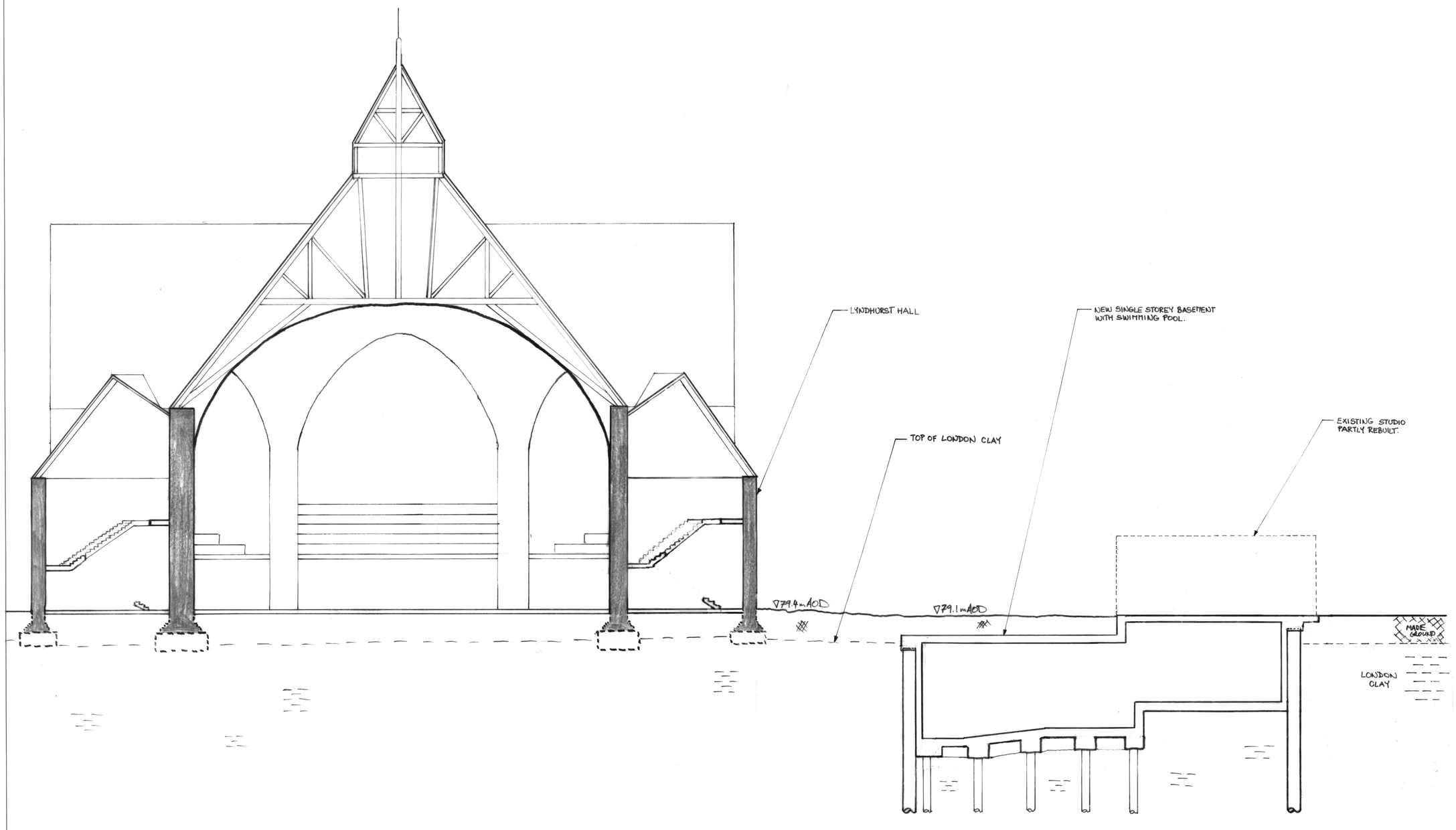

SECTION D-D
1:100

notes

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S AND ENGINEER'S DRAWINGS AND THE SPECIFICATION.

-	7.8.15	ISSUED WITH NOTES.	FN

job
NO.11 ROSSLYN HILL
NW3

title
BASEMENT ADJACENT TO LYNDHURST HALL SECTION D-D

drawn LPe | checked FN
date JULY' 15 | scale (original - A1) 1:100

Alan Baxter

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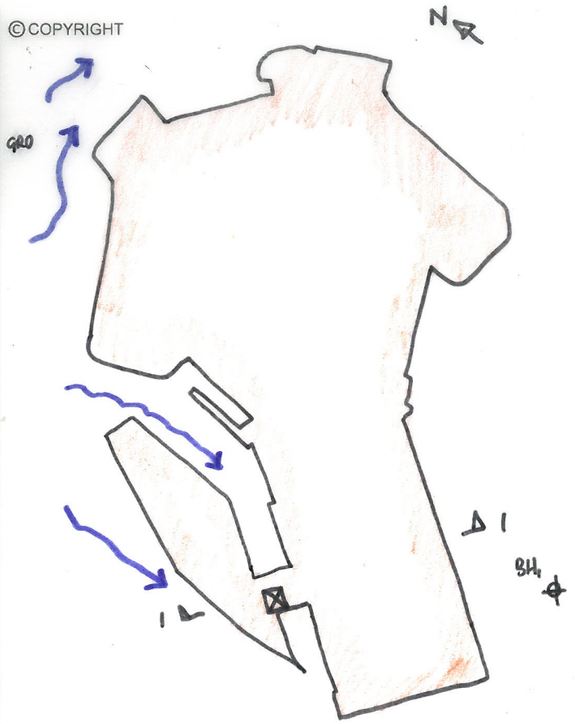
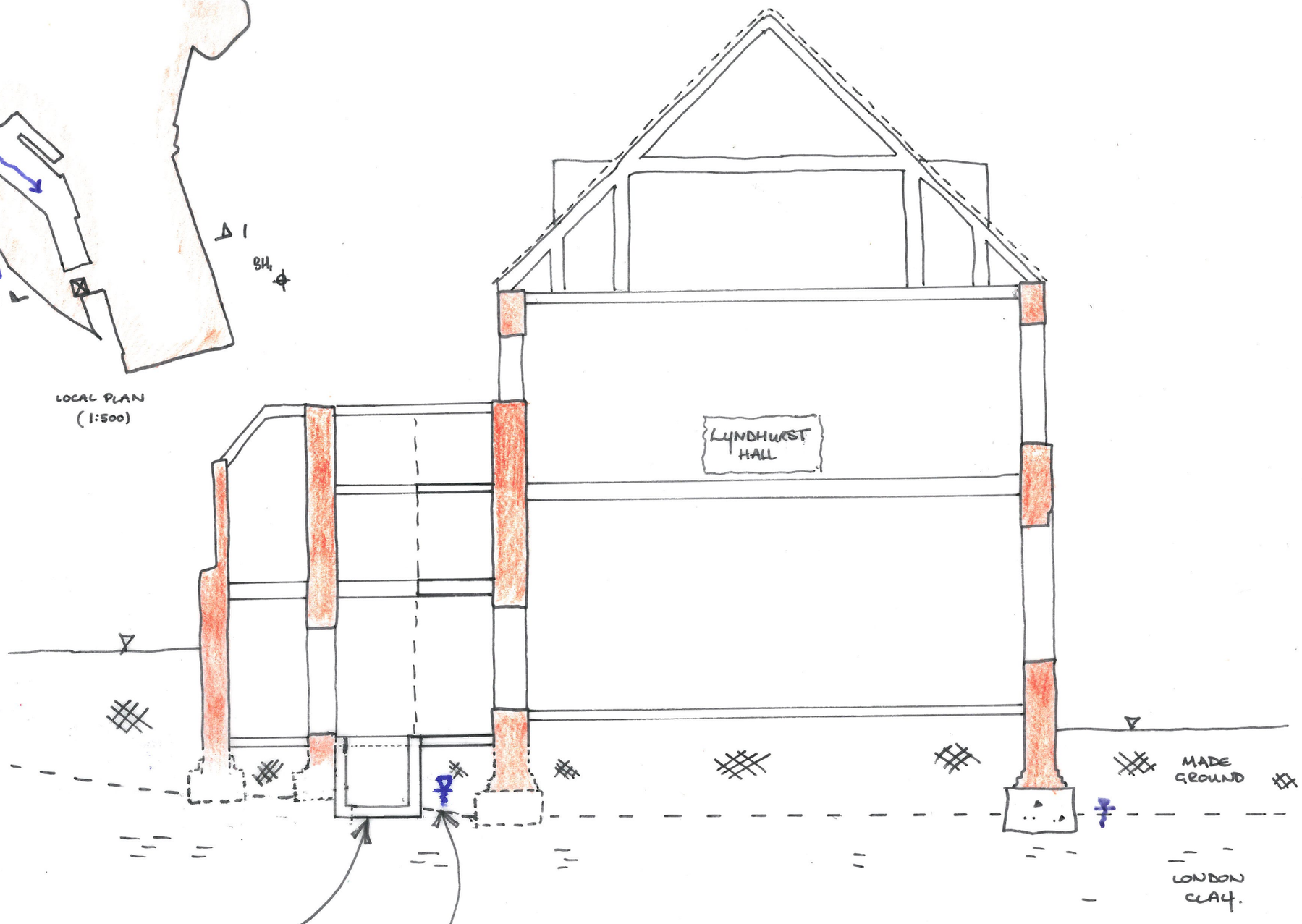
drg. no. 1693/01/203 | rev. -



LOCAL PLAN
(1:500)



LOCATION OF LIFT BASED ON ARCHIVE DRAWINGS.

