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A STUDY OF
THE COSTS OF BUILDING
A SIXTEENTH CENTURY ESTATE WATER MILL

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OBJECTIVES

There were in Essex during the sixteenth and seventeenth centuries a number of small estate water powered corn mills, predominantly sited away from the main rivers, with artificial mill ponds feed from small streams or springs. The objective of this study is to examine the costs of build and maintaining a small mill using as a primary source the Petre family archives. Also to examine the types of craftsmen employed and sources of building materials etc.

INTRODUCTION

During the sixteenth century the Petre estates possessed several mills. These included water mills in Writtle and Margaretting; post windmills at Mill Green, Ingatestone and West Horndon. There were also horse mills at Ingatstone Hall and Thorndon Hall. It was the practise to let the mills on long leases.

Sir William Petre who had made his fortune in royal service, took in 1538, a forty year lease on the manor of Ingatestone from the abbey of Barking. He was able to purchase the manor in the following year from Henry VIII. There is among the papers of Sir William a document apparently in his hand and dated 1555, on requirements for bringing of water to his house and for making of an over shot water mill. This new mill was to replace a horse mill, which was then to be rebuilt at Thorndon Hall. There is no indication of the intended location of the new mill, which must have been near Ingatestone Hall, possibly by damming a small stream that ran near the hall.

"For the making of my overshot mill

Fyrst a hedd to be well mad on the northsid wher the pale standeth which hedd must conteyn cx yards or more as the ground shall require in lenght est and west. The same hedd to be in breadth and thycknes xvij foot in the bottome and xij foot in the topp and att thatt hedd a myll to be placed.

Item ther must be one other hedd mad on the west side conteyning in length ccc yards which hedd shall conteyn in the sides xv foot in the bottom and xij in the topp.

Item on the west sid of this west hedd ther must be a damme or greatt dich cast for conveyaunc away of the water which must be as long the sayd west hedd and the same damme or dych shall conteyn in breadth at the sowth end xij foot in the bottom and in the topp xvij foot in the bottom and xx foot in the topp the depnes to be as the grownd will require and so as the may allwayes conteyn water.

Att the north end of the sayd damme or dich

ther must be a payre of fludd gates for the stay of the water, a grat and wayre for the stay of the ffysshe; and att the sowt end ther must be also a grat for keping in of the ffyssh.

The sowth hedd must be mad in length est and west lxxxij yards or more as the ground shall require. The thycknes or breadth of this hedd to be as the north hedd and in this hedd must be a fludgat and a grat and on the sowth sid of the sowth hedd ther must be a damme or dych for the conveyaunce of the water of the bradness and largenes of th other damme on the west.

Ther must be also beyond the north hedd one great dych cast from the wear to be mad att the end of the damme ther to the Ryver sufytien for conveyaunc away of the water att all tymes.

Att the myll ther must be a bolt or sluse mad for letting out all of the water of the myll pond as often as I shall think good.

The myll pond shall bear water att the north end viij foot and att the sowt end iij foote att the lest.

I must fynd Tymber nough for the said myll fludd gates grates and wearre and the same cast to be caryed to the place

I must also fynd vij^m yen nals

Item thatt all the trees growing within the compass of this work shall be felled att his charges to be occupied ther.

Item thatt the old ryver shall be purged for rootes and biushes growing within the compass of this worke.

Item for a swannes nest to be mad within this pond.

Item this bargayn being fynished and the mill going the said Flemmyng shall tak down my horse mill att Ingatestone and the same amend and sett upp ageyn att Thorndon hall.

For the well doing of all which premisses the sayd Flemming shall have one hundredth powndes wher of xx li payed in hand, and for the said c li the sayd Flemmyng doth covenawnt to mak and perfectly finissh all and

singular the premisses and the same upholde to be well done in all thinges according to a plat drawen by the said Flemyn remayning with me.

Item thatt is agreed thatt all the heddes both on the north west and sowth sid shall be in hight att lest ij foot when it shall be settled more high then the watter when it shall most over flow."

Why the horse mill was to be moved from Ingatestone to Thorndon is not clear since Thorndon was at this time owned by the Mordaunt family. However it seems that the horse mill remined for a map, dated 1566, of water courses constructed on the site of Ingatestone Hall shows buildings standing over a water course and also mention a myll house. An inventory of Ingatestone Hall taken in 1600 included "the mill house: containing two mill stones, with stabling within millhouse". Mentioned elsewhere within the document are two mill horses.

