The JESSOP Consultancy
Sheffield + Lichfield + Oxford

# EAST LOGGIA ROOF

## Hardwick Hall, Derbyshire

## Historic Building Survey

Undertaken on behalf of the National Trust

August 2019
FINAL

**Document No:** TJC2018.61
**Planning Application No:** 18/00294/LBC
**OASIS No:** thejesso1-321528

REGISTERED · CIfA · ORGANISATION

Office contact details

The JESSOP Consultancy
Cedar House
38 Trap Lane
Sheffield
South Yorkshire
S11 7RD

Tel: 0114 287 0323

The JESSOP Consultancy
Unit 18B, Cobbett Road
Zone 1 Business Park
Burntwood
Staffordshire
WS7 3GL

Tel: 01543 479 226

The JESSOP Consultancy
The Old Tannery
Hensington Road
Woodstock
Oxfordshire
OX20 1JL

Tel: 01865 364 543

## SUMMARY OF PROJECT DETAILS

| | |
|---|---|
| **OASIS Number:** | thejesso1-321528 |
| **Planning Reference:** | 18/00294/LBC |
| **TJC Project Code:** | B44 |
| **Project Type(s):** | Historic Building Survey<br>Structural Watching Brief |
| **National Grid Reference:** | SK 46305 63733 |
| **County:** | Derbyshire |
| **District/Unitary Authority:** | Bolsover District Council |
| **Parish:** | Ault Hucknall |
| **Elevation (above sea level):** | c.176m OD |
| **Designation Status(s):** | Grade I Listed Building (NHLE: 1051617)<br>Grade I Registered park and Garden (NHLE: 1000450) |
| **NTHBSMR:** | 60019 / MNA112811 |
| **Prepared by:** | Oliver Jessop MCIfA |
| **Reviewed by** | James Thomson MCIfA, |
| **Date:** | August 2019 |
| **Version:** | FINAL (05.08.19) |

# TABLE OF CONTENTS

# NON-TECHNICAL SUMMARY

*This report presents the results of a Historic Building Survey and a Structural Watching Brief of the East Loggia Roof at Hardwick Hall, Hardwick Hall Lane, Derbyshire, centred on National Grid Reference SK 46305 63733. The archaeological recording has been undertaken in accordance with a Written Scheme of Investigation approved by the National Trust and Bolsover District Council. Hardwick Hall is a Grade II Listed Building (NHLE: 1051617) and falls within a Grade I Registered park and Garden (NHLE: 1000450). The scheme of works comprised the replacement of lead that forms the roof above the Loggia, repairs to the underlaying timber frame and the lath and plaster ceiling above the colonnade below and was undertaken in the Summer/Autumn of 2018.*

*Hardwick Hall was built between 1590-97 to a design by Robert Smythson for Bess of Hardwick to replace the Old Hall and as a new residence to Chatsworth. It is built from sandstone and forms a H-Plan, with a stepped extension at either end. There are Loggias in the central sections of the West and East elevations, and although never completed the original design for the building intended that they should form a complete circuit.*

*The archaeological recording has established that the roof underwent extensive repairs to the leads and sections of the supporting rafters and roof boards between 1966-67. More recent repairs have been undertaken to the lath and plaster ceiling on the colonnade below, although this was not surveyed in detail as part of this scheme of archaeological work.*

*It has been confirmed that the majority of the roof structure that forms the East Loggia is cut from oak and appears to represent historic fabric from the primary phase of construction. The roof was divided into eight main sections supported on substantial ceiling beams orientated west-east. Interestingly, these timbers were not set at right angles to the main wall of the house, having been manoeuvred into position once the parapet had already been constructed. Secondary ceiling joists orientated north-south were tenoned and pegged in position, with a sequence of Roman numerals.*

*Upper raking joists were located in sockets along the east wall of the Hall, to form a fall in the leads of c.5 degrees. Large empty sockets were noted in the corners of each recessed section of masonry hidden within the roof void, presumably originally intended to take massive longitudinal beams along the face of the house. They were however never used, perhaps indicating that the carpentry details of the loggia were adapted following the initial period of masonry construction of the Hall. The recording has established the nature of construction of the roof and demonstrates the value of targeted archaeological recording during programmes of repair and conservation.*

# 1 INTRODUCTION

## BACKGROUND

This report presents the results of a Historic Building Survey and Structural Watching Brief of the Roof structure above the East Loggia at Hardwick Hall, Derbyshire (**Figures 1** and **2**), centred on National Grid Reference SK 46305 63733.

Hardwick Hall is owned by the National Trust (NT).

The programme of repairs were required to address developing defects to the leadwork of the loggia that were permitting water and causing deterioration of the plasterwork to the soffit of the Loggia roof. It is formed of very wide and exceedingly long bays with hollow rolls joints on a shallow pitch of 4 degrees. The lead has been stressed and is suffering fatigue failure leading to leaks.

The monitored works carefully removed the existing lead covering to carry out a programme of sub-structure repairs. The existing plasterwork strengthened, with limited replacement, new ventilation was introduced and the roof covered with new sandscast lead (RMP 2018, 4).

## AIMS

The aim of the Historic Building Survey and Structural Watching Brief was to provide a comprehensive study of the construction and any alterations that have been undertaken to the roof above the East Loggia.

The survey comprises an Analytical Record, compliant with an Historic England Level 3 historic building record (Historic England 2016).

## CONSULTATION

The scope of this Historic Building Survey was formulated in consultation with Sarah Whiteley (Bolsolver District Council (BDC) Planning Archaeologist) and Rosalind Buck (NT East Midlands Archaeological Assistant).

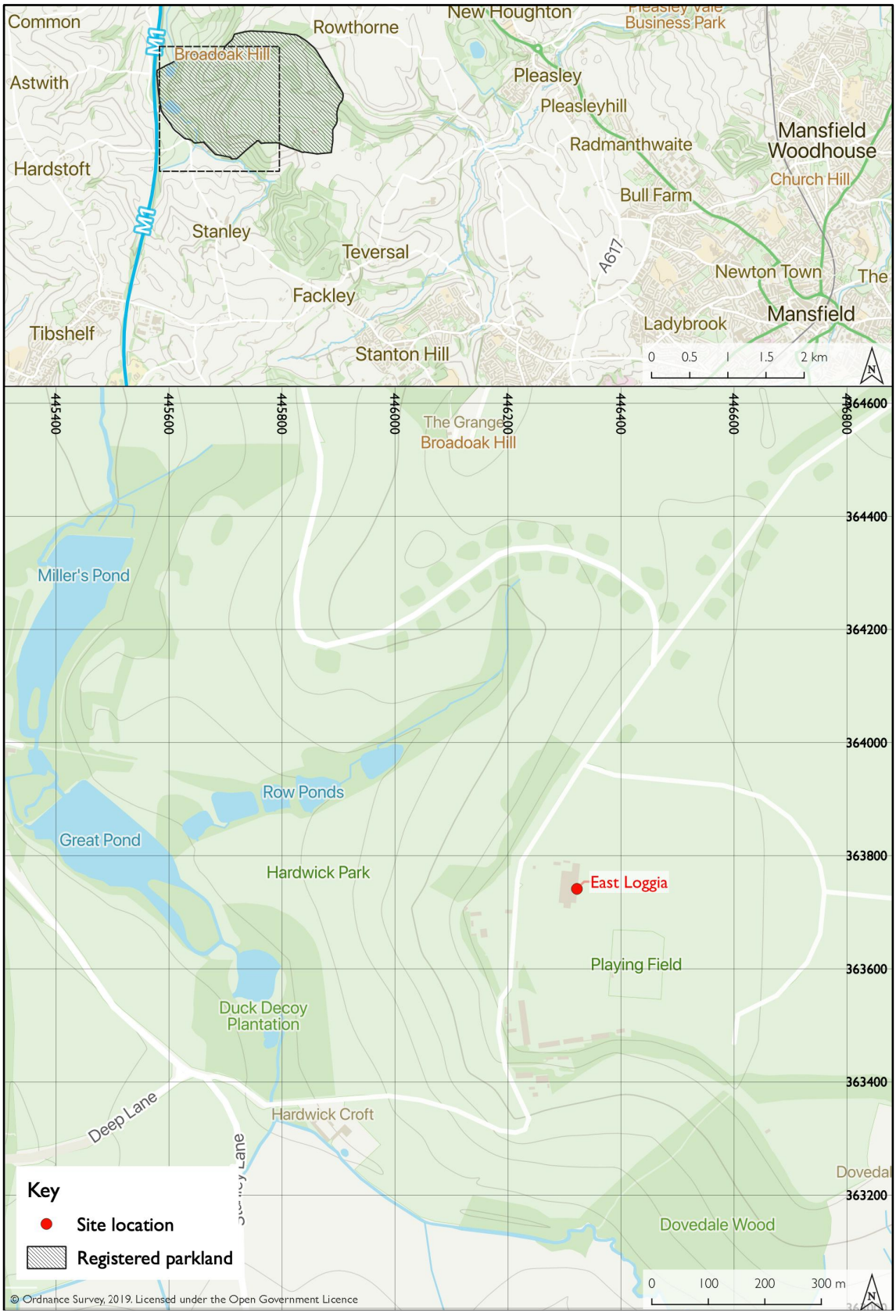



**Figure 1:** Site Location

# 2 SITE LOCATION AND BASELINE CONDITION

## LOCATION OF SITE AND SETTING

Hardwick Hall is located 7.5km to the north-west of Mansfield (**Figure 1**) and lies within an ornamental parkland overlooking the M1 motorway. It has an H-shaped plan with a double stepped extension at each end and flat roofs hidden behind parapets. The hall is two-storeys, with three-storey towers, each over a basement level. Located in the central section of the two principal facades are single-storey colonnades that form a loggia set between the attached towers (**Appendices 1.1, 1.2**). The East Loggia faces the gardens to the rear of the property (**Figure 2**).

The East Loggia comprises the flat roof above the colonnade, which was accessed via a doorway and lobby to the south of the Upper Chapel (**Figure 3**).

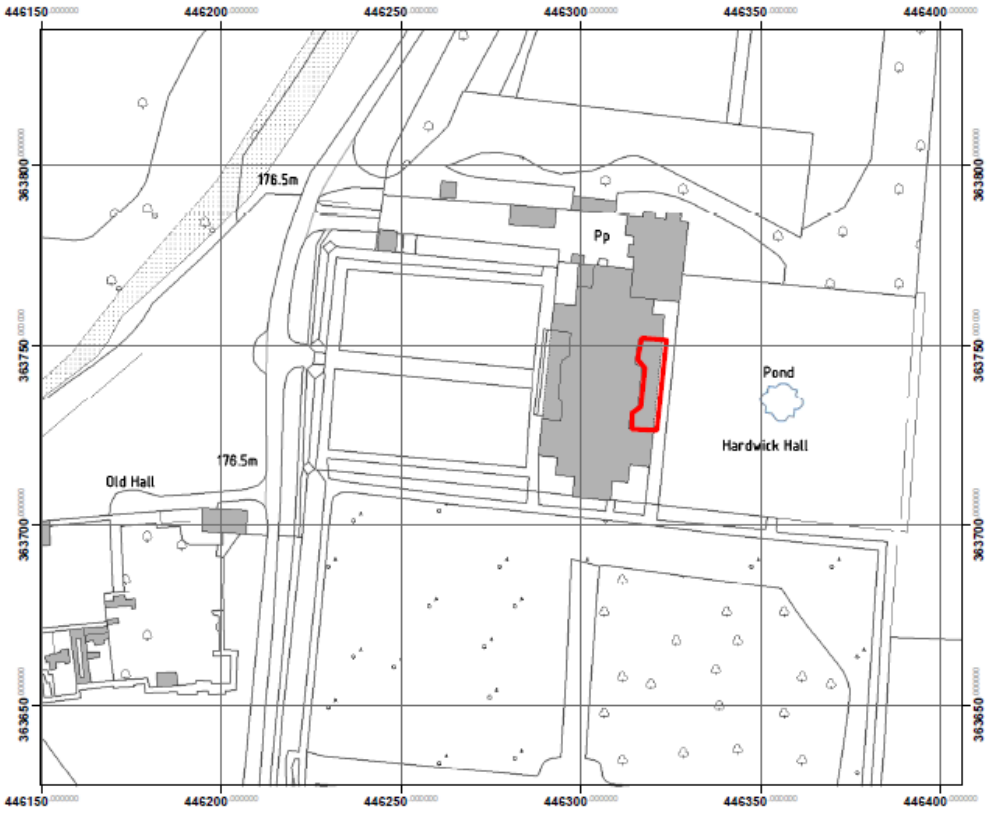



**Figure 2:** Site Location



## DESIGNATION(S)

Hardwick Hall is a Grade I Listed Building (NHLE: 1051617). It sits within a Grade I Registered park and Garden (NHLE: 1000450). Hardwick Hall is registered on the NT HBSMR (ID: 60019 / MNA112811).

