

THE RAREST TIDE MILL

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My interest in tide mills derives from my involvement from an early stage in the restoration of Eling Tide Mill, near Southampton. In early 1975 it was a weak shell, but the main gearing and machinery was intact, though badly defective.

The history of Eling is reasonably well documented, due to being in one ownership for the past six centuries. Also, the church registers of St Mary's, Eling, commence in 1537. The freeholders, Winchester College, received it as an endowment, together with a reasonable parcel of land and water, from William of Wykeham in about 1382. He was a man of considerable influence and standing with church and state in his time.

Out of approximately 40 tide mill sites recorded along the south coast of England, only two remain with substantial fabric and machinery. Beaulieu has not been restored to date, but Eling has. The rare opportunity of investigating earlier mill construction at Eling during 1977 and 1978 was not officially recognised. Both existing and ancient sub-tidal construction and foundations were exposed for the provision of modern concrete foundations, but except for minor notes and measurements taken by myself in undercroft areas, very little recording was attempted, nor were many of the odd artifacts retrieved conserved. This was due in part to the known fact that the existing millwrighting is not very old, having been largely regearred and modernised by Armfield's of Ringwood in the 1890's.

The question is; what did the present form of construction and millwrighting replace?

Documentary and constructional evidence suggests a conventional waterwheel of timber construction. But in my opinion, this was not of long duration, being preceded by a less conventional form of millwrighting.

Investigating an unknown form of millwrighting is plainly difficult, but evidence is available from three sources:

- 1) Original documented records of Winchester College.
- 2) Site investigation.
- 3) Existing tide mill forms in both the UK and Europe.

The first lease/indenture recorded is date 1418. There is then a gap in the information other than a list of leaseholder's renewals until 1675. In this year Lawrence Watts was appointed surveyor of highways for Totton and Redbridge. This would have included the road over Eling causeway, which was then the main road to Hythe and Beaulieu.

Records also exist in the period up to 1720 of an increase in local industry; principally fitting out ships built on the other side of the river at Redbridge, and to a lesser extent at Eling Creek. Exports of oak bark and other New Forest commodities were also shipped out. In 1728 a new watermill near to Eling was constructed at Nursling on the River Test, by Sir Richard Mill Bark, who was also the holder of the lease at Eling.

During the 1740's and 50's considerable damage and neglect resulted in repairs, building contracts, and millwrighting.

In the year 1742 the following items occur:

Surveying at Eling - Mr Switeur

Building contract to John Abbott of Eling: price £96 for bridge, mill house, tumbling bay and hatches.

Millwright contract to 'Willis' for conduit, wheel, etc.

in 1755:

Repairs to tumbling bay, apron and bridge, using Benbridge whitestone (from Isle of Wight).

After what appears to have been an extensive rebuilding phase, the following item occurs:

1785, 1st November; lease to John Chandler, Miller. He to take down and rebuild mill and millhouses.

No site investigation is known at the time of the demolition of the miller's house with its many additions in about 1956, but good photographs exist, including an aerial view of 1949.

Undercroft exposure and constructional excavation for new land bearing foundations in 1977-78 revealed evidence of earlier stone foundations and timber piling. See Fig 1. All the main undercroft walls are generally of brickwork and appear to be of modern construction, or at least after 1785.

The keystone of the inlet culvert to the wheels is incised 1755. The whole of this culvert under the road is of good masoned stone blocks but is not in line with the existing waterwheel.

A small section of circular masonry was found encased in retaining wall brickwork and existing foundation material adjacent to the mill wall. This small wall, vertical in plan, was accurately constructed with small joints and a dressed finish to the concave face. Depth of this stonework was in excess of 800 mm, as the iron bar used as a probe was of about this length.

Architectural survey and recording at Beaulieu Tide Mill has been to visible surface fabric, to date. The existing millwork here probably represents a similar picture to that at Eling prior to 1890, but there do not appear to any circular undercroft walls exposed to date. Reference to both Woodbridge and Carew Tide Mills does not reveal any archaeological or construction records prior to the existing fabric.

So where is this leading us - horizontal watermills in Britain are rare, and horizontal tide mills are unknown! Or could there be a different reason for the circular wall at Eling.

