

Historic Building Recording  
Roof Repairs at  
Hamilton's Land  
Linlithgow

LL05



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*Illustration 1: Location of Hamilton's Land*

*Illustration 2: Detailed location of 42-44 High Street*

*Illustration 3: Plan of roof timbers*

*Illustration 4: Phase plan*

*Illustration 5: Section*

*Illustration 6: The 5 plans drawn on site and areas stripped of sarking that could be externally viewed*

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## **ABSTRACT**

*The National Trust for Scotland commissioned Alder Archaeology to carry out a Historic Building Recording on the roof at 42-44 High Street, Linlithgow which is part of the 16<sup>th</sup> century group of buildings known as Hamilton's Land. Hamilton's Land is located in the centre of Linlithgow at NGR NT 00398 77131. The work (site code LL05) was undertaken between the 3<sup>rd</sup> of October and the 1<sup>st</sup> of November 2011. The requirement was to record the nature of the original roof as it was exposed during essential repairs. The sarking was found to comprise pit-sawn Scots pine planks of a variety of lengths and widths. Stone slates had been attached to it using large headed hand forged wrought iron clout type nails. These nails were also used to nail the sarking to the rafters. The roof itself was found to be of common rafter form with most of the original rafters surviving, though a few had been reinforced or replaced with new rafters in the 19<sup>th</sup> or 20<sup>th</sup> century. All original timbers were found to be adze trimmed softwood, probably Scots pine, and most were whole though some were halved and a few quartered. Rafter pairs were connected at the apex with pegged mortise and tenon joints.*

*On the N roof of the property (that aligned E-W) most of the rafters were mortise and tenoned into original sole plates and ashlar posts. The sole plates on the N side rested on the external stone wall of the property, but those on the S side rested on brick walls that had been constructed on two steel I-beams. These beams had been inserted when a major internal wall in the floor below was removed in the 19<sup>th</sup> or early 20<sup>th</sup> century. Nine of the eleven rafter pairs on the N roof were connected to original collars by nailed lap joints with no dovetailing. The S roof (aligned N-S with a gable overlooking the street) was of similar design to the N though original collars had been sawn off for a modern attic conversion. However, inspection of the stubs showed that the collars had been attached in the same manner as the N roof. In the S half of this roof the W rafters were mortised and tenoned to ashlar posts and sole plates resting on an external wall to the W. On the E, they simply abutted the party wall of the next property. Here the rafters also rested on two softwood beams that bridged a gap that was caused by the party wall being at an angle. The N half of this roof had a ridge plate which rested on a small beam inserted in between the rafters of the N roof. Rafter pairs in this part of the roof were not joined at the apex but were instead nailed to the ridge plate and each ran down to join valley timbers on either side.*

*On the N facing side of the N roof at either side were two sets of vertical grooves in the original rafters marking the possible location of two 'cat slide' type windows. A pair of cat slides were also found on either side of the S roof. Two adze trimmed bracing beams in the S roof pointed to the former existence of two dormers, one which blocked a cat slide. Later on, both of these dormers had been blocked.*

*Differences in collar widths and assembly marks suggested that the N roof may have stood alone prior to the construction of the S. This pointed to the possibility that Hamilton's Land was at one stage set back from the High Street. It is hoped that future dendrochronology of timbers will be able to provide precise dates for the two roofs and further clarify the precise building sequence.*

## **1 Background**

### **1.1 Introduction**

The National Trust for Scotland commissioned Alder Archaeology to carry out a Historic Building Recording on the roof structure of 42-44 High Street, Linlithgow which is part of the 16<sup>th</sup> century group of buildings known as Hamilton's Land. Hamilton's Land is located in the centre of Linlithgow at NGR NT 00398 77131. The work (site code LL05) was undertaken between the 3<sup>rd</sup> of October and the 1<sup>st</sup> of November 2011. The requirement was to record the nature of the original roof as it was exposed during essential repairs and re-slating.

### **1.2 Aims and Objectives**

The main aim of this investigation was to record in detail any original timberwork exposed during the roof repairs, particularly any woodwork which was rotten and had to be removed. Other important objectives were to establish the date and the form of the original roof and look for any alterations.

### **1.3 Reporting**

Copies of this report will be sent to the National Trust for Scotland, The Royal Commission on the Ancient and Historical Monuments of Scotland and the local Sites and Monuments Record.

### **1.4 Acknowledgements**

We wish to thank Daniel Rhodes and Tim Thurston from NTS as well as Laurie Alexander and buildings archaeologist Geoffrey Stell for their assistance and guidance during this project. The National Trust for Scotland funded this Historic Building Recording.

## **2 Details of Work**

### **2.1 Background (illus 1 and 2)**

Hamilton's land is the name given to two 16<sup>th</sup> century buildings originally built by the Hamiltons of Pardovan and Humbie. The land comprises two traditional gable-fronted buildings, 42-44 High Street to the east and 46-48 to the west, partly separated from one another by a covered forestair providing access to the first floors. Both properties are distinctive, having highly worn rubble blocks/masonry and crow stepped gables.

This report focuses on 42-44 High Street, which is both wider than its twin and fully 3-bayed on all the three floors. A pend also runs down the east side of the property.

## 2.2 Archaeological Method

All timbers prior to the modern attic conversion (excepting modern collars) were numbered in a systematic manner. These were drawn in plan where sufficient lighting and space allowed, and detailed notes written of their condition, sizes and character. Notes were also made of any structural alterations in the roof as well as details of joints. A section through the roof was also drawn where space allowed (its location is marked on the phase plan). A good selection of photographs of timbers and general shots of the roof were taken. To help with planning and later interpretation, several intense photo sequences were also taken to allow 3d point cloud models to be created in the office.

Two issues in particular hampered the building recording. Firstly, the unsettled weather in Linlithgow during the main week of the survey meant that archaeological inspection of the roof took place in fits and starts and the roof often had to be covered over at short notice. Another issue was the inconsistent nature of the roof repairs as only some timbers were rotten and therefore exposed. This meant that many timbers had to be investigated from the inside under artificial lighting.

The circumstances of the investigation meant that it was not possible to create a fully accurate survey of the whole roof, as this would have required full stripping of the sarking all at once and a great deal more time. Instead, a reasonably accurate plan of the roof has been created in CAD by synthesizing:

- The five small plans drawn on site (mainly where timbers were exposed).
- Dictation notes of timber spacing (the restricted space at the apex of the S roof)
- Photos
- 3d models as noted above
- A 2<sup>nd</sup> floor plan of the property drawn up by the Office of Works in 1938.

Areas drawn in the 5 small plans are most accurately portrayed. These planned areas are highlighted in illus 6 along with the areas which were stripped of sarking.

## 3 Description of Roof

*(see illus 3 and Appendix 1 for detailed descriptions of timbers)*

### 3.1 Sarking

The old sarking was found to comprise sawn softwood planks, probably Scots pine. Close inspection of the wood showed the saw marks to be straight but irregular, consistent with pit sawn timber. The maximum length of sarking planks was recorded at 3700mm, but many were shorter. A variety of thicknesses and widths were recorded including 220mm x 20mm, 240mm x 28mm and 220mm x 25mm. Due to the sporadic nature of the roof inspections no phasing of the sarking could be established.



*Photo of sarking*

The stone slates had been removed prior to inspection of the building but it was clear that they had been attached to the sarking using square sectioned nails with large heads. These had been hand forged from wrought iron and are commonly known as clout type nails. Similar nails had also been used to nail the sarking to the rafters. Many of these nails had lost their heads when the stone slates were removed due to the soft nature of the iron. The wide variety of nail lengths recorded (from 62mm-85mm) is to be expected from hand forged nails.

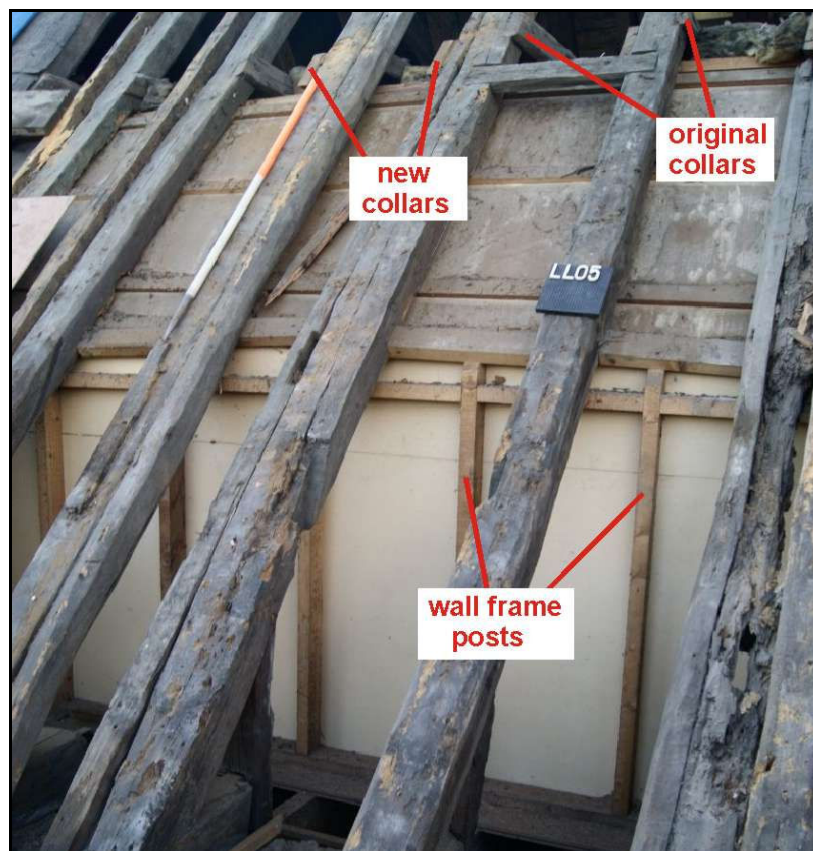


*Some of the nails taken from the sarking*

## 3.2 The North Roof Structure (aligned E-W)

### 3.2.1 Modern Timber

The modern attic conversion had led to the various alterations of the original fabric of the N roof. Inspection below the wall head of the N wall showed no trace of any old floor joists; instead modern floor joists appeared to have been inserted into heavily cemented joist sockets, which may or may not have been original. At the S side of this roof these floor joists were built into modern brick walls constructed on steel I-beams. The joists supported wall frames for the new conversion which were situated so that the floor space in the converted area was about three quarters of the overall roof span. The tops of the wall frame posts were nailed to short planks which bridged the spaces between the original rafters. From here the sloping ceiling of the conversion (made from fibreboard and thin planks) was nailed to the underside of the original rafters.



*Photo showing modern attic conversion*

At the top of the conversion new collars had been nailed to the E faces of the rafters sitting alongside but slightly below the level of the original collars. As the spacing of these collars conflicted with the original collars at the E end of the roof, the builders had sawn off the two most easterly original collars belonging to rafter pairs 10 and 11.

### 3.2.2 Old Timber

In general the old fabric of the N roof was found to survive in a good state of preservation, with most of the woodwork and timber used in subsequent repairs made from hewn, adze-trimmed softwood, probably Scots pine.



*Photo of rafters, N pitch of the N roof*

Essentially the roof was of common collared rafter form with many of the original collars and rafter pairs surviving. Some of the rafter pairs were still mortised and tenoned to original sole plates and ashlar posts (see appendix for details).





*Photo showing ashlar posts and sole plates at the N wall*

At the roof apex each pair of rafters was joined by mortise / tenons and pegged, mainly from the W. There appeared to be no pattern as to which side of the rafter pair was mortised or tenoned. Only two original collars were missing (sawn off for the later attic conversion, noted above), the rest were connected to the W side of the rafters by simple diagonal lap joints, each showing no dove tailing and held in place by a large single nail/spike.



Photo showing lap joint where collar removed (rafter group 10) and iron spike/nail

In contrast to the main rafters which were relatively straight, timber used for collars was quite curved and irregular.



*Photo showing collars of the N roof*

The sole plates and ashlar posts on the N side of the roof rested on and against the external N wall of the property but those to the S side rested on and next to brick walls that had been constructed on the two steel I-beams.

### 3.2.3 Repairs

Fairly extensive repairs were found to have taken place to the roof over the years. Hewn and adze-trimmed timbers 1D, 1E, 3E, 4E, 5D, 6D, 7A, 8D and 9D/E had all been nailed to original rafters to strengthen the N facing roof pitch.



*Photo showing some of the repairs to the N roof*

On the opposite side, more modern timbers 2D, 3D, 4D and 11C had been nailed and bolted to the E sides of the original rafters which had rotted at their lower ends. The latter repairs also corresponded with major replacement of sarking on this side of the roof. Roughly 87-90cm above the old collars, new circular-sawn pine collars had been nailed on to most of the original rafter pairs.

### 3.2.4 Features of interest

Various features were noted on the original rafters, including two opposing pairs of vertical grooves (3A-2A, 9A-8A), a small bridle beam (30) and another pair of opposing shallow recesses (rafters 9A, 8A).



*Photo of bridle beam 30*

On the replacement rafters a mortise was found on timber 9D and a rebate in 3E. A complete sequence of assembly marks was present on the western facing sides of the 9 central rafters and collars (see Appendix 1 for details). These were found in ascending order from E starting at 'I' and ending with 'IIIV'.



*Photos of assembly marks in the N roof*

Unlike the S roof (see below), there was no obvious evidence that laths had been attached to the underside of the rafters. This suggests that the inside of the habitable area of the attic may have been left with rafters, sarking and ashlar posts visible.

### 3.3 The South Roof Structure

#### 3.3.1 Modern Timber

Unlike the N roof, the modern attic conversion in the S had led to all original collars being sawn off (see plan for locations of stubs). The floor was essentially a frame made of circular-sawn timbers, which may be resting on original floor joists, though loose debris and access problems made this hard to ascertain. As with the N roof, the floor supported two frames for the walls of the conversion and again in total the floor area of the conversion used three quarters of the area of the overall roof span. The tops of the wall frame posts were either nailed to short planks bridging the spaces between the original rafters or they were nailed to the old rafters themselves. As with the N roof, the sloping ceiling of the conversion (made from fibreboard and thin planks) was nailed to the underside of the original rafters. At the top of the conversion, new collars which were higher up than those of the N roof had been nailed to the rafters.

#### 3.3.2 Old Timber

The timberwork of the S roof can be split into two main areas, that to the S of the I-beams and rafter pair 17, and that to the N which joins to the N roof.

The S area comprises pairs of rafters joined together and constructed of the same type of timber as the N roof (softwood, hewn and adze-trimmed, tenoned together). A little below the apex, modern circular-sawn pine collars have been nailed to the rafters (12-18), largely on both sides. To the W, original rafters that have not been cut short rest on sole plates with ashlar posts against an external wall.



