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Winchester City Mill

Historic Building Investigation and Recording

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Summary

Winchester City Mill is a Grade II* listed building immediately outside the medieval city walls. There is believed to have been a mill at this location since before the Norman Conquest but the main current buildings are essentially mid 18th century in date, albeit incorporating some fragmentary earlier remains. The mill ceased operations in the early 20th century but the buildings were acquired in 1929 by the National Trust through a public subscription and then part of it was leased to the Youth Hostel Association. It remained in this use until 2004 when, after a lengthy restoration of the mill machinery, the building was once again used to grind corn.

The National Trust has recently undertaken a programme of renovation works in a large range constructed in 1748, to the east of the main building which houses the mill machinery and which was itself constructed in 1744. The renovation has covered both the basement and ground floor of this range and Oxford Archaeology (OA) was commissioned to undertake an historic building investigation during these works. The investigation was not intended to be an exhaustive study of the entire mill complex but instead it was meant to add to previous studies, particularly one undertaken in 2015-6 by Museum of London Archaeology which had focused on the ground floor joists of the 1748 range. Some areas of the joists were obscured at the time of the 2015-6 works but these have now been exposed and added to the survey.

The current renovation works have included breaking out the concrete floor slab in the basement and this has exposed a partially surviving earlier floor surface largely constructed from brick pavers but also incorporating areas of flint cobbles. The exposed floor also included other features such as an area of paving stones (probably a secondary repair), several pads from former posts and two infilled brick-lined channels. A scaled photogrammetric record of the exposed floor has been created as part of OA's current investigation.

OA were also asked to provide comments on the roof of the 1748 range. It seems clear that this roof structure has undergone some remodelling but it is believed that this comprised alterations rather than a full reconstruction and that the main structure survives from the mid 18th-century phase. The roof includes both full trusses and then a type of intermediate truss with tie-beam but no principal rafters. Both the full and intermediate trusses incorporate raking struts but these are secondary additions and empty mortices in the main trusses suggest the possibility that they originally had an upper cruck form (or other similar arrangement).

1 INTRODUCTION

1.1 Project Background

1.1.1 Oxford Archaeology (OA) was commissioned by The National Trust to undertake a programme of historic building recording and investigation at Winchester City Mill in Winchester, Hampshire. The investigation was undertaken during a refurbishment of the 1748 range at the complex and it was intended to add to previous phases of recording work. The National Trust Archaeology Database Number for the work is ENA8989.

1.1.2 The mill is a Grade II* listed building within the Winchester Conservation Area, and although the current building largely dates from a mid 18th-century rebuilding there is known to have been a mill in this location from before the Norman Conquest. The mill ceased operations in the early 20th century and after its acquisition for the National Trust in 1929, through a public subscription, it was leased by the Youth Hostel Association. Recently however the mill has been restored to working order by the National Trust and the building has become a visitor attraction.

1.2 Aims and Objectives

1.2.1 The overall aim of the project has been to record for posterity parts of the building which have been removed in the current work or which have been temporarily exposed by it.

1.2.2 More specific objectives have been to:

- Enhance a previous survey of the joists in the upper level (ground floor) of the 1748 range by adding a number of newly exposed joists;
- Take the opportunity afforded by the refurbishment to undertake outline recording of the upper faces of the ground floor joists;
- Record evidence of a former floor surface exposed in the basement
- Provide an outline assessment of the roof structure within the 1748 range.

1.3 Methodology

1.3.1 The current project has essentially been undertaken in the form of a limited scale watching brief during a refurbishment of the 1748 range of Winchester City Mill. The project was initially commissioned in order to add to the record of the ground floor structure of the 1748 range, produced by Museum of London Archaeology (MOLA) in 2016. MOLA's investigation had included a detailed metric survey of the joists, as well as analysis of the age of the timbers, but the work was undertaken from beneath so the upper faces of the joists were not visible and in some other areas the underside was also obscured by ceilings. These ceilings have recently been removed and the upper faces of the joists exposed by the lifting of floorboards so the previously missing joists have been added to the survey and further recording undertaken on the upper faces of some of the joists.

1.3.2 The intention was to undertake the recording of the upper faces of the joists in a single visit, when the floorboards had been entirely removed, but as the works were starting structural engineers advised that removing all the floorboards in one go may compromise the stability of the floor. Therefore it was agreed that the boards could only be lifted in limited sections before being replaced and this limited the scope of the recording that was possible in the number of site visits that had been budgeted for.

1.3.3 It was also agreed that the work would include a commentary on the roof structure in this range.

1.3.4 During the building works a concrete floor was broken out in the basement and this unexpectedly exposed parts of a former brick and flint floor. The scope of the recording project was therefore extended to also include a photogrammetric record of these features.

1.3.5 Each part of the investigation has comprised three principal elements: a photographic, a drawn and a written record.

1.3.6 The *photographic record* has included general views and details of feature. Digital photographs, in jpeg format, were taken using a camera with up to 24-megapixel capability.

1.3.7 The *drawn record* has comprised the annotation of existing survey drawings and also the creation of a photogrammetric survey of the exposed brick and flint floor.

1.3.8 The *written record* consists of field notes and annotations that complement the photographic and drawn records and add further analytical and descriptive detail.

1.3.9 The initial recording was undertaken on 6 April 2018 and then further recording was undertaken on 26 April following the exposure of part of the historic floor. A final visit was then made on 13 July when loose rubble was cleared to allow a further examination for evidence of the former floor surface.

2 HISTORICAL BACKGROUND

2.1 Winchester City Mill

2.1.1 The following short historical summary is based on previous reports of the building, particularly those by the RCHME in 1991, National Trust in 2000 and MOLA in 2016 (see Appendix A for a full bibliography).

2.1.2 Winchester City Mill is located immediately outside the historic city walls, adjacent to a major crossing of the River Itchen on the east side of the city. There is known to have been a mill in this location since at least the 10th century, possibly earlier, and it was highly profitable both at the time of the Domesday Survey and through much of the medieval period.

2.1.3 The mill entered a period of decline from the early 14th century, partly due to the declining status of Winchester itself during this period, and the Black Death. In 1471 it is listed as being derelict. Prior to the dissolution of the monasteries the mill belonged to Wherwell Abbey in Hampshire but in 1539 it was taken by the Crown (Henry VIII) and then in 1554 it was gifted to the City of Winchester by Queen Mary.

2.1.4 In 1744 the main mill building was reconstructed by a tanner called James Cooke and then in 1748 he also built an extension to the east which forms the main focus of the current study. A plan of Winchester from 1750 shows these ranges as well as a C-shaped group of structures on the southern side of the eastern part of the mill.

2.1.5 In 1820 the mill was purchased by John Benham and his family continued to operate it profitably for much of the rest of the 19th century. In the early 20th century the mill ceased grinding corn, due to technological changes in the industry making traditional stone milling uneconomical, and the building was threatened with demolition. The building was used for a time during the First World War as a laundry. However, the inter-war years was a period of growing appreciation of vernacular architecture and increasing awareness of modern threats to historic structures and in 1929 the City Mill was acquired for The National Trust by a public subscription (The Fund for the Preservation of the Old City Mill).