Only a few months ago I obtained a copy of the T I M S Symposium Transactions for 1965, which contains an article on tide mills in Portugal, by Fernando Castelo-Branco. This created new interest regarding the circular wall at Eling.

Portugese tide mills appear to be predominantly of the horizontal pattern. A number are still complete and possibly one or two are still working (Fig 2, 3). The waterwheels are in the region of 1.5 to 2 m in diameter, of either all timber construction or wooden paddles in a vertical iron shaft. The photographs of the wheel at Mourisca Moinho Mare on the estuary of the River Sado has 24 paddles of unusual pattern. One step gearing to two pairs of stones would appear to be the norm in this region.

Without making undue reference to Portugal, it is difficult to convey the practice of horizontal tide mills. I have found no reference to horizontal wheels in any other European coastal areas at this stage.

Reference to Portuguese geography and geology has little in common with the south coast of England (Fig 4). In fact, earthquakes and coastal movements in the Tagus and Sado estuary areas over the past centuries are markedly different from England.

So, what can we conclude from the information gleaned to date?

- a) According to Castelo-Branco, 'These are the rarest type of tide mill surviving in the world'.
- b) Horizontal tide mills were common in the coastal areas of Portugal, even on the Algarve.
- c) No definite information links Portuguese tide mills to horizontal mills in England at this time.

That does not rule out the possibility that the use of horizontal waterwheels was more extensive in the UK than would appear at present. I believe that horizontal waterwheels were once commoner than has been recorded for tide mills in the Atlantic and English Channel coastal areas. I recommend that members consider the possibility of older forms of mill when recording existing mills in Britain.

Discussion

- Bryan Most of the horizontal waterwheel remains in the British Isles are on Scottish islands, where I believe there is also a substantial tidal range, so in looking for this type of mill it might be as well to look around the bays and inlets of some of the islands.
- Plunkett Certainly Walter Minchinton said there was even a reported tide mill in the Orkneys. Now if there was, it is almost certain to have been a horizontal wheel - if it is something which has been and gone many years ago, that is.
- Jones But horizontal wheels vary enormously; about the only thing they have in common is that they are horizontal! For example, of those I have seen at first hand, in the Faeroes they are just like those in the Scottish islands; very small, crude, essentially family mills - low output, cheap. The others I have seen in central France. They are much better built, and there are two quite different types. One is rather like the illustrations of Portuguese mills, where the wheel is not enclosed and a wooden spout directs water onto it. The other type is placed at the bottom of a masonry pit, with water admitted through a tangential slot. The pit is filled with a swirling mass of water, and the whole bucket area of the wheel is used. They are used on the large rivers, with a massive weir.
- Plunkett I tried not to confuse the horizontal waterwheel type with the tide mill type. What is the relation of the form of the wheel - do they need to be a different form of wheel for a tide mill? It depends on the water engineering before the water gets to the wheel.
- Jones That puzzles me, for the Portuguese tidemills appear to be using the wrong type. We can see why the pit-type wheel was developed; it is a high-power wheel using a large flow of water at a moderate head. Those are the conditions we would expect in a tide mill.

Turner Didn't Alan Stoyel find such wheels in Spain ?

Jones Certainly. What I saw in France was the northern end of its range. A little further north in France, and there are no more horizontal wheels.

Plunkett Horizontal wheels seem to die out once you cross over the border into France.

Jones No, the border runs more or less across the centre of France.

Plunkett I meant horizontal wheels in tide mills.

Jones Ah, tidal mills are a different matter. We don't know about those between Portugal and Brittany, if there ever were any. But concerning the wheels; a tide mill is a large flow, low head plant, and to make full use of the impounded water, you want to run the pond empty, so for at least part of the working cycle it has a very low fall, but can still use a vast flow if the wheel can take it. Even if it is working inefficiently, it can keep working. For this, the jet-type wheel seems the wrong choice, yet they chose it, presumably for good reasons. They also geared it to the stones, which I have not heard of from elsewhere. Does all this have any bearing on Eling ?

Plunkett The thing I see as tying it down is that most horizontal wheels are small diameter. The Portugese wheels do tend to be bigger than normal, and a horizontal wheel at Eling must have been large. The peculiarity at Eling is that the curvature of the wall comes within the head race, not the tail race, so it is at high level.