WATER TABLE (INDICATIVE) SHOWN IS BASED ON READINGS TAKEN FROM BH1

SECTION 1-1

notes

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S AND ENGINEER'S DRAWINGS AND THE SPECIFICATION.

-	7.8.15	ISSUED WITH NOTES.	FN

job
No. 11 ROSSLYN HILL.
NW3

title
SECTION THROUGH LYNDHURST HALL.

drawn: RWa
checked: FN
date: JUL'15
scale (original - A3): 1:50

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drg. no. 1693/01/204
rev. -

Appendix K: Calculation for basement retaining wall adjacent to Lyndhurst hall.

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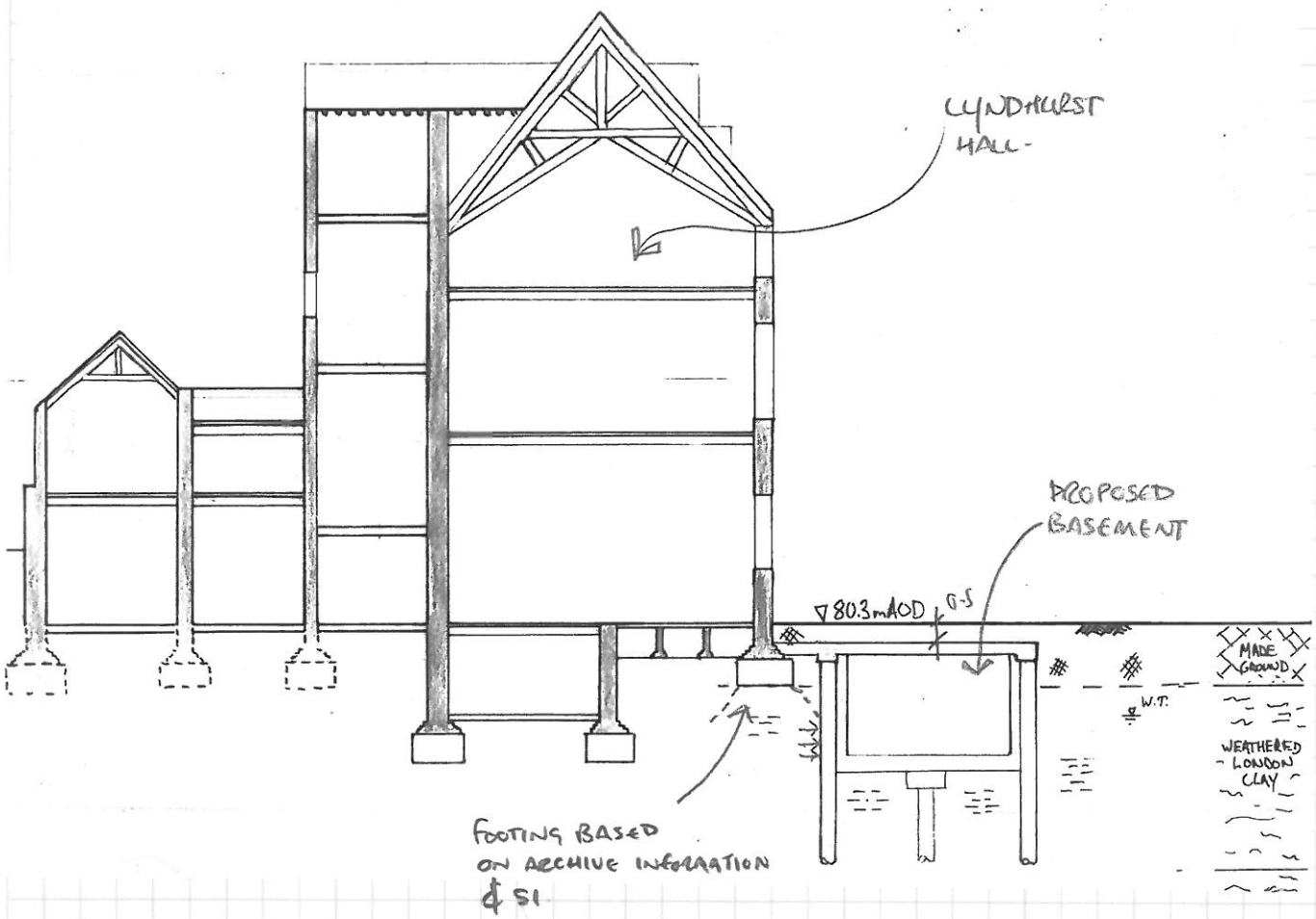
Date	Job no.	Sheet
Jul 15	1693/11	1.1
Engineer RWa		
Checked by FN		
Project No 11 ROSSLYN HILL		

DESIGN OF PILED WALL ADJACENT TO LYNDHURST HALL.

THE CALCULATIONS TAKE INTO CONSIDERATION THE SURCHARGE APPLIED TO THE RETAINING WALL. THE SURCHARGE LOADS ARE BASED ON THE AVALIBLE RECORD INFORMATION ON LYNDHURST HALL.

SECTION SHOWING PROPOSAL.



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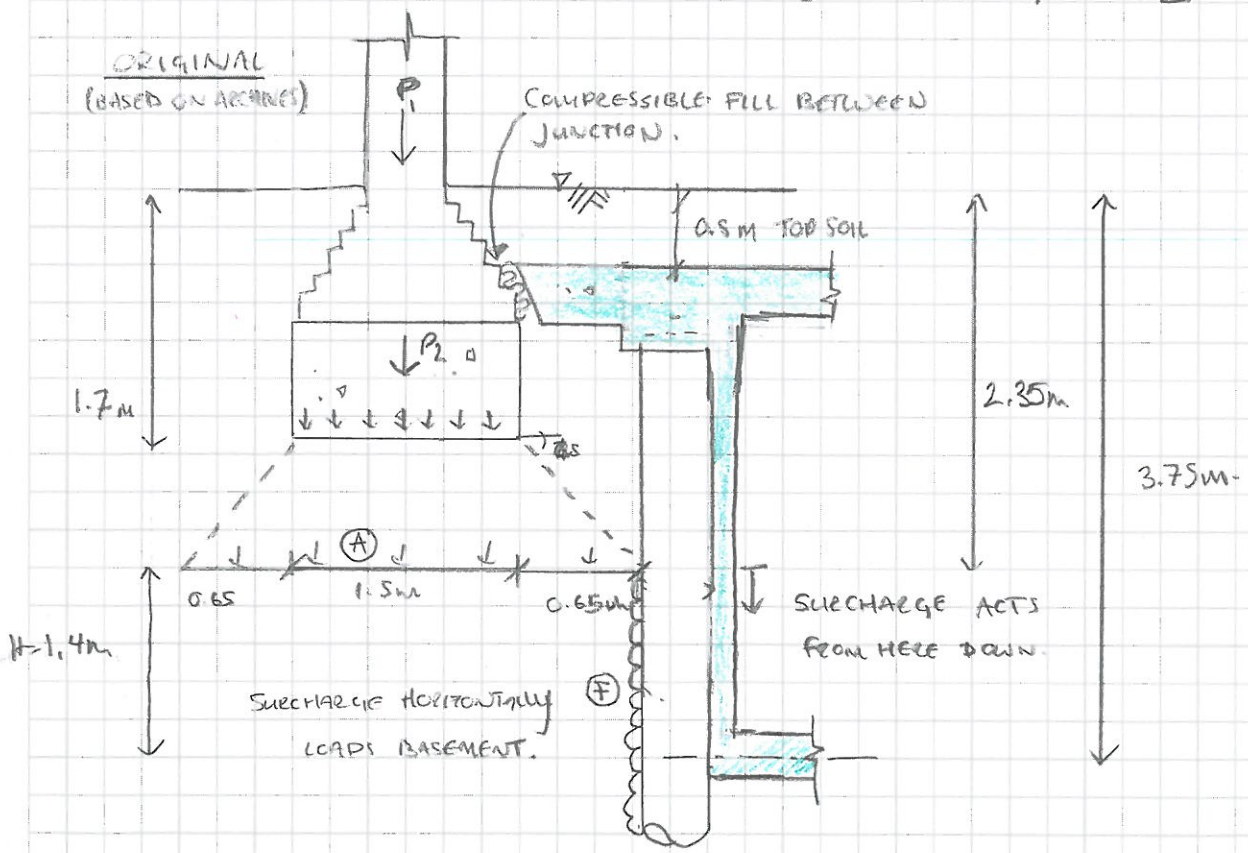
Date	Job no.	Sheet
Jul 15	1693/11	1.2
Engineer RWa		
Checked by FN		
Project No 11 Rosslyn Hill		

SURCHARGE BASED ON BEARING PRESSURE AT GROUND LEVEL

LYNDHURST HALL CAN BE SPLIT INTO 2NO. SECTIONS. THE ORIGINAL BUILDING & THE 1905 EXTENSION. THEY HAVE FOUNDATIONS OF DIFFERENT DEPTH & THUS THE APPLIED SURCHARGE WILL BE DIFFERENT. BOTH CASES WERE CONSIDERED. MOST ONEROUS SURCHARGE FROM ORIGINAL.

