TWO WATERMEADOWS AT CHENIES, BUCKINGHAMSHIRE.

JONATHAN PARKHOUSE AND NICOLA SMITH

Two fields at Chenies still show evidence for their former management as watermeadows. They were originally constructed by George Dodds, the tenant of the adjacent mill, during the early nineteenth century, and were subsequently extended. Although the fields concerned are believed to be unique within the County, they represent a form of agricultural improvement which was widespread over much of southern Britain during the post-medieval period. One field is of additional interest as a description and plan were published in the early nineteenth century.

INTRODUCTION

The features described in this paper were surveyed by the Buckinghamshire County Museum Archaeological Service in 1997, for the County Council Environmental Service's Chilterns Project (BCMAS 1997, which contains additional details concerning survey methodology as well as information relating to Chenies Mill). They consist of two artificially irrigated watermeadows, which have been integrated into the water channels associated with a watermill, as well as with the River Chess. The meadows appear to be a unique survival within the County, although they are a type of agricultural feature which was once widespread in other parts of southern Britain.

THE DEVELOPMENT OF WATER MEADOWS IN SOUTHERN ENGLAND

The practice of floating watermeadows begins in the late sixteenth or early seventeenth century, when an expanding population required improvements in agriculture. Improvement of meadows increased yields significantly. There were essentially two techniques: drowning, or 'floating upwards', in which a valley's natural tendency towards flooding was deliberately encouraged, and 'floating downwards', in which lands were flooded by means of specially constructed leats.

Natural watermeadows, where regular seasonal flooding took place annually in the flood-plains of rivers with a low gradient, had of course been used since the prehistoric periods. Such meadows, for instance in the valleys of the Dove, or the Severn near Welshpool, were amongst the best watermeadows in the land, lying under water during the winter and drained off by clearance of the drains each spring. Controlled flooding produced identical results and made "the grass grow cheerful", and enabled the production of an "early bite" – fodder available early in the year to feed increasing densities of livestock, and allowing farmers to keep more animals over winter.

Fitzherbert, writing in 1535, describes the technique of creating an artificial wet meadow as follows:

> *Another maner of mendyng of medowes is, yf there by any runnynge water or lande flodde, that may be set or brought to ronne over the medowes, from the tyme that they are mowen unto the begynninge of Maye, and they wyll be moche the better, and it shall kyll, drowne and dryve away the moldye-warpes and fyll up the lowe places with landes and make the ground evyn and good to mowe. All maner of waters be good, so that they stande not styl upon the grounde; but specyally that water that cometh out of a towne from every mannes myddyng or dunghyll is best and wyll make the medowes most rankest* (quoted in Kerridge, 1967).