Jones It could fit the pit-type wheel.

Plunkett It could have been.

Jones What diameter is it ?

Plunkett The Eling one would have been about 2.4 m, from the curvature of the wall.

Freedman What about the height of the wall ?

Plunkett The height when I saw it, down to the present breastwork level, would have been about 1.5 m.

Bryan If it had used horizontal waterwheels at some time one would expect three or four of them in separate channels.

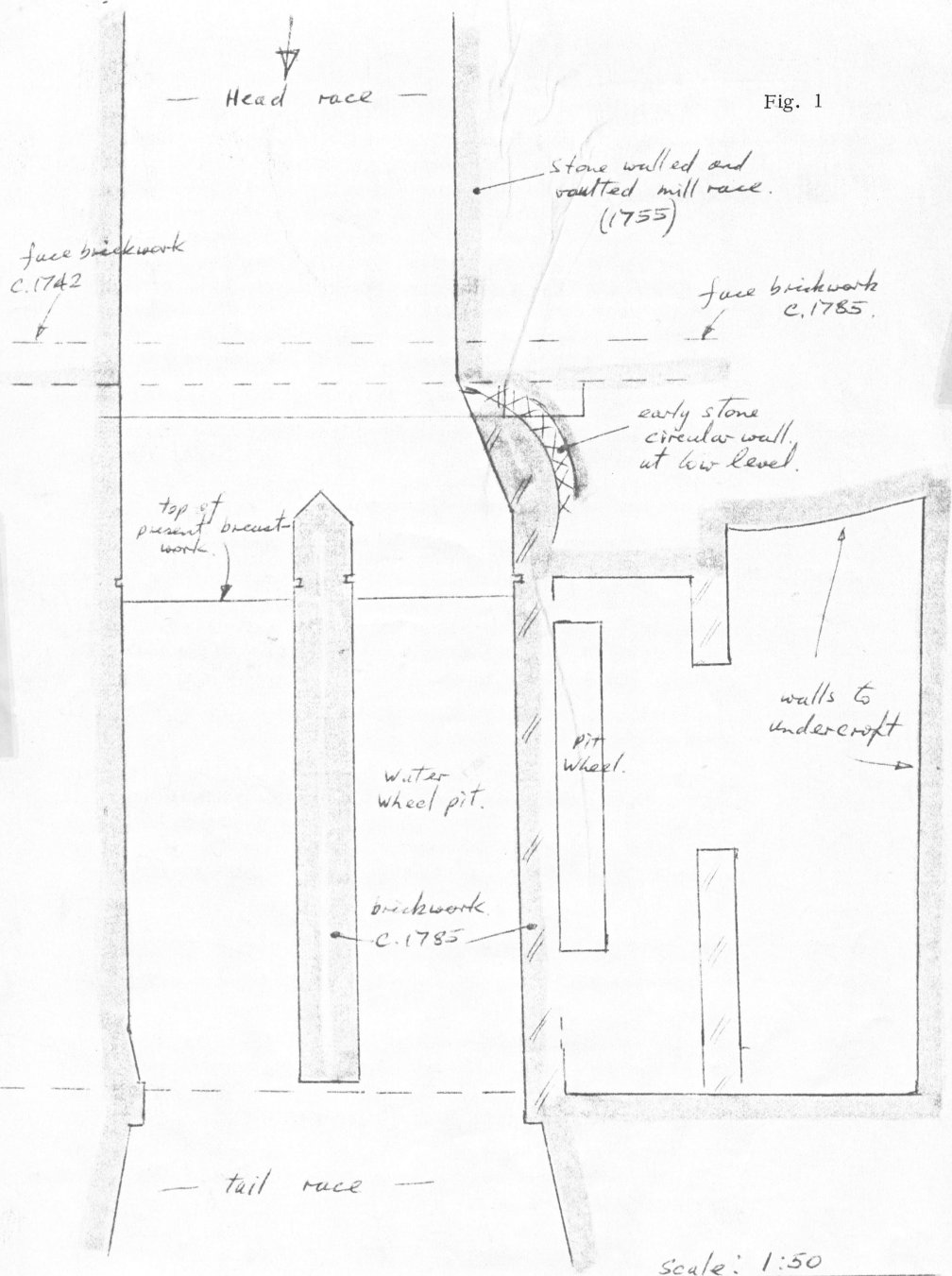
Plunkett The Portugese mills appeared to be in multiples of two, to get the output.

