

PILOT STUDY OF THE MILLS AND ASSOCIATED
WATER ARRANGEMENTS WITHIN THE
CATCHMENT AREA OF THE RIVER LUGG.



by

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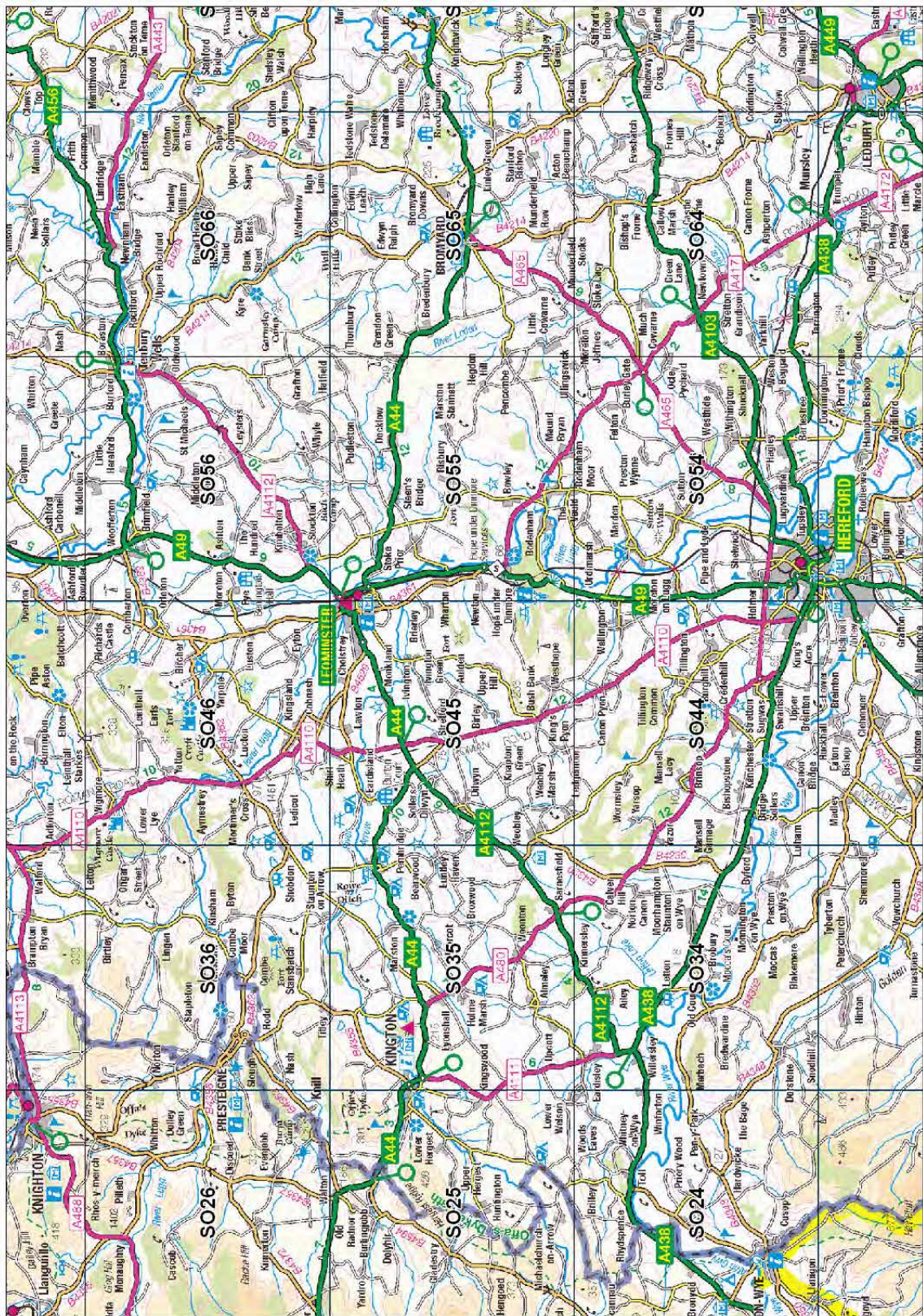


Fig. 1. Map of area with National Grid co-ordinates.

Introduction

This study has been carried out by the writer over a period of approximately two years and it has been financed by English Heritage. Its purpose has been to identify and investigate the mills, weirs, leats and tailraces of the water-powered sites within the catchment area of the River Lugg, itself a tributary of the Wye. This catchment area also includes the Arrow and Frome, two significant rivers in their own right, but tributaries of the Lugg. The study has been generated by the loss of some important features in recent years and the threat which is posed to others. In northern Herefordshire a number of significant mills and associated features still survive, not all of which have any statutory protection. Fig. 1 is a map with National Grid coordinates which includes the study area.

In the past there has been insufficient understanding of the significance of the relationship between mills, weirs and their associated watercourses. There is now an urgent requirement at all levels for informed judgement in achieving directives for better fish migration and naturalising rivers. For a balanced result it is important for the historic and aesthetic features of a river system to be respected. This can only be achieved by assessing and prioritising those features which remain.

For the purpose of this study each mill site has been considered as a single entity, irrespective of what survives above ground. Therefore a mill and its associated features constitute a single entry, as does a weir which served a demolished mill, or a leat which has outlived both weir and mill. The survey has investigated a total of 212 sites, of which 153 appear to have been water-powered. Since the pilot study has involved both fieldwork and historical references, this total of 153 sites is probably not far short of the original population of water-powered mills in the study area. Some of the historical references cannot be attributed to specific sites however, and new discoveries would be likely to emerge after further research, so the original total is bound to have been slightly larger.

The range of features investigated has been large, and an Excel spreadsheet (Appendix 1) has been compiled to enable the various aspects to be analysed, and to assist in the selection of the most important survivals. Appendix 2 comprises a digital series of Historic Environment Record forms for integration into the archives of Herefordshire Archaeology and Archives. Appendix 3 is a series of 528 digital photographs of features associated with the various mill sites, all of which are filed under parish and site name. In the text of the main report parishes are shown in brackets for clarity.

Aims and objectives

There were three aims, as set out in the project design. The first was to enhance the Historic Environment Record for Herefordshire, in order to improve knowledge of the distribution and description of watermills and their associated supply systems. The collection of information would enable descriptions of known assets to be revised and new ones to be recognised. The second was to improve understanding of the best asset

complexes to aid recognition of their significance and condition. This would identify those which require more detailed investigation as a subsequent English Heritage internal project. The third was to establish recommendations for data collection to support comparable projects elsewhere. This would identify recording parameters and approaches which could be applied to other similar Historic Environment Record enhancement projects.

The objectives were to locate all the water-powered mill sites in the study area and to carry out a brief field investigation of them, recording the relevant features. Field notes would be in a form suitable for input into the Historic Environment Record and both these and photographs would form appendices to the main report. The report is to highlight those features which warrant further investigation and possible statutory protection. It will also make recommendations for any similar projects in the future.

Acknowledgements

Grateful thanks are due to Jen Heathcote of English Heritage for all her work in setting up the project, and for her help and patience throughout its course. Thanks, too, to Neil Rimmington, then of Herefordshire Archaeology, for advice in the early part of the study, and to Tim Hoverd of Herefordshire Archaeology in the final stage. A particular debt of gratitude is owed to Lucie Dingwall, also of Herefordshire Archives Service, who has provided an initial list of targets drawn from the Historic Environment Record database, and has prepared and sent a suite of maps for each site involved in the project. Herefordshire Archaeology and Herefordshire Archives Service, are part of Herefordshire Council.

Methodology

A list of all the mill-related sites in the study area was provided by Herefordshire Archives Service from the computerised Historic Environment Record. They also supplied prints of the relevant maps, comprising two sheets for each site. The first was quartered, having the area of interest depicted on each of the four editions of the Ordnance Survey 1:2,500 sheet. The second was the modern large-scale map, at various scales, but with National Grid coordinates, of a similar area. This combination enabled changes to be recorded and dated, and accurate positions to be noted. To the list of sites were added those from the writer's own private research and investigations into Herefordshire watermills, and the same map coverage was obtained for these.