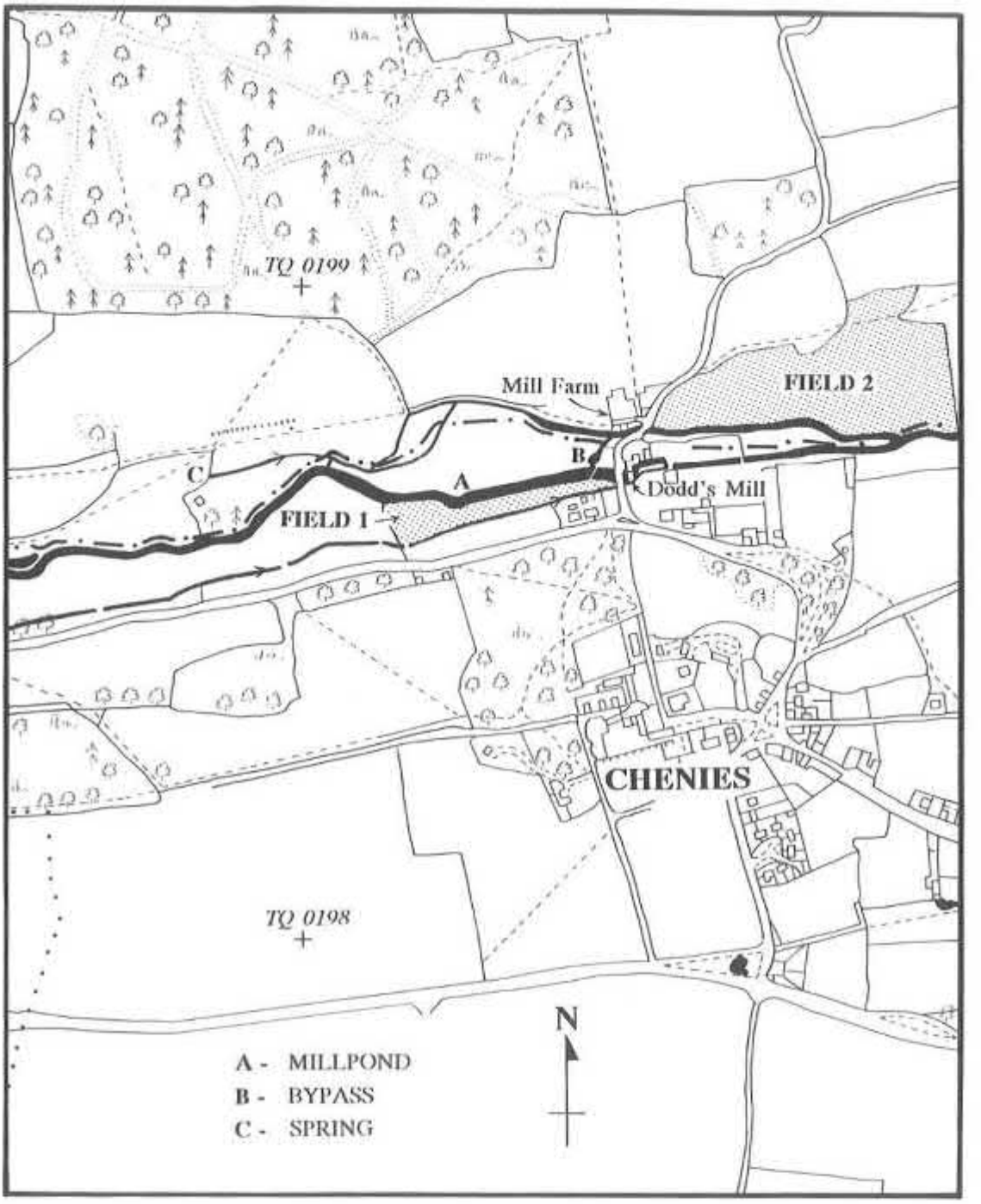

Fig 1. Watermeadows and related features at Chenies: Location plan

The practice of drowning seems to have been widespread by the mid-sixteenth century. The other technique, 'floating downwards', seems to have been introduced towards the end of the century. The advantage of this technique was that whilst drowning could only be carried out on the valley floors, the new system was also capable of taking water along the lowest slopes of the valley. One of the earliest exponents of this form of floating watermeadow was Rowland Vaughan of New Court, in the Herefordshire Golden Valley. His 1610 publication *The Most Approved and Long Experienced Water Workes, containing the Manner of Winter and Summer Drowning of Meadow and Pasture* describes how he was able to graze his mowing meadows until May 1st and keep 300 kine, 300 young cattle and 3000 sheep through summer and winter (Thirsk 1967); the implication is that this was a tried and tested method which he had been using for some time, probably since the 1590s. The practice is also mentioned by John Aubrey in the 1630s and 1640s in Berkshire and Wiltshire.

The technique of constructing a water-meadow was as follows. A dam, or hatch, was constructed on the stream, diverting the water into the main carrier channel or stem which ran along the upper end of the meadow. The water flow could be slowed down by a series of stanks (dams) along the stem. Minor channels, often lined with timber, led off the stem along the crowns of artificial ridges which intersected the "pitch of work" (ie the area to be floated) at regular intervals, typically about 30–40 feet apart. In between the minor carriers were a parallel series of drawing furrows, which led the water into the main drain at the lower end of the meadow, parallel with the stem.

The effects of floating, whether upwards or downwards, were similar, but the more elaborate system of floating downwards facilitated greater control of the water, particularly during the drier seasons. The forced growth of grass would be 5" – 6" high by mid-March, and ready to be fed to sheep, long before other pastures were fit for use. The main hatch controlling the flow of water into the meadow would be closed and the land left to dry for a couple of days before the sheep were let on to the meadow. Early lambs could be more readily bred on these meadows, with grass apportioned day by day by judicious use of hurdles; creep-hurdles allowed the young lambs to feed forward of the main flock. Early lamb naturally carried a premium when sold to the butcher.