2.1.6 In 1931 part of the building was leased to the Youth Hostel Association and it remained in this use until 2004 when, after a lengthy restoration the mill returned to grinding corn. The restoration included the replacement of all the mill machinery and significant alterations to the structure

3 DESCRIPTION OF THE SITE

3.1 Overall description of mill complex

3.1.1 As referred to above the current project is focused on certain distinct elements of the building rather than being intended as a full analytical survey of the entire mill complex but a brief discussion of the wider site, largely based on the previous studies referred to above, would be of value.

3.1.2 The overall mill complex has a P-shaped plan, orientated largely east-to-west and it comprises several distinct elements (see Figs 2-3).

3.1.3 ***Main Mill (1744 range)***: The main mill building spans over the River Itchen, as well as a short parallel channel, and this forms the most prominent element of the overall structure, with its large tile-hung gable (with loading door) visible from the main road. This two storey range, which was constructed in 1744, is where the main historic milling operations took place (and those in the reconstructed mill) with two undershot water wheels, gearing and hurst frame.

3.1.4 The millstones would have been driven by the eastern waterwheel while the western wheel would have driven ancillary machinery only (sack hoist etc). The mill stones (possibly four pairs) were located at the first floor level of the main mill and above this there would have been one (or possibly two) storage floors accessed by the loading doors in the south elevation.

3.1.5 The roof of this range hasn't been examined in the current project but it is understood to incorporate earlier members reused from a previous building. There are two open trusses with staggered butt purlins, pegged collars, diagonal bracing and raking struts.

3.1.6 ***West building:*** To the west of the main mill is a single storey gabled range which is believed to be largely of 18th and 19th century date but to be on the site of an earlier range. There is no building shown here on the 1750 map but some of the brick walls are suggestive of a 17th or possibly 16th century date. Evidence suggests that this range had an industrial function.

3.1.7 ***East Building (1748 range)***: To the east of the main mill is a long two storey range extending eastwards as far as Water Lane and this is the range that has formed the main focus of the current investigation. Straight structural joints and different brick bonding confirm that it was a secondary addition to the main mill and a dated brick in the south elevation suggests that it was constructed in 1748.

3.1.8 This range has two floor levels: a slightly sunken half basement and a single storey above this. The lower level could be considered to be a ground floor, with a suspended first floor above this, but the MOLA study termed these a basement and ground floor so this terminology has been used in the current project.

3.1.9 The main access into the basement of this range is down some steps from Water Lane to the east. There is a doorway to the south, leading into a yard, and there is a secondary flight of stairs between the two floor levels, located against the north wall.

3.1.10 The range projects slightly at the eastern end of the south elevation and at its west end, adjacent to the main mill, it straddles over a sluice channel of the river. It is not believed that this channel ever housed a waterwheel. It has been suggested that there may formerly have been a kiln on north side of east end.

3.2 Ground floor joists in 1748 range

3.2.1 As referred to above, in 2016 MOLA undertook recording and assessment of the ground floor joists in the 1748 range. The floorboards remained in-situ so the investigation took place from

below, in the basement, and although c.85% of the joists were visible there were some areas where the underside of the joists were obscured by a ceiling. The ceiling in these areas has been removed in the current project to expose the joists and it is now possible to add descriptive observations on these as well as adding these to the survey plan (see Fig 4).

3.2.2 The overall floor is arranged with north-to-south principal joists (supported by an irregular arrangement of posts), east-to-west secondary joists (or bridging beams) and north-to-south common joists).

3.2.3 Summary of MOLA investigation

3.2.4 The MOLA report found that nearly half the floor was composed of reused timbers from the medieval period to the 17th century and the rest was a mix of original and replacement timbers. The report divided the floor into 17 distinct areas (A-Q) based on the arrangement of the floor.

3.2.5 Floor boards exposed in current project

3.2.6 Prior to the current project the ground floor surface was formed from regular, relatively modern floorboards. Their character was suggestive of a mid 20th century date and it may be most likely that they were added in the c.1930 refurbishment of the building to convert it to a youth hostel. These boards were added to cover over a set of earlier boards that have been exposed in the current work (see Pl. 1-3).

3.2.7 A full measured survey of these earlier boards was not required but some brief notes would be of use. The condition of the boards recently exposed was poor with extensive wear or cracks or areas where the wood has rotted away to create small holes through to the space below. There were numerous areas of localised patching and repairs where boards had been replaced. Of the areas observed the condition seemed worst towards the western end of the building.

3.2.8 The boards were of softwood and generally c.25 cm wide by c.2.5 cm tall and fixed with nails. It is possible that some of the boards survived from the mid 18th-century building, either in-situ or moved and reused, but generally the character of the boards and overall floor suggests a later date. It is believed that they relate to the period when the building acted as a mill, rather than when it was a youth hostel, so they may have been added during a 19th century (probably later 19th century) refurbishment. If this was a store range at the mill it would have seen a high level of wear and it would not be surprising if floorboards had to be replaced periodically.

3.2.9 Further areas of joists exposed in current project

3.2.10 At the time of the MOLA survey the underside of the joists in the north-easternmost part of the floor (identified as Area D in the MOLA report) were entirely obscured by a modern plasterboard ceiling but this has now been removed. This exposed 10 north-to-south common joists in Area D all of which were softwood (probably pine) and with a consistent size (15.5 cm tall x 8 cm wide) and uniform character (Pl. 15-16). The joists showed no evidence of former laths (the ceiling was modern plasterboard) and they had a black stain although this was relatively thin with the grain beneath still visible.

3.2.11 At their north end these joists sat on top of a contemporary wall plate built into the brick wall (apparently inserted) and extending partly in front of the window in this area while at their southern end the joists were supported by an older floor joist (or bridging beam) following the spine of the building (joist SB1 in MOLA study). At this end some of the common joists sat within and reused older mortices in this bridging beam but they were all also supported by a large batten fixed to the side of the bridging beam.

3.2.12 The underside of the joists showed the imprint of a former abutting east-to-west partition and this appears to have been in the same location as a wall shown on the plan in the 1991 National Trust report.

3.2.13 The joists in Area D are almost certainly secondary and possibly early 20th-century in date. They may have been contemporary with the 18 cm wide floorboards above.

3.2.14 Apart from Area D the second largest area where joists have recently been exposed by the removal of a section of ceiling which had previously hidden them when MOLA undertook their investigations was the western part of Area H (Pl. 13-14). There were six north-to-south common joists exposed in this area, five of which extended from the east-west bridging beam along the spine to the wall which encloses the flight of stairs along this wall of the building. Here they were housed in modern metal joist hangers fixed to the side of a modern non-painted joist.

3.2.15 The sixth common joist (the westernmost of the series) had been truncated to allow the insertion of a trimmer and a hatch in the floor. The six joists closely match those exposed in Area D being of consistent size (8 cm x 16 cm) and formed from regular softwood which had been stained black.

3.2.16 The final area where joists have recently been exposed which were previously hidden was a small section of Area G (Pl. 10, 12) where a ceiling has been removed to expose the southern continuation of two joists (034 & 035). The northern half of these two joists were previously seen and recorded by MOLA.

3.2.17 Exposed upper face of joists

3.2.18 At the start of the current project it was anticipated that a principal element of the investigation would be to undertake recording of the upper face of the joists in the ground floor when they were all exposed by the lifting of floorboards. In particular this recording was to monitor for features such as carpenter's marks, pegs, graffiti or empty mortices which had not been visible during the MOLA recording in 2015-16.