Sir William Petre died in 1572 and was succeeded by his son John Petre. Sir William's

widow, Anne lady Petre, was to hold Ingatestone for the rest of her life. John Petre therefore required his own house and in 1573 purchased the manor of West Horndon form Lord Mordaunt and began to remodel the mansion house. Around 1575 John Petre moved to Thorndon Hall, which became the family seat for over three hundred years, although the Petre's retained Ingatestone Hall.

Sometime during 1580 a decision was made to build a water mill at Thorndon Hall either to replace or supplement an existing horse mill. It seems probable that although the overshot mill was never built at Ingatestone the plans for replacing the horse with water power was transferred from Ingatestone to Thorndon Hall. Interestingly both sites required the building of a swans nest.

BUILDING THE WATER MILL

Entries in the estate account book of Thorndon Hall shows that construction of the new water mill was carried out in three phases.

1. Construction of the earth works for the mill head or dam.
2. Building the water mill house
3. Erecting the mill machinery.

1. BUILDING THE POND HEAD AND WATER WAYS

Some time during 1580 John Robertson, a pond maker from Gilston in Hertfordshire, agreed for the sum of £16 “to make a head of a pond in West Horndon parke upon the brooke at the northe corner of Parsons Grove”. Payment was to be made by instalments. Robertson must have started work by October since on the 18th he received an initial payment of £8. A second advance of £4 was paid on the 23rd November and work was probably completed by 10th of December when he received a fourth and final payment. Robertson also agreed “ram the penstock” of the new mill for an additional £4, this work was completed by the 18th of December.

It is not clear who designed the mill dam but a decision was made to raise the height of the mill head for on the 19th of January Robertson received a further payment of 14 shillings “to make the head of the great pond 2 feet higher than his old bargain”. In February Robertson received a further 40 shillings “towards his charge of making the head at the great pond”.

Robertson’s bargain was for building the mill head for a fixed sum of money, he would have had to pay the wages of his own men.

Clearing the site and building the wooden penstock was carried out by estate workers who were paid by the day or piece work rates.

During the latter part of October and early November estate carpenters Griffith David and John Mudge were paid for work “about the

water mill”, presumably building the penstock, for this work they were paid a daily rate of 7d the day. The site of the mill pond was cleared of bushes and trees by estate worker old Robert Gill.

At the beginning of April some thing serious happened to the dam which required the return of Robertson to direct the repair of the brack at the great pond head. He was supplied with 23d worth of nails and other items for use on the repair work.

To improve the water supply to the mill pond two springs “on the common near Riddon Oak” were opened out by John Gray of Childerditch who was paid for 4 days work, in March and also for 7 days work at “the swans nest” at the daily rate of 8d the day. In April labourer Richard Mathyn was paid for 2 days work at 9d the day for “casting up earth where the water should run from the mill in Easter week.” The water ways were cleared by labourer Richard Drable who spent 10 days doing so.

2. ERECTING THE MILL HOUSE

On 28th February Robert Lyddy laborer received payment at 8d the day for 8 days work on the site of the mill. Robertson agreed to ram the foundations of the mill, and seems to have agreed being paid daily rates. On the 5th March John Robertson received payment for 5 days work at West Horndon, 31w days about ramming of the foundations of the water mill and 1 day digging a pond in the saw pit yard, he was assisted by his son Robert and three of his men Edw Thomas, Richard Mathyns and Christopher Newell. Robertson’s payment was 8d per day and 6d a day for his son. Thomas received 9d the day for 5 days ramming the foundations of the mill, and Mathyns 8d the day for 41w days on the foundations, Newell was paid at the same rate for 3 days work. Robertson was also assisted in digging work by Childerditch men, John Gray who was paid for 15 days at 8d the day; Wil-

liam Sawkyn, 12 days at 8d the day; and Robert Lynddy 5 days at 9d the day. In March George Raynbeard was paid for 9 days at the foundations of the mill at 8d the day.