*Photo showing ashlar posts on the W side of the S roof*

To the E, original rafters rest on two beams (26 and 27) and against the party wall between Hamilton's Land and the property to the E. The two beams bridge a gap caused by the party wall bending quite sharply to the E. Both beams are embedded in the gable wall to the S and the party wall to the N. The narrow gap between the party wall and the N end of beams 26

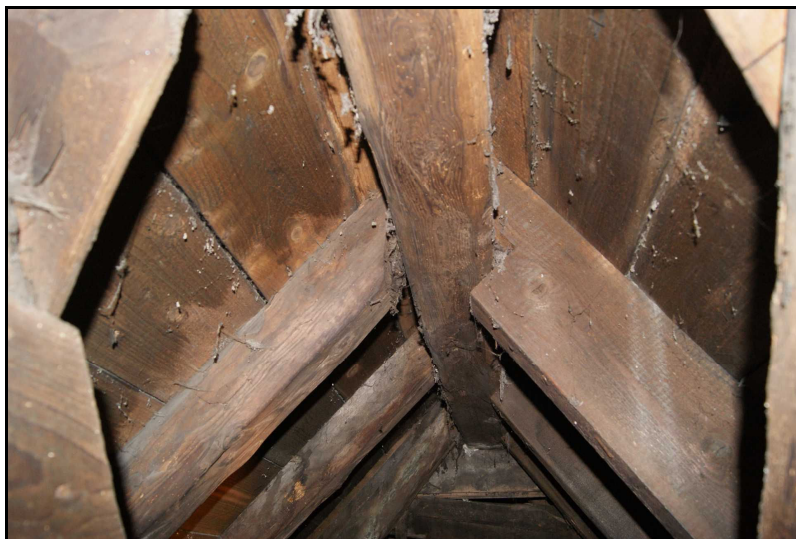
and 27 has been filled with general waste, stone debris and mortar creating a semi-firm false floor. While investigating this layer several leather scraps of shoe were found amongst the waste.



*Photo showing beam 26 with 27 below*

Various brick, concrete and stone plinths have been built above these beams and the waste layer to give a foundation to later rafter repairs.

The N end of the S roof comprises an original ridge plate (25) which is supported to the N by a beam (24) straddling the gap between rafters 6B and 7B, and to the S by a small collar (34) nailed to rafter pair 17.



*Photo showing ridge plate 25*



*Photo showing collar 34*

Running down the valleys in the roof on either side of this plate are two valley timbers: 23A, a replacement and 23B, original. Pairs of rafters run down to these valley timbers from the ridge plate.



*Photo valley timber 23B and rafter 21B*

In total there are 4 pairs, each nailed and set into notches in the ridge plate or themselves notched to fit. Several of these timbers have been replaced on the W side. At rafter pair 19, a sawn pine collar (33) has been nailed from the S side high up and cut to fit round the ridge plate. Rafter pair 17 is more robust than its neighbours to the S as essentially it has to take a large proportion of the weight of the ridge plate and ridge plate rafters.

### *3.3.3 Repairs*

Most of the S roof had been repaired with modern circular sawn timber; essentially replacement rafters nailed to the sides of original ones. In fact only 6 out of 20 rafters still support their own weight (rafters 12A, 17A, 18B, 19B, 20B and 21B). Some of the original rafters have been cut in half, their lower ends removed when fitting the replacements.



*Photo showing replacement rafters on the W side of the S roof*

#### *3.3.4 Features of interest*

Two major features of interest in this roof are the large bridle beams (28 and 36) fixed to both E and W pitches. Rafters 14A and 16B have both been cut short to accommodate the bridles and are nailed to them. Both bridles are tenoned into mortised shoulders which are nailed to rafters 15A, 13A, 15B and 17B with large nails/spikes. The W bridle has been later superseded by attaching to it a piece of re-used timber (35) which in effect reinstated the foot of rafter 14A which had been cut short.



*Photo of bridle 36 on the W side of the S roof*

Mirroring this on the E pitch was a small thin circular sawn plank (40) that had been nailed below shortened rafter 16B to bridle 28, its foot resting on beam 26.



*Photo of bridle 28 on the E side of the S roof*

Other features of interest are two opposing rebates below bridle 36, a vertical slot above on rafter 13A (blocked by a mortised shoulder for 36), a small bridle between 13A and 14A and two vertical slots in 14B and 15B. Further features of interest were two horizontal slots in 13B and 14B which appear to serve no purpose so may be a sign that the rafters are reused.

Assembly marks were only noted on rafters 14B(III), 15A(V), 16B(IV) and 17A(III) which is not in ascending order. There were probably others present, but the modern collars may have obscured them. Sawn off collar stubs were noted on rafters 18B, 19A, and 19B. Inspection revealed that the collars were attached in the same way as those in the N roof (nailed from the S), the only major difference being the collar dimensions which were much less wide than those to the N.



*Photo showing a sawn off collar stub in the S roof*

On both the E and W sides of the S attic there is evidence that laths had been nailed to the rafters from the inside. This could be seen where occasional laths were found still in place and also where rows of nails showed where they had once been.



The later painting of the rafters with a copper solution and possibly a limewash to prevent rot had also preserved the old lath outlines. On the E side of the roof, laths had been nailed across the rafters right down to the floor level (the level of beam 26) whilst on the W side the laths were nailed down the rafters then down the ashlar posts. We can probably assume that these laths were plastered from the inside creating a smooth sloping ceiling up to the former collars of this roof. These original lath divisions in the S roof ended at rafter pair 17, the reason being that the space to the N is taken up by the feet of the N roof rafters. Along the N facing side of this rafter pair can be seen nails for horizontal laths and the ends of vertical studs which supported them.



*Photo of studs nailed to rafter 17A*

The N and S attics were historically connected by a passage (much like that in the modern conversion). Evidence for this is a vertical stud rising from 4B and connecting to 19A.



*Photo of stud nailed to rafter 4B*

The stud supported laths forming the W side of the original passage. To provide an entrance through to the N attic, rafters 5B and 6B have been cut short. Today a modern bridle beam (39) placed between rafters 4B and 7B takes the load from these shortened rafters. However, it is possible that the original passage was narrower and was later widened. This would explain bridle 39 being of circular sawn timber. Also, the shortening of 6B does not make structural sense as it is one of rafters holding up one end of the ridge beam and therefore much of the S roof. A close look at the Office of Public Works 1938 plan (see bibliography), shows that the stairs from the Second Floor would have emerged in or around the passage. This would have made access very cramped, perhaps creating pressure to widen the passage by structurally dubious means. The N and S attics would probably have been separate flats, accessed from this central point.

## 4 Interpretation and Discussion

### 4.1 Phasing

#### 4.1.1 Phase 1

The earliest surviving elements of the roofs are the main adze trimmed timbers. Those of the N roof were clearly erected prior to those of the S, as the S roof's ridge plate is supported by the rafters of the N. However, though we know the N roof was built first, it has been difficult to establish if the N roof stood on its own for a period of time, or whether the S roof was built against it almost immediately. This issue is hard to resolve because on the one hand similarities in the sizes of rafters and the type of joints between rafters pairs and rafters/collars point to both roofs being contemporary, whilst on the other the N roof has a complete assembly mark sequence and the S roof does not, suggesting that the roofs were constructed at different times. The confusing assembly mark sequence on the S roof may even tentatively suggest that the timbers here were re-used from another building, unlike those of the N. This possibility is supported by the unexplained grooves in rafters 13B and 14B suggesting the rafters are reused. The sawn off collar stubs of the S roof support the latter interpretation that the S roof is a later addition, as the collars seem to be from a different batch from those of the N, being made from narrow not whole timber. The implications of these two different interpretations are discussed below in the form and dating section, but for the purpose of this report both N and S roofs are treated as belonging to Phase 1.



*Photos showing the differences between widths of collars between the N and S roofs. The N roof collars (whole) are shown on the left whilst the narrow S roof collar stubs are shown on the right*

Assembly marks, the direction of collar nails and the side to which mortise and tenon pegs were hammered all suggest the N roof was erected from E to W. On the S roof the collar nails suggest construction from N to S, presumably starting with large rafter pair 17A and 17B then beam 24, collar 34 and ridge plate 25, followed by placement of rafter pairs 21-18 or possibly 16-12. The large beams 26 and 27 must have been inserted at the beginning of the construction of the S roof as their presence is essential for the support of the E rafters. Essentially they act as bressumer beams to bridge the gap caused by the sharp E bend in the party wall.

It is worth noting here that the carpenters responsible for the assembly marks made no use of subtractive principles for roman numerals, meaning that 'IIII' was used for 'IV' and that for example 'IIIIIV' meant exactly the same as 'VIII'.

#### 4.1.2 Phase 2

Phase two is represented by historic alterations to original roof timbers as well as replacements on the roof which were made with older hewn or adze/axe trimmed timber. This can possibly be further sub-divided by stratigraphy and typology into two further phases:

##### *Phase 2a*

There are 4 sets of features which are interpreted as 'cat slides' – very small, simple low-angled dormer windows. These are represented by opposing vertical slots for uprights corresponding with small bridles or recesses for bridles further up the roof. Each cat slide is only as wide as a single rafter spacing. If the attics were originally intended for habitation - which is likely given the space they enclosed, it is likely that the cat slides were created soon after the roof was constructed. Their form, positioning and spacing suggests that they were probably all inserted at the same time in order to create roughly equal lighting across the two attics.



*Reconstruction of cat slide (rafters 2A & 3A)*

### *Phase 2b*

A number of hewn timbers were nailed to the original rafters on the N facing pitch of the N roof. Two of these blocked slots and rebates for a cat slide showing that the timbers post dated it.

Most of the timbers were added to strengthen existing rafters rather than being complete replacements. One exception to this was replacement rafter 7A which had no corresponding ashlar post or sole plate. We can probably infer that many of these repairs were carried out using re-used wood from other buildings and in fact rafters 9D and 3E (one containing a mortise and the other a slot) seem to confirm this. Given these early repairs to the N pitch, we can assume that it leaked quite badly during the early part of the roof's life. However, after these repairs the roof pitch seems to have been kept relatively weather tight as no later circular sawn rafters were inserted. Interestingly the S roof appears to have been in relatively good repair in this phase as no replacement hewn timber rafters were added.

Two features which seem to be contemporary with this phase and were probably (given their similar design) both inserted at the same time are the large bridle beams on the E and W sides of the S roof. These are interpreted as full dormers, each the width of 2 rafter spaces. The bridles would have supported the roof beams of the dormer with rebates below possibly marking where the posts supporting dormer cheeks connected to the old rafters (only noted near bridle 36).

Bridle beams and mortised shoulders must have been assembled off site and nailed to the rafters as a single unit. Stratigraphically bridle 36 blocked one of the vertical slots for one of the cat slides, demonstrating that the dormers are later.

Possibly dating to this phase is the lathwork and passage between the two attics. There is no stratigraphic evidence to suggest this as such, but given the insertion of new dormers in the S attic, perhaps the lathwork was also part of the improvements. If this were the case then there must have been separate means of access to each of the attics from the floor below in earlier phases.

#### *4.1.3 Phase 3*

This phase is represented by the relatively recent repairs to the roof excepting the modern attic conversion. Most of these repairs were focused around the S roof and the SW quarter of the N roof. Timbers from this phase are largely replacement rafters made from circular-sawn pine, much deeper than they are wide. These have been simply nailed to the rafters, though the two against the external walls (11C, 12C) had to be fixed with bolts due to lack of space to swing a hammer. Repairs seem to have been necessary because of water damage to the original rafters, and in fact the damage on many rafters must have been so severe that they were either removed or cut short (16A, 18A, 19A, 21(W side), 20(W side)). Strengthening on the S half of the S roof was also undertaken because the roof was spreading outwards, causing the sole plates to move sideways at the wall head; this had also led to the failure of several ashlar posts.



*Photo showing that the ashlar post connected to rafter 17A as been pushed sideways due to the S roof spreading outwards*

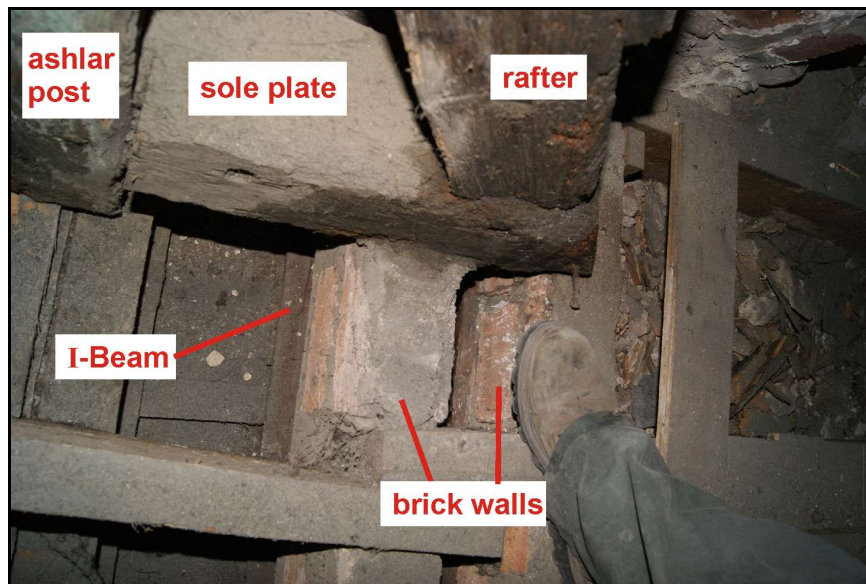
This sideways movement was probably also the reason why the W side of the wall was built up over the sole plates and ends of the rafters. The double sets of collars along the S half of the S roof were probably added at the same time as the replacement rafters to remedy this problem.



*The double sets of modern collars nailed to the rafters in the S roof*

Collar 33 which is earlier than the double collars, may be a survivor from of a previous set of collars which may have been removed when the double set were added.

Dating to this late phase are the two steel I-beams inserted half way along the property. It is unclear what prompted their insertion but presumably either an internal wall was removed from the floor below or the I-beams replaced earlier wooden beams that had started to fail. Small brick walls were built above the I-beams to the level required to support the rafter feet of the N roof.



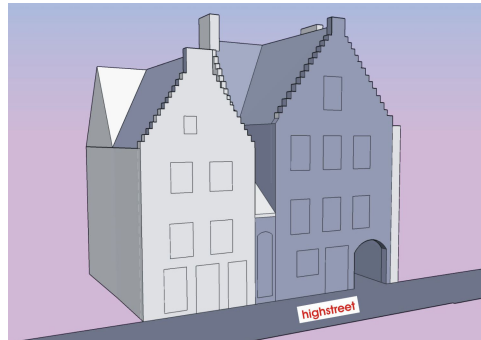
*Photo showing brick walls and one of the steel I-beams*

In both attics some of the timbers had been painted with weak coloured solutions/suspensions that had had seeped into the grains of the wood. On close inspection these appeared to be wood treatment solutions/suspensions rather than paint (which would have lain on the surface). The treatments have been ascribed to Phase 3 because several modern timbers, most notably 12B, 13B and 40 showed traces of colouration from this process. The solutions/suspensions were largely painted on from inside of the habitable parts of the attics, meaning that the outer faces and sometimes the sides of rafters, beams and laths were left untreated. Two different treatments could be identified. At the side of N roof at the wall head it seems that a white one, most likely a lime wash, was applied initially later followed by a turquoise one containing copper salts. Determining a date for the former is difficult as lime washes have been used as a basic wood preserver for many years, the alkalinity of the lime essentially deterring wood boring insects. More easy to date is the copper solution, as such treatments became commonplace only really after the 1930s. Unknown to the author at the time of the investigation was that many solutions also contained chromium and arsenic.