TOTAL LOAD AT BASE OF WALL = 213KN/M = P_1
(BASED ON ARCHIVE DWG'S)

At FOOTING LEVEL (1.7m DEPTH) = 243 kN/m = P_2



PRESSURE AT (A) BASE/m = 213/2.8 = 87KN/m²/m run of wall.

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Date	Job no.	Sheet
Jul 15	1693/11	1 3
Engineer RWa		
Checked by AN		
Project No 11 Rosslyn Hill		

GEOLOGY & DESIGN OF RETAINING WALL

LONDON CLAY = $\phi = 24°$
$\gamma = 20 kN/m^3$

MADE GROUND = $\phi = 23$
$\gamma = 18 kN/m^3$

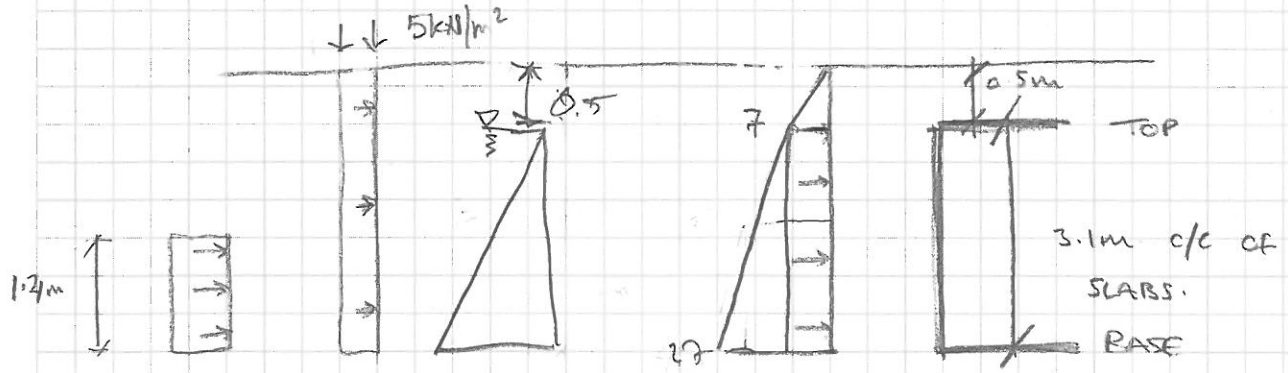
} BASED ON SI CARRIED OUT JAN 2013.

$K_o = 1 - \sin\phi = 0.63$ (AT REST)

SURCHARGE PRESSURES ON RETAINING WALL.

$F = K_o P_2 = 0.63 \times 87 = \underline{55 kN/m}$

LOADS ON RETAINING WALL



(NTS)

	SURCHARGE FROM LYND REST WALL	IMPOSED SURCHARGE $P_o k_o$	WATER kN/m	SOIL (DRY)	TOTALS
AT TOP	—	3kN/m²	0	7kN/m²	↓ 10 kN/m²
AT BASE	55 kN/m²	3kN/m²	32.5kN/m²	27 kN/m²	123 kN/m²

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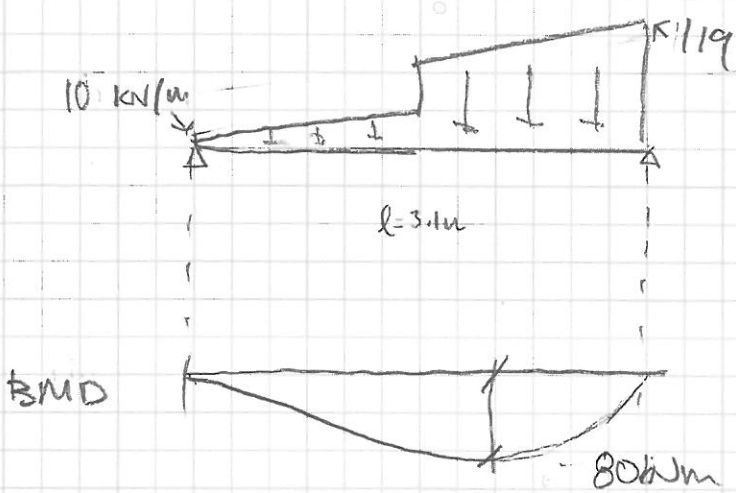
Date	Job no.	Sheet
Jun.15	1693/11	1.4
Engineer Elvira.		
Checked by FW		
Project No 11 Rosslyn Hill		



CONSIDER A 1m STRIP OF WALL IN ANALYSIS

BEAM ANALYSIS CARRIED OUT IN THE COMPUTER ANALYSIS SOFTWARE 'TEDDS'. BENDING MOMENTS SUMMARISED HERE.

CHECK 450 ϕ PILE IN BENDING

AXIAL LOAD IN PILE = 200 kN

ASSUME COVER = 50mm

BARS = 16mm ϕ PROVIDE 6No. = 1206 mm²

f_{ck} = 30 N/mm²

f_{yk} = 500 N/mm²

$d/h = \frac{450 - 100 - \left(\frac{16}{2} \times 2\right)}{450} = \frac{334}{450} = 0.74$ USE GRAPH => 0.7 CURVE

$\frac{N_{ED}}{h^2 f_{ck}} = 0.03$ $\rho = \frac{4 \cdot A_s}{\pi \cdot h^2} = 0.076 \times 10^{-3}$

$\frac{M}{h^3 \cdot f_{ck}} = \frac{M_{allow}}{450^3 \cdot 30}$ $\rho \times \frac{f_{yk}}{f_{ck}} = 0.13$

FROM DESIGN GRAPH $\frac{M}{1.3 f_{ck}} = 0.05$ $M_{allow} = 136$ kNm

THEREFORE $M_{allow} > M_{applied}$ HENCE 450 ϕ wall OK.

Appendix 17

Campbell Reith Hill BIA review October 2015

CampbellReith
consulting engineers

11 Rosslyn Hill
NW3 5UL

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12066-54
Revision: D1

October 2015

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Document History and Status

Revision	Date	Purpose/Status	File Ref	Author	Check	Review
D1	19/10/15	Comment	PCDjw12066-54-191015-11 Rosslyn Hill-D1.doc	P C Daniels	P C Daniels	E M Brown

Document Details

Last saved	19/10/2015 13:10
Path	PCDjw12066-54-191015-11 Rosslyn Hill-D1.doc
Author	P C Daniels BSc MSc CEng MICE
Project Partner	E M Brown, BSc MSc CGeol FGS
Project Number	12066-54
Project Name	11 Rosslyn Hill, London NW3 5UL
Planning Reference	2015/2089/P

Contents

Appendix

1.0 NON-TECHNICAL SUMMARY

1.1. CampbellReith has been instructed by the London Borough of Camden (LBC) to carry out an audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 11, Rosslyn Hill, London NW3 5UL - Planning Reference 2015/2089/P.

1.2. The Audit has been carried out in accordance with the Terms of Reference set by the LBC. The Audit has reviewed the BIA for potential impacts on land stability and on local ground and surface water conditions arising from the proposed basement development.

1.3. CampbellReith has accessed LBC's Planning Portal and reviewed the latest revisions of submitted documentation against an agreed audit check list.

1.4. Following initial issue of the BIA on 24 March 2015 and following receipt of a number of detailed technical queries, the BIA was revised and re-issued on 07 August 2015. The main issues raised and the BIA author's responses are set out in Appendix 1 to this audit together with further comments by CampbellReith and will not be repeated here.

1.5. Stages 1 to 4 of the BIA have been completed as required by Camden Planning Guidance 'Basements and Lightwells' (CPG4), dated July 2015 – but see the various comments below.

1.6. The BIA and associated documents have all been carried out by established companies and the authors are generally considered to be suitably qualified. However, the structural calculations submitted with the BIA have been checked by a number of different people whose identity has not been made clear. The names and qualifications of the checkers should be confirmed.

1.7. The locations of the exploratory holes shown on the key plans within BIA Drawing N°s 1693/01/S03 and 1693/01/S04 are significantly at variance with those shown on the exploratory hole location plan included within the GI report. This discrepancy should be resolved.

1.8. The BIA records that there is no apparent history of shrink-swell induced subsidence at the property arising from the presence of seasonally affected soils. However, the London Clay is known to be susceptible to shrinkage and swelling, particularly in the vicinity of mature trees and this potential is confirmed in the GI report. The implications of the swelling nature of the London Clay on the basements and the use of compressible sub-slab void filler etc. should be made more clear.

