Herefordshire Council

HEREFORDSHIRE ARCHAEOLOGY

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Churchill Forge Water Mill: Archaeological investigation and recording of the spillway weir

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Environment, Planning and Waste
Economy, Communities & Corporate Directorate
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Herefordshire Archaeology is Herefordshire Council's county archaeology service. It advises upon the conservation of archaeological and historic sites and landscapes and carries out conservation and investigative field projects.

Contents

Summary:

Herefordshire Archaeology were commissioned to undertake a measured survey of the spill way of Churchill Forge watermill. The spillway is structurally unstable due to water leaking from the mill pond. This has resulted in significant erosion and areas of collapse. The survey was required in order to document the degree of erosion and to provide detailed elevations, plans and cross sections which will facilitate a programme of consolidation and conservation.

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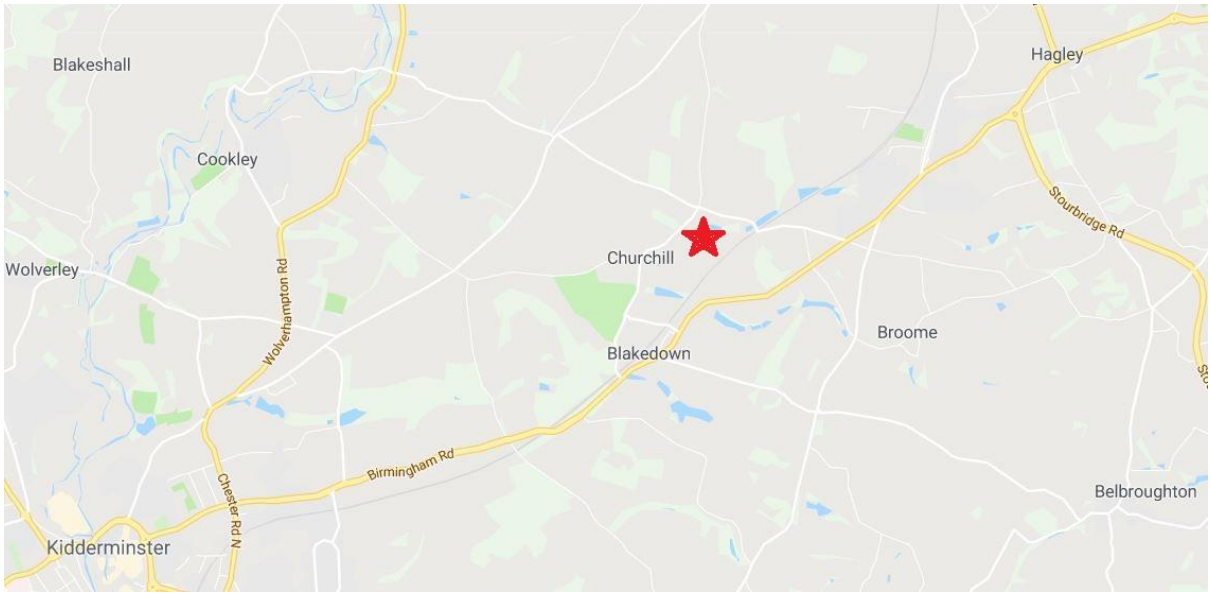
1. Introduction

Churchill Forge Mill, situated in the Worcestershire village of Churchill, is one of the last water powered forge mills remaining in an intact state in the UK and as such is an important example of the industrial heritage of the West Midlands. It is designated as a Scheduled Ancient Monument (SAM 1005274). Part of the site has been restored to working condition and is now maintained and operated by the Churchill Forge Trust. The spillway weir and brick arch which forms part of the Historic mill complex has become structurally unsound and requires partial replacement. Due to the designation status of the complex, Historic England has recommended a scheme of works to be undertaken to assist in its stabilisation and renovation.

This report provides an account of the archaeological survey undertaken in accordance with the Method Statement provided to Historic England and the Churchill Forge Trust.



Location of the site in relation to local towns.

2. Aims and Objectives

The Historic England Brief, produced by Dr. Neil Rimmington contained the following requirements:

1. A drawn record of the weir will be produced in plan, two elevations (reservoir side and downstream side), two or three cross sections (one through centre of arch with both side walls of the arch drawn as elevations, one through dam south of arch and then possibly one through dam north of arch).

2. Scale of drawn record will be 1:10 or 1:20.

3. Photographs will be produced to illustrate the understanding of the construction and development of the weir. These will be general images to give an overview of the weir and dam in addition to elevations and detailed images of key features and materials.

4. A report will be produced incorporating the drawn and photographic records and providing an analysis of the construction and development of the weir.

3. Policy and guidance

The millpond and forge is designated as a Scheduled Ancient Monument Many of the standing structures are listed Grade ll.

The historic England List Entry describes the site as:

Summary

A water powered hammer forge mill with associated mill pond and leats, situated on Ganlow Brook, north-east of Churchill village.

The scheduled area includes the mill pond and earthwork dam, the brick retaining walls of the overflow leat, the forge area and the tailrace which extends to the west.

Reasons for Designation

Churchill Forge, a water powered hammer forge and mill with associated pond and leats, is scheduled for the following principal reasons:

* Survival: the site survives well as water powered hammer forge site with an intact water management system; * Potential: the site retains archaeological deposits which have considerable potential for furthering our understanding of milling in the area. In particular evidence for earlier dam structures are believed to survive within the current millpond; * Historic interest: the water powered forge is a good example of its type and, together with the listed buildings on the site which retain historic machinery, allow an understanding of the industry and its development; * Rarity: intact forges with associated water management systems are relatively rare nationally adding to their historic interest.

