iv) Foundations and geotechnical surveys

A single trial pit has been dug to expose the foundations of Lyndhurst Hall, the results of which have been extrapolated across the entire building by the engineers compiling the BIA, based on the assumption that it represents the footings to the entire building. The trial pit however is unlikely to be typical. Neither is it clear from the BIA as to where the trial pit was made, as the sketches and drawings provided are contradictory. It is understood from our client that Lyndhurst Hall was partially underpinned during its conversion in the early 1990s and in some areas beneath the building there are basements, resulting in the foundations being of variable depth.

The foundation construction of Lyndhurst Hall will strongly influence the proposed adjacent basement design and construction and requires more extensive consideration in the BIA. Where the foundations are shallower they may not prevent perched groundwater flows through the made ground layer over the London Clay beneath our Client's building, as assumed in the BIA, and where there are underground features this needs to be considered properly in the design, construction and location of the new basement. See figure 3 below for a detailed section showing the existing foundations and the proposed basement, deduced from the information provided, which suggests that the basement is too close to Lyndhurst Hall.

Please also refer to the GEA review in appendix B.

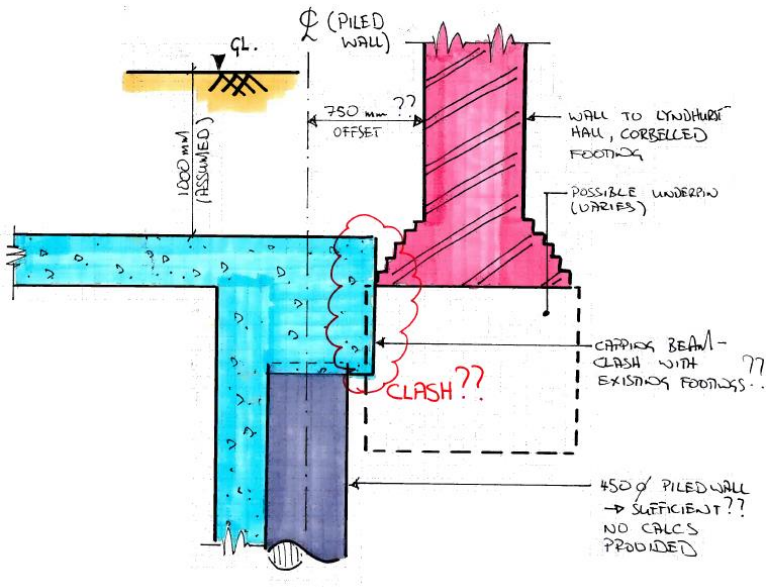


Figure 3: Sketch showing proximity of new underground cinema in relation to the foundations of Lyndhurst Hall (including various measurements taken from BIA)

v) Structural design of basements

Appendix J of the BIA contains some very basic calculations for a 600mm diameter contiguous piled wall with a 10kN/m^2 surcharge load behind the wall; however the section of proposed basement containing the cinema, which abuts our clients foundations and southern boundary wall, is constructed using piles of 450mm diameter and the surcharge load behind this wall will be the bearing force underneath the foundations, significantly higher than the 10kN/m^2 allowed for. Therefore the structural calculations of the basement provided do not appear to consider the actual loads being imparted to the soil by our clients building, nor does it seem that there is a justification in the selection of 450mm diameter piles for the cinema basement and neither was consideration of the deflection noted in the calculations, either immediate or in the long term due to creep, that the walls may experience due to the load on them.

Please also refer to the GEA review in appendix B.

vi) Buildability aspects

The most sensitive time during the construction of the basement will be the installation of the piled walls, followed by excavation of the soil; it should be noted that the movements experienced by the surrounding ground and structures they support are predominantly dependent on the quality of workmanship and the construction methodologies deployed by the contractor. Generally speaking the most damaging type of movement is horizontal movement and one way this is controlled is through ensuring the wall is sufficiently stiff and adequately propped.

The BIA has very little information on the details of workmanship to be deployed during the basement construction, mentioning only that the walls will be propped, but not giving detail on how this will be done or explaining how movement of the ground and our clients' structure will be monitored. Therefore the BIA offers little protection in this regard to our Client.

It should also be noted that extended construction periods increase the risk of ground movements. Groundworks and basement construction is notoriously risky and frequently takes longer than anticipated; it is noted that there may be Archaeology present in the neighbouring site which increases the risk of an extended construction period to the one currently planned.