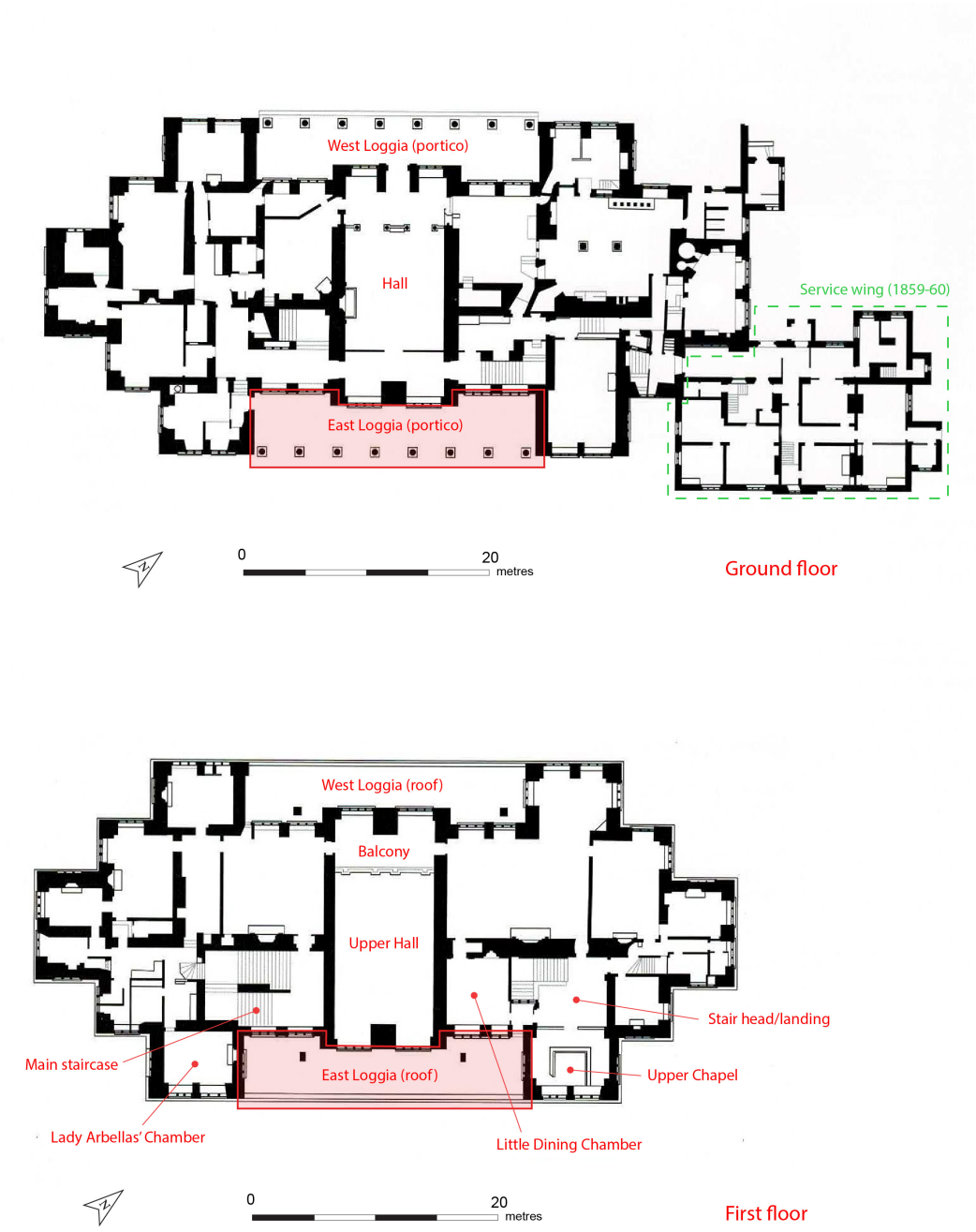



**Figure 3:** Layout of Hardwick Hall (survey areas in red)

## GEOLOGY

The underlying geology of the site is Cadeby Formation – Dolostone, a sedimentary bedrock formed approximately 252 to 272 million years ago during the Permian Period. There are no recorded superficial deposits (BGS, 2018).

# 3 METHODOLOGY

## INTRODUCTION

The principal aim of the project is to produce a Level 2/3 (HE 2016) archaeological building record of the extant historic fabric that comprises the roof above the East Loggia and to make a permanent record in advance of and during the approved scheme of conservation repairs. The methodology has comprised of a series of stages, including a review of previous work, archival research, and survey in accordance with a Written Scheme of Investigation (TJC 2018).

The specific objectives of the programme of building recording are to:

- To identify and record any structural evidence for the development of the roof within all areas to be opened up as part of the works
- To produce measured scaled plans and elevations of the loggia roof, and identify any areas of historic repairs;
- To produce a photographic record of the loggia roof, including detailed shots of the feature's fabric and condition as well as general views of it in its wider setting;
- To assess the current condition of the roof structure;
- To record any historic masonry marks, graffiti and dates;
- To produce a final report that presents the results of the archaeological survey in a meaningful way, allowing for use as a future management tool by the National Trust.

To address these aims the archaeological recording was undertaken in two stages:

**Stage 1:** A record of the building in its present condition was made, prior to the commencement of works, comprising a digital photographic record and descriptive survey of the areas to be affected by the proposed works.

**Stage 2:** A programme of archaeological monitoring during the repair programme was undertaken to make a record of fabric exposed during the course of the works, including a descriptive, measured and photographic record.

### LIMITATIONS

The scope of this report has focused upon the exposed historic fabric and all accessible areas of the East Loggia have been examined as part of this watching brief. The amount of repairs were less invasive than originally intended and the majority of the exposed historic fabric was being retained, for this reason only the southern third of the roof was drawn in detail (see **Figure 4**).

The scope of the report is limited to:

- Review of relevant archive and documentary material;
- Detailed site survey comprising of measured drawing and digital photography;
- The preparation of this report.

### DOCUMENTARY AND ARCHIVE RESEARCH

A rapid overview of existing published documentary and archive research was undertaken to identify the history of the Loggia and to understand its historic context.

The following archaeological databases and archive repositories were consulted:

- NT archives and Derbyshire Record Office; and
- Historic England records (including the Heritage List for England, National Record of the Historic Environment and their historic building Red Boxes)

### SITE RECORDING

#### *Photography*

The exterior and interior areas of the East Loggia were recorded prior to the construction programme with digital photography. Metric ranging poles of an appropriate size were used as a scale, and details of each image were recorded on a pro-forma recording form.

#### *Measured survey*

Existing architectural drawings exist for the site produced by Rodney Melville and Partners were used as a base for archaeological observation during the course of the works, along with the survey of new features that were exposed.

#### *Written Record*

Site notes and observations were documented on pro-forma recording forms and site note books and are included as part of the fieldwork archive (see **Section 7**).

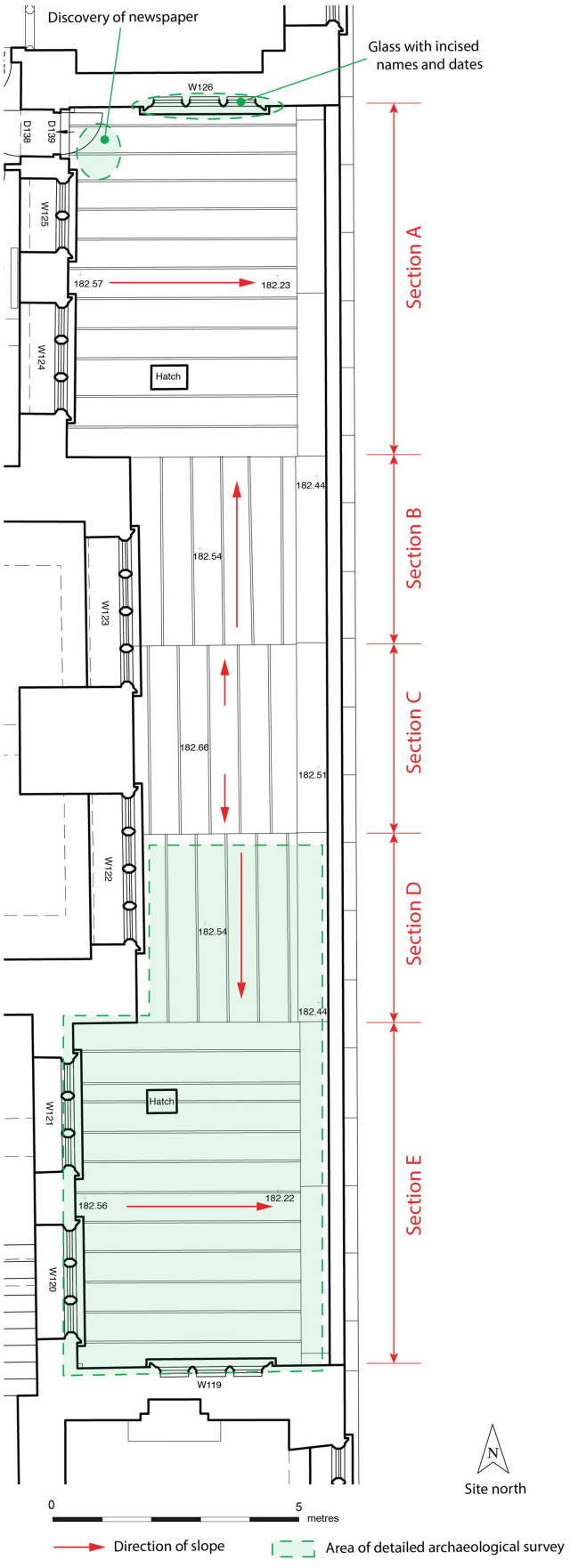



**Figure 4:** Layout of East Loggia roof (after Rodney Melville and Partners 2018)

# 4 UNDERSTANDING THE SITE – HISTORICAL BACKGROUND

## INTRODUCTION

This section of the report presents a summary history of the development of Hardwick Hall and provides an outline of the development of the building and previous archaeological investigations.

## CONSTRUCTION AND DEVELOPMENT OF HARDWICK HALL (AFTER GIROUARD AND ADSHEAD/TAYLOR)

The New Hall at Hardwick is believed to have been built to a design by the architect Robert Smythson (Hartwell, et all, 430) who had a very distinct architectural style and was working locally at Worksop Manor and Wolllaton Hall during the last quarter of the 16th century. Interestingly, there is no direct record of Smythson being responsible for the building, but a payment was made to '*Mr Smythson, the surveyour, and his son'* in 1597 and one of his surviving unlabelled plans is so close in design to the ground plan at Hardwick that it is widely accepted that he was responsible for the architectural form of the building (Girouard 2009, Adshead & Taylor 2016).

The New Hall was named to demark it from the existing Hall on the site, which was part of the landholdings of Bess of Hardwick the Countess of Shrewsbury. Although alterations were underway in 1587 on the existing building, following the death of her husband the Earl of Shrewsbury in 1590, she embarked upon a new project to build a new 'prodigy' house immediately next door to the Old Hall.

Unlike many contemporary houses, the building accounts for the New Hardwick Hall still survive (Durant and Riden 1984) and which provide an almost unparalleled insight into the construction programme, which craftsmen were working on site and how much they were paid. In November 1590 the foundations were dug and laid and by March the following year scaffolding had been erected for the first-storey. Stone started to be quarried further down the hillside and by June the following year in 1592 work had progressed to the second-storey. The cornice around the building had started to be installed by the December of 1593, following by construction of the turrets in 1594. Walls in the gardens were being constructed, and internal plastering and panelling commenced following completion of external elements of the building. The Hall was completed and being occupied by Bess and her household by the end of 1599.

In the proceeding centuries the Cavendish family favoured Chatsworth as their principal Derbyshire residence, resulting in only a limited amount of internal changes and phases of remodelling, which has helped preserve much of the original form and appearance of the building.

THE LOGGIAS

Located on the west and east facades between the projecting towers are two ground level colonnades featuring eight Tuscan Doric banded columns (**Appendices 1.3, 1.4**) with flat roofs (**Figure 5, Appendices 1.1, 1.2**). These features are known as loggia's and were common in courtyard houses, such as at Chatsworth, but their use at Hardwick may represent the first time that they were utilised as architectural elements in a house without an uninterrupted courtyard plan (Hartwell et all, 430). The original scheme was to continue the projecting loggia's around the full extent of the ground floor between the towers to form a rectangular ground plan at first floor level, as evidenced by unsightly horizontal scars in the stonework (**Appendix 1.5**) and blocked access doorways at first floor level in the corner towers.

The West Loggia (**Appendix 1.2**) has a central doorway with moulded architrave and pair of doors which is flanked on each side by three 3-light mullioned and transomed windows with ovolo mouldings. The East Loggia (**Appendix 1.1**) has the same layout as the west except that it lacks the central doorway, with access in the northwest corner (**Appendix 1.6**) via a small lobby between the Little Dining Chamber (now Paved Room) and the Upper Chapel.