Once the grass had been eaten off, by about the end of April, the meadow could be flooded again for a short while to produce a second growth ready for mowing for hay by June. A second and even a third hay crop could be produced by repeating the process, although two cuttings were usually sufficient for winter fodder and the meadows were often given over to dairy cattle in the late summer and early autumn (Kerridge 1967, esp pp 259–260).

Valley-bottom meadows gave about three times as much hay an acre as dry meadows. Fitzherbert's account demonstrates another advantage of floating, namely the benefits of applying a dilute solution of "night soil" and other organic wastes; since the technique was practised in several chalk areas, chalk would also be added to the fields. Furthermore, since the hatches would be opened around October or November, the running water would protect the field from all but the most severe frosts.

The procedure of floating downwards involved a reasonable capital outlay (Rowland Vaughan spent some £2000 on the meadows of his Herefordshire estate), as the gradients had to be engineered with some precision, but thereafter routine maintenance, consisting for the most part of clearance of the stem and minor carriers, would have been comparatively straightforward. The outlay could be quickly recouped – Vaughan reckoned that his capital expenditure had been returned between fourfold and sixfold within four years.

Floating was common in the Vale of Hereford, in the chalk lands of Salisbury Plain (particularly on lands of the earls of Pembroke, who may have copied the examples of the Vaughans, with whom they had family connexions), and from the mid-seventeenth century it spread into Dorset, Hampshire, and into the midlands and eastern England, and the west country, where one eighteenth century scheme was served by water from a canal (Harvey 1980, p64). By the 1790s it was calculated that there were 15–20,000 acres of watermeadow in Wiltshire alone, and by the mid nineteenth century there were some 100,000 acres in the southern counties.

The normal means of floating were those described above. There were, however, regional variations. In the Hertfordshire Chilterns some ridge-and-furrow meadows were floated in the mid seventeenth century, and also on the Duke of Bedford's Woburn estates (Kerridge 1967, p266).

By the nineteenth century, improved rotations were also increasing the fodder supply, whilst imported foodstuffs and fertilisers led to less reliance on the floating watermeadow, which was becoming less economical as the labour costs of maintenance rose, and the traditional skills of the "drowners" became scarce. Close-cropping sheep, which had controlled the growth of coarser grasses, were replaced in many places by dairy cattle with a preference for better grasses; their greater weight caused damage to the soft sward and the edges of the drainage channels. Controlled drowning had largely been abandoned by the mid C20; by 1978 there were only two watermeadows still traditionally managed in the whole of Dorset, Hampshire and Wiltshire, the "classic" watermeadow area (Harvey 1980, p65).

THE CHENIES WATERMEADOWS

Two areas at Chenies provide examples of the type of watermeadow described above; they are, as far as we are aware, the only examples of their type in Buckinghamshire.

Field 1 (centred on TQ 0120 9865)

This meadow (known as Home Meadow in 1838) is part of a complex hydraulic system on the river Chess which also encompasses the mill at Chenies Bottom. The mill is probably on the site of the one mentioned in a late twelfth-century grant to Missenden Abbey of a rent of 12d from John de Cheinei from his mill at Isenhamsted (Chenies) (Jenkins 1946, 98). The mill buildings are called Dodds Mill on the current 1:2500 OS map; the Mr Dodd who, according to Priest, was responsible for creating the watermeadows was George Dodd, one of several generations of Dodds who operated the mill from 1741 until *c*.1871 (Simmons mss, vol 2/21), during which period it was used for both corn-milling and paper-milling.

The Chess has been artificially widened and embanked upstream of the mill to form a long millpond (Fig 1, A), which is higher than the lowest point of the valley bottom some 20m to the south, where that part of the River Chess which does not enter the millpond flows along a small and insignificant stream-channel. That part of the water which does not flow along the former mill race passes through a sluice into a bypass channel some 40m upstream of the mill (Fig 1, B); this channel is soon joined by the stream from a spring (Fig 1, C) which issues in the valley bottom about 600m upstream to the west, before rejoining the main channel about 400m downstream near the edge of Field 2. The watermeadow occupies the space between the mill pond and the small stream-channel of the residual River Chess to the south, extending from a field boundary 360m upstream of the bridge to a point some 140m upstream of the bridge.