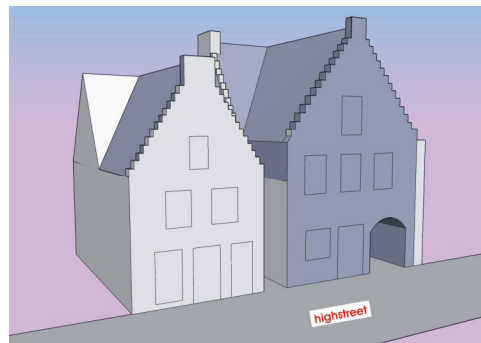
Unfortunately the difficulties of access and the staining of wood through fungal decay meant that it is difficult to build up a precise picture of how the treatments had been applied right across the roofs. One thing that can be said with some certainty is that the faces of timbers inside the original converted attic areas have been much better treated than those outside.

## 4.2 Form and dating

As discussed above under phasing, it has been difficult to ascertain if the N and S roofs are contemporary or whether the N roof was built first and the S added later. If the roofs were constructed at the same time, then perhaps in an earlier form Hamilton's Land was only two stories high, the current roofs being later additions when the structure as a whole was raised to incorporate a 3<sup>rd</sup> floor.

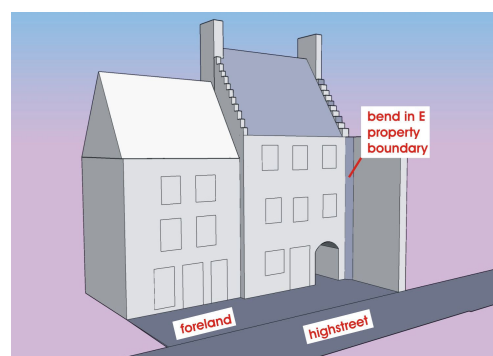


*Basic Model of Hamilton's Land as it stands today*



*Hamilton's Land as it may have looked in a previous two storey form*

However, as outlined above in the phasing section, there is slightly more evidence for N roof having been built first, which would suggest that the property was at some stage set back from the High Street. This would mean that the original frontage was later enclosed within the building when the S roof/S projecting gable was added. This may well explain why steel I-beams were incorporated half way along the property later on: A necessary response to the removal of such a major wall.



*Hamilton's Land as it may have looked if the N roof was built before the S (prior to the construction of the forward projecting gable)*

Such an early frontage would also line up nicely with the eastward bend in the E party wall. This bend (which necessitated the incorporation of the two bressumer beams (27 & 27) when building the S roof) can be followed all the way down to the ground floor where it can be seen in the covered pend. It remains possible that the bend not only marked the front of Hamilton's Land but also the neighbouring rigs in this stage, before expansion into the high street.

With a set back frontage, the space between Hamilton's Land and the High street would in effect have been a 'foreland'. These were the spaces in front of a rigg in which commercial activities and the setting up of temporary booths, stalls or even the construction of more permanent wooden shop fronts took place.

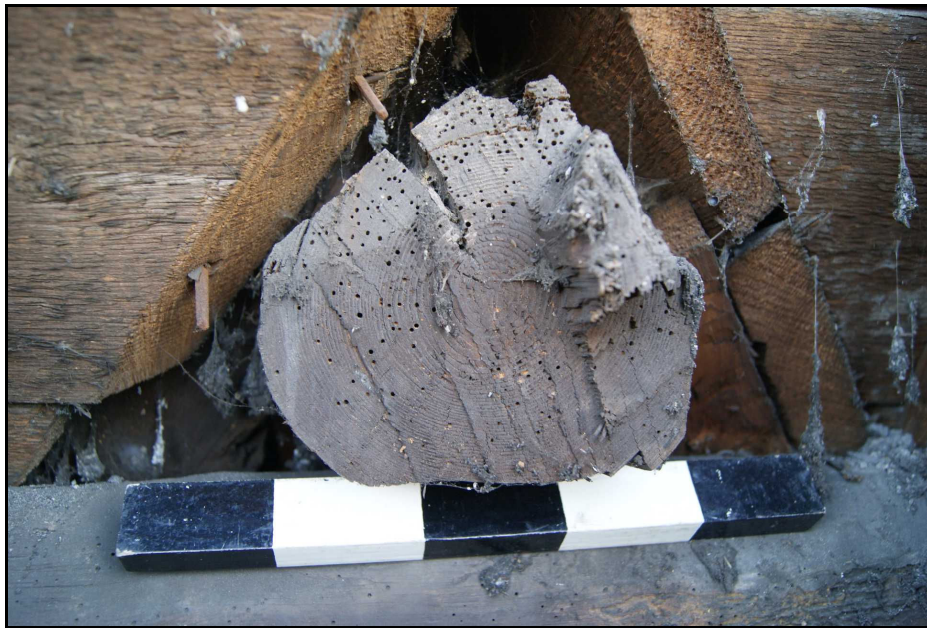
The building of a new gable (S roof) would have effectively filled up this space, narrowing the High Street. Encroachments into major thoroughfares like this are documented in other Scottish Burghs. In Perth for example, excavations have showed how its High Street was c 4m wider in the Medieval period than it is today. The precise dating of such encroachments and the processes behind the expansions still remain relatively poorly understood, however, one activity which had some impact in this regard was the granting of rights in Burghs to build forestairs to properties. These forestairs, which were built out into High Streets tempted people to expand buildings up to the front line of the stair. Another process which resulted in encroachments into High Streets was the construction of buildings with wooden jetties or galleries. These buildings could be easily converted to form arcaded frontages by enclosing the street space below, a process that was encouraged in various Scottish Burghs by local Deans of Guild between the 16<sup>th</sup> and late 17<sup>th</sup> centuries. The most famous example is in Elgin High Street, where numerous stone arcades dating to the late 17<sup>th</sup> century can be seen. In Edinburgh, Glandstone's Land is testament to a similar earlier fashion. Pont's map shows that Linlithgow had arcaded street frontages even earlier, in the late 16<sup>th</sup> century. Though Hamilton's Land is not itself arcaded, one wonders if the creation of a new S gable possibly coincided with a general expansion forward into the High Street by some of these arcaded buildings.

As interesting as all these conjectures may be, the truth is that unfortunately little can be said about the dating of Hamilton's Land from the form of the actual roof structure as recorded during the survey. This is largely because common collared rafter roofs of this form with ashlar posts and sole plates were constructed throughout the late-Medieval/Post-Medieval period (15<sup>th</sup>-17<sup>th</sup> centuries) in Scotland, and unfortunately they contain no diagnostic features which can provide a more specific date. Dates put forward for Hamilton's Land over the years vary from the early 16<sup>th</sup> century (The Linlithgow Burgh Survey) to the early 17<sup>th</sup> century (old RCAHMS entries), however without further investigations to other parts of the building, all we can say for certain is that the roofs under study are the last additions to a building that was probably built over a number of stages, probably starting in the 16<sup>th</sup> century. As far as materials are concerned, the use of softwood for the roofs is to be expected in this period when the use of such timber in Burghs for roofs of stone buildings and frames of timber buildings became increasingly common as hardwood supplies in Scotland dwindled.

It remains a possibility that a date for the building could be obtained via dendrochronology. The timbers particularly suited to this type of investigation, having surviving outer sapwood layers and showing few signs of rot, are the rafters of the S pitch of the N roof and the ridge plate (see illus 3 for specific timbers). Such a study would be particularly interesting to not only get a construction date, but also to find out if the S roof was constructed later than the N.



This would be of particular interest if the results could pinpoint a date for the forward expansion of Hamilton's Land into the High Street.



*Photo of N end of ridge plate, the E side (left) would be suitable for taking a core for dendrochronology*

### 4.3 Function

We can probably assume that the two attics were inhabited soon after their construction, as this would have been an obvious way of utilising spaces in which there was ample room for standing up in. Lighting in early phases would have been provided by the window in the S facing gable overlooking the street and the four cat slides which were probably added soon after the roof was constructed. The fireplaces which lie within the new attic conversion (and therefore could not be analysed) would have provided heating. Taken as a whole it seems likely that the attics together were split into 3 units or rooms, each with a fireplace, one in the S gable wall and two in each of the party walls, which effectively would mean the N roof was divided in half. Besides the fireplaces, there is no direct evidence of such a 3 way division, but such arrangements are common in buildings of this form.

It is difficult to say who would have taken up tenancy in such attic spaces, but the rather inadequate lighting provided by the catslides may point to people at the lower end of the society. It remains possible however, that overcrowding in the burgh may have forced even people of average standing to take up residence in such dark spaces.

The move from cat slide to dormer window lighting in the S roof in Phase 2a is a sign that major improvements were being made to this end of the attic with the intention of providing a much more pleasant space to live in. As well as improved lighting, the two dormers now created a room with views in either direction along the high street. Probably associated with this phase of work was the addition of lathwork which would have given the room a much more professional finish. Lining the attic with lath and plaster would also have made it much warmer in winter, less dusty, less draughty, and more fireproof. Given these improvements, it seems likely that a person or group of people with higher social standing used this part of the attic in this phase. The increased lighting may also be a sign that a trade that required good lighting took place in this space. Linlithgow developed as an important centre for

leather production after Cromwell's occupation in the mid 17<sup>th</sup> century, and became increasingly associated with shoe production. One wonders if a well lit space such as the S attic was perhaps associated with such a trade. Some evidence which may tentatively suggest that was the case are the fragments of shoes found in the S attic stuffed down between the party wall and bressumer beam 26. The fact that these are fragments rather than whole shoes, may point to them being waste from shoe repair work, rather than them simply being discarded footwear belonging to the tenants who resided in the building. Textile manufacture and tailoring also require good lighting, so this is another possible craft which may have taken place in this space.



*Fragments of shoes found stuffed down the gap between beam 26 and the party wall*

In the N roof in this phase, one of the cat slides was blocked off during roof repairs, a sign that the function of one of the rooms here had been altered. Perhaps the room was converted to a storage room for the top floor accommodation or workshop at this point.

In a subsequent phase, prior to the major rafter repairs on the N roof, it seems that the dormers were intentionally blocked. Evidence for this is blocking timber 35 which is re-used and therefore older than later rafter repairs which were made with new timber. This blocking would have been necessary if the dormers were badly rotten and had become leaky or draughty. Perhaps we can infer from this change, that the attics had become uninhabited by this stage, though it seems equally possible that dormers were seen as unnecessary for the type of tenant now residing in the attic.

## 5 Recommendations

The roof structure over 42-44 High Street seems to represent the only surviving original timberwork in Hamilton's Land, as the other roofs are known to have been fully replaced. This has important implications for policies on preservation, as Hamilton's Land is arguably the earliest building along Linlithgow's High Street (the only other vaguely contemporary building being West Port House, c 1600). This uniqueness means the roof has major local significance, and should be reason enough to argue for the preservation of any original wood in situ. The roof's potential for dendrochronology, which may well provide a precise date for construction of the N roof and the forward projecting gable, adds further importance to any strategies promoting preservation of such timber.

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PLAN:

*Old Houses 42-48 High Street Linlithgow* HM Office of Works 122 George Street Edinburgh 1938 (available on CANMORE (NT07NW 77.01)

MAPS:

*OS Map 1<sup>st</sup> Edition*

*Timothy Pont's Map, Linlithgow and part of West Lothian*

## Appendix 1 Detailed Descriptions of Timbers

*sp = sole plate*

*ap = ashlar post*

*ms(S) = mortised shoulder (south)*

*ms(N) = mortised shoulder (north)*

*Dimensions refer to widths first and thickness second.*

No:	Description	Phase
1A	Original softwood rafter, hewn, adze trimmed, whole. Lower half mostly rotted away. Tenon fits into 1B. Section squared / rectangular – measures 115mm x 100mm (near top). Mortise for former ashlar post survives.	Phase 1
1B	Original softwood rafter, hewn, adze trimmed, whole. Section squared / rectangular – measures 112mm x 125mm (near top).	Phase 1
1C	Original softwood collar, hewn, adze trimmed, whole. Section squared / rectangular – measures 130mm x 110mm. Lap jointed (no dovetailing) to 1A and 1 B (W face) and fixed with single nails.	Phase 1
1D	Replacement softwood rafter, hewn, adze trimmed, whole. Section squared / rectangular – measures 111mm x 112mm (near top). Connected to the W face of 1A, possibly nailed.	Phase 2
1E	Replacement softwood rafter, hewn, adze trimmed, halved. Section semicircular – measures 60mm wide. Connected to the E face of 1A, nailed, ends just below collar.	Phase 2
2A	Original softwood rafter, hewn, adze trimmed, whole. Section squared / rectangular – measures 115mm x 112mm (near top). Assembly mark IIIIV cut into W side (upside down). There is a vertical slot in E face at wall head end. Higher in same face a shallow rebate has been cut into which bridle 30 has been inserted.	Phase 1
2Asp	Original softwood sole plate, hewn, adze trimmed, whole. Section rectangular – measures 130mm x 140mm. Tenon fits into ashlar post. A mortise, pegged from the W takes tenon from rafter 2A. Timber probably re-used as two peg holes noted in E face.	Phase 1
2Aap	Original softwood ashlar post, hewn, adze trimmed, whole. Section square – measures 110mm x 110mm. Extends 4cm below wall head. Tenon fits into rafter 1A, pegged from W. A mortise, pegged from W takes tenon from sole plate.	Phase 1

2B	Original softwood rafter, hewn and adze trimmed, whole. Tenon fits into 2A. Section squared / rectangular – measures 112mm x 110mm (near top). Assembly mark IIIIV cut into W face. Rotted at base.	Phase 1
2Bsp	Exists but is rotted and crushed.	Phase 1
2C	Original softwood collar, hewn and adze trimmed, whole. Section squared / rectangular – measures 110mm x 110mm. Lap jointed (no dovetailing) to 2B and 2A (W face) and fixed with single nails.	Phase 1
2D	Replacement softwood rafter, circular sawn. Section rectangular – measures 168mm x 63mm. Nailed to 2B from E.	Phase 3
3A	Original softwood rafter, hewn, adze trimmed, possibly quartered as only 1 corner rounded. Section squared / rectangular – measures 98mm x 125mm (near top). Vertical groove in W face. Higher in same face a shallow rebate has been cut into which bridle 30 has been inserted. Assembly mark IIIIV cut upside down into W face.	Phase 1
3A <sub>sp</sub>	Original softwood sole plate, hewn, adze trimmed, probably whole. Section rectangular – measures 130 x 140. Tenon fits into ashlar post though this has slipped out a little. A mortise, pegged from the W takes tenon from rafter 3A. Timber probably re-used as two peg holes noted in E face.	Phase 1
3A <sub>ap</sub>	Original softwood ashlar post, hewn, adze trimmed, whole. Section square – measures 90mm x 90mm. Extends 4cm below wall head. Tenon fits into rafter 3A, pegged from W. A mortise, pegged from W takes tenon from sole plate.	Phase 1
3B	Original softwood rafter, hewn, adze trimmed, whole. Section squared / rectangular – measures 114mm x 105mm (near top). Tenon fits into 3A. Assembly mark IIIIV cut into W face.	Phase 1
3B <sub>sp</sub>	Exists, not measured.	Phase 1
3C	Original softwood collar, hewn, adze trimmed, whole. Section square / – measures 110mm x 112mm. Lap jointed (no dovetailing) to 3A and 3B (W face) and fixed with single nails. Assembly mark IIIIV cut upside down into W face.	Phase 1
3D	Replacement softwood rafter, circular sawn. Section rectangular – measures 168mm x 63mm. Nailed to 3B from E.	Phase 3
3E	Replacement softwood rafter, hewn, adze trimmed, halved. Section rectangular – measures 80mm x 110mm (near bottom). Nailed to 3B from E. The timber is probably reused as there is a vertical groove or slot in the W face.	Phase 2
4A	Original softwood rafter, hewn, adze trimmed, whole. Section square / rectangular – measures 130mm x 120mm (near top). Tenon fits into 4B.  4E obscures assembly mark.	Phase 1
4A <sub>sp</sub>	Original softwood sole plate, hewn, adze trimmed, whole. Section rectangular – measures 140mm x 160mm. Tenon fitted into ashlar post now lost. A mortise, pegged from the W takes tenon from rafter 4A. Timber probably re-used as two peg holes noted in E face.	Phase 1