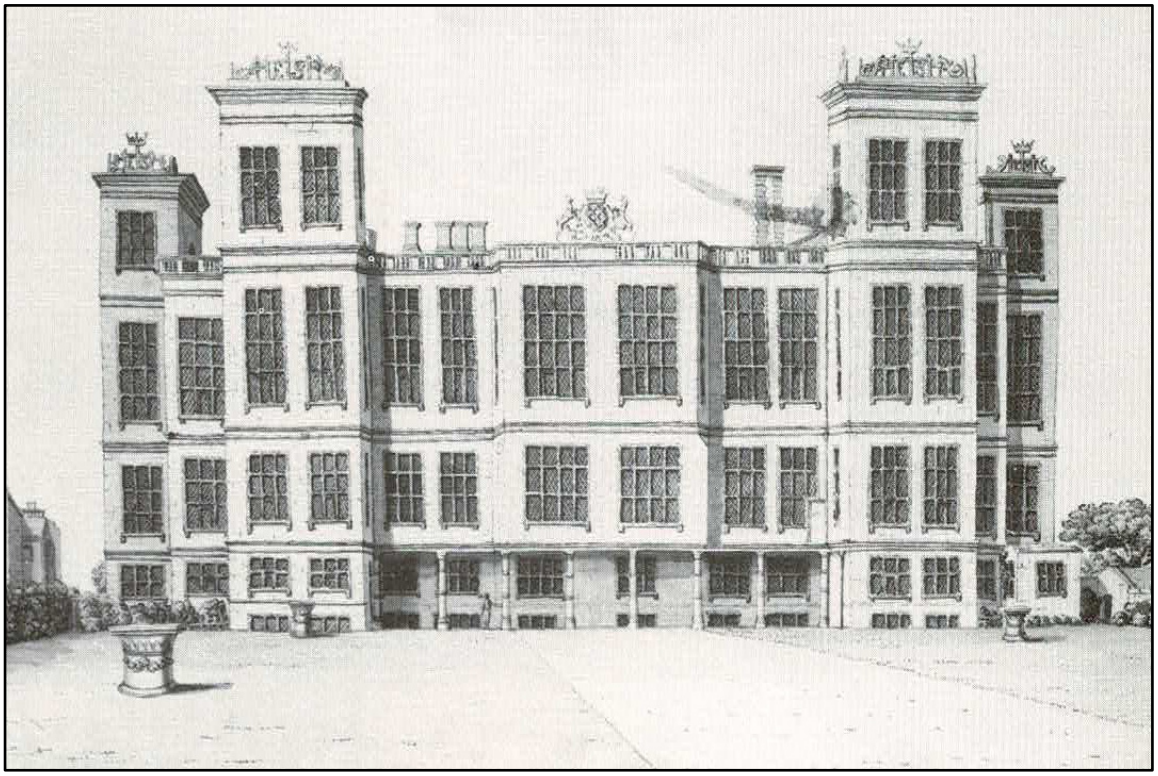


**Figure 5:** Watercolour of the East Front by Samuel Hieronymous Grimm, 4th October 1781

The purpose of the loggia's was similar to the flat leaded roofs (the leads) of the Hall and contemporary buildings elsewhere, in that they provided an elevated means to view the gardens and to take exercise with a certain degree of privacy away from other members of the household or servants. In addition, the roofs often provided a dramatic means of access to upper floor banqueting houses, or rooms, which at Hardwick were located in the top of the projecting towers.

BUILDING ACCOUNTS

A transcript and discussion of the building accounts for Hardwick Hall were published in 1984 by Durant and Riden. They are incredibly detailed and discuss payments made to the masons, carpenters, plumbers, plasterers and glaziers, thus providing a contemporary record of the stages of work and costs associated with building the Hall between 1591-98. Although, they are slightly ambiguous in places in regards to where work was being undertaken, there are a series of entries that relate to the '*walke on the east syde*' of the house, which are assumed to relate to the construction of the East Loggia and are reproduced below (after Durant and Riden 1984):

Payments to masons (for hewing stone for 8 columns and cornice and for setting columns)

(169v) 9th August 1595 – *paid to Gryffyne and Adames for hewing tow cullumnes for the east syd of the house*. 2-8-0

(170r) 23rd August 1595 – *paid to William Gryffyne and Adames for hewing tow cullumnes for the east syd of the house*. 2-8-0

(170r) 6th September 1595 – *paid to Gryffyne and Adames for hewing tow collumns for the east syde of the house*. 2-8-0

(171r) 4th October 1595 – *paid mor to Gryffyne and Adames and Leonord now For hewing one cullum 24s and so ar paid for 7*. 1-4-0

(171r) 18th October 1595 – *paid to Gryffyne and Adames and Leanarde for hewing one cullum 24s and so they ar paid for hewing all the cullumes*. 1-4-0

(204v) 15th November 1595 – *Payd to William Gryffyne….for setting eight cullumnes on the east sydd of the new building at 6s apece*. 2-8-0

(172r) 29th November 1595 – *paid [to Nayll and Malary?] for hewing 54 foots cornishe for the walke of the east syd of the new building at 6d the foot 27s and for 54 foots of ashler to back the same cornishe at 1¼d the foot 5s 7½d. 1-12-7½*

(172r) 29th November 1595 – *paid [to Nayll and Malary?] for hewing44 foots table for to set upon the same Cornish at 2½d the foot. 0-9-2*

(172v) 13th December 1595 – *paid [to Nayll and Malarye?] for hewing 30 foots cornish for the walk of the east syd of the new building at 6d the foot 15s and for 30 foots of ashler to back the same cornishe at 1¼d the foot 3s 1½d and so all the Cornish and ashler for that walk is payd.*

Payments to carpenters (for constructing the roof – framing, raising (erecting) and boarding)

(276v) 20th September 1595 – *payd to Thomas Benbridg the carpenter…uppon a Reckoning of £10 that he to hav for framing Rering and bording of the tow walks in the new building. 2-10-0*

*(277r) 21st February 1596 – Payd to Thomas Benbridg the carpenter…..in full payment of his bargain for tow walks one either syd of the new building. 7-8-0*

Payments to plasters (for plastering the ceiling of the colonnade)

(267v) 2nd Aprill 1598 – *paid to John Bynnye for shuttinge the Roff of the walke upon the east syde of the new building in measur one hundread and fyftye yards at 1¼d the yard. 0-15-7½*

The building accounts for the East Loggia detail that between the 9th August and 18th October 1595 payments were made to William Gryffyne, [James] Adames and [?] Leonord, who were all masons, to carve (hew) the 8 Tuscan columns for the East Loggia (**Appendix 1.3**). The stone would have been quarried further down the hillside, and presumably once cut they would have been carved in the quarry before being transported up to the hall. On the 15th November 1595 William Gryffyne was then paid for setting/fixing the 8 columns in their final locations to form the colonnade. In the following weeks (29th November to 13th December 1595) after the columns were positioned on the East Front (**Appendix 1.1**), payments were made to [Henry] Nayll and [Henry] Malary for cutting stone for the cornice/entablature above the columns, along with ashlar facing stone for the inner face.

On the 20th September 1595 after the columns had started to be cut, Thomas Benbridg(e) 'the carpenter' was contracted for a sum of £10 to '*frame, rering and board*' the two walks (Loggias) on either side of the house. It appears he was initially paid £2 10s as an upfront payment, perhaps to purchase timber, followed by a final payment on the 21st February 1596 of £7 8s which was 2s short of the original value of the contract.

The carpentry undertaken by Thomas Benbridg(e) would have involved sawing and cutting the timber to the correct size and shape, cutting the joints and then fully assembling each roof in a framing yard away from the building. The principal structural members would have been numbered/marked (**Appendix 1.34**) in a logical sequence as part of this process to allow the whole structure to be dismantled and transported to the hall for final assembly. Once the timbers were set in their correct positions (**Appendix 1.25**), they would have been pegged and nailed (**Appendix 1.31**). Finally, the upper sloping roof pitch would have then been boarded with pine boards (**Appendix 1.24**) ready for the addition of sheets of lead as a final roof covering.

The accounts do not detail payment for, or a date for when the lead was added to complete the upper part of the roof, but in April 1598 John Bynnye was paid 15s 7½d for 'shuttinge the roof', which would have comprised the fixing of riven laths (**Appendix 1.44**) to the exposed timbers on the underside of the roof within the colonnade and then applying a series of coats of hair and lime plaster (**Appendix 1.3**). It is interesting to note that the plastering was undertaken over two years after the roof of the East Loggia had been completed in February 1596, presumably once the structure was weathertight, the focus was to complete internal areas of the house.

### Previous Archaeological Survey

There has been no previously archaeological survey or investigation of the roof structure that comprises the East Loggia at Hardwick. The surrounding elevations of the east façade have however, been subject to a programme of detailed archaeological recording by Richard Morriss (Morriss 2001) as part of conservation repairs to the external stonework undertaken in 2000. This scheme of work established that there were four phases of stone repair on the east elevation of the hall and recorded over 32 different mason's marks.

# 5 UNDERSTANDING THE SITE – BUILDING DESCRIPTION

## INTRODUCTION

The following section presents the results of the archaeological investigation of the historic fabric that comprises of the East Loggia roof at Hardwick Hall. Floor plans showing the phasing are presented as **Figures 6-10**, and accompanying photographs are included as **Appendix 1**.

## LAYOUT AND FORM OF THE EAST LOGGIA

The roof of the East Loggia can be sub-divided into five sections (see **Figure 4**). These are partially as a result of secondary modifications to the design of the roof undertaken in the 1960s (**Appendices 1.7, 1.8**), presumably to improve rainwater run-off. The historic arrangement of the roof however, comprised of a single pitch from west to east (see **Figure 8**), resulting in a very shallow fall of 26cm over a distance of 4.4m (**Appendix 1.10**).

The roof was accessed via a doorway in the northwest corner (**Appendix 1.9**). The colonnade at ground level (**Appendices 1.3, 1.4**) below has not been surveyed within this scheme of archaeological investigations which concentrated upon recording the physical structure of the roof timbers – in particular the south part of the roof, Section E (**Figure 4**). The ceiling of the colonnade was plastered and the roof covered in large sheets of lead.

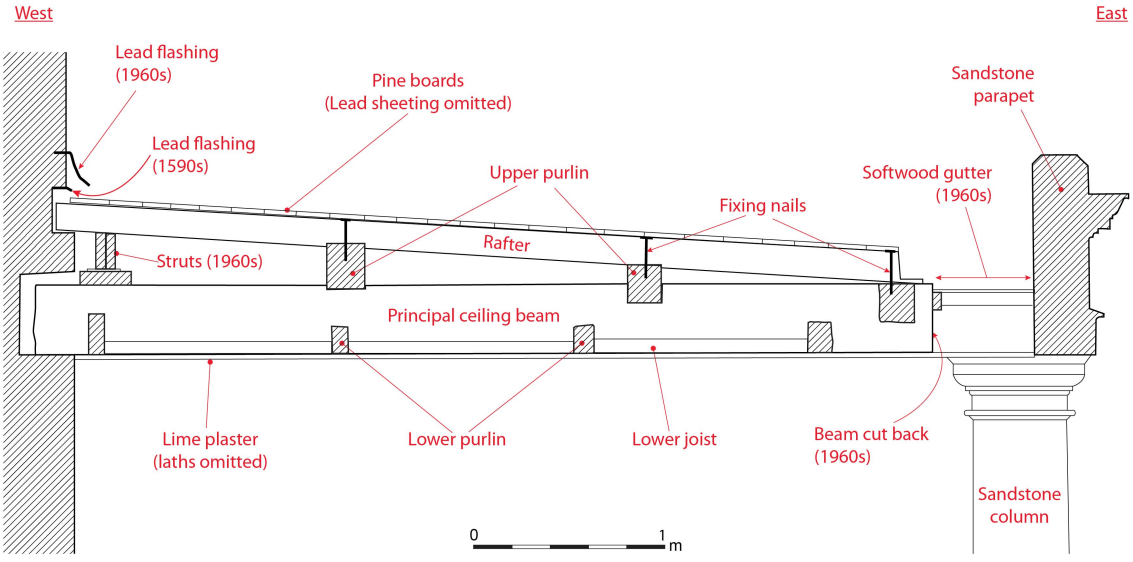



**Figure 6:** Cross section through East Loggia roof – Section E

PHASED DEVELOPMENT

There appears to be five main phases of construction and alteration within the historic fabric that comprises the East Loggia.

*Phase 1: 1595-98*

The original construction of the East Loggia and roof. This began with the construction of the main block of the hall, with recesses built into the fabric for roof timbers. The colonnade and entablature were then built, followed by the insertion of the roof timbers which has previously been cut and laid out off site in a framing yard. The pine boards and lead were then applied and the ceiling of the colonnade below was plastered. Interestingly, a number of the recesses for the roof timbers were never used (**Appendices 1.36, 1.37, 1.41**), presumably the design of the roof structure was changed following the construction of the walls and the date when the roof was cut and assembled prior to being raised into position. It is suggested that the carpenter Thomas Benbridg(e) may have had difficulties during the installation of the roof as the principal ceiling beams are angled and not set at right angles to the house or colonnade below (**Figure 7**).

*Phase 2: Late 19th Century (?)*

A single localised repair was observed in the south-west corner of the roof comprising of a pair of long wrought iron bolts with square heads (**Appendix 1.33**) on either side of a large shake (split)

*Phase 3: 1966-69*

This phase comprised of a comprehensive programme of repairs of the whole roof. This entailed the partial replacement of historic timbers (mainly rafters) with softwood. Sections of the softwood boards were replaced along with the lead sheet, base of downpipes, flashing and a new gutter along the eastern side of the roof (**Appendices 1.10-1.14**). The central section of the roof was re-modelled and two access inspection hatches were created (**Appendices 1.7, 1.12**).

*Phase 4: 1970s-2017*

Minor patch repairs were undertaken to the lead sheet (**Appendix 1.20**) and a single sheet was replaced in Section A in the northern part of the roof (**Appendix 1.10**).

*Phase 5: 2018-2019*

The current phase of repair and restoration of the East Loggia roof by the National Trust.