Field 1 was surveyed by Priest in 1812, who also published a description of the meadow (appendix 1). Priest's plan is reproduced in Fig 2 along with the 1997 survey; both plans are at the same scale to allow comparison. It will be evident that the area of watermeadow was increased at some point after Priest's survey, and the position of the hatch, where water entered the stem, or header channel, must have been moved upstream. In the part of the area shown by Priest furthest downstream the remains of the system were destroyed earlier this century by the installation of a swimming pool, no longer extant.

No trace of the stem survives today. This must be due in part to natural silting, which has also filled the individual feeder channels leading off the stem along the crowns of the ridges, but clearance of the millpond by the fishing club which has rights over this water has raised the ground level by the side of the mill stream and has also obliterated all traces of the stem.

Although no trace survives of the channels along the crowns of the ridges, the individual drawing furrows may still be traced, and their frequency and spacing (average 12.3m apart) correspond with the 1812 plan. Priest describes the distance between furrows as 40', or 12.19m. In the post-1812 extension the furrows were sightly closer (9.3m, approximately 30' apart). The surviving difference

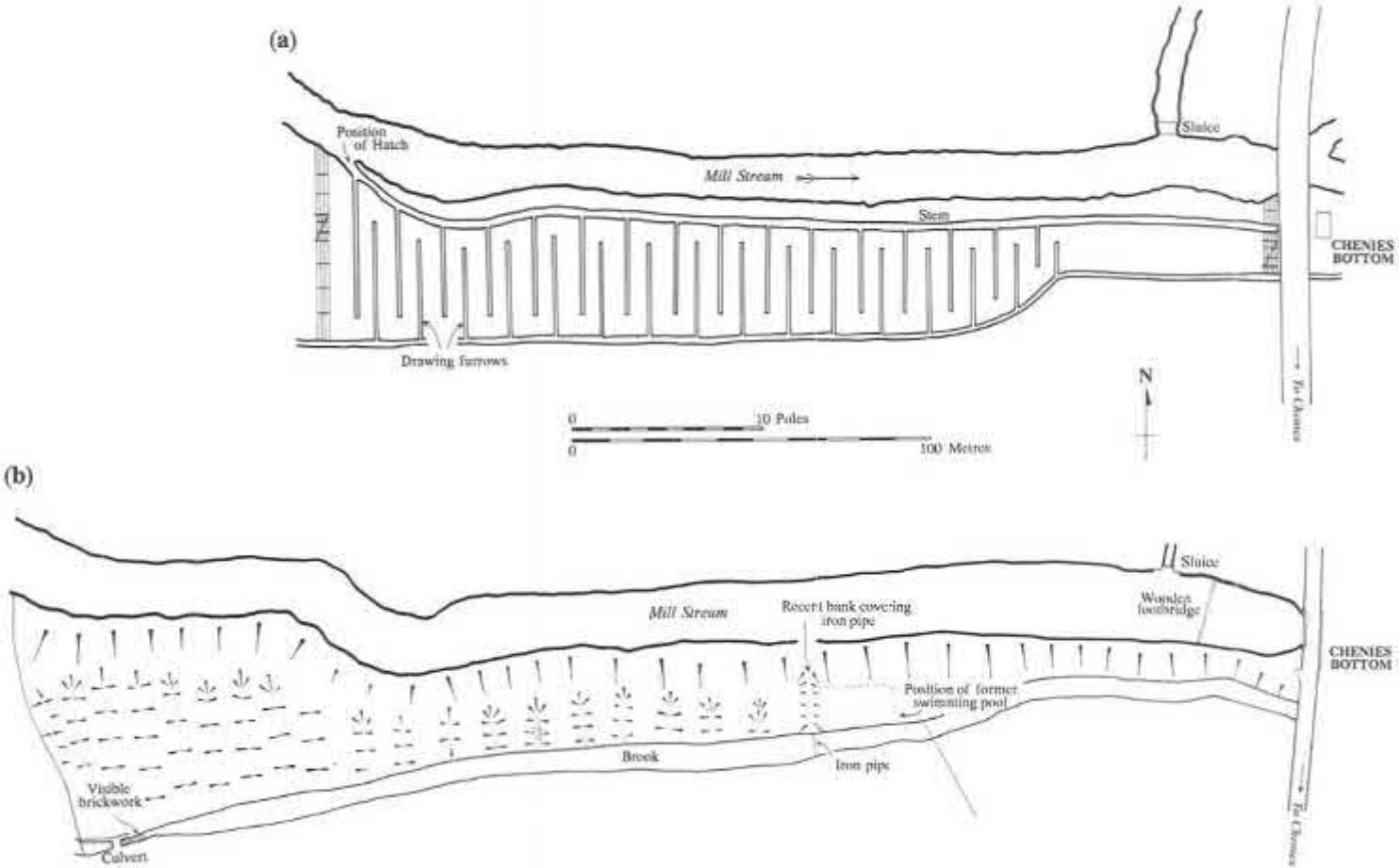

Fig 2. Chenies, Field 1: (a) Priest's survey *c* 1812 (b) 1997 survey. Both plans at 1:1000

in height between the top of the crowns and the base of the drawing furrows was about 0.19m where best preserved.

Field 2 (centred on TQ 0190 9885) (Fig 3)

This was originally two fields, the meadow being situated in the eastern field. The western field contains several features of interest.

The meadow is some 400m downstream of the mill, just below the confluence of the mill race outfall with the mill bypass channel (B on figure 1). The area of the meadow is approximately 200 x 120m.

The meadow is superimposed upon a relict dry river channel (Fig 3, A) which is still visible and meanders along the valley floor; the mill bypass channel appears to occupy the palaeochannel further to the west.