4B	Original softwood rafter, hewn, adze trimmed, whole. Section square / rectangular – measures 120mm x 130mm (near top). 4D obscures assembly mark.	Phase 1
4Bsp	Exists, not measured.	
4C	Original softwood collar, hewn, adze trimmed, whole. Section square / – measures 115mm x 100mm. Lap jointed (no dovetailing) to 4A and 4 B (W face) and fixed with single nails. Assembly mark IIV cut upside down into W face.	Phase 1
4D	Replacement softwood rafter, circular sawn. Section rectangular – measures 124mm x 64mm. Nailed to 4B from W.	Phase 3
4E	Replacement softwood rafter, hewn, adze trimmed, halved. Section rectangular – measures 105mm x 55mm (near top). Nailed to the W face of 4A with wide headed nails.	Phase 2
5A	Original softwood rafter, hewn, adze trimmed, whole. Section squared / rectangular – measures 115mm x 124mm (near top). Assembly mark IV cut upside down into W face. Tenon fits into 5B.	Phase 1
5A <sub>sp</sub>	Original softwood sole plate, hewn, adze trimmed, whole. Section rectangular – measures 100mm x 130mm. Tenon fits into ashlar post. A mortise, pegged from the W takes tenon from rafter 4A. Timber probably re-used as two peg holes noted in E face.	Phase 1
5A <sub>ap</sub>	Original softwood ashlar post, hewn, adze trimmed, whole. Section square – measures 100mm x 100mm. Extends 11cm below wall head. Tenon fits into rafter 1A, pegged from W. A mortise, pegged from W takes tenon from sole plate.	Phase 1
5B	Original softwood rafter, hewn, adze trimmed, whole. Section square / rectangular – measures 125mm x 135mm (near top). Assembly mark cut on W face. This rafter along with 6B was cut in half during an attic conversion and now rests on beam 38.	Phase 1
5C	Original softwood collar, hewn, adze trimmed, whole. Section rectangular – measures 105mm x 95mm. Lap jointed (no dovetailing) to 5A and 5B (W face) and fixed with single nails. Assembly mark IV cut upside down into W face.	Phase 1
5D	Replacement softwood rafter, hewn, adze trimmed, halved. Section rectangular – measures 110mm x 63mm (near top). Nailed to the E face of 5A.	Phase 2
6A	Original softwood rafter, hewn, adze trimmed, whole. Section square – measures 112mm x 112mm (near top). Assembly mark V cut into W face. Tenon fits into 6B.	Phase 1
6A <sub>sp</sub>	Original softwood sole plate, hewn, adze trimmed, whole. Section rectangular – measures 120mm x 140mm. Tenon fits into ashlar post. A mortise, pegged from the W takes tenon from rafter 6A. Timber probably re-used as two peg holes noted in E face.	Phase 1
6A <sub>ap</sub>	Original softwood ashlar post, hewn, adze trimmed, whole. Section square – measures 110mm x 100mm. Extends 12cm below wall head. Tenon fits into rafter 6A, pegged from W. A mortise, pegged from W takes tenon from sole	Phase 1

	plate.	
6B	Original softwood rafter, hewn, adze trimmed, whole. Section square / rectangular – measures 135mm x 112mm (near top). Assembly mark V cut into W face. This rafter along with 5B was cut in half during an attic conversion and now rests on beam 38.	Phase 1
6C	Original softwood collar, hewn, adze trimmed, whole. Section square / – measures 120mm x 95mm. Lap jointed (no dovetailing) to 6A and 6B (W face) and fixed with single nails. Assembly mark V cut upside down into W face.	Phase 1
6D	Replacement softwood rafter, hewn, adze trimmed, halved. Section rectangular – measures 100mm x 65mm (near top). Nailed to the E face of 6A.	Phase 2
7A	Replacement softwood rafter, hewn, adze trimmed, whole. Section square / rectangular – measures 135mm x 105mm (near top). Tenon fits into 7B with wedge.	Phase 2
7B	Original softwood rafter, hewn, adze trimmed, whole. Section square / rectangular – measures 130mm x 130mm (near top). Assembly mark III cut on W face. This rafter along with 6B was cut in half during the modern attic conversion and now rests on beam 38.	Phase 1
7Bsp	Exists in good condition, not measured.	Phase 1
7Bap	Exists in good condition, not measured.	Phase 1
7C	Original softwood collar, hewn, adze trimmed, whole. Section square – measures 100mm x 100mm. Lap jointed (no dovetailing) to 7A and 7B (W face) and fixed with single nails. Assembly mark III cut into W face.	Phase 1
8A	Original softwood rafter, hewn, adze trimmed, whole. Section square – measures 130mm x 111mm (near top). Assembly mark III cut into W face. There is a vertical slot in E face at the wall head end; higher in same face is a shallow rebate to take a bridle now gone.	Phase 1
8A <sub>sp</sub>	Original softwood sole plate, hewn, adze trimmed, whole. Section rectangular – measures 126mm x 131mm. Tenon fits into ashlar post. A mortise, pegged from the W takes tenon from rafter 8A. Timber probably re-used as two peg holes noted in E face.	Phase 1
8A <sub>ap</sub>	Original softwood ashlar post, hewn, adze trimmed, whole. Section square – measures 97mm x 95mm. Extends 12cm below wall head. Tenon fits into rafter 8A, pegged from W. A mortise, pegged from W takes tenon from sole plate.	Phase 1
8B	Original softwood rafter, hewn, adze trimmed, whole. Section square – measures 110mm x 112mm (near top). Assembly mark III cut into W face. Tenon fits into 8A.	Phase 1
8B <sub>ap</sub>	Exists in good condition, not measured.	Phase 1
8B <sub>sp</sub>	Exists in good condition, not measured.	Phase 1
8C	Original softwood collar, hewn, adze trimmed, whole. Section square / rectangular – measures 97mm x 95mm. Lap jointed (no dovetailing) to 8A	Phase 1

	and 8B (W face) and fixed with single nails. Assembly mark III cut into W face.	
8D	Replacement softwood rafter, hewn, adze trimmed, halved. Section rectangular – measures 111mm x 70mm (near top). Nailed to the E face of 6A.	Phase 2
9A	Original softwood rafter, hewn, adze trimmed, whole. Section square / rectangular – measures 125mm x 112mm (near top). Assembly mark II cut into W face. There is a vertical slot in W face at the wall head end; higher in same face is a shallow rebate to take a bridle now gone.	Phase 1
9A <sub>sp</sub>	Original softwood sole plate, hewn, adze trimmed, whole. Section rectangular – measures 143mm x 143mm. Tenon fits into ashlar post. A mortise, pegged from the W takes tenon from rafter 9A. Timber probably re-used as two peg holes noted in E face.	Phase 1
9A <sub>ap</sub>	Original softwood ashlar post, hewn, adze trimmed, whole. Section square / rectangular – measures 113mm x 95mm. Extends 12cm below wall head. Tenon fits into rafter 9A, pegged from W. A mortise, pegged from W takes tenon from sole plate.	Phase 1
9B	Original softwood rafter, hewn, adze trimmed, whole. Section square – measures 115mm x 110mm (near top). Assembly mark II cut into W face. Tenon fits into 9A.	Phase 1
9B <sub>ap</sub>	Exists in good condition, not measured.	Phase 1
9B <sub>sp</sub>	Exists in good condition, not measured.	Phase 1
9C	Original softwood collar, hewn, adze trimmed, whole. Section square – measures 90mm x 90mm. Lap jointed (no dovetailing) to 7A and 7B (W face) and fixed with single nails. Assembly mark II cut into W face.	Phase 1
9D	Replacement softwood rafter, hewn, adze trimmed, halved. Section rectangular – measures 130mm x 60mm (near base). Nailed to the W face of 9A. Timber shows signs of re-use, a mortise into the W face on the end closest to the wall head.	Phase 2
9E	Repair, softwood plank, hewn, adze trimmed, halved. Section rectangular, not measured. Timber as a whole is fairly short, installed above 9D. Nailed to the W face of 9A.	Phase 2
10A	Original softwood rafter, hewn, adze trimmed, whole. Section square / rectangular – measures 128mm x 120mm (near top). Assembly mark I cut into W face. Tenon fits into 10B.	Phase 1
10A <sub>sp</sub>	Original softwood sole plate, hewn, adze trimmed, whole. Section rectangular – measures 127mm x 143mm. Tenon fits into ashlar post. A mortise, pegged from the W takes tenon from rafter 10A. Timber probably re-used as two peg holes noted in E face.	Phase 1
10A <sub>ap</sub>	Original softwood ashlar post, hewn, adze trimmed, whole. Section square / rectangular – measures 110mm x 100mm. Extends 17cm below wall head. Tenon fits into rafter 10A, pegged from W. A mortise, pegged from W takes tenon from sole plate.	Phase 1
10B	Original softwood rafter, hewn, adze trimmed, whole. Section square / rectangular – measures 125mm x 120mm (near top). Assembly mark I cut	Phase 1



	into W face. Tenon fits into 10B.	
10Bap	Exists in good condition, not measured.	Phase 1
10Bsp	Exists in good condition, not measured.	Phase 1
11A	Original softwood rafter, hewn, adze trimmed, whole. Section square / rectangular – measures 125mm x 130mm (near top).	Phase 1
11Asp	Original softwood sole plate, hewn, adze trimmed, whole. Section square – measures 130mm x 130mm. Tenon fits into ashlar post. A mortise, pegged from the W takes tenon from rafter 11A.	Phase 1
11Aap	Original softwood ashlar post, hewn, adze trimmed, whole. Section square / rectangular – measures 102mm x 120mm. Extends 16cm below wall head. Tenon fits into rafter 11A, pegged from W. A mortise, pegged from W takes tenon from sole plate.	Phase 1
11B	Original softwood rafter, hewn, adze trimmed, possibly quartered. Section square / rectangular – measures 130mm x 120mm (near top). Tenon fits into 11A.	Phase 1
11Bap	Exists in poor condition, not measured.	Phase 1
11Bsp	Exists in poor condition, not measured.	Phase 1
11C	Replacement softwood rafter, circular sawn. Section rectangular – measures 162mm x 62mm. Bolted to 11B from E.	Phase 3
12A	Original softwood rafter, hewn, adze trimmed, quartered. Section square / rectangular – measures 110mm x 150mm (at base). Tenon fits into 12B.	Phase 1
12Asp	Original softwood sole plate, hewn, adze trimmed, whole. Section square / rectangular - not measured. Tenon fits into ashlar post. A mortise, pegged from the W takes tenon from rafter 12A. Tenon fits into ashlar post. In general rather rotten, mortared stonework built up around.	Phase 1
12Aap	Original softwood ashlar post, hewn, adze trimmed, probably whole. Section square – measures 100mm x 100mm. Rotted away below sole plate. Tenon fits into rafter 12A. A mortise takes tenon from sole plate.	Phase 1
12B	Original softwood rafter, hewn, adze trimmed, quartered. Section square / rectangular – measures 100mm x 160mm (at base). Rests on beams 26 and 27 and party wall at east end.	Phase 1
12C	Replacement softwood rafter, circular sawn. Section rectangular – measures 170mm x 60mm. Bolted to 11B from E.	Phase 3
13A	Original softwood rafter, hewn, adze trimmed, quartered. Section square – measures 130mm x 130mm (at base). Tenon fits into 13B. In the N face towards the lower end of the rafter is a shallow rebate possibly for a bridle. Just above this is a vertical slot in the same face. A mortised shoulder has been nailed to the same face a little higher up and this blocks the slot. The mortised shoulder takes bridle beam 36.	Phase 1
13Asp	Original softwood sole plate, hewn, adze trimmed, whole. Section square / rectangular - not measured. Tenon fits into ashlar post. A mortise takes tenon from rafter 13A. Tenon fits into ashlar post. In general rather rotten,	Phase 1

	mortared stonework built up around.	
13Aap	Original softwood ashlar post, hewn, adze trimmed, probably whole. Section square – measures 100mm x 100mm. Rotted away below sole plate. Tenon fits into rafter 12A, pegged from W. A mortise, pegged from W takes tenon from sole plate.	Phase 1
13B	Original softwood rafter, hewn, adze trimmed, whole. Section square / rectangular – measures 120mm x 130mm (at base). Rests on beams 26 and 27 at E side. A little way up from the party wall is a horizontal slot in the S face.	Phase 1
13C	Replacement softwood rafter, circular sawn. Section rectangular – measures 68mm x 80mm. Nailed to 13B from N. Sits on wooden chock placed between wall head and beam 26.	Phase 3
13D	Replacement softwood rafter, circular sawn. Section rectangular – measures 65mm x 170mm. Nailed to 13A from S.	Phase 3
13E	Repair, a short softwood plank, circular sawn. Section rectangular – not measured. Nailed to 13A from N	Phase 3
14A	Original softwood rafter, hewn, adze trimmed, quartered. Section square – measures 130mm x 160mm. The rafter has been cut short at its lower end to make way for bridle beam 36. Rafter sits in a rebate in 36.	Phase 1
14B	Original softwood rafter, hewn, adze trimmed, possibly halved. Section square – measures 170mm x 130mm. Tenon fits into 14A. Towards the wall head end there is a vertical slot in the N face and on the S face a horizontal slot. Assembly mark III cut into S side.	Phase 1
14C	Replacement softwood rafter, circular sawn. Section rectangular – 70mm x 170mm. Nailed to 14B and 14E from N. Rests on wall head / against party wall of next property.	Phase 3
14D	Replacement softwood rafter, circular sawn. Section rectangular – 60mm x 170mm. Nailed to 14A from N.	Phase 3
14E	Repair, a short softwood plank, circular sawn. Section rectangular – 60mm x 170mm. Nailed to 14B from N.	Phase 3
15A	Original softwood rafter, hewn, adze trimmed, whole. Section square / rectangular – measures 100mm x 120mm. Tenon fits into 15B. Assembly mark V cut into S face. In the S face towards the lower end of the rafter is a shallow rebate possibly for a bridle. A mortised shoulder has been nailed to the same face a little higher up. The mortised shoulder takes bridle beam 36.	Phase 1
15Aap	Original softwood sole plate, hewn, adze trimmed, whole. Section square / rectangular - not measured. Tenon fits into ashlar post. A mortise, pegged from the W takes tenon from rafter 11A. Tenon fits into rafter 11A, pegged from W. In general rather rotten, mortared stonework built up around.	Phase 1
15B	Original softwood rafter, hewn, adze trimmed, whole. Section square – measures 100mm x 130mm. Assembly mark V cut into S face. Towards the wall head end there is a vertical slot in the S face. Towards the lower end of the rafter a mortised shoulder has been nailed to the N face. The mortised shoulder takes bridle beam 28.	Phase 1
15C	Replacement softwood rafter, circular sawn. Section rectangular – 50mm x 150mm. Nailed to 15B from N. Notch cut where rafter passes round mortised	Phase 3