The proposed basement drawings describing the cinema show this to be located extremely close to our Clients’ building; further study may show

this to be too close – the proximity will make it practically very difficult to construct as can be seen from the sketch in figure 4 below, as the extents of the concrete underpinning to Lyndhurst Hall has not been investigated in the BIA.

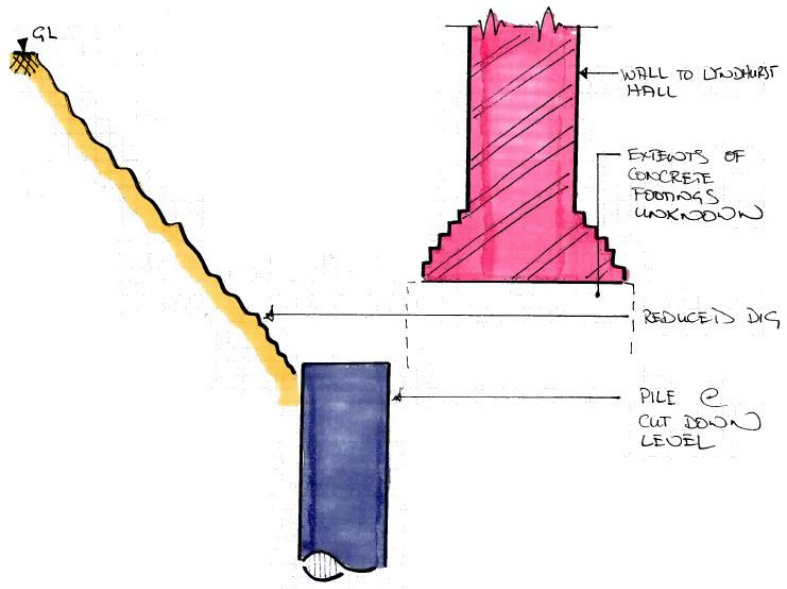


Figure 4: Potential undermining of foundations to Lyndhurst Hall during construction of adjacent basements (depending upon extents of existing concrete footings)

It is understood that the method used to predict ground movements in the BIA are based on limited empirical data and is uncorroborated by numerical analysis; they are indicative only and therefore it should be noted that there is a risk that actual movements may be higher.

Please also refer to the GEA review in appendix B.

vii) Ground water studies

We have obtained first hand recollections of the major refurbishment works undertaken at Lyndhurst Hall in the early 1990s by the project architect George Kounnou BA (Hons), B Arch (Hons), RIBA, formerly of Heber Percy and Parker Architects, and Martin Jenkinson, a quantity surveyor working for the contractor (Transformation). The refurbishment works included the construction of a basement and lift pit beneath Lyndhurst Hall.

George and Martin both recall that when the new basement and lift pit were constructed there was a very significant flow of ground water – of

sufficient flow and quantity for them to attribute this, rightly or wrongly, to the River Fleet. We understand that the specified basement tanking was insufficient to counter the water pressure and so a pressurized grouting procedure was then used around the new basement area, which also proved ineffective to withstand the flow of water. The solution finally adopted was to construct a well with a pump to actively dewater the ground. Through consultation with Air Studio's Technical Director Tim Vine-Lott we understand the well to be approximately 1200mm diameter with a depth of around 5.5m below ground floor level, and to be effectively 'de-watering' the area local to Lyndhurst Hall. Permanent pumps were fitted to the well, pumping out the water to effect this de-watering. These pumps are still in operation today and we understand from Tim that the pumps are rated at 9 litres/second. We have been informed by George that the initial exploratory holes carried out to inform the basement design at Lyndhurst Hall did not pick up the water flow that was later experienced and that the excavation works may have been carried out during a period of heavy rainfall.

This factual account contradicts the ground water flow drawing presented in the BIA for 11 Rosslyn Hill, which indicates that water flows would be around Lyndhurst Hall, principally to the North rather than through or under the building. From the account above, which is corroborated in contemporary written journal accounts of the construction, it is clear that the hydrological characteristics of this area are more complicated and potentially more damaging than currently assumed and a more detailed study is required to fully understand the implications of the proposed basements on the adjacent listed buildings of 11 Rosslyn Hill and Lyndhurst Hall, which should include, for example, an identification of the source of this water and measurement of its flow rate.

Consultation with our client would have led to consideration of the local ground water conditions beneath Lyndhurst Hall in the preparation of the BIA; it is noted that consultation with neighbours is an integral part of the BIA process, see section 2.85 of CPG 4.

