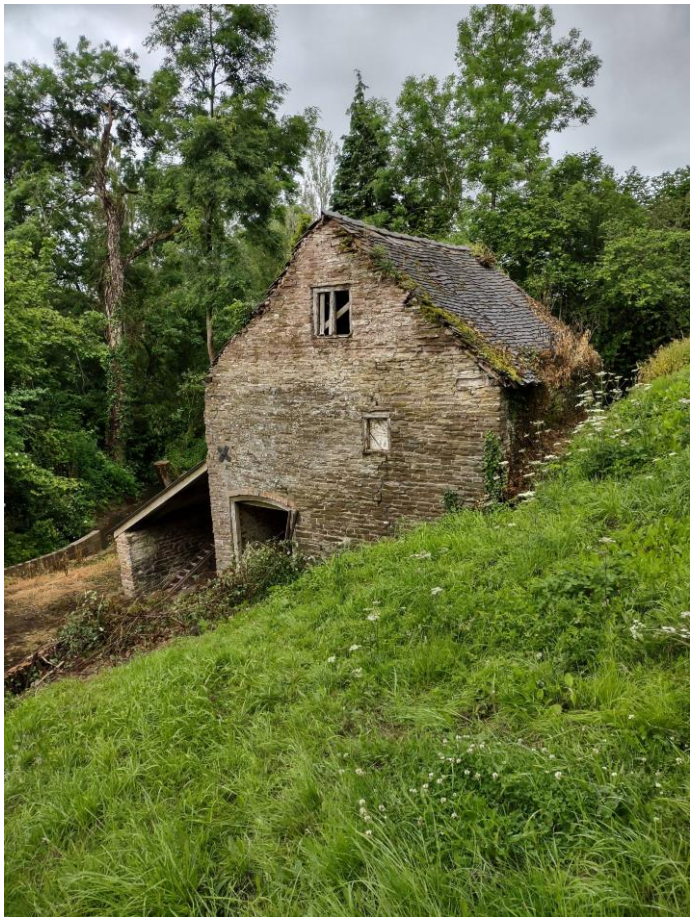
THE CORN MILL, Clee St Margaret

SURVEY of WATER-POWERED MILLSTONES

July 2021



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1.0 INTRODUCTION

This survey was instructed by Mr Williams on 7th April 2021 and undertaken on 6th July 2021.

The Corn mill at Clee St Margaret is a three storey mill and is Grade 2 listed entry number 1470405. According to the listing this dates back to around 18th Century. A brief history as set out on Historic Englands website is below:

"A mill is recorded at Clee St Margaret in the Domesday Book of 1086. The present house (with adjoining barn and pigsty), mill and bakehouse all appear to date to the C18 and all three buildings appear on the 1842 tithe map. The buildings are all shown on the first edition Ordnance Survey Map, and the revision of 1903. The 1903 edition labels the mill as a corn mill. The same map shows a channel running north then east from the Clee Brook meeting the pond north of the mill, and a channel running back to the brook south-west from the mill. The lean-to on the south elevation of the mill doesn't appear on the tithe map, but does on the first edition Ordnance Survey. The bakehouse is depicted as a smaller structure on the tithe map than on later mapping, suggesting that it could have been extended or rebuilt in the late-C19. All maps show the addition of the barn and pigsty to the house.

Tithe apportionment records from 11 August 1847 show Edward Turner as the landowner and Richard Lawrence as the occupier of land and premises described as 'House Mill Pool Building Yard and Garden'. Anecdotally, the mill was last in use in the 1930s. The waterwheel is no longer in place. The house was last renovated in the mid-C20 when it is thought the dormers to the front of the house and the fireplaces were added.

Before the second half of the C19 mills supplied local markets, were generally small-scale and typically wind- or water-driven. Up until the C18, watermills were typically single-storey and were often attached to the miller's house. The decades either side of 1800 saw the construction of many new multi-storey watermills. These had attic storage, feeding to the milling floor below, that in turn was set above the ground floor where the flour was bagged and dispatched, all making good use of gravity in the processing. This is the case at Clee St Margaret where the mill is a detached building over three floors."

2.0 CURRENT CONDITION

The Mill was designed before current legislation and codes of practise came into existence. Much of the structure and machinery do not therefore comply and the proposals set out in this report will not ensure compliance. Specific codes and legislation apply to the sack hoist, lightning conductor, guarding, electrical systems, etc, which the Owner should have surveyed by specialists in these fields.

