



The Mills of Ewell

The Hogsmill was a powerful stream in the early Middle Ages, and it turned several mills at the head of its course. By 1408 there were only two, the Upper and Lower Mills, although Ewell Court and Ruxley also had mills of their own. The Upper Mill was the better site - when it was rebuilt in 1810, it had six pairs of stones, and was grinding five wagon loads of wheat every day. The mill had been enlarged across the bed of the stream, so that the river now flowed through the middle, turning a central wheel. The miller lived in style, with an ornamental garden, a fish pond and a pheasantry.



The Upper Mill, northern elevation with stables on the right, 1929

The Ewell Upper Mill, which is the closest to the village, was a variation of an overshot mill called a breastshot mill, where the water enters the wheel just over the level of the hub and then runs under the wheel. The Upper Mill building is thought to be on the site of one of the mill s mentioned in the Domesday book. In the middle ages the mill belonged to Fitznells manor and is the one shown on Rocque's 1768 map as the corn mill.



The miller's house at Lower Mill, 1920s

After centuries of grinding grain the Lower Mill was bought in 1730 by William Jubb and was converted to a paper mill. This enterprise lasted into the early 19th century and in 1832, after the Lower Mill had given up making paper, the milling firm of Hall & Davidson bought it and installed new cast-iron machinery. Profits from the mill was carried to their headquarters on the London coach - on one occasion this was held up by highwaymen, and the money would have been lost if the miller's little son had not created a distraction by bursting into tears and refusing to be moved from his seat (with the cashbox under it).



Rocque map of 1768 showing position of mills on the Hogsmill river (highlighted in blue)

When corn arrives at an old-fashioned mill, it is hauled up from waggons into the loft through an overhanging projection called the **luccombe**. The grain is poured out of the sacks, down a chute into a **hopper** on the floor below, and this feeds the millstones. They are made out of stone from the Peak District (for animal feed) or out of blocks of French burr stone bound together (for wholemeal flour). The lower millstone stays still while the upper one revolves, catching the grains between grooves which have been cut across the stone, and so cracking and grinding it. These grooves slowly wear down, and the millstone has to be pulled over for them to be cut again. The flour spills out round the edge of the stones, and is then shaken in a bolter, which is a mechanical sieve separating out flour from bran.