3.2.19 However, as the repair works were about to commence structural engineers advised that it would not be safe to expose the entire floor in one go and instead the conservation work had to be undertaken in a piecemeal fashion with only small areas being exposed at any one time. The recording work had been budgeted on the assumption that a single visit would be made so it was agreed that this part of the investigation would be more limited than intended and would just record areas that happened to be exposed when visits were made for the other elements of the project. This more limited scope was supported by the relatively low potential for significant features to be revealed.

3.2.20 The main areas of the floor which were monitored and recorded when the joists were exposed were Areas K and Q and parts of M, N and P (as defined in MOLA's 2016 report). The upper faces of the old joists were generally heavily worn and although there were many marks which could have been from carpenter's marks they were too indistinct to interpret or clearly identify. As previously noted in the MOLA report many of the joists were reused (See Fig 5 and Plates. 4-6, 17-30).

3.2.21 Using the joist numbering from the MOLA report the main marks noted were:

3.2.22 **No 50** (Area K): This joist had at least five notches in either side, relating to a previous use. The notches may have been from ceiling battens.

3.2.23 **No 51** (Area K): when viewed from above this joist could be seen to be considerably more warped than indicated on the previous survey.

3.2.24 **No. 57** (Area K): this joist had an empty mortice in the west side, towards the north end as well as an 'X'-carpenter's mark towards the south end (adjacent to bridging beam) and a peg slightly to the north.

3.2.25 **No. 79** (Area Q): slot mortice in upper face

3.2.26 **No. 103** (between Areas H and G): it is clear that this bridging beam is a later insertion to replace a previous joist. The empty mortice from the previous joist is visible adjacent to No.103 but at a slightly higher level.

3.2.27 **No. 105** (between Areas K and H): this N-S principal joist had what appeared to be a long shallow groove in the top, in the northern half, but the fact that it was not straight suggests that it was probably just a surface crack in the timber.

3.2.28 **No.107** (between Areas K and J): this principal joist has tenoned joists to either side with pegs in the upper surface.

3.2.29 **No. 109** (Bridging beam between Areas O and Q): two square headed bolts towards west end as well as an 'E' mark and a 'II' mark.

3.2.30 **No. 111** (at western edge of floor): slot mortice in upper face of this principal joist as well as chiselled carpenter's marks ('II') adjacent to northern bridging beam.

3.3 Brick/flint basement floor exposed in 1748 range

3.3.1 The excavation of the concrete floor slab in the cellar exposed evidence of former floor surfaces and the scope of the recording was therefore extended to include these features. The recording included producing a rectified photographic plan (or photogrammetric plan) and notes were then taken on the various features shown. The photogrammetric image is included in this report as Fig 6 and then a further image with annotations is also included as Figure 7. Distinct features have been identified by a number and these are included below (eg *[No.1]*).

3.3.2 The features of interest were entirely within the eastern half of the cellar within areas B, C, D, G and H as defined in the MOLA study. The subsequent work to lift the slab in the western half was also monitored but any features here had previously been removed to leave loose hardcore.

3.3.3 The southern half of the exposed area of intact floor was largely formed from handmade bricks (or brick pavers), many of which were broken or half bricks but the full ones measured 6 cm by 10 cm by 21 cm *[No.1]*. This floor was generally in a poor condition, with clear undulations reflecting the patterns of wear, and with various patches where repairs have been undertaken or some bricks replaced. The bricks were laid in a simple end-to-end pattern although there were areas of inconsistency from where bricks have been damaged and the jointing between lines of brick was not perfectly straight.

3.3.4 There was a clear northern edge to the brickwork, close to the spine of the building, and distinguishing the brickwork from what was a different flooring to the north (discussed further below). It strongly appeared that this brick flooring did not formerly extend further north.

3.3.5 The eastern part of this northern edge was formed by a simple line of bricks laid at right angles to the bricks to the south while towards the west there was a distinct area of bricks laid on their edge *[No.11]*. It is possible that the bricks laid on their edge are a repair to an area of stone paving immediately to the south *[No.9]* discussed further below.

3.3.6 In the northern half of the basement there was an area of intact floor exposed to the west comprised of flint nodules *[No.6]* set within a lime mortar and it likely that this continues beneath the flight of stairs although this wasn't exposed. In the area to the east of this *[No.2]*

any former floor had previously been removed to leave loose hardcore (broken bricks) acting as hardcore for the concrete slab. The western edge of the in-situ flint had clearly been truncated and this floor would formerly have continued westwards. At its south-eastern corner the area of intact flint floor extended slightly to form a distinct area around the pair of in-situ posts supporting the floor above and interrupting the line of brickwork along the spine of the building.

3.3.7 Within these general areas of brick and flint flooring there were a number of other features exposed including a broadly north-to-south channel *[3&4]* which extended the full width of the building from another east-to-west channel *[No.5]* adjacent to the northern wall to the door in the southern wall. The northern half of this channel *[No.3]*, adjacent to the in-situ flint flooring, retained brick edging to either side but this edging had been lost from the southern half *[No.4]* where the channel curved towards the doorway. The full width of the channel was 46 cm (including brick edging) while the channel itself was 26 cm wide. Both sections of the channel had been infilled with loose debris but a small section of this was removed to confirm that the channel had a V-shaped profile and was lined in render.

3.3.8 The north end of the channel *[No.3]* appeared to have been blocked where it met the east-to-west channel *[No.4]* but this junction was not dug out or fully explored. It appeared that the east-to-west channel, which had been infilled and capped with a cement skim to form a surface, continued westwards beneath the staircase but again this was not fully exposed.

3.3.9 To the west of the channel there was a small area (c.1.5 x 1 m) of crudely laid, irregular paving *[No.9]* with c.10 stones of differing size from c.0.7 m by 0.3 m to c.20 cm^2. As referred to above there is a distinct area of edge-laid brickwork [*No.11*] immediately to the north of this stone paving, extending up to the intact flint floor, and it is possible that the bricks formed a repair to a larger area of stonework. The rough way that the paving stones were laid is also however suggestive of a repair or secondary infill and it could be that this location at the centre of the floor saw a particularly high level of wear.

3.3.10 Towards the western end of the bricks on the spine of the basement there is a stone pad *[7]*, c.30 cm x 35 cm, which presumably formerly supported a post. The pad didn't quite align with the east-to-west joist above but this joist was a secondary insertion and at the west end the north-to-south principal joist had an empty socket from a previous east-to-west joist which would have aligned with the pad.

3.3.11 In the northern half of the basement, between the intact flint floor and the area where the historic floor had been lost, there was a roughly circular c.30 cm diameter stone pad *[No.8]*, flush with the floor surface and set within the intact flint cobbles. It was beneath a north-to-principal joist so it presumably supported a post and the truncated edge of what appears to have been another stone pad also survived, also beneath the same north-south joist towards the south *[No.10]*. This pad had been truncated by the channel *[No.4]* so only its corner survived with the longest edge measuring 30 cm. It would seem much easier to have entirely removed the stone when the channel was inserted rather than cutting in-situ but the location of the stone beneath the joist, and midway between the basement spine and the south wall, is exactly where a post would be expected if there was a heavy load on the floor above.

