Longwick Mill
Longwick
Buckinghamshire

Historic Buildings Recording

Oxford Archaeology

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Longwick Mill, Buckinghamshire

HISTORIC BUILDING RECORDING

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LONGWICK MILL, BUCKINGHAMSHIRE

HISTORIC BUILDING RECORDING

Summary

Oxford Archaeology (OA) carried out a programme of historic building recording and analysis as part of a wider programme of archaeological investigation at Longwick Mill near Princes Risborough in Buckinghamshire. The building appears to have been originally built in the early 18th century as a paper mill but this closed in c.1830 and by 1862 it was operating as a corn mill. The location and general chronology of Longwick paper mill is typical of the paper-making industry and reflects national trends. Buckinghamshire was one of the main centres of the trade and many mills were established in the 18th century before closing in the early 19th due to introduction of new technology making older paper mills uneconomical.

The building divides into three distinct sections: the mill house at the north end, the mill itself to the centre and an adjoining barn at the southern end. Although the current form of the mill house largely dates to a substantial rebuilding probably in the mid 19th-century this part of the building was found to incorporate the remains of two earlier buildings probably dating to the original establishment of the paper mill in the early 18th century. Almost all of the historic gearing, machinery and other features had been removed from the mill prior to the current works but some indication of the former layout of the mill could be established from some surviving physical evidence and from discussion with a former employer at the mill. The work confirmed the location and approximate size of the water wheel which powered the mill before being removed in the 1960s. The southern section of the building consists of a timber-framed barn (probably re-erecting the main frame from a previous building) at first floor which appears to have been added as a secondary addition on top of the primary ground floor brick walls contemporary with the main mill building.

The building is listed Grade II and is of considerable historical interest as a surviving relic from a once important local industry. It is also of some industrial archaeological interest but this has been significantly diminished due to the loss of the vast majority of its machinery and workings. It is also limited by the fact that its most significant period, while operating as a paper mill, ceased in the early 19th century and that its conversion to a corn mill would have removed much evidence of its use as a paper mill.

1 INTRODUCTION

1.1 Background

1.1.1 Oxford Archaeology (OA) has been commissioned by John Moore Heritage Services to undertake a programme of historic building recording at Longwick Mill near Princes Risborough in Buckinghamshire (NGR: SP7922 0423). The work forms part of a wider programme of archaeological recording being undertaken at the former mill by John Moore. This has been required by Wycombe District Council as a condition of planning approval for a housing development at the site. The former mill and adjoining buildings are to be

converted to three housing units and new cottages are to be built on adjacent land. The building recording work has been required due to the historic interest of the mill (Grade II listed) and is in line with national planning guidance (PPG15).

1.1.2 The building was originally built in the 18th century as a paper mill powered by a water wheel but was converted to a corn mill in the 19th century. The water wheel was removed in the mid 20th century but the mill continued grinding corn with electrically driven machinery until the late 1990s.

1.2 Aims and objectives

1.2.1 The overall aim of the building recording was to create for posterity a record of the building before its conversion concentrating on the building's structure, construction, history and use.

1.2.2 More specific objectives were to:

- Record the surviving features relating to the corn-milling operations on the site
- Identify and record evidence of the earlier paper-making operations
- Interpret the form of the former water wheel
- Determine the phasing and the development of the existing structures

1.3 Methodology

1.3.1 The building recording was undertaken at Level III as defined by the Royal Commission on the Historical Monuments of England (*Recording Historic Buildings: a Descriptive Specification*). It consisted of three main elements: a drawn survey, a photographic survey and a written, descriptive record. The drawn record was based on an existing survey of the building and consisted of plans, elevations and sections with archaeological annotations added to explain the construction, phasing and history of the building. The photographic record was undertaken using 35 mm black and white prints and colour slide film. It consisted of general internal and external views together with specific details of features of interest. The written record was a descriptive, analytical survey to complement the other elements of the recording.

1.3.2 In addition to the main recording discussions were also held on site with John Gomme whose family owned the mill and who worked there from c.1955. Mr Gomme was able to provide particularly useful information regarding the former layout and operations of the mill.

1.3.3 A programme of historical and documentary research on the site has been undertaken by Michael Farley as a separate part of the current archaeological investigation and the results of this research have informed the building recording. A limited amount of further research has also been undertaken specifically targeted at the paper-making industry and Longwick paper mill.

1.3.4 The project archive, which will include photographs, photographic negatives, slides, plans, elevations and site notes, will be deposited with the County Museums Service or other agreed body. Copies of this report will be deposited with the Buckinghamshire Sites and Monuments Record and with English Heritage's National Monuments Record in Swindon.

1.3.5 As referred to above the current building recording formed part of a wider programme of archaeological investigation at the site and the current report specifically relates to the building. The ground floor slab within the mill was lifted and this was observed archaeologically by John Moore Heritage Services together with excavations surrounding the building but the results of these investigations will be reported separately. It is likely that in certain parts of the building archaeological features will survive undisturbed by the current development. This is particularly true of the deep pits for the water wheel and the pit wheel which were filled with concrete when the machinery was removed. Evidence may also survive beneath the mill of the vats and water courses through the building although these may have been removed by previous developments.

2 HISTORICAL BACKGROUND

2.1 Introduction

2.1.1 As referred to above the historical research for the current project has been undertaken separately and has already been reported (*Longwick Mill*, Michael Farley). Therefore only a short summary of the research has been included here. This is particularly because there is a relatively large body of information on the mill, as there is on many Buckinghamshire mills, due to a study of the county's mills undertaken before the Second World War by Stanley Freese. This is now held by the County Archaeological Service in typescript form but much of it has been included in Michael Farley's study on Longwick. We are also fortunate in that there are eight old photographs (mid 20th century) of Longwick mill included on Buckinghamshire County Council's web site.

2.2 Development of paper-making industry

2.2.1 A short summary of the development of the paper-making industry in England would be useful in understanding the context in which the paper mill at Longwick was initially constructed and was then closed (or converted to a corn mill). Some appreciation of the processes involved in papermaking is also essential in understanding the operations of Longwick Mill.

2.2.2 Paper making is believed to have been first undertaken in England in the late 15th century (relatively late compared to several other European countries) in water-powered mills using the vat method. Although the scale of the trade developed substantially in the following centuries (particularly in the 17th

century) the principals of the technology remained relatively unaltered before the early years of the 19th century with the industrialisation of paper making.

2.2.3 A typical pre-industrial paper mill would have consisted of a number of elements including:

- a storage area to keep the rags from which paper was made;
- a boiler to initially boil the rags to remove grease and dirt and subsequently to gently warm and agitate the pulp in the vats;
- a set of wooden hammers (or stamps) driven by a water wheel to pulp the rags
- a vat (sometimes two or very occasionally more) to hold the pulp which would be formed into sheets with moulds and wire meshes;
- a drying loft where the paper would be hung to dry on animal hair ropes (so as not to stain the paper)
- cutting and pressing room where the paper would be dressed.

2.2.4 The main area in which new technology was applied prior to the 19th century was the initial stage to pulp the rags with the introduction of the Hollander engine in the first half of the 18th century. This machine had blades which cut the rags in water rather than stamping them and by 1800 there were few mills left with stamps (Shorter p.40). A paper making machine, which made an endless stream of paper rather than individual sheets in a hand-made mill and which removed the need for vats was first invented at the very end of the 18th century in France, but it was not successfully developed or applied to the industry until the first decade of the 19th century in England. The advantages of the new technology quickly became apparent and the machine was gradually adopted in an ever increasing number of mills and the use of vats became obsolete. The first year in which the total quantity of machine-made paper was greater than hand-made paper (in vats) was 1824 and the trend continued for the rest of the century with old mills either adopting the machine, converting to an alternative use (eg corn milling) or closing down altogether.

2.2.5 From the initial establishment of the industry through to the 19th century the geography of the paper-making industry was relatively regionalised with one of the most important centres of the industry being in south Buckinghamshire (including Longwick). Other main centres included Kent and Middlesex. Among the principal reasons for the industry prospering in these locations was their proximity to London, relatively close to the main printers and with a regular supply of rags. Among the most important reasons for the specific location of any paper mill was a reliable source of a large quantity of water both for driving the wheel and for processing the paper (cleaning the rags, forming the pulp etc).

2.3 Longwick Mill

2.3.1 The earliest specific reference to a mill at Longwick occurs in the 17th century when a water mill at Longwick was left in the will of William Hampden to his cousin (VCH, 1908, 265). There are several documentary references of 18th-

and early 19th-century date from when the mill operated as a paper mill. In 1719 John Francis was an apprentice at Longwick Mill and in 1726 the paper mill at Long Wick in Buckinghamshire was insured by Richard Fry, a rag merchant at the premises of Mr Scales, a jeweller in Green St, Leicester Fields in London (Shorter, 1971). The mill burnt down in 1743 when in the ownership of John Fryer but it must have been reconstructed as Jeffery's map of 1788 shows a paper mill.

2.3.2 In 1823 the mill was offered for sale and was described as *a two-vat paper-mill worked by a powerful stream of 18 ft fall, with Sal, Drying House and Offices, Garden, Paddock and Meadowland, Cottages etc., and convenient Paper Master's House*. There was a further fire at the mill in the 1820s (exact date not known but presumably after being offered for sale in 1823). In 1830 the equipment of Longwick Paper Mill was auctioned. The items offered for auction were described as *Machinery, household furniture and effects, valuable and modern paper machine, set of 3 copper drying cylinders in triangle order by Donkin (very superior), steam boiler of 4 hp and 7 large presses, large retorts and piping part, iron furnaces, overshot wheel 14 ft dia x 8 ft 10 ins., pitwheel, flywheel, 3 capital beating and breaking engines, large chests, bins, boxes, scales wts, 12 reams paper, rags, benches, stoves, trebbles stand and hair lines, pumps, cisterns, tubs, boards, planks, piping, etc.*

2.3.3 By 1869 the mill had been converted to a corn mill operated by Edwin Paine baker and miller and remained as a grain mill until the late 1990s (in its later phase it ground animal feed). The original machinery was removed in 1970.

2.3.4 The above documentary references are all taken from M Farley's research on the site other than the insurance reference dated 1726 (from Shorter, 1971) which is new to the current study. M Farley's report also includes more significant information of the building and machinery, taken principally from S Freese's description from the 1930s/40s.

3 SUMMARY DESCRIPTION

3.1 Introduction

3.1.1 Longwick Mill consists of three adjoining buildings orientated north to south. The mill itself is in the centre where the main milling operations took place; the mill house is to the north and to the south there is an adjoining building known as the barn. The roof of each of the three sections of the building is clad in hand-made pegged tiles. The mill pond is to the east of the buildings fed by a stream which ultimately runs into the River Thame. Before the start of the recent works there were also several other structures adjoining the mill but these were demolished (as part of the development) prior to the current building-recording. These buildings were included in the initial survey drawings of the site undertaken in 2000 on which the current building recording drawings are based.

4 EXTERNAL DESCRIPTION

4.1 Mill exterior

4.1.1 The ***west elevation*** (front) of the mill is formed of primary (early 18th-century) red brick at ground floor laid in English bond with a coffee coloured softish mortar. The brickwork is braced with three circular tie-bar plates which enter the building and are bolted to each side of the first floor principal joist. There are two ground floor windows, both 3-light 20th-century beneath probably primary segmental arch lintels. Between the windows is an off-centre horizontally split stable door. The elevation is timber framed at first floor and weatherboarded. There are two first floor windows either side of a horizontally-split loading door.

4.1.2 Among the more interesting features of the west elevation is a section of old brickwork at the northern end of the mill (ie forming the division between the mill and mill house). This brickwork extends up the full height of the elevation (in contrast to the rest of the mill) and at ground floor the two distinct sections are roughly keyed together. It appears that this old brickwork is the south-western corner of a previous building which extended north over the current footprint of the mill house. There is a full height straight joint between this brickwork and the 19th-century brick of the mill house but it is apparent that each of the old bricks has been truncated and that there is a true corner where the old brickwork abuts the first floor timber frame of the mill

4.1.3 The ***east elevation*** (rear) of the mill is of primary (early 18th-century) red brick at ground floor similar to that of the west elevation. There is a ground floor doorway (apparently secondary) towards the southern end of the mill beneath square-headed lintel and a primary 2m wide doorway at the northern end beneath segmental brick-arch lintel. This doorway has been partially infilled and replaced by a smaller single doorway. Immediately to the south of this door is a probably primary window (now boarded over) again beneath a segmental brick arch. The elevation has been substantially altered at first floor due to the secondary adjoining structures which extended the building westwards but which have recently been demolished. Thus two thirds of this part of the first floor elevation have been removed. The northernmost third is of brickwork (Flemish bond, chalky white mortar) of slightly later date (later 18th or early 19th century) than that at ground floor level, but the rest of the first floor elevation is of very rough, partially surviving open timber framing. The most interesting feature in this area is a timber frame (two vertical posts and a simple horizontal member) supporting a cast iron power shaft bearer. The support frame is secondary and is immediately outside the primary line of the elevation. The shaft would have extended east into the recently demolished building and it is known to have connected with a north-south power shaft in this area which powered corn crushers and other machinery in the mill. The most interesting feature in the brick part of the elevation is a 3-light mullioned window of later 18th or early 19th-century date.

4.2 Mill house exterior

4.2.1 The ***west elevation*** of the mill house is covered in a hard white render with grooves scoured to look like ashlar. There are two windows at ground floor either side of a door (beneath small gabled porch) and three windows at first floor. Each window is a 6-light sash (3 + 3) and the central door is 6-panelled with rectangular fanlight.

4.2.2 The ***north elevation*** of the mill house contains several significant pieces of phasing evidence which provide clues to the development of the building. The clearest of these is the outline of a former smaller building within the elevation which would have had a half-hipped roof. The outline now echoes the half hip of the later (existing) taller elevation. The gable of the smaller building is constructed with red brick in an irregular bond with very white chalky mortar while the taller later gable (beside and wrapping over the top of the older wall) is of Flemish bond red brick (with areas of irregular bonding) bonded with coffee coloured mortar. The outline of the smaller gable is further distinguished by it being painted white and the former location of its half hip is shown by a row of tiles. The western extent of this previous building is shown by a straight joint c.2.75 m in from the current west wall, while the original eastern wall is the same as that of the later building (now a straight joint formed by the main mill house abutting the later adjacent out-shut). The outline of the smaller previous building is also reflected on the internal face of the wall (see 5.2.19 below).