In April work on the mill house commenced. Griffith David, carpenter was paid for 21 days work for "framing a house for the water mill" and making a dog kennel at the warren lodge for which he received 6d the day plus meat drink and lodgings. He was assisted by John Mudge, carpenter, who received 7d a day plus meat and drink. Griffith David was still at work on the mill at the beginning of May when he was paid for a further 121w days. On 3rd June John Mudge was paid for 12 days about the mill house at 8d the day and Griffith David for 15 days at 6d the day.

By the end of April the bricklayers had commenced for on the 29th payment was made for 4 days work. Edward Alberd, bricklayer, was paid 12d per day, Robert Alberd's boy 8d, Wm Springfield, labourer, 10d the day and his son James 8d, old Deake, labourer, also received 10d. At the beginning of May, Richard Springfield, bricklayer, was at work on the mill walls, being paid 12d the day with meat drink and lodgings. Richard Drable was serving the bricklayers and making mortar for the walls for this he received 4d the day plus meat and drinks.

By the 3rd of June the roof of the mill was completed. John Foster, tyler, was paid for 14 days tyl ing and daubing the walls and also mending broken walls about the stables. He was paid at rate of 12d the day, his brother William 11d, brother Richard 8d for 16 days and John Hille for 10 days 8d the day.

John Walker's estate map depicts a small two story mill with a pitched roof. That the mill was of more than one story is confirmed by the need for a winch and rope to wind up sacks, mentioned in inventories of mill equipment.

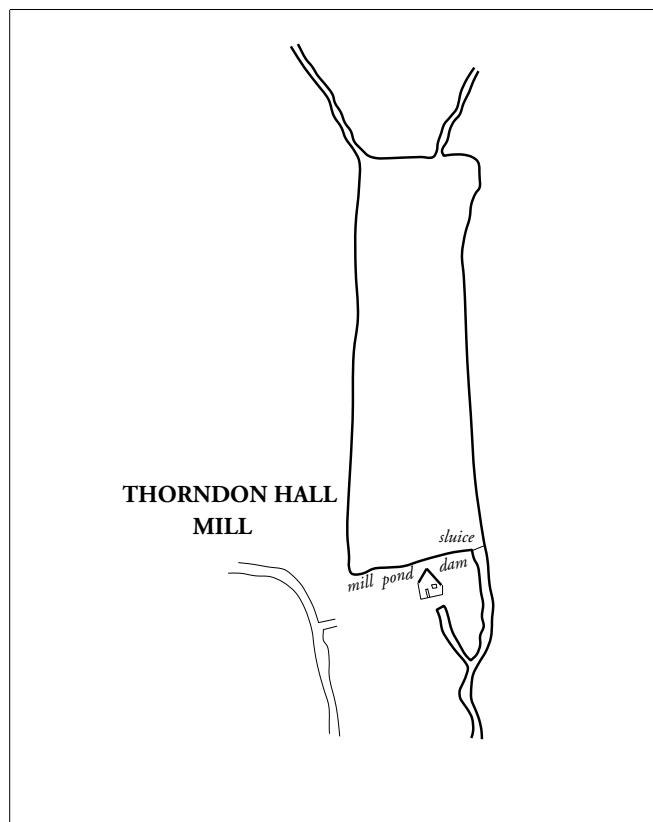
3. MILLWRIGHT WORK

The mill machinery was built by William Cakebread, millwright of Writtle who agreed to "make a water mill at the great pond head at

West Horndon Park" for the sum of £12, and was also to be allowed timber iron work and meat, drink and lodgings for him and his folk. He received his first part payment on 5th of February 1580(1). At the beginning of March, Cakebread made the first of two journeys to London, to obtain millstones, at the end of the month a second journey was made to obtain brasses for the mill machinery.

There is no record of the type of machinery fitted in the mill, however the lists of iron work supplied to Cakebread by the Horndon smith, Richard Richards do give an indication. From this evidence the mill appears to have been equipped with a single pair of stones driven from a water wheel through lantern (trundle) and pinion gearing.

John Walkers map places the mill building on the side of the mill dam, rather than astride it. This would seem to indicate an overshot water wheel. The height of the dam, as it now stands, is sufficient for a overshot wheel. However the present shape of the mill pond differs from the Walker map, possibly the pond was at some later date landscaped and the dam raised and strengthened.