1.9. Despite the absence of an aquifer beneath the site, it is stated in the BIA that groundwater flows are/will be diverted around N° 11 Rosslyn Hill by the shielding effect of the Lyndhurst Hall sub-surface wall construction and foundations which are considered to present an impenetrable barrier to flow. If the potential impact on subterranean flow is confirmed, it is considered that

further investigation should be undertaken to confirm the founding depths along the Lyndhurst Hall frontage facing onto N° 11, Rosslyn Hill. Further standpipe monitoring to confirm the groundwater regime is also recommended.

1.10. Drawing N° 1693/01/100 in the revised BIA shows new land drains as being required to drain water from the light wells adjacent to the new southern plant basement. It is not clear how the water from these drains is to be disposed of. This matter should be addressed.

1.11. A preliminary construction management plan (CMP) has been submitted with the planning documents. Given the need for a high level of construction control to limit ground movements, and structural damage/cracking to N°11 Rosslyn Hill and Lyndhurst Hall, it is considered essential that a formal construction management plan be prepared and approved prior to work commencing on site.

1.12. Basic calculations have been enclosed within the BIA for the reinforced concrete (RC) design of the basement retaining walls to the swimming pool basement and the media basement (revised BIA only) and also for the roof to the swimming pool basement. These will need to be developed prior to construction including full soil-structure interaction modelling of the walls with all construction stages represented. No design has been included in the BIA for the two-storey section of basement to accommodate the swimming pool plant room, nor for the third basement to the south of N° 11 Rosslyn Hill. These should be provided.

1.13. The soil parameters adopted in design are not consistent between the various basement structures and do not always reflect the BIA.

1.14. It is considered that the revised BIA (as did the first issue) fails to make it clear which basements are being evaluated at any given point in the document. The assumptions made and the findings are to be provided in a more transparent manner.

1.15. Given the apparent complexity of the structure of Lyndhurst Hall – see Appendix 1 to this BIA, AB&A should confirm the appropriateness of using the CIRIA C580 approach. It should be confirmed by AB&A that their assumptions regarding the structure of Lyndhurst Hall are based on as built, rather than design, information. An internal survey of the building may be required to confirm the nature and condition of the structure.

1.16. It is not possible to accept the currently predicted damage categories without further development of the BIA as noted.

1.17. The revised BIA has made it clear that a high stiffness propping system will be used in combination with high levels of site supervision to control workmanship and construction methodology, together with rigorous monitoring set against rationally designed trigger levels.

There should also be contingency provisions in place should on-going movements indicate the likely exceedance of predicted values. It is essential that the designer's requirements are fully specified in the contract documents for the Works so that the contractor is fully aware of the levels of compliance required.

1.18. In summary there are a number of items to be clarified in the BIA as discussed in Section 4 and summarised in Appendix 2. In additional, it is recommended that a Basement Construction Plan is prepared which includes the following:

- Formal construction plan detailing construction methodology and sequence.
- Details of temporary works and measures to control construction and limit ground movements/damage.
- Final ground movement and building damage assessment for agreed construction methodology.
- Detailed calculations for basement retaining walls, slabs and permanent props.
- Detailed monitoring plan with locations of monitoring points, frequently of readings and agreed trigger levels and mitigation measures.
- Measures for safeguarding properties in the case of delays to/breaks in construction.

1.19. Queries and requests for clarification/further information are summarised in Appendix 2.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by the London Borough of Camden (LBC) on 08 September 2015 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 11, Rosslyn Hill, London NW3 5UL - Planning Reference 2015/2089/P.

2.2. The above Audit has been carried out in accordance with the Terms of Reference set by the LBC. The Audit has reviewed the above BIA for potential impacts on land stability and on local ground and surface water conditions arising from the proposed basement development.

2.3. A BIA is required for all planning applications with basements in the LBC in general accordance with policies and technical procedures contained within the following documents:

a) Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.

b) Camden Planning Guidance (CPG) 4: Basements and Lightwells.

c) Camden Development Policy (DP) 27: Basements and Lightwells.

d) 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.

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

2.5. The LBC Audit Instruction described the planning proposal as '*Excavation to create basement extension and sub-basement plant room to east of property, demolition of single storey self-contained studio above and replacement with single storey studio as ancillary accommodation to main house, demolition and replacement of 2 x single story outbuildings above proposed basement extension to west of property.*'

The Audit Instruction noted the following:

a) The basement proposals involve a listed building and the site neighbours a listed building.

b) The site is not in an area subject to slope stability, surface water flow and flooding or subterranean (groundwater) flow constraints.

c) The application requires determination by the Development Control Committee (DCC).

d) The scope of the submitted BIA extends beyond the screening stage.

2.6. CampbellReith accessed the LBC Planning Portal on 15 October 2015 and has examined the following reports and drawings relevant to the audit:

a) An 'Historic Building Report' prepared by Donald Insall Associates, dated March 2015 and subsequently revised and re-issued in July 2015.

b) The BIA prepared by Alan Baxter & Associates, dated 24 March 2015 and subsequently revised and re-issued on 07 August 2015.

c) A ground investigation (GI) factual and interpretative report prepared by Ground Engineering Ltd, Ref: C13469 (included within the BIA), dated March 2015.

d) The application for 'Planning Permission and listed building consent for alterations, extension or demolition of a listed building', dated 26 March 2015.

e) A 'Design and Access, Planning and Heritage Statement' prepared by Thomas Croft Architects, dated 2 April 2015.

f) An 'Outline Construction Logistics Plan' prepared by Paul Mew Associates, dated August 2015.

g) The following planning application drawings:

Existing location and site plan.

Existing lower ground floor plan.

Existing ground floor plan.

Existing sections AA to DD.

Proposed demolitions and conversions plan.

Internal floor area sub-basement plan.

Internal floor areas lower ground floor plan.

Internal floor areas ground floor plan.

Proposed lower ground floor plan.

Proposed ground floor plan.

Proposed sub-basement plan.

Proposed sections AA to GG.

2.7. In addition to the above reports and drawings, the following technical responses to the planning application have been examined as instructed by the LBC:

a) An 'Initial Appraisal of the Impacts on Lyndhurst Hall of the Proposed Basement Construction at 11, Rosslyn Hill, NW3', prepared by Corbett & Tasker, Structural Engineering, dated 27 May 2015.

b) Report entitled 'Opinion of Basement Impact Assessment for 11 Rosslyn Hill, London NW3 5UL, prepared by Geotechnical & Environmental Associates (GEA), dated 04 June 2015.

c) Report entitled 11 Rosslyn Hill, London NW3 5UL, Planning Application 2015/2089/P, 2015/2109/L, prepared by David Cooper & Co, dated 18 June 2015.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are the BIA author(s) credentials satisfactory?	Yes	Except that the qualifications of the various checkers of the included calculations have not been supplied and should be submitted.
Is data required by Cl.233 of the GSD presented?	Partial	An overall timescale of 7 - 8 months is quoted for basement construction. It is not clear whether or not this includes for post-construction restoration of the site.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	
Are suitable plans/maps included?	Yes	Except that many lack a north point.
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	Yes	
Slope and Ground Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	
Hydrogeology (Groundwater Flow) Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	

Item	Yes/No/NA	Comment
Is a conceptual model presented?	Yes	
Slope and Ground Stability Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrogeology (Groundwater Flow) Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Is factual ground investigation data provided?	Yes	
Is monitoring data presented?	Yes	Groundwater monitoring only at this stage.
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	
Is a geotechnical interpretation presented?	Yes	
Does the geotechnical interpretation include information on retaining wall design?	Yes	However, queries raised in Section 4.
Are reports on other investigations required by screening and scoping presented?	No	No such reports were identified as being required.
Are baseline conditions described, based on the GSD?	Yes	

Item	Yes/No/NA	Comment
Do the base line conditions consider adjacent or nearby basements?	Yes	
Is an Impact Assessment provided?	Yes	But it is not entirely conclusive - see comments below.
Are estimates of ground movement and structural impact presented?	Yes	However, these are considered to be of poor presentation quality and difficult to follow.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	No	No formal comparison of the impact of all of the issues identified in the screening and scoping stages has been provided but impacts and the need for mitigation are generally discussed in Section 5.0 of the BIA.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	
Has the need for monitoring during construction been considered?	Yes	
Have the residual (after mitigation) impacts been clearly identified?	No	All potential risks are stated in the BIA as having been designed out. But see comments below on building damage assessment.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	It should be confirmed that the adopted approach is appropriate for the assessment of potential damage to Lyndhurst Hall and whether any further information on the form of the structure is required.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	No	Further long-term groundwater monitoring is recommended to confirm the direction of groundwater flow on the site.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	It is considered that an external and internal survey of Lyndhurst Hall should be undertaken as noted above to confirm the validity of current estimates of strains and damage category.
Does the BIA report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	However, it is considered that an external and internal survey should be undertaken and it should be confirmed that the

Item	Yes/No/NA	Comment
		methodology adopted in the building damage assessment is appropriate to the affected structure(s). The ground movement and building damage assessment are to be presented with greater clarity.
Are non-technical summaries provided?	No	

4.0 DISCUSSION

4.1. Following the issue of the BIA by Alan Baxter & Associates (AB&A), a large number of comments were received from employees of Air Studios (the current occupants of Lyndhurst Hall adjacent to N° 11, Rosslyn Hill – see below), the general public and from professional advisors to Air Studios who were commissioned by them to report in detail on the BIA. Three technical reports were commissioned by Air Studios and placed on the LBC planning portal as listed in Section 2 of this audit.