Please also refer to the GEA review in appendix B.

3. Conclusions

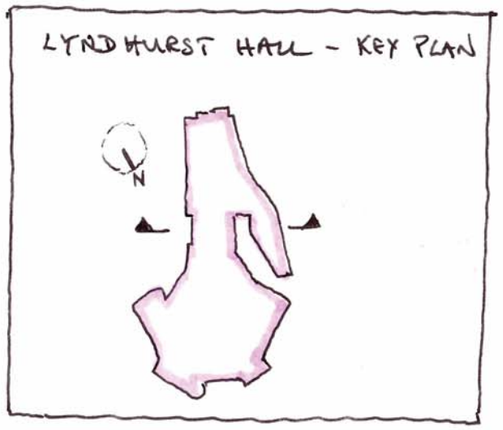
A full review of 'As Built' drawings of Lyndhurst Hall is required, corroborated by site surveys, with in-depth analyses and assessments of the interaction between the proposed ground works and existing structural fabric of our Client's building, to fully assess the impacts of the proposed basement construction.

In particular the following points are noted:

1. There is insufficient consideration of the potential damage to the fragile structure of the main Hall vaulted roof structure and large masonry panels with inlaid historic stained glass windows, contrary to the requirements of CPG 4
2. The foundations assumed for the Hall have not been investigated sufficiently which may affect the conclusions drawn in the BIA; more trial holes are required
3. There is anecdotal evidence of a local ground water feature beneath Lyndhurst Hall which has not been investigated or considered in the BIA
4. There is insufficient detail given on workmanship and propping details of the proposed basement and movement monitoring of Lyndhurst Hall
5. The structural proposals for the basement do not consider the forces on the ground due to the weight of Lyndhurst Hall
6. There has been no consultation with Lyndhurst Hall which would enable sufficient understanding of the structure and discussion of suitable mitigation measures to reduce the impact of the basement construction on our Client's building and business. This mitigation step is recommended in Clause 2.85 of CPG 4.
7. More section drawings are required, showing the interface between new basement and existing structures, to fully understand the structural interaction
8. New piles are proposed extremely close to Lyndhurst Hall's corbelled brick foundations; a more detailed study may well reveal the close proximity is impractical
9. There is insufficient information contained within the BIA to ascertain the effects on our Client's building

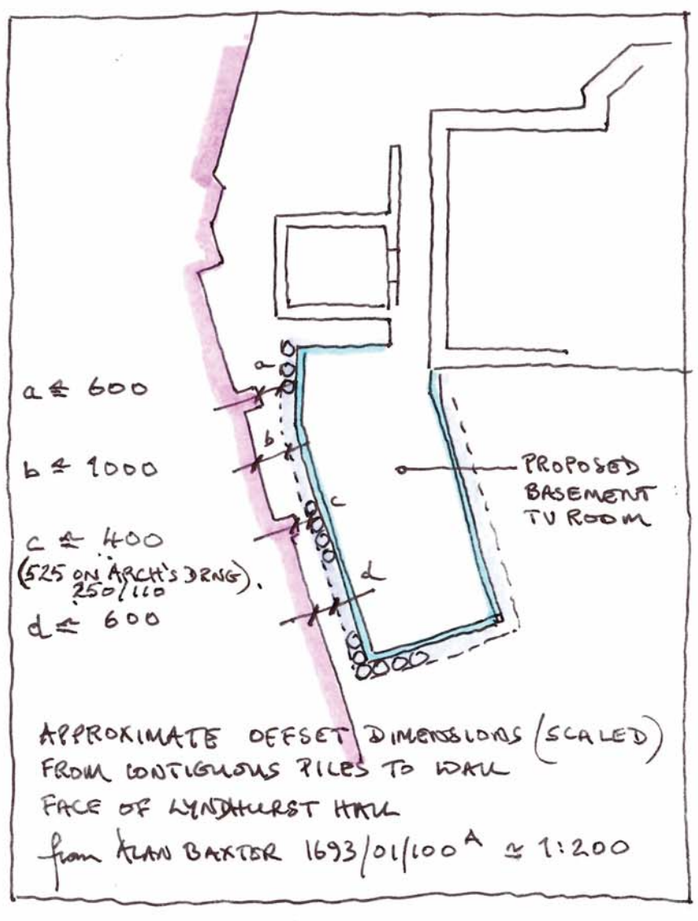
A fuller review of the BIA and the structure of Lyndhurst Hall may well show up further issues requiring further study. From our initial review, as a result of the significant shortcomings, omissions and inconsistencies noted, we conclude that this BIA in its current form is unacceptable and does not provide a credible assessment of the impacts of the proposed basements on Lyndhurst Hall.