4. THE COST OF BUILDING THE MILL

Estimating the total cost of building the new water is difficult for a number of reasons. The cost of timber and bricks is not stated. The actual labour cost can only be approximated since payments noted in the estate book are sometimes for work on the mill and around the estate, also the true value is unknown where payments included allowances for meat, drink and lodgings.

Building the earth dam, digging the water ways and erecting the penstock to control the water cost around £24. The total cost of building the mill house can only be estimated, since building materials, such as brick and timber, supplied from the estate were not costed. However approximate labour charges for various stages of construction can be obtained from the account book.

The labour cost for digging and ramming the foundations came to around 38 shillings, carpentry work 46 shillings and laying bricks 55 shillings, allowing for food and drink an amount in excess of £7. For tiling the roof and plaster-

ing the walls the cost of labour and materials was some £12. The outlay for erecting the milling machinery was approximately £18 plus food lodgings and timber.

The total expenditure for building the watermill at West Horndon may have been as high as £70.

As a comparison, of expenditure, the proposed overshot mill at Ingatestone was to cost £100 including the cost of dismantling, transporting and rebuilding a horse mill from Ingatestone to Thorndon. At Fristling Hall water mill, rebuilt about the same period, £25 was spent in repairs. This involved scouring the river so as to enlarge the mill pond, building new sluices and repairs to the water wheel and gearing. Although the cost of felling timber trees and carting them to Fristling mill were noted in the accounts no charge was made for the timber. However monies received from selling the bark and also tops of the trees were recorded.

TRADES OF CRAFTSMEN

MILLWRIGHT

William Cakebread, who was also involved in the maintenance of the the horse mill at West Horndon, was recorded as a millwright in the estate accounts, whereas the reconstruction of Fristlings Mill in Margaretting, also part of the Petre estates, was carried out by Purle *the myller*.

A study of late sixteenth century Essex wills would seem to indicate that most of those who chose to call themselves millwrights also had milling interests. Millwrights George Cooper of East Mersea (1585) and John Payne of Dedham (1568) make no mention of mills, in their wills. Other millwrights did however make mention of leases in their wills. Robert Underwood of Wix (1568) leased a windmill in Wix; John Carrier of Little Hallingbury (1568) leased a mill in Gt Shelford, Cambs; Thomas Hardye of Fyfield (1583) leased Little Laver windmill.

William Cakebread, from Writtle, does not seem to have been a tenant at either Writtle windmill or one of the two Writtle water mills, although he may have had interests elsewhere.

PONDMAKER

There seem to be no surviving records of a pond maker in Essex which may explain why John Robertson had to be brought in from Hertfordshire. The work he was paid for included building the earth dam for the new mill, ramming foundations and digging a pond in the saw pit yard.

METAL WORKING TRADES

BLACKSMITH

Iron work was supplied by Richard Richards, blacksmith of East Horndon, who was paid by weight of item supplied at a typical

rate of 4d the pound weight for heavier components and 21wd the pound for smaller items such as hinges and hooks. Richards also shod the estate horses and provided iron work for the horse mill, and other items required around the estate and household.

LOCKSMITH

The source for locks was from London locksmiths. This was presumably the most convenient source for locks, although Saffron Waldon seems to have been a centre of lock making during this period.

NAILMAKER

The source for nails was from a Barking nailman.

WOODWORKING TRADES

SAWYER

Timber from the estate was sawn in a saw pit in the Saw Pit Yard. However some timber was sawn, on site, in the warren, this required a saw pit to be dug on site, by Father Gill who was paid 8d for doing so.

The estate sawyer, Luke Middleton was paid piece work rates. By the hundred for slitting work or sawing boards. For preparing baulks of timber he was paid per *breaking carf* by the foot.

In April Middleton was paid for sawing of 3000 slitting work for the flood gates and 800 of boards at 20d the hundred. For a breaking calf of 23 feet he received 18d.

For sawing 21 feet of “breaking work” in the Warren, for the flood gates, he was paid 1d per foot. In May he was paid for 500 planks and 300 of “slitting work” at 19d the hundred.

CARPENTER

The rates for the carpenters seems to have be variable. Work on the penstock was paid at daily rates of 7d, whereas work on framing the mill house was paid at a higher rate of 6d plus meat drink and lodgings, and 7d plus meat and drink. Other work on the mill was paid at 8d or 6d the day.