The hydraulic works are generally much better defined than in Field 1 and are better preserved. In places the channels along the crowns of the ridges are still faintly visible as slots *c*5–10cm wide and up to 5cm deep. The difference in height between the crowns and the drawing furrows is generally about 0.2m, although along parts of the eastern side of the system the crowns are nearly 0.5m above the main outfall furrow. The spacing between the furrows is fairly regular at 9.3m, the same distance apart as the furrows in the later extension to the Field 1 system. The similarity in spacing is unlikely to be mere co-incidence, and suggests that the hydraulic system in Field 2 and the extension to that in Field 1 were both installed some time after Priest's survey. The regular spacing is interrupted adjacent to the river and also where the meadow narrows near its northern edge; in the latter case it is suspected that a small extension was made to the system.

The stem channel ran N-S along the western side of the meadow, and was more deeply cut than the channels along the crowns. It may have been fed directly from the Chess by means of a hatch in the southwest corner of the system, close to the confluence of the two main stream channels in the valley floor, but this is highly uncertain, as this area was one of the few areas of the field where the surface was obscured by vegetation, and no trace of any hatch was visible. Near the northern end of the meadow the stem curves slightly to the west to a junction with a header channel, now dry. This header channel ran north from a sluice on the mill bypass channel. Brickwork, part of the sluice, is visible on the northern side of the bypass channel, at the point where its course diverges from that of the palaeochannel, about 110m upstream of the irrigated meadow (Fig 4). A corresponding section of brickwork is visible in the bed of the channel where there is a small shingle bank, and a third piece of brickwork was removed from the southern side of the channel within the last fifty years, according to the farmer, Mr Fitch. The structures are of engineering brick (probably nineteenth century) throughout, and a vertical slot for a sluice is visible in the brickwork on the northern side of the bypass channel. Water was carried north across the field by an embanked channel approx 8m wide; where the valley side was encountered the channel turns sharply to the east and followed the bottom of the valley slope to join the main stem about 30m from the northwest corner of the meadow. It is not clear whether the sluice and channel were part of the original scheme, or a secondary addition to improve the flow of water, made perhaps at the same time as the possible extension to the irrigated area on the northern side of the meadow (see above).