Bryan Could the curved wall at Eling have been designed to resist water pressure, or streamline the flow ?

Plunkett Not streamline the flow, that is certain. It could possibly be designed to help retain the wall for the causeway, but it doesn't tie up with the masonry of the rest of the causeway. But there is a lot of rebuilding. Certainly there was a great rebuilding phase in the 1740's, continuing on the causeway side in the 1750's. When it was leased to John Chandler in 1785 - 'He to take down and rebuild the mill and mill house. For the last 20 years they seemed to be rebuilding it almost at yearly intervals.

- Jones Is this curved wall at Eling still accessible ?
- Plunkett It is under the concrete foundations now; it is one of the piers which support the the floor. Part of it may be visible outside, but you would have to lift floorboards. The top of it would be about 250 mm below the floor joists. Eling is fairly well chronolated, in that most of the walls and floor levels can be attributed to certain phases, and this circular wall is the oldest section I found. It doesn't seem to relate to anything other than some of the masonry blocks which are use as retaining work within the undercroft, and I know they have been out and back again once already. Through all the times this place has been breached and dealt with, this section of wall has been retained.
- Jones If it was a horizontal wheel, could you put any limits to its date ?
- Plunkett It is certainly before 1742. I would say it is likely to be before the construction of Nursling Mill, in 1729. I have been trying to establish if Eling was out of action then, and they had to build Nursling Mill, because they were in the same ownership.
- Bryan They may just have had so much business that they had to have another
- Plunkett Quite possibly; it coming up to a period when the demand for food was increasing, though not so much as in the Napoleonic period, when there was a vast increase. I have some information on the population around Eling, and it did not increase rapidly until just before the advent of the railway. The it really shot up.
- Jones Local population is not a sufficient indicator near a port; provisioning ships could form a large part of their trade.
- Plunkett There was also the army. I am sure there was a big demand there, both for flour and animal feeds. Also, Eling was a minor port, and it was also an embarkation point at various times in history for the military. In fact, the Black Prince's archers left from Eling, before the battle of Crecy. There was also shipbuilding of various sorts.
- Freedman Could Eling Mill receive grain direct from ships ?
- Plunkett Yes. It certainly had a regular trade with the Isle of Wight.
- Jones That is surprising when we consider the huge milling capacity on the on the island.
- Plunkett The grain surplus there was always large, and it was regularly exported, I believe since Roman times. Another point I should perhaps look into is any possible connection between Eling and the navy; naval victualling ships coming up to Eling - that sort of thing.
- Harverson The period you mention would be a rather dead period - after 1713 until the 1740's. They were times of peace. From the 1740's, rebuild- the navy would be big time.

Fig. 1



ELING TIDE MILL - MILL RACE PLAN c.1977.