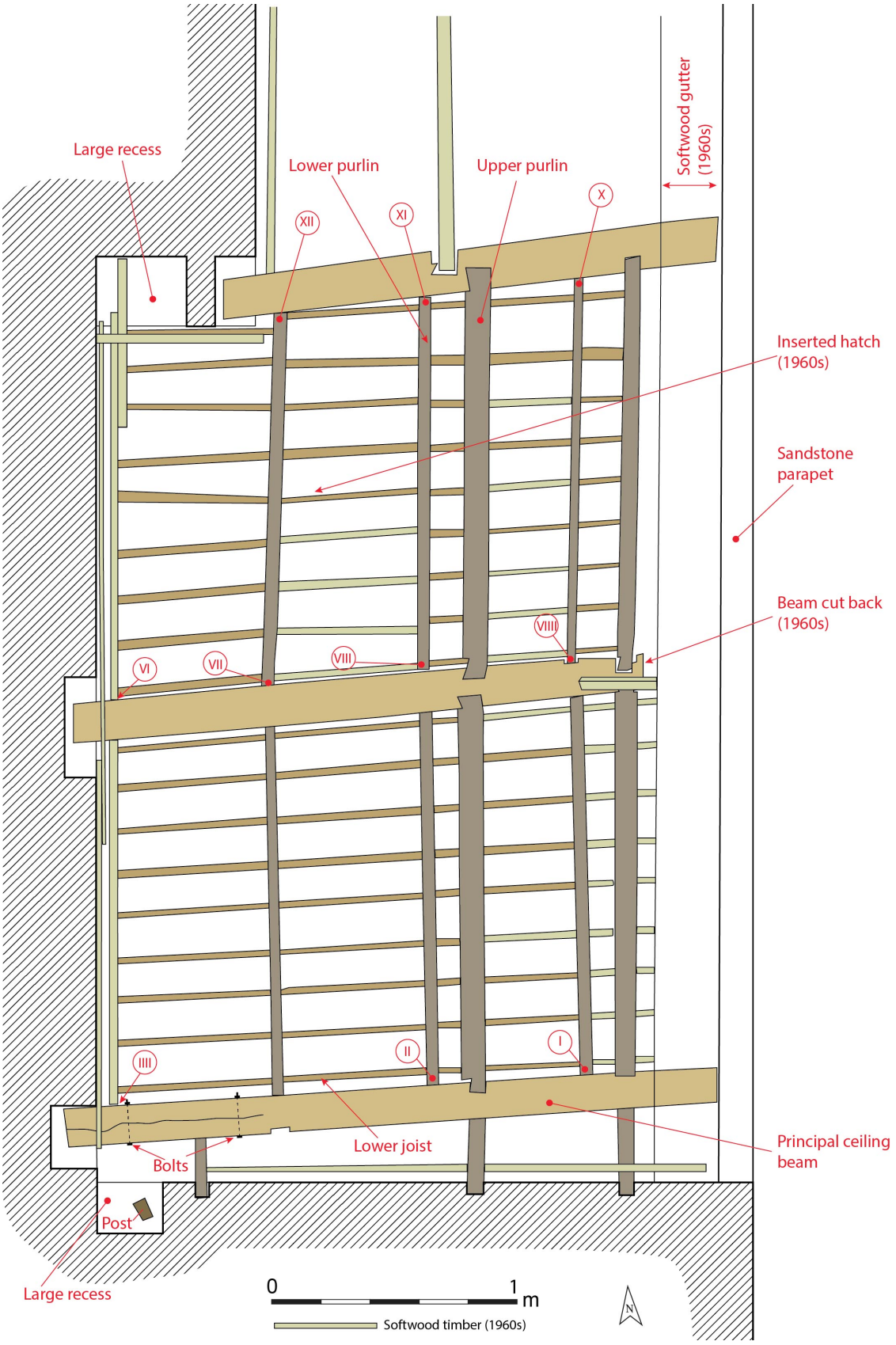



**Figure 7:** Arrangement of lower timbers within Section E

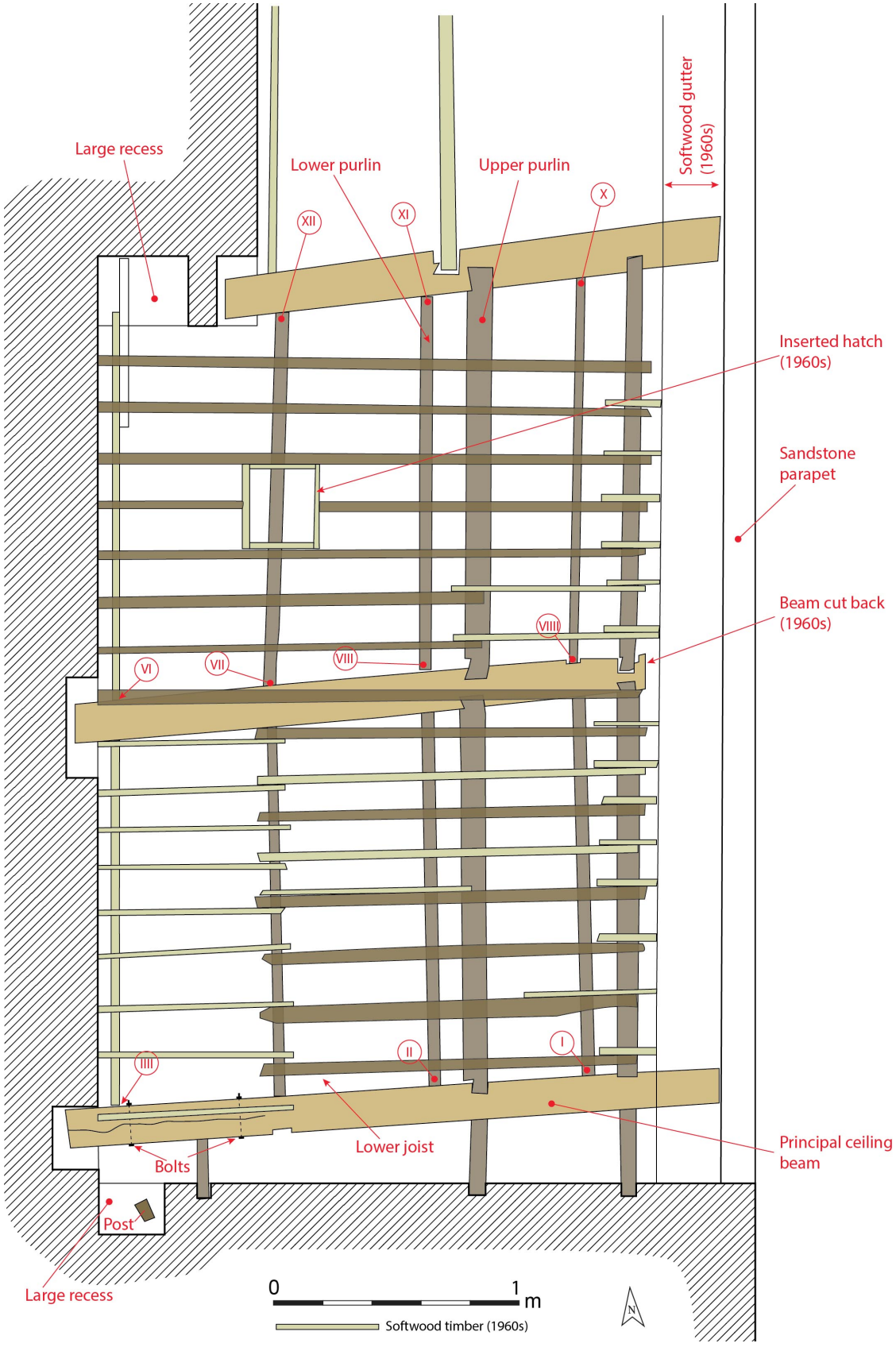



**Figure 8:** Arrangement of upper timbers within Section E

DESCRIPTION OF FABRIC

*The Roof Covering*

The roof of the East Loggia comprises of flat sheets of lead, with timber rolls that are laid over softwood boards. The timber boards were butt jointed and up to 4.32m in length, measuring 2.5cm x 17cm. Approximately 80% of the boards were replaced, although a section in the south-west corner may have been original (**Appendix 1.24**), being wider at 27cm, although shorter in length up to 3.4m. Two forms of nails were noted (**Appendix 1.49**), with the wider ones having handmade nails.

*The dimensions of the lead over each section of the roof are as follows:*

**Section A**: 12x sheets orientated west-east that measure 4.64m in length, with widths varying from 36cm, 44cm, 53cm, to 69cm.

**Section B**: 6x sheets orientated north-south that measure 3.72m in length, with widths varying from 24cm, 58cm to 60cm. There is an 8cm step down to the gutter along the east parapet.

**Section C**: 6x sheets orientated north-south with two pitches and step down 10cm to the gutter along the east parapet, and a 7cm step down to Sections B and D. The lead sheets measure 4m in length, with widths varying from 30cm, 52cm, 59cm.

**Section D**: 6x sheets orientated north-south that measure 3.76m in length, with widths varying from 17cm, 59cm to 60cm. There is an 8cm step down to the gutter along the east parapet.

**Section E**: 12x sheets orientated west-east that measure 4.6m in length, with widths varying from 37cm, 45cm, 57cm, 58cm to 59cm.

Set within the pitch of Sections A and E are two lead covered access hatches measuring 37cm x 62cm (**Appendix 1.18**). The upstands of the hatches contain pencil graffiti of the tradesmen who were involved in the roof construction in Phase 3. In the hatch in Section A the names were (**Appendices 1.14-1.17**): E.Wisher, F.Holt, K.Hammond – dated April 1966. A fourth name EDSONs may be the company they worked for. In the hatch in Section E the names were (**Appendix 1.19**): F.Holt and K.Hammond, dated 22nd March 1966. A newspaper stuffed beneath the doorway (**Appendix 1.46**) provides another date for works to the roof – 17th March 1967 (**Appendix 1.21**).

Chased within the horizontal courses of the ashlar masonry of the façade of the House are strips of lead flashing (**Appendix 1.23**), which provide a water tight seal to the edge of the roof. Once the

lead covering had been lifted and the boards removed a slight offset was noted in the vertical plain of the wall face which had trapped sections of an earlier flashing (**Appendices 1.38, 1.39, 1.47**) (**Figure 6**). This was set within the masonry joint of the course below the existing flashing with large flat headed iron nails/pegs (**Appendix 1.47**).

In the corners of each bay of the roof, square sectioned lead gutters directed rainwater from the main roof of the house, down onto the roof of the East Loggia. The base of the downpipes are angled (**Appendix 1.23**) and appear to have been remodelled in Phase 3. The one in the north-west corner had scratched graffiti - E F 1969 (**Appendix 1.22**).

The timber boards were butt jointed and up to 4.32m in length, measuring 2.5cm x 17cm. Approximately 80% of the boards were replaced, although a section in the south-west corner may have been original (**Appendix 1.24**), being wider at 27cm, although shorter in length up to 3.4m. Two forms of nails were noted (**Appendix 1.49**), with the wider ones having hand-made nails.

*The Timber Frame*

The roof of the east Loggia is supported upon seven large principal ceiling beams that are roughly orientated west-east (**Figure 7**). Although are slightly angled, presumably when being set within the existing stonework of the house and colonnade it was not possible to rotate them fully to a right-angled position. These beams are oak with dimensions of 33cm x 40cm and lengths of 5.10-5.2m. The central beam in Section E has been cut back (**Appendix 1.27**), presumably to remove a rotten piece of timber as part of the repairs undertaken in the 1960s. The eastern end of the principal ceiling beams are positioned on top of the stone columns of the colonnade below, whilst the opposite ends are housed within large sockets built within the stonework of the house.

Interestingly, there are opposing stone recesses/sockets in the south-west and north-east corners of Section E of the roof (**Appendices 1.36, 1.41**). These were formed as part of the original phase of construction of the house, presumably being left empty until the roof was constructed, and one still contains an oak post supporting the masonry above (**Appendix 1.37**). However, the fact that these two recesses were never used, suggests that the original intention may have been to locate a large beam between them to form part of the East Loggia the roof. One interpretation is that once the masonry has been constructed above and the scaffolding removed, it would have not been possible to retrospectively insert a timber of the required length within the openings and thus the form of the roof was altered.

Following the insertion of the principal ceiling joists the whole frame was secured in position by the insertion of three short timbers along the south wall of the House. These were set within small stone cut sockets and the timbers were then tenoned from above into the upper face of the principal ceiling beam (see **Appendix 1.32**).

Located between the principal ceiling beams were two sets of purlins – upper and lower (**Figure 9**). The upper purlins were tenoned from above into the upper face of the principal beams (**Appendices 1.25, 1.27**) and fixed in position with large T-headed nails (**Appendix 1.48**). The upper purlins measured c.20-26cm, with lengths of c. 3-3.05m.