4.2.3 The original building had central windows at ground and first floor. That at ground floor (beneath segmental brick arch) has been blocked but that at first floor (beneath square-headed brick lintel) remains in-situ. This window has been substantially damaged, with few glazing bars surviving in-situ, but it has four main lights divided by transom and mullion. It is believed that this window post-dates 1830 and thus does not survive from the building's paper-making phase. There is a ground floor 6 + 6 sash towards the western edge of the elevation in the later section of the wall and a 20th-century casement immediately to the east of the blocked ground floor window referred to above. This was presumably inserted when the interior was rearranged and the window blocked (19th century). To the east of the first floor window is a secondary 2-light window which straddles the primary building and the adjacent outshut and truncates the straight joint between the two structures.

4.2.4 The ***east elevation*** of the mill house divides into two halves: to the north is the face of the secondary out-shut and to the south is the recessed face of the main mill house. The outshut wall is of red brick (English bond) on a flint base and there is a single narrow window. The southern, recessed half of the mill house elevation is of Flemish bond with chalky white mortar and it has two windows (ground and first floor) and a door immediately adjacent to the outshut projection. The windows are both of softwood and of probable early 20th-century date. The first floor window is immediately beneath the eaves but the

ground floor window has a segmental brick-arched lintel with curved underside but squared upper edge. Immediately to the north of the window is a similar brick arch with squared upper edge which was above a former doorway which has been replaced (and partially overlain) by the current door just to the north. Beneath each side of the arch are straight joints from the former door jambs but the northern joint has been largely removed by the secondary door.

4.2.5 The realignment of the door is almost certainly contemporary with alterations to the internal plan in this part of the building. These included the construction of a cross wall which would have abutted the original door had it not been previously moved (see 5.2.8 below). Another feature worth noting is a plinth along the original east wall of the mill house which continues inside the building overlain by the later outshut.

4.3 Barn exterior

4.3.1 The ***west elevation*** of the barn is of red brick at ground floor (English bond, coffee-coloured softish mortar with inclusions) beneath a weatherboarded timber-framed first floor. The ground floor wall divides into two main sections: the northernmost 4.5 m which faces what was the wheel house and the rest (c.8 m long) which faces a storage area (possibly originally stables?) beneath the barn. There is a wide door at the southern end of the wheel house and a straight joint continues up above the door jamb (ie the internal cross wall at this point extends out to a return in the external face of the building and is abutted by the N-S wall above the doorway). From the bonding either side of the straight joint it is apparent that the southern part of the wall (the former stables) pre-dated that of the wheel house to the north which may have been totally open fronted. There is a low rendered section of wall (c.2 m wide) towards the northern end of the wheel house which presumably relates to the modern blocking of the opening where the tail-race passed through the building. Above this rendered area is a window beneath segmental brick arch which has covering shutters.

4.3.2 Immediately to the south of the doorway (and the straight joint above it) is a S-shaped cast-iron tie bar plate and there are three further circular tie plates to the south of this facing the ?stable, matching the circular plates referred to above facing the mill itself. This part of the elevation shows several areas of patching to the brickwork. The most obvious area is the southern end of the elevation which has been rebuilt immediately south of the window in modern brick and above this window in 19th-century brickwork. The brickwork beneath the window also has two straight joints from a blocked former doorway although these are not directly beneath the window jambs. In this infill (between the straight joints) is a low circular blocked shute which formerly linked to one of several large hopper/silos which stood on frames immediately adjacent to this wall (J Gomme pers comm). There is another similar low blocked circular opening c.4 m to the north and these shutes

formerly carried grain into the building and onto a simple conveyor. Among other areas of rebuild are the uppermost four courses (topped by a soldier course) of the southern half of the wall.

4.3.3 The only feature within the weather-boarded first floor of the west elevation is a double door (with small window above) towards the southern end of the elevation. The doors had been removed prior to the current study.

4.3.4 The ***east elevation*** of the barn is of brick (various dates detailed below) at ground floor beneath a weather-boarded timber-framed first floor. The northern 4.5 m of the ground floor (which faces the former wheel house) has been rebuilt in modern brick clearly dating from when the wheel and raised head-race into the wheel was removed. The southern part of the ground floor wall is of rough old brickwork which may be a section of wall incorporated from a previous building although it may just have been constructed using reused old bricks. The bricks have a rough, hand-made quality (various sizes eg 5.5 cm tall x 22 cm) bonded with lime mortar and they incorporate patches of header bond brick and random bond. There is a bricked-up doorway towards the centre of the elevation the square-headed brick lintel of which has sagged significantly together with the brickwork immediately above. Significantly however the timber framing is closer to horizontal and thus has been added after the brickwork had sagged. Only the southern half of the first floor elevation remains weatherboarded; it having been removed from the northern half to link the barn with the secondary adjacent lean-to (now demolished). There was a large (secondary) loading dormer within the roof towards the centre of the elevation but this had been removed prior to the current survey leaving a large opening. The dormer appears to have been of mid to late 20th-century date.

4.3.5 The ***south elevation*** of the barn has been exposed in the current works by the removal of an adjoining structure (pig styes?) and this end of the barn is believed to have originally extended a further two bays to the south (J Gomme pers comm). The ground floor is of secondary brick (possibly 20th-century) with a large opening which formerly led to the adjoining building and the first floor is of open timber framing. The framing would have been clad in weatherboarding but this only survives to the upper part of the gable. The lower weatherboarding has been removed as it was until recently enclosed by the adjoining building. The framing is of regular machine-sawn softwood with vertical posts braced by two diagonal members at the lower corners. There was a central window but this had been removed prior to the current survey.

5 INTERNAL DESCRIPTION

5.1 Mill interior

5.1.1 The mill is two full storeys tall with a storage loft above. There are two simple flights of open-tread steps at the south-west corner of the mill (orientated E-W) providing access to the first and second floors.

5.1.2 The ***ground floor*** of the mill is a single open room with 20th-century concrete slab floor and the exposed undersides of the first floor joists are visible above. There are four irregularly spaced principal joists (29 cm tall x 25 cm wide) spanning east to west across the room into which are tenoned common joists (14.5 cm x 4.5 cm). Three of the four principal joists are in the southern half of the room. The joists are all whitewashed with no evidence of a ceiling. The floor construction (both first and second floor) appears to have been inserted into the existing building when the mill was converted to a corn mill in the 1830s (?). This is based largely on the quality of the carpentry which appears more consistent with a 19th-century date than the 18th century but also by the fact that various features detailed below (sack hoist, mill stone supports etc) which clearly relate to corn milling appear integral with the whole floor structure.

5.1.3 Within the underside of the floor there are several elements relating to the former use of the building (particularly the corn milling phase) including a door hatch at the centre of the floor through which the sack hoist lifted sacks of grain and evidence of the supports for the former mill stones towards the south-east corner of the room. There are two pairs of short but deep elm supports (N-S) spanning between the first and second principal joist and the second and third towards the east side of the building. Each of these pairs of bearers would have supported a pair of mill stones above and there was also a set of bearers for a third pair of stones immediately to the west of the southernmost of the existing supports but in this area the first floor (and supports) have been removed (possibly for modern equipment/hoppers which have also now been removed). The former third set of stones is confirmed by John Gomme who used to operate the mill but it is also suggested by empty mortices (from the former stone support structure) on the inner faces of the principal joist. At the very south-eastern corner of the room is a modern concrete base with bolts (x 6) projecting from it which held down an electric hammer mill (pers comm J Gomme) and directly above this is an inverted pyramid shaped hopper/shute (modern plywood) within the first floor.

5.1.4 Within this narrow southernmost bay was formerly a deep trench in which the vertical pit wheel sat with wooden cogs (pers comm J Gomme). The pit wheel was connected via a horizontal shaft through the adjacent wall to the water wheel. The top of the pit wheel connected via a horizontal gear (or wallower at head height) to a vertical main shaft rising through the building to a crown wheel in the storage loft. This top shaft would have projected through the first

floor in the general location of the third millstone (see 5.1.3 above) but where the first floor structure has now been removed together with possible evidence of the top-shaft bearer. There were four posts at ground floor marking each corner of this opening (although the south-western post has been removed) and this frame would have supported the third mill stone at first floor together with other machinery and the top shaft. There are large mortices (53 cm tall) through each of the northern two posts (base of mortices c.1 m above floor level) which would have supported a structure (possibly part of the support structure for the main vertical shaft).

5.1.5 The dominant feature of the northern end of the room is the rear face of the large brick chimney stack which projects from the north wall. Both sides of the chimney abut the adjacent walls suggesting that the stack may have originally been freestanding within the main body of the mill which extended further north before the current arrangement of the mill house was established. A further suggestion that the stack may have been free standing is the fact that its south-western corner is curved beneath head height but rises to a squared edge immediately beneath first floor level. The rounded corner would have allowed easier passage around the stack but the adjacent abutting wall now prevents such access. This stack would have been for the boiler to provide heat to boil and clean the rags and then to gently agitate the pulp when the mill was a paper mill. There are no blocked openings visible within the south face of the chimney and it appears that the main operations (boiler etc) would have been in the area to the north (now the mill house).

5.1.6 Approximately 1.5 m to the west of the chimney stack is a former doorway (now bricked up) in the wall adjoining the mill house directly above a low semi-circular brick-arch immediately above the current ground floor. The small arch is now roughly blocked up and abuts the higher ground floor within the mill house. It is possible that this low arch may survive from a water channel in the floor from when the building was a paper mill and required large quantities of water. John Gomme (who worked at the mill from the 1950s and whose family's connection with the mill extends further back) confirmed that he had never known what the arch related to. To the west of this arch and bricked-up door is a further blocked doorway to the mill house, this one of more recent date and in-filled with concrete block.

5.1.7 It is likely that when the building was a paper mill most of the main operations would have taken place on the ground floor with the first floor used principally for drying and finishing the paper and for storage. The vats and stamps (or possibly Hollander engine) would have been on the ground floor but the interior of the building has been altered so substantially in its conversion to corn milling that making any substantial interpretation of the internal layout of the paper mill is impossible. The concrete floor slab has been removed as part of the current development to allow for the installation of a modern insulated floor and this may have revealed some evidence relating

to the building's former use. This was observed as part of the main archaeological watching brief on the site and is to be reported separately.

5.1.8 The ***first floor*** of the mill is timber framed and like the ground floor is a single open room (F9) with the exposed (limewashed) undersides of 2nd floor joists visible above. There are three principal joists (E-W) which also form tie-beams for the roof (see below for roof description). Two of the principal joists are within the body of the building, with one immediately adjacent to the chimney stack in the northern wall. At their western end each principal joist is supported by a post with a jowled head (crude jowls compared to those in the barn - see 5.3 below) and long arched braced between post and joist. Similar posts support the eastern end of the joists but without arched braces and there are several intermediate posts and props (mainly secondary additions) within the room providing additional support for the joists. Cut-off braces and empty mortices confirm that there were formerly arched braces to the east posts similar to those attached to the west posts but these were presumably removed to remove obstructions from this part of the building. The brace remains in-situ in the post furthest north. The central principal joist is supported by one possibly primary post (circular section with load-spreading head) and three square-section secondary props while the southern joist is supported by two secondary posts. One of these posts (at the centre) was the iron topshaft (or mainshaft) which has been reused as a prop when the mill machinery and shafting was removed.

5.1.9 The three principal joists divide the ceiling into three main bays (as the northern joist is immediately adjacent to the north wall) and the northern two bays have common floor joists (14 cm x 6 cm) running straight over the principals. Within this arrangement of narrow joists are two equally-spaced wider joists (also N-S, 12 cm wide) which support the grain bins in the loft above. There is a different arrangement of common joists in the southern bay due to this area being the former location of the millstones and the vertical main shaft. In this area there are 5 binders (N-S) with shorter common joists (E-W) tenoned into these. Between the 2nd and 3rd binders from the east was a further east to west beam (25 x 24 cm) which secured the vertical topshaft bearer. The semi-circular shaft bearer itself is no longer in-situ but the iron plate and bolts which held the bearer remain bolted to the beam.

5.1.10 A short distance to the east of this (between the 1st and 2nd binders) is a pulley wheel (20 cm diameter x c.20 cm long drum) immediately beneath 2nd floor level which is held to each side by two long iron rods which extend through a void in the 2nd floor. This was part of the sack hoist and would have held the upper loop of a belt (the sack belt see below for more detail). Directly to the east of the pulley and the former top shaft bearer is an in-situ shaft bearer resting on a horizontal elm beam between two posts in the outer frame of the wall which would have supported a horizontal power shaft. This shaft, which it appears would have projected outside the current building into a recently

demolished extension, would have connected with the vertical topshaft via a pair of gear wheels.

5.1.11 As referred to above the west wall comprises four main posts with jowled heads. Between these are studs of various sizes (rough quality but not obviously reused) and diagonal braces. There are two windows (early - mid 20th century) both of which may previously have been full height openings. There are full height thicker posts which flank the windows and later diagonal braces have been added beneath the windows. Between the two windows is a loading door and aligning with this door is a 3 m long infill board within the first floor which has clearly been inserted when a feature (possibly such as a screw elevator) was removed.

5.1.12 The east wall (rear) has been substantially more altered than the west wall largely due to the building's extension to the east with some recently demolished structures, and partly because much of the shafting and machinery was located to this side of the building resulting in alterations to the building's original form. It is known that among the machinery in this part of the building were corn crushers and elevators. These machines were connected through the opening in the east wall to a north-south shaft within the adjacent lean-to (now demolished). This shaft connected with the east-west shaft from which a bearing (on supporting frame) survives in the east wall of F9 (pers comm J Gomme).

5.1.13 At the northern end of the east wall is a three-light window (2 timber mullions) which was until the start of the current works abutted by an outshut extension (thus confirming that it must have pre-dated the extension). The northern light had 12 plain rectangular panes (most lost) and the central light retains about one third of its diamond panes but the panes to the southern light have been entirely lost. The window is of softwood with thin glazing and appears to be of 19th-century date.

5.1.14 This window is within a secondary brick-up panel (between primary posts) and directly beneath it are a pair of mill stones leaning against the wall and no longer in-situ. They are strapped together (2 straps around the side) and there are three cast iron name plates screwed to stone each one showing "Barron & Son Ltd Makers Gloucester".

5.1.15 The first floor floorboards are largely historic (probably dating to early/mid 19th-century conversion to corn mill) and are 14 cm wide. There are various areas of patching or infilling for posts etc and there are three large modern boards where the mill stones were formerly situated. As detailed above (internal description of ground floor of mill) the three mill stones were located towards the south-east corner of the mill.

