ARCHAEOLOGICAL EVALUATION AT BROOME MILL, CHURCHILL AND BLAKEDOWN, WORCESTERSHIRE

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Background information

Client	Environment Agency
Site address	Broome Mill, Chuchill and Blakedown, Worcestershire
National Grid reference	SO 890 788
Sites and Monuments Record reference	WSM 33587
Brief	HEAS 2003a
Project design	HEAS 2003b
Project parameters	IFA 1999

Previous archaeological work on the site

As part of the Environment Agency's work towards a wetland restoration scheme a Conservation Statement for Broome Mill and Cottage Pools was prepared consisting of a desk-based study, topographical survey and a suite of recommendations (WSM 33398; Watt 2002). Based on these recommendations two phases of fieldwork were carried out. Phase one: a watching brief was carried out during groundworks for the construction of a new dam (WSM 33397, CAA 506; Woodiwiss 2003). Following this, the evaluation reported below was undertaken.

Previous archaeological work on associated sites

The mill pond belongs to a series of four similar ponds situated between the Clent Hills and River Stour. (Watt 2002).

Aims

The aims of the project centred on the cleaning and detailed recording of the various component structural elements of the sluice and outflow channel. A key objective to be met was a clear assessment of the type of materials used and their current condition. This was aimed at fulfilling the requirements set by the brief to provide a suitably detailed record that should inform the restoration strategy of the structure (HEAS 2003a). Where appropriate, sample excavations were to be carried out to determine the nature and depth of deposits within the outflow channel.

Methods

General specification for archaeological evaluations	CAS 1995
Sources consulted	SMR Sources cited by the SMR
Date(s) of fieldwork	18th – 19th February 2004
Area of deposits observed	*c* 9.00m². Indicated on Fig 2

Access to or visibility of structure

It was possible to clean the entire sluice structure by hand enabling observations and a detailed record to be made of all visible structural elements, and an to assess their condition. Three areas

were selected for targeted excavation totalling 3.10 m² and these were cleaned by hand to reveal the profile of the leat.

Statement of confidence

Access to, and visibility of, deposits allowed a high degree of confidence that the aims of the project have been achieved.

Deposit/structure description

Context	Type Colour Texture	Description	Date	Interpretation	Dimensions
100	Dark red course sandstone .	Visible tool marks. Appears to be the last remaining block from a top course of the NW-SE sluice wall.	Post-medieval to modern	Worked sandstone block	Upstanding of the ground surface, 0.65m long x c 0.32m x 0.27m
101	Light grey.	Block structure formed by filling Hessian sandbags with mortar. The Hessian pattern can still be seen in places.	Post-medieval to modern	Mortar wall below sandstone capping	2.35m long x c 0.40m wide x c 0.30m deep. 0.16-0.25m bgs
102	Light grey flecked with brown.	Steep sloping layer of coarse sandy mortar with crushed sandstone and some inset large cobbles.	Modern	Mortar Skim consolidation or facing for down slope of NW-SE sluice wall	1.72m long x 0.40m deep. Thickness unknown. 0.40m bgs
103	Dark red course sandstone .	Rough worked blocks forming the sluice opening in the NW-SE wall and the SW-NE side wall. Set on a triple brick course (104), the blocks either side of the sluice are mortared in, however, the blocks forming the upper course of the SW-NE wall are un-bonded.	Post-medieval to modern	Sandstone sluice opening and revetment	NW-SE wall: 1.20m long x 0.40m high x 0.30m deep NW-SE wall: 3.0m long x 0.25m high x 0.30m deep. 0.05-0.40m bgs
104	Hard fired reddish brown brick..	A wall of un-bonded regular sized bricks below the NE-SW sandstone part of 103. The two lower courses are laid with the long side visible while the top course are laid end on.	Post-medieval to modern	Red brick wall foundation for 103	2.65m long x 0.07-0.25m high x 0.25m deep. 0.40-0.65m bgs Each brick averages 0.25 x 0.10 x 0.08m.
105	Hard fired Dark reddish	17 rows of bricks laid as a gently sloping floor away from the sluice opening. Well	Post-medieval to modern	Brick sluice floor	3.10m long x 1.15m wide x 0.10m deep. 0.65-0.75m bgs. Each