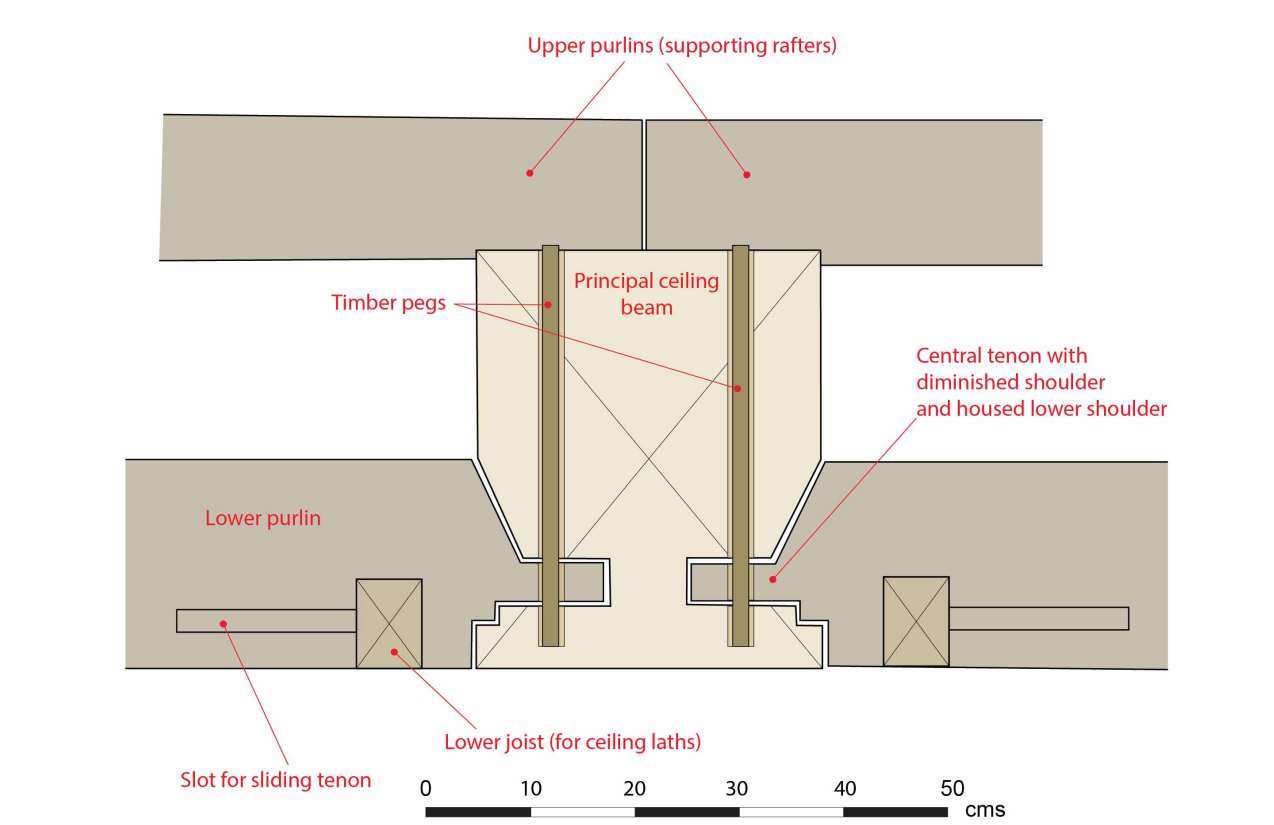



**Figure 9:** Detail of joints used for purlins

Set into the base of the principal ceiling beams were four lower purlins within each bay at c.1.2m centres. These timbers were oak (**Appendix 1.45**) and jointed into the beams with a central tenon with a diminished upper shoulder and a housed lower shoulder (see **Figure 9**), being secured with an oak peg from above. At either end in the upper faces and also incised into the ceiling beams were chisel cut Roman numerals (**Appendix 1.34**) to act as assembly marks.

Between the lower purlins secondary timbers measuring 5cm x 8cm x 1.1m were positioned at 0.35-0.44m centres. These lower joists formed the batons onto which laths were nailed for the plaster ceiling below. The lower joists contained simple central tenons that were located within horizontal grooves within the lower purlins (**Appendix 1.35**), indicating that they had been slid from the side into position. Many of these timbers had rows of nails (**Appendix 1.44**) exposed within the roof void, indicating that they had either been rotated, or more likely they represent reused timbers from former studwork partitions, or ceilings used elsewhere at Hardwick, perhaps from the Old Hall.

The upper section of the roof (**Figure 8**) comprised of long oak rafters that were housed in rough cut sockets in the east wall of the House (**Appendix 1.40**) and nailed in position at the east end (**Appendix 1.30**) with large T-headed nails. Where the rafters oversailed (**Appendix 1.26**) the upper purlins they were cut back and thin strips of wood were used to pack them up to obtain the correct fall, or pitch of roof. They were also secured in these locations with large nails (**Appendix 1.31**). On the northern face of each rafter incised Roman numerals were noted (**Appendix 1.30**), although many of them were obscured by later softwood repairs and a full sequence was not able to be surveyed.

Within the roof occasional timbers contain features such as redundant mortices (**Appendices 1.32, 1.43**) or rows of nails (**Appendix 1.44**) which suggest that when the roof was built the carpenters were recycling structural timbers from elsewhere.

The west end of the south principal ceiling beam (**Figure 7**) contains a large shake (split) in its upper face. This may have been due to water leakage from the downpipe immediately above (**Appendix 1.23**). There are two large bolts with square heads (**Appendix 1.33**) on either side of the shake and appear to represent a historic repair in this corner of the roof.

During the 1966-69 phase of repairs the ends of many of the rafters were strengthened by shorter sections of softwood (**Appendix 1.28**), along with a complete bay in the south-west corner (**Appendix 1.38**), where the original timbers were cut back to the edge of the upper purlin (**Appendix 1.29**). These new timbers were noticeably narrower in section then the original oak purlins, as evidenced by the sockets within the east wall (**Appendix 1.39**).

As part of the repairs undertaken in Phase 3 the central sections of the roof were raised (**Appendix 1.8**). This involved the construction of a softwood super structure that sat above the existing rafters (**Appendix 1.42**) being nailed together with round wire headed nails (**Appendix 1.49**).

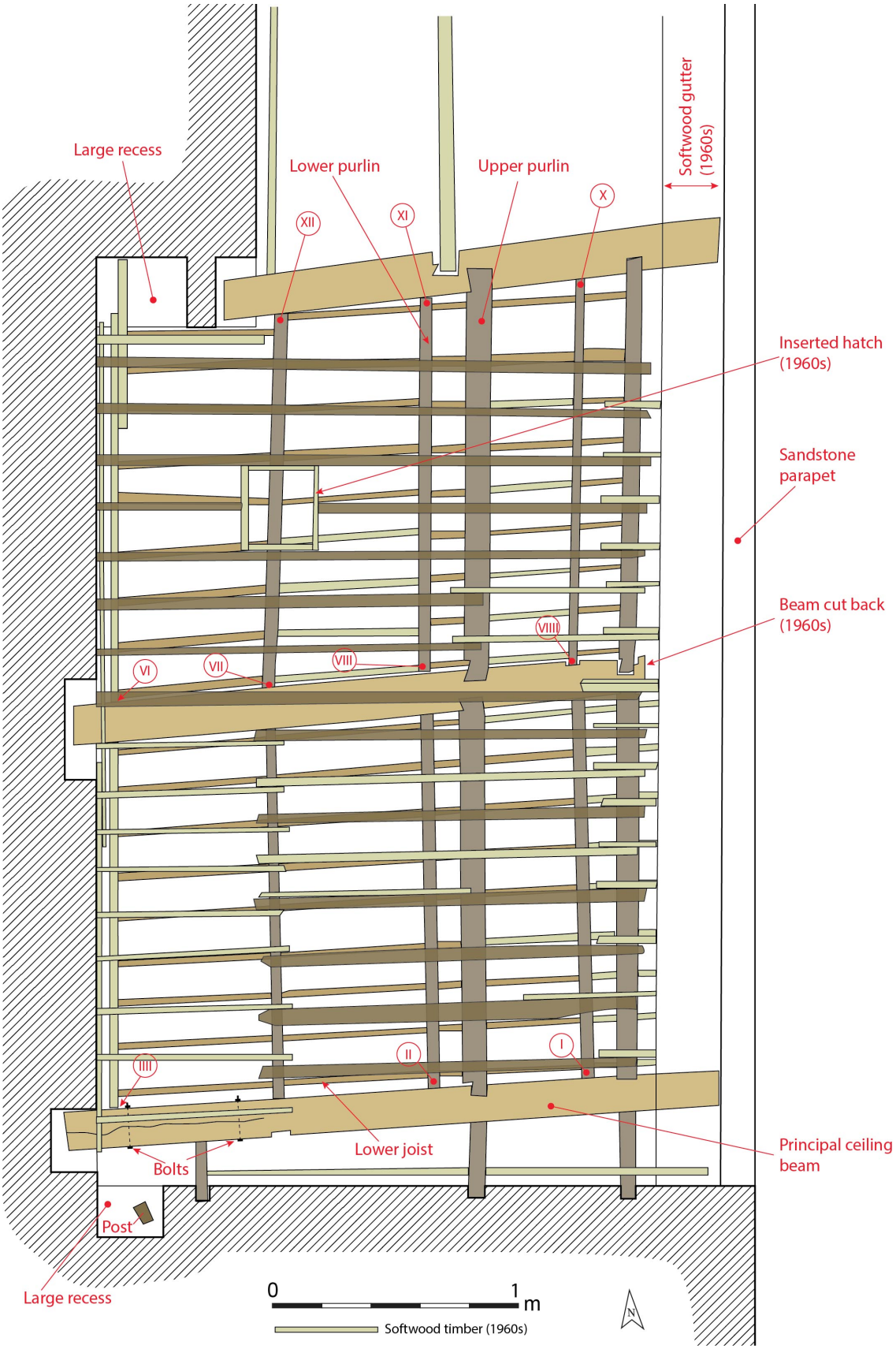



**Figure 10:** Plan of all timbers surveyed in Section E of the East Loggia roof

GLAZING AND LEADED LIGHTS

Although beyond the scope of this watching brief during the survey of the exposed sections of roof, the opportunity as taken to examine the adjacent walls and windows in case any additional evidence might exist that was related to the functioning of the roof.

The stone walling had previously been surveyed in the 2000 by Richard Morriss and no new masons' marks were noted, however an examination of the glazing at first floor that overlooked the East Loggia did reveal additional evidence not previously recorded.

All of the leaded lights comprise of diagonally set lead cames with a mixture of clear (modern) and greenish glass (quarries). In the northern window (W126) that forms the south wall to the Upper Chapel (**Appendix 1.50**) a number of the quarries contained graffiti in the form of incised names, some with dates. All of the windows appear to have undergone a degree of repair, with some being screwed in position with flat headed screws. The clear glass is secondary and 20th Century in date.

*The names that were observed are as follows:*

| Incised name | Appendix |
|---|---|
| *North window (right hand light)* | |
| Mary Ludlam 1776 | (**Appendix 1.51**) |
| Francis Beth August 27 1788 | (**Appendix 1.52**) |
| E.B Clay cross Feb 1899 | |
| Scawy joules raimber 1891 clay cross | |
| G.Wall 26th Nov 1911 plumber | (**Appendix 1.55**) |
| R Ball 1960 | |
| Cyril Woodgate 1968 Worksop<br>[**note:** this was on clear (modern) glass, potentially the glazier who restored the windows] | (**Appendix 1.56**) |
| Louise | |
| Hob | |
| Bicgary Part (unclear)<br>[**note:** if viewed in reverse/flipped over this spells Richard Dory] | (**Appendices 1.51, 1.52**) |
| *North window (central light)* | |
| DAV | |
| Ball | |
| John | |
| Denis | |

The marking of the glass quarries with names and dates confirms that the roof was accessed for a variety of uses and people. Further research however, along with the survey of the windows along the West Loggia may provide a greater insight into the individuals who left their names, being a mixture of guests/servants/craftsmen working at or visiting the Hall.

# 6 DISCUSSION AND CONCLUSION

## Discussion

The archaeological watching brief that has been undertaken during repairs to the East Loggia have enabled its constructional sequence to be established and that the majority of the timber frame dates to the original phase of construction in the 1590s. In addition to this, the survey has identified historic carpentry and jointing techniques, along with subsequent phases of repair all of which were set as research aims at the outset of the project.

Whilst the original single pitch of the roof has been lost due to modifications during the 1960s, its original design can still be appreciated and the function of the space for walking and to view the gardens is apparent.

It was interesting to note that the two windows at the north and south of the East Loggia lighting the Upper Chapel and Lady Arbellas Chamber are false windows. Internally they comprise of masonry walls that are painted a dark colour to give the impression of windows and thus maintain the overall appearance and symmetry of the façade. The remaining windows along the east façade light the Main Staircase and Upper Hall, with only the Little Dining Chamber (now Paved Room) directly overlooking the leads. It may be significant that the only door onto the East Loggia roof is adjacent to what was the Little Dining Chamber and may indicate a direct link between them. This is suggested by a historic refence that relates to the West Loggia on the opposite side of the House, where musicians and entertainment could take place externally whilst meals, or events were being undertaken internally:

'*Given my lady to…the Musicians that came from Court X1 IIIS. More given to them playing at my La:Chamber window vs'* (Girouard 2009, note 60. Pg 485).

Interestingly, Girouard (Craven and Stanley 2004) considers that the interior of the Hall underwent a degree of redesign as the construction works were undertaken, principally in relation to the desire for internal and external symmetry. Evidence for changes to the original design are apparent within the roof structure of the East Loggia and may survive hidden elsewhere within the building within floor voids, or behind panelling, and applied structural fabric.