3.3.12 Discussion and interpretation

3.3.13 It seems reasonable to assume that the main areas of brick pavers and in-situ flint are contemporary with each other and that both are essentially primary to the mid 18th-century building, albeit with numerous areas of secondary repair. The culverts strongly appear to have been secondary insertions and the rough character of the paving stones also suggest that they were alterations.

3.3.14 The individual stone pads, presumably from three former structural posts, are suggestive of heavy loads on the ground floor above supporting the likelihood that this was a grain/flour store.

3.3.15 Loose hardcore in western half

3.3.16 As referred to previously there were no comparable features or evidence of a former floor exposed in the western half of the basement. The concrete slab was also removed here as well as a thin layer of loose fill but clearly any previous floor had already been removed to leave loose dirt, rubble, fragments of stone and brick. The extent of the removal of loose fill was limited with 10 cm being cleared from Area D (as defined in MOLA study) and 5 cm being cleared from the larger area to the west (Areas J-N in MOLA study).

3.3.17 A layer of limecrete was being laid in this area in the current works and a new distinct edge was added to the intact brick floor to the east.

3.4 Roof of 1748 range

3.4.1 As part of the investigation OA were also asked to describe and comment on the roof in the 1748 range.

3.4.2 The roof in this range comprises a combination of six 'full' trusses, (five in the main open room and one in a separate room at the east end) as well as five 'intermediate' trusses. In the current study the full trusses have been numbered west to east as T1 to T6 and the intermediate trusses have been numbered T1.5, T2.5 etc, again running west to east. Their locations have been roughly marked on Figure 3.

3.4.3 Five of the ***full trusses*** (T2-T6) have a relatively standard form with tie-beam, two principal rafters and two raking struts which are separated from each other at their base by a block on top of the tie-beam (Pl. 47). These blocks vary in length between the trusses so that in some cases the raking struts almost meet while in other trusses they are widely spaced. The raking struts are secondary insertions and they are nailed to the principal rafters (discussed further below).

3.4.4 The principal rafters have relatively consistent empty mortices just above the height of the current raking struts and purlins suggesting that the trusses would formerly have had a high collar (Pl. 60). At the east end of the building there is a small raised loft room which allows a closer examination of the full truss here, particularly of the upper face of the tie beam which has widely spaced mortices towards each end (Pl. 61). If we assume that all the principal rafters have these mortices to their upper face then these, together with those mentioned above in the principal rafters would suggest that the trusses in this building may originally have had an upper cruck form (discussed further below).

3.4.5 The one full truss with a different form (Truss 1) is towards the western end of the main room and approximately aligned with the east side of the mill race (Pl. 45-46). This has a queen-strut form with two vertical queen struts rising from a tie-beam and supporting principal rafters at a point immediately below the purlin. These queen posts are closer to the centre of the truss than the empty mortices referred to above in the upper face of the tie at the eastern end. There is also a horizontal collar between the queen struts but this is relatively low so does not clasp the purlins as is common in most roofs of this type. It is also lower than the former collar that would be suggested by the empty mortices in the principal rafters of the other trusses.

3.4.6 Trusses 2 and 4 have empty slot mortices in one side of the tie-beam which could be suggestive sliding tenons from a ceiling but the other ties don't have these and the mortices probably relate to the their use in a previous building.

3.4.7 At the southern end of Truss 4 there are a series of simple carpenter's marks with 'IIII' inscribed on the tie beam, the principal rafter and adjacent to the slot mortice referred to above.

3.4.8 There doesn't appear to be a comparable carpenter's mark adjacent to the slot mortice in the side of Truss 2 but this area is partly hidden by a secondary steel plate.

3.4.9 There is a simple 'V' carpenter's mark at the southern end of Truss 3 on the principal rafter.

3.4.10 Truss 4 has a simple curved brace beneath each end, nailed to the underside of the tie-beam and resting on a brick pier in the wall (Pl. 53). The fact that the brace is nailed suggests that it was a secondary addition and there is no other evidence of the other trusses formerly having braces such as these. There are other piers in both walls (north and south) but other than Truss 4 they don't align with the other trusses so they are not believed to relate to the roof. It is more likely that they supported an attic floor.

3.4.11 Truss 3 has simple metal straps at the ends, just securing the ends of the tie rather than the principal rafter, which could be original.

3.4.12 The easternmost truss in the open room (Truss 5) has a secondary tie-beam with metal straps at the end which may be early 20th-century in date (Pl. 56). The principal rafters in this truss are old however so it appears that the tie was merely replaced rather than the full truss.

3.4.13 The ***intermediate trusses*** are similar to the full trusses, with tie-beam and raking struts, but they do not have a pair of principal rafters (Pl. 47). The tie beams of the intermediate trusses are slightly larger than those of the full trusses and they incorporate a larger number of empty mortices. It could be that the intermediate trusses were taken from another local building and they were added to strengthen between the existing older trusses in this mill (discussed further below).

3.4.14 ***Purlins and rafters:*** There are staggered butt (or tenoned) purlins extending between each full truss, additionally supported by the raking struts in the intermediate trusses. Edward Roberts discusses butt purlins in the book *Hampshire Houses* (p37) and he suggests that earlier butt purlins were aligned but by the end of the 17th century they were commonly staggered.

3.4.15 There are c.8 pairs of butt rafters pegged to the purlins in each full bay and there is considerable variety in whether the rafters are laid flat or vertically.

3.4.16 The trusses (full and intermediate) are generally open other than one towards the east end which separates off a small attic room and one towards the centre of the room (intermediate truss 3.5) which incorporates a timber frame (raking struts, collar and studs) and a plastered east side.

3.4.17 Either side of this closed truss the roof appears to have been heavily or entirely rebuilt. The rafters in these bays appear later in date than elsewhere and this is also the only area where the roof incorporates a ridge piece (a clear indicator of a later roof).

3.4.18 Discussion and interpretation of roof structure

3.4.19 The roof of the 1748 range at the City Mill is an interesting structure and although it has undergone some alterations it does appear to substantially survive from its original construction in the mid 18th-century. There is little reason to doubt that the six main trusses survive from the original building (albeit with alterations) as well as most of the purlins and rafters. If the roof had been entirely reconstructed in the 19th or 20th century then it would almost certainly have incorporated a ridge piece whereas this is only found in the reformed central bay.

3.4.20 The raking struts in the trusses are secondary additions, partly suggested by the nature of the blocks which separate their bases on top of each tie but also shown by the fact that they are nailed (at least those in the easternmost truss).

3.4.21 Perhaps the most intriguing features of the main trusses (T2-T6) are the consistent empty mortices in the principal rafters which suggest that each truss had a relatively high horizontal member (collar) as well as the empty mortices in the upper face of the tie beam in Truss 6 (the only one that could be seen at this height). These mortices in the tie are suggestive of widely spaced 'struts' or 'blades', probably extending between the tie and the underside of the former collar in each truss. These mortices are suggestive of curved (or cranked) inner principals, a distinct type of roof noted in Oxfordshire, Berkshire and Buckinghamshire[1] but it may be more likely that this roof had an upper cruck form, similar to curved inner principals. Various types of cruck roofs are known to have been constructed in the Winchester area but curved inner principals have not previously been noted here.