5.1.16 The ***2nd floor*** of the mill is a grain loft with a series of storage bins. There is a raised central walkway c.1 m above the first floor ceiling (tie-beams) which extends the full length of the mill with bins to either side of this down to the

first floor ceiling level. On the west side there are three flat-bottomed rectangular grain bins with vertical boarded sides and a small sock shute in the bottom while the east side has a space for the shaft and other mechanisms at the south end (detailed further below), a hopper type bin to the north of this and two flat-bottomed rectangular bins to the north of this. The northernmost bin incorporates a small hopper within it. Each of the rectangular bins is constructed with raking braces and vertical studs on the outer face.

5.1.17 Several small elements relating to the mechanical operation survive at the southern end of the east side including a horizontal, cast-iron, power shaft bearer set immediately beneath the edge of the central walkway. Thus it would have supported a horizontal power shaft (E-W) which extended across the southern part of the mill and connected via gearing to the vertical topshaft.

5.1.18 The other main surviving mechanical element in this part of the mill are the upper two rods (or levers) attached to the pulley drum referred to above immediately beneath the first floor ceiling. These levers are hinged and the upper end is attached to a simple rope which hangs down to first floor. Thus it appears likely that the drum would have formed part of the sack hoist and when the rope was pulled down the drum would have tightened against a belt which ran over this drum together with a further pulley wheel on the horizontal power shaft (referred to above) which formerly ran immediately above this area. A further belt (or other connection) would have linked the drum pulley with the main sack hoist drum and lifting mechanism at the centre of the 2nd floor. The lifting mechanism and main support for the hoist has been entirely lost but the opening in the walkway floor remains (although reused as a grain shute).

5.1.19 There is not enough surviving evidence to gain a full clear picture of the workings of the sack hoist and it may be that the small drum pulley at the south-east corner of the mill did not form part of the main sack hoist but was a lesser hoist or pulley. However the fact that the pulley was hinged with a lever that would (presumably) pull the drum against a powered belt suggests that it must have been some such feature and it is known that there was a sack hoist (known both from evidence detailed above and pers comm J Gomme).

5.1.20 Another feature of some interest which relates to the operations of the mill is a screw shute located between two rafters on the east slope of the roof. This consists of an circular open vessel with a screw mechanism inside which would have turned and transferred grain upwards into the grain bins on the second floor.

5.1.21 The roof structure has a distinctively regional form and appears to be an entirely (or substantially) reused roof from a previous building (possibly even a previous mill building on this site) which has been adapted for the current corn mill. The roof consists of 4 trusses and is largely constructed of elm. The trusses consist of a tie-beam (at first floor ceiling height), principal rafters, a collar, two posts (flanking the walkway) and two curved inner

principals. The two posts support the upper ends of the curved inner principals (with packing piece between) and the inner end of a projecting interrupted collar (immediately beneath the true collar). There are two purlins to each slope: the upper purlin is clasped between the interrupted collar and the true collar and the lower purlin is secured between the principal rafter and the curved inner principal.

5.1.22 Each post has a notch towards its head for a raking strut (to its outer side) but such struts in this roof would have been unnecessary (due to the curved inner principals) and the notches must relate to raking struts from a previous roof. In addition there are cut-off mortices (with single pegs) from a horizontal strainer beams between the posts. The height of such a beam (1.2 m above walkway) strongly suggests that these mortices must also relate to a previous building. The roof has a ridge piece and common rafters of inconsistent size.

5.1.23 The south end of the mill roof is gabled (adjacent to the lower barn roof) but two half hip ridge pieces remain in-situ within the roof to show that the roof was originally half-hipped to match that at the north end of the mill house. The base of the half-hip ridges would have been at the height of the upper purlins and the roof has been raised with later common rafters and ridge piece above this. There was a low lath and plaster ceiling within the 2nd floor attached to the underside of the collars but this has been largely lost. The ceiling was c.1.7 m above the walkway but at the southern end of the mill (adjacent to the staircase, where the half-hipped roof has been raised) it slopes upwards towards the roof apex to give a greater head height.

5.1.24 The inconsistent nature of the carpentry together with the empty mortices and the number of packing pieces all show that the roof has been substantially reused. It is likely that the current roof dates to the conversion /rebuilding of the mill in the 1830s and it is possible that the main roof timbers were reused from the 18th-century paper mill. One of the more interesting features of the roof is the use of curved inner principals which is a particularly characteristic roof form in this general area (South Oxfordshire, Buckinghamshire, Berkshire).

5.2 Mill house interior

5.2.1 The ***ground floor*** of the mill house consists of two rooms at the front (west) divided by a central entrance hall and three rooms to the rear with a 2-room outshut beyond this. The room at the north-west corner (**G1**) has plastered walls and 20th-century decoration (picture rail, cornice, plain skirting, tiled fireplace). The two windows (one to each external wall) were each 6-light sashes (3 over 3) with ovolo section glazing bars of probable 20th-century date. When the windows were removed it was apparent that the jambs had been rebuilt in brick using a secondary hard mortar contrasting with the primary whiteish mortar showing that the windows must have been secondary insertions. As detailed above (see 4.2.2) on the outside of the north wall of

the mill house there is a straight joint and when plaster was removed from within G1 it was confirmed that this structural break continued through the full depth of the wall. It is also significant to note that the east wall of the room (the spine of the house with the chimney stacks) abuts the north wall. Plaster on the north wall continues behind the abutting wall and the spine is clearly a secondary addition. The south wall of G1 is of the same brickwork at the east wall and is contemporary with it.

5.2.2 It is apparent that the mill house has undergone a substantial rebuilding, probably in the 19th century, consisting of extending the house to the west. Thus the whole west wall, the central N-S spine, the south wall of G1 and the western half of the north wall of G1 all date to this rebuilding.

5.2.3 **G2** is immediately to the south of G1 and is the entrance hall at the centre of the west side of the mill house. It has a lino tile floor and a well-worn stone door step at its east end (centre of the building) which has presumably been moved and reused from elsewhere. The room again has plain later 19th/20th century decoration and the front door has a simple rectangular fan light (probably early 20th century) over it.

5.2.4 **G3** is at the south-west corner of the mill house and has similar plain decoration to G1 and G2. There is a 19th-century cast iron fireplace (segmental arch, tiled surround, mantel removed) which was boarded over prior to the current works. The window in the west wall is the same as those in G1 (3 over 3 sash). In the western half of the south wall was a former doorway infilled with concrete block. The doorway post-dates the plastered walls and the blockwork was simply boarded over when the door was in filled. There is a further (older) blocked doorway immediately to the east of the later blocked door but this is only visible on the other side of the wall (south) as it has been plastered over within the mill house (blocking detailed below in internal description of mill). The north wall of the room (flanking the entrance hall) is of single skin brick nogging and at each end it abuts the adjacent wall. Thus it appears that G3 was formerly larger and the hall was created from it. The first floor principal joist in this part of the building extends from the south wall of the mill house to the load-bearing north wall of the entrance hall.

5.2.5 The room at the south-east corner of the ground floor **(G6)** is one of the more interesting areas of the ground floor in terms of providing phasing evidence of the development of the building and its former use. The most significant feature is the large fireplace within the south wall which (as detailed earlier) projects into the mill (G9) and is abutted by the walls to each side of it. The large size of the stack is out of scale with the mill house and can only have been from its former industrial use in the mill. The chimney clearly pre-dates the current arrangement of the mill and mill house and it appears that it was formerly free-standing within a longer mill building. As detailed earlier this is suggested by the curved south-west corner of the stack which would have

allowed ease of access around the stack and plaster survives on the west of the stack where it is now abutted by the later mill house brick wall. There is no fireplace within the southern face of the stack (or apparent blocking) and it appears the stack was used from the north (now within the house).

5.2.6 There is currently an iron range (early - mid 20th century) within the fireplace together with some contemporary low brick infilling. The existing opening is formed by a segmental brick arch and iron bar but within the face of the stack (towards the eastern end) there is what appears to be a surviving section from an oak bressumer which would have extended over a wider opening. The east side of the bressumer has been truncated and it appears that the face of the stack would have extended c.30 cm further east before returning to the south. The chimney stack is constructed of bricks (21 cm x 6.4 c) which appear to be of earlier 18th-century date and it is probably an original feature of the paper mill.

5.2.7 The north wall of G6 is a single skin of brickwork and as it abuts the adjacent walls at each end it is clearly secondary. The brickwork that it abuts at its east end is itself also secondary having been added to infill the door jamb which was originally splayed like the opposite jamb. Clearly this door would formerly have opened into a larger room. The bricks in the east wall appear to be of the same age as those in the chimney stack apparently confirming that they are primary.

5.2.8 **G4** is to the north of G6 and as detailed above is believed to have formerly been part of a single larger room (probably originally part of the mill) with the current south wall having been inserted. The external door at the south-east corner of the room has a splayed north jamb and lintel but the southern jamb (which was also formerly splayed) has been partially infilled to allow the insertion of the cross wall dividing the room from G6. At the north-west corner of the room is the base of a plain straight staircase which rises to the north to provide access to the first floor. The staircase is clearly a secondary insertion. This is partly shown by the fact that it is built against (and is integral with) the secondary brick spine wall and partly by the blocked window in the north wall which is abutted by the north end of the staircase.

5.2.9 **G5** is to the north of G4 and to the east of the staircase. There is a window in the north wall but this is a secondary feature (late 19th-early 20th) inserted when the adjacent window (now abutted by the stairs) was blocked. The east wall of G5 is on the line of the primary external wall but this has now been enclosed by a secondary lean-to. When the lean-to was added (19th-century) the northern part of the primary wall was removed to link G5 and G7. This wide opening has now been partially infilled (with a small doorway) but the southern part of the primary wall survives. The ceilings in the eastern half of the mill house are noticeably low (c.2 m above floor) but there is a small step up into G5 and here the ceiling is just 1.9 m above the floor. The ceilings in the western half of the building are higher (c.2.5 m) and almost certainly date

to the enlargement of the house and insertion of the spine probably in the 19th century.

5.2.10 **G7** and **G8** form the small catslide-roofed extension. The walls of G7 are plastered but the lower section of the east wall is of a flint and rubble suggesting that it may survive from a previous building. The ceiling in both rooms is of plasterboard but supported on older (19th-century) rough joists. G8 is a small bathroom and the window in the south wall has been lost.

5.2.11 The ***first floor*** of the mill house is again divided to an east half and a western half by the secondary north - south brick spine incorporating the two chimney stacks. The east half incorporates the primary building and the floor in this area is c.50 cm lower than that in the later west half; the two areas being linked by two steps at the centre of the floor. The east half consists of a large room to the south (F8) and a series of smaller rooms to the north (F5, F6, F7). The walls of **F8** are plastered but areas of the plaster have been removed from the external (east) wall to reveal a red brick of probably 18th-century date. There is a cast-iron fireplace of 19th-century date in the south wall of F8. The north wall is of secondary brick nogging but is directly beneath an apparently primary enclosed truss which formed the north wall of a second floor attic room (see below for further detail).

5.2.12 **F7** is a small hall (E-W) to the north of F8 with a cupboard to the east and the steps up to the western half of the first floor to the west. Within the external east wall of the cupboard is a former window which has been bricked-up due to it having been enclosed by the adjacent secondary lean-to. **F5** is a landing at the head of the staircase but when the current recording was undertaken the stud partition dividing it from F6 had been removed. There is a window in the north wall of F5 (transom and mullion) which as referred to above has lost almost all its glazing bars and is believed to date to the mid or later 19th century. The staircase has a plain curved handrail supported by square-section balusters and a plain turned newel post. It is likely to date to the 19th-century refurbishment of the mill house. Similarly to the arrangement on the ground floor the west wall is not bonded into the north wall and the two walls have subsided apart to form a significant gap. This is further confirmation that the north-south spine of the mill house is secondary.

5.2.13 **F6** is the room at the north-east corner of the first floor and its east wall has been removed (when the adjacent lean-to was constructed) to extend the room to the east. There is a window in the north wall which must be secondary as it straddles the two parts of the room (and interrupts the straight joint beneath in the north elevation).

5.2.14 The regular arrangement of the west half of the first floor dates to the 19th century. It is divided into two principal rooms (**F1, F4**) at each end (each with fireplace) linked by a corridor (**F2**) and smaller room (**F3**). When the current survey was undertaken however these partitions had been almost entirely removed to form a single open space. The fragments (and other evidence)

which survived showed that this arrangement of rooms was primary to this part of the building with the studs being of 19th-century date and the former ceilings supported by contemporary (but reused) joists. The internal faces of the three external walls in the west half are of plastered brick but the north wall has been refaced (internally) to form a non-bonded double skin. This internal refacing is of 19th-century date and is contemporary with the substantial rebuilding of the mill house including the new front (west) wall. There are two fireplaces within the brick east spine wall which formerly served each of the two main rooms. Each fireplace is of cast iron (with mantel removed) and is of 19th-century date.

5.2.15 The ***roof*** of the mill house is half hipped and the current profile is largely 19th century, dating to the enlargement and rebuilding in this period. However, there is evidence of two earlier roofs (enclosed by the later roof) which provide a good indication of the original footprint and form of the building.

5.2.16 The 19th-century rafters above F3 and F4 enclose an earlier set of rafters presumably from the original early 18th-century mill. This building extended north to approximately the east-west mid line of the mill house, east to the current east wall of the building and west to a line c.1 m inset from the current west wall. It would have been the same height as the current building and its north end was half hipped. The wall plate survives from this building (inset c.1.25 m from the current west wall) together with a single primary purlin above this. The primary wall plate is supported by a later east-west joist which extends west to the 19th-century external wall. Some laths survive (together with very fragmentary plaster) fixed to the undersides of the primary rafters up to the mid-point between purlin and wall plate. There are no laths (or nails from former laths) on the rafters above this line. This ceiling would have been very high in relation to the current first floor level and is likely to have been from a 2nd floor storage loft (similar to the second floor above F8 - see below).

5.2.17 The primary rafters of the half-hip at the north end of the original building survive (now above F2 and F7) together with the purlin on which their bases rest. The eastern hip ridge-piece has been lost but it appears that many of the primary rafters from the east slope survive having been incorporated into the slope of the current building. The rafters in the southern half of the east slope (ie from this half-hipped building) have been laid flat. The rafters in the northern half of the east slope (beyond the line of the original building) also appear to partially survive from an earlier lower building (only extending up to the upper of two purlins rather than the ridge piece) with some later extensions and additional later full height rafters. (See 5.2.18 for further detail on this lower building).