JOINER

Payments for wages recorded in the estate books show that the trade of carpenter was separate to that of the *joyner* who was also paid 8d the day. There is no record of a joiner working at the mill.

COOPER

The tunn (the wooden cover surrounding the mill stones) was evidently circular as this was supplied by a cooper, Thomas Stevens of Ingatestone, who was paid 12/- in July 1581, for "a myll bynne that standethh about the water mill stones."

BUILDING TRADES

BRICKLAYER

The bricklayers were paid at the daily rate of 12d or 12d plus meat, drinks and lodgings for the master bricklayer Richard Springfield. The bricklayers were served by labourers and "hod" carriers who were paid lesser rates. The Springfields were mainly employed in rebuilding the mansion house.

BRICKMAKER

Brick makers were paid piece work rates. Edward Grantan was paid 10/- for making and burning 4400 of bricks made by him.

LABOURER

The standard daily rate was 8d the day although some work commanded a higher rate of 9d or 10d. Serving the bricklayers was 4d plus meat and drink.

PLASTERER

Daubyng the mill walls was undertaken by the Foster brothers on daily rates. They also carried out repair work on the walls of farm buildings.

Daubyng was work of a coarser nature than that required for interior work in the mansion house. The accounts show that during the remodelling of the mansion a *playster* was employed for *playstering* the walls and ceilings of rooms. Remuneration for plain plastering of walls and ceilings was per square yard but work on the elaborate fretted ceilings of the principle rooms was carried out by contract, a new bargain for each room. Richard Bardfield ceiled the Great Gallery for £20.

TILER

Fixing the roof tiles was work for a *tyler*. This was carried out by the Foster brothers on daily rates which varied between 12d for the head tiler and 11d or 8d the day for those assisting him.

CARTER

In February John Gamonte was paid for 5 days work driving the cart loaded with timber for the water mill at 31wd the day. On the 4th June Gamonte was paid for 15 days carting of brick tile and timber for the mill at 4d the day plus meat and drink also Edward Stokes for carting bricks from Branstone clamp to the new mill at the same rates.

BUILDING MATERIALS USED

BRICKS

Production of bricks was carried out on the estate at Bramstones kiln sited “near the parsonage”. There is no record of the number of bricks used in building the mill. The kiln was fired with brush wood off the estate.

MORTAR

The estate possessed a brick lime kiln which was maintained by the estate bricklayers. Richard Springfield in May 1581 was paid 4d plus meat, drink and lodgings for mending the kiln. Loading the kiln was work for a labourer. Richard Drable was paid for *slating of lyme* and making mortar.

Mixing mortar was a job for a labourer. In April Richard Drabble was paid for 4 days work in making mortar for the walls of the water mill at a daily rate of 8d.

In 1580 a new mortar sieve was purchased for the sum of 9d. This would seem to have been an expensive item equal to a days wages.

SAND

Coarse sand came at no cost from pits on the estate and was dug or *stubbed* by labours on daily rates.. There is therefore no specific mention of sand for the mill

LIME

Lime was required for making mortar and plaster. Ten loads of *lyme* were used at the mill. This was supplied by John Bayliss, lyme man of Averly, from pits at Purfleet at 14/- the load.

The chalk pits at Purfleet belonged to the manor of West Thurrock and were leased to London business men who in turn sub let the pits. In 1574 2 *lyem kills* and 2 *choake clyffe* were leased to Richard Farmer gentleman of

London for a period of 19 years at £10 19s 0d per annum. The chalk pits being occupied by Jn Arden and a Mr Mellarme. In 1581 Farmer's lease was transferred to Thomas Broke Gent. In 1594 Chris Holford, Gentleman of Islington, the Lord of the manor, leased a chalk cliff and lime kiln with two houses to Wm Taylor, a mason in Barking, for 21 years at £16 and 2 capons per annum. Taylor's lease contained a clause stating that “lyme to be made and burnt at the said lyme kill of the chalk to be digged out of the said cliffe”. By 1610 this lease been transferred to a Edmund Skinner. There are no surviving records dated before the sixteenth century to show when these early lime kilns and chalk pits at Purfleet were first developed. However this give an early date in the exploitation of an important mineral source, chalk, which was used not only by South Essex farmers as a fertilizer but also in the manufacture of lime and cement.. The chalk pits were later expanded into West Thurrock and Grays, and in the nineteenth century the area became a centre for the large scale manufacture of cement.