3.4.22 It is possible that the mortices relate to the use of these timbers in a previous building but their consistency would suggest that they do relate to this building. In addition, an upper cruck roof form would be a logical form for this building as it would have allowed a relatively open and uninterrupted attic space as the building is believed to have formerly had.

3.4.23 Another question with regard to the historic form of the roof is whether the intermediate trusses were part of the original build or whether they were later to strengthen the structure. Intermediate supports such as these are often added to historic buildings when signs of structural issues such as sagging roofs start to appear. This may particularly be suggested at the City Mill by the known remodelling of the roof such as the addition of the raking struts. However, when intermediate supports are added they are not so consistent through the building which suggests that they probably were original features. The width between the full trusses (8 rafters) would be unusually wide for a building such as this, also suggesting that it would be unlikely that that it was originally constructed without the intermediate trusses.

[1] For a description of curved inner principals see David Clark's article in *Vernacular Architecture*, 2004.

4 CONCLUSION

4.1.1 Winchester City Mill is a Grade II* listed building owned by the National Trust and although there has been a mill on this site since before the Norman Conquest the current buildings are largely of mid 18th-century date. The mill ceased operations in the early 20th century and the buildings were reused as a youth hostel but more recently the machinery has been restored (or replaced) and it once again functions as a traditional working corn mill.

4.1.2 The National Trust have recently undertaken repairs and refurbishment works in a range probably dating from 1748, to the east of the main mill building, which probably originally formed a store and Oxford Archaeology have undertaken a programme of historic building recording as part of this.

4.1.3 The recording was principally intended to add to a previous study by MOLA of the joists and beams in the upper floor (the ground floor). Further areas have been exposed so the joists from these areas have been added to the survey. The floor has also been exposed from above by the removal of floor boards so notes have been made on the upper surfaces of the joists.

4.1.4 Works to break out a concrete floor unexpectedly exposed the remains of previous historic brick and flint floor, probably dating from the mid 18th century (with various repairs) and this has been recorded. An outline assessment has also been made of the roof structure in this range which is also believed to substantially survive from the mid 18th century, again with various modifications. Empty mortices suggest the possibility that the trusses originally had an upper cruck form (or possibly curved inner principals).

APPENDIX A BIBLIOGRAPHY

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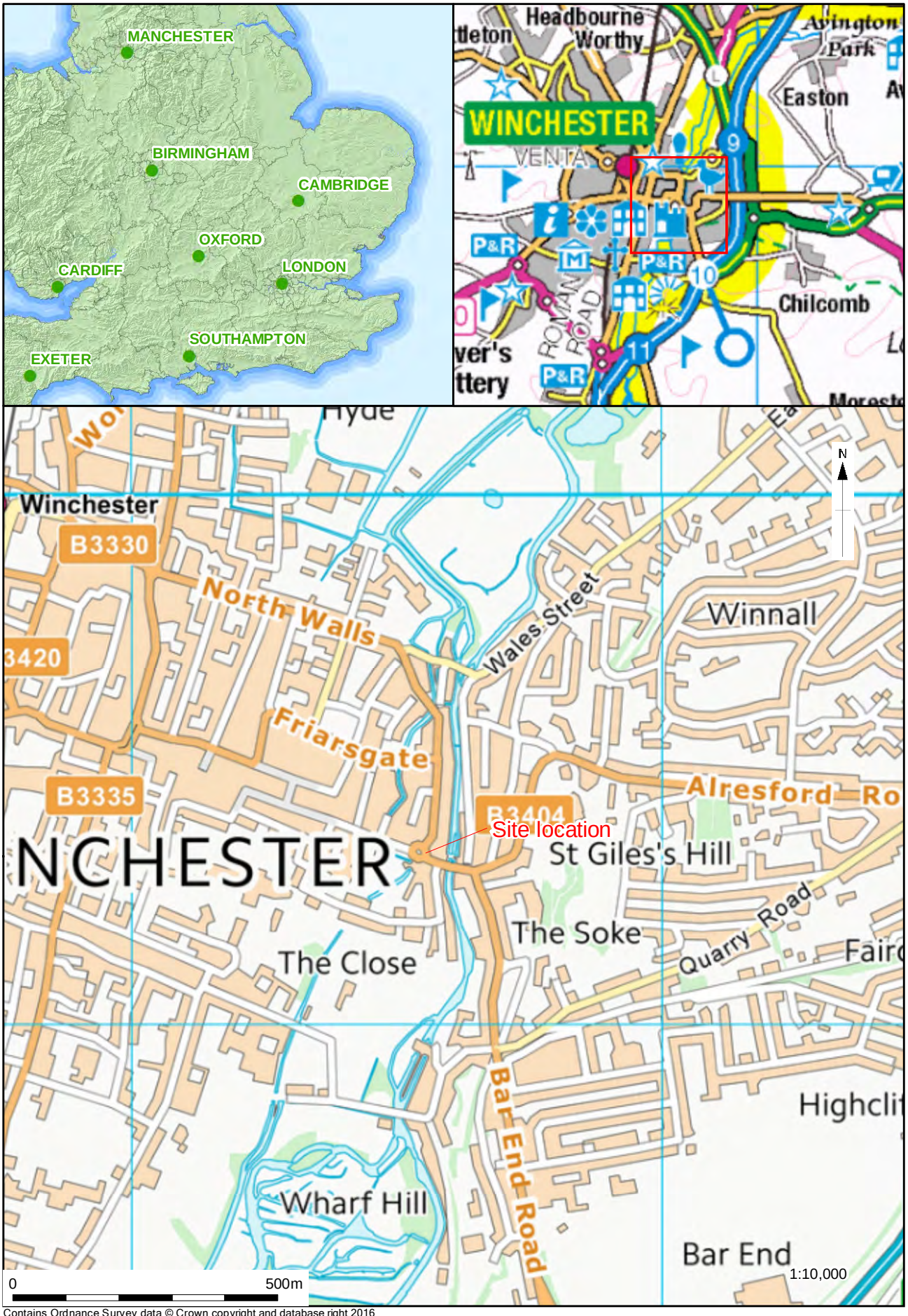