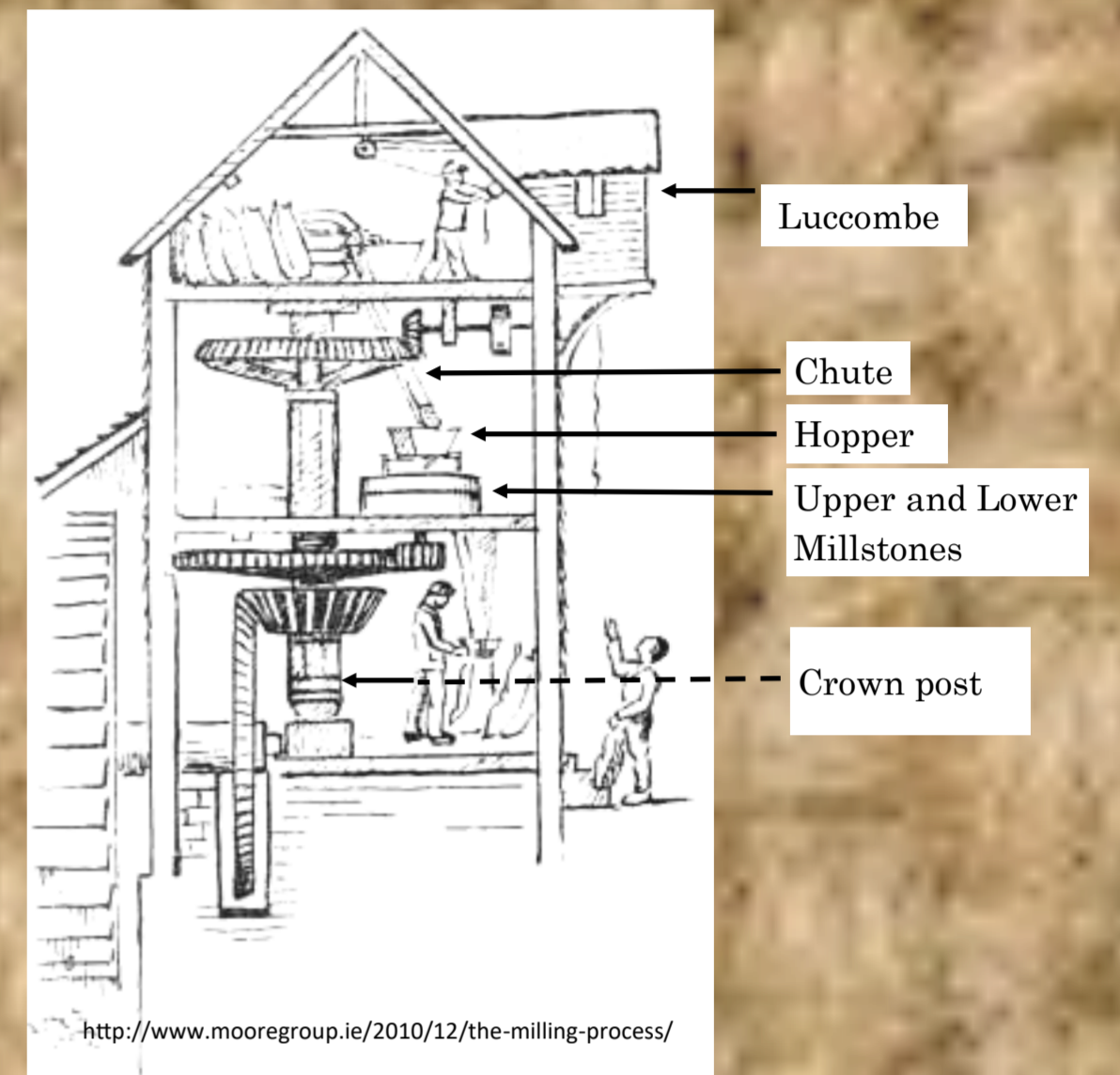


Diagram of milling process driven by a water wheel

The top millstone, called the runner, rests on a shaft which runs down through the floor: every pair of stones has a shaft, and they are all turned by cogs driven from the main vertical shaft of the building, the **crown post**. At the base of this is another cog called the wallower, which engages at right angles with one which is attached to the mill-wheel, and in this way the wheel drives the machinery. The millwheel turns slowly, but because it connects to big cogs which then engage with little ones, the millstones go much faster. The wheel is spun by the force of the stream, either because the water flows fast underneath, or because it is directed along a wooden trough to drop on top of the wheel or to strike it halfway. When the water is to be diverted away from the wheel, a sluice gate is lowered across the channel that leads to it, and at the same time another is raised to let the flow from the millpond go round the back of the building.



General view of the interior of the Upper Mill 1900



A map showing the Upper and Lower mills and associated property, from the 1929 sales particulars

The Lower Mill was rebuilt in brick, instead of timber, in 1896, and the millstones were replaced by roller plant, which produces white flour rather than wholemeal. The tenant miller, Jesse Ayling, found that this was an inferior product and he resigned in protest. Ironically the Upper Mill, which Hall & Davidson had also taken over, kept its millstones and was later to advertise the traditional quality of its flour, said to have been supplied to Queen Victoria. By 1925 water levels had dropped, due to extraction to supply the new suburbs, and the mills could only work in the daytime. The Lower Mill burnt down in 1938, while the Upper Mill continued on a small scale until 1953.



Handling of grain in the Upper Mill c.1900



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Papermaking in Ewell

The Lower Mill at Ewell had been grinding corn for over three hundred years when a paper-maker from West Drayton, William Jubb, visited it in 1730. He decided to move his business from Middlesex to Ewell, and redirected the stream so that it would run a new mill alongside the old one. Rags were kept over the mill, and in a long building next door the paper was taken to be dried, coated with size and polished. Jubb used several watermarks over the years - some of them featured Dutch patriotic images, such as the Maid of Holland, while others incorporated a Liberty Bell. He was among a syndicate of top paper makers who tried to persuade the Bank of England that they should have bank-note manufacture put out to open competition, instead of giving a closed contract to a Hampshire firm. The letter in which they pressed their claims was written on Ewell paper.

Paper is traditionally made from strips of linen and cotton, reduced in water to a pulp called stuff, and spread out on a mould to form sheets. The market for paper in London was met by mills in Surrey, where the clear streams provided water which would wash the rags clean, as well as a source of power for the mechanical hammers

Children cut the rags into strips and fed them into a long trough, where hard and soft hammers were arranged to rise and fall on them until the linen and cotton fibres were pounded free.

