6 Albert Terrace and 6 Albert Terrace Mews BIA Audits

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Good Afternoon

5 ALBERT TERRACE MEWS

ALBERT MEWS ELEVATION

FRONT ELEVATION

WE PROPOSE TO MONITOR THE FRONT& REAR ELEVATIONS AND THE PARTY WALLS FORTNIGHTLY DURING THE UNDERPINNING WORKS AND 6 WEEKS AFTER COMPLETION WE PROPOSE THE RED AND AMBER TRIGGER LEVELS TO BE:

HORIZONTAL MOVEMENT:

AMBER: 5mm
RED: 7mm

VERTICAL MOVEMENT

AMBER: 6mm
RED: 10mm

notes

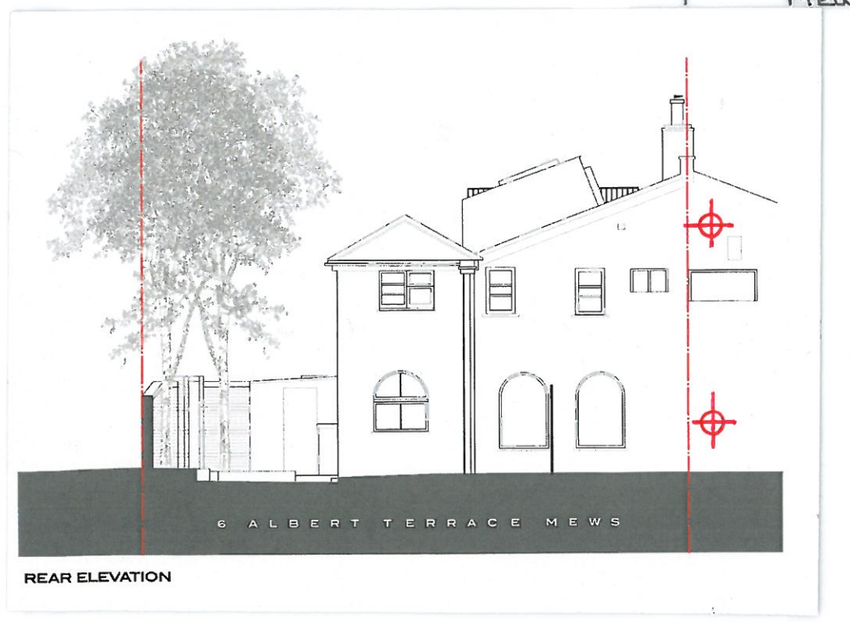
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND THE SPECIFICATION.

2. KEY

⊕ PROPOSED MONITORING LOCATIONS

3. THE RESULTS OF EACH SURVEY SHALL BE PRESENTED TO THE CONTRACT ADMINISTRATOR AND PARTY WALL SURVEYORS WITHIN THREE WORKING DAYS OF THE SURVEY BEING COMPLETED

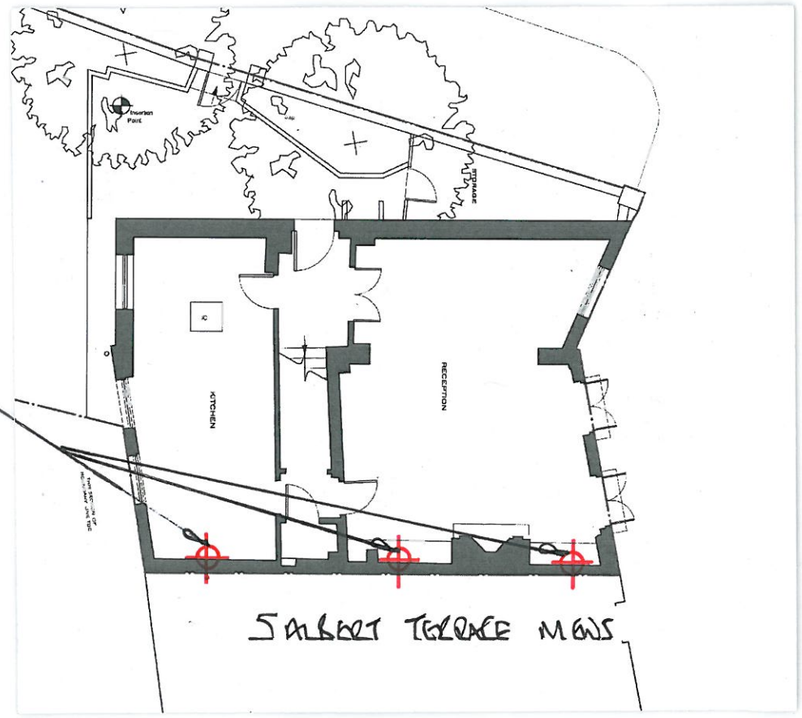
→ 5 ALBERT TERRACE MEWS



REAR ELEVATION

REAR ELEVATION

TARGETS LOCATED AT GROUND FLOOR LEVEL



PLAN

26/11/18	ISSUED FOR INFORMATION	ATL

job
6 ALBERT TERRACE MEWS NW1

title
MOVEMENT MONITORING PROPOSALS

drawn ATL | checked JGA
date NOV 18 | scale (original - A3) NTS

Alan Baxter

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drg. no. 1808/21/M02
rev.