

# **HUDLEY MILL CHARLES, DEVON**

## **REPAIR AND MANAGEMENT PLAN FOR THE WATERWHEEL, LEAT AND MILL POND**

**July 2010**

**Martin Watts**

1 Trinity Cottages  
Cullompton  
Devon  
EX15 1PE

**Project HMC 183/2009**

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### Summary

*Hudley Mill, Charles, worked as a corn mill from at least the early 17th century to about 1920. A salvaged iron waterwheel was installed in the 1940s to drive a generator for producing electricity for the mill cottage. The waterwheel and generator were last used in about 1987. The waterwheel is at present in a decayed state and the leat and mill pond which supplied it with water are silted and overgrown. This report sets out to describe the background of this site and its present condition, and to put forward proposals for the repair, reinstatement and future management of the hydraulic system and waterwheel.*

### Introduction

This report has been compiled to form a repair and management plan for the hydraulic system and waterwheel at Hudley Mill, Charles, at the request of the property owners. It is based on the project design prepared for Natural England.

Hudley Mill has been run as a smallholding, specialising in sheep and wool, since 1991. The farm is in the Countryside Stewardship agri-environmental scheme and the following assessment of the hydraulic features and waterwheel form part of this management, CSS reference 19CSS010819.

A preliminary visit was made by Martin Watts on 17 March 2010 and a detailed visual non-intrusive survey was carried out by Martin and Sue Watts on 12 May 2010. Background and other relevant information have been compiled from a variety of sources, which are referenced and acknowledged.

A copy of the site record and photographs will be deposited with the Museum of Barnstaple and North Devon, under accession number NDDMS 2010.19. A digital copy of the report will be uploaded onto the OASIS (Online Access to the Index of archaeological investigationS) database under the reference martinwa1-75244.

### Location

Hudley Mill is situated on the west side of the small historic parish of Charles, at the bottom of Hudley Mill Hill, NGR SS 678 325. The mill is located to the north-west side of the road, with the mill house and outbuildings on the opposite side of the road, to the south-east (Figure 1). The buildings are sited on the east bank of Thorne Water, a tributary of the river Bray, which forms the parish boundary between Charles and East Buckland. The height of a bench mark on the mill is given as 154.2m above Ordnance Datum.

The underlying geology is Pilton shales of Devonian age, comprising sandstones and shales, which are divided from Baggy sandstones to the south-west by a fault line that runs along the valley bottom (Institute of Geological Sciences, Geological Map, 1982, 1:50,000 sheet 293). In the 1880s the soil was described as light and good, with skillett rock subsoil; the chief crops were oats, roots and pasturage (Kelly's *Directory* 1889).

### Historical summary

Charles is recorded as *Carmes* in Domesday Book, when it was held by Robert of Pont-Chardon from Baldwin, the sheriff, who held a large amount of land in Devon (Thorn and Thorn 1985, 16.71). The earliest known reference to *Huddeleyg* is in 1306. The place-name is a personal name + leah, meaning ‘Hud(d)a’s clearing,’<sup>1</sup> (Gover *et al* 1931, 62).

The earliest indirect reference to a mill in the parish so far found dates from 1601:

“Charells. A true certyfycat of all the Glebe land belonging to the Rectory, and also who ys Patron. Ao Dni 1601. ...There is belonging to the same Rectory, by estymacon thes manye acres as followeth:- Towe meadows by estimacon some three acres, on[e] called Dybbwyll, the other the medowe by the Mill... John Blake, Rector.”

(WSL parish cuttings file, A7, typescript copy of document, unprovenanced)

This would appear to refer to Hudley Mill, from the proximity of glebe lands to the mill site, which is confirmed by the tithe map.

The following is a summary of the historical information directly concerning the mill, arranged chronologically, from sources as acknowledged:

- 1617 Grant of Hudley Mill by John Wright, of Gray’s Inn, and Haar (sic) Payne, his servant, to Ralph Davey, yeoman, of Barnstaple (JU)
- 1648 Lease of Manor and Lordship of Charles ‘and all that tenement and Grist Mill with the appurtenances commonly called or known by the name of Hudley Mill... and all and every the soke mulecture gristolle customes waters and watercourses attachments of water streams dames pools and commodities and appurtenances to the said Mill...’ (DRO 1148 Ma/L11/5)
- 1688 William Buckingham, miller, and sister Mary lease the Hudley Mill for 99 years or three lives, at an annual rent of 6s 8d (DRO 1148/Ma/L11/27a)
- 1689 On 23 August the manor court had before them ‘Lawrence Lavercombe of the parish of Charles for turning out the water of its course on Moccombe Down within the said parish and not suffering it to run to the Mill called Hudley Mill in the said parish’ (DRO 1148/Ma/9/3a(i))
- 1713 Assignment of Hudley Mill and Water Parks between John Stevins and Elizabeth Watson to John Jone of Landkey. Refers to suit and grinding all his and their corne and grain that shall be grown and spent (?) in and upon the demised premises to and at the mill within the aforesaid manor of Charles’ (HM deeds)
- 1732 Assignment of the Manor of Charles, excepting ‘the Water-Grist Mills called Hudley Mills and the Cottages Houses Gardens Orchards and four severall pieces of Ground adjoining or near to such Mills sold to the said William Bennett’ (DRO 1148 Ma/7/4)

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<sup>1</sup> Hud(d)a is an Old English personal name, which strongly suggests that a place bearing this name would have been established before 1150, possibly even before the Norman Conquest (Fox 2006, xii).

- 1742 John Smyth purchases Hudley Mill, Water Parks and other land from William Bennett, for 99 years and the remainder of 2000 years. The property remained in the Smyth family until 1920 (JU)
- 1841 Christopher Colman (?), miller (Census)
- 1842 Tithe award: Hudley Mill, a holding of 13a 0r 33p, owned and occupied by John Smith Senior (who also held the adjoining Water Park, 28a 3r 21p) (DRO)
- 1851 William Huxtable, miller (Census)
- 1855 Agreement to partition lands, Smyth family (NDRO 2309-3/41/10)
- 1857 Richard Smyth, miller (Directory)
- 1861 John Procter, miller (Census)
- 1871 Edwin Gay, miller; William Brookes, farmer (Census)
- 1878 'In the High Court of Justice, Chancery Division... Smyth v Smyth... Auction... Lot 2. Two farms (now forming one estate) with water grist mills, called 'Higher and Lower Water Parks' and 'Hudley Mill' situate in the parish of Charles... 42a 0r 14p... arable, meadow and pasture land... convenient dwelling house, with stables and cattle sheds, a water grist mill, having a good stream of water, with an overshot water wheel driving two pairs of stones. The buildings are stone and cob built, and for the most part covered in thatch... in the occupation of Mr William Brooks and his under-tenants... aggregate rental £72, of which £70 shall belong to this lot...' (*Exeter Flying Post*, 31 July 1878, 1d. Bodman 2003, 297)
- 1881 James Woollacott, farmer of 42 acres (Census)
- 1889 Levi Woollacott, miller (Directory)
- 1891 Levi Woollacott, miller (Census)
- 1892 Indenture between Eleanor Loosmore and Robert Woollacott, refers to 'all that messuage tenement Farm and Water Grist Mills called Hudley Mills', includes liability for repairs to the mill, except the external walls and slate roofs, and finding timber for the waterwheels and also repairs to the thatch, doors and floors of the dwelling (HM deeds)
- 1893 Levi Woollacott, miller (Directory)
- 1902 Levi Woollacott, miller (Directory)
- 1906 Levi Woollacott, miller (Directory)
- 1920 8 October: John Smale FAI, to sell by auction at Bridge Hall, Barnstaple, on Friday 22 October:

Lot 1. – FREEHOLD FARM, known as “HUDLEY MILL,” in the Parish of Charles, comprising:- Dwelling-house, Slatd Mill, Water Wheel, conveniently-arranged Outbuildings, and about 41a. 2r. 35p. of superior Meadow, Pasture, and Arable Lands, all within a ring fence, adjoining good roads, well watered, southern aspect, as now in the occupation of Mr. John Woollacott as a Lady-day tenant.”