History

A watermill uses the gravitational force of water to turn a paddled wheel, the energy thus generated in the axle of the wheel enabling the operation of varying kinds of machinery. Usually, an artificial channel, or leat, is diverted from the main watercourse and its flow to the wheel regulated by sluices. The spent water returns to the main stream via a tailrace. Where the natural flow of water is inadequate, a millpond may be constructed to increase the body of water (and thus the flow) behind the wheel.

Simple vertical waterwheels used for irrigation had been in use in the Roman period, although the earliest mill so far identified was dated from its timbers to the late C7 AD. Early medieval mills could have wheels set horizontally or vertically. By the time of the Domesday Book an estimated 6000 mills were in existence, and the number increased steadily over the

next three centuries. During the medieval period, mills, usually used for corn grinding, were a sign of status, and an important source of income to the lord of the manor who usually leased the mill and its land to the miller. With technological improvements, an increasing range of equipment including fulling stocks, tilt hammers, bellows and textile machinery could be powered by watermills, and they became increasingly important to urban and rural life and industry. With the advent of steam power and the introduction of iron gears in the C18, water power eventually became obsolete for major industry, although many smaller rural mills continued in use. As a common feature of the rural and urban landscape, watermills played an important role in the development of technology and economy.

A mill is first mentioned at Churchill in 1268, again in 1368, and at the end of the C16 a blade mill and mill pool are described. By the later C18, this site was in use as a water powered forge, and it came into the ownership of the Bache family. The forge produced spades, shovels, forks, ladles and other implements and was operational until 1969. A charitable trust was established in 1981 to assist with maintaining the site.

Details

PRINCIPAL ELEMENTS: The monument includes a water management system with mill pond and leats. It is situated on Ganlow Brook, north-east of Churchill village.

DESCRIPTION: The forge at Churchill consists of three brick buildings, probably dating from the early C19, with two water wheels providing power. These buildings sit in a small courtyard, with a large mill pond to the east behind a retaining dam and leats to the north and west. The pond is fed from the east, with further ponds up stream which historic mapping shows were also associated with mill and forge sites (not part of the monument). It is understood that the pond was drained during the 1970s, at which time an earlier, smaller dam was observed to the east of the present dam. At the north-west extent of the pond, there is a timber sluice gate which controls the overflow leat, with a retaining structure mostly of brick, with some concrete repairs. Sections of the leat have retaining walls of most likely C19 engineering brick laid in English bond with stone cappings. The leat flows west and south-west, before joining the tailrace leat. A representative sample of the overflow leat with brick retaining walls is included within the scheduling to preserve its relationship to the other water management features. The sluice gate and mechanism and the remainder of the leat are excluded from the scheduling.

A further sluice to the south, positioned approximately centrally on the dam, also has a timber sluice gate with brick retaining structure; this sluice gate and mechanism are also excluded from the scheduling. The sluice controls the flow of water to the two water wheels, with header tanks over. The northern wheel powers the machinery in the northern building, including the drop hammers, and the southern wheel powers the blower in the

south building which feeds the furnace. Below the wheels are brick tailraces which continue underground and feed the leat beyond, which flows south-west.

Between the forge buildings is a working yard which is partly covered by an open, roofed structure on thin metal columns, probably of C20 construction. This structure is excluded from the scheduling.

EXCLUSIONS: The C19 mill buildings (Listed Grade II) and the freestanding structure in the yard between them are excluded from the scheduling, although the ground beneath them is included. In adition all modern fences, fence post, gates, gate posts, signage, steps and road surfaces are excluded from the scheduling, although the ground beneath them is included. Both sluice gates and sluice mechanisms are also excluded.

4. Site location

Churchill Forge lies in the valley of the Ganlow Brook which rises in the Clent Hills , between Kidderminster and Hagley in North Worcestershire, and flows down to meet the River Stour, which itself is a tributary of the Severn. The site lies to the north east of the village of Churchill.

The sluice takes water from the north west corner of the header pond and comprises the remains of a timber sluice gate which controls the overflow leat, with a retaining structure mostly of brick, with some concrete repairs. Sections of the leat have retaining walls of most likely C19 engineering brick laid in English bond with stone cappings. The leat flows west and south-west, into a deeply incised channel cut through the bedrock.

Plan showing location of the survey in relation to the mill pond and mill buildings.

5. Geology

The solid geology of the area comprises the Wildmoor Sandstone levels overlain by glacio-fluvial fan deposits of sand and gravel which, in turn is covered in alluvium. (British Geological Survey website, Accessed 20-06-2019; (http://www.bgs.ac.uk).

6. Historical and archaeological background

Historical Background.

Churchill Forge is the last many water powered forges that could once be found in this area. It has, for many years, been in the hands of the Bache family, a family that has had many connections with the forge over the years. The power for the forge is provided by two water wheels. The water to turn these wheels is stored in "Hammer Pond" a pool, some two acres in extent, which was formed, probably as early as the 13th or 14th century, by damming the Ganlow Brook, the embankment thus formed now being the approach road to the forge. A sluice gate allows water from the pond to enter a culvert under the footpath and into two header tanks from which it can be released when the wheels are required to turn.

The earliest history of Churchill Forge is given in a Charter granted in the reign of Henry III. This is on parchment in Latin and is in the reference library in Birmingham. The Charter states that in 1238 Robert de Hurcote gave Hugh Drugel "the whole land of Churchill with the advowson of the church and the mill" in the marriage with his sister Margery. Robert paid twenty shillings to the Lord of Hagley for the vill(age) and a yearly rent of six shillings and eight pence to the Prior of Dudley for the mill at Churchill. There were eighteen witnesses to this deed of grant and they were probably the guests at the wedding.