The survey has investigated a total of 212 sites. In the Historic Environment Record are cases where more than one feature associated with a particular mill site has been entered separately. When investigated, 30 of the sites were found to be duplicated for the purpose of this pilot study. Field work revealed later that a further 21 sites did not appear to have any relevance to water-powered mills. At 8 sites it is not clear whether the water was ever used for power. After all these have been removed there is a residue of 153 mill sites, ranging from where no visible evidence of a mill remained, to a fully workable mill.

The owner's permission had to be obtained for each feature to be investigated. Because of the lengths of some of the former watercourses this sometimes involved

more than one owner. At each site the watercourses were then followed, and a cursory inspection of the mill made, both external and internal where possible. Notes, measurements and photographs were taken of salient features.

An Excel spreadsheet was set up for all the sites in order to ease interpretation and analysis, and this forms Appendix 1. It has been arranged in alphabetical order of parish and site. Under the columns for features, each site was given a number showing whether that feature was present and, if so, an indication of its condition. Since the integration of milling and water meadow irrigation was a significant local feature, a column recorded this association. The final criterion shown was whether the site had any statutory protection and, if so, its unique identification number in the National Heritage List for England.

Column A shows the number ascribed to each site in the Historic Environment Record. The absence of a number means that it is unrecorded.

Column B shows the name of the parish in which the site lies. If the parish boundary runs down the middle of the stream, and therefore the middle of the weir, the parish given is the one on the side through which the leat runs. If the leat runs through more than one parish, the given parish refers to the mill which was supplied by the leat.

Column C has the name by which the mill is generally, or historically known. If no name is known, the site is referred to by the name of a nearby farm or other feature.

Column D gives the National Grid Reference to as many figures, up to ten, as is appropriate. All of them are prefixed by SO. These locations refer to a mill where possible, but if, for example, only a weir can be located, the NGR for the weir is shown, and such a figure is in brackets.

Column E gives the function of the mill. A corn mill is '3', a mill for another specific function is '2', '1' is where the function is unknown and '0' is where no evidence for a mill was found. 'Unknown' denotes that it is not known whether the site was ever used for water power.

Column F deals with the primary weir associated with a mill. A '3' denotes that a weir is standing fully, irrespective of its material of construction or of its condition. '2' shows that part of the weir remains, '1' means there are only traces surviving and '0' indicates it has disappeared completely.

Column G is for those few sites where the head of water is supplied by a dam across a valley, as distinct from a weir. '3' is for a dam still holding water, '2' is where the dam exists dry, '1' means there are only traces, and if nothing survives a '0' is appropriate.

Columns H and I are for leats and ponds respectively, and the same notation is used as for Column G.

Column J refers to the mill building. If it is essentially complete a '3' is shown. A '2'

means that part survives, whereas a '1' is for where there are traces only. Where nothing remains a '0' is indicated. An asterisk by the '0' is an indication of where buried archaeological evidence of the mill could survive.

Column K is for the working parts of the mill. '3' shows that these are mostly complete, and '2' means that only part of the machinery is there. '1' indicates there are traces only and '0' is for those mills which have been completely gutted. 'Unknown' denotes that the presence or absence of working parts has not been possible to ascertain.

Column L concerns the tailrace, and the same notation has been used as for G,H and I.

Column M shows those sites in which the mill is integrated with a managed system of water meadow irrigation.

Column N indicates those sites which enjoy statutory protection and, if so, their unique identification number in the National Heritage List for England.

The results of the fieldwork were also written up in the text format of the Herefordshire Historic Environment Record and these are presented as Appendix 2. A representative series of 528 digital photographs forms Appendix 3.

Functions of water-powered sites

Mills are defined by their primary, or sole, function. The majority of the sites supported mills which maintained a single function throughout their period of production. The remaining ones are where changes of function have occurred with time. Occasionally, too, there are multi-functional sites where the power was utilised for different purposes concurrently.

Of the 153 mill sites 81 were corn mills, 11 driving farm machinery, 6 pumping water, 2 tanneries, 3 woollen mills, 2 sawmills, and 1 iron foundry. Several sites have seen different functions at different times. Strangworth Forge (Pembridge) and Tidnor Forge (Lugwardine) were iron forges which became corn mills. Floodgates Mill (Kington), Combe Mill (Combe) and Bullock's Mill (Lyonshall) changed from fulling to corn milling with the last example later generating electricity. Priory Mill (Leominster) was converted from corn milling to oil production, and Three Mills corn mill (Bromyard & Winslow) became a pumping station. Pinsley Mill (Leominster) was a corn mill which even had a brief period of cotton spinning in its history. Hampton Court Mill (Hope under Dinmore) was a multi-functional site where corn was milled and both timber and stone were sawn. There are an additional 40 sites where the function is unknown or where the use of water for power is uncertain.

Weirs

For the vast majority of the water-powered sites the water was taken from the natural watercourse by an artificial weir. Most commonly the weir's location coincided with a bend in the stream or river, the water supply for the mill being on the outer side of the bend. An oblique arrangement of the weir increased the length of the crest, thus increasing its capacity for dealing with flood water. The most impressive example is

the weir for Aymestrey Mill (Aymestrey) [Fig. 2] which is approximately 50 metres long.

The weirs in the area demonstrate a variety of forms. The majority were built obliquely to the watercourse in plan, directing the water into a leat leading to the mill. Traditionally these were of stone, well coursed and pitched, with an evenly graded apron, as at Crabtree Mill (Kington) [Fig. 4]. These weirs appear to be of considerable antiquity, although each will probably have been repaired from flood damage at various times. A few weirs are convex in plan with stone-work which appears to be less well coursed, such as at Bullocks Mill (Lyonshall). It has been suggested that this may be an earlier form, but it is more likely to be a later adaptation, with the convex side facing upstream to resist the force of floods more effectively and to give an even greater crest length.

In some cases the weirs have been constructed almost straight across the watercourse. These tend to be on relatively small watercourses, as at Parkstile Mill (Kington Rural), where perhaps flooding is not as serious a threat. The tall weir at Mortimer's Cross Mill (Lucton) [Fig. 3] is an example on a main river, but it is of particularly massive construction. Some weirs have a sluice-gate at one end, as distinct from a sluice controlling the water entering a leat. This would enable the level of impounded water to be lowered so that maintenance on the weir could be carried out. Examples are at the weirs of Aymestrey Mill (Aymestrey) [Fig. 2] and Stretfordbury (Leominster).

At 37 of the mill sites there are weirs still performing their function. At 16 others parts of the weirs remain, having been broken by natural floods or by demolition. At a further 8 sites traces of the structures can be seen. The remainder have disappeared completely.

There is considerable variation in the height of the weirs. Probably the tallest is the very fine stone structure at Mortimer's Cross Mill (Lucton) [Fig. 3], which is at least 3m high, with a crest of large ashlar blocks. The lowest example has a height of less than 1m and is at Crabtree Mill (Kington) [Fig. 4]. This is an excellent example of ancient pitched stone-work, despite a small amateur repair at its eastern end.

The condition of the weirs varies considerably. In many cases the whole weir has been replaced with concrete, as has occurred at Lugg Mill (Kingsland). In others concrete has been used to replace only part of the structure, as at Bullock's Mill (Lyonshall). At Arrow Mill (Kington) the whole weir has been re-formed using a jumble of very large rocks, while a similar treatment has been carried out in the repair of Hampton Court weir (Hope under Dinmore). Occasionally large blocks of stone have been used at the bottom of the weir's apron to break the force of the water and prevent undercutting of the apron, as at Aymestrey Mill (Aymestrey) [Fig. 2]. The Aymestrey Court and Yatton Court weirs (Aymestrey), which still survive, appear to have been part of a designed landscape, apart from any functional use.

At many sites the weir has been washed away by floods, but at some, one or both of the ends are still visible against the bank. In such cases a cross section of the weir can be seen, and this shows that there is frequently surprisingly little of any rigid structure. The core is merely of earth, with skilfully-built pitched stone-work forming

the outer layer. This construction is well-seen at the weir for Hergest Mill (Kington) and at Pencombe Mill (Pencombe with Grendon). Other weirs, such as at Hampton Court Mill (Hope under Dinmore), showed an internal timber framework when their reconstruction was taking place. The weir of 1820 which fed Kington Foundry (Kington) is the only one to which a reliable date can be ascribed. The recent damage to this fine weir from the installation of an unsightly concrete fish pass is regrettable.