*North Devon Journal* (unprovenanced cutting in parish file, NDLSC)

22 October: Condition and contract of sale of Hudley Mill, purchased at public auction by John Woollacott, of Middle Cottage, East Buckland, for £1550

24 December: Henry Smyth Gibbs to Jane and Susan Woollacott, Hudley Mills and Water Park; reference to water wheel (HM deeds)

1930 John Woollacott, farmer (Directory)

1948 Jane and Susan Woollacott sell property to Mr and Mrs Stockley for £3250 (JU)

c.1949 Probable date of installation of present waterwheel and generator (see below)

1987 Waterwheel stopped being used regularly

1991 Hudley Mill purchased by the present owners

### **Description of the water supply system**

The water supply for Hudley Mill is taken off the Thorne Water, a tributary of the river Bray. The stream, which is about 6km long, rises on the south side of Mockham Down and runs slightly east of south to join the river Bray near Blakewell Bridge. For nearly all of its length the stream forms the parish boundary between Charles (on the east) and East Buckland (on the west) and historically was also the boundary between the Hundreds of Shirwell (east) and Braunton (west). The leat, which is taken off the east side of the stream, is about 350m long. Its course is shown on the Tithe Map (Figure 2) and the Ordnance Survey map (Figure 3). It is a good example of a contour leat, cut into the natural slope of the hill side and following the curve of the hill just below the 160m contour. The leat is embanked on the stream side, presumably originally using the upcast from its excavation and subsequently made up with silt and material taken out of the leat during cleaning. This would have taken place regularly, perhaps on an annual basis.

The entrance to the leat is now poorly defined, with islands of alluvial deposit and some fallen trees dividing the stream into several channels, obscuring the area where a weir structure would have been. There is no clear evidence of a weir, other than some large stones in the stream bed. A sluice is marked at the leat entrance on the 1:2500 Ordnance Survey map (Figure 3). Water was taken from the stream at a natural bend in its course, a familiar feature, which allowed the main flow of the stream to be directed straight into the leat entrance. The leat entrance channel, which is about 1.2 – 1.3m wide, is now silted up. Working downstream from the entrance, there is about 3m of stone revetment on the west side, then a stone reinforced post and plank structure for 2.6m, with masonry wall 0.8m thick behind. About 8m down from the entrance is a narrow pipe-like opening about 0.4m wide, through a stone wall which is about 1.2m thick. A smooth vertical groove on the west side of this opening suggests that it could have been closed with a vertical sluice,

perhaps a metal plate, dropped in to stop flow into leat. No evidence of the remains of a gate or any control gear was noted. On the downstream side of the wall the leat widens out to about 1.6m. Its course has undercut the bank on the east side, where there are the remains of some stone revetment, which has mostly collapsed and fallen away. On the west side is an eroded stone wall which forms a spill weir, about 4.5m long, with an open channel on its west side running back to the stream.

The upper section of the leat, which is fairly straight for about 100m, is generally about 1.3 to 1.5m wide, with the raised bank on the stream side, which is about 1.8 to 2.0m wide, standing about 0.5m high over leat fill. This bank provides a means of foot (possibly small vehicle) access along the course of the leat. On the north-east side of the leat course is Parsonage Wood, with trees growing down to the leat side, where recent felling, trimming and clearance is in evidence. The bed of the leat is filled with silt and leaf mould to a depth of 15-20cm at its upper end. At the south end of Parsonage Wood the leat curves round the natural slope and narrows to about 1.2m width. Where the course of the leat starts to run in an easterly direction, the slope on the north side becomes less and there appears to have been a significant breach on the stream side, where the top of the bank is noticeably lower for about 18m. Where a field boundary approaches the middle section of the leat from the north-east, the north bank of the leat is less well defined, where a track comes down, possibly due to a former use for watering livestock. From this boundary the leat runs eastwards and the mill becomes visible. The channel is deeper and narrows to about 1.3m wide. The bank on the north side becomes steeper and better defined and the top of the built up bank on the stream side narrows to about 1m wide, rising to about 2m above the meadow. There are more standing mature trees along the north side of this final section. As the leat approaches the pond it widens and the outer bank becomes lower and wider. The final section of the leat has stone revetting on the south side. The leat terminates above an un-mortared rubble stone weir and a by-pass spillway close to the west of end of pond. The weir has a flat stone top, 5.5m long by 0.65m wide, and the leat channel is about 1.3m wide. The spill weir has a vertical drop of about 1m to a masonry ledge, then an irregularly stepped descent down to an open channel that runs south back to the stream.

A second stream, which runs down a narrow combe from Grange Farm, enters the north-east corner of the mill pond (Fig.1). This is a natural watercourse, supplementing the supply of water to the mill, whereas the leat is a man-made feature.

The mill pond is roughly triangular in shape, with its apex at the south (mill) end. It is about 20m wide by 40m long. It is heavily silted up, with grass and reeds growing out of a large silt island. There is vertically pitched stone walling at the north-west corner, where the bank of pond curves towards the leat entrance. The south-west side of the pond is defined by a well developed slightly curved top grassed bank. The mill end of pond is about 2.2m wide, with a single brick wall inserted across it, with a sluice gate, close to the side of the road. The sluice opening is 0.38m wide, with a vertical metal gate in a 7.5cm steel angle frame. The gate, which is a piece of steel plate, is raised and lowered on a single screw. It is in a reasonable condition. The water in the pond was standing to a depth of 0.65m over the cill of this sluice. This depth also reflects that of the silt at this end of the pond. Immediately downstream of the sluice gate is a decorative cast-iron grille set in the ground over the channel. It is understood that this was put in by the present owner.

From the end of the pond, the leat is culverted for about 3m, emerging in a narrow channel 0.45m wide by 0.35m deep, the west side formed with concrete slabs. This channel is about 5.3m long, with a second iron sluice, which is no longer complete or functional. This is at the upstream end of a spillway, a rock-cut channel that allows excess water to run back westwards to join the overflow channel from the spillway at the end of the leat (Figure 1). On the downstream side of the spillway is a small timber guillotine gate, raised and lowered by a metal lever, fixed to two 10cm square oak posts set 0.91m apart. There is a timber footbridge over the top of the spillway channel. Beyond the spillway the water runs in an open channel 3.5m long, 0.5m wide with up to 0.35m deep sides. At the south end of this final section is the timber launder, which carries the water onto the top of the waterwheel.

The present launder is a timber trough about 6m in length, which falls at a slight angle from the leat end to the top of the waterwheel. The trough is 0.7m wide overall with 18cm x 4cm timber sides, 15cm deep internally. It is made with single side boards nailed to 15cm bottom boards, which run lengthways. The launder is supported on 3 steel channels, 15 by 7.5cm section, the inner ends of which are built into the pit wall and the outer ends are supported by piers. The piers are of cast concrete; the outer and downstream faces of the lowest pier have been faced in stone (since 1990). Each of the three channels appears to be set at a slightly different height, so there are timber blocks between them and the underside of the trough. A small amount of water still runs along the launder, which has plants and moss growing in it. Although it has been lined with roofing felt to make it more watertight, the timber structure and packing is saturated and the steel channels are wet, but appear in fair condition.

The wheelpit is about 1.25m wide. On the outer side, 0.92m downstream of the wheel, is a cast concrete bearing base, with part of a cast-iron bearing pedestal still loosely in place on it. The rubble stonework of the outer wall of the wheelpit has partially collapsed and there is a build up of silt in the bottom of the wheelpit downstream of the wheel. From the south end of the wheelpit the tailrace is culverted under the road, emerging under a low arched opening at the west end of the barn opposite. The tailrace course appears to run in a fairly straight line, water flowing back into the stream via an open channel on the downstream side of the road bridge. The condition of culvert was not examined, but a small amount of water appeared to be flowing freely through it.