RECOMMENDATIONS

1. Should the opportunity arise in the future, it is recommended that glazing elsewhere at Hardwick Hall is examined for incised graffiti to add to the archaeological record of the building.

2. Any repairs that are undertaken to the West Loggia, or main roof the House would benefit from an archaeological watching brief to further survey and understand the carpentry techniques that were employed at Hardwick during the 1590s.

3. The results of this programme of archaeological recording should be considered for publication in an appropriate architectural, or archaeological journal to disseminate them to a wider professional audience.

# 7 SUPPORTING INFORMATION

## AUTHORSHIP

Fieldwork and archive research was undertaken by Oliver Jessop MCIfA. This report has been prepared by Oliver Jessop MCIfA. Editing has been provided by James Thomson MCIfA.

## ACKNOWLEDGEMENTS

Rosalind Buck and Matt Horsfield of the NT are thanked for commissioning the project and for their help and advice throughout all stages of the watching brief. Ross Hetherington of Rodney Melville and Partners is acknowledged for providing drawings and details of the scope of restoration works. Matt Davis and Rob Bailey of Croft Building & Conservation are thanked for providing safe access to facilitate the survey.

# 8 BIBLIOGRAPHY AND SOURCES

## SOURCES AND REFERENCES CONSULTED

*Bibliography*

Adshead, D. and Taylor, D. 2016. *Hardwick Hall a great old castle of Romance*. Yale University Press

BGS (British Geological Survey) 2017. *Geology of Britain Viewer* [online]. Available: mapapps.bgs.ac.uk/geologyofbritainviewer/home.html. Accessed: 10/04/18.

Chartered Institute for Archaeologists (CIfA). 2014. *Standard and Guidance for the archaeological investigation of standing buildings or structures.* CIFA: Reading

Craven, M and Stanley, M. 2004. *The Derbyshire Country House*. Landmark Collectors Library

Durant, D and Riden, P. 1984. *The Building of Hardwick Hall, Part2: The New Hall, 1591-98*. Derbyshire Record Society, Vol. IX. Alan Sutton Publishing Ltd

Hartwell, C., Pevsner, N, and Williamson, E. 2016. *The Buildings of England – Derbyshire*. Yale

Historic England 2016. *Understanding Historic Buildings: A Guide to Good Practice.*

Girouard, M. 2009. *Elizabethan Architecture its rise and fall, 1540-1640*. Yale University Press

Girouard, M & Durant, D. 2010. Hardwick Hall. NT (Guidebook)

Morriss, R. *2001. Hardwick Hall, Derbyshire – an Archaeological Report on the East Front. (Unpublished) Mercian Heritage Series No.126*

RMP. 2018. Hardwick Hall, east Loggia Roof Repairs – Design, Access and Heritage Statement. (unpublished) Rodney Melville and Partners. No.7028

TJC. 2018. Written Scheme of Investigation for Historic Building Recording and Structura Watching Brief – prepared on behalf of the National Trust. (Unpublished) The Jessop Consultancy report No.TJC2018.60

## PROJECT ARCHIVE

The fieldwork archive will be deposited with the National Trust (August 2019).

*Its contents include:*

- Field survey drawings and Site notes
- Archive research
- Photographic registers and plans
- Prints of digital photographs.

# APPENDIX 1:

## SITE PHOTOGRAPHY

**Appendix 1.1:** General view of the East Loggia, looking northwest (2m scale) (**Photo D87**)

**Appendix 1.2:** General view of the West Loggia, looking east (2m scale) (**Photo D105**)

**Appendix 1.3:** Detail of collonade below East Loggia, looking south (2m scale) (**Photo D94**)

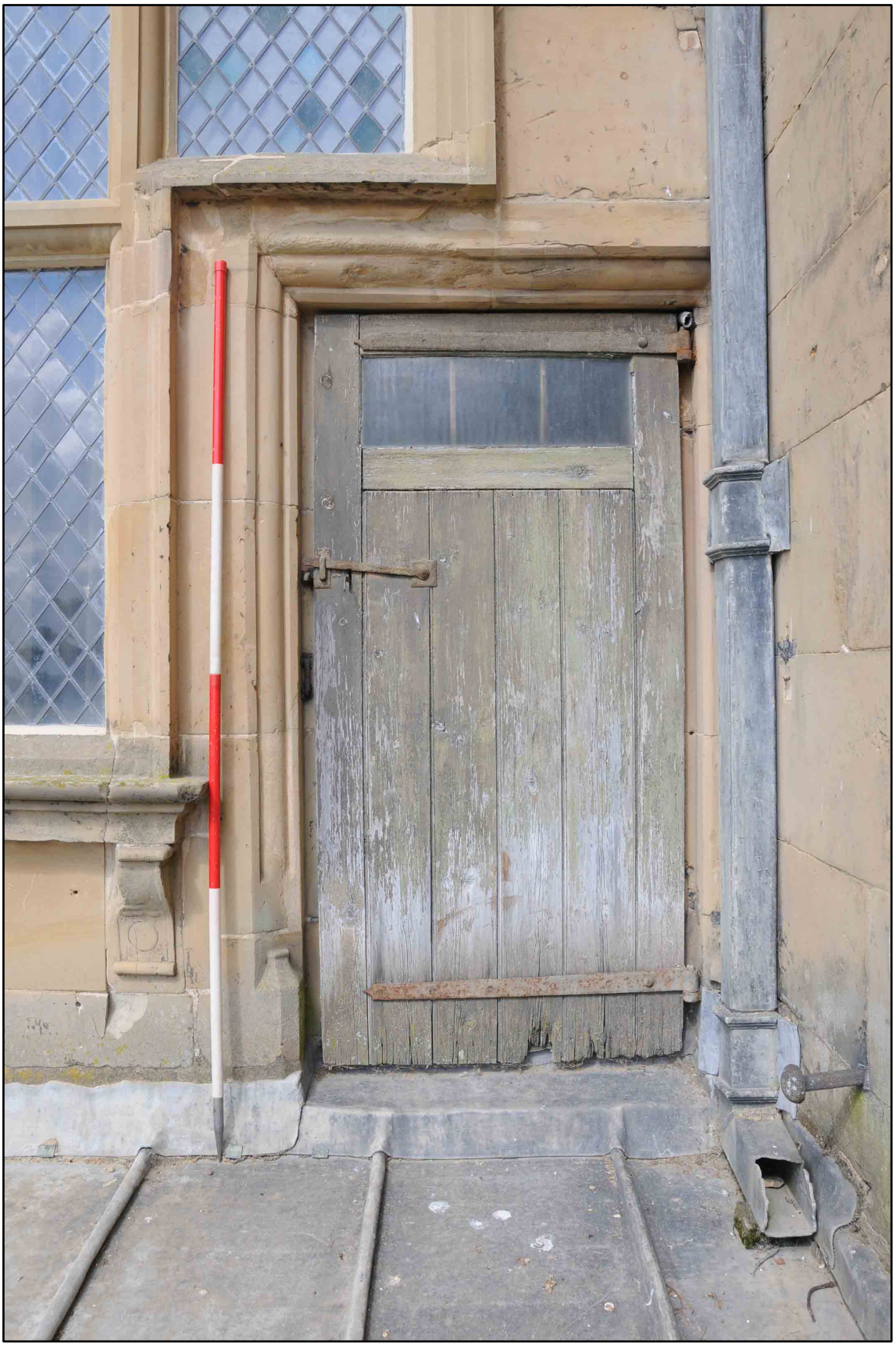
**Appendix 1.4:** Detail of collonade below East Loggia, looking north (2m scale) (**Photo D92**)

**Appendix 1.5:** Detail of north-west corner of the Hall; note unused first floor doorway (**Photo D112**)

**Appendix 1.6:** Detail of access doorway in north-west corner of East Loggia (**Photo D1**)

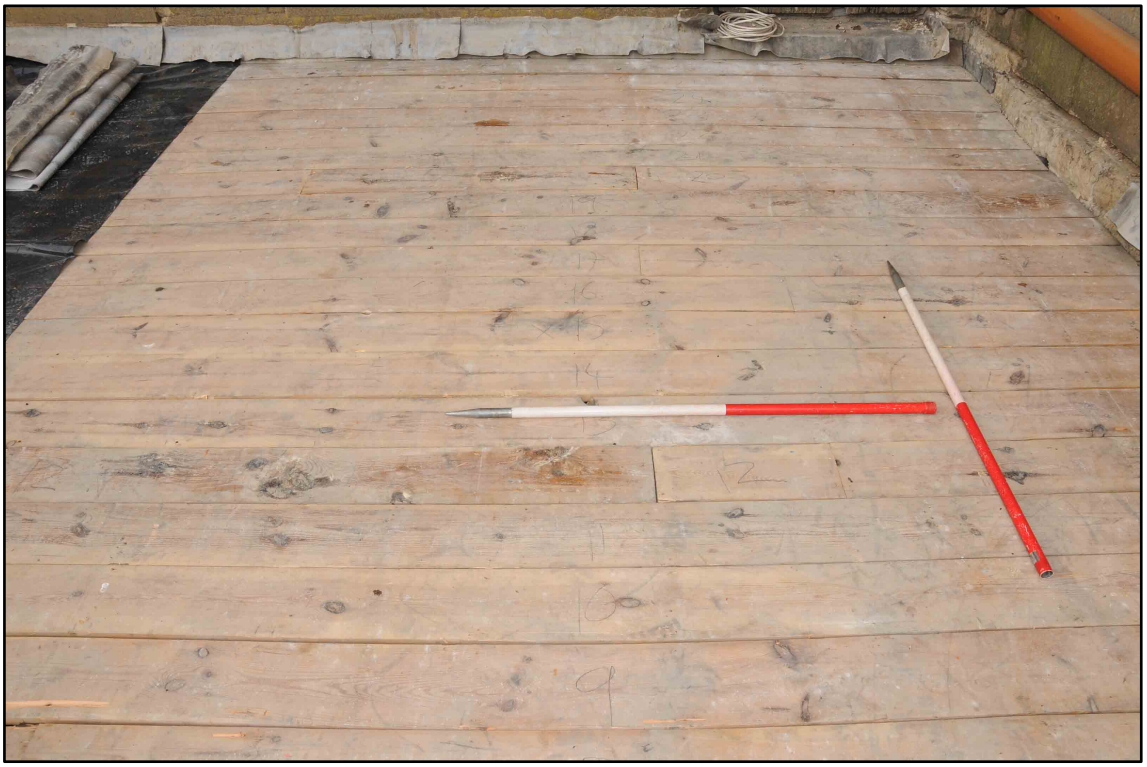
**Appendix 1.7:** General view looking south of East Loggia roof before restoration (1m scale) (**Photo D77**)