Although the sites of many of the weirs must be of considerable antiquity, the structures will have been repaired and rebuilt after flood damage. On those rare occasions when a timber framework is exposed there is a true indication of age. In the River Lugg there are remnants of mill weirs which were demolished as a result of the 1699 Navigation Act.

At several mills where flooding is prevalent the water arrangements for the mills are characterised by having two weirs. The primary weir directs the water from the river into the leat at a high level, creating a head with potential to power the mill. The secondary weir is on the side of the leat allowing the return of excess water to the river, thus safeguarding the mill at times of flood. This is well seen at Arrow Mill (Kingsland) and at Monkland Mill (Monkland and Stretford). An impressive example of a secondary weir is that for the former Little Froome Mill (Avenbury), although the primary weir has been destroyed by floods. The flow of water along the leat was often controlled by a sluice-gate close to the weir, as at Arrow Lodge mill (Kington) and Bullocks Mill (Lyonshall).

Occasionally, where the water is diverted to feed the mill, the main watercourse is obstructed by sluice-gates on a low weir, rather than by a conventional type of weir. This was the case at Hide Mill (Stretton Grandison), but here it was probably a modification carried out by the canal company when the water system was altered to feed the Hereford & Gloucester Canal. The River Frome has the worst reputation for flooding in the area, and the only weir to survive in the whole course of the main river is at Court Mill (Canon Frome). This is another example of sluice-gates on a low weir, and it, too, was probably rebuilt in its present form in another scheme to provide water for the Hereford & Gloucester Canal. The most dramatic example of a low weir with sluice-gates was formerly to be seen at Lugg Bridge Mills (Lugwardine), where a new mill had been built so as not to interfere with an existing navigation.

Weirs have always been vulnerable to damage by flooding, and the sites in the Frome valley have been the worst affected. Weirs have also become targets in flood prevention schemes. Recently there has been a trend to remove remaining weirs to facilitate fish migration, or to disfigure the structures with fish ladders, as a result of a European Water Framework Directive. A prime example of such disfigurement is the recent treatment of the fine 1820 weir of Kington Foundry (Kington). Weirs are the most striking landscape features associated with mills, and yet they are structures which are currently under the greatest threat.

Dams

At very few of the sites has water been impounded by a dam across the valley. This was both a way of storing the water and of increasing the head available to drive the waterwheel. Suitable topography, and the risk of shortness of supply, meant that this

feature is normally restricted to the upper parts of catchment areas. For corn mills in Herefordshire such a situation is unusual, although at several of the more upland sites the leats widen towards the mills to allow a certain amount of storage. In such cases significant dams needed to be constructed to contain the ponds. Examples of this are at Linton Mill (Linton by Bromyard), Brockmanton Mill (Pudleston) and Yarpole Mill (Croft and Yarpole).

At only one corn mill, Newchurch Mill (Kinnersley) [Fig. 5], has a dam, 8 or 9 metres high, been built across the valley forming a large mill-pond, with the mill tucked beneath it. Some estates threw dams across streams with the double purpose of providing water to drive a pump and of creating a pond as an amenity. Examples can be seen at Croft Castle (Croft and Yarpole) and Burton Court (Eardisland). Where such dams occurred they usually remain as landscape features and are not so liable to threat. At Stapleton Castle Farm (Stapleton) a dam has been thrown across a very minor stream to form a pond which was capable of storing water for intermittent use to drive machinery.

Leats

The leat is the artificial channel bringing water to the mill. It may vary in length from a few metres at Hampton Court Mill (Hope under Dinmore) to almost a mile at Hergest Mill (Kington). The longer leats are more typical of the upper reaches of a river, where, because of the low water flow, it was important to maximise on the available head. The width of the leat relates to the volume of water it carried, so this tends to increase with the size of the stream or river.

The civil engineering involved in the construction of the leats varies according to the topography of the site, the regime of the river or stream, and the period in which it was built. Some leats, such as at New Mill (Pembridge) [Fig. 10], are merely ditches in relatively level ground, while others, like Hall's Mill (Huntington), have sections which are cut to a depth of 3m. Occasionally the scale of the work involved is exceptionally great, as at Risbury Mill (Humber) [Fig. 6], where the bank supporting the leat is up to about 3 metres in height and similarly broad. The leat to Forge Mill (Pembridge) has a width reflecting its former use for heavy industry as distinct from what would have been required for the later rural corn mill.

In two cases on the River Arrow, despite the relatively low gradient, the cutting of a particularly long leat has enabled overshot, rather than breast-shot or undershot, waterwheels to be used. Overshot waterwheels are more efficient, but are atypical of such an environment. The examples are Hergest Mill (Kington) and Staunton Mill (Staunton on Arrow) [cover]. At Staunton Mill the necessary head was obtained by extending an existing leat in the mid 17th century [Fig. 20]. An interesting feature at some sites, however, is that the waterwheel did not utilise the full head that the weir could have provided. At Aymestrey Mill (Aymestrey) [Figs. 3, 30 & 31] the available head at the mill is just under 2 metres, despite being fed by a long leat from a weir of similar height. The gradient of this leat is much greater than normal, and even powered a hydraulic ram on its course. At Mortimer's Cross Mill (Lucton) the height of the weir [Fig. 2] is greater than the head used by the waterwheel. In this case the wheel is set significantly higher above river level than might be expected. Clearly it

was more important for the mill to be able to operate in times of flood rather than maximising on the available power.

At three of the water-powered farms the water was piped from the storage pond to the power-source. At Alder's End (Tarrington) and Lower Hengoed (Huntington) a long, inclined pipeline fed a turbine. At the third site, Stapleton Castle Farm (Stapleton), the piped supply ran virtually horizontally to feed a waterwheel below ground level, which was later superseded by a turbine.

Leats are extremely vulnerable once their purpose has ceased. Not only are they in-filled and levelled relatively easily, their presence in modern agriculture is often a great nuisance. They are therefore disappearing relentlessly, particularly in the middle courses of the rivers where the land is cultivated more intensively.

Ponds

Mill-ponds are not commonly seen in the area of study. To a large extent this is a reflection of a lack of need, as compared with south-eastern England where periods of drought are more frequent. Where mill-ponds have occurred it is generally because the water supply is insufficient for continuous working, and storage is important. At a number of sites which were fed by relatively minor streams the leat widens to form a small storage pond immediately above the mill. The examples of Linton Mill (Linton by Bromyard) and Yarpole Mill (Croft and Yarpole) have been given already. The situation at Newchurch Mill (Kinnersley) [Fig. 5] is unique. It appears to have been an estate mill, erected at the beginning of the 19th century on a fresh site. A large pond has been formed on a small stream by building a huge earth dam, with the mill tucked in at the base.

The only example of a large mill-pond at an ancient site is at Cowarne Mill (Much Cowarne). Here the leat appears to have been greatly enlarged to form an extensive sheet of water at some later date, presumably for some reason other than merely a lack of water. At Court of Noke (Pembridge) [Fig. 8] the water for the farm mill is derived from the historic water gardens of the country house.

When minor uses are considered, such as farm mills and water pumping installations, these are more frequently situated on very minor streams where water storage becomes much more important. Farm mills, in particular, would be used for short periods only, and would often rely heavily on a pond for water supply. Good examples were Stapleton Castle Farm (Stapleton) and Lower Hengoed (Huntington). A few water-pumping waterwheels were associated with estates, and the provision of a pond not only powered the pumping wheel, but also provided aesthetic qualities, as at the Fishpool Valley pump-house at Croft Castle (Croft and Yarpole) and the Burton Court pump-house (Eardisland) [Fig. 15].

Many of the ponds associated with the use of water power have been drained, either by design or by accident, often by the destruction of the weirs which fed them. Those which survive are attractive landscape features, sometimes stocked with fish. There is also a tendency to keep ponds as a refuge for wildlife. The current threat to ponds in this area is therefore not great.