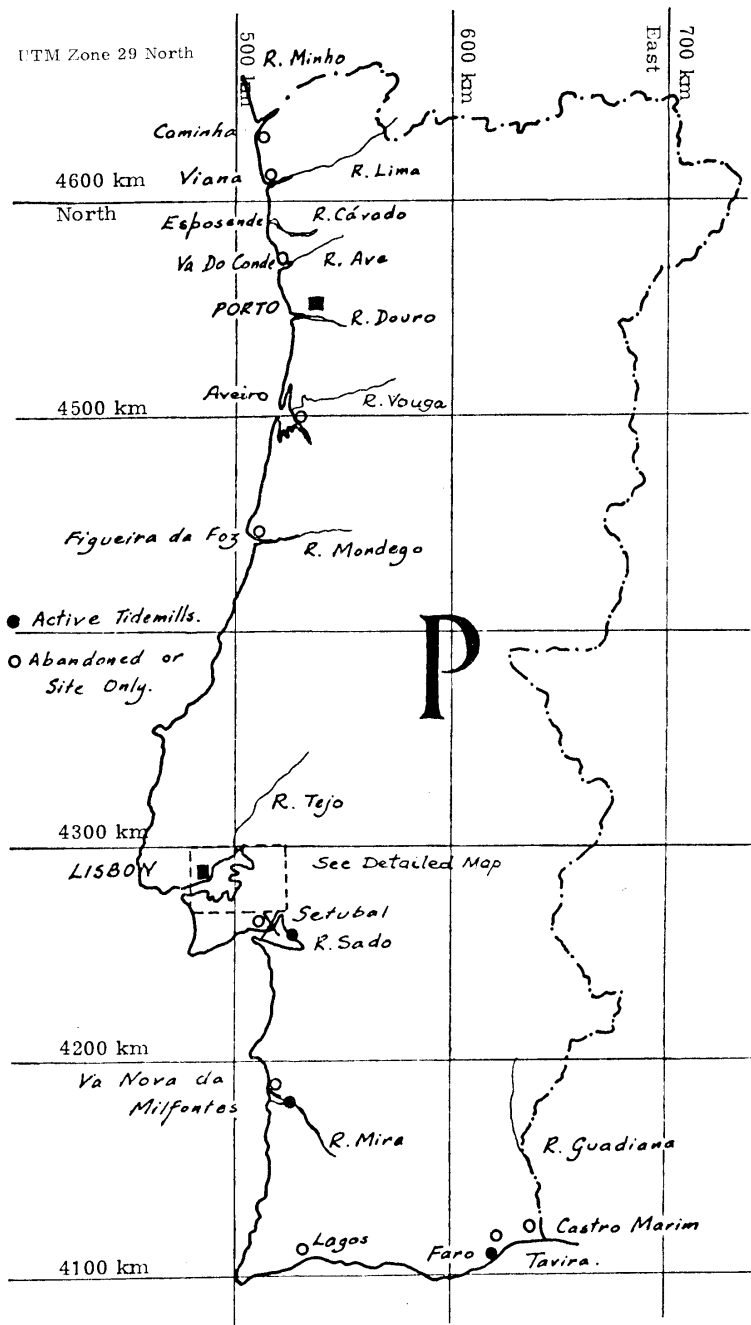


Fig. 2

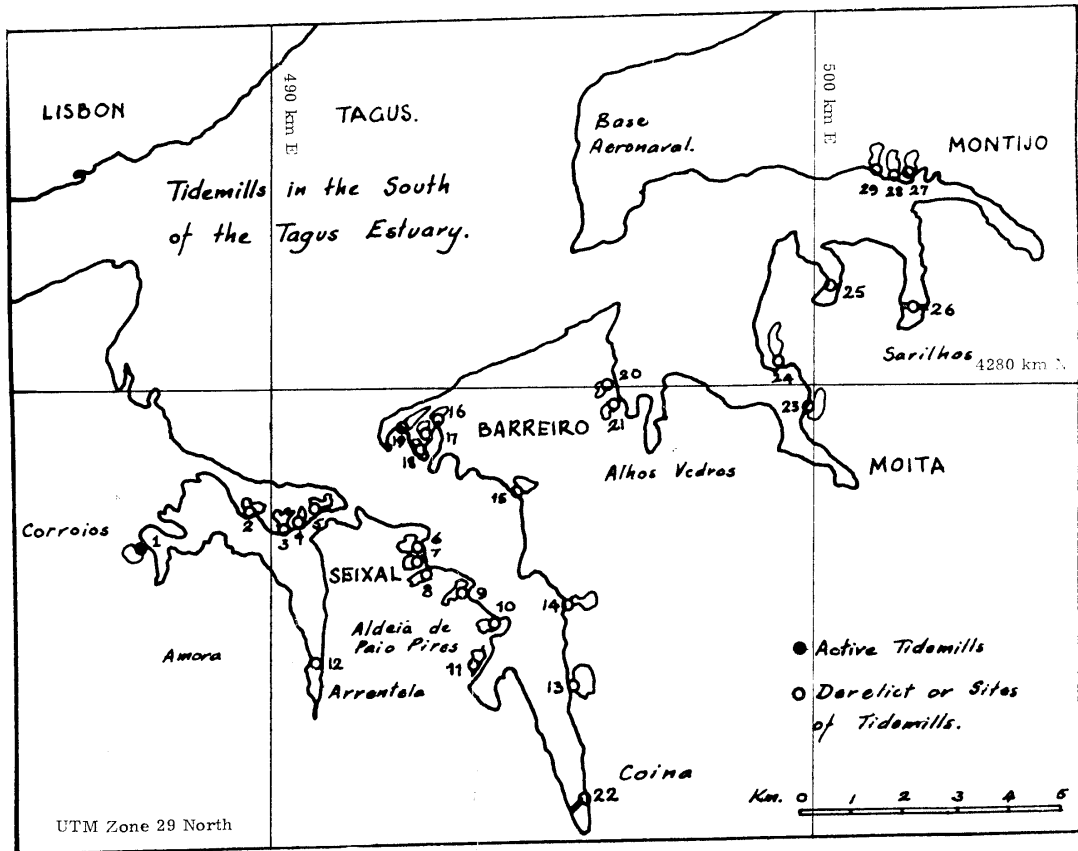