**Appendix 1.8:** General view looking north of East Loggia roof before restoration (2m scale) (**Photo D52**)



**Appendix 1.9:** Detail of access doorway onto the roof of the East Loggia (2m scale) (**Photo D3**)

**Appendix 1.10:** Detail of lead roof sheets in Section A, looking north-west (2m scale) (**Photo D20**)

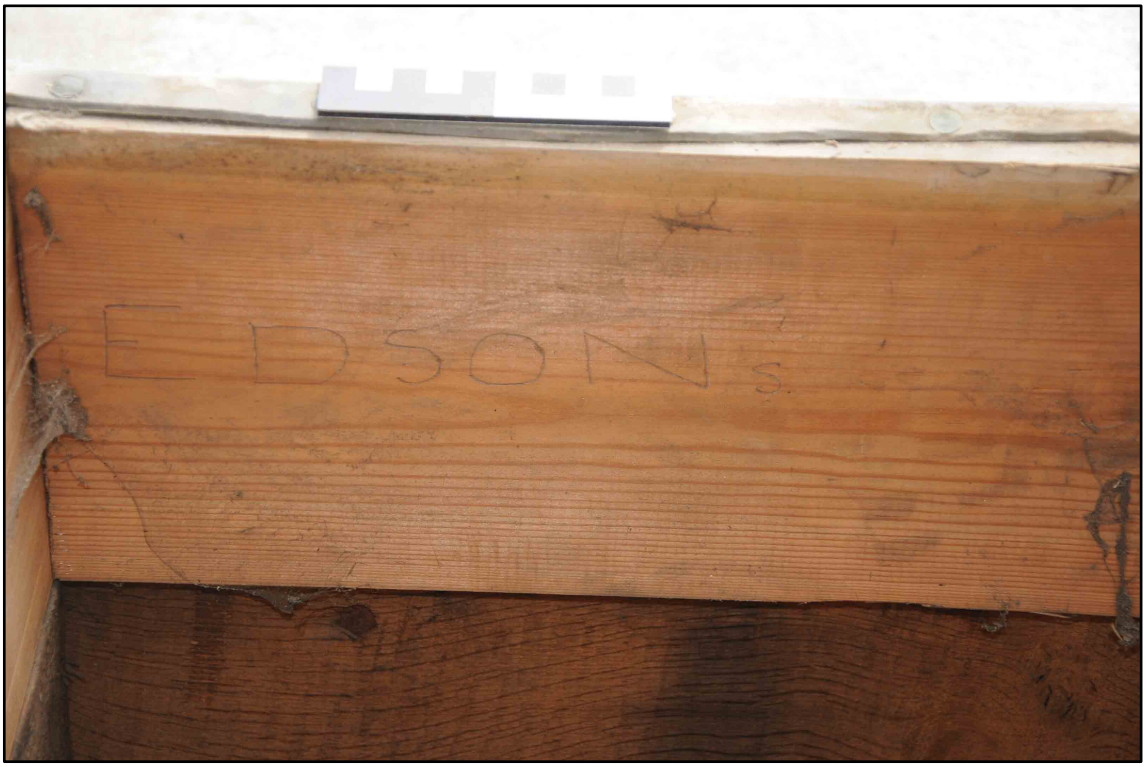


**Appendix 1.11:** Detail of pine boards below leads in Section A, looking west (1m scale) (**Photo D169**)

**Appendix 1.12:** View looking south across Section E prior to works commencing (2m scale) (**Photo D49**)

**Appendix 1.13:** View looking south across Section E during removal of boards (2m scale) (**Photo D115**)

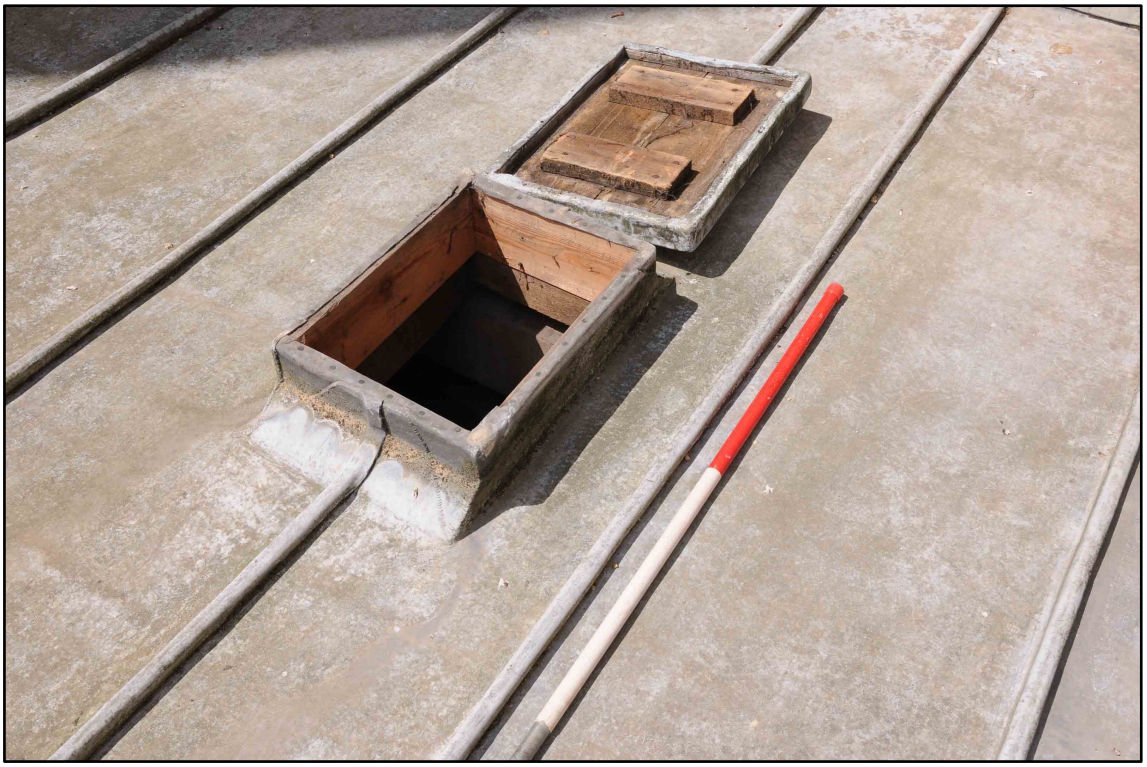

**Appendix 1.14:** Graffiti in hatch in Section A 'E.Wisher 1966' (10cm scale) (**Photo D25**)



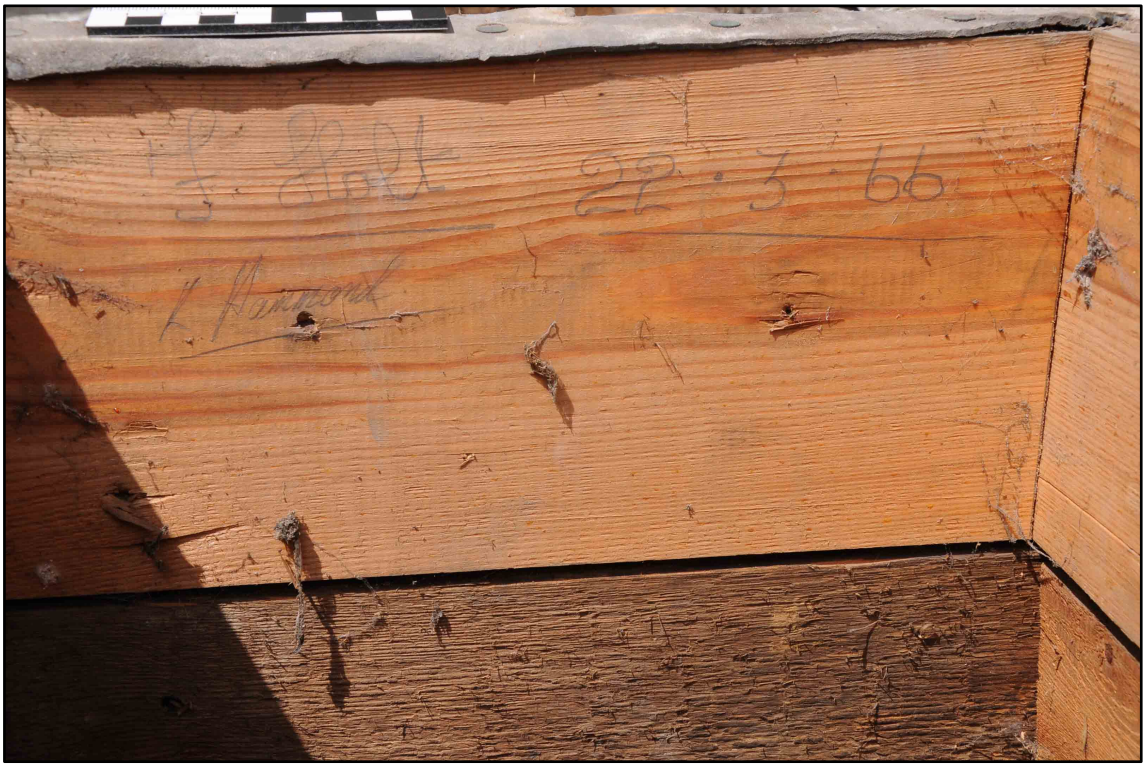

**Appendix 1.15:** Graffiti in hatch in Section A 'EDSONs' (10cm scale) (**Photo D26**)


**Appendix 1.16:** Graffiti in hatch in Section A 'F.Holt April Joiner 1966' (10cm scale) (**Photo D27**)

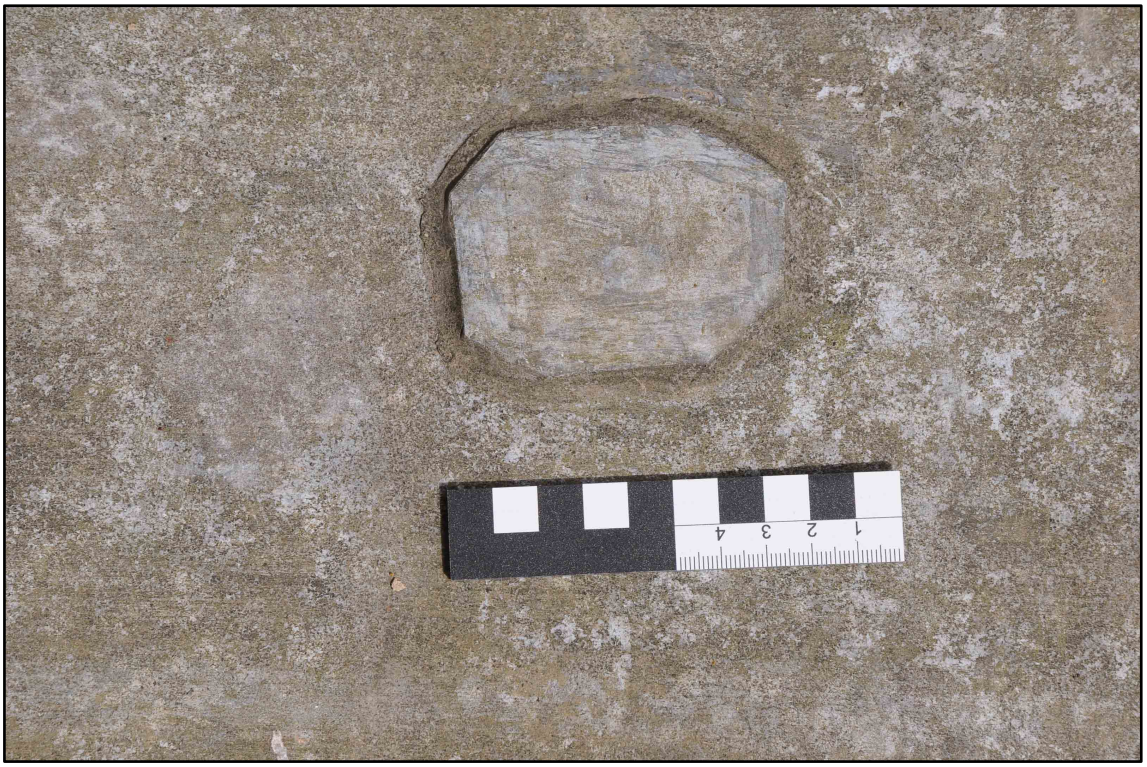

**Appendix 1.17:** Graffiti in hatch in Section A 'K.HAMMOND 1966' (10cm scale) (**Photo D24**)



**Appendix 1.18:** Detail of hatch in Section E, looking south-west (1m scale) (**Photo D70**)




**Appendix 1.19:** Graffiti in hatch in Section E 'F.Holt L.Hammond 22.3.66' (10cm scale) (**Photo D71**)



**Appendix 1.20:** Detail of lead patch repair in Section C (10cm scale) (**Photo D64**)

CHESTERFIELD Edn.

Derbyshire Times

Incorporating Chesterfield Herald and Derbyshire Courier

Wedding and Engagement Rings
HILL THE JEWELLER

DERBYSHIRE COURIER, ESTABLISHED 1828 FRIDAY, MARCH 17, 1967 POSTAGE: INLAND 7d., FOREIGN 6½d. TEL. CHESTERFIELD 77024-5-6-7-8 PRICE FIVEPENCE

ST. HELENA GIRLS EXCEL IN MOLIERE COMEDY

Amalgamation planned for Chesterfield and Staveley Co-ops.

JUST two years short of its centenary, Staveley Town Co-operative Society may soon cease to exist in its present form if proposals, announced this week, for its absorption by bigger but much younger, Chesterfield and District Co-operative Society are successful.

Details of the plan were revealed to Staveley Co-op's 120 employees and union representatives, at a meeting on Monday. The next step will be to seek the approval of