In 1368 another Charter recites a grant from Donimus de Duclent to John de Duclent, son of Edmund de Duclent, and Alice his wife, of "six shillings worth of annual rent from the mill at Churchill". This deed names one of the witnesses as Thomas Penne of Harborowe. In 1538 a bond was made and endorsed by Bishop Lyttleton whereby Thomas Penn of Harborowe would pay "twenty pounds sterling" to Richard Penn for the sale of Brake Mill. A blade mill and pool are mentioned in another account toward the end of the sixteenth century. The Bache family have lived in the Churchill area for many hundreds of years and their descendants still own Churchill Forge.

The first recorded Bache from which the present owners can trace their decent, is William who was born in 1743 and died in 1817. He had six children and his eldest son William married Penelope Willets whose family, at that time, owned Churchill Forge. The Baches ran the nearby Stakenbridge Forge and by this marriage in 1796 the two businesses came under one ownership. Of William senior's six children, only William junior and younger brother Benjamin worked at the Forge. William junior had seven children but only one, Henry (1810

to 1870), came into the business, and on his death his widow, Lydia, kept the Forge going for three years until her two sons, William and Thomas were able to take over.

One of Benjamin's sons, John (born 1827) is on record as being a "spade and shovel plater" and his son, another Benjamin, who had also worked in the profession, for Isaac Nash Ltd of Stourbridge, returned to re-open the forge after it had been closed due to shortage of manpower during the First World War. Together with his son Claude, then twenty one, he commenced trading as "Benjamin Bache and Son, Spade, Blade, Shovel and Ladle Works". Benjamin worked well into his seventies, but he became blind and died in 1943 however Claude Bache carried on until he retired in 1969 aged 66, and died only a year later.

The main wheel, which drives the machinery in the forge, has a diameter of 17 feet and is 5 feet 3 inches wide. This has been carefully restored to its original condition. The spokes are of oak with steel buckets and it is mounted on a hollow cast iron axle, 18 feet in length. The axle carries two of the original flywheels which have projections which operated the tilt hammers which (unfortunately) no longer exist. The axle now has a spur wheel which meshes with a smaller one on a counter-shaft which in turn powers, via a flat belt, overhead shafting for the various hammers, presses and other machines.

The older wheel is also 17 feet in diameter, but only 2 feet 3 inches wide. The spokes are also of cast iron and are unusual in that there are seven. The axle is of oak. This wheel was used to power the furnace blower for the forge and two wet grindstones. Alas, the machinery is long gone and the wheel now turns for effect only.

In the same building as the forge, on a higher level, is what was the grinding shop, but is now utilised to house an exhibition of former products and historic photographs.

The forge produced what falls into the category of edged metal tools. From 1700 onwards the principal items made were spades, shovels, forks, rakes, hoes, cultivators, salt skippets (special shovels for the salt industry at nearby Droitwich), and ladles, which by 1960 were the main product and were used in the Stourbridge glass industry and the metal refineries of the West Midlands. The ladles were produced from one piece of steel and were considered to be of superior quality due to the very good design of the pouring lip. (details courtesy of Churchill Forge website, Churchillforge.org.uk)

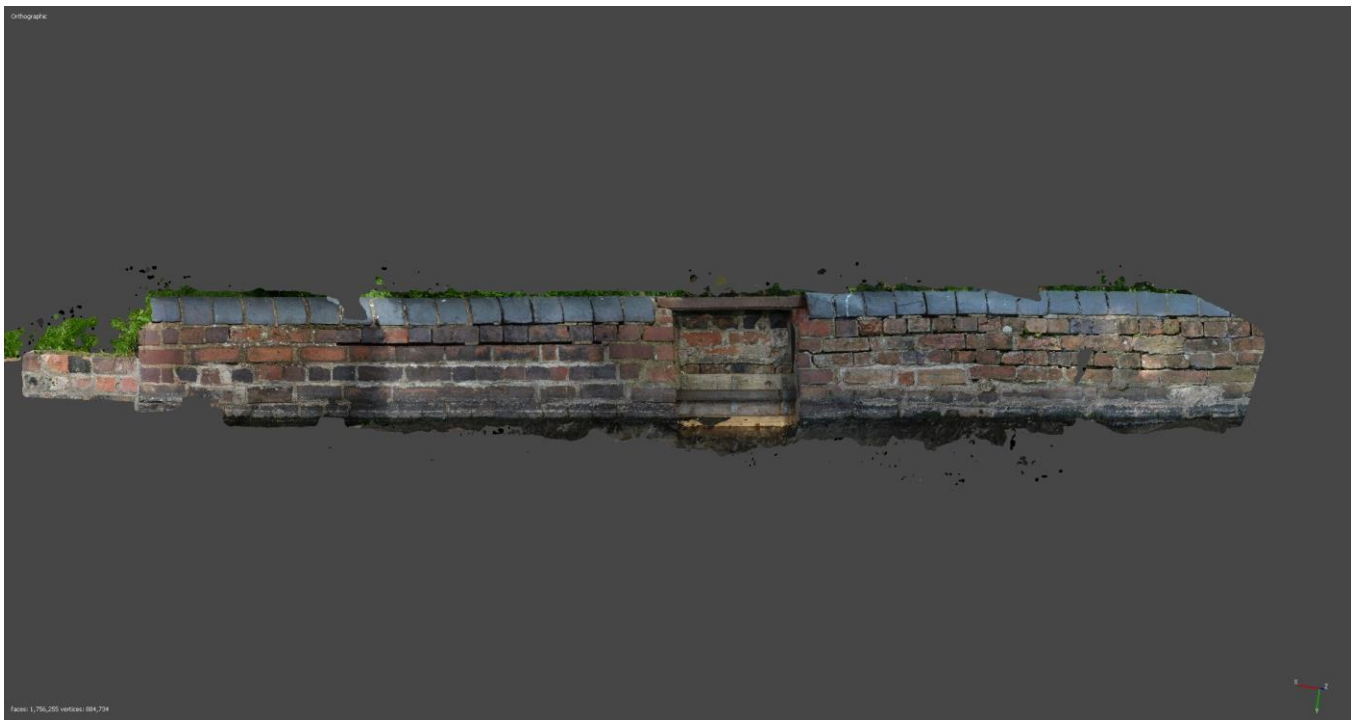
7. Methodology

Due to the water level within the pond and the flow of water and generally unstable conditions of the brick arch it was not possible or practicable to undertake a conventional hand drawn survey of the structure. A Total Station survey instrument was used to produce a plan, elevational data and detailed dimensions. The structure was then recorded by photogrammetry and elevations and cross sections produced. A Trimble Geo X7 GPS unit was used to locate the structure within the National Grid and provide datum levels.