Figure 1: Site location

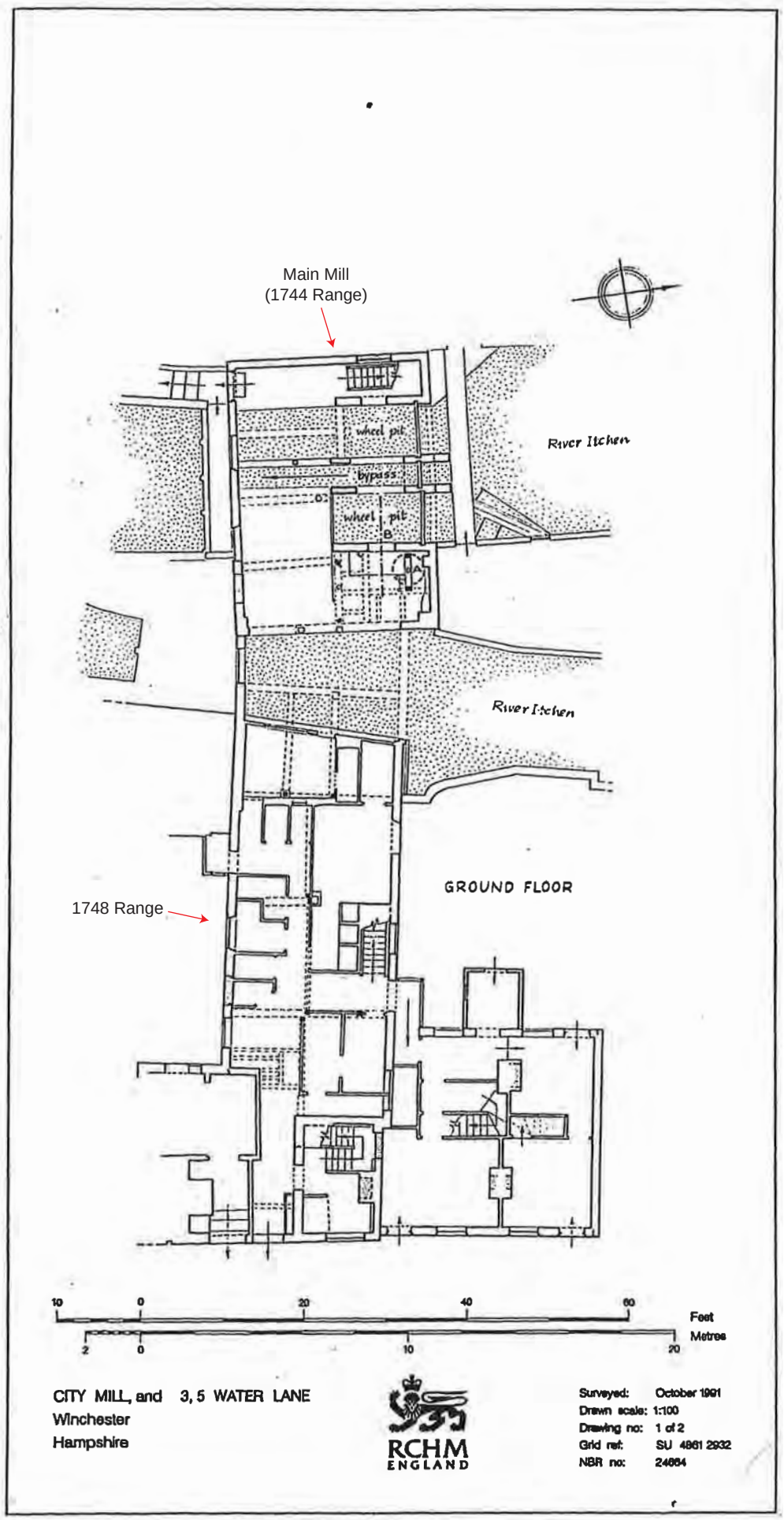

Figure 2: Lower floor plan of Winchester City Mill from 1991 RCHME study

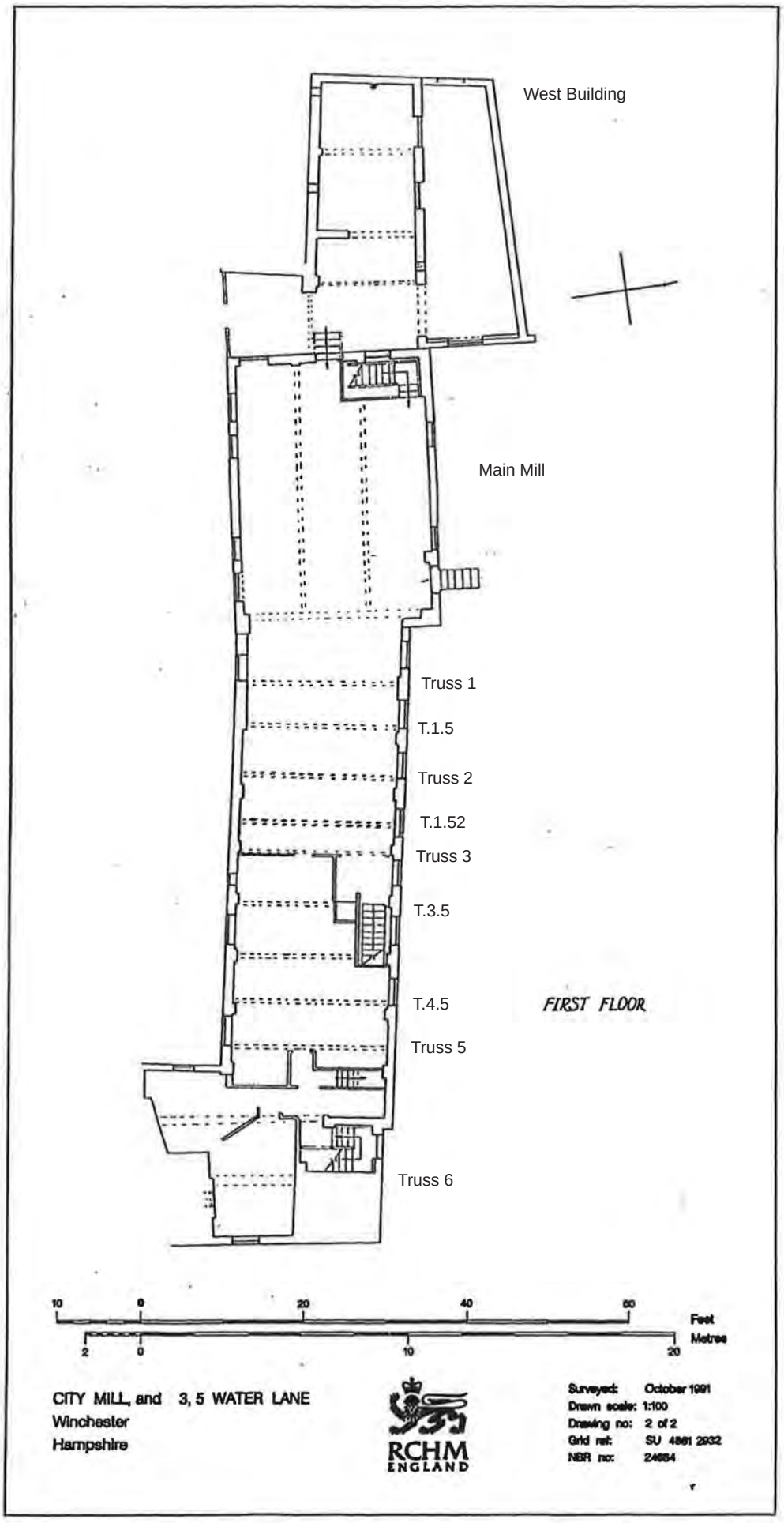

Figure 3: Ground floor plan of Winchester City Mill from 1991 RCHME study

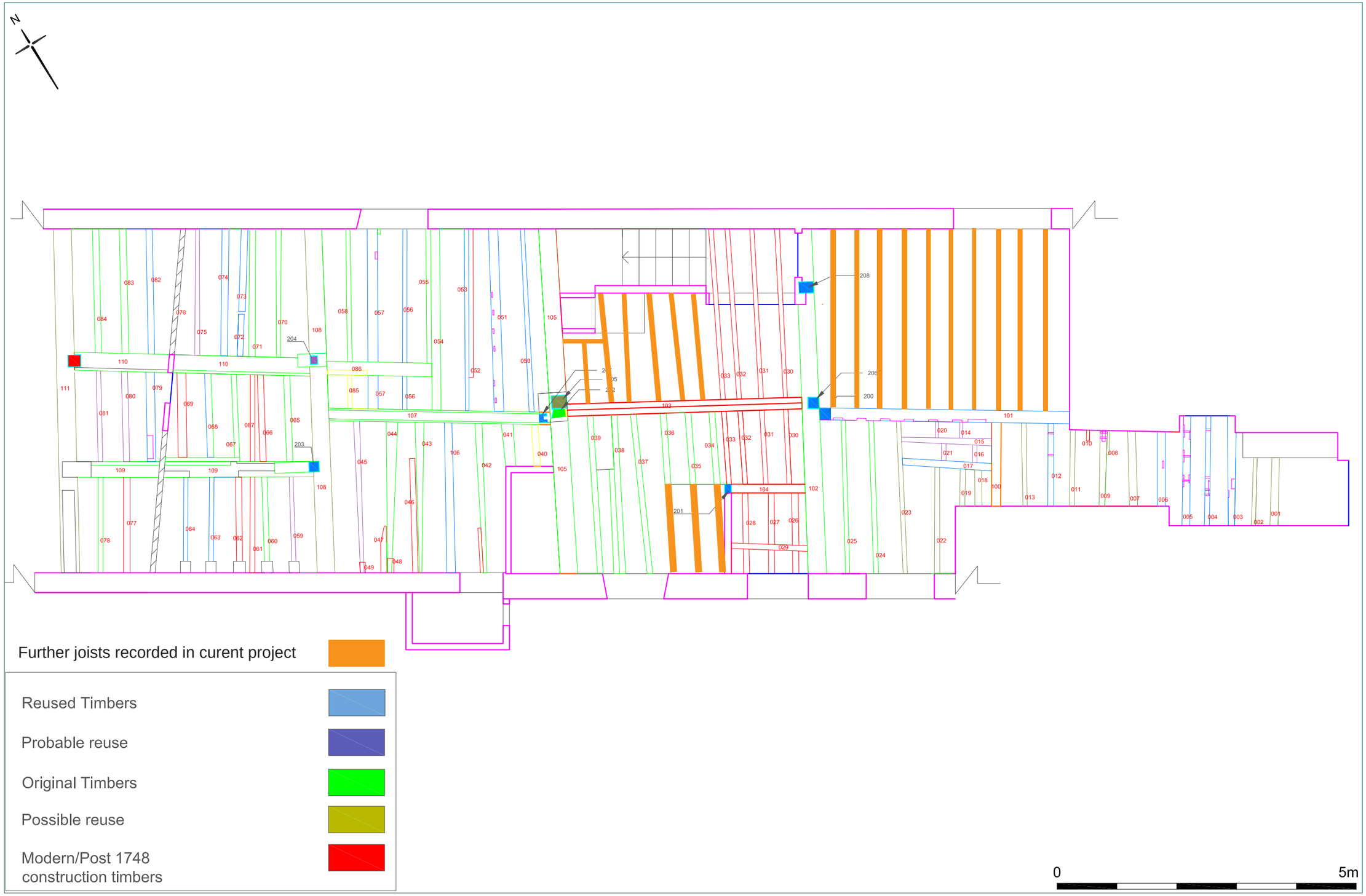

Figure 4: Plan of ground floor structure from MOLA study with additional areas of joists added

Figure 5: Plan of joists in western half of ground floor (from MOLA study) showing