The stuff made in this way was run off into a paper-making vat, where a worker called the vatman would dip his mould into it. These moulds were made out of a wooden frame covered with copper wires: there was a pattern stitched over these in a finer wire, which appeared in the finished paper as a watermark. The mould was dipped sideways into the stuff, and then lifted up flat, so that it carried a film of paper with it.

This was passed to a second worker called the coucher, who laid the sheet onto a piece of felt to drain. This was repeated again and again until six quires of paper, each containing 144 sheets, had been stacked up. Then they were taken to the screw press, and all the workforce helped twist the handle on this, so that the water would be squeezed out of the paper.



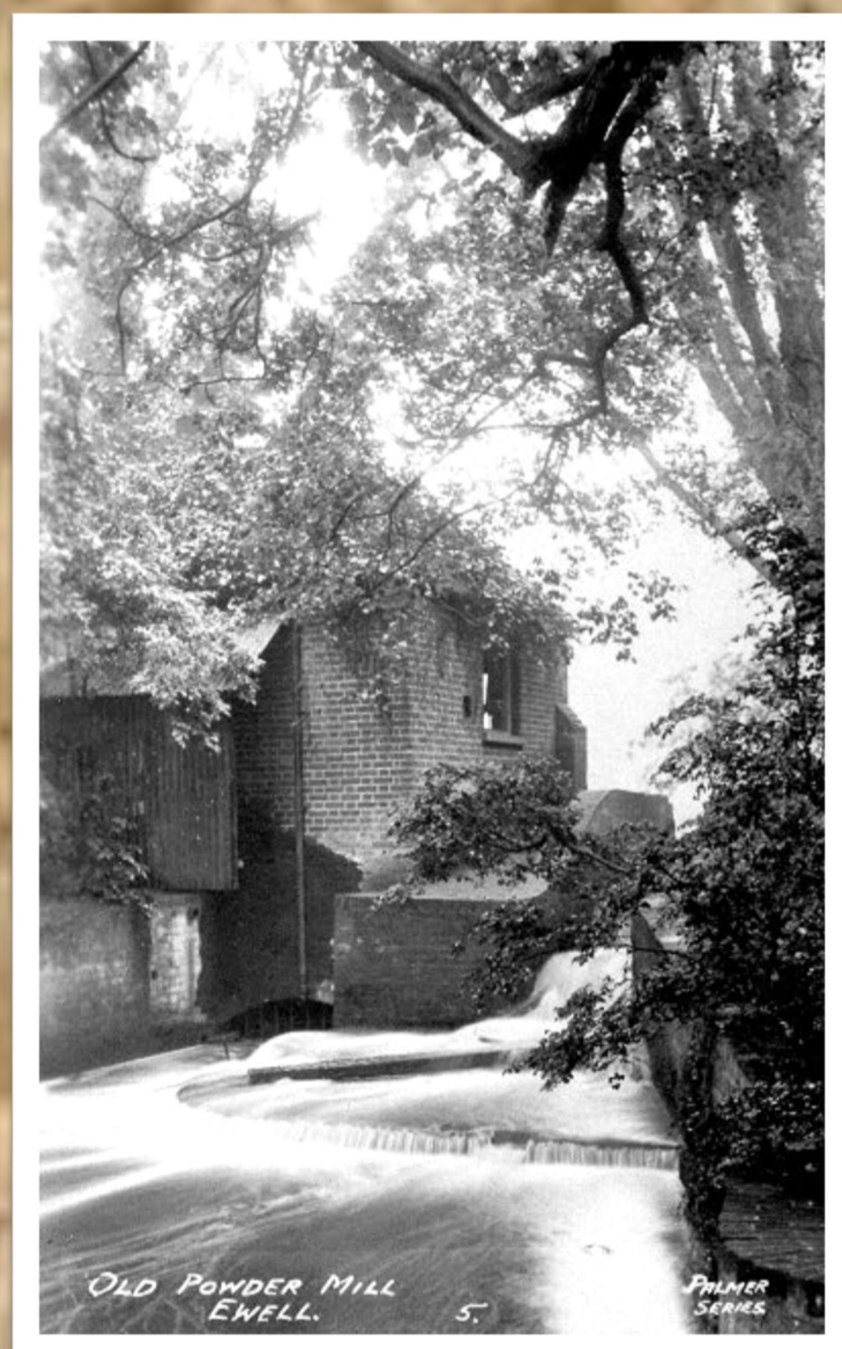
18th century watermarks used by William Jubb