4.2. Following receipt of the above technical reports, the BIA was revised and re-issued by AB&A. Appendix L to the revised BIA addresses the technical issues raised in the above three reports. The main issues raised and AB&A's responses are set out in some detail in Appendix 1 to this audit together with further comments by CampbellReith and will not be repeated here.

4.3. Stages 1 to 4 of the BIA have been completed as required by Camden Planning Guidance 'Basements and Lightwells' (CPG4), dated July 2015 – but see the various qualifying comments below.

4.4. The BIA together with the enclosed ground investigation report and structural calculations and the Design and Access, Planning and Heritage Statement issued by the scheme architect have all been carried out by established companies and the authors are generally considered to be suitably qualified. However, the structural calculations within the BIA have been checked by a number of different people whose identity has not been made clear. The names and qualifications of the checkers should be confirmed.

4.5. N° 11, Rosslyn Hill (formerly Rosslyn Grove) is a Grade II listed building constructed sometime after 1770 in the currently designated Fitzjohn and Netherhall Conservation area of Hampstead Heath. Historical mapping indicates a nearby area formerly associated with brickmaking and N° 11, Rosslyn Hill is indicated to be located close to an infilled pond (possibly a former clay pit) to the south of the property.

4.6. A substantial masonry building, Lyndhurst Hall (formerly Lyndhurst chapel), is located in close proximity to the north-west and west of N° 11, Rosslyn Hill, around which it partially curves. Lyndhurst Hall is also a listed building and is currently used as a music studio. Lyndhurst Hall is a much larger than N° 11 Rosslyn Hill and post-dates it.

4.7. N° 11, Rosslyn Hill comprises a three-story detached house of load-bearing masonry construction with a lower ground floor provided with light wells on the north-eastern and south-western faces, extending to 1.6m or so below ground level (bgl). A cellar is located on the north-western side of the house. Foundations to the building were noted from trial pit excavations to comprise corbelled brickwork set on concrete footings of varying thickness

founded on the London Clay at depths of between 2 and 3m or so bgl. The building is considered to be in reasonable condition for its age and construction. A small detached single-storey brick-built flat-roofed building located a short distance to the east of the main building forms part of the premises. The property has mature gardens with shrubs, large trees and a large grassed area to the west.

4.8. The proposed development is to include the construction of three basements. A large north-west/south-east trending 8m or so deep basement constructed below the main building forecourt on the north-western side of the property will accommodate a swimming pool, sauna and gymnasium. A locally deepened section will house a plant room. A second smaller 5m or so deep basement constructed to the west of the main building immediately adjacent to Lyndhurst Hall will house media facilities. The third basement, around 3m deep, at the southern extremity of the property will house air source central heating equipment.

4.9. British Geological Survey (BGS) mapping indicates ground conditions at the site to comprise Made Ground overlying London Clay. The north-south outcrop of the overlying Claygate member is shown to the west of the property. The ground investigation confirmed ground conditions to comprise 0.6 to 3.2m of Made Ground lying directly over the London Clay. The greatest depth of Made Ground was encountered in the suspected infilled former clay pit on the south side of the site. The London Clay upper surface was found to generally follow the topography of the site with a general drop in level towards the south-east.

4.10. The locations of the exploratory holes shown on the key plans within BIA Drawing N^{o}s 1693/01/S03 and 1693/01/S04 are significantly at variance with those shown on the exploratory hole location plan included within the GE report. This discrepancy should be resolved particularly as it may have implications for the conclusions drawn in the BIA on the groundwater flow regime at the site.

4.11. The BIA records that there is no apparent history of shrink-swell induced subsidence at the property arising from the presence of seasonally affected soils. However, the London Clay is known to be susceptible to shrinkage and swelling, and tree roots were observed in all of the exploratory holes sunk on the site, the greatest depths being along the south-eastern boundary.

4.12. Groundwater monitoring was undertaken during the period January to March 2015 within standpipes located adjacent to Lyndhurst Hall and in the eastern and southern parts of the site. Groundwater levels of between 0.5m to 2.95m bgl or so were recorded. The BIA confirms that groundwater pumping was required during the trial pit excavations.

4.13. Due to the relative impermeability of the London Clay, groundwater flow at the site will occur within the Made Ground. The direction of groundwater flow will most likely follow the clay sub-surface towards the south-east and the now culverted River Fleet. It should be confirmed

whether there are significant subterranean flows which will be impacted by the proposed basements.

4.14. Despite the absence of an aquifer beneath the site the BIA considers subterranean flows. It is argued in the BIA that existing and also future south-easterly groundwater flows are/will diverted around N° 11 Rosslyn Hill by the shielding effect of the Lyndhurst Hall sub-surface wall construction and foundations which have been shown in a trial pit to be taken down to the London Clay and are therefore considered to present an impenetrable barrier to flow. The BIA includes sketches showing current and postulated future groundwater flow directions following construction of the basements and these are shown to be the same.

4.15. Given the assumptions made by AB&A regarding the effect of Lyndhurst Hall on groundwater flow across the site, it is considered that further investigation should be undertaken to confirm the significance of the impacts to groundwater flows. It may be necessary to confirm founding depths along the Lyndhurst Hall frontage facing onto N° 11, Rosslyn Hill.

4.16. The top of the basement roof slabs are proposed to be set at levels which maintain the existing flow regime within the Made Ground.

4.17. The site upon which the building sits was originally benched into the locally gently sloping (< 7°) south-east facing hillside and is sensibly level (and will remain so after the Works) at an elevation of 79mOD to 80m or so. The site is not close to any railway cuttings or similar. The site is thus not considered to be susceptible to problems of slope instability.

4.18. It is accepted that the property is not located within an area considered at risk of flooding and the site is also not within a fluvial or tidal flood plain. The BIA shows the site not to have been directly affected by flooding during the flood events of 1975 and 2002.

4.19. The BIA notes that the property is not within 100m of a watercourse, well (used or disused) or potential spring line.

4.20. The London Clay formation beneath N° 11, Rosslyn Hill is of generally very low permeability and thus the site is not considered to be at risk of flooding due to rising groundwater.

4.21. The BIA notes that there will be no increase in the area of impermeable surfacing resulting from the development and hence no increase in discharge of surface water to local storm water and foul drainage systems. However, it is noted that Drawing N° 1693/01/100 in the revised BIA shows new land drains as being required to drain water from the light wells adjacent to the new southern plant basement (these had not been shown previously). It is not clear how the water from these drains is to be disposed of. This matter should be addressed.

4.22. Walls to the new basements are to comprise a combination of contiguous and secant piles. The piled walls to the media room basement immediately adjacent to Lyndhurst Hall are to be contiguous as are the piled walls at the northern end of the swimming pool basement. All other walls i.e. those which wrap around the southern and south-western flanks of the swimming pool basement and those which enclose the plant basement adjacent to the southern extremity of the property are to be secant piled walls. Secant piling has been selected in the southern areas to seal off the expected greater head of groundwater in these areas arising from the increased depth to the top of the London Clay in the suspected infilled former brick pit. The foundations to the main building will be locally underpinned with mass concrete in areas of closest proximity to the new basements.

4.23. Basement slabs will be constructed on a compressible void former to limit heave pressures following excavation of the London Clay. A granular drainage layer will also be provided to prevent the build-up of groundwater pressures on the underside of the slabs. Water from the drainage layers will be pumped (presumably) into the local surface water sewers. The quantities of water are expected to be small. The basement slab directly beneath the swimming pool will not be ground bearing but will be supported locally on ground beams and piles.

4.24. Propping of all basement walls will be provided by the concrete basement floor and roof slabs. Temporary propping as required will be adopted during construction. The proposed sequencing of basement construction is generally outlined on sketches presented within the BIA.

4.25. A preliminary construction management plan (CMP) has been submitted with the planning documents. Given the need for a high level of construction control to limit ground movements, and structural damage/cracking to N°11 Rosslyn Hill and Lyndhurst Hall, it is considered essential that a Basement Construction Plan (BCP) be prepared and approved prior to work commencing on site.

4.26. Basic calculations have been provided for the reinforced concrete (RC) design of the basement retaining walls to the swimming pool basement and the media basement and also for the roof to the swimming pool basement. These need to be developed in the BCP for detailed design. No design has been included in the BIA for the two-storey section of basement to accommodate the swimming pool plant room, nor for the third basement to the south of N° 11 Rosslyn Hill. These should be included in the BIA for completeness and to avoid ambiguity/confusion.