There are also several other features in the adjacent field to the west which may also be associated with water management in this part of the Chess Valley. These are as follows (Fig 3):

A) The palaeochannel, mentioned previously, a broad meandering channel 10 to 18m wide and varying in depth from *c* 0.10m (downstream of the meadow) to 0.43m (immediately upstream of the meadow). The upstream end appears to have been incorporated into the hydraulic scheme associated with the mill, but the remainder, now dry, does not appear to have been part of the watermeadow system, although it must have become filled with water when the meadow was flooded.

B) A small, dry and scarcely visible channel approx 3m wide runs between (A) and the main header channel, following a curved course.

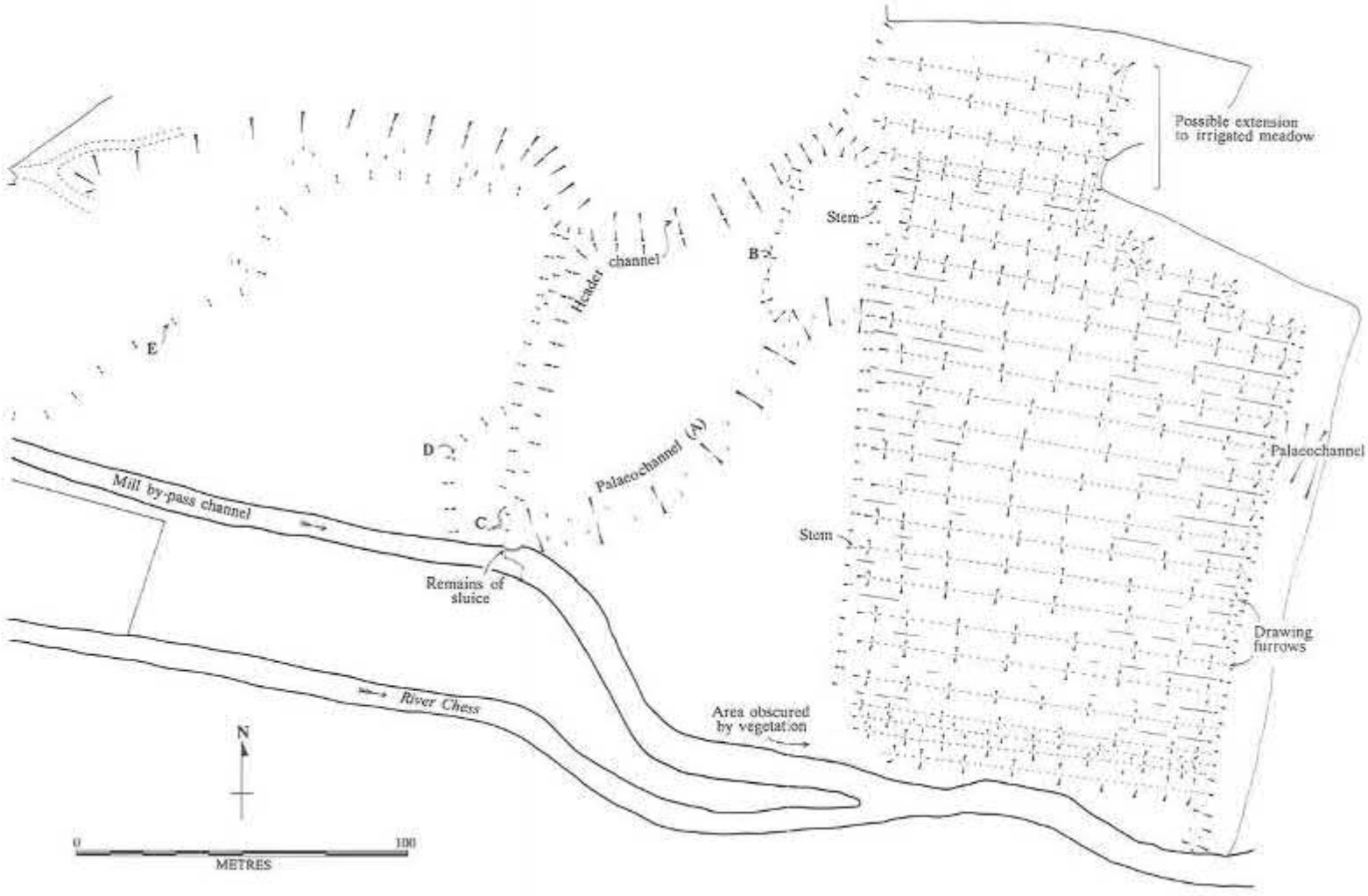

Fig 3. Chenies, Field 2: Scale 1:2000

Fig 4. Remains of the sluice on the north side of the mill bypass channel in Field 2. The header channel is just visible as a low bank to the left of, and behind, the standing figure.