Lime was transported from Purfleet in horse drawn wagons or by water in 10 ton chalk boats. The evidence for the size of chalk boat is found in a covenant attached to Taylor's lease concerning mending sea walls and banks with 14 *faires* (loads) of Chalk, “every faire containing 10 tons of chalk according to the burthen of chalk boats that usually carry same”.

HAIR

The manufacture of daub required hair to bind the lime mix together. This was obtained from local tanners. In May 1581 supplies of *parietting hear* were obtained from Welde, tanner of Margaretting, at 31wd the bushel and Waylett, tanner, of Brookstreet who sent 30 bushels at 3d the bushel.

The supplies of hair from local tanners

possibly indicate centres of leather manufacture. The hair was a waste product from the preparation of the animal hide.

ROOFING TILES

These were obtained from Walter Guy of Great Warley, who supplied 7000 *playne tyle* from his kiln at Heron Green in May 1581 at 7/6d the thousand. The total cost being 52/6d

TIMBER

Wood for the mill came from trees standing on the Horndon estate primarily from the “warren”, after felling the tree was topped and sawn on the spot, this required a saw pit to be dug. The timber was used green.

IRONWORK

On 9th January 1580(1) Richards was paid for 4 “new myll bylles well steeled at both ends to serve the water myll stones” (ie to dress the stones) at 8d each, total cost 2/8d. This shows the price of steel was such that it could only be used for cutting ends of the mill bills which were used for dressing the mill stones. The price is less than the 12d allowed, in November 1580, to William Tomlynd for a *myll byll to beate the stones*, to be used in the horse mill. Tomlynd was also paid for a spade and shovel for use in the mill and slaughter house.

At the end of March there were payments for 2 *gudgions*; 2 little bolts and 2 hoops for the water wheel, weighing in total 78lbs at 4d the pound; total cost of 26/-. Also 8 *dove tayles* for the water wheel and 8 bolts for the *cogge wheele* weighing 50lbs at 4d the pound; total cost 48/4d. 1 *spynkle and ring* for the mill stones weighing 72lb, at like rate, cost 24/-.

In June Richards received payment for an iron bolt to hang a lock upon for the penstock weighing 5lbs, also 3 pairs of *hynges and hooks* for the mill at a cost of 21wd the lb. A further payment 2/10d was made to Richards on the 29th of June for 2 bands of iron for the

trundle (ie the gearing) of the new water mill and for a *new spilyng yeon to wedge the gudgion and boxes of that myle*.

BRASS-WORK

Brass was used for bearings in the mill machinery. Cakebread received ten shillings on his going to London to purchase *brasses* from suppliers in London. This may possibly be because there was little brass working being carried out in Essex

NAILS

Nails were brought in bulk and are not listed specifically for use at the mill. The major supplier, during this period, was Edward Cartright *nayleman* of Barking.

The type of nails supplied to the Horndon estates were:

doubletons (double tens) at 20d the hundred.

singletons (single tens) at 10d the hundred.

six penny nails at 6d the hundred
three penny nails at 3d the hundred.
hooke lathe nails at 15d the hundred.
round head nails.

LOCKS

Locks for the mill were obtained from Thomas Scott, smith, London who received in July 1581 5/- for a stock lock for the mill door. The household accounts show Scott, who was presumably a lock smith, as the main supplier of locks to the Horndon estates.

MILL-STONES

The stones for the new water mill were purchased in London. Although there is no record of the cost paid. Cakebread was allowed 8d the day to go to London to purchase stones, receiving in total five shillings. The type of mill stone installed in the

mill is not recorded, however the need for “new myll bylles well steeled at both ends to serve the water myll stones” would seem to indicate that french burr stones were fitted.

Millstones seem to have been expensive items, the cost based on the thickness of the stone.

A single stone, eight inches thick, purchased for Fristling Hall mill which was rebuilt sometime in the 1580's cost 54/8d. This stone was obtained in Chelmsford from Durrant the miller, the cost of carriage from Chelmsford to Margaretting being five shillings.