Context	Type Colour Texture	Description	Date	Interpretation	Dimensions
	brown brick with light grey sandy mortar.	mortared and in good condition except at the SW edge where the structure has become undermined by water erosion. There is a remnant skim of mortar on the surface which is probably where mortar has been mixed to consolidate the walls.			brick averages 0.25 x 0.10 x 0.08m
106	Light grey sandy mortar.	Mortar bedding layer for 105. Visible where some bricks are out of situ.	Post-medieval to modern	Mortar bedding layer for 105	3.10m long x 1.15m wide x 0.04m deep. 0.75-0.85m bgs.
107	Hard fired Dark reddish brown brick with light grey sandy mortar.	Brick built foundation of a now demolished NE-SW revetment wall opposite 103, 104. In part, three courses survive.	Post-medieval to modern	Foundation course for a largely demolished wall	2.0m long x 0.25m wide x 0.25m deep. 0.65-0.75m bgs. Each brick averages 0.25 x 0.10 x 0.08m.
108		Irregular construction cut into the natural sandstone for wall 107.	Post-medieval to modern	Construction cut of 107	2.35m long x up to 0.40m wide x 0.20m deep. 0.74-1.0m bgs.
109	Mid to dark brown loose sandy loam.	Backfill of 108 with heavy root disturbance.	Post-medieval to modern	Backfill of 108	2.35m long x up to 0.10m wide x 0.20m deep. 0.74-1.0m bgs.
110	Loose, dark brow sandy loam.	Fill of 113 the main outflow channel. Mostly comprised of topsoil that has eroded from the steep bank sides.	Modern	Fill of leat	Up to 0.30m deep. 0.75-0.80m bgs.
111	Light reddish brown soft sandstone	Natural		Natural sandstone bedrock	C 0.25m bgs
112	Hard fired Dark reddish brown brick.	A small brick built ramp that abuts the SW edge of 105. Un-bonded and bedded onto the natural sandstone this structure is now very	Post-medieval to modern	Brick and concrete ramp abutting 105	0.90m long x 0.35m wide x 0.20m deep. 0.85m bgs.

Context	Type Colour Texture	Description	Date	Interpretation	Dimensions
		unstable. Has been patched with part of a broken pre-cast concrete fence post.			
113		Large curvilinear, irregular sided cut of mill pond outflow channel. Heavily eroded along its NW edge and undermined by water erosion at the point where the channel turns E-W.	Post-medieval to modern	Cut of leat	20.0m long x1.40-3.0m wide x up to 1.30m deep.

Discussion

Cleaning of the sluice revealed a structure of one main building phase with some patchy later consolidation evident on the north-west/south-east wall and the brick ramp. Examination of wall 107 indicated that it was contemporary with the brick floor 105, and thus, the opposite wall 103/104. It seems clear that 107 must have originally joined with wall 102 represented by the sandstone block set within 102 forming a narrow, vertical sided outflow channel from the sluice. Much of the visible fabric construction of 102 would appear to represent a later consolidation of the structure at a time when wall 107 has apparently collapsed and not been re-built allowing erosion of the soft sandstone bedrock to create a wider channel. Nonetheless, it is noteworthy that the total length of the north-west/south-east wall seems to be of one build and so this may have provided an additional higher level outflow to cater for times when the water level within the pond was too high for the sluice to manage alone. This may have eroded the bedrock from behind the wall, no doubt, hastening its deterioration. The soft composition of the bedrock is clearly evident at the fall of ramp 112 where much of the structure has been undermined and a notable bowl-shaped depression was observed in the base of the rock-cut channel resulting from water erosion. The depth of deposit within the channel was not found to be excessive, and therefore if desired, it could be easily cleared back to bedrock.

Recommendations for conservation: the sluice structure

In terms of the structure's overall condition much of the surviving fabric is well consolidated, although there are some notable exceptions. Four key areas requiring particular attention were identified during the project. It should be noted the following recommendations have not been prepared by a structural engineer, but seek to give guidance on a suitable approach to the sluice's conservation.