Mill buildings

Many of the mill sites are of ancient foundation, although they have been modernised in order to remain competitive. At most mills this up-dating has been carried out in the late 18th or early 19th century, although some fine 17th century structures have survived, as at Arrow Mill (Kingsland) [Fig. 32] and Limebrook Mill (Lingen). In a number of cases part of an earlier structure survives, as at Glanarrow Mill (Eardisland), Brockmanton Mill (Pudleston), and Cowarne Mill (Great Cowarne). At others the rebuilding has been total, as at Arrow Lodge Mill (Kington) [Fig. 33]. Sometimes hidden within the mill are remnants of older fabric as shown by an earlier tie-beam at Burton Mill (Eardisland) [Figs. 25 & 26] for example. The most recent mill appears to be Cowarne Mill (Much Cowarne) which was rebuilt in about 1900.

The buildings follow the local vernacular traditions and externally they rarely differ markedly from farm buildings. Typically the mills are of three storeys, of rubble stone with a slate roof. Some timber framing examples exist, either as the whole structure, as at Wegnall Mill (Rodd Nash and Little Brampton) [Fig. 11], and at Limebrook Mill (Lingen), or as part of it as at Brockmanton Mill (Pudleston). In the south-eastern portion of the area brick is used as in Stoke Lacy Mill (Stoke Lacy) and at Cowarne Mill (Much Cowarne). Where the mill was constructed of only two storeys it has often been raised in height to give room for storage as at Risbury Mill (Humber) and Stoke Lacy Mill (Stoke Lacy).

Occasionally a mill has been constructed on a larger scale so that a distinctive style of mill building has developed, as at New Mill (Pembridge) [Fig. 9] and Arrow Lodge Mill (Kington) [Fig. 33]. Both of these had projecting lucombs for ease of hoisting grain directly from wagons. The greatest development of water power in the area of study was at Lugg Bridge Mills (Lugwardine) where there were at least three waterwheels in a sprawl of buildings.

Some of the mill buildings are kept in excellent repair, such as Aymestrey Mill (Aymestrey) [Figs. 30 & 31], which has been restored to working condition recently, but many others show serious signs of deterioration. One mill, Pinsley Mill (Leominster), has been totally demolished during the course of this study.

A significant number of the mill buildings in the area have been converted, either to permanent dwellings or for holiday letting. Others have been left unused, often in deteriorating condition, and there is a particular threat to those which still retain their working parts. Clearly, for the structure of a disused building, it is good for a sympathetic use to be found for it. Indeed the destruction of Pinsley Mill (Leominster) was due to vandalism – simply because it was a derelict building. All the disused mills in the study area are under threat.

Working parts of mills

Two of the mills are complete and workable; these are Mortimer's Cross Mill (Lucton) and Aymestrey Mill (Aymestrey) [Figs. 30 & 31]. Thirteen more have virtually complete working parts, although Limebrook Mill (Lingen) has lost its waterwheel. Another three, probably four, have some parts remaining. These are shown in the Protection section of this report.

Eighteen mills, including three farm mills at Court of Noke (Pembridge) [Figs. 8 & 14], Leen Farm (Pembridge) and Day House (Kingsland) [Fig. 29], have waterwheels. There is also Staunton Mill (Staunton on Arrow) [cover] which has two wheels. Of the waterwheels, nine are overshot, one is breast-shot and eight are low breast-shot. The oldest waterwheel is at Newchurch Mill (Kinnersley) [Fig. 5], thought to date from 1815-20. It is significant that at a number of mills the waterwheel was raised above the river level as a protection against flooding. It was clearly more important to maximise on the number of days that milling was possible, rather than develop the greatest available power, as is well seen at Mortimer's Cross Mill (Lucton). The present study was not able to establish whether a waterwheel and machinery survive at the Listed and converted Paunton Mill (Bishop's Frome), or New Mill (Monkland and Stretford) [Fig. 24], or if internal working parts remain in Thornbury Mill (Thornbury). [Fig. 27].

Of the eleven farm mills the one at Court of Noke (Pembridge) [Figs. 8 & 14] is the best survival and is complete with its working parts. Its association with the corn mills is justified by its pair of millstones for grinding cattle feed. A feature sometimes found at farm mills is a long rotating drive-shaft running from the waterwheel to the barn. This occurred at Leen Farm (Pembridge), Day House (Kingsland) [Fig. 29], Broom Farm (Eardisland) and probably at Letchmoor Farm (Kinsham); waterwheels at the first two of these still survive. Power was provided by turbines at four farms, Stretfordbury (Leominster), Stapleton Castle Farm (Stapleton), Lower Hengoed (Huntington) and Alders End (Tarrington).

There are four virtually complete waterwheel-driven pumping installations. These are at Fishpool Valley (Croft and Yarpole), Burton Court (Eardisland) [Fig. 14], Hampton Park pumping wheel (Ford and Stoke Prior) and Staunton pump-house (Staunton on Arrow) [Fig. 28].

Apart from the working turbine at Arrow Lodge Mill (Kington) there are five turbines within the area. These are at Rowden Mill (Bromyard and Winslow), Castle Mill Farm (Stapleton), Stretfordbury (Leominster), the sawmill now known as "Lealands" (Staunton on Arrow) and one currently generating electricity beside Aymestrey Mill (Aymestrey).

For every mill retaining working parts some degree of compromise is a necessity for any alternative use. Unfortunately such a compromise generally results in irreversible loss of character, so often causing the destruction of significant elements of what had been special about the mill. The survival of every complete mill rests with its current owner unless there is robust statutory protection for it. The Arrow and Lugg valleys constitute a small area which is particularly rich in terms of watermill survival, and protection needs to take this into account. These buildings and their contents are under significant threat.

Tailraces

There is great variation in the length of tailrace at the various mills. Those with the longest tailraces are generally prone to flooding, so that the tailwater is kept separate from the main stream for as long as is necessary. A good example of a long tailrace is

at Glanarrow Mill (Eardisland), where it is approximately 230 metres in length, as distinct from that at Hergest Mill (Kington) where it is only a very few metres.

The condition of the tailraces depends upon whether the channel still has a purpose. After the mill ceases to function the tailrace often continues to act as a drainage channel and survives in a recognisable state, but it is rare for it still to be in its former working condition.

Water meadow irrigation

An interesting feature of some of the rural mills in this area is the integration of milling and water meadow irrigation. At 20 of the sites the leat supplying power to the mill also provided water for water meadows. The main aim of water meadow management was to keep a continuous, even flow of water running over the pasture for specified periods between November and March, and then to let the sheep graze for about a month before a second period of irrigation. Hay was cut in June and then cattle were allowed onto the ground until the cycle started again. The management of these water meadows was tightly controlled but very successful.

The use of mill leats to supply water for irrigating water meadows has been prominent in the mid courses of both the Arrow and the Lugg since the 17th century. The greatest areas were around Pembridge and Kingsland, where some of the systems paralleled the main rivers for a matter of miles. Only fragments of these arrangements still exist but there are two important survivals. One is the leat which served Staunton Mill (Staunton on Arrow) [Fig. 20], which can still be followed for a considerable distance beyond the mill where it fed the water meadows. The other is the wooden sluice and iron aqueduct which led off the leat to Lugg Mill (Kingsland) in order to feed the farm mill at Day House (Kingsland) [Fig. 29], where the waterwheel is preserved. This aqueduct used to feed water meadows, too.

The conditions for this combination to work required enough relatively flat land for an intricate pattern of irrigation channels to be created. There was also the need for the area in question to be relatively free from natural flooding. This meant that only the middle courses of the rivers could be developed in this way. On the Arrow the suitable part of the valley extended from Hergest Mill (Kington) down to Arrow Mill (Kingsland). Within this section, however, rejuvenation of the river between Bullocks Mill (Lyonsall) and Mowley Weir (Pembridge) prevented such a use. A similar pattern can be seen for the River Lugg. There were ideal conditions just below Presteigne for Letchmoor Farm (Kinsham) and Combe Mill (Combe) to have the combination of uses, but rejuvenation of this river downstream prevented it. There was another suitable stretch at Aymestrey for Aymestrey Mill and Aymestrey Court Mill to have water meadows, but not until Lugg Mill (Kingsland) did the integrated pattern appear again. From Crowards Mill (Eyton) downstream it appears that natural winter flooding of the Lugg prevented the successful operation of water meadows. At no mill site on the Frome was any evidence seen of water meadow development, presumably because of the prevalence of natural flooding.