C) A very small part of what appears to be the roof of a culvert, built of the same brick as the sluice, is visible on the surface of the ground about 6m from the channel edge, close to the dry header channel. It appears to be heading in the same direction as the header channel. An association with the sluice seems likely, but the area of brickwork is so small as to defy definite interpretation; it may even be part of the damaged sluice structure which has been left in the field and become overgrown.

D) A short section of shallow channel runs between a point a few metres upstream of the sluice and a point along the header channel.

E) A dry shallow drain runs from a point close to the stream channel near the western end of Field 2 and meanders across the field to a point where it appears to join the header channel, close to the northern edge of the field, but the feature is barely distinguishable at this point.

Features A – E are all difficult to interpret, not least because some of them are scarcely visible on the ground. None of them need be associated with the watermeadow system; on the other hand, the other elements of the hydraulic system along this sector of the Chess, the meadows and mill, are so closely integrated it seems unlikely that these were not also associated in some manner.

DISCUSSION

The Chenies watermeadows represent a type of agricultural improvement system which was once common over many areas of southern England, although it seems unlikely that they were ever frequent in Buckinghamshire or the Chilterns. Their existence here is probably due in some measure to the former landowner, the Duke of Bedford, who is known to have carried out similar works on his Woburn estates. There appear to have been two main phases of work undertaken at Chenies, and

we are fortunate in having a very detailed plan and description of the earlier phase.

The integration of water management systems for two distinct purposes, corn-milling (subsequently also paper-milling) and watermeadow floating, is of particular interest, and demonstrates the extent of the resources which were put into major engineering schemes in an age devoid of any earthmoving equipment beyond human effort and animal traction. A large area of the valley floor of the Chess was carefully engineered to tolerances no greater than a couple of inches.

Like many other types of earlier agricultural regimes that have left their trace in the landscape, the shallow banks and ditches are vulnerable to agricultural improvement. The present regime, however, is sympathetic to their long-term preservation. The main cause of damage in the past has been the casting of the mill stream in Field 1, but although this activity still continues it is unlikely that the surviving features will be obscured any further, as the dredgings are restricted to the margins of the mill-stream.

Finally, it should be noted that to the inexperienced eye the surviving features in Field 2 appear very similar to those associated with recent improvement by drainage. It is not impossible, therefore, that other meadows of this type await detection in the County.

APPENDIX

Field 1 in the early nineteenth century

Priest St. J., *General View of the Agriculture of Buckinghamshire* (1813)

"There is but one instance of irrigation worthy of record in the county of Bucks, and that is at Cheynies, upon a meadow containing only 1½ acre and 8 perch, the property of His Grace the Duke of Bedford, farmed by Mr Dodd, in whose occupation it is. *Plate* XIII. is a delineation of it, which scarce requires any explanation. The beds with the floaters upon their crowns, and the drains between them, are 40 feet wide from drain to drain, and the fall, from the floaters to the drains, 20 inches; that is, an inch to a foot. The water enters from the stream at A, and by the feeder AC (very judiciously formed parallel to the stream, to serve as a drain to stop any water which otherwise might issue from the stream, and breaking out below, might poison the whole meadow) is carried into the floaters; and from D to C is itself a floater, and irrigates that part of the meadow which falls from DC to EB, having also one inch fall to a foot.