4.27. It is noted that groundwater level for the swimming pool basement walls has been taken as 1m bgl whereas the BIA states that a groundwater depth of 0.5m bgl will be assumed in design. Additionally, the soil shear strength parameters adopted in the swimming pool wall design appear to be at variance with those recommended in the GI report, albeit more conservative. It is also noted that active soil pressures have been assumed in the swimming pool basement wall design whereas at-rest soil pressures have been adopted in the media basement wall design.

The soil shear strength parameters adopted in the media basement wall design are in accordance with those recommended in the GI report. The design approach and assumptions made should be consistent across the various structures.

4.28. Calculations of the total horizontal and vertical movements at ground surface level arising from construction of the basement have been undertaken for the swimming pool and media basements in general accordance with the empirical methodology outlined in CIRIA C580 and amended (in the revised BIA) in accordance with the recommendations of Ball, Langdon and Creighton (assuming a high level of construction control etc.) as published in Ground Engineering, September 2014. The revised BIA calculations are stated to show the predicted damage category for both N^{o} 11 Rosslyn Hill and Lyndhurst Hall to be zero i.e. negligible and that the damage category for the modern single-storey buildings to the east of the site (undefined) would be 1 i.e. very slight.

4.29. It is considered that the revised BIA (as did the first issue) fails to make it clear which basements are being evaluated at any given point in the document. The comments and calculations regarding ground movements and crack width predictions are poorly presented and distributed throughout the document within the main text, within various appendices and within appendices within appendices. In order to evaluate the impacts, each basement should be addressed separately, with clear headings and clear assumptions as to wall depths, excavation depths and with individually generated ground movement curves marked up to unambiguously show the extent and identity of buildings likely to be affected and the damage category predicted for each building.

4.30. Added to the above, and given the apparent complexity of the structure of Lyndhurst Hall – see Appendix 1 to this BIA, AB&A should confirm the appropriateness of undertaking the damage category assessments based on the CIRIA C580 approach. It is likely that an internal survey of the building will be required to confirm the nature and condition of the structure.

4.31. It is not possible to accept the currently predicted damage categories without further development of the BIA as noted.

4.32. The revised BIA has made it clear that a high stiffness propping system will be used in combination with high levels of site supervision to control workmanship and construction methodology, together with rigorous monitoring set against rationally designed trigger levels. There should also be contingency provisions in place should on-going movements indicate the likely exceedance of predicted values. It is essential that the designer's requirements are fully specified in the BCP so that the contractor is fully aware of the levels of compliance required.

4.33. Given the important structural, and potentially hydrogeological, implications, it is recommended that the footing details to the Lyndhurst Hall frontage facing the site are confirmed by further

trial pitting. Additionally, if the hydrogeological implications are confirmed, it is recommended that additional long-term groundwater level monitoring is undertaken within the existing standpipes for the purpose of confirming groundwater flow directions.

5.0 CONCLUSIONS

5.1. Following initial issue of the BIA on 24 March 2015 and following receipt of a number of detailed technical queries, the BIA was revised and re-issued on 07 August 2015. The main issues raised and the BIA author's responses are set out in Appendix 1 to this audit together with further comments by CampbellReith and will not be repeated here.

5.2. The BIA and associated documents have all been carried out by established companies and the authors are generally considered to be suitably qualified. However, the structural calculations submitted with the BIA have been checked by a number of different people whose identity has not been made clear. The names and qualifications of the checkers should be confirmed.

5.3. The locations of the exploratory holes shown on the key plans within BIA Drawing N°s 1693/01/S03 and 1693/01/S04 are significantly at variance with those shown on the exploratory hole location plan included within the GI report. This discrepancy should be resolved.

5.4. The BIA records that there is no apparent history of shrink-swell induced subsidence at the property arising from the presence of seasonally affected soils. However, the London Clay is known to be susceptible to shrinkage and swelling, particularly in the vicinity of mature trees and this potential is confirmed in the GI report. The implications of the swelling nature of the London Clay on the basements and the use of compressible sub-slab void filler etc. should be made more clear.

5.5. Despite the absence of an aquifer beneath the site, it is stated in the BIA that groundwater flows are/will be diverted around N° 11 Rosslyn Hill by the shielding effect of the Lyndhurst Hall sub-surface wall construction and foundations which are considered to present an impenetrable barrier to flow. If the potential impact on subterranean flow is confirmed, it is considered that further investigation should be undertaken to confirm the founding depths along the Lyndhurst Hall frontage facing onto N° 11, Rosslyn Hill. Further standpipe monitoring to confirm the groundwater regime is also recommended.

5.6. Drawing N° 1693/01/100 in the revised BIA shows new land drains as being required to drain water from the light wells adjacent to the new southern plant basement. It is not clear how the water from these drains is to be disposed of. This matter should be addressed.

5.7. A preliminary construction management plan (CMP) has been submitted with the planning documents. Given the need for a high level of construction control to limit ground movements, and structural damage/cracking to N°11 Rosslyn Hill and Lyndhurst Hall, it is considered essential that a formal construction management plan be prepared and approved prior to work commencing on site.

5.8. Basic calculations have been enclosed within the BIA for the reinforced concrete (RC) design of the basement retaining walls to the swimming pool basement and the media basement (revised BIA only) and also for the roof to the swimming pool basement. These will need to be developed prior to construction including full soil-structure interaction modelling of the walls with all construction stages represented. No design has been included in the BIA for the two-storey section of basement to accommodate the swimming pool plant room, nor for the third basement to the south of N^{o} 11 Rosslyn Hill. These should be provided.

5.9. The soil parameters adopted in design are not consistent between the various basement structures and do not always reflect the BIA.

5.10. It is considered that the revised BIA (as did the first issue) fails to make it clear which basements are being evaluated at any given point in the document. The assumptions made and the findings are to be provided in a more transparent manner.

5.11. Given the apparent complexity of the structure of Lyndhurst Hall – see Appendix 1 to this BIA, AB&A should confirm the appropriateness of using the CIRIA C580 approach. It should be confirmed by AB&A that their assumptions regarding the structure of Lyndhurst Hall are based on as built, rather than design, information. An internal survey of the building may be required to confirm the nature and condition of the structure.

5.12. It is not possible to accept the currently predicted damage categories without further development of the BIA as noted.

5.13. The revised BIA has made it clear that a high stiffness propping system will be used in combination with high levels of site supervision to control workmanship and construction methodology, together with rigorous monitoring set against rationally designed trigger levels. There should also be contingency provisions in place should on-going movements indicate the likely exceedance of predicted values. It is essential that the designer's requirements are fully specified in the contract documents for the Works so that the contractor is fully aware of the levels of compliance required.

5.14. In summary there are a number of items to be clarified in the BIA as discussed in Section 4 and summarised in Appendix 2. In additional, it is recommended that a Basement Construction Plan is prepared which includes the following:

- Formal construction plan detailing construction methodology and sequence.
- Details of temporary works and measures to control construction and limit ground movements/damage.
- Final ground movement and building damage assessment for agreed construction methodology.

- Detailed calculations for basement retaining walls, slabs and permanent props.
- Detailed monitoring plan with locations of monitoring points, frequently of readings and agreed trigger levels and mitigation measures.
- Measures for safeguarding properties in the case of delays to/breaks in construction.

Appendix 1: Resident's Consultation Comments

Residents' Commissioned Technical Reponses on BIA Submission dated March 2015

Company Name & Date	N°	Issue raised	Alan Baxter & Associates (AB&A) Responses within revised BIA Submission dated August 2015	CampbellReith Comments
A) Corbett & Tasker Structural Engineering (C&T) 27/07/15	1	The structure of Lyndhurst Hall appears to comprise a combination of load-bearing masonry and steel framing with timber and concrete floors and corbelled brick foundations. In some areas, the foundations are supported on mass concrete strip footings, possibly the result of underpinning. There is a 27m high vaulted roof structure over the main studio within Lyndhurst Hall, supported on masonry walls inlaid with fragile stained glass windows - Ref; Figure 1.	The roof structure is not vaulted but comprises iron trusses with timber purlins and rafters. The ceilings are suspended below this structure.	No comment.
	2	Very limited consideration is given within the BIA to the special form of construction of Lyndhurst Hall and its susceptibility to damage from ground movement. There are no studies within the BIA of the hall's construction or a full assessment of the impact of the proposed basement construction on its structural fabric.	Lyndhurst Hall is constructed with load-bearing masonry walls founded on strip footings on the London Clay. External walls are heavily buttressed and robust. Brickwork is constructed with lime mortar and hence is more tolerant of movement than modern forms of construction. The building is in good condition. The building is not particularly susceptible to ground movement induced damage and will not be adversely affected.	AB&A to confirm appropriateness of building damage assessment methods for Lyndhurst Hall and advise whether further investigation of structure needed.
	3	No structural stability assessment is included in the BIA (for Lyndhurst Hall) as required by Clause 2.41 of Camden Planning Guidance document CPG4 for basements in close proximity to listed	An assessment of the impact of proposed basement construction on Lyndhurst Hall is provided in Appendix I to Appendix L to the revised BIA and shows a reduced category O	The new assessment is based on stringent construction and quality controls and rigorous monitoring set against