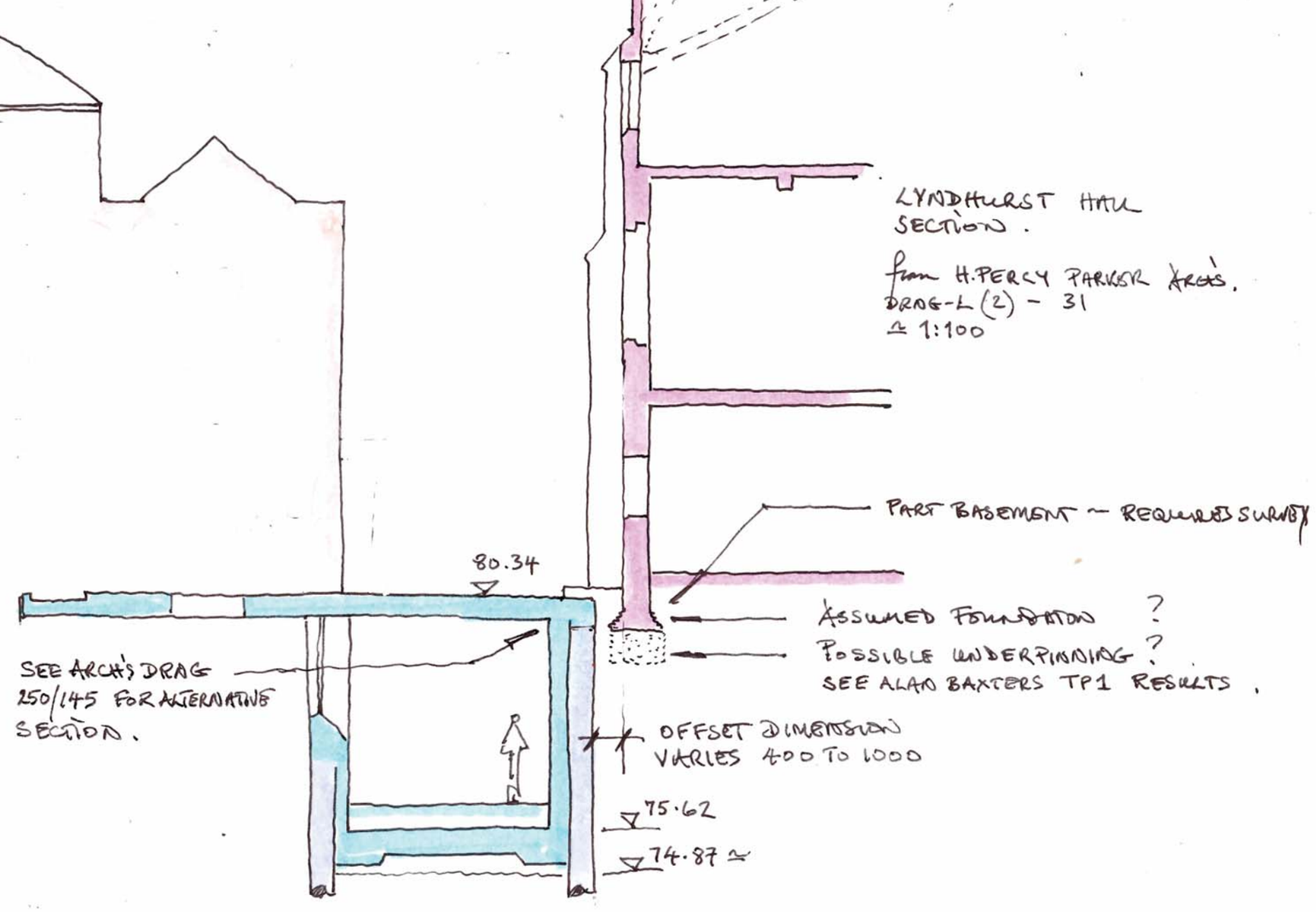
Appendix A – Approximate Section Sketches showing proximity of proposed basements to Lyndhurst Hall