Mr Smith, who has formed some excellent watermeadows in Norfolk, does not make the beds so wide, and gives the water a more rapid fall. Mr Smith's beds are generally about 11 or 12 yards wide, having two feet fall from the crowns or floaters to the drains. Mr Dodd estimates the expense of this meadow, taking it from its swampy boggy state to its present rich luxuriancy, at not less than 25*l.* per acre. The produce of this meadow this year (1808) is very great. In the spring, from the first week in March to the 14th of May, Mr Dodd kept upon it ten ewes with their lambs, at the end of which time he sold the lambs for 40s. each. The ewes were afterwards fattened, from which having taken their fleeces, he sold them to the butcher at their original price. As soon as the lambs were sold, Mr Dodd watered the meadow, and then mowed it, and carried off the hay. he then watered it again, and mowed it a second time for hay. By these two cuttings he obtained six loads of hay, reckoning 18cwt to the load, part of which he sold for 5*l.* and 6*l.* per load. From November to the present time (Dec. 31, 1808), he has had four cows upon the aftermath, and doubts not but he shall be able to keep them upon it a month longer, if the season permits. Such a produce as this is sufficient to encourage any one to form a water-meadow, who has but water at command. Let us recapitulate the above.

Omitting the ewes* and their fleeces, ten lambs were sold for	£20 0 0
Six loads of hay, at 5*l* 10s. per load	33 0 0
Four cows feeding, from Nov. 1 to Dec. 31, with the feed remaining	4 4 0
	£57 4 0

* These were fattened, and after they were shorn, were sold to a butcher for their original price, when bought in the preceding autumn with lamb, viz. two guineas each.

In addition to the above, and in contradiction to the received opinion of the value of water-meadow hay, I ought to state, that in the beginning of this year a cow he intended for the butcher, had after a

fortnight's time been glutted with barley-meal, and Mr Dodd gave her from that time only hay from a rick, which was a mixture of water-meadow hay and other hay. Within three or four months the cow was sold for 20*l.* weighing 85 stone, of 8lb. to the stone. The hay from a water meadow adjacent to Mr Dodd's, is part sold at five guineas per load of 18 cwt. and part kept to feed chaise-horses; and the gentleman who uses the water-meadow hay for this purpose, informs me his horses thrive with it.

By the above water-meadow, added to the improvement of a pasture, [.....], Mr Dodd has benefited his occupation so much, that, whereas upon 12 acres he used to keep only two cows and a horse, he is now enabled, by the addition of three acres, having in all fifteen, to keep four cows and two horses (viz. a yearling and a nag) throughout the year, together with ten ewes with their lambs from Michaelmas to May, and to sell them as they become fat; to mow his watermeadow twice, and get six loads of hay; to take in agistment stock at 5s. per head per week, so as to produce this year 5*l.* 17s. 6d., and to sell some hay

To his horse Mr Dodd gives half a peck of corn per day, and sometimes three quarters of a peck, in addition to the produce of his pastures. But it must also be taken into consideration, that he keeps near a score pigs, for which some barley is bought. The above however is a very valuable instance of the effects of improving pasture lands, and particularly by irrigation.

ACKNOWLEDGEMENT:

The survey was undertaken for the Buckinghamshire County Council Chilterns Project, and we are greatly obliged to Mr Chris Damant for facilitating this work. We are also extremely grateful to Mr Fitch, who kindly allowed access to the areas described in this report, and who was a source of much useful information. The survey work was undertaken with the assistance of Brett Thorn and Anna Stocks.

REFERENCES:

BCMAS 1997 *Two Watermeadows at Chenies, Buckinghamshire* (Buckinghamshire County Museum Archaeological Service Report No 503)

Fitzherbert 1535 *The Boke of Surveyinge and Improvementes*

Harvey, N. 1980 *The Industrial Archaeology of Farming* (London, Batsford)

Jenkins, J.G. 1946 *The Missenden Cartulary, Part II* (Buckinghamshire Recs. Soc. **10**)

Kerridge, E. 1967 *The Agricultural Revolution* (London: George Allen and Unwin)

Priest, St. J. 1813 *General View of the Agriculture of Buckinghamshire*

Simmons, H.E.S. n.d. *The Simmons collection of records relating to British Windmills and Watermills: Vol 2/21: Watermills of Buckinghamshire A–H* (photocopy of ms typescript and notes in Science Museum Library (1977), in local studies colln; Bucks County Library)

Thirsk, J. 1967 *The Agrarian History of England and Wales, Volume IV 1500–1640* (Cambridge Univ Press)