Company Name & Date	N°	Issue raised	Alan Baxter & Associates (AB&A) Responses within revised BIA Submission dated August 2015	CampbellReith Comments
		buildings.	i.e. 'negligible' damage.	rationally designed trigger levels. There should also be contingency provisions in place should on-going movements indicate the likely exceedance of predicted values. It is essential that the designer's requirements are fully specified in the contract documents for the Works so that the contractor is fully aware of the levels of compliance required.
	4	No drawings of Lyndhurst Hall are provided in the BIA and no sections provided showing the relationship between the proposed basements and the hall. Approximate section sketches (with notes) through the hall and the media and swimming pool basements are provided in Appendix A to show possible issues and conflicts between the new and existing structures.	Drawings and sketches are provided in Appendix J to Appendix L to the revised BIA. C&Ts sketches suggest possible existing underpinning to the footings of Lyndhurst Hall. However, the original building plans clearly show that the walls were constructed on mass concrete strip footings. This is consistent with the findings of the single trial pit excavated adjacent to the footings of Lyndhurst Hall recorded in the BIA.	It should be confirmed that if available, drawing information for Lyndhurst Hall is based on as-constructed details not design details.
	5	The BIA movement predictions and crack assessments using the Burland scale are based on the methodology (set out in CIRIA C580). However, no account has been taken of likely	The roof structure to Lyndhurst hall is not vaulted. The closest masonry pier supporting the roof is some 14m from the proposed swimming pool. The ground movements	The swimming pool basement is shown on the BIA sequence drawings to be constructed by top down methods at the

Company Name & Date	N°	Issue raised	Alan Baxter & Associates (AB&A) Responses within revised BIA Submission dated August 2015	CampbellReith Comments
		ground movements on the stability or cracking of the vaulted roof to Lyndhurst Hall. An approximate ground settlement profile due to excavation for the swimming pool basement is provided in Figure 2.	predicted at this distance are very small and will have negligible impact on the structure. The ground movement profiles in C&Ts Figure 2 are mis-leading as they would be consistent with an unpropped excavation whereas a top down construction methodology is proposed for the swimming pool basement where the roof slab will act as a very stiff high level prop.	north-western end only.
	6a	Only one trial pit was dug to ascertain the foundations to Lyndhurst Hall and the results assumed to be representative of the entire building frontage. A single pit is however unlikely to be typical.	The trial pit was excavated at the location of the proposed media basement and the results are consistent with the record drawings of the footing arrangements to Lyndhurst Hall. It is not necessary to undertake investigations to confirm every detail of the existing foundations. There is now a good level of confidence as to the footing depths etc.	Given the important structural and potentially hydrogeological, implications, it is recommended that the footing details to Lyndhurst Hall facing the site are confirmed by trial pitting.
	6b	It is understood that Lyndhurst Hall was partially underpinned during the conversion works in the early 1990s and that in some areas, there are basements, resulting in foundations being of various depths throughout the building.	Based on drawings, the only works possibly entailing underpinning were those related to the installation of a lift pit between Lyndhurst hall and Lyndhurst cottage on the opposite side of the hall to N° 11 Rosslyn Hill. A basement forms part of the original building on the opposite side of the hall (west) to N° 11 Rosslyn Hill. There will inevitably be variable foundation depths within the building.	No comment.

Company Name & Date	N°	Issue raised	Alan Baxter & Associates (AB&A) Responses within revised BIA Submission dated August 2015	CampbellReith Comments
	7	The foundations to Lyndhurst Hall will strongly influence the design and construction of the adjacent media basement and requires more extensive consideration in the BIA. Where the foundations to Lyndhurst Hall are more shallow, they may not form a barrier to water flow through the Made Ground under the Hall as postulated in the BIA. Underground features should be properly considered in the location, design and construction of the new basement. The basement is considered to be too close to the foundations to Lyndhurst Hall - see Figure 3.	The footing depths shown on the original Lyndhurst Hall drawings together with the trial pit information are consistent with the footings being founded on the London Clay. It is inconceivable that the architect for Lyndhurst Hall would have founded the building within the overlying Made Ground. The good condition of the building after 130 years supports that. The section produced by C&T is incorrect. There will be no clash between the proposed construction and the hall footings. The correct relationship between the existing footings and the proposed construction is shown in Appendix J to the revised BIA.	See above comment regarding further ground investigation.
	8	Piled wall design in the BIA is very basic and only assumes a 10kN/m^2 surcharge. This is significantly lower than the likely ground pressure beneath the foundations to Lyndhurst Hall and which will provide a lateral surcharge load to the nearby basement. Pile design was undertaken for a 600mm diameter contiguous piled wall whereas the media basement walls are shown to be 450mm diameter. Deflections were not calculated, either for the short term or the long-term.	The typical retaining wall calculations provided in the original BIA (and reproduced in the revised BIA) were specifically for the swimming pool basement. It is not a requirement of planning to include calculations for all elements of a project. This is undertaken at detailed design stage. However, additional calculations have now been included for the media basement walls in Appendix K to Appendix L to the revised BIA in response to C&Ts comments. Detailed calculations considering long-term effects are not required at planning stage.	The BIA should make it clearer as to which calculations refer to which structure. Indicative calculations are required for all various retaining wall situations. Consistent soil parameters and ground conditions are to be assumed.

Company Name & Date	N°	Issue raised	Alan Baxter & Associates (AB&A) Responses within revised BIA Submission dated August 2015	CampbellReith Comments
	9	Structure and ground movements arising from basement construction are highly dependent on the quality of workmanship and the construction methodologies employed by the contractor. Horizontal movements are most damaging and one way to control this is to ensure that the wall is sufficiently stiff and adequately propped.	A high stiffness propping system will be used in combination with high levels of site supervision to control workmanship and construction methodology.	As noted above, it is essential that the designer's requirements are fully specified in the contract documents for the Works so that the contractor is fully aware of the levels of compliance required.
	10	The BIA provides very little information on the quality of workmanship that will be employed during construction of the basements, nor on the propping arrangements. No information is given on ground movement monitoring or monitoring of Lyndhurst Hall for movement.	The end-section of the swimming pool basement is to be constructed using top-down construction methods as shown in the construction sequence within the BIA. Initial proposals for the propping to the media basement are also shown. The monitoring arrangements will be confirmed as part of the party wall agreement.	Again, as noted above, it is essential that the designer's requirements are fully specified in the contract documents for the Works so that the contractor is fully aware of the levels of compliance required.
	11	Extended construction periods increase the risk of ground movements. Archaeological findings could give rise to such extended construction periods and hence a greater risk of ground movement.	Any archaeology will be within the Made Ground i.e. at shallow depth.	Potential archaeological issues should be catered for in the construction plan so that the timing of propping is not compromised.
	12	The media basement as shown on drawings in the BIA is too close to Lyndhurst Hall and will be very difficult to construct due to potential undermining of the foundations to the hall for which the founding levels are uncertain - see Figure 4.	The C&T sketch showing the foundation arrangements is mis-leading as it does not show the mass concrete footings to the hall (verified by trial pit excavation) and their depth below ground level.	The C&T sketch also does not show the piled wall as extending from ground level. See above comments on the need for further exploration and foundation verification.

Company Name & Date	N^{O}	Issue raised	Alan Baxter & Associates (AB&A) Responses within revised BIA Submission dated August 2015	CampbellReith Comments
	13	The BIA movement predictions are understood to be based on limited data, uncorroborated by numerical analysis and thus are indicative only with the risk that actual movements may be higher.	The CIRIA C580 approach adopted is an industry standard approach and provides a conservative estimate of movements.	However, the method assumes good quality workmanship and good construction control. As noted above, this must be conveyed to the contractor.
	14	Based on first hand testimony regarding the refurbishment works undertaken at Lyndhurst Hall in the early 1990s, a very significant flow of water was encountered during construction of the basement and lift pit, requiring the installation of a 1.2m diameter dewatering well to 5.5m below ground floor level. This well is still being pumped today. It was postulated at the time that the water inflow may have been attributable to the River Fleet and/or due to a period of heavy rainfall at the time of excavation.	The course of the former River Fleet is some 400m to the east of the site. A drain carrying rainwater from the roof adjacent to the lift pit location may have been the source of the water described. Nevertheless, the lift pit is on the opposite side (west) of Lyndhurst Hall to the proposed media basement (and N^{O} 11 Rosslyn Hill). It is postulated that a groundwater build-up could exist on the upstream side of Lyndhurst Hall arising from the cut-off to groundwater flow caused by the sub-surface walls and footings.	It is recommended that further groundwater monitoring is undertaken to confirm hydrogeological conditions.
	15	Based on the groundwater flows experienced during construction of the lift shaft at Lyndhurst Hall, it is concluded that the site hydrology is far more complicated than assumed in the BIA where groundwater flows are assumed to be around Lyndhurst Hall rather than under it. A more detailed study is considered necessary to fully understand the effects of the proposed basements, including the identification of the source of the above water and measurement of the flow rate.	Comprehensive site investigation and groundwater monitoring undertaken to inform the BIA do not indicate the groundwater regime at the site to be complex.	The presence of significant subterranean flows which could be impacted by the basements should be confirmed. It is recommended that further long-term groundwater monitoring is undertaken to confirm hydrogeological conditions. This may mean that extra standpipes should be installed