### **Waterwheel**

The water wheel is overshot, 3.66m (12 feet) in diameter by 0.91m (3 feet) wide. It is of iron construction, with timber buckets and sole boards. It is of relatively light construction and stylistically of late 19th century date. The use of hexagonal-headed bolts and nuts reflects its rebuilding at Hudley Mill in the second quarter of the 20th century. The cast-iron shrouds are formed of 6 segments each side, joined midway between the arms with a lap plate with 2 bolts. The shroud sections are 225mm deep, with integrally cast flanges to carry 36 timber buckets and 2 cross tie rods between each pair of shroud castings. The buckets are elbow-shaped, each formed of 2 boards, with timber sole boards bolted to a return flange on the inner circumference of the shroud castings. The existing buckets, which appear to be elm, are now in a poor state; some boards are hanging loose and others are missing. Some relatively recent repairs have been carried out on the buckets, using stainless steel fastenings which have far outlasted the timber. The wheel has 2 sets of 6 flat steel arms, 75mm x 16mm (3 x  $\frac{5}{8}$  inch) section, which are located and bolted at their outer ends into integrally-cast pockets on the outer face of the shrouds. The



inner ends of the arms are bolted into pockets in the circular cast-iron naves, which are about 0.66m in diameter by 16mm thick. Each nave is fixed to the wheelshaft with a single key. The wheelshaft is of iron or steel, about 108mm (4¼ inches) diameter. The outer journal, which is slightly worn, is about 83mm diameter by 270mm long, and runs in a plain bearing. The inner bearing is set in the pit wall (see below).

### **The mill building**

The mill is a rectangular plan building, orientated south-west – north-east. Its south-east wall fronts the road, with the wheelpit and waterwheel on the north-west side. It is approximately 13m long by 5.5m wide and contains two floors and a loft. The walls are of random coursed rubble stone, with brick-arched heads to the ground floor and gable end door and window openings. The window openings have slate cills and the doors and windows are of timber. The gable roof is slated, with red clay ridge tiles and timber barge boards at both gable ends, which return over the slate verges. There are three rooflights in the rear (north-west) slope (inserted post 1990) and a good decorative weathervane towards south-west end of roof (also post 1990). There is some evidence of straight joints and stonework repair in the pit wall, which is discussed below. Above the downstream end of the launder, a timber block built into the wall indicates the position of an earlier penstock control, for controlling the flow of water onto the waterwheel. The general appearance of building is late 19th century. The building envelope is maintained in good condition.

Internally the ground floor of the mill is completely divided off at its downstream end by a rubble stone cross wall, the end room being entered through a stable door on the road side. A second door gives access to the ground floor of the mill, which has a stone-flagged floor on the south-east side. There is an area of concrete flooring along the north-west wall, where the hurst frame and corn milling machinery would have been located, with cast *in situ* concrete bases that support the drive from the waterwheel and the generator. The internal walls are whitewashed stone.

The masonry of the pit wall has collapsed where the inner end of the wheelshaft enters the mill and is supported in a bearing in the pit wall, the bearing at present being partly covered with loose rubble and mortar. There are no lintels to support the masonry of the wall above the inner bearing position.

There is a flight of timber steps up to the first floor from just inside the mill door. The first floor is a suspended timber floor, with softwood boards on joists. There is also a short exterior flight of stone steps leading up from road level to the first floor of the mill at the north-east end. A flight of timber steps leads from the first floor to the loft, which is also a timber floor with boards on joists. At the downstream end of the building the roof is of two bays with a central truss; the main mill roof is 4½ bays, defined by simple timber trusses, some with collars. The pitch of the roof is 45 degrees.

The ground floor of the mill is currently used for storage of hand tools and other equipment, the first floor for wool processing and the loft for storage.

### **The working parts**

The corn milling machinery has been almost completely removed, the only surviving evidence for this phase of use being a timber sack hoist drum and belt pulley in the roof space and the sack traps in the floors. Several displaced millstones also remain on site.

These include a 1.22m diameter conglomerate former bedstone, leaning against the south gable of the mill, and two reconstructed 1.22m diameter French burr stones (one a former runner stone) set in the paving outside the house (see photographs). The dressing on these stones is a typical 19th century pattern, for anti-clockwise rotation. The present waterwheel was installed to drive a generator, for a domestic electricity supply, and the two-step chain and belt drive and generator remain in place and are basically intact, although some of the drive chains are displaced. The generator casing has 'LSE' embossed on its top. The bearings for the drive shafts and the generator are mounted on cast *in situ* concrete blocks and there is an angled steel stay which runs from the inner end of the wheelshaft towards the upstream corner of the ground floor of the mill. The generator and drive are now enclosed in a timber stud and batten framework.

### **Dating and discussion**

Hudley Mill appears to have been the historic mill serving the manor and parish of Charles. Although it does not appear in the documentary record until the beginning of the 17th century, the 1648 lease indicates that it was then the manorial mill, with established rights of custom and toll-taking. This suggests that it is likely to be of earlier foundation, so evidence for its existence in the medieval period may yet be found.

The leat that feeds Hudley Mill is a typical contour leat, of which many examples formerly existed in Devon and elsewhere. The millpond is a less common feature in Devon, perhaps indicating that a reservoir was required to store water for the use of the mill in times of low flow. While the leat is likely to be an original feature, dating from the establishment of the mill, the age of the pond is more difficult to assess. Neither the leat nor the pond are shown on the Ordnance Survey surveyor's 2 inch to 1 mile scale drawing of 1804 (North Molton sheet, OSD 33, British Library online gallery, accessed 11 July 2010) although this does not give particular detail. The stream that flows from the north-east is shown on this drawing, however. The tithe map of 1842 (Figure 2) shows a rectangular plot, 706, which is listed as Mill Pond in the apportionment, where it is described as 'waste', with an area of 1r 20p (0.375 acre). The triangular shape of the pond is recorded on the first edition Ordnance Survey 1:2500 map of 1889 (Figure 5) where its area is given as 0.149 acre. While this seems to imply the present pond was constructed or re-configured between 1842 and 1889, the topographical accuracy of the tithe map cannot be relied on. The relatively steep slope of the valley side below the present pond bank and the lack of evidence of any other embanking would seem to confirm that the millpond cannot formerly have occupied a larger area than it does now. This suggests that the tithe map surveyor simply drew the whole area comprising the pond and the triangle of land between the overflow and spillway channels as one plot which, as waste, had no particular significance for the survey.

The 1732 assignment refers to water grist *mills*, implying more than one set of millstones, or, quite possibly, two waterwheels. The proportions of the mill building on plan and visible breaks in the masonry of the wheelpit wall, including a possible former opening for the shaft of a second waterwheel downstream of the surviving wheel (Figure 7) suggest that the mill may at one time have had two overshot waterwheels in line, a once familiar arrangement in Devon. By 1878 there was a single overshot wheel driving two pairs of millstones, but it appears likely that the mill was, or had recently been, rebuilt about this time. The 1892 indenture indicates that the mill had a slate roof, although the mill house was still thatched.

A waterwheel is still referred to in 1920 and, from trade directory evidence, it appears that the mill stopped work as a grist mill during the following decade; a note dated 1974 (see Appendix B) states that the mill last worked ‘in about 1930’. Presumably the waterwheel which was last used to drive corn milling machinery was either subsequently removed or had decayed beyond repair, to be replaced by the surviving waterwheel. The date of installation of the present wheel is uncertain. E.J. Cotsford says ‘1930s’, whereas the 1994 survey of North Devon watermills gives 1949. The generator is understood to be a re-used searchlight generator, so a date of installation in the immediate post-war period appears more likely than the 1930s. All three published accounts (Appendix B) state that the present wheel came from Low or Lower Hall, High Bray and the whole set up at Hudley Mill appears to be contemporaneous. The wheel at Lower Hall or Hole was a farm wheel installation, the power being used for threshing and chaff cutting (U3A 1995, 73-4; DCC HER Monument 54320). The waterwheel is probably of late 19th century date, having design and constructional features similar to other known waterwheels that were produced in Barnstaple between about 1880 and 1920. The castings do not appear to be signed or dated. Cotsford states that the wheel was moved ‘by a Mr Darch of Landkey’ and it is of interest to note that Town Mill, Landkey, which was owned by the Darch family from the 1870s until 2009, has an overshot waterwheel which latterly drove a small generating plant that also dates from the 1940s. Both of these installations represent an interesting local example of mid-20th century use of existing water-power systems for the production of small scale domestic electricity, using surplus war-time generators to provide a DC supply.