11 ROSSLYN HILL - SECTION

from T.C. ARCH'S DRNG 250/146 ≙ 1:100

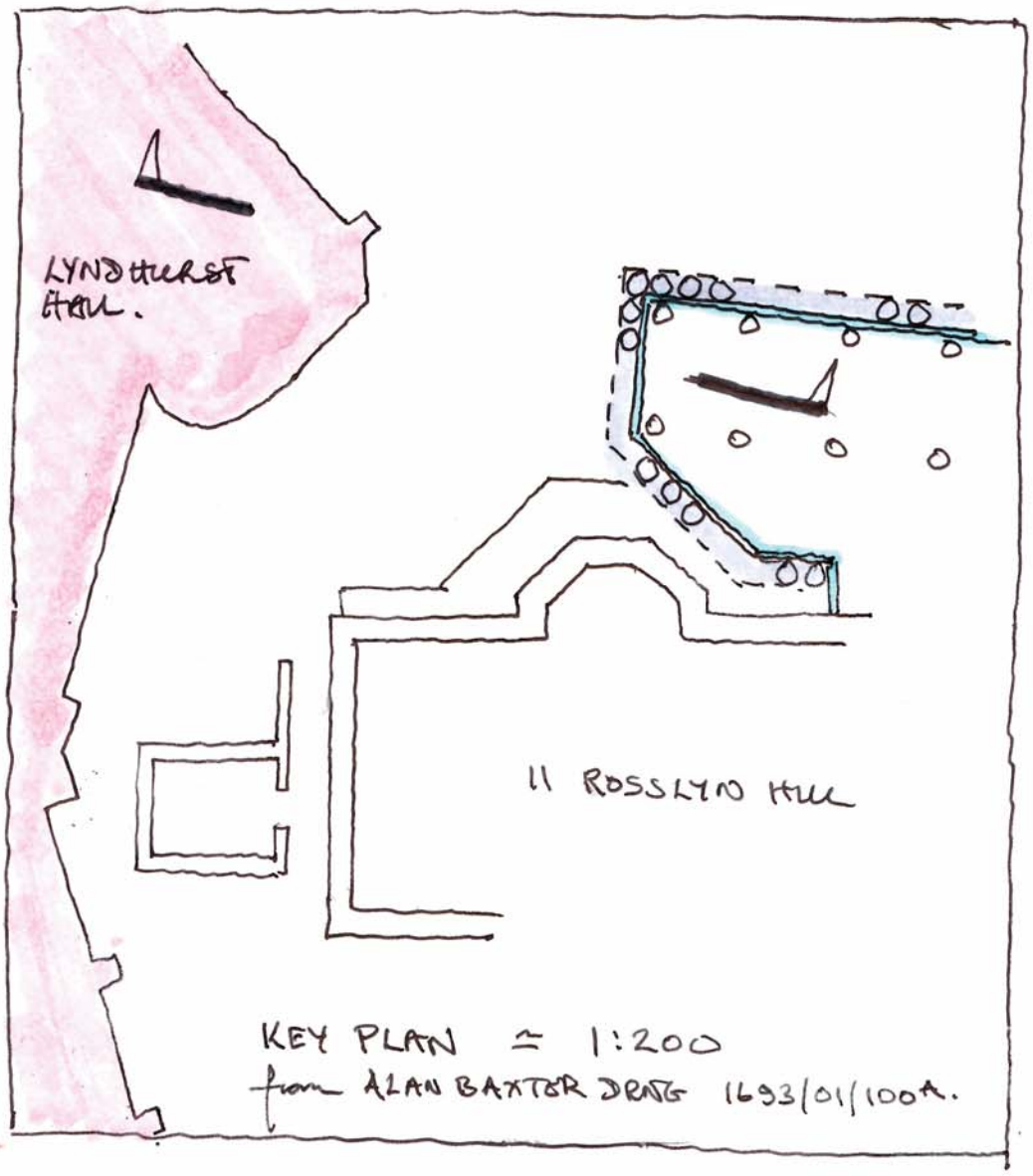


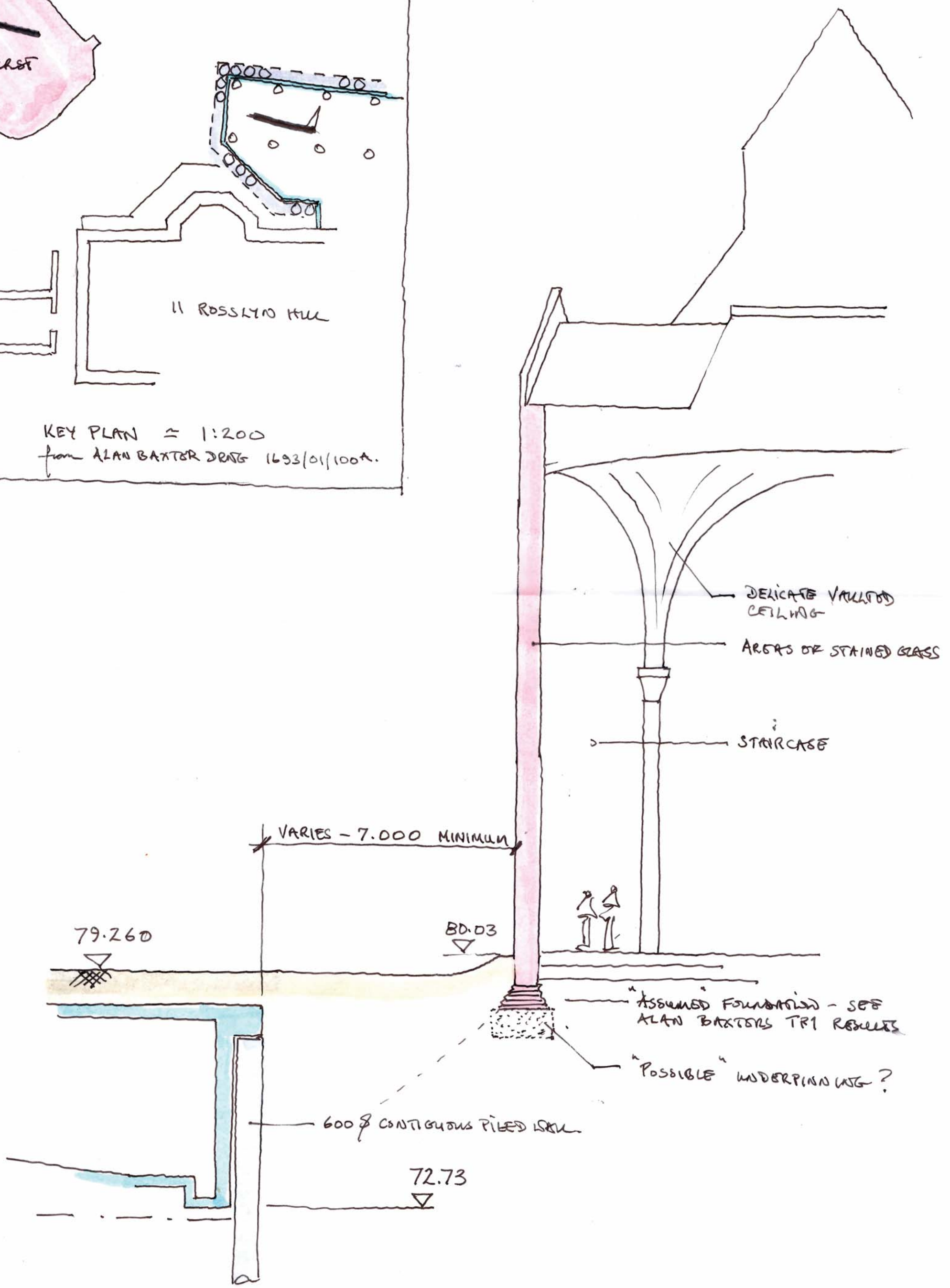


SK. A SKETCH SECTION SHOWING PROPOSED UNDERGROUND CINEMA SHOWN ADJACENT TO LYNDHURST HALL

~1:100 @ A3

CORBETT & TASKER
Structural Engineers





CORBETT & TASKER
Structural Engineers

SK. B SKETCH SECTION SHOWING PROPOSED UNDERGROUND SWIMMING SHOWN ADJACENT TO AIR STUDIOS MAIN HALL

~1:100 @ A3

Appendix B: Geotechnical and Environmental Associates report

04 June 2015

Our ref J15169/MC/1

Geotechnical & Environmental Associates

Widbury Barn
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Ware
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email mail@gea-ltd.co.uk
web www.gea-ltd.co.uk

Richard Boote
Air Studios (Lyndhurst) Limited
Lyndhurst Hall
Hampstead
London
NW3 5NG

Dear Richard

Re: OPINION OF BASEMENT IMPACT ASSESSMENT FOR 11 ROSSLYN HILL, LONDON NW3 5UL

Further to your instruction, we have now completed our initial review of the ground movement and groundwater aspects of the Basement Impact Assessment (BIA) relating to your neighbours' proposed basement construction adjacent to your building and this letter forms our report on the review.