Company Name & Date	N°	Issue raised	Alan Baxter & Associates (AB&A) Responses within revised BIA Submission dated August 2015	CampbellReith Comments
				to the north of Lyndhurst Hall.
B) Geotechnical & Environmental Associates (GEA) 04/06/15.	0	The CIRIA C580 methodology adopted in the BIA to assess ground movements is considered too simplistic given that excessive ground movements would have a significant impact on Lyndhurst Hall.	No comment made but see earlier comment that the CIRIA C580 approach adopted is an industry standard approach and provides a conservative estimate of movements.	See above.
	1	A structural assessment of the hall should be undertaken as required by Clause 2.41 of Camden Planning Guidance document CPG4 to address the potentially sensitive nature of the Lyndhurst Hall to movement.	A detailed desktop study has been undertaken of Lyndhurst Hall and its history, supplemented with visual observations (external) and physical investigations to develop an understanding of the structure and condition of the hall. It is considered that the assessment undertaken is sufficient to ensure that basement design is of a high standard and is appropriate for the site.	Note the above comments as to the complicated structural form of Lyndhurst Hall and also the recommendations for further exploratory investigation of footing depths.
	2	The construction sequence provided in the BIA provides a brief overview of site operations rather than a detailed stage by stage excavation plan. A construction sequence should be included in the BIA where all excavation stages are defined by	The information provided in the BIA is appropriate for planning stage and will be developed in more detail as the design develops.	See comments above regarding the need for the contractor to be made fully aware of the need for a high level of construction control

Company Name & Date	N°	Issue raised	Alan Baxter & Associates (AB&A) Responses within revised BIA Submission dated August 2015	CampbellReith Comments
		level and extent.		etc.
	3	Consideration does not appear to have been given to the temporary works required to maintain the stability of Lyndhurst Hall while the piling platform is prepared.	The external walls to Lyndhurst Hall are of thick load-bearing masonry founded well below piling mat level. Piling rigs will be of modest scale.	No comment.
	4	A single trial pit has been excavated to determine the nature and depth of the foundations to Lyndhurst Hall. Further ground exploration should be undertaken to ascertain the nature of the foundations to Lyndhurst Hall facing the basements.	Desk study information is now provided in the revised BIA showing the footing arrangements (size and depth) for Lyndhurst Hall.	See above comments regarding further ground investigation.
	5	The simply supported beam model as adopted in the BIA is considered wholly inadequate (for the design of the piles to the media basement). The surcharges arising from the Lyndhurst Hall foundations should be incorporated.	The wall calculations included within the BIA did not cover the walls to the media basement. A calculation to cover this is now included in Appendix K to Appendix L to the revised BIA (including surcharge effects).	No comment.
	6	A full soil/interaction type of analysis (long and short-term) is required of the basement construction sequence e.g. WALLAP to ascertain bending moments etc. and wall deflections. The predicted movements should then be used to inform the assessment of wall stiffness category in CIRIA C580 so that the most appropriate ground movement curves are adopted to predict ground movement outside the basement excavation.	The level of detail described by GEA goes beyond that required at planning stage and is a matter for detailed design. Irrespective of the output of any analyses, the proposal is to use high stiffness props to support the basement walls in both the temporary and permanent cases.	No comment.

Company Name & Date	N°	Issue raised	Alan Baxter & Associates (AB&A) Responses within revised BIA Submission dated August 2015	CampbellReith Comments
	7	The maximum heave movements within and surrounding the basement should be calculated. Total expected movements should be used to derive likely building strains to prove the acceptability of the design. If the design is not acceptable, it will have to be revaluated e.g. the use of different propping arrangements or piles.	The proposal is to use high stiffness props to support the basement walls. Detailed calculations are unnecessary as it would not be appropriate to use propping which does not achieve this.	AB&A appear possibly to have misunderstood the question which it is believed was referring to heave and long-term swelling movements arising from vertical stress relief following bulk excavation of the basements.
	8	Monitoring requirements are to be defined. The minimum requirements are considered to comprise the installation of inclinometers within all piles and precise levelling and 3D monitoring of Lyndhurst Hall. The BIA is to include contingency measures should movements be greater than predicted.	Detailed monitoring, trigger levels etc. will be subject to agreement under the party wall act. However, it is confirmed that external wall elevations to Lyndhurst Hall and basement walls will be monitored for movement in all directions throughout basement construction against pre-set trigger levels.	See comments above regarding the need for the contractor to be made fully aware of the need for a high level of construction control etc.
	9	There is a need for a construction management plan as per the requirements of Camden Planning Guidance document CPG4 in relation to existing buildings.	It is expected that this will form a condition to planning consent being given.	It is considered that a construction management plan is necessary.
	10	Groundwater has been measured as being as shallow as 0.5m bgl but the designs do not appear sufficient to address this particularly for the temporary works to prepare the piling area close to Lyndhurst Hall. The choice of contiguous rather than secant piles adjacent to the hall is questioned given the high groundwater level and	The nature and depth of the foundations to Lyndhurst Hall have been shown in the BIA to act as a barrier to flow resulting in low groundwater levels on the downstream (N° 11 Rosslyn Hall) side. Secant piled walls are adopted for basement construction to the south of the site outside the Lyndhurst Hall	See above comments regarding further ground investigation.

Company Name & Date	N°	Issue raised	Alan Baxter & Associates (AB&A) Responses within revised BIA Submission dated August 2015	CampbellReith Comments
		the possibility of groundwater inflow and the loss of fines, potentially leading to settlement.	cut-off influence zone.	
	11	In summary, detailed design will need to be undertaken together with monitoring before during and after construction by a reputable contractor. A structural appraisal of the hall will need to be undertaken as part of the baseline study.	No comment.	See comments above regarding the need for the contractor to be made fully aware of the need for a high level of construction control etc.
	12	It is considered that the BIA has not taken adequate cognisance of the presence of Lyndhurst Hall which is immediately adjacent to one of the basements (the media basement). As such, it has not adequately addressed the impacts of the basement which is the key aim of a BIA.	No comment.	BIA now revised to more clearly address Lyndhurst Hall.
C) David Cooper & Co. 18/05/15.	This report summarises the above two reports and no further comment will be made.			

Note: The above comments are not direct quotations nor numbered exactly as per the original documents although the order of comments has been preserved. The comments are a summary of the points made under the various headings. Reference should be made to the original documents for an exact record of the various submissions.

Appendix 2: Audit Query Tracker

Audit Query Tracker

	Subject	Query	Status	Date closed out
1	BIA	Qualifications of retaining wall design checkers to be confirmed.	Open.	
2	Hydrogeology	Significanceof subterranean flows to be confirmed. If potential impact identified, additional long-term groundwater level monitoring to be undertaken within the existing standpipes at the site for the purpose of confirming groundwater flow directions.	Open.	
3	Hydrogeology/Stability	Further trial pit investigation should be undertaken to confirm the founding depths along the Lyndhurst Hall frontage facing onto No 11, Rosslyn Hill.	Open.	
4	Hydrogeology/Stability	GI exploratory locations to be confirmed.	Open.	
5	Hydrogeology/Hydrology	It is not clear how water from the new land drains leading from the southern light wells to N^{o} 11, Rosslyn Hill is to be disposed of. This matter should be addressed.	Open.	
6	Ground Stability	Proposals for determining the requirements for compressible sub-slab void filler etc. should be made more clear.	Open.	
7	Stability	Outline wall designs should be included for the two-storey section of basement to accommodate the swimming pool plant room. Also, for the basement to the south of N^{o} 11 Rosslyn Hill.	Open.	

	Subject	Query	Status	Date closed out
8	Stability	Groundwater level and soil parameter discrepancies to be resolved in the basement wall designs.	Open	
9	Stability	Each basement should be addressed separately and clearly in the ground movement prediction calculations.	Open	
10	Stability	Confirmation to be given to whether or not it is valid to determine induced strains and to make damage category assessments for Lyndhurst Hall based on the CIRIA C580 approach and whether any further investigation of structure is required.		
11	Stability	Full soil-structure interaction modelling of all basement walls with all construction stages represented would be expected for detailed design.	To be provided in Basement Construction Plan.	N/A
12	Stability	It is essential that the designer's requirements are fully specified so that the contractor is fully aware of the levels of compliance required i.e. the high levels of site supervision to control workmanship and construction methodology, together with rigorous monitoring set against rationally designed trigger levels, contingency provisions etc.	To be provided in Basement Construction Plan	N/A

Appendix 3: Supplementary Supporting Documents

None

Appendix 18

Alan Baxter Associates revised BIA dated August 2015

Appendix 19

Campbell Reith Hill BIA review February 2016