As millwrights and metalwork conservators Wallis Conservation Ltd T/A Dorothea Restorations, does not offer any opinion on the structural adequacy or fitness for purpose of any parts. The Owner may need to engage the services of a structural engineer.

Some elements of the propose works may require listed building consent, which it is the Owners responsibility to obtain.

Dimensions recorded in this report are for guidance only, and must not be relied on by contractors undertaking subsequent works.

The Mill was constructed in Imperial measure, so this has been used during the inspection. For conversion:

1 inch = 25.4 mm.
1 foot = 305 mm.

Excluded from this report is any investigation to the building structure either externally or internally.

2.1 Mill pond

Currently the mill pond is dry and heavily overgrown. It is not known if it can hold water or where the water supply may come from. To the western edge of the pond there is a break in the walling which would have housed a by-pass sluice gate enabling water to be released from the pond back into Clee brook around the side of the mill.

A red mark on the internal face of the wall pond shows the line at which a cast iron feed pipe provided water to the launder (now missing) Whilst this Cast iron feed pipe is evident on the other side of the wall no trace could be seen within the mill pond itself. This will require investigation and re-instating if missing. There should also be a way of controlling water into the pipe – again this could not be found.

The above picture shows the remains of the cast iron feed pipe (14" diameter), the end is broken and the pipe is rusting. There is good wall thickness left on the pipe so it could be re used if the other end and internal stability of the pipe can be ascertained.

2.2 Launder, waterwheel and wheel pit

As seen in the photograph above, the launder and waterwheel are missing. The remains of the waterwheel shaft are evident and scrape marks on the side wall give a good indication as to the wheel diameter. Using this evidence we believe the wheel was around 12ft in diameter and 3ft in width. The shaft (now cut off) is 16" across flats and would have extended by a further 4ft to sit on a bearing block now no longer existing. Due to the pronounced scrape marks it is thought that the wheel consisted of cast iron shrouds, probably a cast iron central hub with the spokes, buckets and sole boards bring in timber. If as the history suggests, there has been a mill on this site for century's, it would originally have been all timber. Therefore the scrape marks seen could be from a latter style of wheel.

The cast iron pipe is broken at its outer most end. This may mean it continued as a pipe and supplied water to the wheel with timber supports underneath it. Alternatively, it may have fed a timber launder, supported on a timber trestle which in turn fed the waterwheel. This would have a control flap set within it to control the follow of water over the waterwheel. Opening the flap would waste water behind the wheel thus stopping it.

The waterwheel wheel pit is currently full of soil and will require excavating to enable any new wheel to sit at the correct height. It was noted that the soil level within the pit needs to be reduced by around 4ft. At the base of the wheel pit there should be a defined bottom, i.e. bricks, stones possibly slate or puddled clay. This, if discovered should be kept and will help decide the actual wheel diameter.

The tail race will require excavating back to the river with a slight slope on it enabling water to run away from the mill.

Waterwheel shaft remains however this has been cut of at the outside wall and is now too short. It is therefore missing its outer gudgeon and journal.

There is evidence internally of what this should look like. Both bearings are missing along with their plumber blocks and timber beds.

2.3 Hurst frame

The hurst frame is the main internal timber structure that carried the millstones, allows for their adjustment and supports the main upright post. There is evidence of significant historic woodworm within the remaining timbers although nothing active could be seen. Two vertical posts nearest the waterwheel wall are rotten at the bottom and require new base sections around 1ft in length. Both sections supporting the millstones are rotten or missing along with both tentering arms. The main front horizontal timber is also missing. These timbers are generally 11" x 10". The main timber supporting the upright shaft appears generally sound apart form the last 2ft at the southern (downstream) end of the mill.

2.4 Pit Wheel

Pit wheel would sit on the waterwheel shaft and drive the wallower. It is missing completely and the pit in which it sat is full of soil and debris, this will require clearing.

2.5 Upright shaft, Wallower and Great spur wheel

Upright shaft is the main vertical timber shaft that takes the drive from the waterwheel to all other operating elements. It passes from ground floor to first floor and is sat on a single bronze bearing within the hurst frame. This base bearing requires renewal. Due to uncertainty about the 1st floor stability the upper bearing could not be inspected closely but appears serviceable. The shaft itself appears serviceable.

The Wallower is a small gear sat underneath the spur wheel and takes a drive from the pit wheel. This is completely missing and will require replacement.