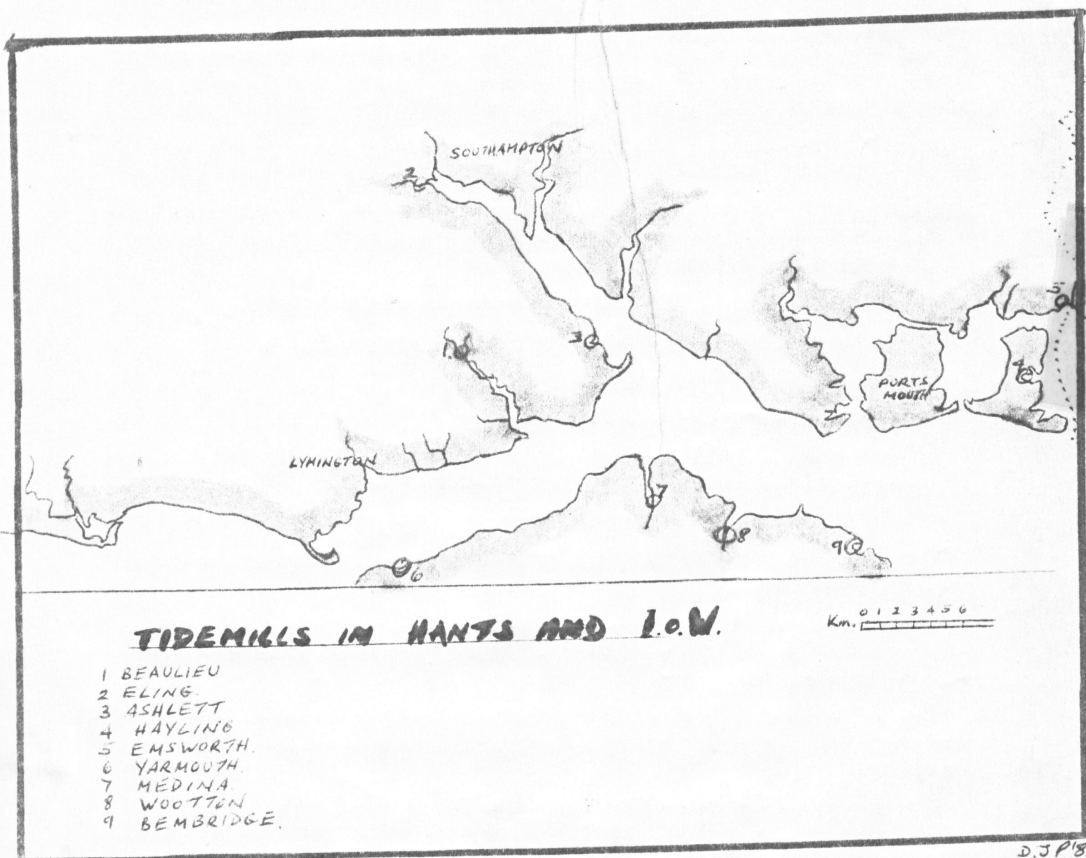


Fig. 3



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Fig. 4