	shoulder.	
15D	Replacement softwood rafter, circular sawn. Section rectangular – 60mm x 150mm. Nailed to 15A from N.	Phase 3
16A	Original softwood rafter, hewn, adze trimmed, whole. Section square – measures 130mm x 130mm. Rafter cut off half way down to wall head.	Phase 1
16B	Original softwood rafter, hewn, adze trimmed, whole. Section square – measures 120mm x 140mm. Tenon fits into 16A. The rafter has been cut short at its lower end to make way for bridle beam 28. Rafter sits in a rebate in 28 and nailed from top. Assembly mark IV cut upside down into S face.	Phase 1
16C	Replacement softwood rafter, circular sawn. Section rectangular – 60mm x 150mm. Nailed to 16B from N.	Phase 3
16D	Replacement softwood rafter, circular sawn. Section rectangular – 60mm x 150mm. Nailed to 16A from N.	Phase 3
17A	Original softwood rafter, hewn, adze trimmed, quartered. Section square / rectangular – measures 120mm x 150mm. Tenon fits into 17A. Assembly mark III cut into S face. Mini collar 34 nailed to rafter.	Phase 1
17Aap	Survives but has been bulled off vertical, presumably when 17A slipped. Not measured.	Phase 1
17B	Original softwood rafter, hewn, adze trimmed, quartered. Section square / rectangular – measures 120mm x 150mm. Mini collar 34 nailed to rafter. Towards the lower end of the rafter a mortised shoulder has been nailed to the S face. The mortised shoulder takes bridle beam 28.	Phase 1
17C	Replacement softwood rafter, circular sawn. Section rectangular – 60mm x 150mm. Nailed to 17A from N.	Phase 3
18A	Original softwood rafter, hewn, adze trimmed, quartered. Section square / rectangular – not measured. Notch cut in ridge plate to take rafter.	Phase 1
18B	Original softwood rafter, hewn, adze trimmed, quartered. Section square / rectangular – not measured. Notch cut in ridge plate to take rafter.	Phase 1
18C	Replacement softwood rafter, circular sawn. Section rectangular – not measured. Nailed to 18A from N.	Phase 3
19A	Original softwood rafter, hewn, adze trimmed, quartered. Section square / rectangular – not measured. Notch cut in ridge plate to take rafter. Mini collar 33 nailed to S face.	Phase 1
19B	Original softwood rafter, hewn, adze trimmed, quartered. Section square / rectangular – not measured. Notch cut in ridge plate to take rafter. Mini collar 33 nailed to S face.	Phase 1
19C	Replacement softwood rafter, circular sawn. Section rectangular – not measured. Nailed to 19A from N.	Phase 3
20A	Replacement softwood rafter, circular sawn. Section rectangular – not measured. Notch cut into rafter where it joins ridge plate.	Phase 3
20B	Original softwood rafter, hewn, adze trimmed, whole. Section square /	Phase 1

	rectangular – not measured. Notch cut in ridge plate to take rafter.	
21A	Replacement softwood rafter, circular sawn. Section rectangular – not measured. Notch cut into rafter where it joins ridge plate.	Phase 3
21B	Original softwood rafter, hewn, adze trimmed, whole. Section square / rectangular – not measured. Notch cut in ridge plate to take rafter.	Phase 1
22	A small axe cut strut (not measured) inserted between the chimney column on the W wall of the N roof and rafter 1D.	Phase 2
23A	Replacement valley timber, circular sawn. Section triangular – not measured. Rafters joining this timber simply nailed.	Phase 3
23B	Original softwood rafter, hewn, adze trimmed. Section rectangular – not measured. Rafters joining this timber lap jointed, probably nailed.	Phase 1
24	A short adze trimmed beam supporting the ridge plate. Original, softwood (possibly Scots pine as bark noted, hewn, whole. Section rectangular – 160mm x 100mm. Lap jointed onto rafters 6B and 7B, pegged or nailed from the S side.	Phase 1
25	Ridge plate. Original, softwood (possibly Scots pine as bark noted, hewn, adze trimmed, whole. Has been trimmed to form a roughly triangular cross section, point facing upwards. Simply rests on 24. Notches have been cut into this timber where some of the original rafters in the S roof join.	Phase 1
26	Original beam, possibly softwood, hewn, adze trimmed and probably whole. The beam is gently curving. Section roughly rectangular / squared to circular – not measured. N end fixed into party wall, W end built into S gable.	Phase 1
27	Original beam, possibly softwood, hewn, adze trimmed and probably whole. Top of beam c 25cm below top of beam 26. Section roughly rectangular / squared – not measured. Beam turned at c 30 degrees so one of the flat sides is at same angle as rafters.	Phase 1
28	Bridle beam, softwood, hewn, adze or axe trimmed. Rectangular in cross section - not measured. Ends tenoned into the mortised shoulders that are attached to beams 15B and 17B.	Phase 2
28ms(S)	A flat rectangular piece of softwood (cross section not measured) roughly shaped with an axe. Straight on the S side, both ends chamfered on the N. A mortise has been cut centrally in the N face which takes a tenon from 28. Fixed to rafter 15B with two large headed nails.	Phase 2
28ms(N)	A flat rectangular piece of softwood (cross section not measured) roughly shaped with an axe. Straight on the N side, both ends chamfered on the S. A mortise has been cut centrally in the S face which takes a tenon from 28. Fixed to rafter 15B with two large headed nails.	Phase 2
29	Bridle beam, softwood, hewn. Rectangular in cross section – not measured, (but small). Nailed to parallel recesses in rafters 13A and 14A	Phase 2
30	Bridle beam, softwood, hewn. Rectangular in cross section – not measured, (but small). Nailed to parallel recesses in rafters 3A and 2A	Phase 2
31	Modern timber (circular sawn pine) for access hole into modern loft conversion. Section rectangular – not measured.	Modern

32	Modern timber (circular sawn pine) for access hole into modern loft conversion. Section rectangular – not measured.	Modern
33	Two sawn softwood planks (dimensions not recorded) nailed the S side of rafters 19A and 19B under ridge, one below the other. The planks are clearly older than the double collars of the S roof as they show traces of decay.	Phase 3
34	Original softwood collar to support end of ridge plate, hewn, very roughly adze or axe trimmed. Section rectangular – not measured, collar trapezoidal in shape to fit with roof. Nailed to the N side of rafters 17A and 17B with two nails.	Phase 1
35	A piece of circular sawn softwood placed centrally below 36 acting as a rafter and as an extension to 14A. Section rectangular – 140mm x 130mm. Timber shows signs of re-use – the southern upper edge is moulded and there is a central groove running down the upper face with a series of holes along its length.	Phase 3
36	Bridle beam, softwood, hewn, adze or axe trimmed. Rectangular in cross section - not measured. Ends tenoned into the mortised shoulders that are attached to beams 15B and 17B. Notches cut in rafters 14A and 35 to fit this beam, nailed vertically.	Phase 2
36ms(S)	A roughly rectangular piece of Scots pine (cross section not measured), split and shaped with an axe or adze. Straight on the S side, naturally rounded with bark on the N, ends sawn off. A mortise has been cut centrally in the N face which takes a tenon from 36. The timber has broken where it blocked the vertical slot in rafter 13A. Fixed to rafter with two large headed nails.	Phase 2
36ms(N)	A semicircular piece of Scots pine – possibly an offcut (cross section not measured), split and shaped with an axe or adze. Straight on the S side, naturally rounded with bark on the S, ends sawn off. A mortise has been cut centrally in the S face which takes a tenon from 36. Fixed to rafter 15A with two large headed nails.	Phase 2
37	A short sawn plank nailed to the S side of rafter 17A and ashlar post 17Aap.	Phase 3
38	A short piece of wood, hewn, adze or axe trimmed, end sawn off. Section rectangular – not measured. Wood is diagonally placed one end mortared into the wall head, the other nailed onto the S side of rafter 18B. Strengthening support for where rafters 18B and 23 join.	Phase 1
39	A short sawn piece of timber attached between rafters 7B and 4B. Cross section rectangular – dimensions not recorded. This beam supports rafters 5B and 6B which are cut short. This enables access between the two attic conversions.	Phase 3
40	A short circular sawn softwood plank nailed to the underside of bridle 28 and extending down to beam 26 - dimensions not recorded.	Phase 3

## Appendix 2 Photographic Register

### Folder: 03-10-2011

<i>Image No</i>	<i>Description</i>	<i>View</i>
DSC03396-9	Taking off the sarking. N facing side of N roof, W side	S
DSC03400-2	Rafters exposed on the N facing side of N roof, W side	SW
DSC03403-5	Shot showing where rafters join the wall head of the N wall.	E
DSC03406-7	Shot showing where rafters join the wall head of the N wall.	W
DSC03416	View of ashlar posts for rafters 2A, 3A, 5A, 6A	W
DSC03468	General shot of rafters	S
DSC03556-9	Shot of sole plate for rafter 2A	E, W
DSC03560-3	Shot of sole plate for rafter 3A	E, W
DSC03464-7	Shot of sole plate for rafter 4A	E, W
DSC03468-71	Shot of sole plate for rafter 5A	E, W
DSC03572-75	Shot of sole plate for rafter 6A	E, W
DSC03576-7	Shot of crows steps on W side of roof	SW

### Folder: 03-10-2011

<i>Image No</i>	<i>Description</i>	<i>View</i>
DSC03578-80	Shot of sole plate for rafter 6A	E, W
DSC03581-82	Shot of sole plate for rafter 7A	E, W
DSC03583-85	Shot of sole plate for rafter 8A.	E
DSC03586	General shot looking down on N side of building	NE
DSC03587	Sealing up the exposed rafters on the N facing side of the roof (W side)	SW
DSC03679-81	Shot of where collar 5C and rafter 5B join	-
DSC03582-4	Shot of rafter 10A showing where collar has been removed. Note large nail.	-
DSC03685-6	Shot of mortise and tenon where rafters 7A and 7B join. Notice that the mortise on rafter 7A appears to have been cut too wide and has been filled with a small wooden wedge.	-
DSC03687-8	Shot looking at mortise and tenon where rafters 8A (left) and 8B (right) join.	-

DSC03689	Shot looking at mortise and tenon where rafters 8B (left) and 8A (right) join	-
DSC03710	VIII mark on collar 2C	E
DSC03711	VIII mark on rafter 2B	SE
DSC03712	VIII mark on rafter 2A	NE
DSC03713	VIII mark on collar 3C	SE
DSC03714	VIII mark on rafter 3B	SE
DSC03715-6	VIII mark on rafter 3A	NE
DSC03717	VII mark on collar 4C	E
DSC03718	VI mark on collar 5C	E
DSC03719	VI mark on rafter 5B	E
DSC03720-21	VI mark and a I mark, on rafter 5A	E, NE
DSC03722	V mark on collar 6C	SE
DSC03723	V mark on rafter 6B	SE
DSC03724	V mark on rafter 6A	NE
DSC03725	III mark on collar 7A	SE
DSC03726	III mark on rafter 7B	SE
DSC03727	III mark on collar 8C	SE
DSC03728	III mark on rafter 8B	SE
DSC03729	III mark on rafter 8A	NE
DSC03730	II mark on collar 9C	SE
DSC03731	II mark on rafter 9B	SE
DSC03732-4	I mark on rafter 10B	SE
DSC03735	I mark on rafter 10A	NE
DSC03862-5	Looking up at the small beam (24) supporting the ridge plate (25)	S

**Folder: 06-10-2011**

<i>Image No</i>	<i>Description</i>	<i>View</i>
DSC03867	Shot looking down at where the original collar joining rafter 10B has been sawn off by the converters of the loft	SE

DSC03868	Shot looking down to the lower ends of rafters 7B, 8B and 9B.	SE
DSC03869	The ridge plate (25) at rafters 21A and 21B	W
DSC03870	The ridge plate (25) at rafters 19A and 19B. Note the sawn pine collar below the ridge plate.	S
DSC03871	Shot looking down to where rafters 11B, 10B, 9B and 8B were originally attached to a wooden beam or the top of an internal wall. The wall was replaced by two large steel 'I' Beams supporting small brick walls on which the rafters now rest. Ashlar posts and sole plates survive.	SE
DSC03872	Close up of sole plate and ashlar post for rafter 8B	E
DSC03873	Close up of sole plate and ashlar post for rafter 9B	E
DSC03874	Looking up at rafter 7B	NW
DSC03875	Close up of sole plate and ashlar post for rafter 11B and 10B	E
DSC03876-7	Shot looking at the timber forming the base of the valley between the N roof and the S projecting roof (23B).	N
DSC03878	Shot looking at lap joint where S projecting roof rafter number 19B joins the above valley timber 23B	E
DSC03879-80	Shot looking at joint where S projecting roof rafter number 18B joins the valley timber	E
DSC03881-2	Shot looking at ashlar post and show plate for rafter 11B	E
DSC03883	Close up of valley timber 23B	E
DSC03884	Shot looking down the E side of the S projecting roof. Looking at beam 26	SE
DSC03885-86	Shot looking at where the N end of beam 26 fixes into a modern brick pillar	E
DSC03887-8	Shot looking at beam 26. Note the small wedge between rafter 14B and beam 26.	SE
DSC03889-90	Shot looking down to the lower end of rafter 14B. The rafter rests on beams 26 and 27 as well as the E wall of the property.	E
DSC03891	Shot looking back to the N end of beam 26	NE
DSC03892	Shot looking at where beams 26 and 27 slot into the gable wall of the S projecting roof.	SE
DSC03893	General shot at the E side of the S projecting gable.	N
DSC03894	Slot cut into beam 14B	N
DSC03895	Shot looking at beam 27 below 26	E
DSC03896-7	Shot looking along beam 27 (right) below 26.	N
DSC03898	Capstan cigarette packet	-



DSC03899	Parts of leather shoes found in rubble jammed down gap in between beams 26, 27 and the E wall.	NW
DSC03904	Shot looking at collars 1C, 2C, 3C, 4C, 5C in daylight	NW
DSC03927	Rafters and Collars 1B/C, 2B/C, 3B/C, 4B/C, 5B/C, 6B/C in daylight	SW
DSC04092-5	Shot of rafters 21B and 21A	SE, S
DSC04096-4100	Shot of rafters 20B and 20A	SE, S
DSC04101-6	Shot of rafters 19B and 19A	SE, SW, S
DSC04107-13	Shot of rafters 18A and 18B	SW, S, SE
DSC04114-22	Shot of rafters 17B, 17A and collar holding up ridge plate.	SE, S, SW
DSC04123-31	Shot of rafters 16A and 16B	SE, S, SW
DSC04132-38	Shot of rafters 15A and 15B	-
DSC04136-41	Shot of rafters 14A and 14B	-
DSC04142-4	Shot of rafters 13A and 13B	-
DSC04145-8	Shot of rafters 12A and 12B	-
DSC04149	Close up of modern rafter 12C next to 12B	-
DSC04150	Shot of bricks on inside face of S gable next to rafter 12A	W
DSC04151	Shot looking up at old collar supporting the ridge plate. Note the wedge. At rafters 17A and 17B	S
DSC04152	Shot looking up under the collar supporting up the ridge plate. Collar lap jointed onto rafters 17A and 17B	-
DSC04153	Shot looking at the end of the ridge plate extending S from rafters 17A and 17B	-
DSC04154	Shot looking at underside of end of ridge plate.	NW
DSC04155	Shot looking at W side of ridge plate as it extends S from rafters 17A and 17B	-
DSC04156	Shot looking at E side of ridge plate as it extends S from rafters 17A and 17B	-