Great Spur wheel, this is the largest wheel, sitting above the wallower and attached to the upright shaft. This drives the stone nuts and subsequently the millstones. The one here is timber. Its main structure appears solid however all the teeth have suffered from woodworm and are now crumbling. These will all require replacement (112 nr). Some structural work may be required to the Spur wheel once it becomes operational if it starts to flex or move.

2.6 Stone nuts and millstones

There are two driven millstones within the mill, one downstream and one upstream. Both are missing their drives (stone nut and shaft) from ground floor level. What remains of the millstones are the bedstones, both running stones are now missing. Both bedstones appear to be French burr types with the downstream stone being in significantly better condition. The upsteam bedstone has been significantly damaged and is beyond repair. Both have fallen through the floor and require resetting at the correct level.

It is suggested that only one set be made operational and this in our view should be the downstream ones. A new running stone, stone furniture and control ropes would be required for this. In addition, all feed chutes and hoppers will be required new as none exist.

2.7 Crown Wheel, and layshaft

At the top of the upright shaft there is the crown wheel. This drives a lay shaft from which drives could be taken via flat belt pullies to other machinery such as a sack hoist of flour dressing machine.
The crown wheel appears stable however most of the teeth are missing, those remaining can be used as evidence to reproduce new.

Raising and lowering arm for the lay shaft is complete and assumed operational.

Due to the condition of the floor close access to the lay shaft could not be gained, however the iron shaft and bearings appear serviceable as do the timber drums (however based on the woodworm found on the ground floor these may require replacement when close access is available.)

Second floor access was not available due to safety concerns, however looking through the sack hoist hatch the remains of the sack hoist control mechanism can be seen and believed to be repairable.

3.0 WORKS TO ENABLE ROTATION of the waterwheel and current internal machinery.

3.1 Mill Pond

- New bypass sluice gate manufactured in Oak to traditional methods
- Clear and seal the pond and provide water into it (by others)
- Locate and check condition of outlet pipe / renew if required
- Install gate valve on outlet pipe to enable control of water (this may require the pipe to be renewed anyway)

3.2 Launder, waterwheel and wheel pit

- Design & manufacture new launder in oak with control flap and mechanism
- Design and manufacture new waterwheel complete with new oak shaft, internal and external bearings. If possible re use internal gudgeon
- Dig out water wheel and pitwheel pits (by others)
- Dig out tail race channel back to Clee Brook (by others)

3.3 Hurst frame

- Rebuild hurst frame saving as much of the original as possible
- Where required use oak to replace missing timbers or scarf in new
- Re install tentering control arms
- Treat remaining wood with a suitable woodworm treatment
- Rebuild / point stone plinths as required (by others)
- Remove later addition animal pen boarding
- First floor stabilisation and re boarding (by others)

3.4 Pit Wheel

- Design and produce pattern for new pit wheel
- Cast new pitwheel in SG iron and fit to waterwheel shaft

3.5 Upright shaft, Wallower and Great spur wheel

- Lift upright shaft and check / renew foot bearing
- Check upright shaft top bearing, clean, possibly renew
- Design and build wallower
- Renew all teeth in the great spur wheel
- Possible repairs to the main spur wheel structure

3.6 Stone nuts and millstones
- Re instate and level downstream bedstone
- Level upstream bedstone but then no further works

3.7 Crown Wheel, and layshaft
- Replace missing teeth to crown wheel
- Clean and paint lay shaft ironwork
- Overhaul / replace lay shaft bearings

3.8 Preliminary requirements
- Design works for new components
- Toilet (assumed available on site,)
- Hot and cold running water (Assumed available on site)
- Somewhere to sit and dry out (Assumed available on site)
- Scaffold towers

If the above items, which have currently been exclude are required they would be £750 per week)

4.0 WORKS TO ENABLE MILLING
This is in addition to the works noted under section 3.0

- Manufacture a composite running stone for the downstream set
- Design and manufacture tun and all millstone furniture including control lines
- Design and supply 1 new stone nut and shaft to the downstream set
- Check and re pack neck box to downstream bedstone
- Re instate sack hoist
- Re instate trap doors
- Provide new flat belts to drive sack hoist
- Overhaul lay shaft timber drums
- Re instate / renew grain feed chutes
- Install new grain hopper on top floor
- Commission and set up for milling

Notes: milling will put significant vibration through the historic structure so all floor joists, roof and external repairs must be carried out before trying to mill.

There will be a requirement for keeping everything clean particularly if the intent is to use the flour. You would not be able to sell the flour for human consumption without gaining a licence to do so from the Environment Agency and they will want to check over the mill for hygiene requirements, grain storage, cleaning regime etc.. before considering any application. You would also need to consider how the flour is bagged and stored.