To a large extent the system of milling and water meadow management could be worked in with the demands of the millers as the irrigation tended to coincide with periods of good water flow in the rivers. Obviously there were problems. There would

have been occasions when low water levels in the river coincided with the need to irrigate the water meadows. Milling and irrigation were then competing for the water, so complex local agreements were made and litigation was not unknown. One mill, Staunton Mill (Staunton on Arrow) [cover, Figs. 13 & 20], is unique since it was erected in the mid 17th century specifically as an integrated scheme of corn milling and water meadow management. The irrigated area extended for about a mile in length and lasted successfully for over two hundred years. Much of the leat system can still be followed and the rebuilt corn mill retains all its working parts.

Some of these irrigation schemes were very complex. Perhaps the most elaborate was the one supplied by the weir and leat feeding Lugg Mill (Kingsland). A short distance above the mill a branch of the leat, controlled by sluices, was conducted across the River Lugg by an iron aqueduct to feed a waterwheel at Day House (Kingsland) [Fig. 29]. This wheel drove farm machinery in a nearby barn. Water from the aqueduct and tail-water from the waterwheel fed irrigation channels of an extensive water meadow system. From where the water left the Lugg on one bank, to where it was returned on the other bank was over a mile. The wooden sluices and iron aqueduct, and the waterwheel and barn (now a domestic conversion) survive, although most of the old water channels have been in-filled.

Protection of mills

In general the degree of statutory protection reflects the importance of the mills themselves as historic structures with their associated working parts, as laid out in the “Listing Selection Guides” and “Criteria for Protection”. The only Scheduled example is Mortimer’s Cross Mill (Lucton), a workable mill with three pairs of stones. The 18th century building with its 19th century working parts is remarkable for its completeness and condition, including good ancillary machines. The only mill Listed at grade II* is Arrow Mill (Kingsland) [Fig. 32]. This is an outstanding 17th century timber-framed building with later additions. It is complete with working parts including three pairs of stones, a very old flour-dressing machine and an unique clover mill. This mill was later integrated into a scheme for irrigation of water meadows, and at least one sluice remains. The weir includes an eel trap and the live water system still turns the waterwheel.

21 water-powered buildings are currently Listed grade II in the area. They are Kington Foundry (Kington), Croft Castle pump-house (Croft and Yarpole) and 19 corn mills. Of these grade II Listed buildings there is a wide spectrum between the demolished Huddle Mill (Stoke Lacy) to the workable Aymestrey Mill (Aymestrey) [Figs. 30 & 31]. All the mills in the study area which enjoy statutory protection are shown in tabular form below, together with the more important unlisted examples.

<u>Complete workable corn mills</u>	<u>Statutory protection</u>
Aymestrey , Aymestrey Mill [Figs. 2, 30 & 31]	II
Lucton, Mortimer’s Cross Mill	Scheduled & II
 <u>Corn mills with complete machinery</u>	
Bodenham, Riffins Mill [Fig. 23]	-
Bromyard & Winslow, Rowden Mill	II
Eyton, Croward’s Mill [Figs. 16 & 17]	-

Humber, Risbury Mill	II
Kingsland, Arrow Mill [Fig. 32]	II*
Kingsland, Waterloo Mill	II
Kington Rural, Park Stile Mill [Fig. 34]	II
Leominster, Cholstrey Mill	II
Lingen, Limebrook Mill	II
Mordiford, Mordiford Mill	II
Much Cowarne, Cowarne Mill	II
Rodd, Nash and Little Brampton, Wegnall Mill [Figs. 11, 12 & 21]	-
Staunton on Arrow, Staunton Mill [cover, figs. 13 & 20]	-

Corn mills with some working parts

Croft and Yarpole, Yarpole Mill	II
Eardisland, Glanarrow Mill	II
Kington, Arrow Lodge Mill [Fig. 33]	II
Kinnersley, Newchurch Mill [Fig. 5]	-
Monkland & Stretford, New Mill [Fig. 24]	-
Pembridge, Forge Mill [Fig. 22]	-
Thornbury, Thornbury Mill [Fig. 27] (working parts not confirmed)	-

Corn mills with complete building but no working parts

Pembridge, New Mill [Figs. 9 & 10]	-
Stoke Lacy Mill, Stoke Lacy	II

Corn mill completely demolished

Stoke Lacy, Huddle Mill	II
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Mills with complete working parts which have no statutory protection:

- 1 Riffins Mill, Bodenham [Fig. 23]. The building materials have been largely removed, leaving the early 19th century waterwheel and all the primary gear in place.
- 2 The 18th and 19th century Crowards Mill, Eyton [Figs. 16 & 17]. The mill has been converted to a dwelling but retains a waterwheel and fine machinery.
- 3 Forge Mill, Pembridge [Fig. 22]. Another converted mill which has lost its waterwheel but retains internal machinery.
- 4 Wegnall Mill, Rodd Nash and Little Brampton [Figs. 11, 13 & 21]. This is an 18th century timber-framed building with complete contents.
- 5 Staunton Mill, Staunton on Arrow [cover, figs. 13 & 20]. An 18th century building with two waterwheels and associated working parts of considerable interest. In addition it is on the site of a 17th century integrated mill and water-meadow irrigation system.

For Listed mills the associated weirs and artificial watercourses generally have little statutory protection. What is considered as curtilage of the mill buildings is usually too restrictive to include such features. It appears that they either need to be worthy of being Listed in their own right, or Scheduling of the site has to be considered. Scheduling has the advantage of specifying precisely those areas which are covered, whereas Listing is more subjective in that regard. The presumption of Scheduling,

however, is that the monument should remain undisturbed, and any change has to be the subject of an application for consent, however small it may be. This restricts the very maintenance required to keep features related to watermills in good condition. With Listing, on the other hand, there is the presumption that the structure will be maintained in good condition. Statutory powers can be invoked for a Listed building if its maintenance is considered to be unsatisfactory, yet there is the threat of draconian powers against anyone carrying out any work relating to a Scheduled Monument without specific consent.

The mill with the highest degree of statutory protection in Herefordshire is Mortimer's Cross Mill (Lucton), which is both Scheduled (County no. 150) and Listed grade II. The mill is outstanding in its completeness and condition, and the fine weir [Fig. 3], leat and tailrace continue to give it a live water supply. Alongside the mill is the site of an 18th century paper mill. However, the corn mill is a workable one, so the fact that it is Scheduled creates difficulties in terms of the maintenance and repairs which have to be carried out to keep it in working condition. Such tasks in a working mill counter the whole concept of a Scheduled Monument. It could be more appropriate to remove the mill and its working parts from being a Scheduled Monument and to raise the building's grade of Listing.

Protection of weirs

The protection of weirs is a difficult matter and none appears to be Listed in its own right in this area. Most of them are at some distance from the mills they served, in which case they cannot be said to fall within the curtilage of the relevant Listed building. Kington Foundry (Kington) weir is a case in point where the fact that the foundry was Listed failed to protect the associated fine weir of 1820 being damaged by the addition of a concrete baulk fish-pass without, apparently, the need for Listed Building Consent. Another impressive weir at Mortimer's Cross Mill (Lucton) [Fig. 3], falls within the boundaries of a scheduled monument, but even this has been damaged by the application of a concrete fish-pass.

The problem of how best to protect the water supply systems associated with mills is a difficult one. In this area none of the systems is complete, but the weirs, or their remains, have tended to be the features which have outlived the others until recently. Apart from deterioration resulting from a lack of maintenance, the weirs are currently the focus of attention from the fishing lobby. Aided by the Water Framework Directive, there is a strong movement towards the naturalisation of rivers and of removing or altering weirs in an attempt to aid the migration of fish. There is a need at all levels for the importance of these weirs to be recognised, and for their historic and aesthetic qualities to be respected.