The north-east/south-west wall (103/4), although structurally sound, would benefit from pointing to prevent water penetration from the sluice outflow washing between the bricks. Not only could this cause degradation of the surrounding soil deposits, but long-term frost action may begin to break-up the bricks, and more so, the softer sandstone blocks. The angle of the new outflow pipe may at times direct a greater flow of water onto the wall and, if possible, should be either redirected or fitted with some form of short extension to direct the flow onto the brick sluice base (105). In terms of maintaining the historic integrity of the structure's makeup, the use of lime mortar might be considered, although existing repairs have used a cement based mortar.

The foundation remains of the opposite wall (107) are comprised of well mortared bricks, however, the construction trench for the wall has become inundated with roots that have further eroded the sides of the trench and heavily disturbed the soil back-fill. The effective conservation of this structure might be achieved by clearance of the soil and root material from within the foundation trench, perhaps, followed by the in-filling of a suitable material to prevent further root or water erosion.

The brick ramp (112), and the south-western end of the sluice floor (105) where this joins the ramp, is an area now suffering from heavy undermining. This is largely due to water erosion dating from when the channel was last in use, but also subsequently, root action which has further dislodged some of the bricks. It is evident, from the presence of the broken concrete fence posts that have been used to patch the ramp, the integrity of this structure was suffering while the sluice was still in regular use. This area should be targeted for both consolidation and reconstruction as it will be particularly vulnerable once the sluice is put back into use. Part of the consolidation should include mitigation to, hopefully, prevent or limit future undermining of the structure.

The sandstone block (100), in addition to the similar block uncovered during the dam reconstruction phase (Woodiwiss 2003, 3), could be re-set onto the sluice wall (101) as part of a restoration scheme to reconstruct the top sandstone block course. This would restore the original appearance of the sluice wall and maintain the continuity of the structure's height still represented by wall 103.

Recommendations for conservation: the channel (113)

Figure 2 illustrates three key areas of heavy bankside erosion. Where the channel bends to the west, a section was excavated with the purpose of identifying the extent of undermining that has taken place due to long-term water erosion. This is illustrated in Figure 3; Section 4. The two other areas indicated have been affected by erosion of the upper banks caused, in part, by water erosion widening the channel. This has allowed material to slip from the upper bank. A method of limiting further erosion and subsequent bank collapse might be considered, particularly in the area of the western bend. Further erosion of the channel base is, perhaps, inevitable. However, if the effects of this can be limited close to the sluice structure, and where the banks have become undermined then the overall impact will not be detrimental.

Conclusions

The sluice structure and channel are valuable elements within the range of water management features associated with Broome Mill. The restoration and re-use of the feature will undoubtedly enhance the character of the local historic landscape. Its use will also help to keep the channel from becoming silted-up and once more inundated with roots. The overall condition of the feature is fair, however, recommendations concerning the key target areas discussed above should be considered in order to facilitate the feature's re-use with minimal future impact on its structural integrity.

Publication summary

The Service has a professional obligation to publish the results of archaeological projects within a reasonable period of time. To this end, the Service intends to use this summary as the basis for publication through local or regional journals. The client is requested to consider the content of this section as being acceptable for such publication.

An archaeological evaluation was undertaken on behalf of the Environment Agency at Broome Mill, Churchill and Blakedown, Worcestershire (NGR ref SO 890 788; SMR ref WSM 33587). The 19th century brick and sandstone built sluice, outflow channel associated with the upper level mill pond were cleaned and then archaeologically recorded. Evidence of the original construction of the

sluice, as well as subsequent alterations and repair were identified. The project included an assessment of the structure's condition which it is planned to bring back into service following the mill pond's restoration. The assessment led to a suite of recommendations that aims to inform the future conservation programme of the structure, enabling a full enhancement of its restored function.

Archive

Fieldwork progress records AS2	2
Photographic records AS3	1
Digital photographs	38
Abbreviated context records AS40	14
Drawings	8
Computer disks	1

The project archive is intended to be placed at:

Worcestershire County Museum
Hartlebury Castle, Hartlebury
Near Kidderminster
Worcestershire DY11 7XZ
telephone 01299 250416

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