The Lower Mill as a paper mill, 18th century

On William Jubb's death his widow Sarah ran the mills until their son, young William, was 21 and could take over. He oversaw the rebuilding of the family home, a dignified house which still stands beside the river, and reconstructed the working area so that the flour and paper mills were under one roof in a long weatherboarded building. There were separate buildings to store, wash and bleach the rags, and depots for the felt and leather sheets used in the drying process. The foreman William Wells, who had kept the mills going when Sarah inherited them, died in 1785; Jubb himself died ten years later, and as there was no-one to take the business on, it was converted back to a corn mill.

Then another worker called the layman separated the sheets from the felts, and they were hung up in the drying loft. This had vertical ventilation holes, so that the wind played on the front of each sheet. When dry they were given a thin coating of gelatine, called size, so that they would not absorb ink, then they were briefly returned under a trip-hammer to be polished.



The only known photograph of one of the Ewell Gunpowder Mill buildings c.1900

Gunpowder mills

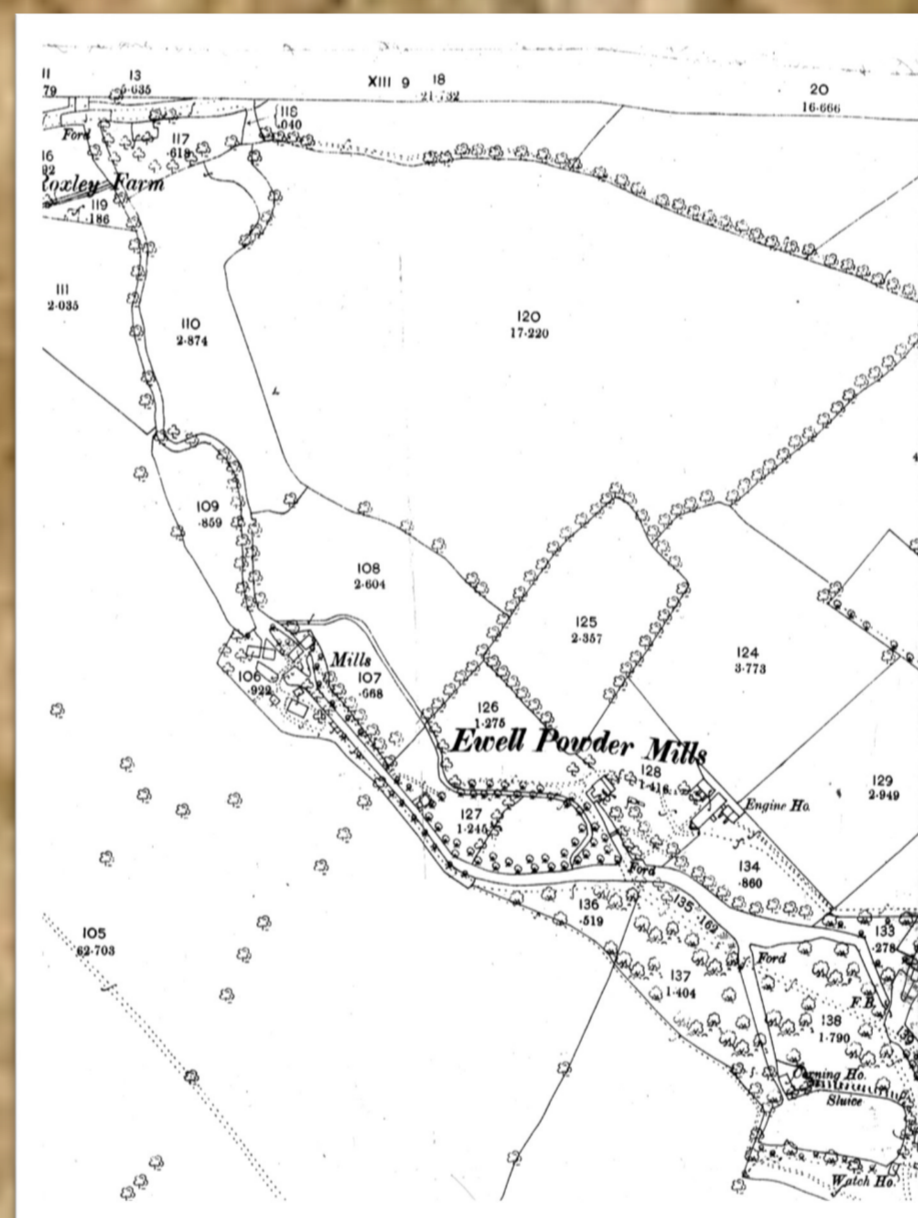
The gunpowder mills at Worcester Park were among the earliest in England. In 1589 George Evelyn, grandfather of the famous diarist, received license from the government to obtain saltpetre and to manufacture gunpowder. Evelyn set up the mills where the Hogsmill fringed his manor of Tolworth, and ran them until Nonsuch Park was extended over the site in 1606.