5.2.18 The upper part of the south wall above F4 reflects the line of the original roof structure and only extends up to the lower line of primary rafters and laths. This wall is plastered. However this brick skin (which appears to be of 19th-

century date) is in front of a separate earlier (probably 18th-century) brick wall (the adjacent north wall of the mill) which continues above the primary rafters and has been incorporated into the later (19th or possibly early 20th-century) roof structure. The apex of the 19th-century brick skin of the south wall (above the collar or bearer) is of modern brick with a doorway (now blocked) which formerly allowed access through to the 2nd floor of the mill. The chimney which is abutted by the south wall appears to be of early 18th-century brick suggesting that the whole stack survives from the original mill.

5.2.19 The north wall also provides evidence of the former arrangement of the building. Above the former ceiling in this part of the building there is the plastered imprint of an earlier roof (probably 18th-century) against the north wall. This is largely obscured at first floor by the later (19th-century) brick skin in front of the earlier wall but the uppermost c.1 m is visible. The plastered area from the earlier roof extends east as far as the current roof line (apparently confirming that that the northern part of the east slope survives from the earlier building) and west to approximately the mid point of F1. The plastered area extends up to an elm bearer (or collar) at the height of the lower of two purlins in the east slope. The upper of these two purlins is at the height of the ridge piece of the original building. The purlin from the original western slope has been removed due to the later brickwork enlarging the wall and building in this direction. The later part of the wall (above the plastered area) is of bare brickwork of probable 19th-century date. The fact that the brickwork is later above the collar than below strongly suggests that this building would have been half hipped (as is the current later roof above this).

5.2.20 A truss substantially survives from this building above the brick-nogging wall dividing F8 from F7. It consists of a tie-beam at the current ceiling height, a collar (the eastern end of which clasps the purlin), one complete principal rafter (the east rafter) and the uppermost 1 m of the west principal rafter. The rest of this principal was presumably truncated and lost when the millhouse was enlarged to the north-west. The truss is enclosed (ie studs between tie and collar and above the collar) and there are laths fixed to the south side from an attic room above F8. (There are also plastered ashlar posts and rafters within this attic room). Fragmentary plaster also survives to the north side (over the studs and recessed laths).

5.2.21 The truss is in line with the north end of the taller half-hipped building and was therefore presumably the south end of the lower building. The form of the truss would support the belief that the former building at the north-east corner of the mill house dates to the early 18th-century mill. It is impossible to know what function the building served but it is likely to have been either one of several buildings adjoining the main mill for storage or the previous smaller mill house.

5.3 Barn interior

5.3.1 The ***ground floor*** of the barn divides into two areas: G10 adjoins the mill to the south and G11 is to the south of this. Although **G10** is now a grain store and has substantially lost its historic form it is known that this was the wheel house where the water wheel was located. The shaft of the wheel would have continued through the north wall and would have driven a vertical pit wheel immediately within the mill together with the rest of the mill gearing described above. The leat (head race) would have entered the wheel house from the east and passed over the wheel (ie an overshot wheel) before continuing west (at a much lower level) in a tail race beneath what is now a car park. The first 4-5 m of the leat (away from the wheel) was an uncovered stream in the mid 20th century whereas this area has now been entirely infilled and the stream diverted from the building.

5.3.2 The wheel is believed to have been removed in the 1960s and the deep pit substantially infilled with concrete so that the floor within G10 is now only c.65 cm below the ground floor of the adjacent mill. The wheel is reported to have been c.14 ft in diameter and c.8 ft wide. It was situated immediately adjacent to the north wall of the wheel house with the shaft resting on a bearing within the wall and the southern end of the shaft supported by an east-west sleeper wall across the wheel house inset from the current south wall. Between the wheel and the current south wall was a walkway at the height of the axle. The sleeper wall has been removed (or buried within the concrete) and there is no clear trace in the north wall of blocking from where the axle bearing formerly was. It is likely that the axle would have been located a short distance below the current slab level.

5.3.3 This wall (north wall) was originally rendered but much of the render has been lost to reveal historic (18th/19th century) brickwork (very rough English bond) with soft coffee-coloured mortar behind. The only clear feature of some historic interest within the wall is a pair of straight joints immediately to the east of the central line. The joints are high up (now abutted by the secondary first floor above G10) and it may be that they relate to a former walkway across the top of the water wheel. There are several areas of patching to the north wall but no oil staining or scouring from the wheel. The rough and irregular nature of the brickwork suggests that much of this wall has been substantially rebuilt (although the soft mortar shows that the rebuild must be historic). Such a rebuild would not be unexpected considering that the wall supported the wheel axle and would have experienced heavy wear and possibly subsidence. A doorway through to the mill has been added (since the wheel was removed) at the western edge of the wall.

5.3.4 The east wall is where the mill race would have entered the wheel house and this is entirely of later 20th-century brick (clearly added when the wheel removed).

5.3.5 The south wall is of brick similar in age to the north wall (18th/19th century) but it is much more regular than the north wall and is constructed with a white

mortar in contrast to the coffee coloured mortar of the north wall. Towards the western side of the south wall is a 1.2 m wide blocked doorway beneath a timber lintel which would have lead to G11. The only other clear phasing evidence within the wall is a straight joint c.1.5 m in from the east wall and secondary infill immediately adjacent to this.

5.3.6 To the south of the former wheel house is an open room (**G11**) which is believed to have formerly housed the stables (pers comm J Gomme) although little evidence of this survives. The room is three bays long and the floor above is entirely secondary. The joists in the central and northern bays are of 19th century date (18 cm x 6 cm machine-sawn softwood; probably dating to the construction of the barn above) and those in the southern bay are of 20th-century date. The joists are supported by a pair of steel joists (to the south) and a softwood joist to the north. Each of these principal joists is supported to the east by modern brick piers. The north wall consists of a former doorway to the west (now blocked) and a central recess (1.3 m tall from floor) which presumably formerly connected with the wheel house. The south wall is of secondary brickwork (later 19th or early 20th century) and it abuts the brick of the east wall.

5.3.7 The ***first floor*** of this part of the building is a single open room (F10) created by 6 trusses and is a true 5-bay barn (although the ground floor is also known as the barn). When the current survey was undertaken the room was empty although it had presumably until recently been used for storage and it is believed that when the site operated as a paper mill it was where the paper was hung up to dry on long animal hair ropes (pers comm J Gomme).

5.3.8 There are six cross frames: the four inner ones are open and the two end ones are closed to form the end walls (the north end abuts the south wall of the mill). Each frame consists of posts at each end resting on a sill beam (or sole plate) at first floor above the ground floor walls. As referred to above some areas of the brickwork beneath the sill beam has subsided and other areas rebuilt but the plate itself is relatively horizontal. This suggests that the construction of the frame post dates the brickwork beneath. Each of the posts supports one end of a tie-beam and a wall plate. The tie is additionally supported by shallow arched braces resting on the posts. The head of each post is jowled immediately above the brace with a decorative ogee carving. The attention to detail of the carving is somewhat out of character with the rough nature of the posts particularly with the fact that much bark remains on some and some bark extends over the carving. This detail may have been added by machine in the 19th century when the framing is believed to have been reconstructed. The tie supports two queen struts which in turn support a collar. Each end of the collar clasps a purlin together with a relatively slender principal rafter. There is only one purlin to each slope and these support softwood common rafters which run directly over them and meet at a thin softwood ridge piece. The common rafters are braced within every other bay with straight softwood braces.

5.3.9 The end walls of each bay (other than where there are doorways) are formed of narrow rough softwood posts braced by a single mid-height rail. The only diagonal braces in the wall frames are straight softwood braces at the southern ends of the east and west walls. The outer face is weatherboarded and the lower part of the internal face of the west wall is similarly weatherboarded. The internal face of the east wall is unboarded. There is a double doorway in the second bay from the south end of the west wall and the northern two bays of the east wall are open. This would have allowed access into the first floor of the adjacent building but this has now been lost. The floor of the barn is now covered with large modern boards beneath which are older floorboards of probable later 19th-century date. As detailed above (see section on ground floor) the first floor joists are of 19th-century softwood to the northern two-thirds and of 20th-century date to the southern third.

5.3.10 The principal members of each cross frame (tie, collar, struts, braces, posts) are of elm and each of the main joints is tenoned (secured with a single peg). These members all appear to be of 17th-century (or possibly early 18th-century) date but the rafters (both common and principals), ridge-piece, wall plate and wall framing is all of softwood and of later date (probably largely 19th century). This, together with the fact that the sole plate on which the frame stands appears to post-date the brickwork beneath and the fact that the frame of the barn abuts the frame of the adjacent mill, suggests that the barn has been rebuilt (probably in the 19th century). The main members have all been reused (probably from the previous structure on the same site but possibly from a different building) and the ground floor brickwork survives from the earlier structure.

6 CONCLUSION

6.1.1 Longwick Mill is a building of considerable local and historical interest due particularly to its original use as a paper mill, an industry of historical importance in south Buckinghamshire. Its later use as a corn mill is also of local interest but despite its industrial past the use the building is of greater historical interest than industrial archaeological interest. This is due to the fact that the water wheel and the vast majority of the internal machinery had been removed prior to the current study. The industrial features that do survive (power shaft bearers, evidence of sack hoist mechanism, screw shute, bearers for mill stones etc) relate almost entirely to the corn milling phase rather than the paper milling.

6.1.2 The building has developed in several phases and has undergone several substantial programmes of rebuilding, suggested not only by the physical evidence detailed here but also due to two fires at the building documented in 1743 and the 1820s. Due to these rebuildings there is doubt as to how much actually survives from the early 18th-century paper mill. The two external walls appear to date to this period but the first floor and roof structure appear to be later, possibly dating to the 19th-century conversion to the corn mill.

Other than the surviving primary walls the most significant feature of the mill is the large chimney stack which would have provided the necessary heat for the paper mill (to boil the rags and agitate the pulp).

6.1.3 Evidence identified in the current study suggests that the mill formerly extended further to the north, possibly as far as the east-west mid line of the mill house and that the chimney was free standing. The half-hipped roof structure of this building survives enclosed within the later roof of the mill house. The current form of the mill house is largely 19th century but this also encloses an older smaller building from which survives a plastered imprint both inside and outside the north wall. A rough truss also partially survives from this building at its southern end where this building would have adjoined the formerly longer mill. The ground floor of the barn (at the southern end of the complex) is contemporary with the main mill but its timber framed first floor appears to have been rebuilt (probably reusing the main members from the previous cross frames).

6.1.4 The fact that so little evidence survives from the paper mill makes it impossible to provide any substantial interpretation of the former layout of the operations of the paper mill. Many specific operations would have taken place within the ground floor (stamps, vats, screws etc) but almost nothing of these survives or what does survive is not interpretable.

6.1.5 The location and chronology of the mill at Longwick are an accurate reflection of developments in the paper-making industry generally during this period. Many new paper mills were established in the later 17th and early 18th-century in several specific area including Buckinghamshire. One of the reasons for the establishment of the industry in these locations was there proximity to the London from where large quantities of rags could be obtained and it is interesting to note that in 1726 the mill at Longwick is known to have been owned (or at least insured) by a rag merchant. It is also typical in closing (or converting to corn milling) in the early 19th century when many paper mills became uneconomical by new technology in the industry.

6.1.6 The building is also of some interest for its vernacular architecture. The use of curved inner principals in the roof trusses of the mill is a typical truss type for this area and the use of half hipped roofs (the mill house and formerly both ends of the mill) also appears to common in Longwick and the surrounding area.

APPENDIX I BIBLIOGRAPHY AND REFERENCES

Published Sources

Foreman W Oxfordshire Mills (1983)

Hunter D Papermaking: The History and Technique of an ancient craft (1947)

Shorter AH Paper Making in the British Isles: an Historical and Geographical Study (1971)

Victoria History of the Counties of England: Buckinghamshire Vol ii (1908)

Unpublished sources

Farley M 'The Historical Background' in John Moore Heritage Services 'A Watching Brief at Longwick Mill, Buckinghamshire (unpublished report).

Cartographic Sources

Ordnance Survey 6" Sheet 37 (pub 1885 surveyed 1877)
Ordnance Survey 25 Sheet XXXVII.6 (1921 revised 1919)
Ordnance Survey 1:2500 (1976)

APPENDIX II SUMMARY OF SITE DETAILS

Site name: Longwick Mill, Buckinghamshire
Site code: LWMILL02
Grid reference: SP7922 0423
Type of evaluation: Building recording
Date and duration of project: Site work undertaken Jan-Feb 2002
Location of archive: The archive is currently held at OA, Janus House, Osney Mead, Oxford, OX2 0ES. It will subsequently be deposited Buckinghamshire County Museums Service (Museum Accession No: AYBCM 2002.34)

Contents of archive:

Eight films of 35 mm photographic negatives (black and white prints)
Eight sets of black and white photographic prints (contact sheets)
Eight films of 35 mm colour slides
A copy of the current report
Original site drawings on permatrace
Descriptive notes