Another step in new town

Mainly About Peop

**Appendix 1.21:** Newspaper discovered in floor void in north-west corner Section A – 17th March 1967


**Appendix 1.22:** Graffiti on lead downpipe in north-west corner of Section A 'EF 1969' (**Photo D210**)

**Appendix 1.23:** Detail of lead downpipe in southwest corner of Section E (10cm scale) (**Photo D59**)

**Appendix 1.24:** Pine boards in Section E; note two different widths (10cm scale) (**Photo D124**)

**Appendix 1.25:** Detail of roof structure in Section E, looking north-east (**Photo D148**)

**Appendix 1.26:** Detail of roof structure in Section E, looking south (10cm scale) (**Photo D145**)

**Appendix 1.27:** Detail of roof structure in Section E, looking east (10cm scale) (**Photo D142**)

**Appendix 1.28:** Detail of roof structure in Section E/D, looking north-west (10cm scale) (**Photo D168**)

**Appendix 1.29:** Detail of roof structure in Section E, looking west (2m scale) (**Photo D178**)

**Appendix 1.30:** Detail of purlin in Section E; note assembly mark and iron peg (10cm scale) (**Photo D205**)

**Appendix 1.31:** Detail of purlin in Section E; note assembly iron peg (10cm scale) (**Photo D174**)

**Appendix 1.32:** View of re-used struts along south wall of Section E (10cm scale) (**Photo D166**)

**Appendix 1.33:** Detail of iron bolt (repair?) in south-west corner of Section E (5cm scale) (**Photo D186**)


**Appendix 1.34:** Detail of assembly marks 'VIII' for lower joist in Section E (10cm scale) (**Photo D135**)

**Appendix 1.35:** Detail of tenon and groove for lower joists in Section E (10cm scale) (**Photo D156**)

**Appendix 1.36:** Detail of square recess in south-west corner of Section E (**Photo D188**)

**Appendix 1.37:** Oak post in square recess in south-west corner of Section E (10cm scale) (**Photo D187**)

**Appendix 1.38:** View looking north-west along replaced rafters in Section E (**Photo D193**)

**Appendix 1.39:** Detail of cut sockets for secondary rafters in Section E (5cm scale) (**Photo D192**)

**Appendix 1.40:** Detail of primary oak rafters in north-west corner of Section E (1m scale) (**Photo 194**)

**Appendix 1.41:** Detail of sockets within masonry of central bay of the east facde (1m scale) (**Photo D197**)

**Appendix 1.42:** Inserted softwood timbers above oak beams in Section D (1m scale) (**Photo D201**)

**Appendix 1.43:** Reused timber floor beam along east wall of Hall in Section D (**Photo D203**)

**Appendix 1.44:** Detail of lath and plaster ceiling in Section E; note reused or rotated joists (**Photo D207**)

**Appendix 1.45:** Detail of roof timbers at junction of Sections D and E (10cm scale) (**Photo D204**)

**Appendix 1.46:** Detail of newspaper below pine boards in north-west corner (1m scale) (**Photo D170**)

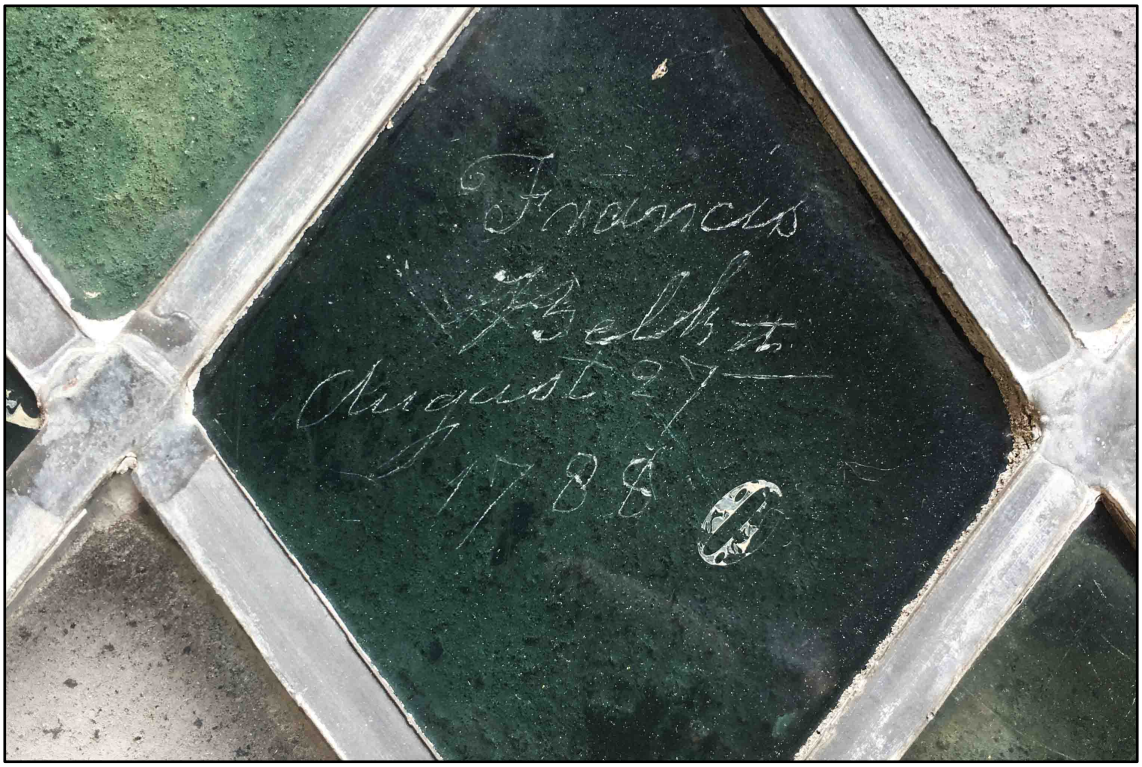
**Appendix 1.47:** Detail of original lead flashing bent down below pine boards (5cm scale) (**Photo D171**)

**Appendix 1.48:** Large wrought-iron fixing nail from rafter (10cm scale) (**Photo D175**)

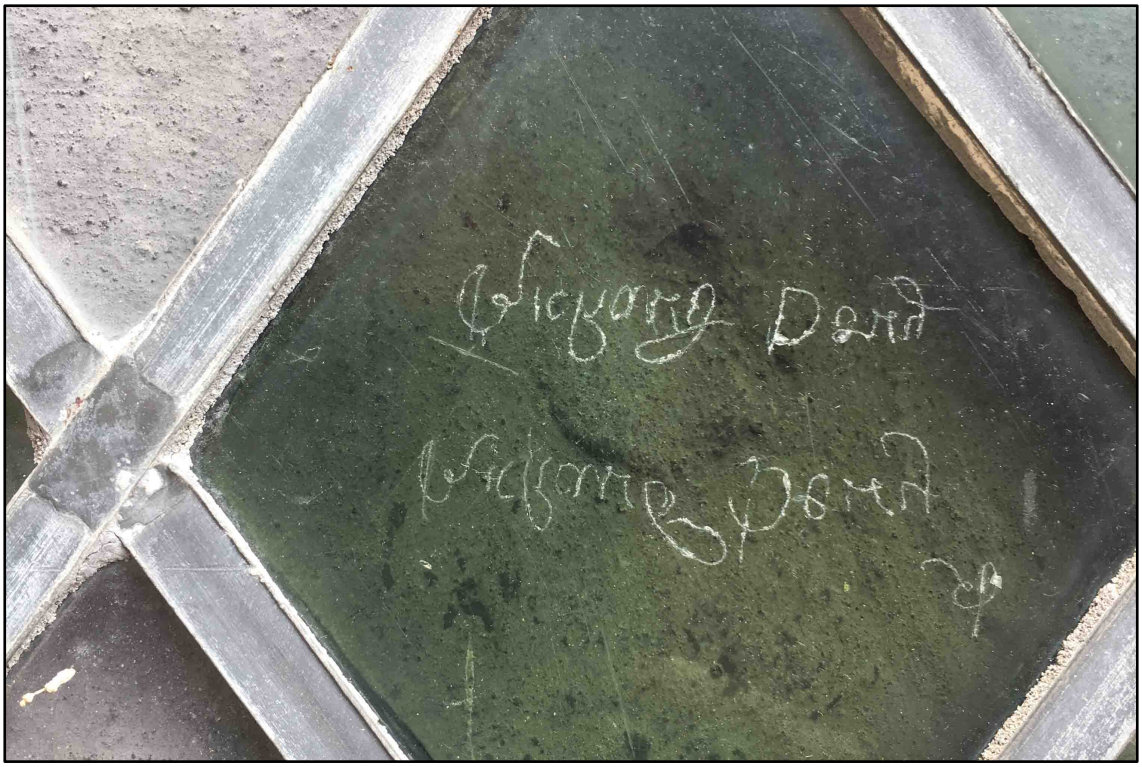

**Appendix 1.49:** Iron nails used to secure pine boards below leads (10cm scale) (**Photo D173**)

**Appendix 1.50:** Detail of (false) north window (W126) with graffiti (**Photo D11**)

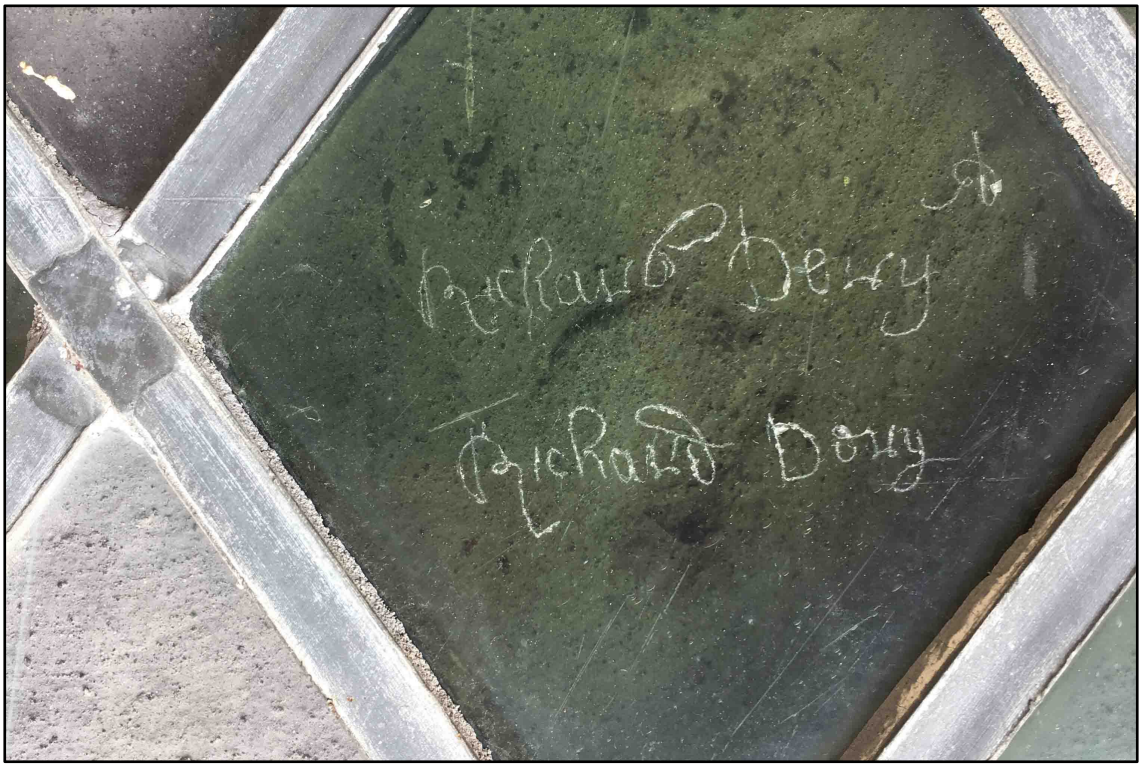

**Appendix 1.51:** Detail of graffiti in north window 'Mary Ludlaw 1776' (**Photo D212**)




**Appendix 1.52:** Detail of graffiti in north window 'Francis Beth 1788' (**Photo D213**)



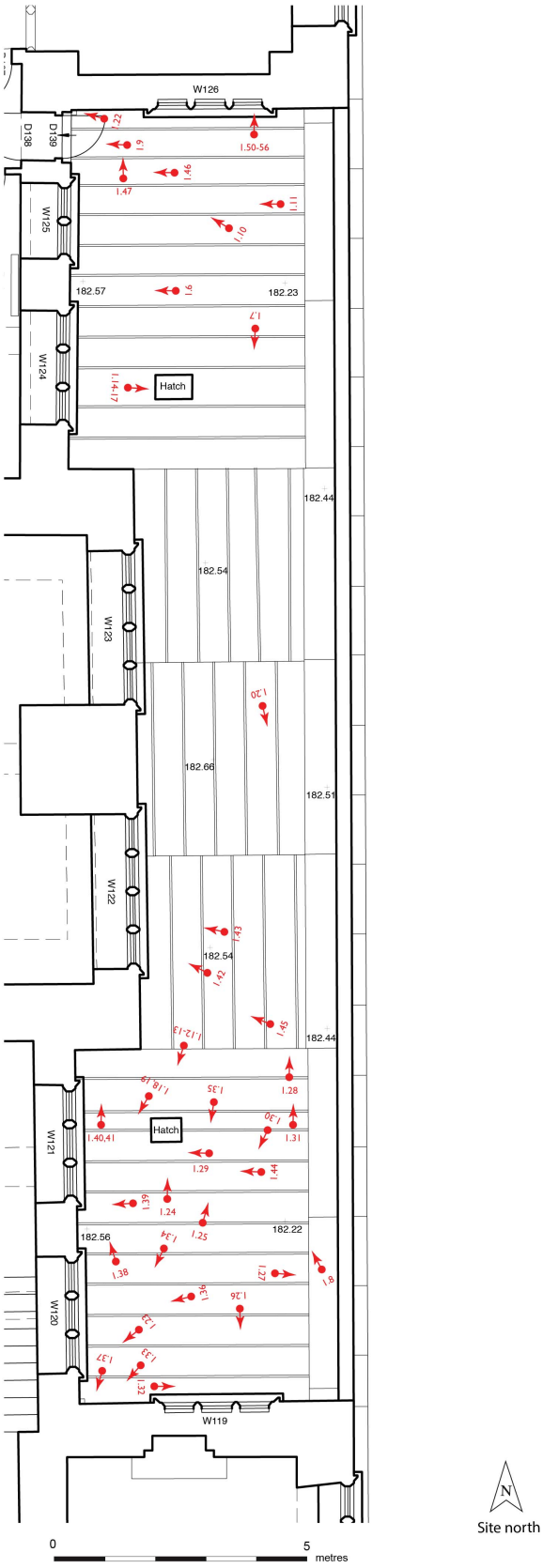
**Appendix 1.53:** Detail of graffiti in north window; written upside down (**Photo D214**)



**Appendix 1.54:** Detail of graffiti in north window; digtially reversed to read 'Richard Dory' (**Photo D214**)

**Appendix 1.55:** Detail of graffiti in north window 'G.Wall 26th Nov 1911 plumber' (**Photo D215**)

**Appendix 1.56:** Detail of graffiti in north window 'Cyril Woodgate 1966' (**Photo D216**)




**Appendix 1.55:** Site plan with location of photographs in **Appendix 1**

(Note: **Appencies 1.1-1.5** are ground level exterior shots and not located on the plan)