The Gunpowder manufacturing process

Gunpowder is made when a pound of charcoal is mixed with two of sulphur and six of potassium nitrate, also called saltpetre. The materials have to be ground together slowly until they are incorporated into a grey powder. Sulphur was imported from the volcanic regions of Sicily, while saltpetre was distilled out of organic residues, mostly obtained from pigeon droppings. Charcoal was manufactured locally by burning wood in air-tight clamps until it was black and dry. Alder and willow trees, which grew by the river which powered the mill, made the fastest burning charcoal.

In the incorporating mill, a circular pan was filled with the materials, which were kept wet; they were ground together by a pair of millstones, set edge upwards and rolled round and round the pan. The millstones were suspended from a cogwheel, which was driven from the millwheel. Buildings were constructed with a flimsy wall on one side, so that if there was an explosion this would give way and leave the rest of the structure standing. After being ground into mill cake, the gunpowder was pressed flat into hard sheets.

In the corning house, these were broken into little pieces called corns, which were glazed to keep them separate, and then dried. Until the use of steam heating, drying was one of the most dangerous parts of the process. At every stage the risk of explosion had to be minimised. The mill machinery was made of wood and brass, not iron, because iron would give off sparks. Workmen were forbidden to wear hobnailed boots, or even clothes with metal buttons, for the same reason.



Extract from 1870 OS map showing the Ewell gunpowder mills

In August 2013 the Wandle Trust commenced work to remove the concrete weirs and retaining walls at two points on the Hogsmill river, which coincided with the know mill buildings. EEHAS members were there to record the archaeology that was uncovered. The main sections of walling uncovered were of brick set in a white lime mortar. Some had shallow frogs but others not and would appear to be of early/mid C18 date. The walling was set on substantial chalk rubble, with no concrete, and there were indications that the chalk may represent an earlier phase.



Section through brick walls, with the blue arrow indicating the direction of flow of water from the grind wheel behind

Meanwhile another set of mills had been established further up the Hogsmill by Alexander Bridges, who developed the river around Ewell Court until it ran incorporating mills and a corning house. These buildings, like the powder magazine, were set apart from each other beside a series of millponds, so that if one of them blew up, the blast would be absorbed by the water and would not set off the rest. Despite this, there were nineteen explosions at Ewell Court and Worcester Park during the hundred years that they were in operation, more than twenty men being killed. One of the first explosions, in 1757, was felt in London and mistaken for an earthquake.

In the 19th century the Bridges family brought in a Scottish manager, John Carr Sharpe, to oversee the mills. Eventually, in 1875, the Ewell mills had to close down when the government's Explosives Act imposed safety regulations with which they could not comply.



Brick walls of the incorporating mill in the left hand bank of the Hogsmill river cut through by the environmental works in 2013

Watching brief by EEHAS on Ewell gunpowder mills

It seems that the brickwork revealed in this area relates to the pair of mill buildings and water wheel channel shown on the maps on the left hand side of the river where it had been split into three streams. It is clearly more complex than the simple rectangular outlines shown on the 1866 OS. A corner was evident on the north end but not on the south. A second pair of mills presumably still survives further over under the right hand bank. These buildings, together with their holding ponds and ancillary buildings serviced two pairs of grinding wheels in the Incorporating Mill. It is uncertain whether the central wheels were of over or under shot type.



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Recent excavations on the Mill Race of the Lower Mill, Ewell

In October 2016 the Borough Council undertook urgent repairs to the head race of the Lower Mill in Ewell. The mill building was demolished following a fire in 1938, but the miller's house survives; it is a listed grade II building which has been dated to the seventeenth century. These repairs were made necessary by the apparent instability and loose masonry of the channel walls.