carpenters' marks, pegs and other features on top of joists recently exposed by removal of floorboards

N

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Oxford Archaeology

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Scale at A3 1:30

Figure 6: Photogrammetric survey of exposed floor in basement

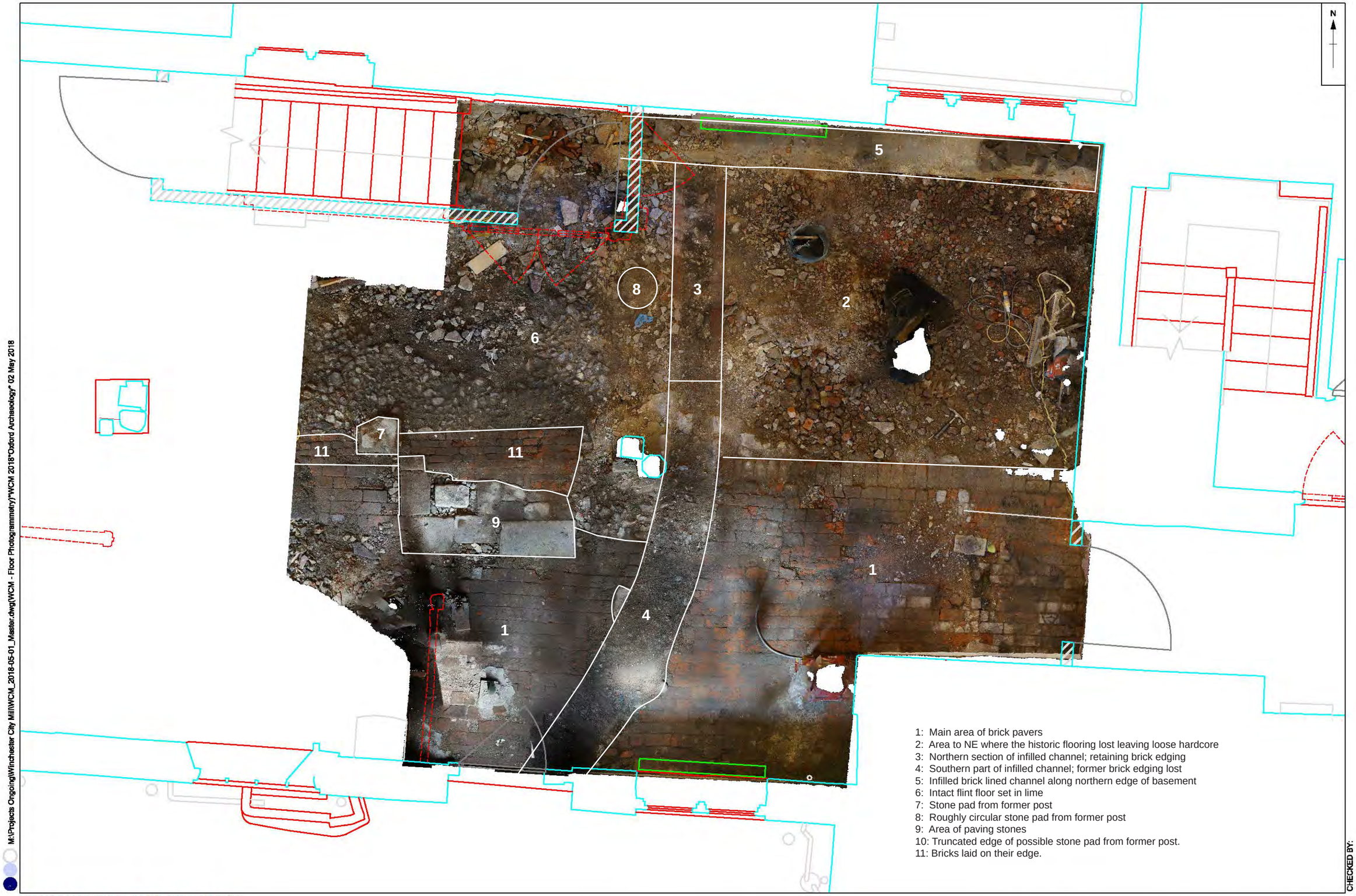

Figure 7: Photogrammetric survey of floor in basement with annotations

Close-up of floor photogrammetry from Winchester City Mill (2018-05-03)