1.0 INTRODUCTION

1.1 Brief

Geotechnical and Environmental Associates Limited (GEA) has been instructed by Air Studios (Lyndhurst) Limited to undertake an initial review of the geotechnical and groundwater aspects of a BIA for proposed basement at a neighbouring site, namely No 11 Rosslyn Hill. Concerns have been raised in respect of the potential impact of the proposed basement on the Grade II* listed Lyndhurst Hall which is in use as an orchestral recording studio. This report provides an initial review of the BIA and raises items of concern where the submission does not appear to satisfy the requirements of Camden Planning Guidance CPG4[1].

1.2 Proposed Development

The development site is adjacent to Lyndhurst Hall and comprises the Grade II listed No 11 Rosslyn Hill in the Fitzjohn and Netherhall conservation area of the London Borough of Camden (LBC) which is understood to comprise a three-storey building with a single-storey basement.

The proposed redevelopment is understood to comprise the retention of the existing listed building and the construction of two new basements. The eastern basement is located south of 11 Rosslyn Hill and comprises a two-storey basement with a swimming pool and plant room that extends to a depth of roughly 8 m whilst to the west of No 11 is a slightly smaller single-storey basement that extends to a depth of roughly 5 m and is only 1.0 m laterally from Lyndhurst Hall.

Contiguous and secant bored piled walls are proposed to support the excavation and reinforced concrete lining walls are proposed within the piled walls.

1 London Borough of Camden (2013) Camden Planning Guidance (CPG) 4: *Basements and lightwells*

1.3 Documentation

A BIA has been prepared by Alan Baxter and Associates (ABA), referenced 1693/10/FN/fn and dated 24th March 2015. The BIA includes a Ground Investigation by Ground Engineering Limited, referenced C13469 and dated March 2015. A number of building sections and elevations by Thomas Croft Architects Limited have also been provided along with calculations by ABA within the appendix.

2.0 REVIEW OF THE BASEMENT IMPACT ASSESSMENT

2.1 Qualifications and Procedure

This review has been undertaken by Martin Cooper, a Chartered Civil Engineer (CEng) and Member of the Institution of Civil Engineers (MICE) with over 25 years of experience in the geotechnical industry and specific experience of the design and construction of bored pile walls close to listed buildings. The review has been undertaken in conjunction with Steve Branch, a Chartered Geologist (CGeol) specialising in engineering geology and geotechnical engineering for over 28 years with specific extensive knowledge and experience of the ground and groundwater conditions in the London Borough of Camden (LBC).

The reviewers have authored a significant number of Basement Impact Assessments in the locality and act as independent auditors for LBC.

2.2 Overview

Detailed design will need to be undertaken together with monitoring before, during and after construction by a reputable contractor and a structural appraisal of Lyndhurst Hall will need to form part of the baseline study. Some of these issues are within the remit of a structural engineer, but GEA has been appointed to provide initial opinion in respect of the ground movement analysis and the groundwater flow aspects of the BIA.

2.3 Ground Movements

Ground movements may be considered to take place during four discrete phases of the basement construction work. In the first instance, the installation of piles will cause settlement around the piles. Secondly, the excavation within the bored pile walls will cause movement of the pile walls into the excavation and settlement of the ground surface retained behind the walls. Thirdly, the excavation of soil down to the basement level will cause heave due to the unloading of soil removed and finally long term swell of the formation will take place as pore water pressures recover to long-term equilibrium.

At this site a very simplistic pile design approach has produced a rudimentary design and been used to predict ground movements on the basis of the approach of CIRIA C580. Unfortunately the analysis undertaken is considered inadequate for this site where excessive ground movements would have a significant impact on Lyndhurst Hall.

The following is considered to be the minimum requirement to demonstrate that Lyndhurst Hall would be protected.

1. Structural assessment of Lyndhurst Hall as required in Section 2.41 of CPG4. The delicate vaulted large span Victorian ceiling suggests that this building would be more sensitive to ground movements than, for example, a three-storey house but no such assessment has been included within the BIA.