The Lower Mill was a straddle mill, with water running through the building. The head race, which penned water just before it fed the waterwheel, ran in front of the building where it was covered over, which is why it does not appear in old photographs. Repair works concentrated on this head race.

The structure, where excavated, was some 3m deep. It was covered by ten girders (of which one has since been removed). These girders were set into the top courses of the wall, where it could be seen that the top three courses of brickwork had been disturbed and rebuilt to accommodate them. They were of cast iron I-section, 12 feet long and 9 by 4 inches in section; as originally laid, they carried two-course brick jack arches springing from the lower flange of each girder. The arches were then covered by a brick surface. (These arches have now been removed and the whole channel covered with a metal surface).



There is a double girder at the pond end, the outside or upstream of the pair carrying a cast iron bollard railing bolted to the leading edge with an integral block beneath. The railing is presumably contemporary with the girders. This last girder is marked - HENRY PRINCE & Co PHOENIX IRON FOUNDRY - SOUTHWARK 1872



Southern side of headrace showing exposed brick and chalk courses



Close up of cleaned brick and chalk courses

The works exposed a short section of the deep walls of the head race. These walls, with courses of chalk below and brick above, channelled water from the mill pond so that it could run over a long flat trough or penstock (now lost) and onto the overshot waterwheel. This lay in a wheel pit, divided from the head race by a ramp of inclined brickwork. The head race is 5.2m wide at the pond end and reduces to 2m, funnelling the water as it approaches the wheel.

The upper 22 courses of brickwork in English bond would appear to be of later eighteenth or early nineteenth century date and might correspond with works undertaken between 1795 and 1832 when the old paper mill was converted to a corn mill. In that case the earlier three courses below this walling would be the remnants of a previous phase, perhaps to be associated with William Jubb's eighteenth-century paper mill. The lowest and earliest stretch of the wall is not easy to date. The use of chalk as a building material seems to have died out in this area after the opening of brickworks on Epsom Common, which would suggest an early modern or even medieval date for this phase.