The illustrations within this report are produced to fit on an A4 format but are 1:50 at A3 format. The CAD drawings which remain digital can of course be viewed at any scale.

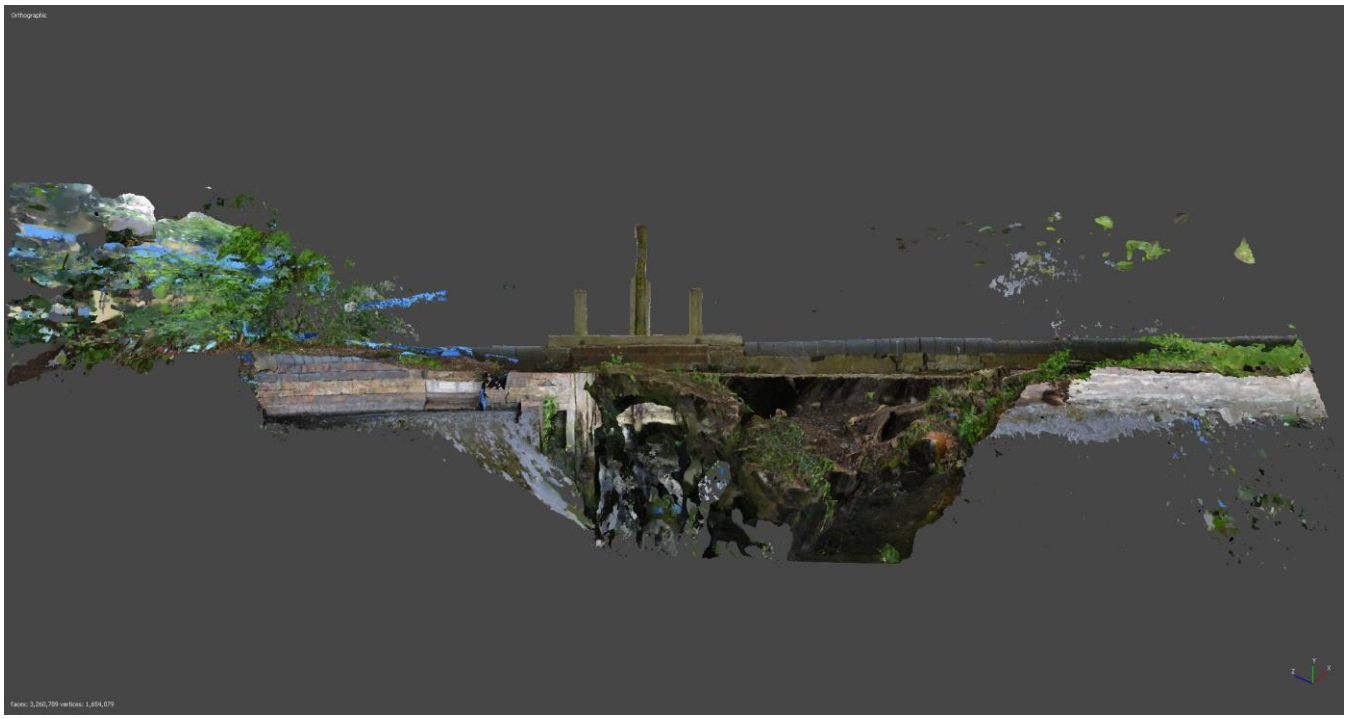
8. Results

The curved wall to the north of the spillway looking west

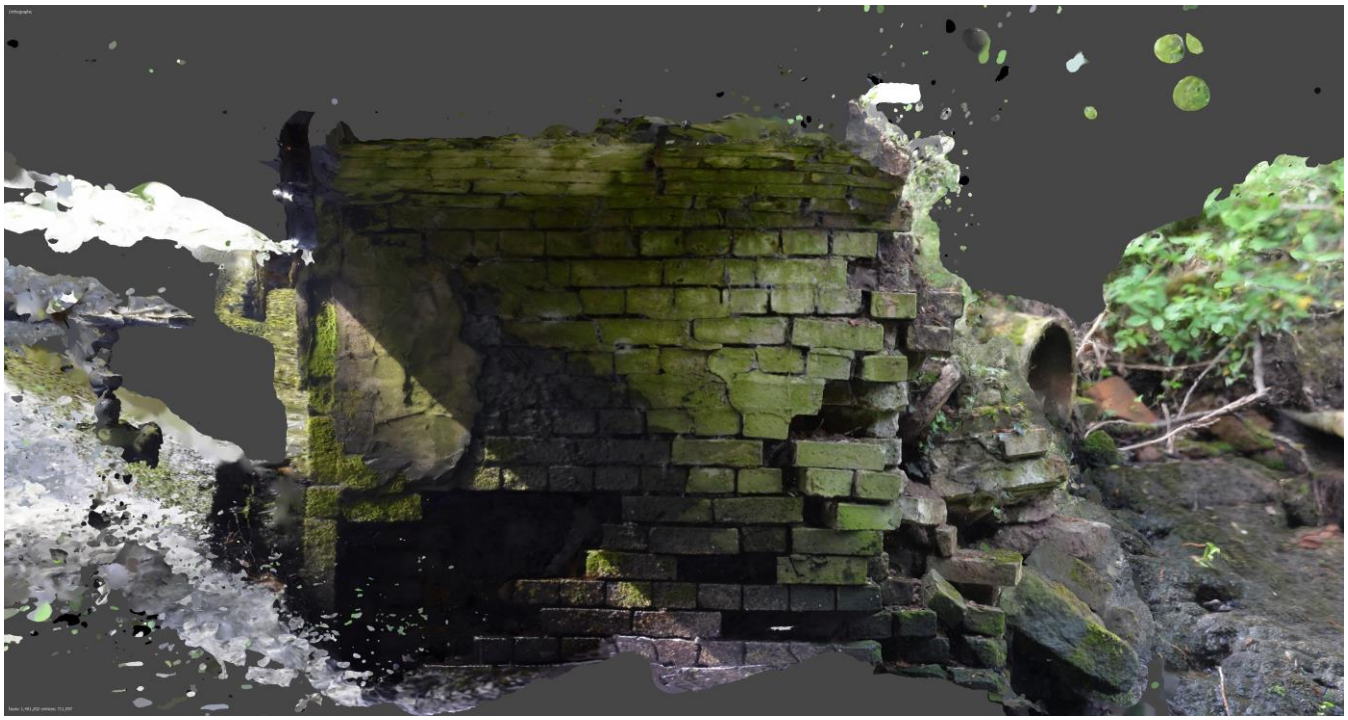


The straight section of wall to the south of the spillway

Vertical view

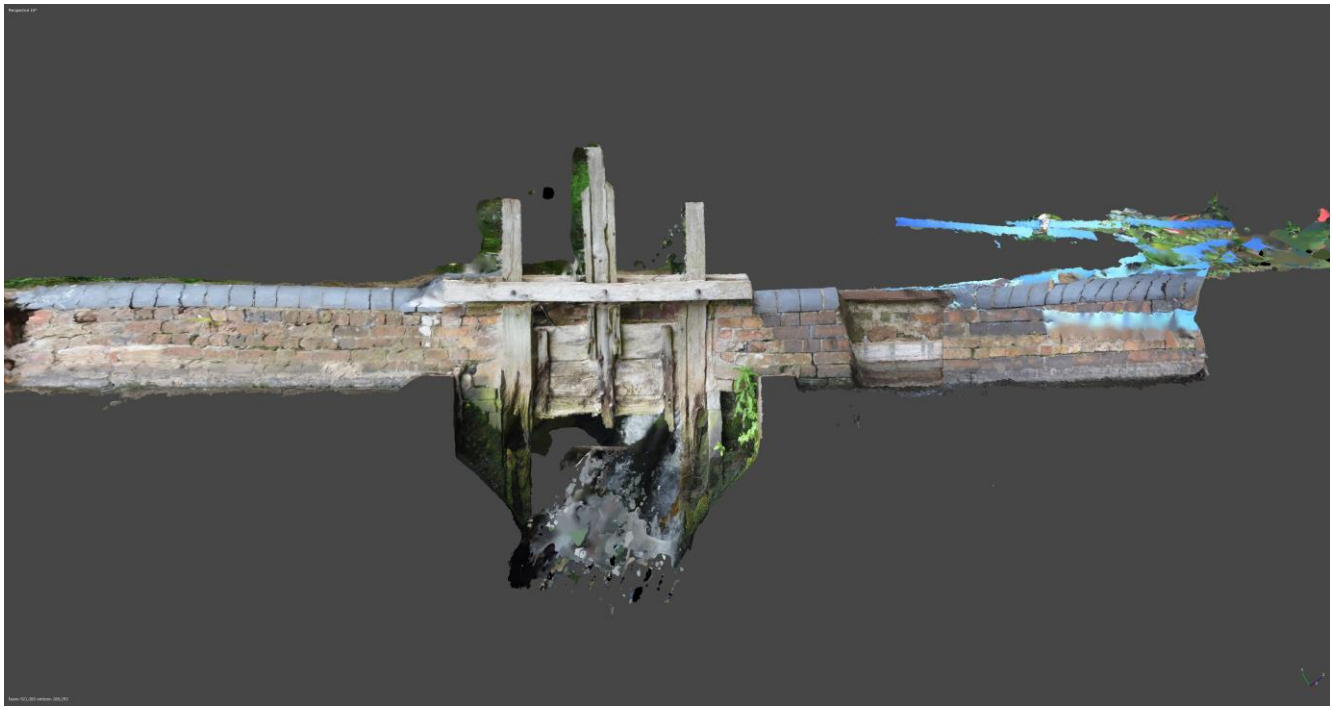


The structure looking east



Southern Inside wall

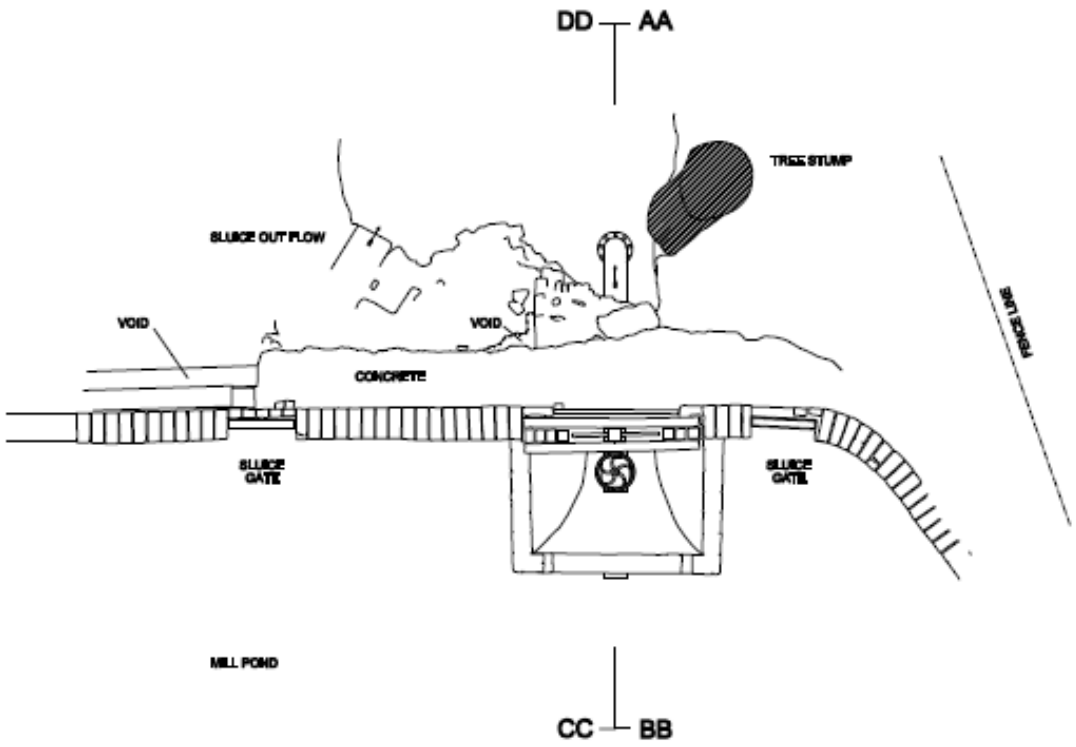
Northern inside wall



Sluice gate looking west

Detail of sluice

North internal elevation