APPENDIX III LISTED BUILDING DESCRIPTION

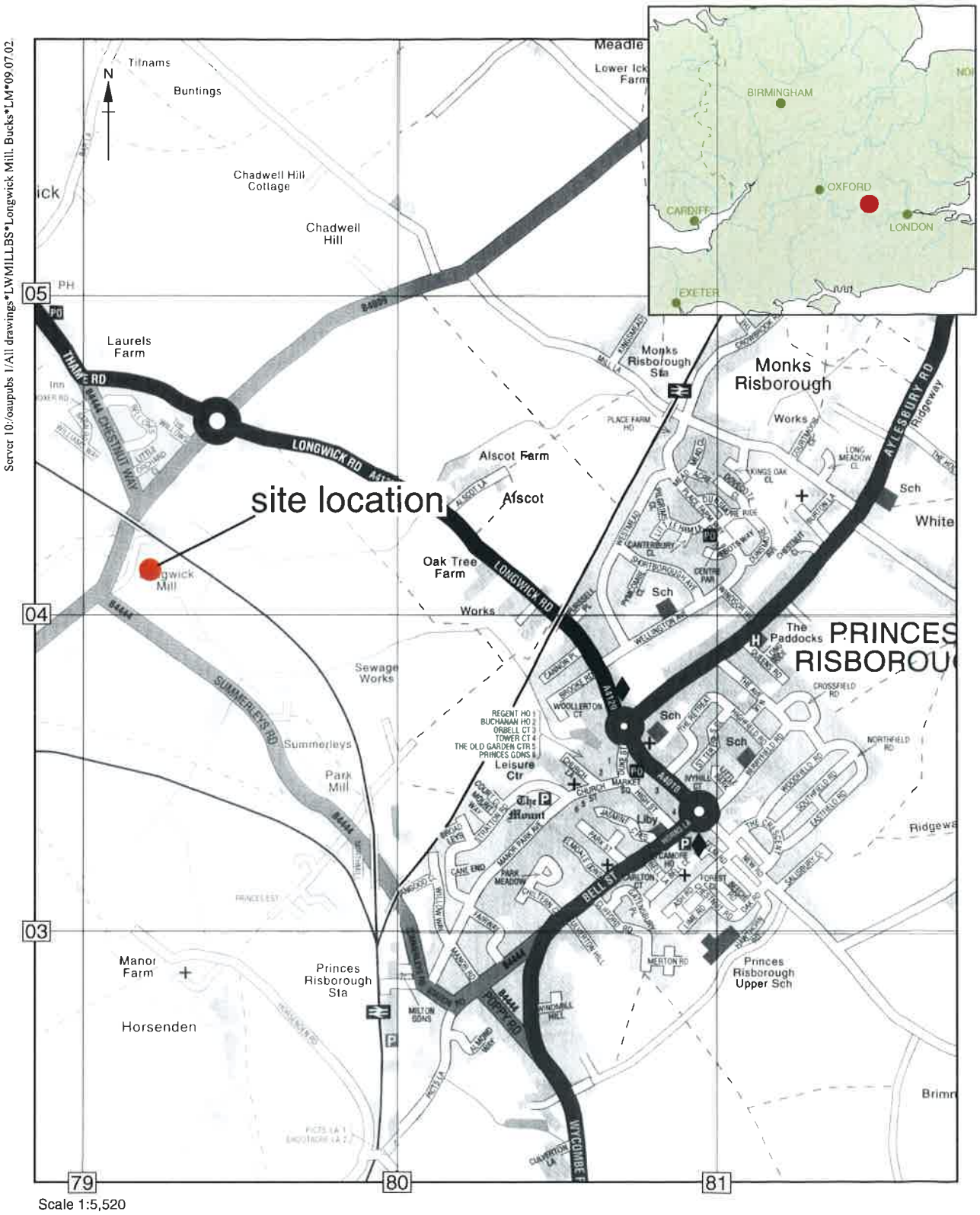
Location : LONGWICK CUM ILMER, WYCOMBE, BUCKINGHAMSHIRE
IoE number : 046367
Date listed : 26 APR 1985
Date of last amendment : 26 APR 1985
SP 70 SE LONGWICK-CUM-ILMER LOWER ICKNIELD WAY

4/96 Longwick Mill
(G.B. Gomme & Son)

-

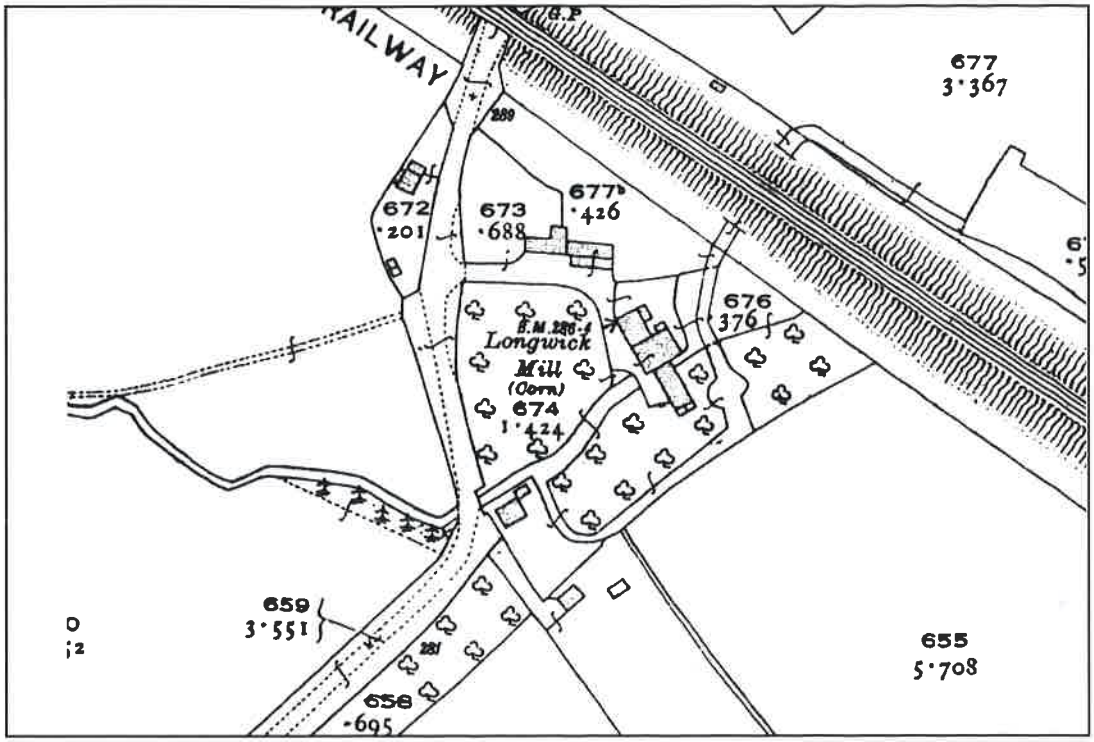
- II

Mill with nillhouse attached to left and barn attached to right. Mill and barn are mid-late C18 with ground floor walls of brick laid in English bond, and timber framed upper storeys with weatherboard cladding. Old tile roofs. Mill has 2 storeys and loft for grain bins, and 2 bays. Ground floor has C20 3-light leaded casements with segmental heads; first floor has C20 3-light wooden casements with top lights. Each floor has board door to left of centre. Door and loft entry in right end. Roof timbers have been renewed. Original ladders and some millstones are still in situ but wheel and other machinery have been removed. Barn is set back to right and has 2 storeys and 5 bays. Irregular board doors and windows, C20 hoppers to front, C20 lean-to to right. Roof has queen strut trusses and curved braces to tie beams. House is early C19,of brick, rendered and whitewashed to front. Old tile roof, half-hipped to left, brick chimneys to rear. 2 storeys, 3 bays of 3-pane sashes. Central 6-panel door with rectangular fanlight and C20 gabled hood.

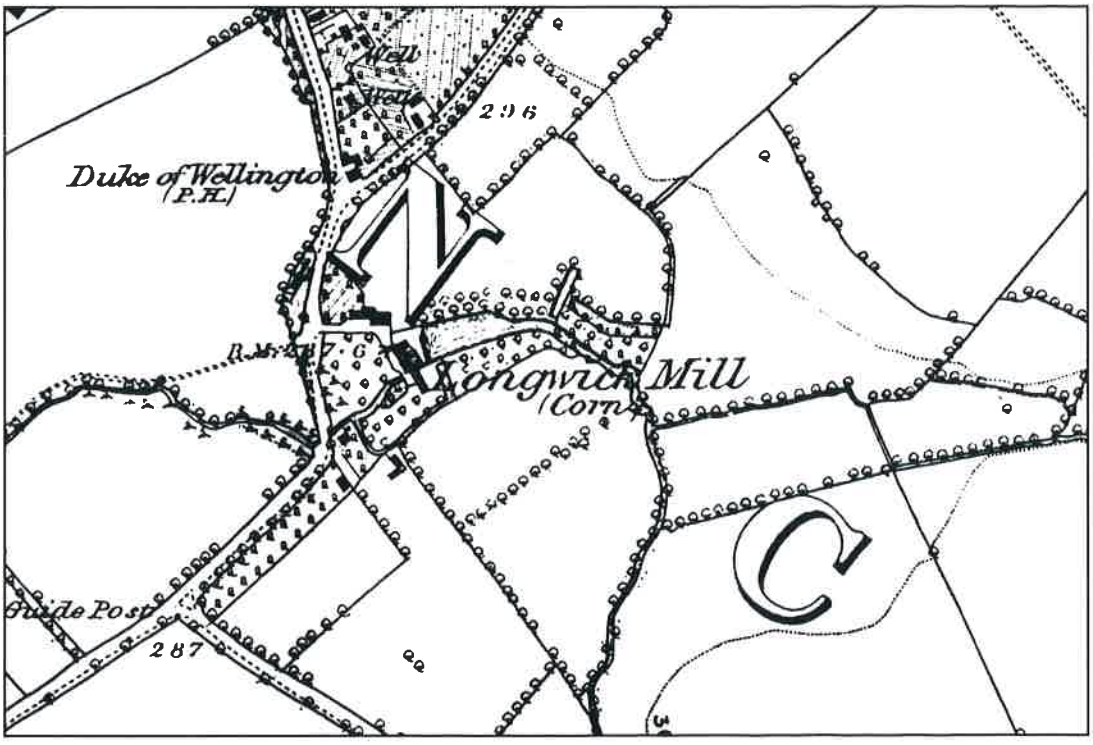


Scale 1:5,520

Figure 1 Site location.



25" Ordnance Survey Map (1919).



First edition Ordnance Survey Map (1885).

Figure 2 Historical maps.

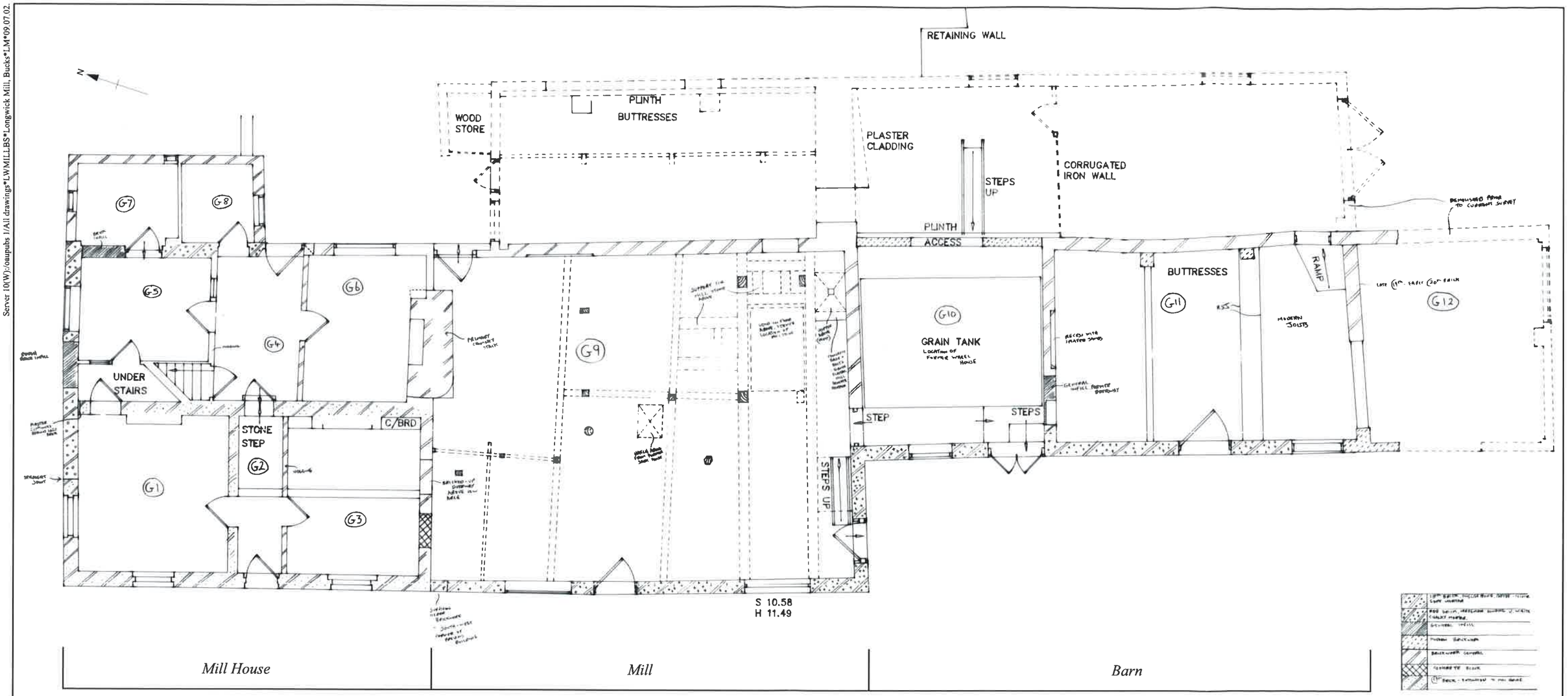


Figure 3 Ground floor plan.