There are several weirs which warrant statutory protection, although the selection of these is a very difficult process. Apart from the Mortimer's Cross (Lucton) weir [Fig. 3], there are others which stand out as being particularly fine examples. Probably the most impressive of these is the one for Aymestrey Mill (Aymestrey) [Fig. 2]. Others are those serving Leen Mill (Pembridge) (also damaged by the installation of a concrete baulk fish-pass), Glanarrow Mill (Eardisland) and the Aymestrey Court site (Aymestrey). Some good stone structures have suffered damage, such as at Bullock's Mill (Lyonsall) and the secondary weir for Monkland Mill (Monkland and

Stretford). Although on a much smaller scale, there is a particularly fine, ancient weir which once diverted the River Arrow to Crabtree Mill (Kington) [Fig. 4]. Mowley (Pembridge) weir is not thought to have been associated with a water-powered site, but is a fine stone structure with a brick crest. The pair of weirs by Court of Noke (Pembridge) [Fig. 19] are most unusual and worthy of protection.

Protection of leats, ponds and tailraces

Once these watercourses and ponds cease to have a function they become extremely vulnerable. Examples like Mortimer's Cross Mill (Lucton) and Aymestrey Mill (Aymestrey) [Figs. 2, 30 & 31] need their water supply, so the maintenance of the necessary earthworks and structures is continued. In some cases, like New Mill (Pembridge) [Figs 9 & 10], a little water still flows along the leat, particularly at times when the water table is high, so the watercourse is maintained as a drainage channel. At many sites the presence of a leat interferes with modern agricultural practice and considerable lengths have been completely obliterated, such as the watercourse to feed Little Froome Mill (Avenbury). The leat system which had served Cholstrey Mill (Leominster), a Listed building, has been destroyed during the course of the present study.

The treatment of a leat and a tailrace tends to differ once the mill has ceased working. In general the leat's purpose stops with the last turn of the waterwheel or turbine. Thereafter, if it has any effect it is only a nuisance. A tailrace, however, since it was dug to drain water away, is often left alone to continue fulfilling the same purpose. At several mills the leat has been destroyed leaving little trace, and yet the tailrace can be followed with ease.

In some of the more upland parts of the area the leat gradually widened as it approached the mill to form an elongated storage pond. When milling ceased, and the water stopped running, the earthworks associated with the enlarged final length of the leat remain as enormous banks. Good examples still survive at Linton Mill (Linton by Bromyard) and Scar Mill (Stanford Bishop), whereas in each case the weir, parts of the leat, and the mill itself, have long disappeared. It is in these upland areas that the earthworks associated with these leats and ponds are much less threatened. The soils are poorer and the topography more rugged. Thus some impressive illustrations of leat and pond earthworks have survived at Whyte Mill (Pudleston) [Fig. 7] and Buckenhill Mill (Edwyn Ralph) [Fig. 18].

The greatest use of mill leats to supply water for irrigating water meadows was around Pembridge and Kingsland, where some of the systems paralleled the main rivers for a matter of miles. However, only fragments of these arrangements still exist, but there are two important survivals. One is the leat which served Staunton Mill (Staunton on Arrow) [Fig. 20] and a vast tract of water meadows beyond. The other is the system at Kingsland, which includes the surviving wooden sluices, iron aqueduct and waterwheel for Day House [Fig. 29] and its water meadows. This is unique in that the supply was taken off an ancient mill leat on the opposite side of the river.

Conclusions and recommendations

The Lugg and its tributaries provide a fascinating cross section of mill buildings, weirs and watercourses, and there are many interesting survivals. There have been losses even during the course of this study and much of what remains has no statutory protection. The Arrow and Lugg valleys constitute a small area which is particularly rich in terms of watermill survival, and protection needs to take this into account. All the disused mills are under threat, particularly those which still retain working parts.

Of the weirs, it would appear that only two are protected at present. One is at Mortimer's Cross Mill (Lucton) [Fig. 3] as it is part of a Scheduled Monument. The other is at Arrow Mill (Kingsland) [Fig. 32], where it is beside the grade II* Listed mill and is clearly within its curtilage. It is recommended that consideration be given to a selection of the stone structures which remain. Some of the best are the weirs for Aymestrey Mill (Aymestrey) [Fig. 2], Glanarrow Mill (Eardisland) and Crabtree Mill (Kington) [Fig. 4]. Water conditions were so high during part of the fieldwork that it was impossible to record details of some of the other weirs.

An interesting and unusual situation occurs on the boundary between the parishes of Pembridge and Staunton on Arrow where two weirs have been built across the River Arrow, separated by only about 30m. The upper weir directs water to the south bank of the river, supplying the unique water gardens and farm mill of the grade II* Listed Court of Noke (Pembridge) [Fig.8]. The lower one diverted water to the north bank from where a long leat fed the waterwheel which still exists at Leen Farm (Pembridge). It is recommended that consideration be given to protect this pair of weirs [Fig. 19].

There is only one significant dam across a valley, at Newchurch Mill (Kinnerley) [Fig. 5], but this site is recommended more for its early Kington-built waterwheel than for the dam.

The best leats, in terms of condition, are those which are still in use, such as at Aymestrey Mill (Aymestrey) and Mortimer's Cross Mill (Lucton). Prominent examples of dry leats survive at Whyle Mill (Pudleston) [Fig. 7], Forge Mill (Pembridge), Hall's Mill (Huntington), Brockmanton Mill (Pudleston), Buckenhill Mill (Edwyn Ralph) [Fig. 18] and Risbury Mill (Humber) [Fig. 6]. Forge Mill (Pembridge) is the only one of these five for which the weir remains, although it appears to have been largely rebuilt in concrete. Of the leats which widened out to form ponds immediately before the mill, Whyle Mill (Pudleston), Brockmanton Mill (Pudleston), Linton Mill (Linton by Bromyard), Scar Mill (Stanford Bishop) and Buckenhill Mill (Edwyn Ralph) are good examples. From the point of view of protection, apart from the leat at Staunton Mill (Staunton on Arrow) [Fig. 20], the best landscape features are probably at Whyle Mill, (Pudleston) [Fig. 7], Buckenhill Mill (Edwyn Ralph) [Fig. 18] and Forge Mill (Pembridge).

The leat to Staunton Mill (Staunton on Arrow) is long and particularly important. It is still active, although out of use, and once served two generations of sawmill, a probable ancient mill site and the corn mill, as well as supplying water meadows. This leat was extended in the mid 17th century for an historic integrated system of milling and water meadow irrigation. It is a landscape feature which can be followed past the

mill for some distance. It is recommended that this water system is given some protection. Another site which warrants protection is the wooden sluice, iron aqueduct and waterwheel at Kingsland [Fig. 29]. The aqueduct conveyed water from the Lugg Mill leat across the River Lugg to drive the farm waterwheel at Day House, which still exists, and to serve water meadows.

The only significant mill-pond is at Cowarne Mill (Much Cowarne), which is a much later modification of an early leat system. It is more of an amenity rather than a functional necessity for milling. There are ponds formed by damming small valleys at two of the water-pumping sites. The one at Croft Castle pump-house (Croft and Yarpole) is adjacent to the Listed building and should be considered to be within its curtilage. Neither the pond, nor the complete mid 19th century installation at Burton Court pump-house (Eardisland) [Fig. 15], on the other hand, has any protection and is an interesting survival.

In general, tailraces do not have features which warrant special consideration in terms of protection. They vary considerably in their length and their character. Where the leat is active the tailrace is normally still fulfilling its purpose. When the leat ceases to function the tailrace silts up. Significant examples of extant tailraces are at Glanarrow Mill (Eardisland) and Mortimer's Cross Mill (Lucton). There do not appear to be any tailraces which warrant special protection, although those which survive in reasonable condition should be considered as curtilage features of the Listed mills with which they are associated.

There is an urgent need to consider how significant water supply features associated with a mill can be protected. The Listing of a mill building is unlikely to offer protection to an associated weir, for example, unless the two are in very close proximity. Not only is the completeness of the system important, but the best examples of single items, such as weirs, need to be recognised. Consideration of each water supply feature should address how representative it is of a particular type, as well as its completeness, rarity, quality and age.