HEREFORDSHIRE ARCHAEOLOGY

CHIRCHHILL FORGE
WATER MILL
SLUICE GATE

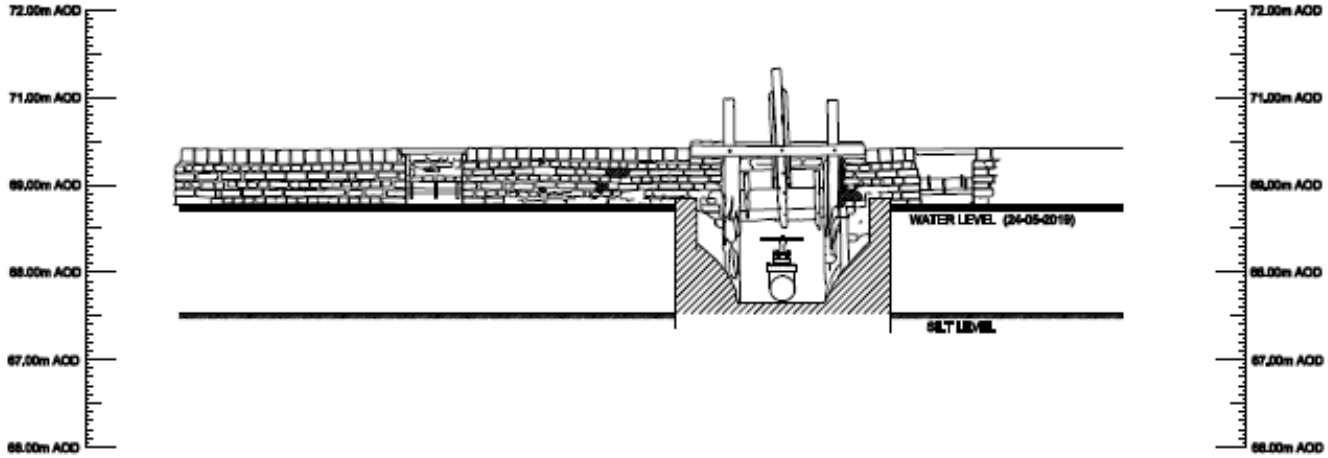
GROUND PLAN

DWG-001-HA

Drawn /Survey -TH SM

Scale 1:50 @A3

0 2
metres



HEREFORDSHIRE ARCHAEOLOGY

CHIRCHILL FORGE
WATER MILL
SLUICE GATE

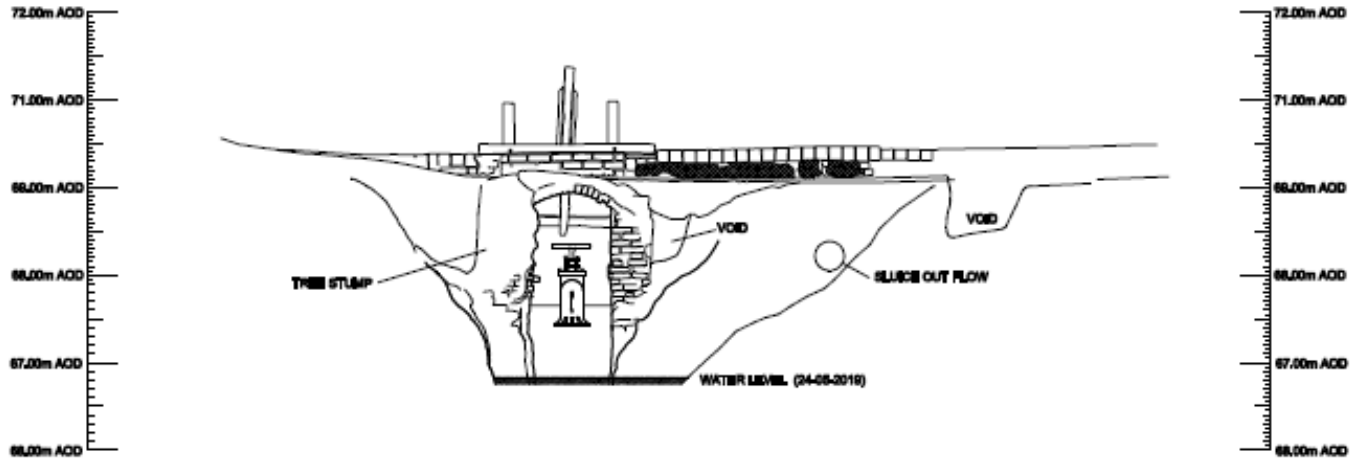
UP STREAM ELEVATION

DWG-003-HA

Drawn /Survey -TH SM

Scale 1:20 @A3

0 2
metres



HEREFORDSHIRE ARCHAEOLOGY

CHIRCHHILL FORGE
WATER MILL
SLUICE GATE

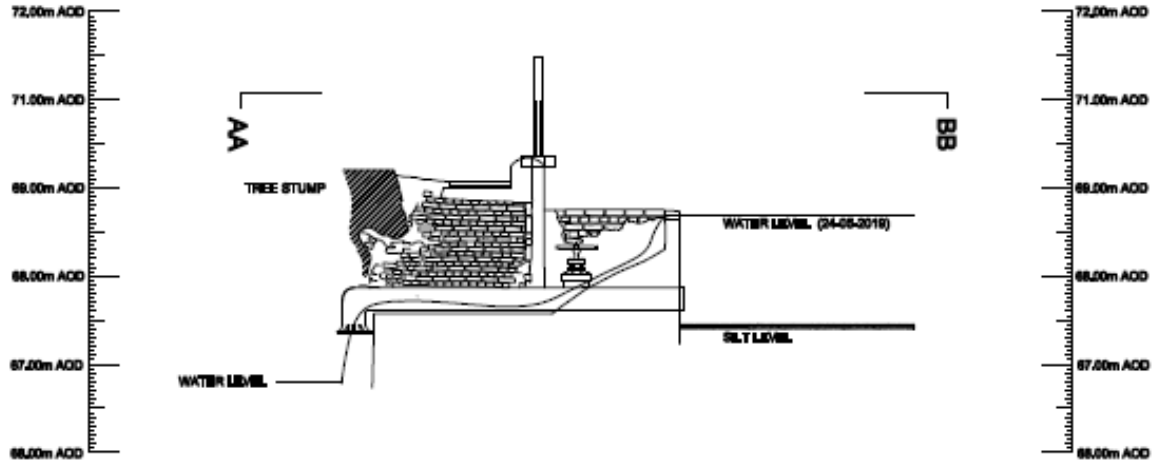
DOWN STREAM ELEVATION

DWG-003-HA

Drawn /Survey -TH SM

Scale 1:20 @A3

0 2
metres



HEREFORDSHIRE ARCHAEOLOGY

CHIRCHHILL FORGE
WATER MILL
SLUICE GATE

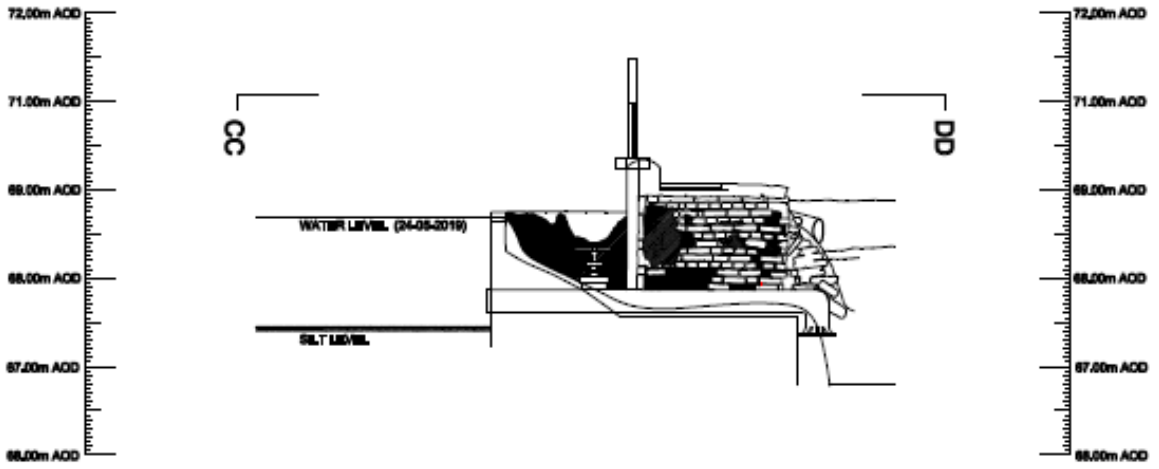
SECTION LINE AA-BB

DWG-004-HA

Drawn /Survey -TH SM

Scale 1:20 @A3

0 2
metres



HEREFORDSHIRE ARCHAEOLOGY

VEGETATION

VOID

RENDER

CHIRCHILL FORGE
WATER MILL
SLUICE GATE

SECTION LINE CC-DD

DWG-005-HA

Drawn /Survey -TH SM

Scale 1:20 @A3

0 2
metres

9. Discussion

It is clear that a substantial amount of the structure and the material from immediately around the structure has been eroded through leaks over a number of years and that urgent stabilisation and conservation work is required.

It would appear that a number of phases of development have taken place through time in order to keep the structure working despite the ever increasing leakage and erosion. Phasing an industrial monument such as this is not simple, its small size and therefore small amounts of materials required to maintain it mean that it may not have been repaired using new materials, but by "recycled" materials left over from other structures on the site or close by. The survey has identified 5 possible phases for the development of the structure, however these have been arrived at without the benefit of being able to investigate the structure in any way other than a visual inspection and it is more than likely that this initial phasing could change once structural works have begun.