A lease on a tide mill in the manor of Great Wakering dated 1587 contained the following covenant concerning the thickness of the mill stones:-

The said Crissicke covenanted to leave two good french mylstones ready and lyinge in the mill the stones to be bredth six foote of assise & one to be fifteene inches thicke at the hole and the other nyne inches thicke at the

hole, or sixtene shilling for everye inche the said stone shall want of thikness.

The term “french stones” was used to indicate the type of mill stone. French burr stones were built up from segments of a very hard stone, known as chert, imported from northern France, these are considered to be the best for milling. A softer mill stone was the peak stone. These were cut in one piece from millstone grit quarries in Derbyshire and Yorkshire. Early hand querns excavated in Essex have been found made of pudding stone, from Hertfordshire, or “cullin” stone, a lava rock from the Mayen district of Germany shipped via the port of Cologne, hence the name. Millstones for Essex were brought to Colchester or London by sea.

LEASING THE MILL

The water mill was worked in conjunction with a slaughter house, granary and malt house, all previously combined with a horse mill which in March and July 1581 was out of repair and needed the attention of Richard Richards. It is not clear whether the mill etc were leased or formed part of the household.

In an inventory taken in 1608 the water mill was described as a “myll for wheat and malt furnished to grind same”.

An inventory was taken in the October of 1592 at the leaving of William Moll and the delivery into the charge of Peter Bradwyn. Bradwyn left in 1595 when Robert Pigg took over. Pigg stayed until 1608 when Robert Aboroll took over. Another inventory was taken in 1611 but this gives no names. In 1595 there was a new spare stone lying by in the house, however this seems to have been used by 1608. Other items include the 2 mill bills made by Richards the smith, a rope and winch to wind up sacks, a stock lock and a key to the door with a ring on the outside, the penstock had an iron bolt going through it with a hanging lock and a key there to.

A number of tools were kept at the mill. These included a hand saw, hatchet, hammer, crow bar and a *spiling chizell of yron* (the use

of which is unclear). There was also a *skoope-scoop* and a *towle disshe of a quarter* - a quarter measure.

The date when the water mill went out of use is unknown. A rental survey of the Petre estates taken in 1728 records only the post windmill at West Horndon.

The mill pond seems to been well stocked with fish. In 1641 Thos Reave, Wm Madelay, John Witham and Wm Mott were accused of pulling up the sluice in the pond, at West Horndon, and stealing 500 carp and other fish to the value of £20 and doing likewise at the ponds on Childerditch common, stealing fish to the value of £10. A Thomas Reeve leased the nearby windmill, High Mill, paying £8 and 4 capons or six shillings per annum. The pond is today much frequented by anglers

Old Thorndon Hall was pulled down around 1760, the great pond was at some latter date landscaped, the overall shape of the pond as shown on modern maps is different from that drawn on Walkers map, it may be that the old mill dam was raised and strengthened.

The only memory of the watermill is now found on ordinance survey maps which record the name of Mill Wood lying below the dam.