When first visited by the writer in 1990, the present wheel was still capable of turning by water, although it was then understood not to have been run regularly for about three years. This is confirmed by Caroline Norman (1989, 21), who states ‘it was only in 1987 that the wheel stopped being used to produce electricity for the cottage.’

### **Statement of significance**

The small complex of buildings that comprise Hudley Mill, approached down steep and narrow lanes from the east, from Charles, with the mill pond clearly visible at the side of the road, or the west, from Middlecot, form an important and unspoilt element in the local landscape.

The survival of the hydraulic system – the leat, mill pond and tail race – in a restorable condition, is of considerable value, both as a means of controlling and managing the water supply and making use of it, and also as a visual and wildlife amenity.

The mill building represents a feature that has been part of the local landscape for at least 400 years, and probably since the later Middle Ages. The survival of a waterwheel with an improvised drive to a generator that was introduced to supply electricity before a mains supply was available represents an interesting chapter in the use of water-power on this site.

There are now few working or workable waterwheels surviving in North Devon. The wheel at Hudley Mill is within economic repair to turning and working order. The potential of using the water-power for small scale energy production also remains and the current proposal to carry out work on the leat, pond and waterwheel are simply continuing an established tradition.

### **Results of condition survey**

The main areas where repairs and remedial work are required, identified by the site survey, are summarised as follows:

1. Leat: reinstatement of weir; re-establishment of entrance; repair and reinstatement of water controls (spillways and sluices); removal of overgrowth, debris and silt
2. Mill pond: removal or reduction of silt; overhaul water controls
3. Launder: renewal of structure and reinstatement of water controls to wheel
4. Waterwheel: overhaul bearings; cleaning and conservation of iron structure; complete renewal of timber buckets and sole boards
5. Wheelpit: removal of silt; masonry repairs
6. Mill building: structural repairs to masonry of mill wall at shaft entry point

### **Summary of guiding principles**

When considering repairs to waterwheels and historic machinery, the following general principles are considered to be appropriate:<sup>2</sup>

- All repair work should be carried out with the primary aim of conserving the visual appearance and the functional and historical integrity of the machinery.
- Historic machinery is the product of functional evolution and contains features of particular historic interest and importance. Great care should be taken, therefore, to avoid unnecessary disruption and to retain as much as possible of the historic fabric. New work should be fitted to the old, rather than the old being altered to accommodate the new.
- Damage to historic fabric is different to damage to new work; it cannot simply be rectified by replacement, because original features are no longer so if they are renewed.
- Particular attention should be paid to detail and the use of good, traditional and compatible materials and methods. Observation of existing methods of construction, fixings and finishes (where original examples survive) is important in determining how to conserve historic machinery, to ensure the retention and survival of specific local or regional millwrighting and engineering details and traditions.
- Any renewal of timberwork should be carried out using good quality timber of the same dimensions, section and, if possible, species as that being replaced.
- Any strengthening and/or renewal of parts that is necessary for machinery to be maintained in a safe condition, whether static or working, should seek to use

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<sup>2</sup> A general *The Philosophy of Repair* for watermills and windmills has been issued by the Mills Section of the Society for the Protection of Ancient Buildings. The Mills Section publication *Some Principles and Practice in Watermill Repair* (1994 and subsequent editions) which may also be consulted.

traditional solutions that properly reflect the history and development of the machinery.

- Fixings and fastenings should be of traditional form and of the correct diameter and proportions for millwrighting work. The use of threaded bar, or studding, for bolts and tie rods in waterwheels and other moving parts is not recommended, as it has poor lasting qualities and, if used to join timber and iron components that are likely to flex or move whilst turning, a fully threaded fastening will cause rapid enlargement of bolt holes, with resultant instability of the wheel or machinery. Bolts of the correct diameter, with plain shanks, should therefore be used.
- On no account should historic timber surfaces be subjected to grit blasting, as this destroys patina and surface features. Grit blasting can also be damaging to weathered metal surfaces and can remove the stable surface patina from iron castings.
- Treatment of rusted ironwork should be restricted to cleaning off loose and scaling surfaces and coating with a water-resistant rust inhibitor, such as Finnegan's *Waxoyl* (in dry locations) or an appropriate paint system. Paint finishes should however only be applied where there is clear historical precedent. New paintwork should match the original colour and finish as closely as possible.
- Bearings should be retained or replaced in their traditional form. The provision of lubricators or remote grease points for bearings in locations that may be difficult to access once the waterwheel or machinery is turning is considered to be acceptable practice.
- A particular feature of millwrighting work is the need to allow for adjustments to be made, both when setting up and working machinery. It is important therefore that all wedges and fittings are in good condition and capable of being altered or tightened as/when such a need arises.
- It is considered that the majority of the repair works at Hudley Mill can be carried out *in situ*, without any need for major dismantling or the removal of the waterwheel from the building. Where any dismantling is necessary it is important to mark all parts for correct re-assembly.
- It is recommended that work to waterwheels and historic machinery should be carried out or supervised by a specialist or specialists with relevant experience and competence
- Stonework repairs and re-pointing should be carried out using lime-based mortar of an appropriate mix and colour. Hard cement-based mortar must be avoided.

## **Outline schedule of work**

Note: work is not necessarily listed in the order in which it may be carried out

1. Weir
2. Leat entry
3. Leat clearance
4. Repairs to banks
5. De-silting of mill pond
6. Overhaul sluice gates and controls
7. Clear channel from pond to launder and area around waterwheel and wheelpit
8. Remove silt from wheelpit and tailrace culvert
9. Repair stonework of wheelpit wall downstream of waterwheel
10. Dismantle existing launder
11. Remove remains of existing buckets and sole boards to wheel, including fastenings
12. Rebuild and repair stonework of pit wall around shaft opening position
13. Open up and overhaul bearings, allowing for new shells and work to journals
14. Overhaul, clean and paint iron structure of waterwheel
15. Supply and fit 36 new timber buckets and sole boards, including new fastenings and cross tie rods
16. Construct and set up new timber launder
17. Prove system and run wheel by water

## **Impact assessment**

The most significant areas of impact resulting from the proposed works are likely to be the reinstatement of the leat entrance, water controls – sluices and spillways – and the removal of silt from the leat and the mill pond.

The Environment Agency has recommended the installation of a fish screen at the leat entry and a gauge for measuring the flow in the leat.

The renewal of the launder and the work to the waterwheel will have a visual impact, but new work will soon weather down.

Masonry repairs and re-pointing of the mill pit wall and the outer wall of the wheelpit will, if carried out using appropriate mortar and masonry techniques, have a limited visual impact and will ensure the stability of these structures for the future.

## **Future management and maintenance**

With regard to the hydraulic system and working parts which are within the scope of this report, the following management and maintenance issues need to be considered:

1. Maintenance of weir structure, leat entry sluice gates and water level controls
2. Maintaining clear access along the course of the leat
3. Clearance of overgrowth from the banks of the leat
4. Maintaining water flow along the leat, including periodic removal of silt and debris
5. Monitoring and periodic removal of silt from the millpond

6. Maintenance and lubrication of sluice gates, water controls, etc.
7. Maintenance and clearance of by-pass and spillway channels
8. Maintenance of launder, including caulking and checking tightness of fastenings, particularly after prolonged periods of dry weather
9. Regular lubrication of waterwheel shaft bearings
10. Checking waterwheel buckets and re-fixing or replacing loose, broken or damaged bucket boards
11. Maintaining clear outflow of water from the wheelpit, via the tailrace, back to the stream
12. Maintenance of fences, gates, barriers etc. adjacent to watercourses, millpond and waterwheel

### **Requirement for further work**

There is always the possibility that further historical information may be found which can confirm a more precise date or period for the establishment of Hudley Mill, although the available records and sources have been investigated quite fully.

It is also likely that more information may be forthcoming with regard to the installation of the present waterwheel and generator.