The phasing below is not therefore intended to be regarded as definitive, rather a starting point to be considered during future investigative work.

Phase 1: The creation of the spillway by constructing the brick arch and side walls and possibly re-facing the front of the dam. The timber sluice would also be part of this phase.

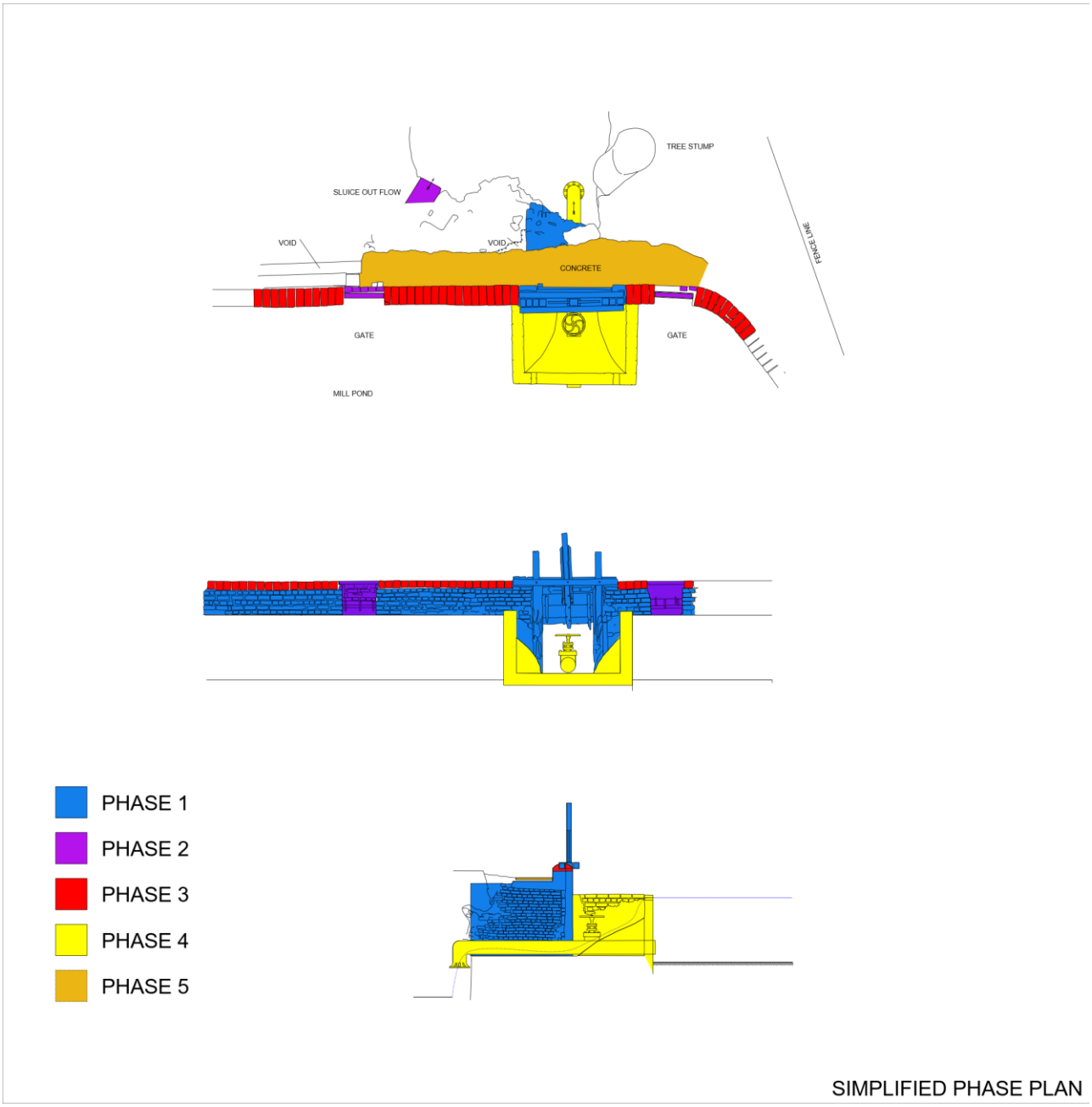
The bricks comprising the arch and sides appear to be unfrogged and comparatively small, some are irregular and / or show signs of warping during firing. It is unclear at this stage how the dam was faced.

Phase 2: The insertion of the two side sluices. It would appear that the side sluices were added in order to maintain a safe water level the original slice presumably not being large enough to cope with the volume of water.

Phase 3: The capping and perhaps in part re-building of the dam wall using the half round dark bricks (also present on the bridge over the spill way).

Phase 4: The construction of the front "box" and insertion of the iron pipe through the main spillway.

Phase 5: The application of a concrete “cap” in an attempt to reinforce the structure.



SIMPLIFIED PHASE PLAN

It is clear that the spillway is suffering from long term erosion by water resulting in relatively gradual structural failure. It would appear that increasingly substantial volumes of water are leaking through the dam to both its north and south. The reason for this in part appears to be the apparent weakening of the structure by the insertion of the two additional sluices. Water appears to have exploited the line of the ceramic pipes and is now flowing through the dam undermining the earthen structure and causing the brick arch and associated

walling to collapse. The force and volume of the water has eroded the soft sandstone bedrock onto which the brick spillway arch was founded which has caused the collapse on the northern side. The tree which for many years has helped bind and stabilise the northern side of the structure has been undermined and is now in imminent danger of collapsing a significant proportion of the northern half of the spillway.

10. Acknowledgements

Herefordshire Archaeology would like to thank David Bach and Dr. Neil Rimmington (Historic England), for their co-operation and assistance during this project.

11. Bibliography

Data sources:

The following sources of information were referred to:

- Digital data for nationally designated heritage assets, from the National Heritage List for England (held by English Heritage)
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