**Folder: 07-10-2011**

<i>Image No</i>	<i>Description</i>	<i>View</i>
DSC04163	General shot of fully exposed rafters 1A to 5A from outside	SW

DSC04172	General shot of fully exposed rafters 1A to 5A from outside	SW
DSC04198	Shot looking at horizontal hewn piece of wood fitted into grooves in rafters 2A and 3A.	S
DSC04199	General shot looking at rafters 4A and 5A	SE
DSC04200	Close up of N end of ridge plate	S
DSC04201-3	Misc Shots	Various
DSC04204	Shot showing sawn off original collars in the E side of the S projecting roof.	NE
DSC04205-6	Shot showing sawn off original collar on rafter 19B	N, NE
DSC04207-10	Shots of beam (28) for window between rafters 15B and 17B. Note that rafter 16B ends in the middle.	S
DSC04211	Shot of beam 26	SE
DSC04212	General shot inside the E side of the S projecting roof	S
DSC04213-5	Shots of beam 26	SE
DSC04216	Shot of western valley timber 23A, a modern replacement.	W
DSC04217	Shot of eastern valley timber 23B and damp.	E
DSC04218-20	Shot of western valley timber 23A, a modern replacement.	SW
DSC04235	General shot of timbers exposed on N side of S projecting roof	NE
DSC04244	General shot of the W facing side of the S projecting roof.	E
DSC04251	General shot of timbers exposed on N side of S projecting roof	E
DSC04282-3	Shot of the S gable	NE
DSC04298-300	Shot the S end of beam 36 which was for a window between rafters 13A and 15A. Shot shows mortised shoulder attached to 13A. Shot also shows vertical slot in 13A	E, NE
DSC04301	Shot showing where rafter 14A rests on beam 36. A later rafter has been attached below (35), effectively continuing 14A down to the wallhead.	NE
DSC04302	Rafter 35 in between 13A and 15A	E
DSC04303-4	Shot showing ashlar post and sole plate for rafter 12A	SW
DSC04305-6	Shot showing ashlar post and sole plate for rafter 13A	SW
DSC04307	View of projecting stonework at wall head between rafters 13A and 15A	SW
DSC04308	Short plank nailed to the underside of rafter 35	N
DSC04309	Shot showing where notch cut in rafter 35 to attach it to beam 36	N

DSC04310	Shot shows mortised shoulder for beam 36. timber attached to rafter 15A	N
DSC04311	Ashlar post and sole plate for rafter 17A	NW
DSC04312	View of projecting stonework at wall head between rafters 13A and 15A	W
DSC04313-9	Shot looking N inside W side of S projecting roof	N
DSC04321-2	Shot looking at lower end of rafter 3B	N
DSC04323-4	General shot inside the W side of the S projecting roof	SE
DSC04333	General shot inside the W side of the S projecting roof	SE
DSC04351-7	Shot of sarking attached to the W facing side of the S projecting roof	NE
DSC04358	Shot looking at small notch cut into rafter 13A	SE
DSC04359	Shot looking at rafter 15A	NE
DSC04360-1	Shot of the lower end of rafter 2B	N
DSC04362	Shot of lower ends of rafters 2B and 3B. Sole plates are visible for both	N
DSC04363	Shot of sole plate for rafter 3B	NE
DSC04364	Shot of sole plate for rafter 4B	E
DSC04365	Vertical timber attached to rafter 4B	NE
DSC04366	Shot showing where rafter 2B has failed.	N
DSC04367	Shot showing where rafter 3B has failed.	NE
DSC04368	Void	-
DSC04369	Shot showing remains of vertical posts attached to rafter 17A	SE
DSC04370	Vertical timber attached to rafter 4B	N
DSC04371	Where the above vertical post joins to rafter 18A. The remains of a collar can also be seen	N
DSC_0003-4	Shot showing empty groove for collar in rafter 10B with iron nail	SE
DSC_0005-6	Projecting curved stone on NE corner of building	SE
DSC_0007-9	Sarking planks from the N facing side of the main N roof.	NE

**Folder: 01-11-2011**

<i>Image No</i>	<i>Description</i>	<i>View</i>
DSC_0001-2	Shots of ashlar post and sole plate for rafter 11A	E

DSC_0003-4	Shots of ashlar post and sole plate for rafter 11A	SW
DSC_0005-6	Shots of ashlar post and sole plate for rafter 10A	E
DSC_0007-8	Shots of ashlar post and sole plate for rafter 10A	SW, W
DSC_0009-10	Shots of ashlar post and sole plate for rafter 9A, shot also shows rafter 9D	E
DSC_0011	Shot of ashlar post and sole plate for rafter 9A, shot also shows rafter 9D	NE
DSC_0012-3	Shots of ashlar post and sole plate for rafter 9A	W
DSC_0014-5	Shots of ashlar post and sole plate for rafter 8A	E
DSC_0016-8	Shots of ashlar post and sole plate for rafter 8A	W, NW
DSC_0103	Shot of mortise in rafter 9D	E
DSC_0104-7	Shots of vertical slot in rafter 8A	S
DSC_0108-10	Shots of vertical slot in rafter 9A	S
DSC_0111-2	Shots looking at notches in rafters 8A and 9A	S
DSC_0113	Shot looking at notch in rafter 9A	S
DSC_0114	Shot looking at notch in rafter 8A	SE
DSC_0140	Close up of wall head under rafter 10A showing recent cementing for attic conversion	NE
DSC_0141-44	Shots of loose brick found on wall head between 8A and 9A	-
DSC_0145	Shot of possible wide notches in rafters 9A and 8A	S
DSC_0146	Shot of possible wide notch in rafter 9A	S
DSC_0147	Shot of possible wide notch in rafter 8A	S
DSC_0167-9	Shot of mortise in rafter 9D	E
DSC_0170	Shot of peg for mortise in rafter 9D	N

## Appendix 3 3d model Register

### Folder: AtticDaylight

<i>Files</i>	<i>Description</i>
DSC03901- DSC03960	Photo sequence for 3d model of the interior of the W side of the N roof (above collars)
sparse.ply	Sparse 3d point cloud of the interior of the W side of the N roof (above

	collars) [scale from scale bar]
dense.ply	Dense 3d point cloud of the interior of the W side of the N roof (above collars) [scale from scale bar]

**Folder: NwallRaftersExternal1**

<i>Files</i>	<i>Description</i>
DSC03445- DSC03491	Photo sequence for 3d model of the lower end of the rafters of the W side of the N pitch of the N roof
sparse.ply	Sparse 3d point cloud of the lower end of the rafters of the W side of the N pitch of the N roof [scale from scale bar]
dense.ply	Dense 3d point cloud of the lower end of the rafters of the W side of the N pitch of the N roof [scale from scale bar]

**Folder: NwallRaftersExternal2**

<i>Files</i>	<i>Description</i>
DSC03492- DSC03519	Photo sequence for 3d model of the lower end of the rafters of the W side of the N pitch of the N roof
sparse.ply	Sparse 3d point cloud of the lower end of the rafters of the W side of the N pitch of the N roof [scale from scale bar]
dense.ply	Dense 3d point cloud of the lower end of the rafters of the W side of the N pitch of the N roof [scale from scale bar]

**Folder: NwallRaftersInternal**

<i>Files</i>	<i>Description</i>
DSC03408- DSC03444	Photo sequence for 3d model of ashlar posts, W side of the N pitch of the N roof (E faces in shots only)
sparse.ply	Sparse 3d point cloud of ashlar posts, W side of the N pitch of the N roof (E faces modelled only) [scale from scale bar]
dense.ply	Dense 3d point cloud of ashlar posts, W side of the N pitch of the N roof (E faces modelled only) [scale from scale bar]

**Folder: NwallRaftersExternal3**

<i>Files</i>	<i>Description</i>
DSC_0019- DSC_0102	Photo sequence for 3d model of the E side of the N pitch of the N roof

dense.ply	Dense 3d point cloud of the E side of the N pitch of the N roof [scale from scale bar]
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#### **NwallRaftersExternal4**

<i>Files</i>	<i>Description</i>
DSC_0148- DSC_0166	Photo sequence for 3d model of the E side of the N pitch of the N roof
dense.ply	Dense 3d point cloud of the E side of the N pitch of the N roof [scale from scale bar]

#### **RearPitchEsideAshlarP**

<i>Files</i>	<i>Description</i>
DSC_0115- DSC_0139	Photo sequence for 3d model of ashlar posts, E side of the N pitch of the N roof (W faces in shots only)
dense.ply	Dense 3d point cloud of ashlar posts, E side of the N pitch of the N roof (W faces in shots only) [scale from scale bar]

#### **SProjectingGable**

<i>Files</i>	<i>Description</i>
DSC04221- DSC04243	Photo sequence for 3d model of stripped area which was viewed on the W side of the S roof
dense.ply	Dense 3d point cloud of stripped area which was viewed on the W side of the S roof [scale from scale bar]

#### **SProjectingGableRoofProfile**

<i>Files</i>	<i>Description</i>
DSC04245- DSC04281	Photo sequence for 3d model of W side of S roof
dense.ply	Dense 3d point cloud of W side of S roof [scale from scale bar]

#### **SProjectingGableWWallhead**

<i>Files</i>	<i>Description</i>
DSC04325-	Photo sequence for 3d model of ashlar posts, W side of S roof (N faces in

DSC04350	shots only)
dense.ply	Dense 3d point cloud of W side of S roof [scale from scale bar]

### WHalfNRoofFull

<i>Files</i>	<i>Description</i>
DSC04157- DSC04197	Photo sequence for 3d model of full stripped W side of the N pitch of the N roof [scale from scale bar]
dense.ply	Dense 3d point cloud of full stripped W side of the N pitch of the N roof [scale from scale bar]

## Appendix 4 Finds Register

<i>Object</i>	<i>Location / Context</i>	<i>Description</i>	<i>Material</i>	<i>Possible date</i>
Shoe fragment	Amongst rubble and mortar layer found above N end of beam 26 and filling gap between N end of beam 26 and the party wall (see plan)	Sole of child's shoe 207mm long and 65mm wide (max)	Leather	18 <sup>th</sup> -19 <sup>th</sup> century?
Shoe fragment	As above	Part of upper for shoe 150mm long 30mm wide	Leather	18 <sup>th</sup> -19 <sup>th</sup> century?
Shoe seg	As above	Seg (protector) for shoe. Strip contains two rectangular nail holes, tapers at front end, 59mm long, 13mm wide	Wrought Iron	18 <sup>th</sup> -19 <sup>th</sup> century?
Cigarette Packet	As above	Historic Capstan Navy Cut Cigarette Packet	Cardboard	20 <sup>th</sup> century
Nails	Rescued from sarking stripped off the N pitch of the N roof	Various sizes 62-85mm long	Wrought Iron	16 <sup>th</sup> -early 19 <sup>th</sup> century?

## Appendix 5 Drawing Register

<i>Sheet No.</i>	<i>Description</i>	<i>Scale</i>
1	Plan, section and descriptions of rafters, ashlar posts and sole plates of N roof, W side of rear (N facing) pitch.	1:20, 1:10
2	Plan and descriptions of collars, and rafters in N roof	1:20
3	Plan and descriptions of rafters, E side of S roof, section through N roof	1:20
4	Plan of W side of S roof	1:20
5	Plan and descriptions of rafters, ashlar posts and sole plates of N roof, E side of rear (N facing) pitch.	1:20



## Appendix 6 Discovery & Excavation in Scotland Entry

LOCAL AUTHORITY:	West Lothian Council
PROJECT TITLE/SITE NAME:	Historic Building Recording, Roof Repairs at Hamilton's Land, Linlithgow
PROJECT CODE:	LL05
PARISH:	Linlithgow
NAME OF CONTRIBUTOR(S):	Barton, T
NAME OF ORGANISATION:	Alder Archaeology Ltd
TYPE(S) OF PROJECT:	Historic Building Recording
NMRS NO(S):	NT07NW 77.01
SITE/MONUMENT TYPE(S):	17 <sup>th</sup> century Tenement
SIGNIFICANT FINDS:	None
NGR (2 letters, 8 or 10 figures)	Site centred on NT 00398 77131
START DATE	03-10-11
END DATE	01-11-11
PREVIOUS WORK (incl. <i>DES</i> ref.)	None
MAIN (NARRATIVE) DESCRIPTION: (May include information from other fields)	<p>The National Trust for Scotland commissioned Alder Archaeology to carry out a Historic Building Recording on the roof at 42-44 High Street, Linlithgow which is part of the 16<sup>th</sup> century group of buildings known as Hamilton's Land. Hamilton's Land is located in the centre of Linlithgow at NGR NT 00398 77131. The work (site code LL05) was undertaken between the 3<sup>rd</sup> of October and the 1<sup>st</sup> of November 2011. The requirement was to record the nature of the original roof as it was exposed during essential repairs. The sarking was found to comprise pit-sawn Scots pine planks of a variety of lengths and widths. Stone slates had been attached to it using large headed hand forged wrought iron clout type nails. These nails were also used to nail the sarking to the rafters. The roof itself was found to be of common rafter form with most of the original rafters surviving, though a few had been reinforced or replaced with new rafters in the 19<sup>th</sup> or 20<sup>th</sup> century. All original timbers were found to be adze trimmed softwood, probably Scots pine, and most were whole though some were halved and a few quartered. Rafter pairs were connected at the apex with pegged mortise and tenon joints.</p> <p>On the N roof of the property (that aligned E-W) most of the rafters were mortise and tenoned into original sole plates and ashlar posts. The sole plates on the N side rested on the external stone wall of the property, but those on the S side rested on brick walls that had been constructed on two steel I-beams. These beams had been inserted when a major internal wall in the floor below was removed in the 19<sup>th</sup> or early 20<sup>th</sup> century. Nine of the eleven rafter pairs on the N roof were connected to original collars by nailed lap joints with no</p>

	<p>dovetailing. The S roof (aligned N-S with a gable overlooking the street) was of similar design to the N though original collars had been sawn off for a modern attic conversion. However, inspection of the stubs showed that the collars had been attached in the same manner as the N roof. In the S half of this roof the W rafters were mortised and tenoned to ashlar posts and sole plates resting on an external wall to the W. On the E, they simply abutted the party wall of the next property. Here the rafters also rested on two softwood beams that bridged a gap that was caused by the party wall being at an angle. The N half of this roof had a ridge plate which rested on a small beam inserted in between the rafters of the N roof. Rafter pairs in this part of the roof were not joined at the apex but were instead nailed to the ridge plate and each ran down to join valley timbers on either side.</p> <p>Differences in collar widths and assembly marks suggested that the N roof may have stood alone prior to the construction of the S. This pointed to the possibility that Hamilton's Land was at one stage set back from the High Street. It is hoped that future dendrochronology of timbers will be able to provide precise dates for the two roofs and further clarify the precise building sequence.</p> <p>On the N facing side of the N roof at either side were two sets of vertical grooves in the original rafters marking the possible location of two 'cat slide' type windows. A pair of cat slides were also found on either side of the S roof. Two adze trimmed bracing beams in the S roof pointed to the former existence of two dormers, one which blocked a cat slide. Later on both of these dormers had been blocked.</p>
PROPOSED FUTURE WORK:	None
SPONSOR OR FUNDING BODY:	National Trust for Scotland
CAPTIONS FOR ILLUSTRS	View of the W half of the N pitch of the N roof after the sarking was stripped away.
ADDRESS OF MAIN CONTRIBUTOR:	Alder Archaeology Ltd, 55 South Methven Street, Perth PH1 5NX
ARCHIVE LOCATION (intended)	NMRS
EMAIL ADDRESS:	<a href="mailto:Director@AlderArchaeology.co.uk">Director@AlderArchaeology.co.uk</a>

## Appendix 7 Standard Terms of Reference for all Fieldwork

### 7.1 Recording Methodology

Alder Archaeology employs a Single Context Recording System that allows full cross-referencing of stratigraphy, finds and environmental samples, as well as site-wide phasing. All features will be planned at scale 1:20, and sections drawn at scale 1:10. Sections and profiles will be drawn and all features will be photographed with metric scale included. Environmental samples will be taken from archaeologically significant contexts, if the analysis of these samples would aid significantly in the interpretation of any features identified.