The following fifteen mills and sites have no statutory protection and warrant a more detailed study.

Seven mills which have most of their working parts are:

1 Staunton Mill, Staunton on Arrow [cover, figs. 13 & 20]

This is a very important mill for several reasons. It was established in the mid 17th century and is unique in being built on a new site specifically as an integrated project of milling and water meadow irrigation. The area of these water meadows was vast, and the water supply to that, and to the mill, via a long leat, is still live. The leat system starts at the weir for the sawmill, passes it and the remnants of an older sawmill, and another probable ancient mill site, before reaching Staunton Mill and the water meadows. Most of the evidence of the water meadows has been destroyed by agriculture, but vestiges still remain. The mill was rebuilt in the 18th and extended in the 19th century. It still retains two overshot waterwheels and very interesting 18th and 19th century machinery connected to three, once four, pairs of stones. This historic integrated complex should be investigated and recorded, and the surviving elements given some protection.

2 Court of Noke Mill, Pembridge [Figs. 8, 14 & 19]

The farm mill at Court of Noke was used to prepare food for a prize herd of Hereford cattle. It may be said to be within the curtilage of Court of Noke, a grade II* Listed country house of about 1700, but is not even mentioned in the Listing schedule, and warrants Listing in its own right. It is fed by the house's contemporaneous water garden and is of very early, and mid, 19th century date, with mid 19th century machinery. The low-breast waterwheel, which is being restored at present, drove a pair of millstones, a root-chopper and a chaff-cutter. The tailrace formerly served water meadows. This mill is complete and is a most important survival. Its weir needs both protection and restoration in order for this unique complex to survive.

3 Crowards Mill, Eyton [Figs. 16 & 17]

Although this corn mill has been converted to a dwelling, it still possesses a fine set of late 18th and mid 19th century machinery of wood and iron with two pairs of stones, and an interesting external iron waterwheel. The building is of various phases, from possibly late 17th to late 19th century. It once had two waterwheels, but the second wheel and most of what it drove have been removed, leaving only the wooden hurst frame. The weir and traditional water arrangements have been swept away in flood-prevention work. It is a particularly interesting mill because of the survival of very good working parts and a low-breast waterwheel.

4 Wegnall Mill, Rodd Nash and Little Brampton [Figs. 11, 12 & 21]

Wegnall Mill is an 18th century, timber-framed corn mill which has been abandoned with all its working parts complete. Now used for some domestic storage, it has recently been re-boarded in order to halt its decay. The machinery is of late 18th and mid 19th century date, with three pairs of stones, driven by an external low-breast iron waterwheel. The weir, leat and tailrace all remain, with a live water supply.

5 Forge Mill, Pembridge [Fig. 22]

A corn mill on the site of Strangworth Forge, this small early 19th century building has lost its waterwheel but retains its internal contemporaneous machinery. The weir and dry leat remain, and the massive scale of the leat is a relic of the earlier Strangworth Forge. There is slag from the iron-working on site.

6 Riffins Mill, Bodenham [Fig. 23]

This is a small rural corn mill from which most of the stone-work of the building has been removed, leaving the working parts exposed. The main gear is complete, although partly collapsed and overgrown. It is a good example of early 19th century iron machinery, with the frame of an iron overshot waterwheel. The site is overgrown, most of the long leat has been in-filled and levelled, but nearly half of the fine pitched stone weir remains some distance upstream. This mill is probably too decrepit by this stage to warrant Listing, although it is a most interesting survival.

7 New Mill, Monkland and Stretford [Fig. 24]

Although now a house, this mill still contained its waterwheel and machinery in 2007 after its domestic conversion. The building is timber framed and appears to be of 17th or early 18th century date, with brick and stone extensions. It has not been possible to investigate the building on this project, but the accompanying photograph is from Bill Jackson's sale brochure of 2007.

Four other mills are of particular interest:

8 New Mill Pembridge [Figs. 9 & 10]

This is a fine un-Listed mill building which is standing unused and in deteriorating condition. Unusually for this area it has a brick front, with a wooden lucomb, now removed. Although it has lost its working parts it shows evidence of two distinct mechanical layouts at different times, and was the most powerful watermill in the area with 8 pairs of millstones. It is the best example to show the use of sluices to distribute and control water both for the mill and water meadow irrigation.

9 Newchurch Mill, Kinnersley [Fig. 5]

This site is unusual in this area in that the mill was tucked-in below a massive dam which had been thrown across a small valley. The pond thus produced still remains, but most of the mill building has been demolished. Of the internal working parts, there are only a couple of iron gears and two pairs of stones. The large iron and wood waterwheel has survived, however, with an impressive header-box which fed it. This fine wheel appears to be the oldest example in Herefordshire. It shows a number of early features and was cast at Kington Foundry, probably between 1815 and 1820.

10 Burton Mill, Eardisland [Figs. 25 & 26]

The range comprises both mill and dwelling, and the mill appears to have been rebuilt and modernised in the late 18th century. The structure is of boarded timber frame on a rubble stone base, but at the dwelling end of the mill is a smoke-blackened tie-beam, still *in situ*, of at least a couple of hundred years earlier. The waterwheel and much of the machinery has been removed, but the wooden upright shaft, crown-wheel and sackhoist survive, all of late 18th century date.

11 Thornbury Mill, Thornbury [Fig. 27]

The mill is a small three-storeyed stone building with a tiled roof and an external overshot waterwheel. Adjoining are an attractive two-storeyed stone cottage and a small brick barn. The mill and cottage are probably 18th century, and the buildings make a good group. It was not possible to view the interior of the mill, but it is likely that the working parts remain *in situ*.

Two water-pumping installations are important survivals:

12 Staunton pump-house, Staunton on Arrow [Fig. 28]

A small mid 19th century building of ashlar and dressed stone stands beside a stream with a tiny adjacent weir. Inside is a small disused, 7ft 6in (2.29m) high breast-shot waterwheel attached to a second-generation pump which used to supply water to many of the village properties.

13 Burton Court pump-house, Eardisland [Fig. 15]

A small mid 19th century brick building is tucked in at the end of its pond. Inside is the disused, 10ft (3.05m) breast-shot waterwheel and pump which used to supply water to the estate.

Two more sites are of particular interest and deserve further study and consideration for protection:

14 Sluices, aqueduct and waterwheel, Day House farm mill, Kingsland [Fig. 29]

A situation exists where the leat feeding Lugg Mill (Kingsland) (Listed grade II) was used formerly to supply the farm mill at Day House (Kingsland), too. This was once part of a long and complicated, integrated water system for both power and water meadow irrigation. The leat to Lugg Mill has been in-filled, as have watercourses on the Day House side of the river, but the wooden sluices and iron aqueduct across the River Lugg are still in place, as is the waterwheel at Day House which they supplied. The converted farm mill building at Day House and the waterwheel were considered for Listing fairly recently, but the application to have them Listed was discounted, largely because of the loss of the associated watercourses. Despite this, the survival of the wooden control sluices and the iron aqueduct, as well as the Day House waterwheel and the Listed corn mill, make this site very important.

15 Hampton Court Mill, Hope under Dinmore

Although most of the above-ground structure has been demolished, this site is unique in that the mill not only ground corn, but sawed timber and stone for building work on Hampton Court and its large estate. Foundations, wall-bases and millstones survive, together with an impressive weir and the remains of a lock – one of the very few surviving examples of locks on the Lugg Navigation. One building only of this complex still stands, together with a well-preserved race for a low-breast waterwheel, and an impressive stone-built headrace tunnel.

There are four mills which are already Listed that would be worthy of a more detailed appraisal:

1 Aymestrey Mill, Aymestrey [Figs. 2, 30 & 31]

Aymestrey Mill was rebuilt after a fire, thought to be in the 1870s. It is a fine mill, in excellent condition. All the working parts are complete and have been restored to working state recently. It has a magnificent weir, a live leat and tailrace, and is a first-class example of a mill of this period. The group of buildings still includes its fine range of pigsties. In an extension of the mill is a water-powered printing press, and in an adjacent extension is a turbine generating electricity. This mill would appear to be a candidate for having its Listing upgraded.