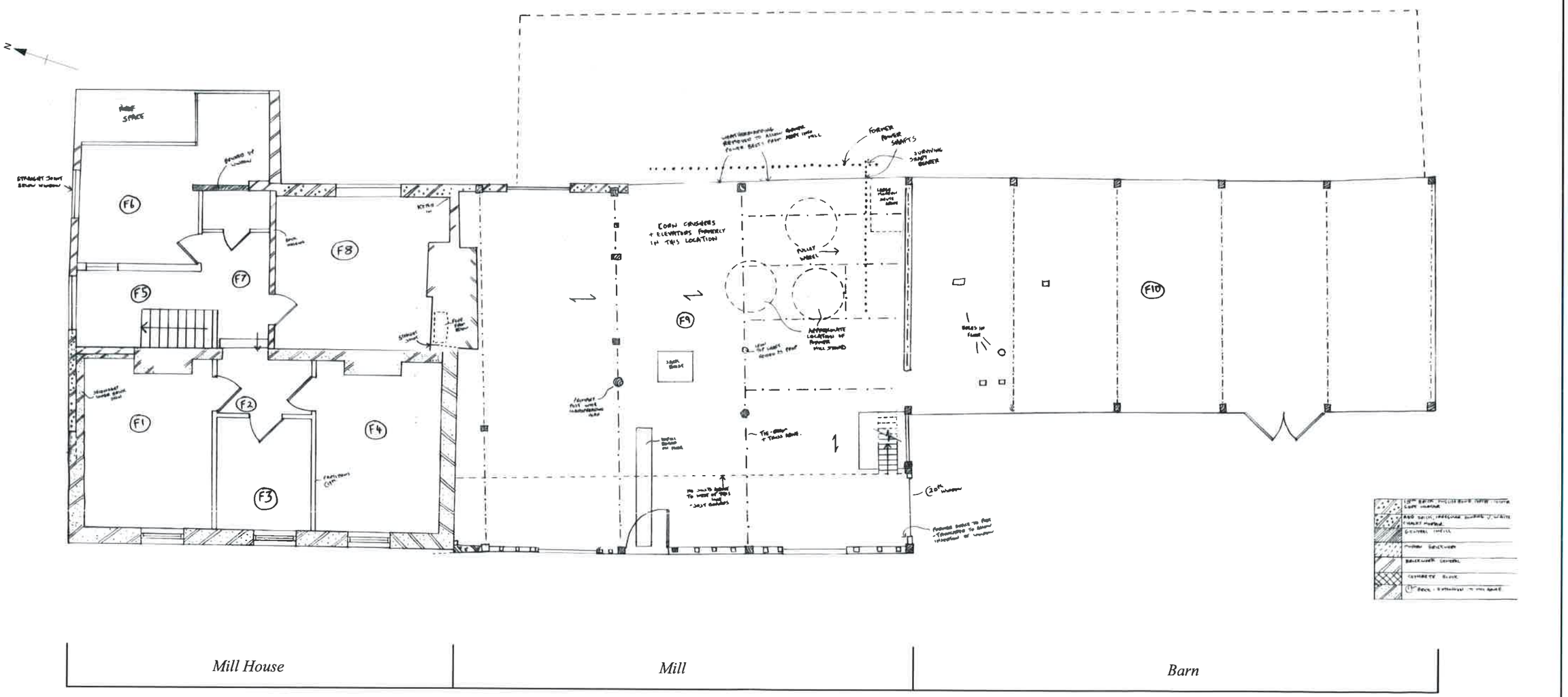
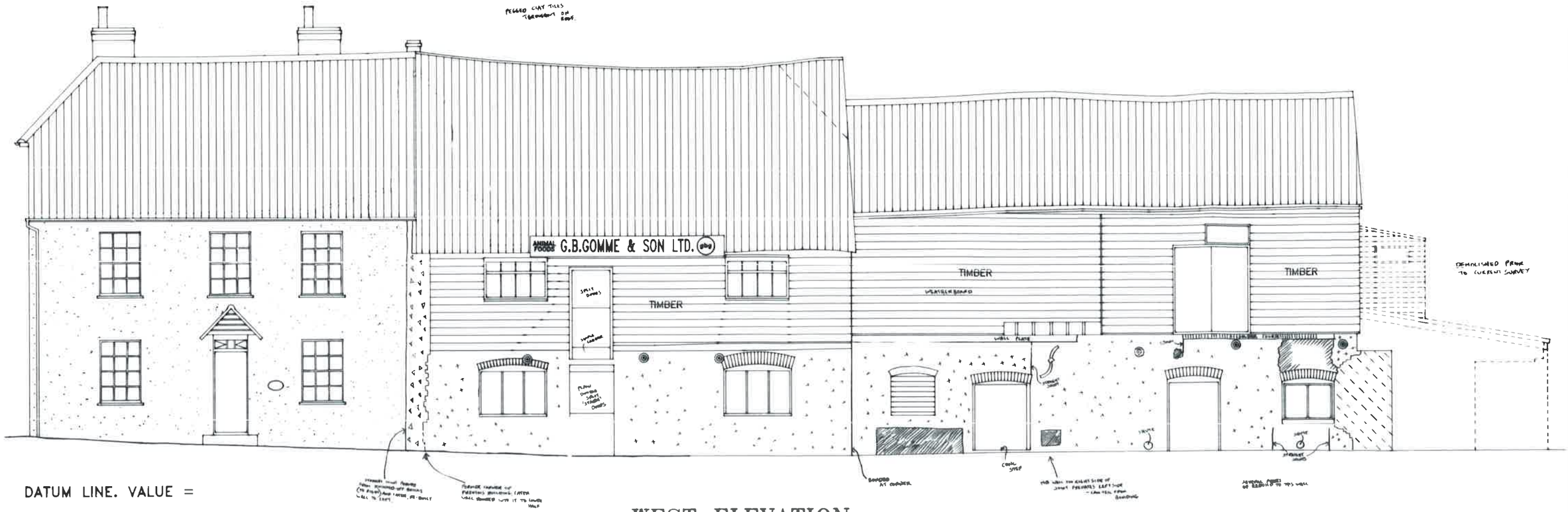
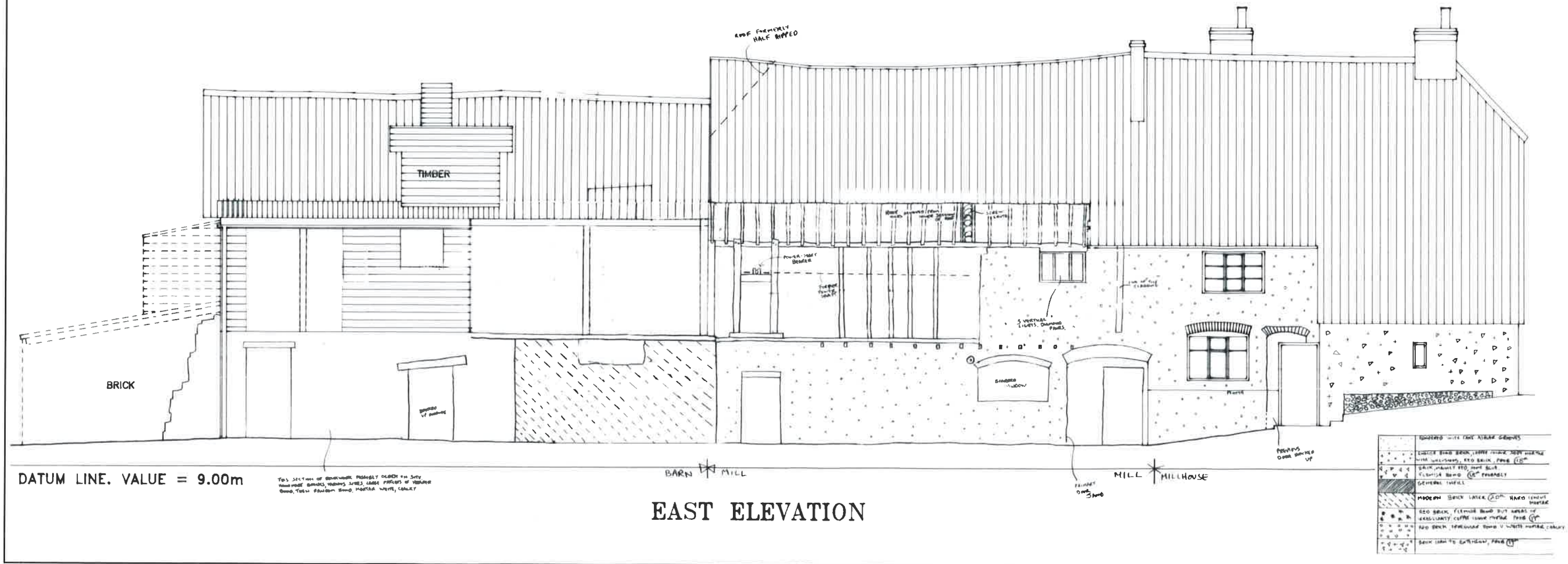


Figure 4 First floor plan.



WEST ELEVATION



EAST ELEVATION

Figure 5 West and east elevations.

NORTH ELEVATION

SOUTH ELEVATION

Figure 6 North and south elevations.

Plate 1 General view from south-east.

Plate 2 East elevation of barn.

Plate 3 East elevation of mill.

Plate 4 Power shaft bearing frame in east wall of mill.

Plate 5 East elevation of mill house.

Plate 6 North elevation of mill house.

Plate 7 West elevation of barn.

Plate 8 View of mill and house from south-west.

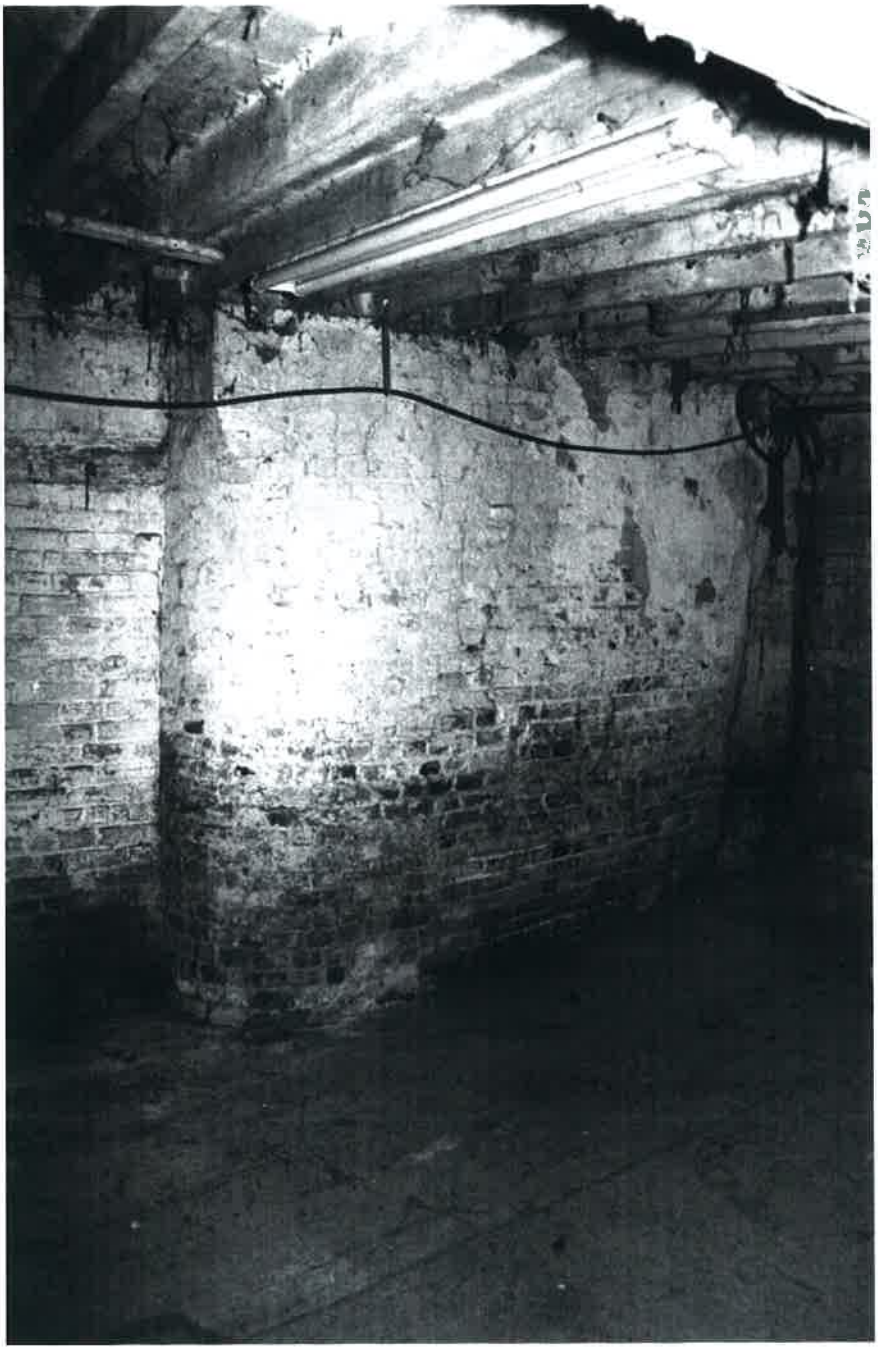


Plate 9 Primary chimney stack within G9

Plate 10 Underside of mill stone bearers within mill.

Plate 11 General view from west within ground floor of mill (G9)

Plate 12 First floor of mill.

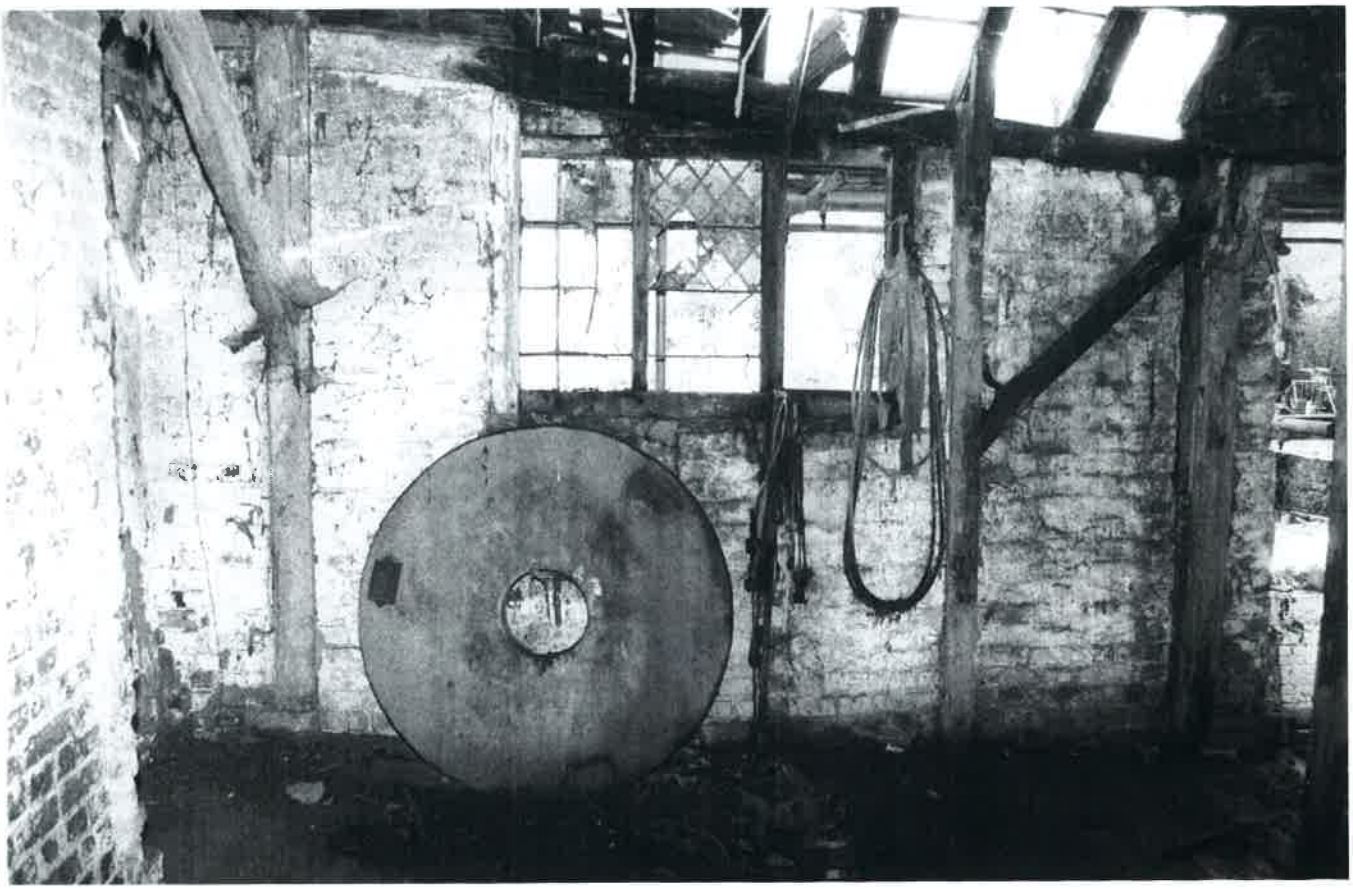


Plate 13 Mill stone and window in F9.