It is possible that further details of the waterwheel, including evidence of its manufacturer, may be found when it is cleaned down for repair and replacement of the buckets. Any such additional information should be recorded as appropriate and added to the site archive.

Martin Watts

Draft: June 2010

Revised: July 2010

### **Acknowledgements**

I am grateful to the property owners for their hospitality and for providing much useful background information; to Martin Bodman, for making available copies of his research; and to Sue Watts, for her help with the site survey and in the preparation of this report. I am also grateful to Joy Ede and Rob Dixon of Natural England for their comments on the draft of this report and useful discussion on site and to Andrew Charles of Devon Wildlife Consultants for information concerning the ecology and management of the leat and pond system.

## Sources and bibliography

### Primary sources and archives:

|          |   |
|----------|---|
| DCC HER  | Devon County Council Historic Environment Record, Exeter  |
| DRO      | Devon Record Office, Exeter   |
| NDLSC    | North Devon Record Office and Local Studies Centre, Barnstaple  |
| WSL      | Westcountry Studies Library, Exeter   |
| HM deeds | Original deeds held by the owners   |
| JU       | Notes from research made from deeds and other records by John Usmar of Witheridge, December 1995, kindly made available by the owners |

### Secondary sources:

- Bodman, Martin. 2003: *Watermills and other water-powered sites in Devon* (unpublished: copy in WSL), 297
- Cotsford, E.J. not dated [1984]: *Local History of Charles*
- Joyce, Walter W. 1937: *The Moorside Parish of Charles* (Exeter)
- Norman, Caroline. 1989: *Charles was once a prosperous village, so why has it declined over the years?* (unpublished GCSE Local History Personal Project, copy in NDLSC)
- Thorpe, Josephine, editor. 1989: *North Devon Watermills* (Barnstaple)
- University of the Third Age. 1995: *Watermills in North Devon 1994* (Ilfracombe)



## **Appendix A**

### **Environment Agency comments and Abstraction Licence**

A letter from the Environment Agency to the present owner dated 11 November 2009, states that ‘the watercourses in question are classed as ‘Non-Main River’ and that no formal permission, in terms of flood defence consents are required for the proposed works. Six points concerning water control and silt management were put forward for consideration.

A Licence to Abstract Water, number 14/50/08/0741, dated 2 July 1991, was granted to Hudley Mill for power generation for domestic purposes. The quantity of water authorised to be abstracted was set at 3,456 cubic metres (760,216 gallons approx) per day, with a total of 1,064.418 cubic metres (234 million gallons approx) per annum at a rate not exceeding 0.040 cumecs. The authorised means of abstraction is by use of the leat. A further condition of the licence was that a suitable calibrated apparatus or device should be provided and installed by the licence holder, to measure the amount of water abstracted.

## Appendix B

### Published sources on Hudley Mill

#### “ 38) HUDLEY MILL, CHARLES SS 678324

The overshot water wheel, which came from Low Hall, High Bray, is constructed of cast iron with wooden buckets. It is 12 feet in diameter by 3 feet wide and in fair condition. The machinery has gone, apart from one millstone *in situ*. There is a dynamo. The mill was served by a leat and mill pond, with water being taken from Thorne Water. There is believed to be a lease of 1648 which refers to this site. The mill was last working in about 1930. W.T.B. 1974.

The dynamo is now disused. J.E.T. 1989”

Josephine Thorpe, editor. 1989: *North Devon Watermills* (Barnstaple), 43

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“Hudley Mill... This mill is where people living around brought their grists (pronounced around here ‘greasties’). The water wheel (overshot type) originally came from Lower Hall in Highbray parish to replace a former one. It was moved in the 1930’s by a Mr Darch of Landkey. The miller had a right to any pond during dry weather to keep the wheel turning. The wheel is still in use to make electricity for the house. When I knew the place first, it was a cottage attached to Middlecot Farm in East Buckland, farmed for many years by the Woolacott (sic) family but now Hudley Mill is a farm on its own.”  
E.J. Cotsford, nd [1984] *Local History of Charles*, 6

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### HUDLEY MILL

County ref. no. 21508

Location: Charles      Grid Ref.: 678324

....

Present Condition: The mill wheel 12 ft. in diameter and 3 ft. wide, which was brought from Lower Hall Farm in 1949 to use for generating electricity, replaced a larger wheel. The gearing and dynamo are still in position. The pond, which was overgrown and unrecognisable, has been cleared out and restored to its original size, with two renovated sluice gates. Other restoration work is in progress.

Name of River: Thorne Water

Condition of Leat: Good. The leat has been cleared and is running. Water is seeping down onto the launder at present. There are plans to clear out the weir on a neighbour’s land above the mill, which would no doubt increase the flow of water to the pond.

Last Used as a Mill: 1930

*Hudley Mill is mentioned in a lease of 1648. The first documentary reference to Hudley (not the mill) is in 1306.”*

University of the Third Age 1995: *Watermills in North Devon 1994* (Ilfracombe) 61-2

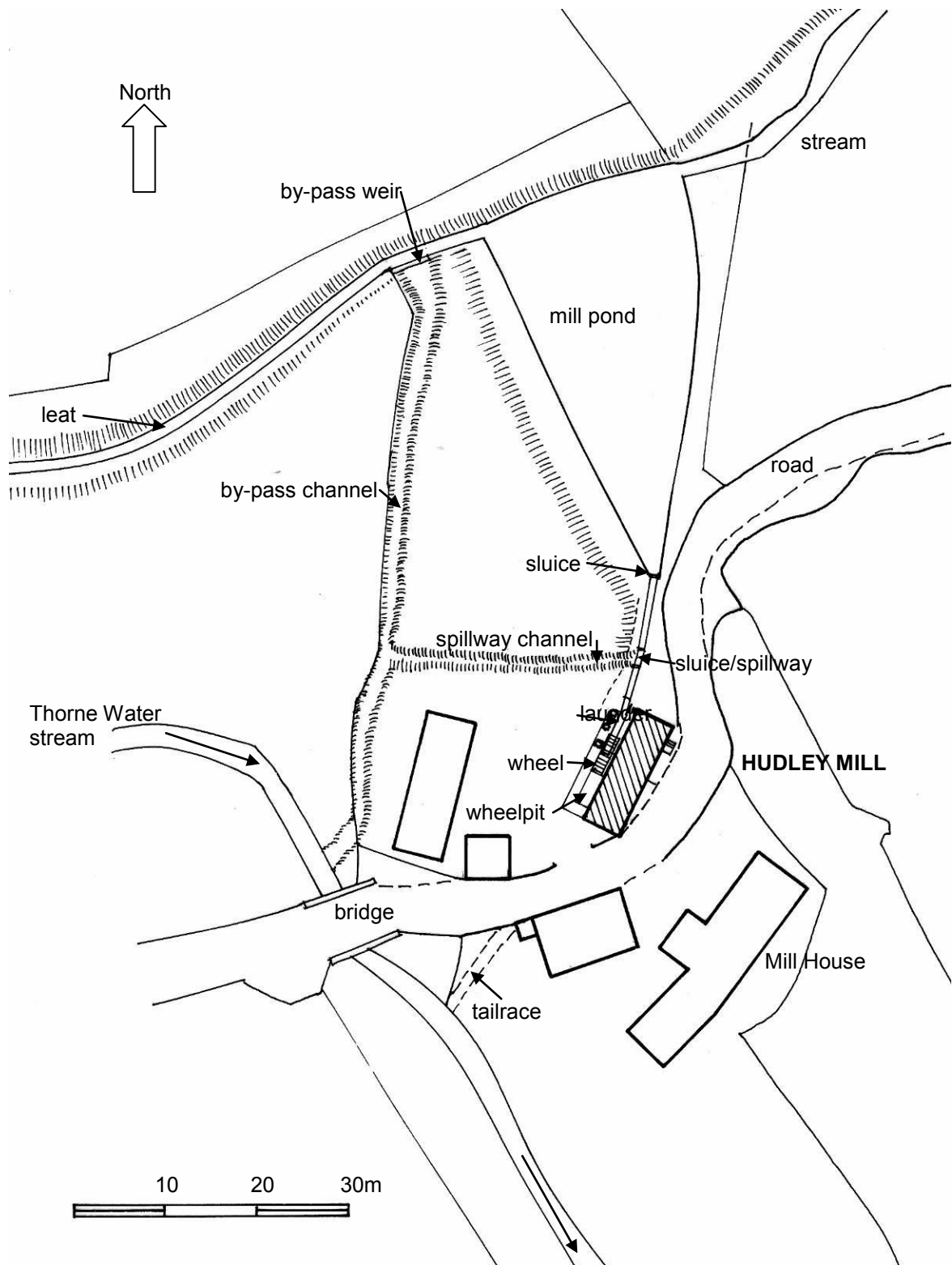


Figure 1. Hudley Mill, Charles: site plan showing principal buildings and mill pond