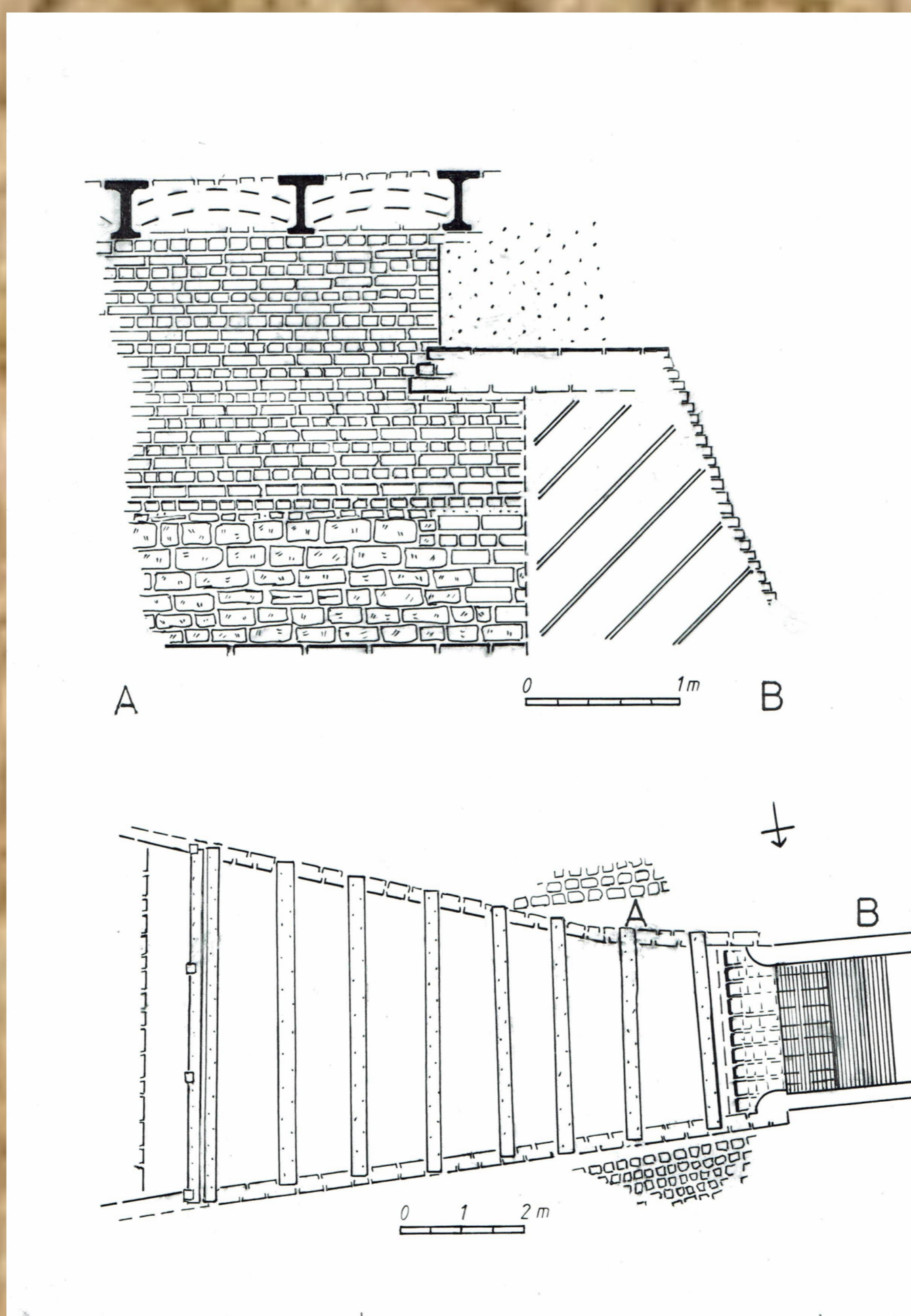
View of girders across the headrace



The Lower Mill shown in sales particulars, 1929



Jack arch above head race before removal



Section and plan of the Lower Mill's headrace as excavated 2016

Historical Background

The mill site dates back to the Middle Ages, when it was created by directing the tail water of the Upper Mill to flow into a millpond embanked about 3m above the natural course of the river Hogsmill so that it could feed the Lower Mill and then drop back down into the old river course. The line of this embankment continues as the southern wall of the head race surveyed here, and this is strong presumptive evidence that the mill race has always occupied its present position. Certainly it is on its present course in the 1802 Enclosure Map. The eighteenth-century paper mill of William Jubb occupied the same site as the later mill building. An early photograph (below) shows people standing in front of the miller's house next to a timber-framed corn mill building which either is or occupies the same footprint as the earlier paper mill. Notes on the original photograph in the Museum identify the family as the Hendersons, in which case, from the ages of the children, it cannot be much earlier than 1874.



Framed albumen print, c.1874, of the Lower Mill showing Robert Henderson with his family outside the house



View across the girders across the headrace to the Grade II listed miller's house beyond

The construction date of the later mill building – the one which burnt down in 1938 – is usually taken from the following statement in Stidder's *The watermills of Surrey*: 'in 1896 the wooden mill was replaced by a much larger structure, which incorporated a roller milling system... and this led to the miller, Jesse Ayling, leaving apparently in disgust. In a letter published in *The Times*, he complained most bitterly against the introduction of the roller milling system'.

This statement should be taken with caution – not least because a search of The Times Digital Archive has failed to find any reference to Ayling, roller milling, or mills at Ewell in 1896. Furthermore, the main mill building and its numerous extensions as photographed and mapped in sales particulars of 1929 are the same as appear on the 1913 OS. It seems unlikely that so many additions would have taken place to the core building in only 17 years. In fact the mill building shown on the 1895 OS corresponds in outline to the main building recorded in the maps and plans of 1913 and 1929. It may therefore be older than we have previously thought, in which case the photograph of c.1874 would have been intended to record the last days of the wooden mill building before it was demolished and replaced. Certainly there are other Surrey mills of the 1870s which have the same rather gaunt and industrial appearance of the last-phase Lower Mill.

Interpretation

The latest phase of the head race is represented by the girders, which carry a date of 1872. However, it seems unlikely that they were laid in that year, because the photograph of the Henderson family, which cannot be earlier than 1874, shows an otherwise old-fashioned and unaltered building. It is more likely that they were laid c.1875, as Henry Prince died in that year and shortly afterwards his foundry was closed down, when old stock like the girders might have been sold off cheap. It follows that this was the date at which the weatherboarded mill was demolished and replaced by the more industrial brick building.

The girders bridging the head race, with the jack arches between them to support a brick floor, may have been intended to support the weight of carts passing in front of the mill, since the lucam (lucombe) or extended loft for loading sacks lay beyond the covered head race.