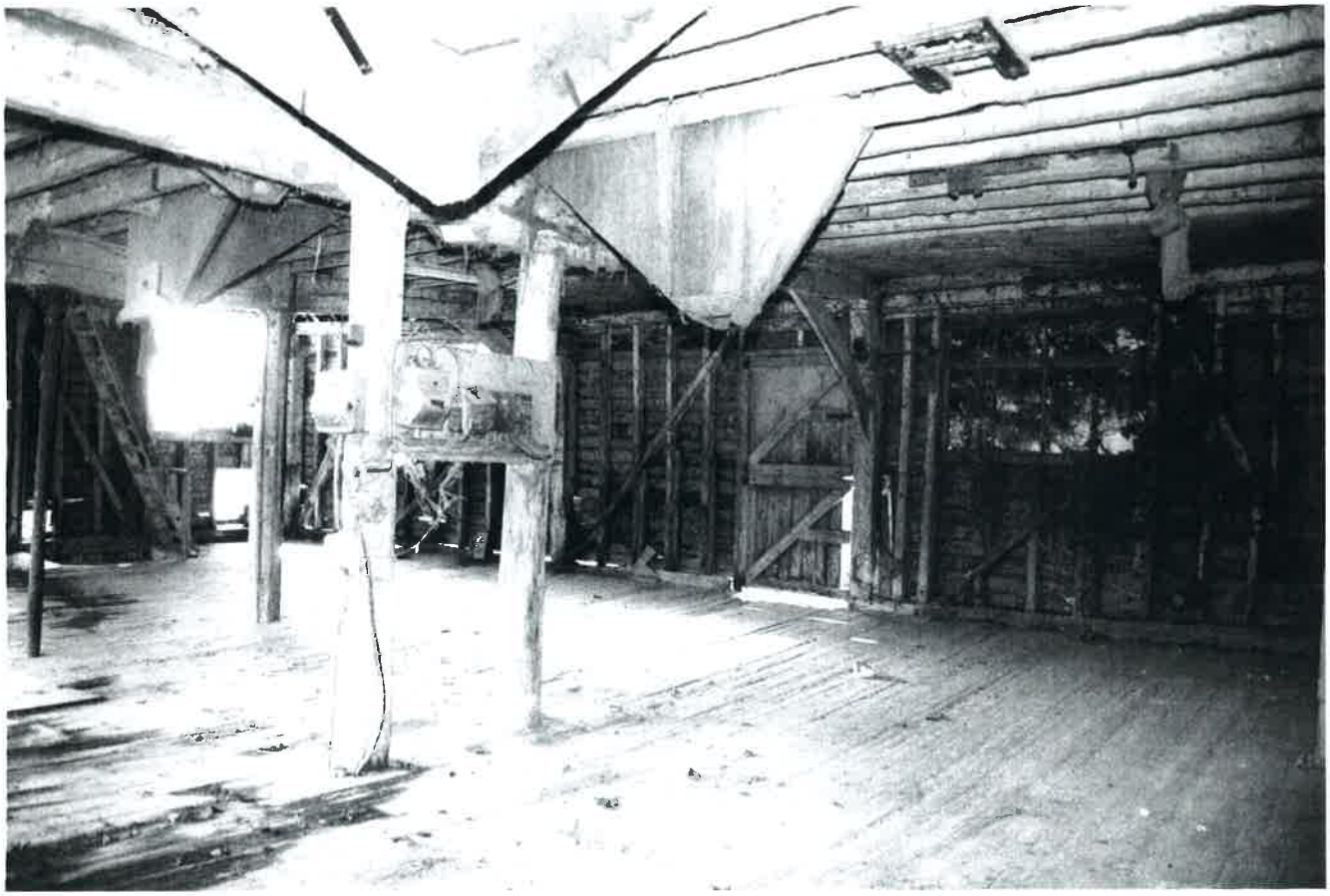


Plate 14 General view within first floor of mill.

Plate 15 Power shaft bearer in east wall of F9.

Plate 16 Underside of second floor of mill. Note top shaft reused as prop.

Plate 17 Second floor of mill.

Plate 18 View during removal of mill roof.

Plate 19 Truss above mill during roof works.

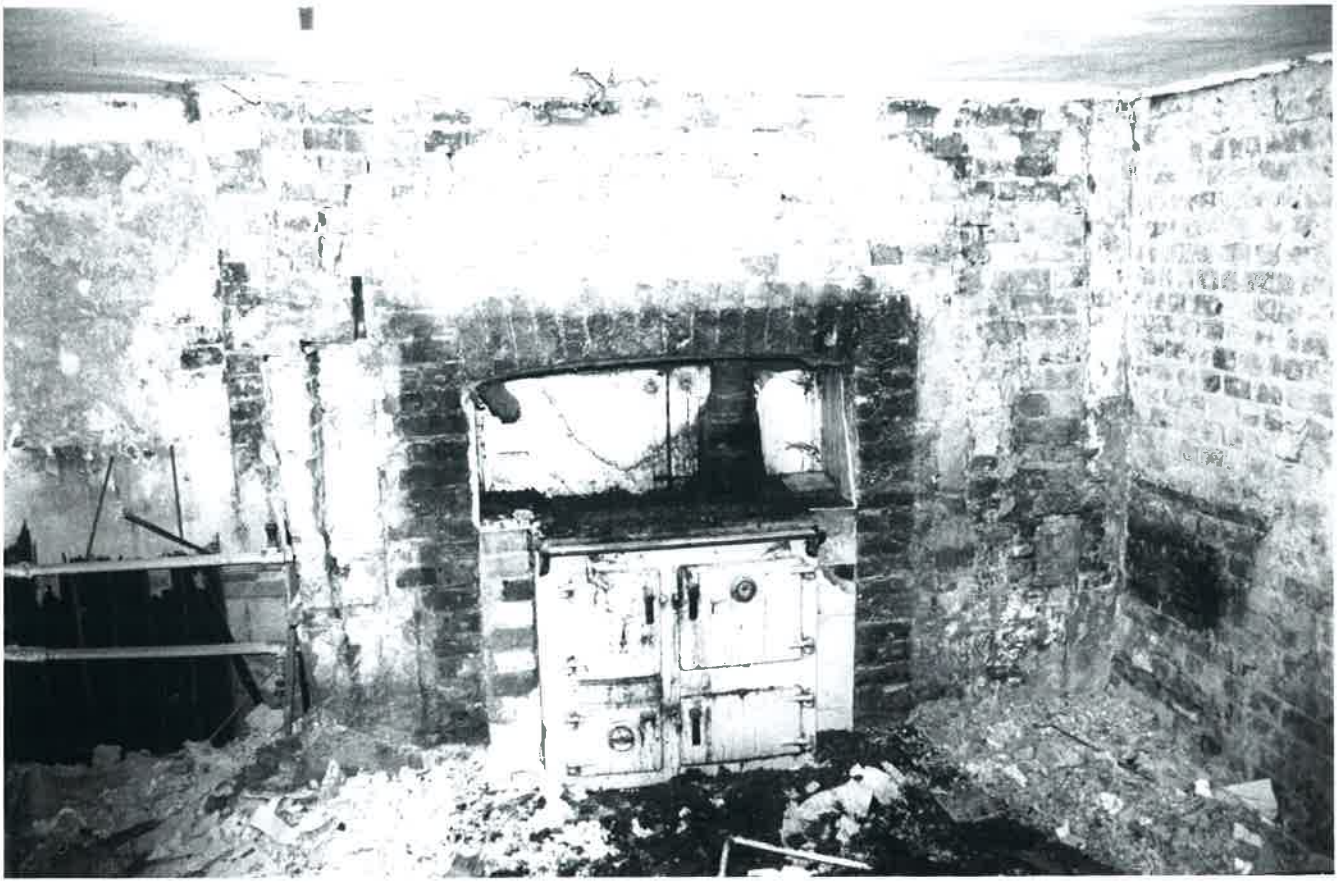


Plate 20 Secondary range in primary stack in G6

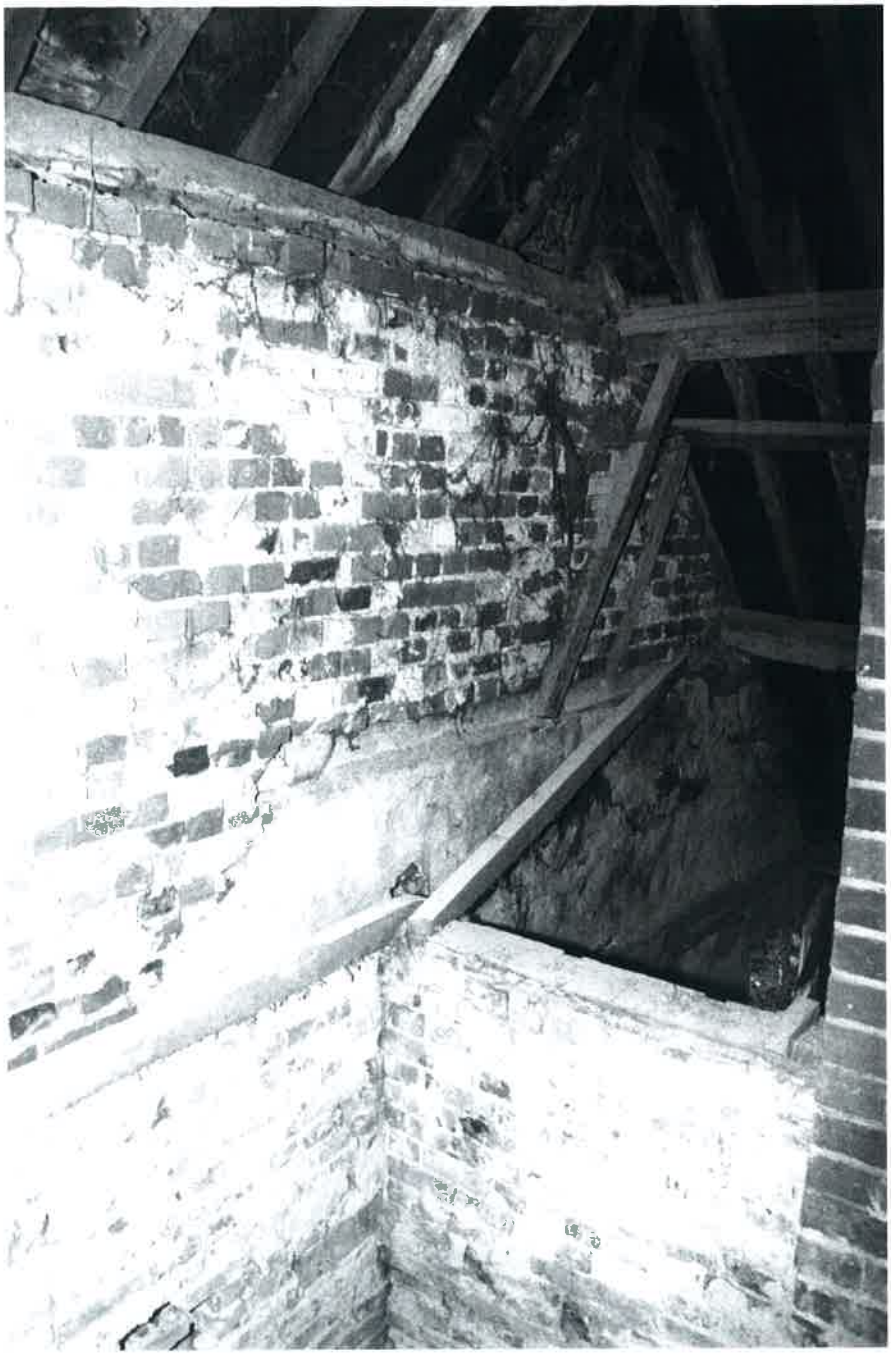


Plate 21 Imprint of former roof on north wall of mill house.