### 7.2 Human Remains

If human remains are encountered they will be left in situ and the local police will be informed. If removal is required this will take place in compliance with Historic Scotland's Policy Paper *The Treatment of Human Remains in Archaeology*.

### 7.3 Products and Reporting

A Data Structure Report will normally be prepared within a period agreed within the Written Scheme of Investigation/ Project Design, after the completion of the fieldwork. This forms the basic level of reporting. Further reporting may be required on the basis of discoveries made during excavations.

A copy of the report and the project archive will be deposited in the NMRS. Further copies will be sent to the client, LAAO and others, as appropriate.

### 7.4 Artefacts

Finds of objects will be subject to the Scots Laws of Treasure Trove and *Bona Vacantia*. We will report such finds, if recovered, with supporting documentation to the Secretariat of the Treasure Trove Panel for disposal to the appropriate museum.

### 7.5 Discovery and Excavation in Scotland

A brief summary of the results will be submitted to *Discovery and Excavation in Scotland*.

### 7.6 General Conditions and Health and Safety

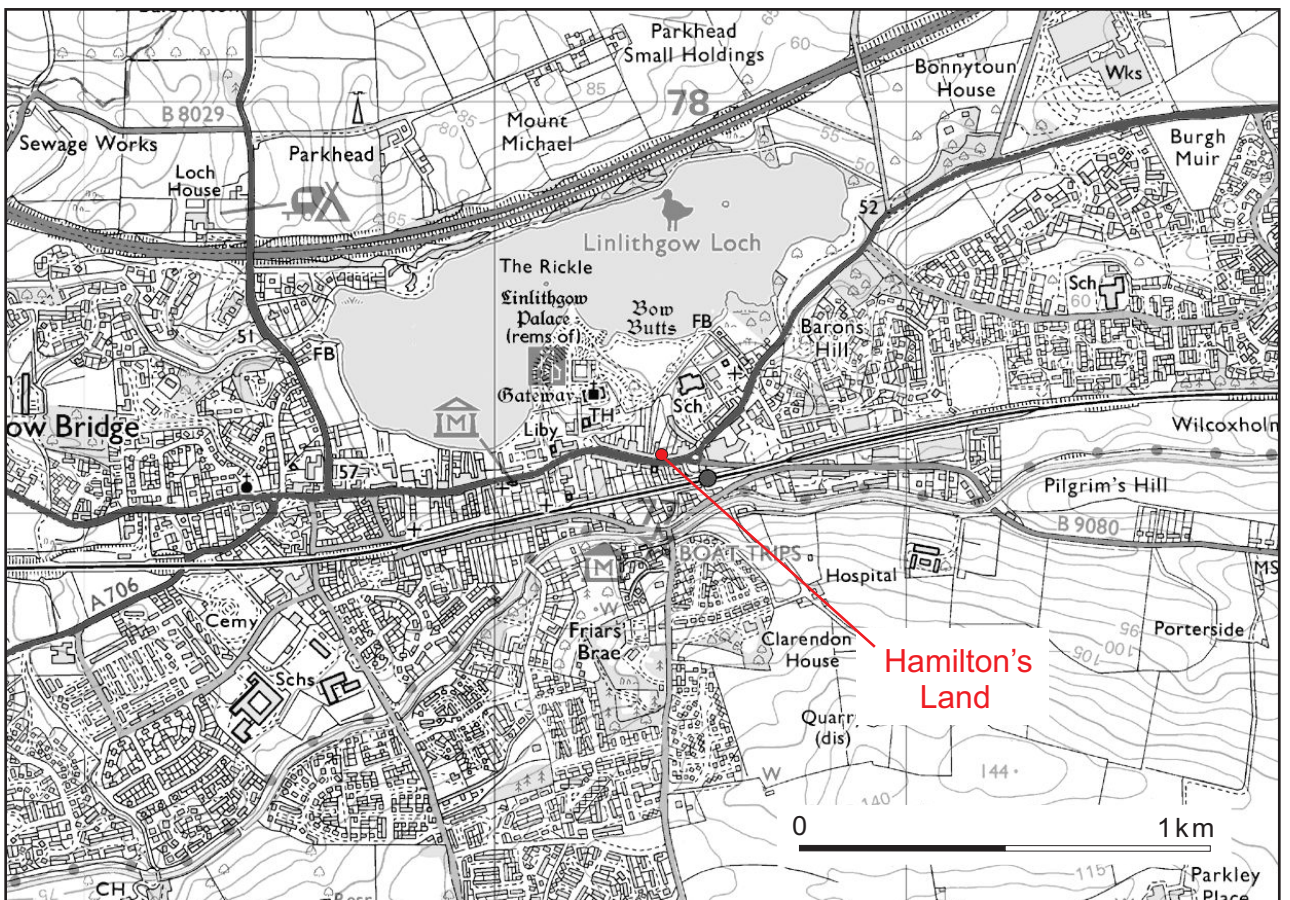
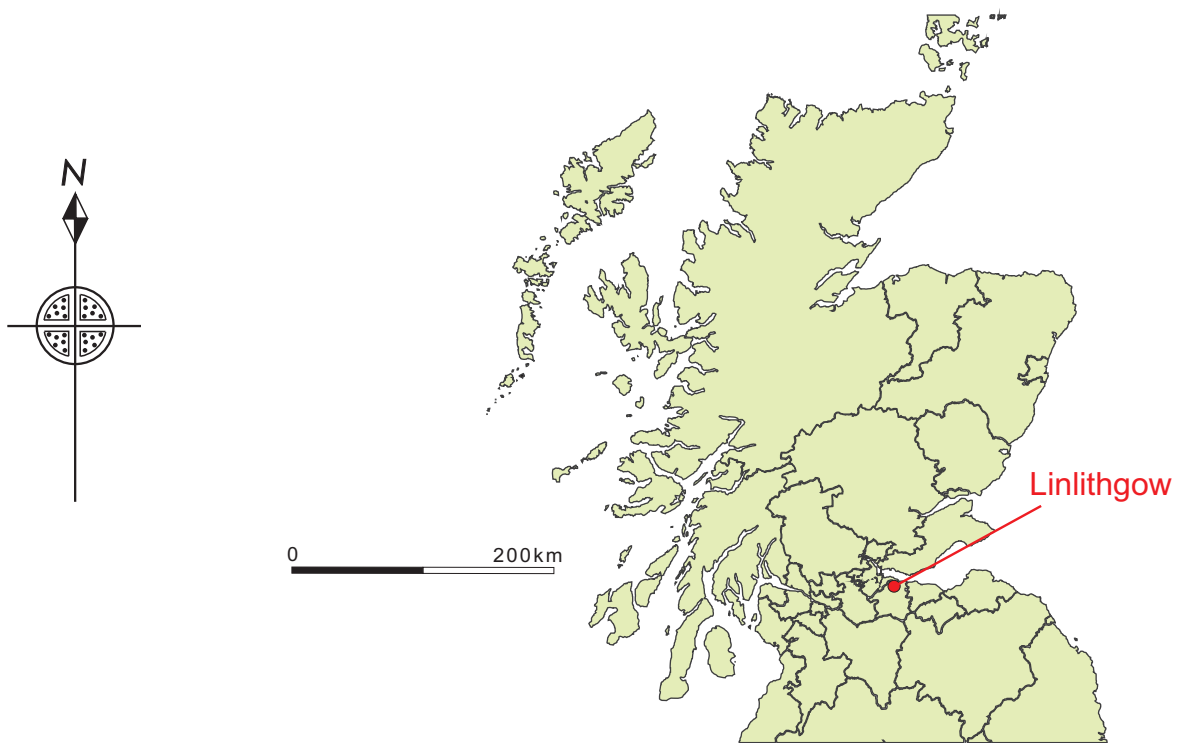
We adhere to the Code of Conduct of the Institute for Archaeologists.

Alder Archaeology Ltd has public liability insurance of £2,000,000. Details of this can be provided on request.

We operate a strict health and safety policy and conforms to the Health and Safety at Work Act. We undertakes Risk Assessments on all fieldwork carried out.

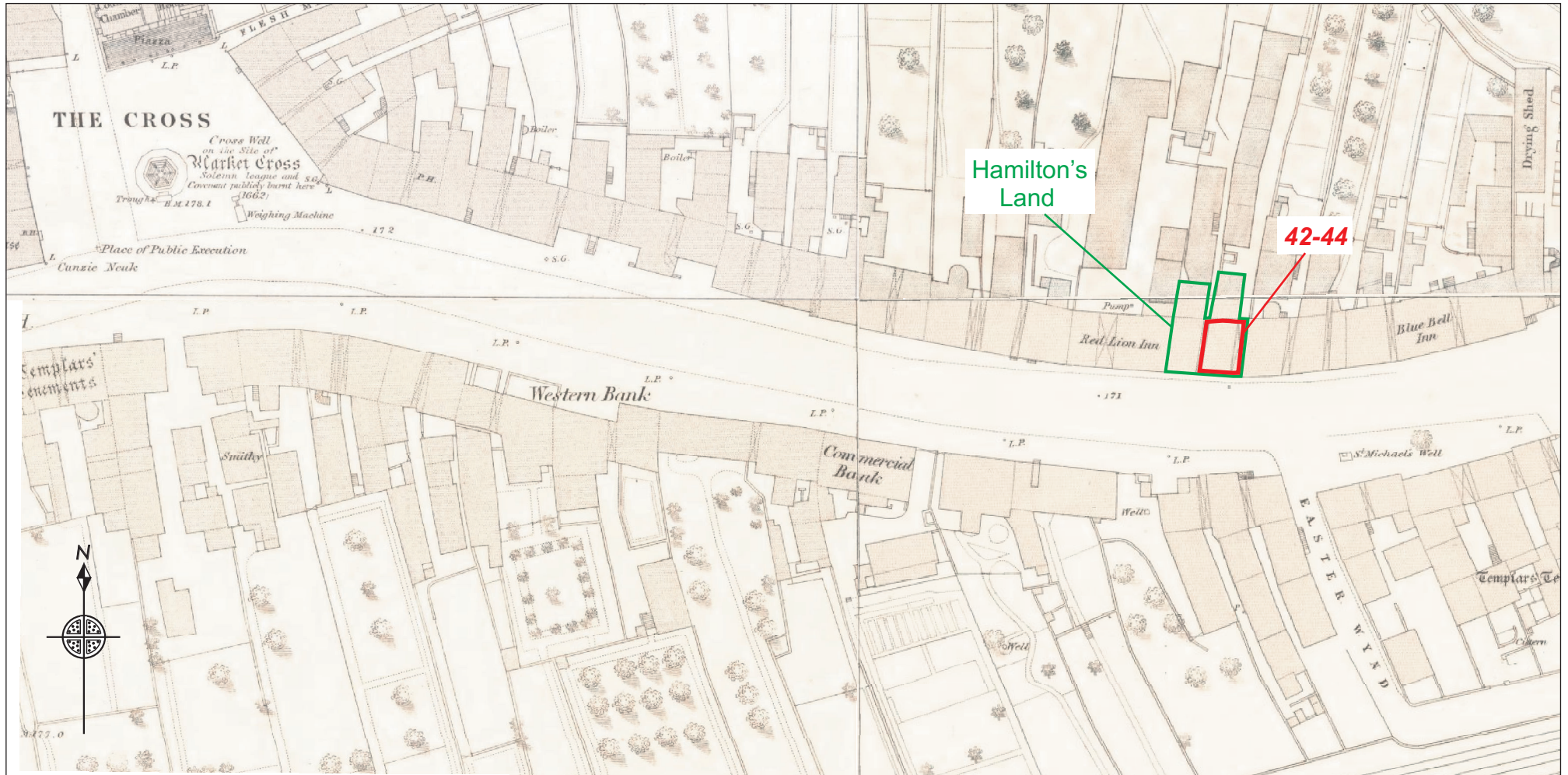
Alder Archaeology representatives will at all times wear protective footwear, high visibility clothing and other appropriate clothing. Hard hats will be worn if there is active plant on site or at all times if the site is deemed a hard hat area.

If lightly contaminated deposits are uncovered disposable boiler suits and gloves will be worn. A source of clean water will be made available for staff to clean hands with. If the health risk posed by site contamination is felt to be too high all further archaeological work will stop in that area.