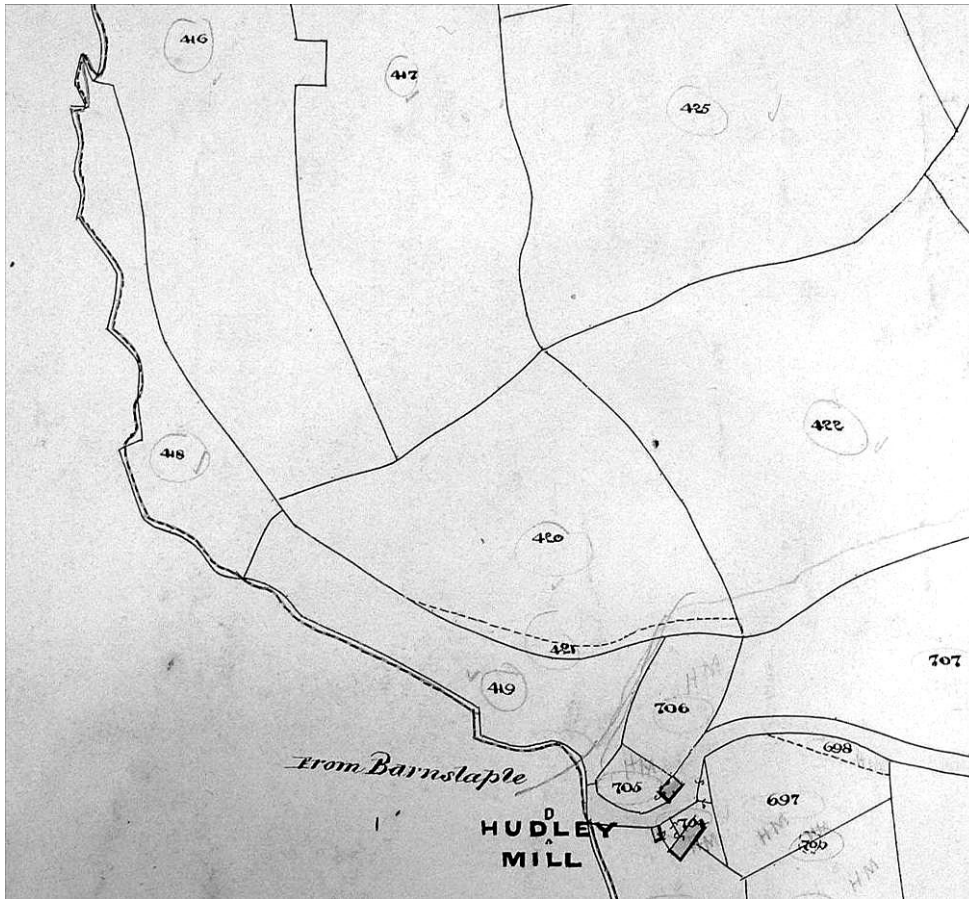


Figure 2. Hudley Mill and leat, from Charles tithe map, 1842 (DRO)

|     |                    |  |
|-----|--------------------|--|
| 416 | Coppice            | All held by Rev Richard Blackmore as part of Glebe |
| 418 | Higher Mill Meadow |  |
| 419 | Mill Meadow        |  |
| 420 | Pond Meadow        |  |
| 421 | Waste              |  |
| 697 | North Orchard      | HUDLEY MILL  |
| 698 | Waste              | Owner and occupier John Smith Snr                  |
| 704 | Buildings          |  |
| 705 | Hopy               |  |
| 706 | Mill Pond          |  |
| 707 | Cole Park          |  |