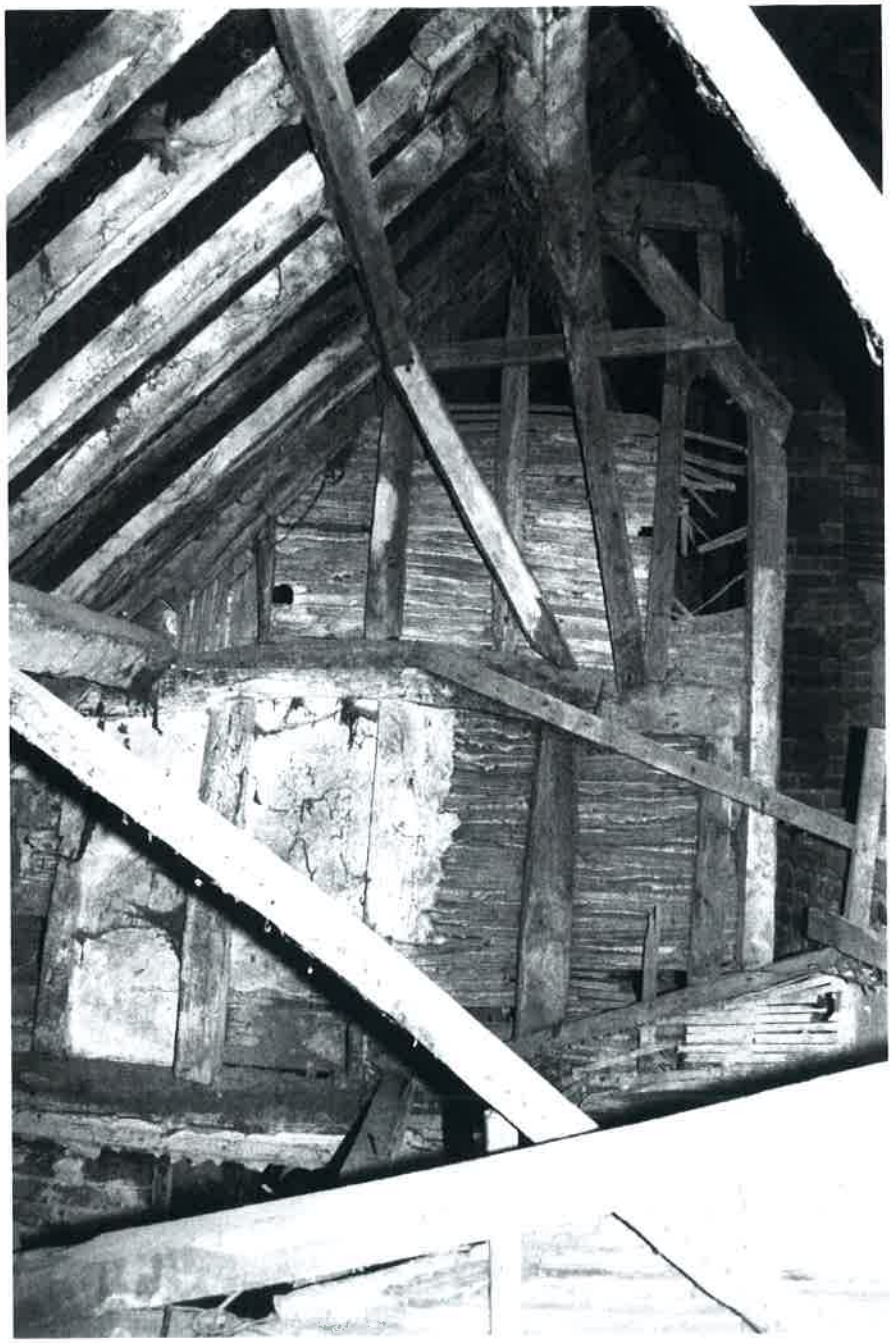


Plate 22 Surviving truss and cross frame above wall between F7 and F8.

Plate 23 First floor fireplace within secondary spine in mill house

Plate 24 Rafters of earlier building enclosed within roof of mill house

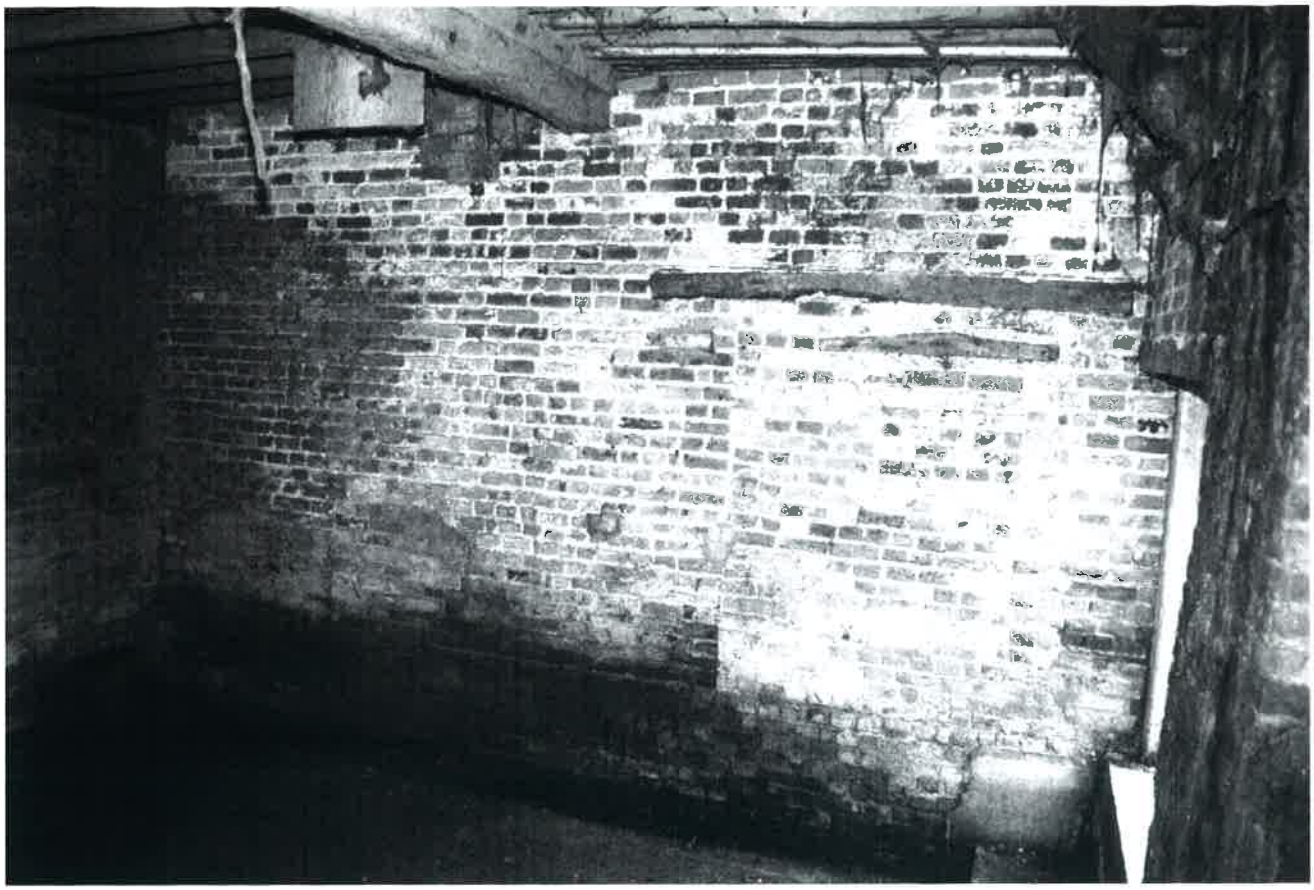


Plate 25 South wall of former wheel house (G10).

Plate 26 Typical truss within barn (F10).

Plate 27 Wall framing and truss post within barn.

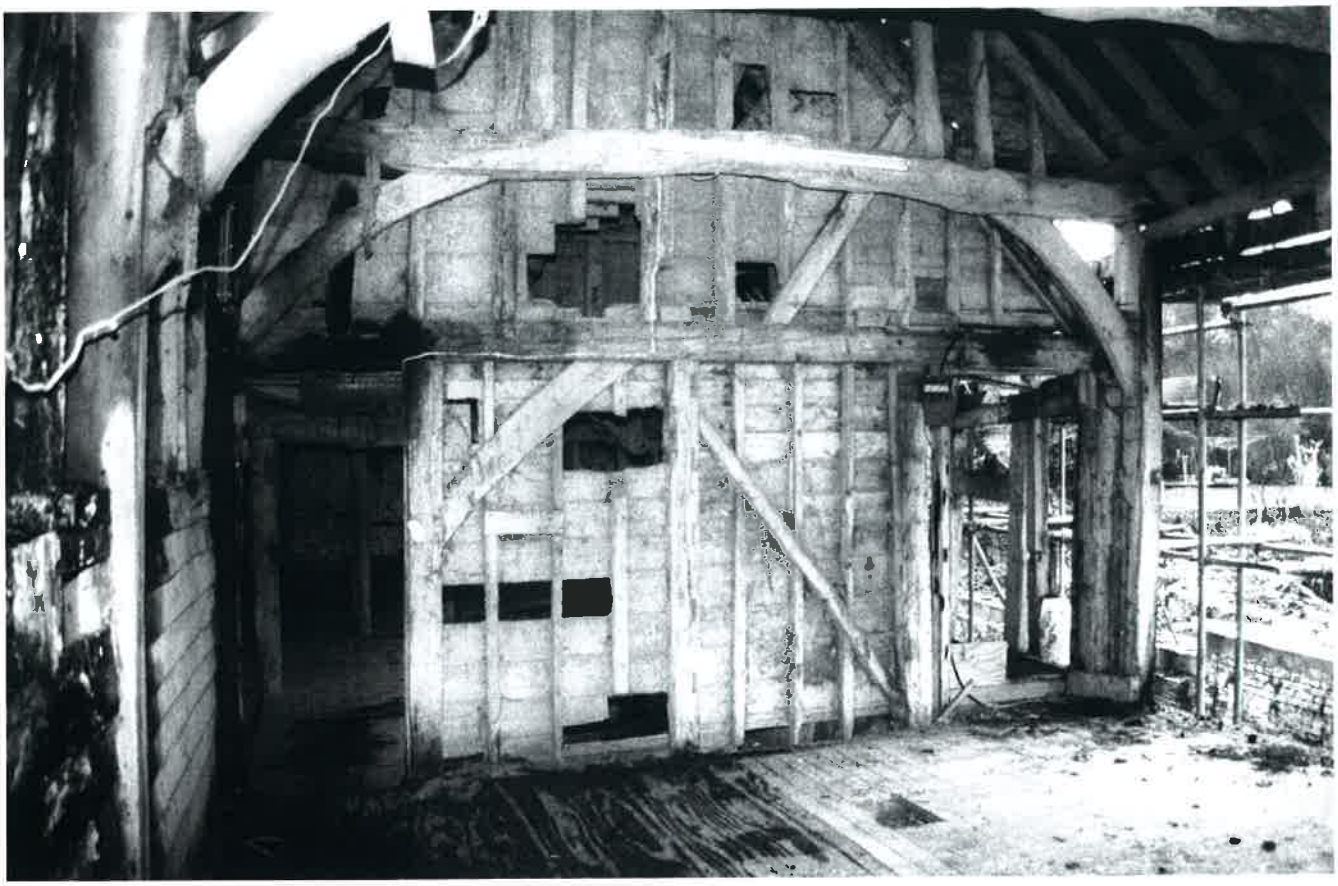


Plate 28 North end cross frame within barn (F10).

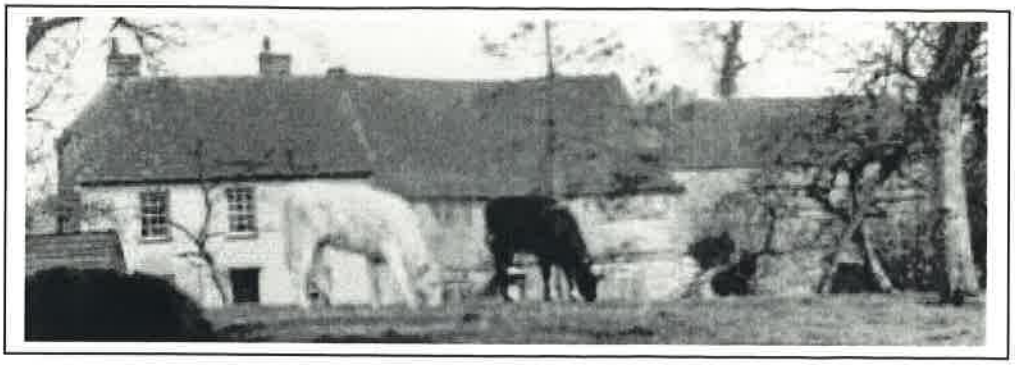


Plate 29: Longwick Mill from west

Plate 30: Historical view from north-west

Plate 31: Historical view of west elevation of mill

Plate 32: Historical view from south-west

Plate 33: Historical view of interior of barn

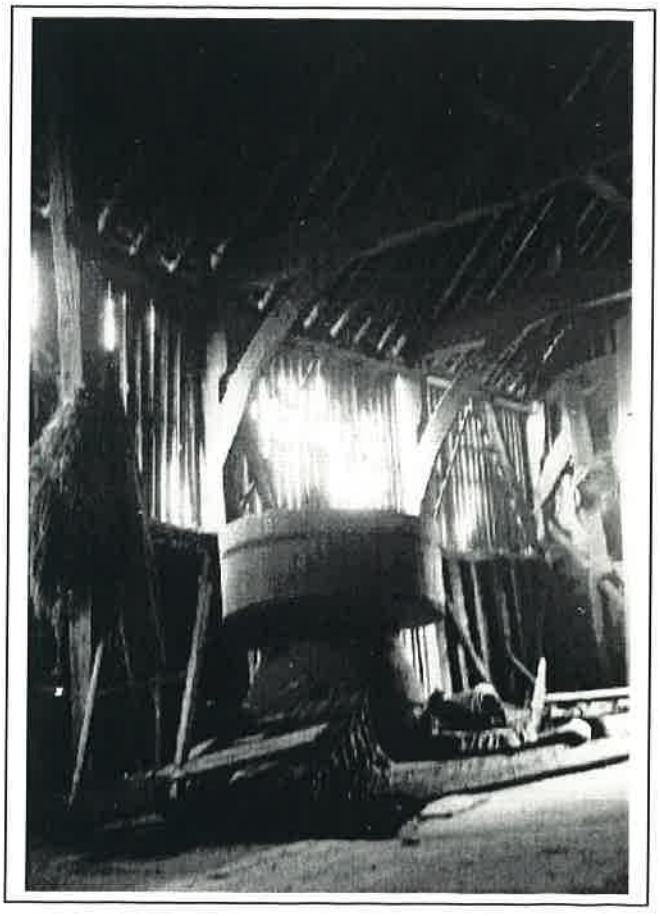
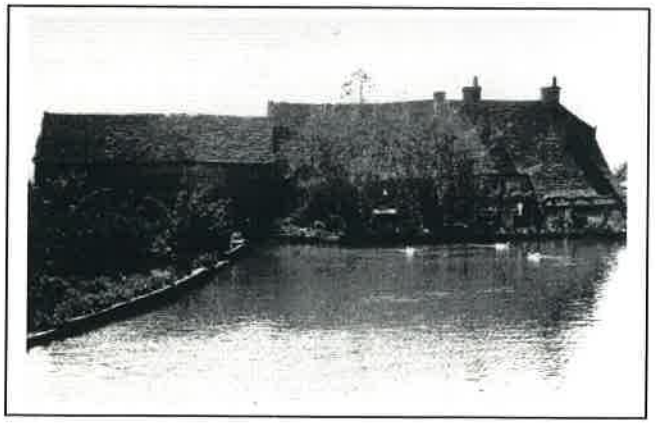


Plate 34: Historical view of east elevation



Plates 29-34: Historical photographs taken from Buckinghamshire County Council's web site (www.buckscc.gov.uk/photo-database). None certainly dated but probably from mid 20th century