Illus 2

Detailed location of 42-44 High Street

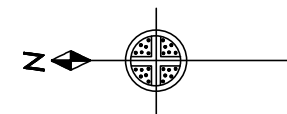
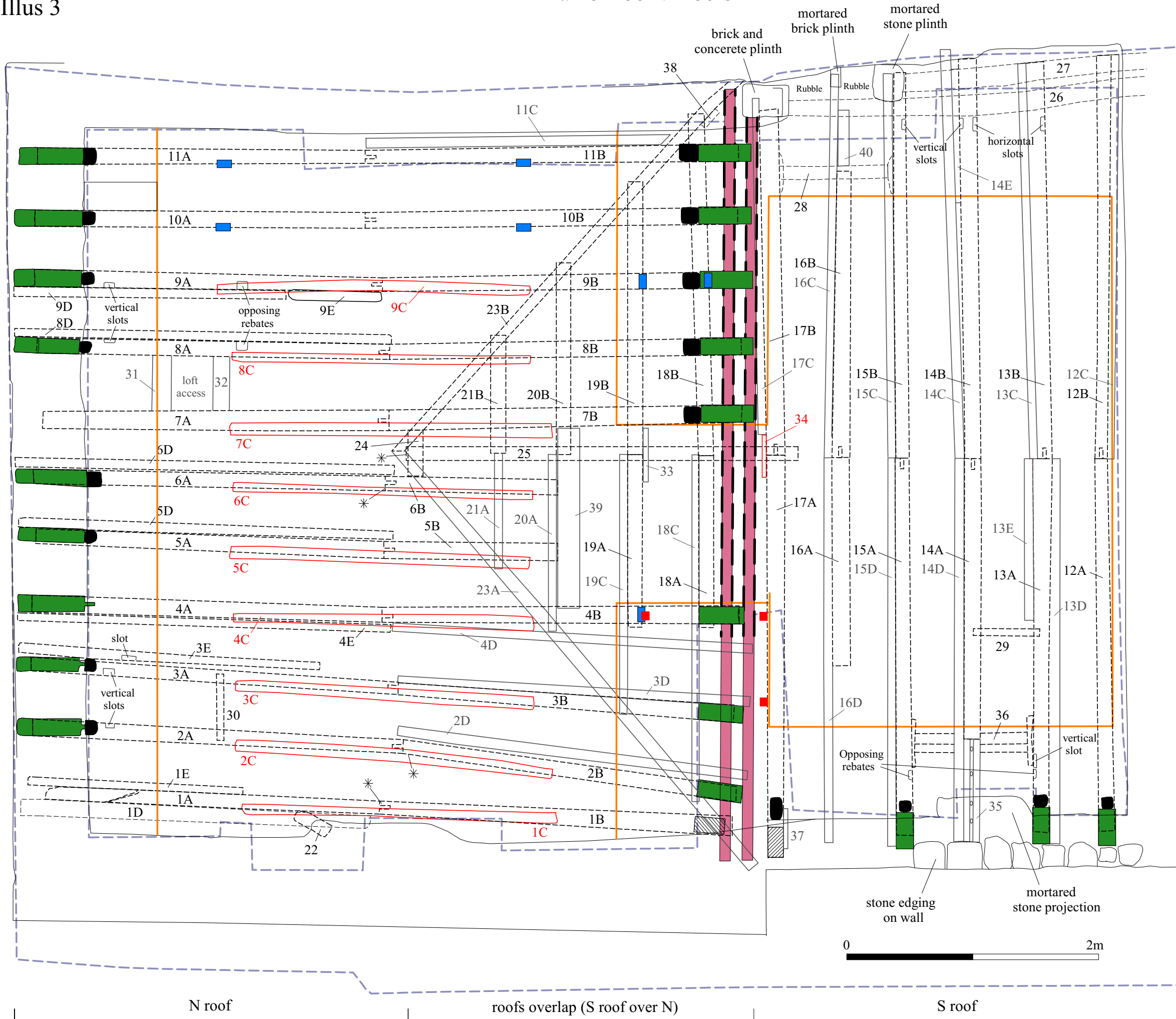


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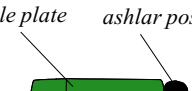
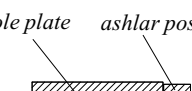
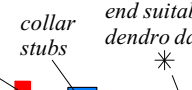
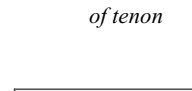


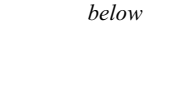



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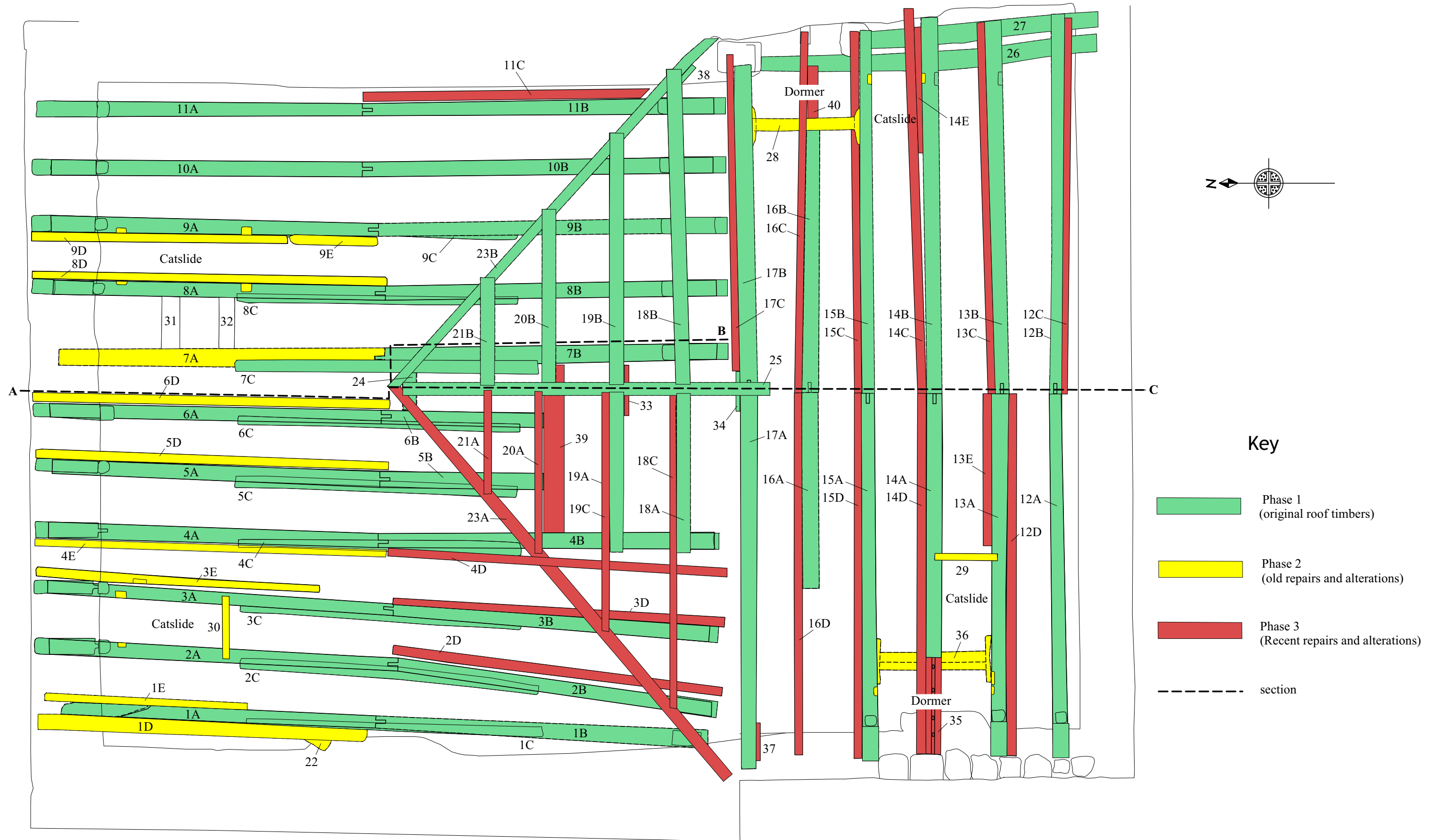
Illus 3

# Plan of roof timbers

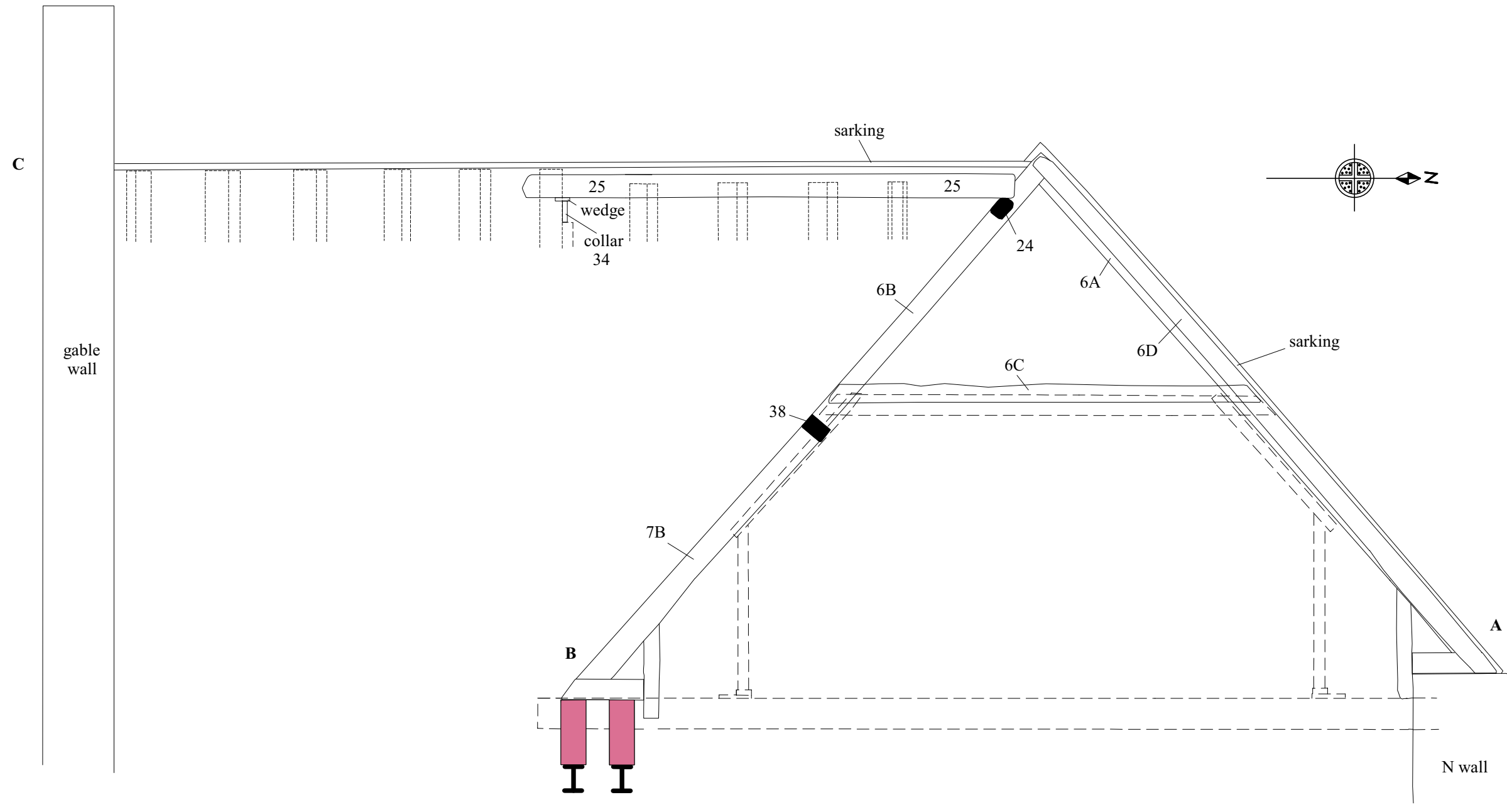


## Key






-  sole plate ashlar post present
-  sole plate ashlar post not seen but assumed to exist
-  stud for laths collar stubs end suitable for dendro dating hewn timbers, axe or adze trimmed
-  12B direction of tenon sawn timber
-  joint not recorded
-  brick wall
-  Steel I-beam below
-  6C original collars
-  modern attic conversion
-  Plan of 2nd floor from Office of Works 1938 survey



Section



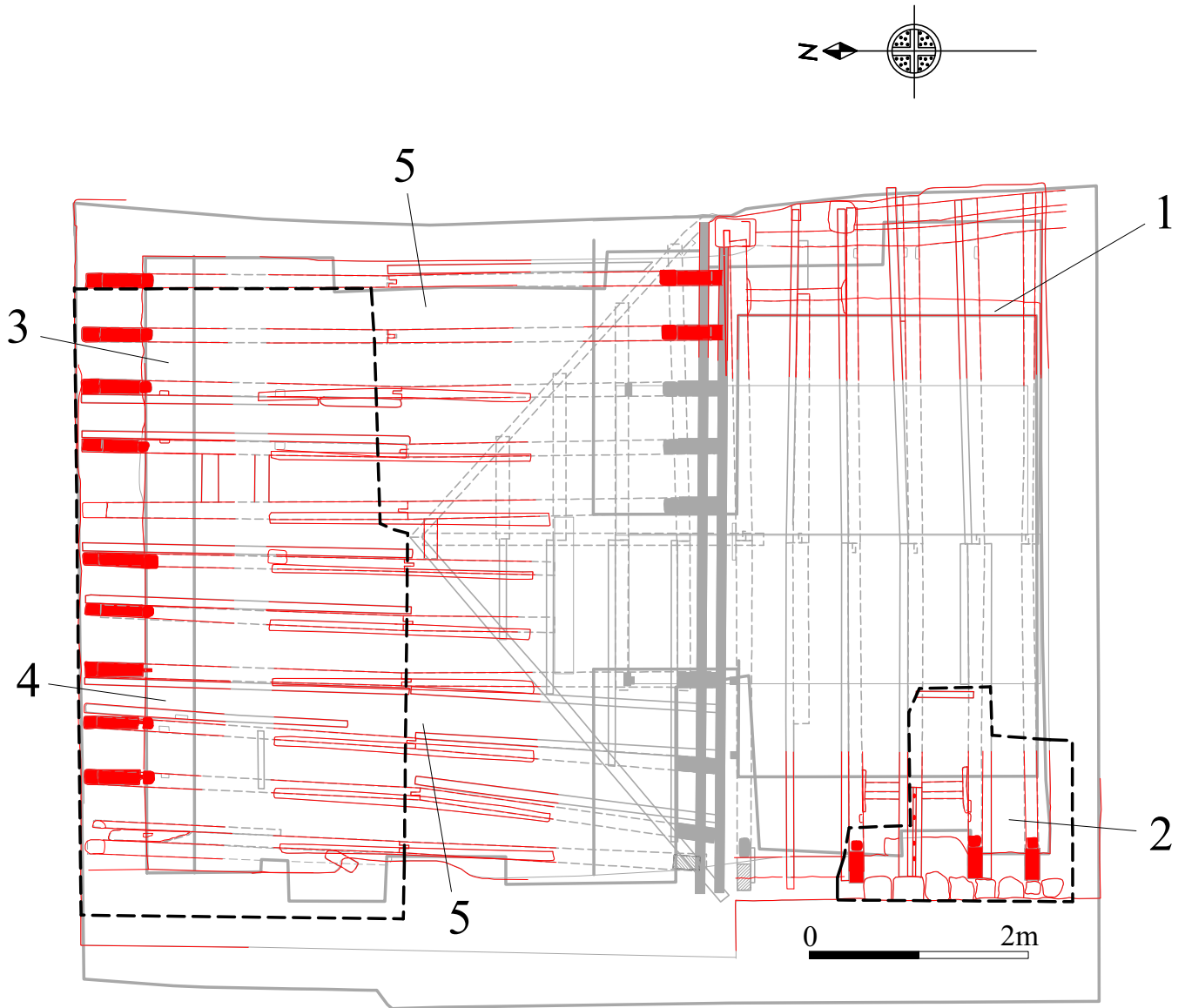
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Key			
	modern attic conversion		steel I-beams
	beams		S roof rafters
	brick walls		



Illus 6

The 5 plans drawn on site and areas stripped of sarking that could be externally viewed



Areas stripped of sarking  
that could be externally viewed