from Charles tithe apportionment, 6 April 1842

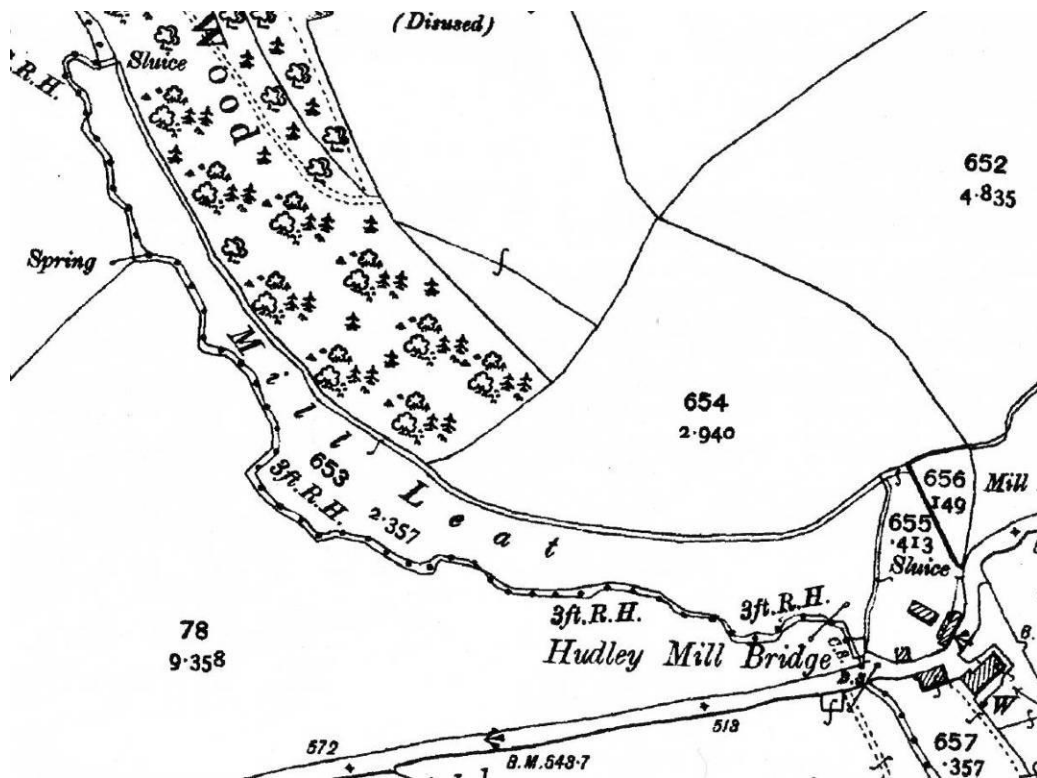


Figure 3. Hudley Mill and leat, from Ordnance Survey 1:2500, 1904-6

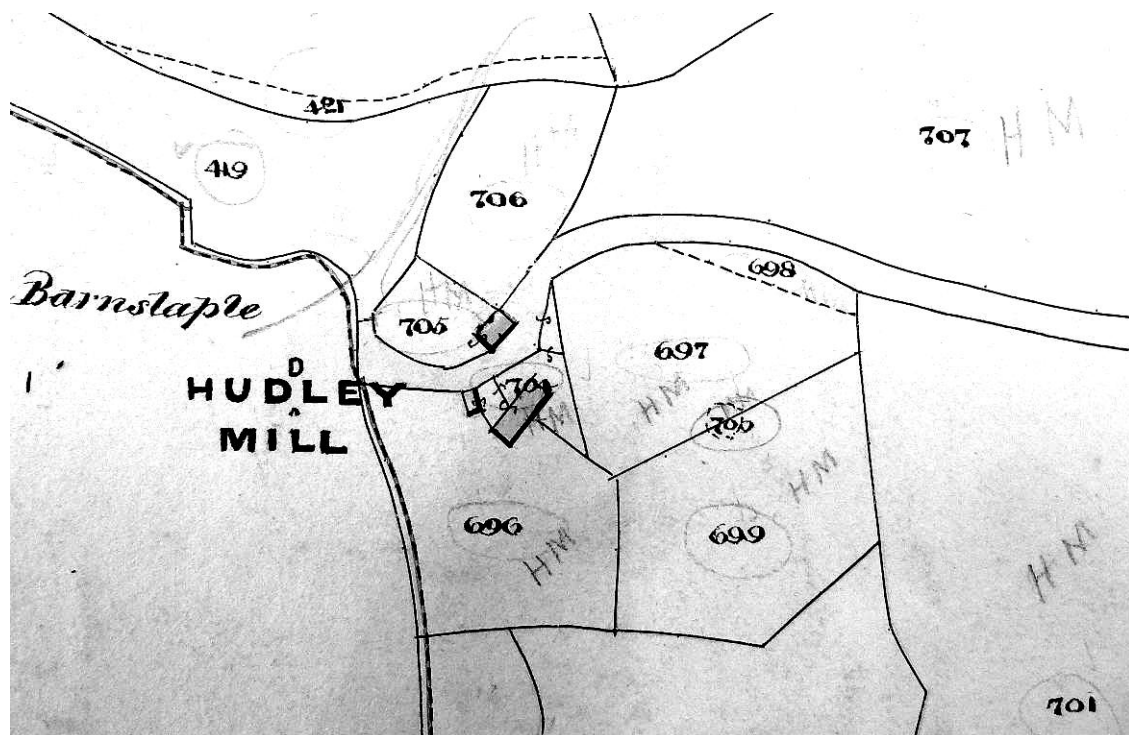


Figure 4. Hudley Mill: layout of buildings as shown on the tithe map of 1842

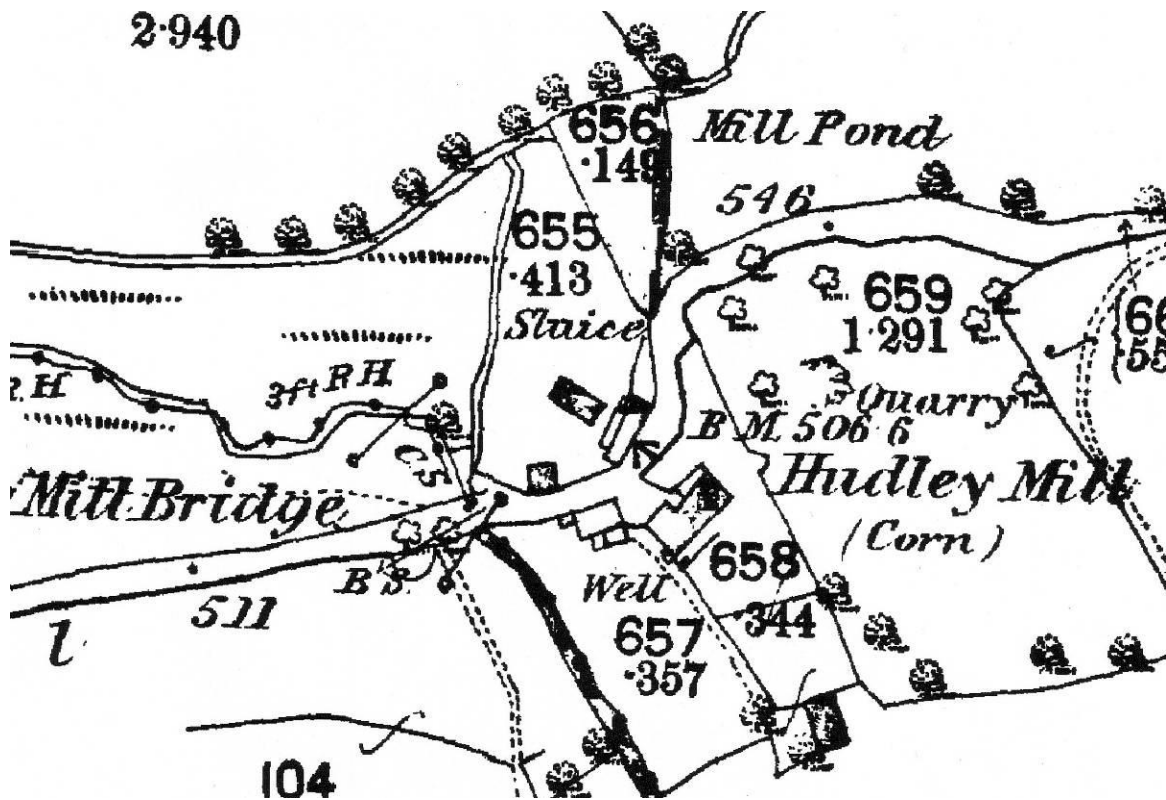


Figure 5. Ordnance Survey 1:2500, 1st edition, 1889

Not reproduced to scale

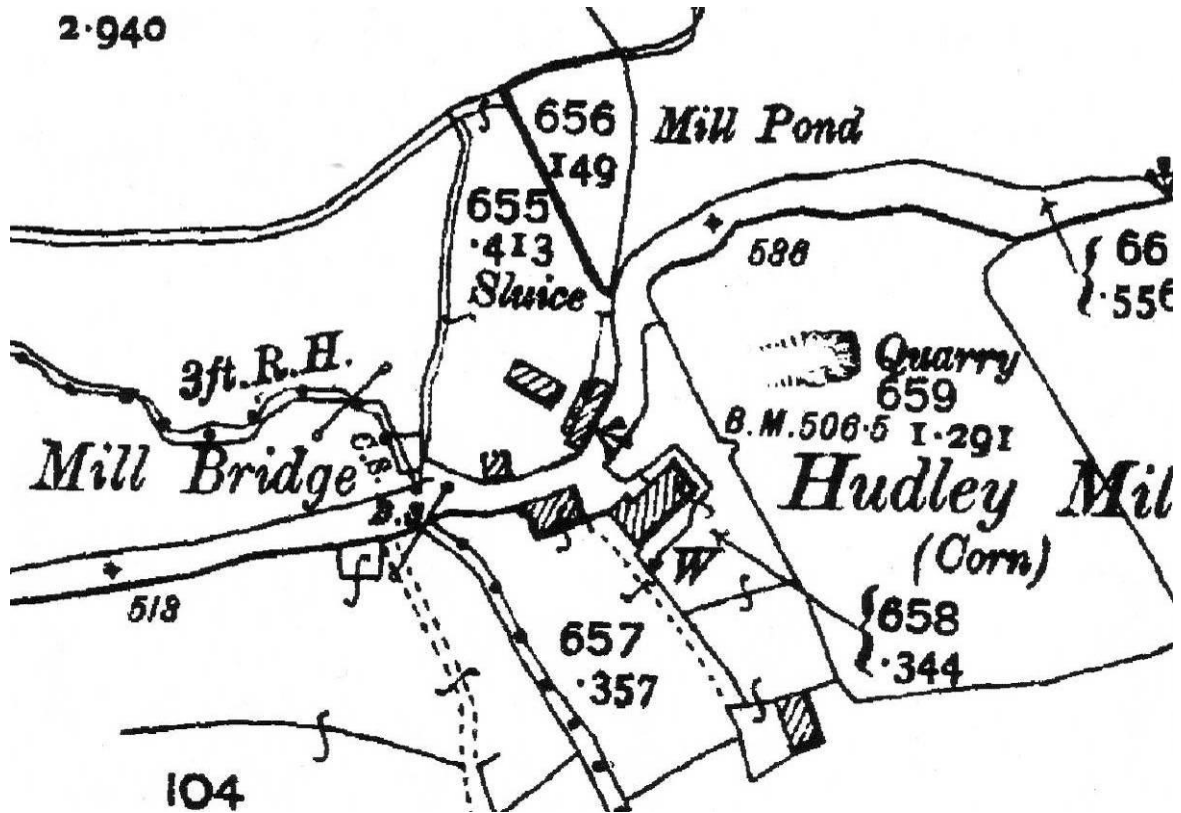


Figure 6. Ordnance Survey 1:2500, 2nd edition, 1904-6

Not reproduced to scale

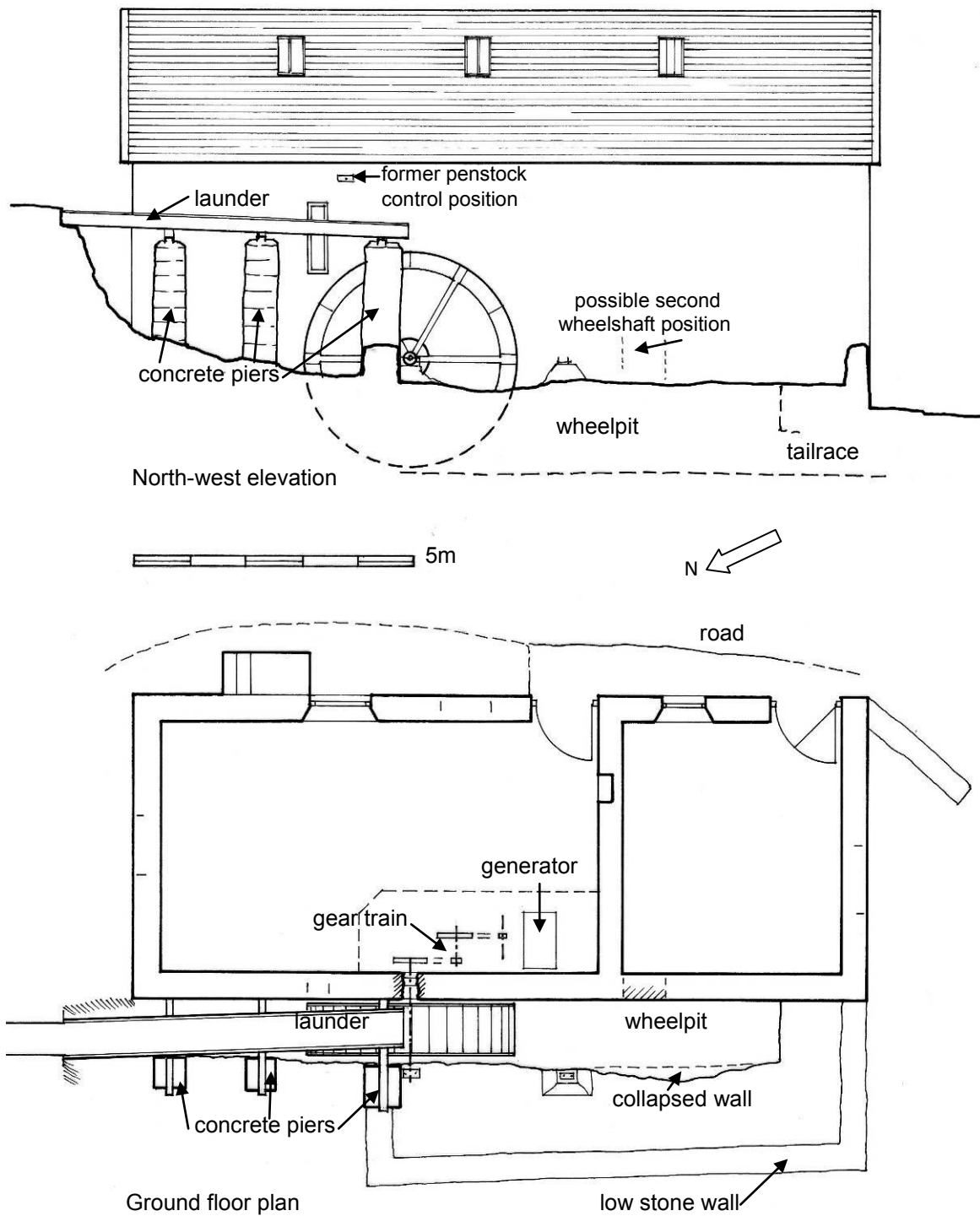


Figure 7. Hudley Mill: ground plan and wheel elevation

Scale as drawn





Leat entrance, right, looking upstream



Upper straight section of leat, looking south



Leat entrance, foreground, and bend in stream



Bend in leat course, built up bank to right



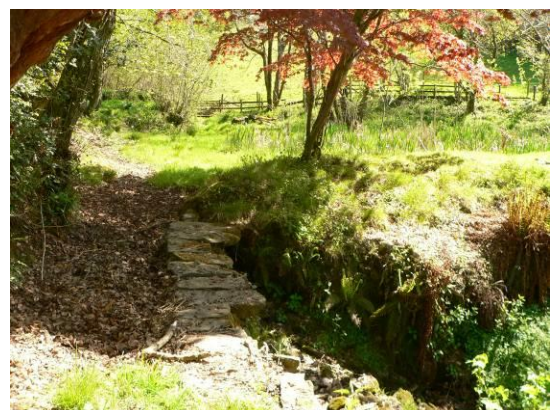
Revetted leat entry and sluice opening in wall



Eroded section of bank at bend in leat course



Sluice opening in wall, spill weir behind



Top of by-pass weir, looking to mill pond





Face of by-pass weir



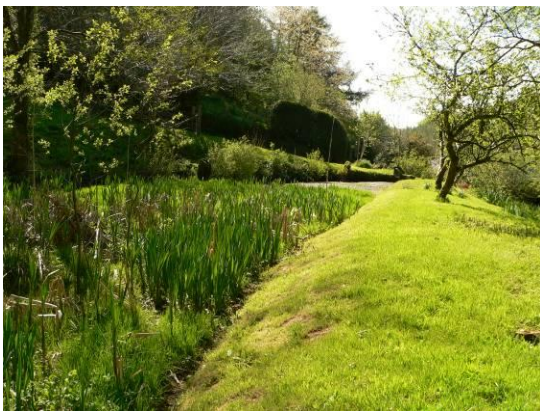
Silt and sluice at south end of mill pond



Stream entering north-east corner of mill pond



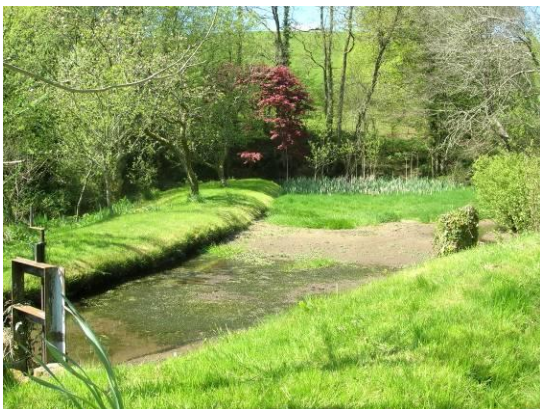
Mill pond from south, with sluice gate



Built up bank on west side of mill pond



Spillway sluice gates



Mill pond from south-east, showing silt build up



Spillway channel running west from end of pond





Mill from north, above spillway channel



Overgrown launder



Launder and supporting columns



Waterwheel and columns carrying launder



Overshot waterwheel



Detail of nave and outer wheelshaft bearing



Concrete bearing support downstream of wheel

Photographs taken 17 March and 20 May 2010, unless stated otherwise





Hudley Mill Hill, with mill pond below road level



Mill Cottage from the entrance to the mill yard



Hudley Mill and Mill Cottage from north



Mill from the west



East elevation of mill, from north-east



Hudley Mill Bridge, looking west



East elevation of mill, from south



Tailrace outlet below wall to road





Ground floor of mill, with gear enclosed by screen



Mill, first floor, with former penstock control



Drive to generator, wheelshaft end to right



Mill roof, looking north



Generator and drive, November 1991 (MW)



Sack hoist drum and drive pulley in mill loft



Conglomerate millstone against south gable of mill



French millstone in paving outside Mill Cottage