Plate 1: General view of ground floor floorboards looking east

Plate 2: Floorboards at ground floor level prior to removal, looking north-west

Plate 3: Exposed ground floor joists

Plate 4: Joists at west end of floor looking west

Plate 5: Joists at west end of floor looking west

Plate 6: Joists at west end of floor looking west

Plate 7: Basement view towards stairs

Plate 8: Basement looking west

Plate 9: Basement looking north towards foot of stairs

Plate 10: Underside of joists in Area G looking NE towards stairs

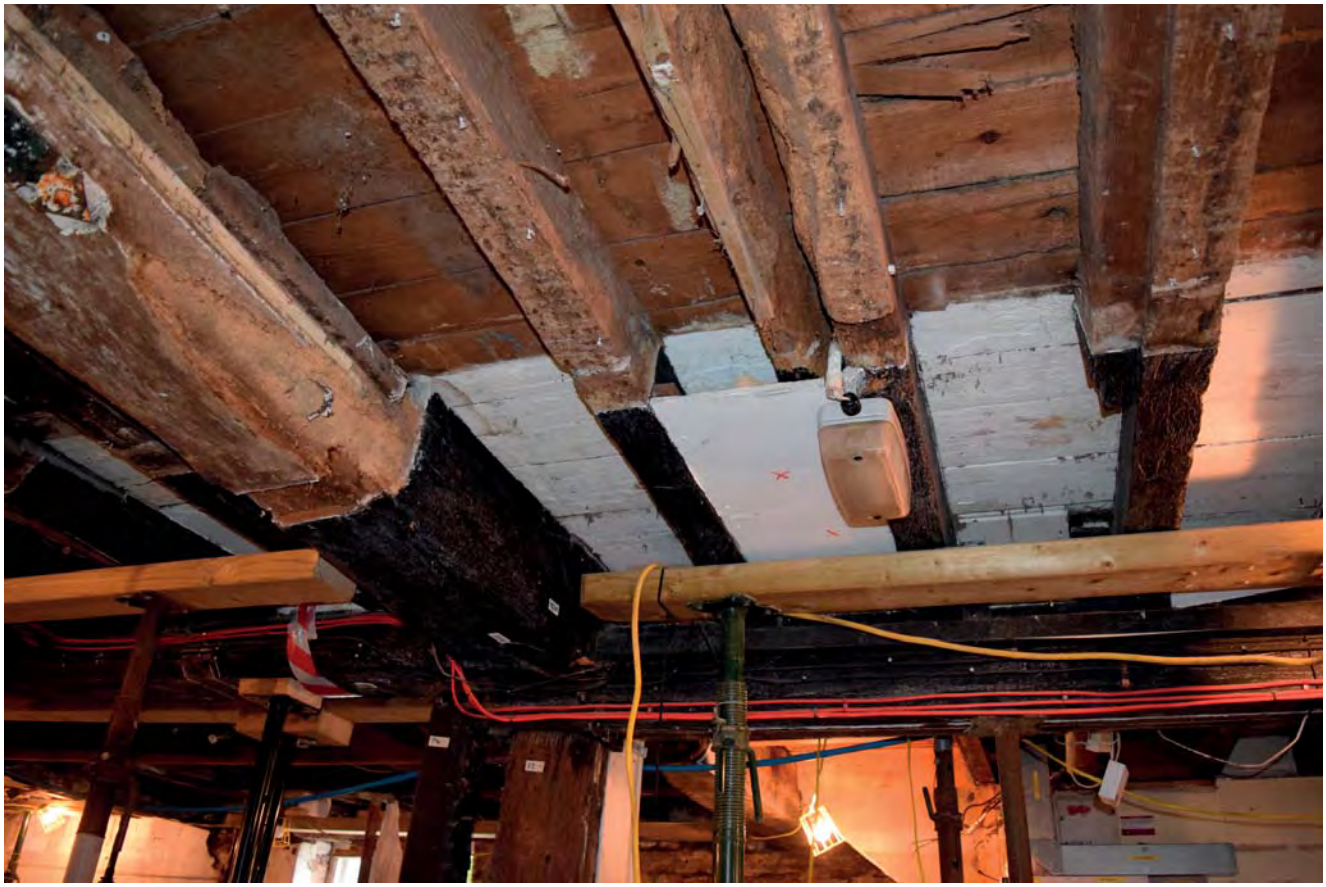

Plate 11: Joists in Area G looking north

Plate 12: Recently exposed joists in Area G looking south-west

Plate 13: Underside of ground floor joists in Area H looking east

Plate 14: Joists in Area H looking west

Plate 15: Joists in Area D looking west

Plate 16: Joists in Area D looking north-east

Plate 17: Joists during repair works in Area K looking north

Plate 18: Joists in Area N during works looking north

Plate 19: Exposed joists looking north-east

Plate 20: Joists in Area K looking north-west

Plate 21: Joists in Area J&K looking west

Plate 22: Trench mortice in Joist 79 (Area Q) looking south

Plate 23: Trench mortice in beam III (Area Q) looking west

Plate 24: Bridging beam between Areas K & J looking south

Plate 25: Mortice in beam 105 (Area G) looking south-west

Plate 26: Marks on joist 111 (Area G) looking west

Plate 27: Hatch in Area H looking north

Plate 28: Floor looking west; Areas M, O, QM

Plate 29: Mark on joist 110, by joist 70, in Area N

Plate 30: Joists in Area O looking west

Plate 31: Exposed basement floor looking east (Feature 1)

Plate 32: Floor in basement looking NW

Plate 33: Infilled channel in basement looking SW

Plate 34: Flint in floor of basement

Plate 35: Features in basement floor looking south

Plate 36: Features [1] in basement floor looking SE

Plate 37: Basement (Area D) looking east

Plate 38: North end of infilled channel in basement

Plate 39: Detail of exposed floor in basement

Plate 40: General view of basement looking west

Plate 41: Floor towards west end of basement

Plate 42: In-situ flint floor after repairs

Plate 43: In-situ floor in basement after repairs

Plate 44: General view of roof looking east

Plate 45: Truss 1 looking north-east

Plate 46: Truss 1 looking south-east

Plate 47: Intermediate truss (T.1.5) looking north-east

Plate 48: Intermediate truss looking east

Plate 49: Truss 3 looking south-east

Plate 50: north end of Truss 3

Plate 51: Closed intermediate truss at centre looking east

Plate 52: Closed intermediate truss at centre of building looking east

Plate 53: South end of Truss 4 looking east

Plate 54: Truss 5 looking east

Plate 55: Truss 5 looking east

Plate 56: Detail of end of Truss 5

Plate 57: Top of easternmost truss (Truss 6)

Plate 58: Roof in raised room at east end of building

Plate 59: South end of Truss 6 at east end of building

Plate 60: Mortice in principal rafter of easternmost truss (Truss 6)

Plate 61: Mortice in top of tie of easternmost truss (Truss 6)

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