2 Arrow Mill, Kingsland [Fig. 32]

This is the only mill in the area which is Listed at grade II*. It is an exceptional 17th century timber-framed building with 18th and 19th century additions and an earlier wing. It retains a waterwheel and complete machinery to drive three pairs of stones, as well as a clover mill – the only one surviving of many in the county. Another unique feature is an integral hop kiln. There are two fine weirs, one of which still has its eel-trap. The mill had its associated water meadows, and one of the sluices for this is still in place near the mill.

3 Arrow Lodge Mill, Kington [Fig. 33]

One of the largest mills in the area and on an ancient site, this mid 19th century building has lost its internal workings except for the sack-hoist and a turbine. The turbine has been restored recently and is now working again, generating electricity, fed by water from the reconstructed weir. The building is a mixture of stone, brick, timber framing and render. What makes this mill special is the complex that has

grown around it, including a fine stone maltings, a brick bakery and a stone house, re-fronted in the 19th century. There is interesting evidence of two generations of waterwheel before the turbine was installed over a hundred years ago.

4 Parkstile Mill, Kington Rural [Fig. 34]

A complete little 18th century rubble-stone mill into which the adjoining cottage has partly extended, but all the working parts are still *in situ*, plus an external overshot waterwheel. Originally built with two pairs of stones it was remodelled in the mid 19th century to drive three pairs. Unique to the county is the survival of a kiln for drying oats, forming part of an extension of the mill. The weir and most of the leat is still in good condition.

In addition to the above cases, a number of the existing descriptions of the mills in the Listing schedules need revision. Some are inadequate and others contain errors, as shown below:

Bishop's Frome, Paunton Mill

The complete description given for the Listed mill is: "C18. Stone. Machine tile roof. Adjoining rear of Mill House."

Bromyard and Winslow, Rowden Mill

This is described merely as a "disused mill of painted rubble with slate roof", although it contains 18th and 19th century working parts connected to a surviving turbine.

Croft and Yarpole, Gothic pumphouse (Croft Castle Pumphouse)

There is no mention of the waterwheel and pump in the building, nor of the internal evidence of former pumping installations.

Croft and Yarpole, Mill N of Church House (Yarpole Mill)

The schedule states "Two pairs of stones on first floor formerly overdriven." This is incorrect; they were driven from below in the conventional way.

Kingsland, Arrow Mill [Fig. 32]

The description includes "A lean-to hop kiln also appears to have been added on the north side" This hop kiln is not a lean-to addition. It is an integral part of the mill building.

Kingsland, Lugg Mill

The Listing schedule omits that the building and its working parts were symmetrical with a waterwheel at each end, each driving two pairs of stones.

Kington, Arrow Lodge Mill [Fig. 33]

The Listing description describes the mill building as being of the 18th century, although it was constructed in 1848-9. It makes no mention of the internal water turbine, which is over 100 years old and still working. The nearby early 19th century maltings, associated with the mill, are Listed separately – but as a "warehouse". The bakery, a later, but integral, part of the same group is not mentioned.

Kington, Hergest Mill

For the interior the Listing schedule reads: “retains 2 vertical shafts and lower stones” whereas both sets of machinery are almost complete, and one set is of particular historic interest.

Kington Laundry and Border Cleaners (Kington Foundry)

The complex is now a series of industrial units with some domestic conversion. The “altered openings under stone segmental arches (probably former wheel races)” were not former watercourses.

Leominster, Cholstrey Mill

The schedule reads “Covered leat runs for approx 25m to stream; sluice with cast-iron gate and mechanism on north bank.” The leat to the mill was an open one, but it has been in-filled during the course of this survey and the cast-iron gate and mechanism has been demolished.

Lingen, Limebrook Mill

This building is Listed under Wigmore parish but is in the parish of Lingen. It is stated as being “Mill, now house” whereas it should be “mill and house”. The mill is not part of the house and, although the waterwheel has been removed, all its internal working parts are still complete and untouched.

Recommendations for comparable projects elsewhere:

Locating water-powered sites in the study area was from a combination of known locations from the Historic Environment Record together with others from the writer’s own research and recording work carried out prior to this pilot study. This has been a successful combination and has shown significant omissions in the HER.

The series of site maps supplied by Herefordshire Archaeology and Archives proved invaluable. Since this was only a pilot study, however, the four editions of the 1:25000 map were more of interest than of use. The first edition, together with the modern large scale map with National Grid co-ordinates, however, are essentials for any similar project.

The fieldwork and recording was straightforward, although the time taken was longer than had been anticipated. A combination of difficulties with obtaining the necessary permissions, more detail being required than had been expected, adverse weather conditions and personal health problems all extended the time being taken. In addition the allotted time for Herefordshire Archaeology and Archives was insufficient. The combination of these factors showed that the budget for a similar project would need to be increased significantly.

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Fig. 2. Aymestrey Mill, Aymestrey; a very long oblique weir.



Fig. 3 Mortimer's Cross Mill, Lucton: a massive weir almost straight across the river.



Fig. 4. Crabtree Mill, Kington: a beautifully constructed, ancient oblique weir.



Fig. 5. Newchurch Mill, Kinnersley: the mill ruins tucked under the dam.



Fig. 6. Risbury Mill, Humber: the massive bank supporting the leat.



Fig. 7. Whyle Mill, Pudleston: the leat on the left, a landscape feature, looking downstream.



Fig. 8. Court of Noke, Pembridge: The house & water gardens with the mill to the left.



Fig. 9. New Mill, Pembridge: the most powerful mill in the area.



Fig. 10. New Mill, Pembridge: sluices controlling water for the mill, with a minor one for water meadow irrigation.



Fig. 11. Wegnall Mill, Rodd Nash & Little Brampton: the re-boarded timber-framed mill.



Fig. 12. Wegnall Mill, Rodd Nash & Little Brampton: the low breast-shot waterwheel.



Fig. 13. Staunton Mill, Staunton on Arrow: 18th & 19th century machinery.



Fig. 14. Court of Noke Mill, Pembridge: mid 19th cent. machinery - to chaff-cutter to right and drive to millstones at left.



Fig. 15. Burton Court Pump-house, Eardisland: waterwheel and pump, with their successor!



Fig. 16. Croward's Mill, Eyton: 18th & 19th century machinery.



Fig. 17. Croward's Mill, Eyton: the waterwheel.



Fig. 18. Edwyn Ralph, Buckenhill Mill: leat



Fig. 19. Court of Noke, Pembrokeshire: pair of weirs. The upper one feeds Court of Noke water gardens & mill to the left of the photograph, and the lower weir fed a leat to the right for the waterwheel at Leen Farm, Pembrokeshire.



Fig. 20. Staunton Mill, Staunton on Arrow: the leat with the mill buildings in the distance



Fig. 21. Wegnall Mill, Rodd Nash & Little Brampton: 18th cent. machinery on the stone floor.



Fig.22. Forge Mill, Pembridge: the converted mill and the outbuildings.



Fig. 23. Riffin's Mill, Bodenham: machinery in ruins of mill, waterwheel to right-hand side.



Fig. 24. New Mill, Monkland & Stretford, the converted buildings.



Fig. 25. Burton Mill, Eardisland: front of mill with dwelling behind.



Fig. 26. Burton Mill, Eardisland: 18th century crownwheel & upright shaft.



Fig. 27. Thornbury Mill, Thornbury: the attractive group.



Fig. 28. Staunton Pump-house, Staunton on Arrow: the waterwheel



Fig. 29. Day House, Kingsland: the aqueduct across the River Lugg, with the farm mill and the waterwheel in the background.



Fig. 30. Aymestrey Mill: front of mill.



Fig. 31. Aymestrey Mill: late 19th century millstone furniture.



Fig. 32. Arrow Mill, Kingsland: the mill and waterwheel.



Fig. 33. Arrow Lodge Mill, Kington: the complex from the leat, with the mill to the right, the bakery in the centre and the maltings to the left.



Fig. 34. Parkstile Mill, Kington Rural: the front of the mill, with the drying kiln to the left.