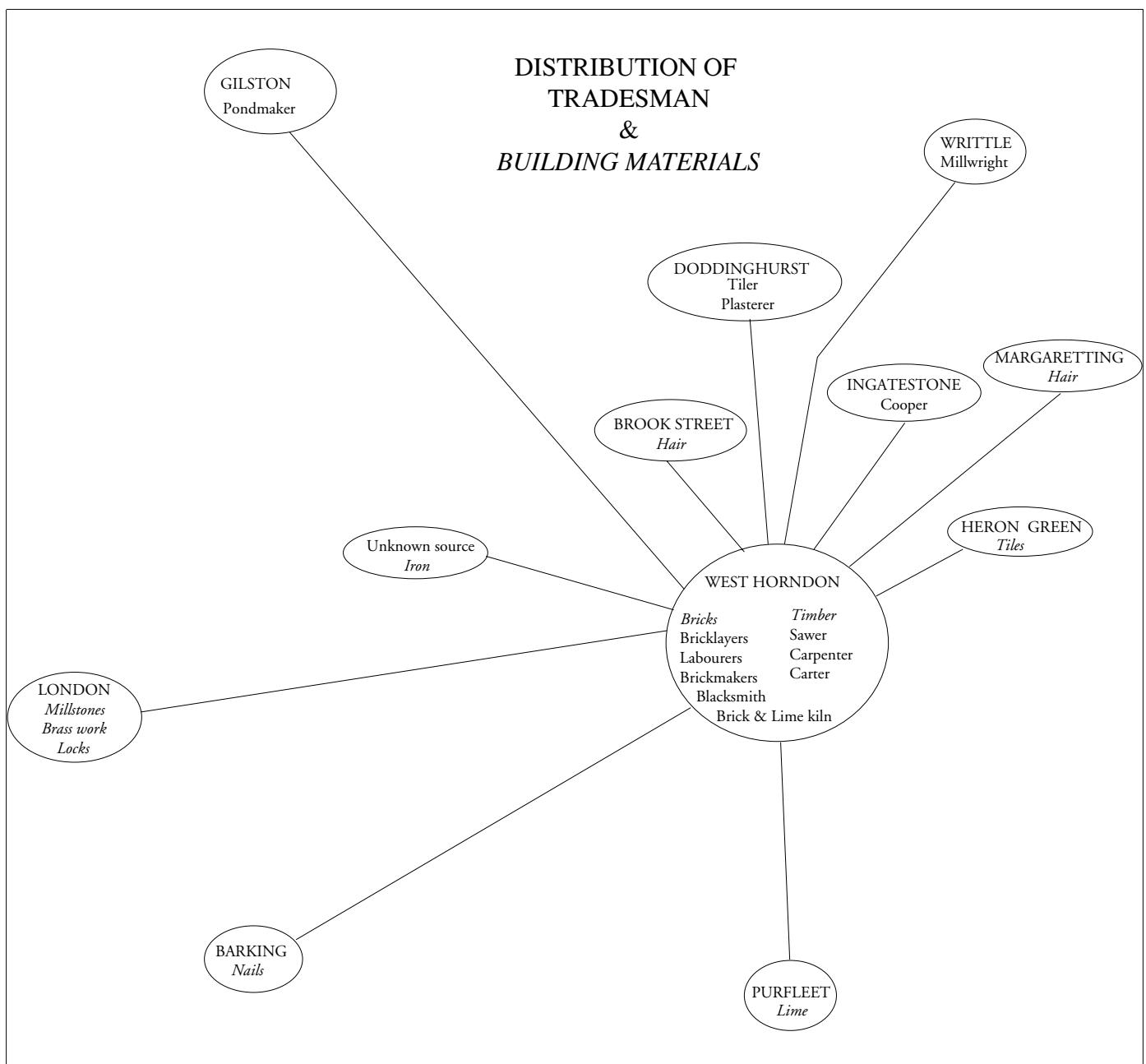
CONCLUSIONS

This research revealed some of planning process of building a small water mill and who erected it. The method of accounting used in the estate records did not allow a true cost of erecting the mill to be arrived at. This may have been because the mill was built to serve Thorndon Hall rather than to be let on lease.

The cost remodelling of the mansion house which took from about 1575 to 1595 and building the new water mill was it seems

paid for out of Sir John Petre's annual income.

In the field of civil engineering and mill machinery a sufficient level of expertise was not readily available among staff normally employed on the Petre estates. In these two areas outside contractors were employed who undertook the work at a fixed price or "bargain", payment being made in stages. The distances which these contractors had to travel were some twenty miles for the pond maker and ten miles for the mill wright.



The erection of the mill house was well within the ability of those skilled tradesmen employed on the estate, many of whom would have been involved the rebuilding of the mansion house. The method of remuneration was daily rates of pay which on occasion included lodgings and or food, however piece work rates were applied to the preparation of timber. The division of labour into trades such as carpenter, bricklayer or labourer are clearly recognizable with those to be found on any modern building site. The only trades not employed on the Horndon estate were those of plasterer and tiler, who were brought in to carry out the work on daily rates. Also the skills of

the estate joiners and carpenters were not sufficient to make the circular cover or “tun” for the millstones as this had to be purchased from an Ingatestone cooper.

In terms of building materials, for the water mill, the West Horndon estate was clearly self sufficient in bricks and timber but not roofing tiles which had to be brought in from a tile maker a few miles away at Heron Green. Records would seem to indicate that no value was placed on timber and bricks used within the estate although timber sold was accounted for as were wages paid for making bricks or sawing timber. The main source for finished goods was London.

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