Staircases will need to be installed to gain access to the upper floors

The above does not take into account any Health and Safety requirements for barriers and protection should you wish to open the mill to the public.

5.0 ESTIMATES

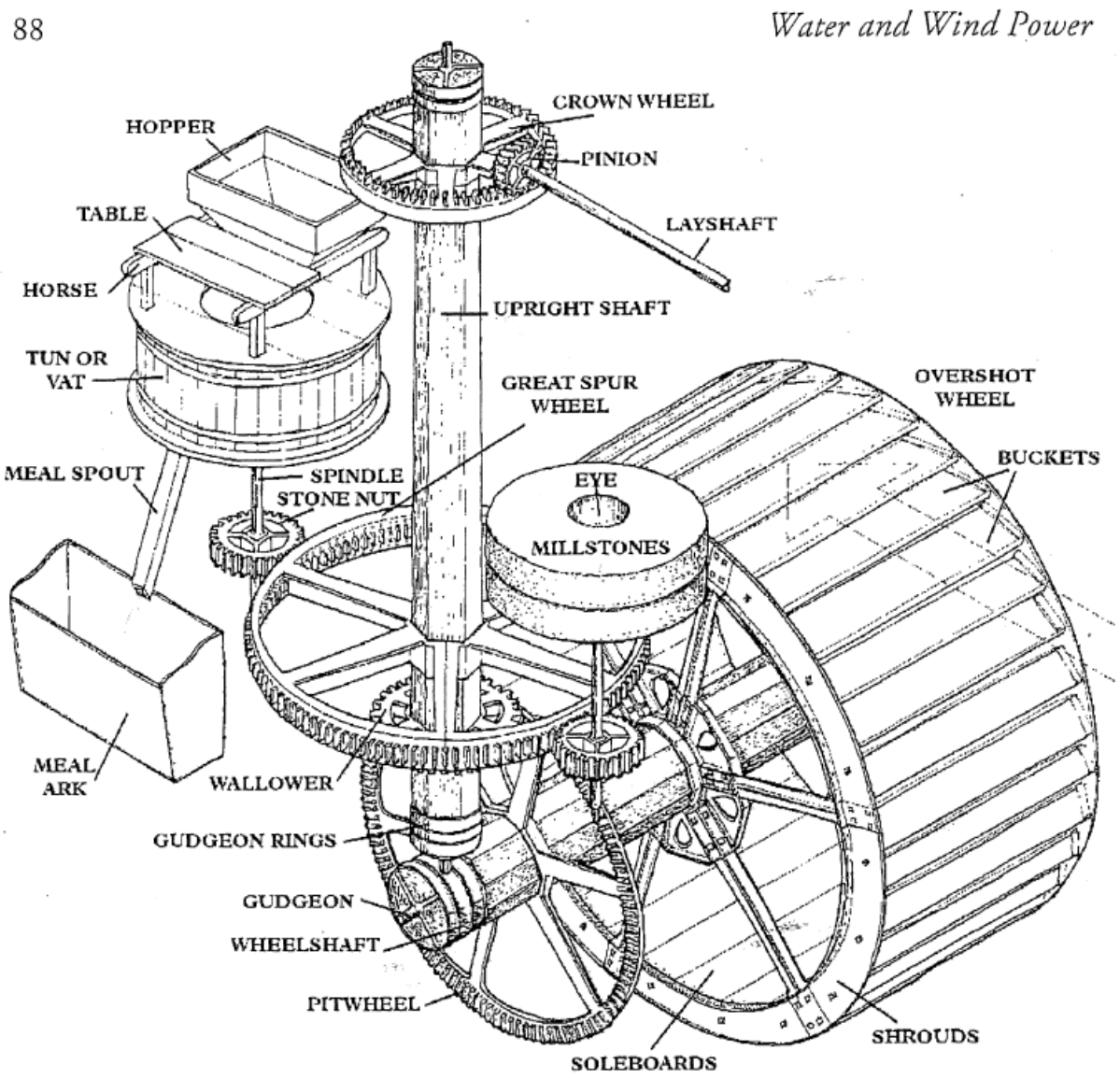
Items under 3.0 excluding VAT

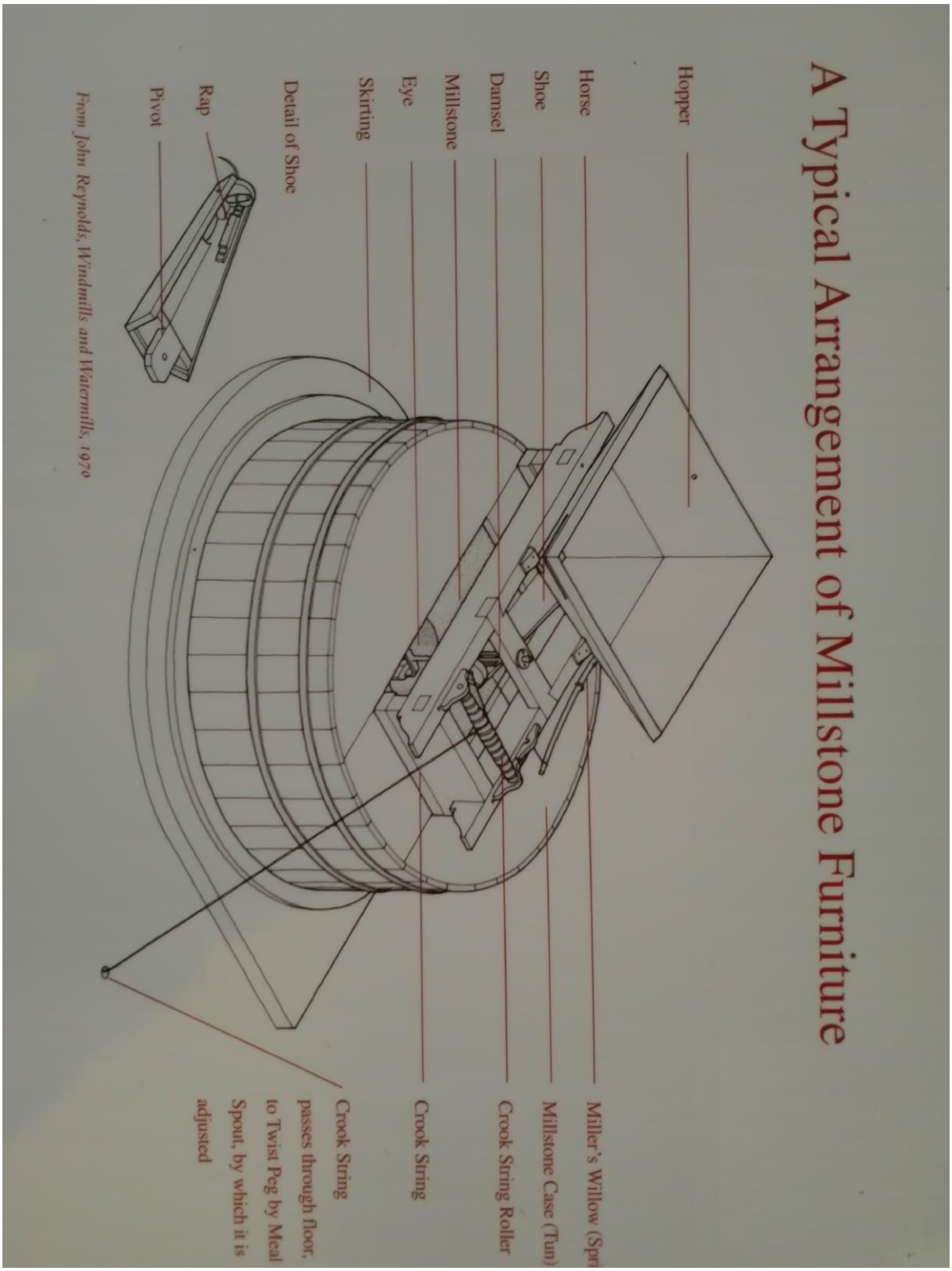
3.1 - £6,580
3.2 - £47,445
3.3 - £12,100
3.4 - £17,610
3.5 - £10,580
3.6 - £1,760
3.7 - £3,170
3.8 – £3,800

Items under 4.0 excluding VAT

Total sum for this section £31,500

6.0 USEFULL DRAWINGS




A Typical Arrangement of Millstone Furniture
Hopper
Horse
Shoe
Damsel
Millstone
Eye
Skirting
Detail of Shoe
Rap
Pivot
Miller's Willow (Spri
Millstone Case (Tun)
Crook String Roller
Crook String
Crook String
passes through floor,
to Twist Peg by Meal
Spout, by which it is
adjusted
From John Reynolds, Windmills and Watermills, 1970