



**INSPECTION AND REPORT
KIRK MILL POND AND WATER WHEEL
KIRK MILLS, CHIPPING
FOR
53N BOWLAND LTD**

Project Ref: LS1271

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ISSUE	AUTHOR	DATE	CHECKED	APPROVED	REVISIONS





1.0 Introduction

On the instruction of Crowther Turnbull Booth, acting on behalf of their client 53N Bowland Limited, BSCP were invited to inspect and report on the mill pond and associated water management system associated with Kirk Mill, Malt Kiln Brow, Chipping. We were not asked to inspect and report on the structural condition of the mill although access was gained into the mill for the purposes of inspecting the water wheel and associated housing. Our inspection comprised a visual walk around survey of all safely accessible areas of the pond and mill.

The inspection was duly undertaken on Thursday 7 June 2012. The weather was overcast with rain.

2.0 Background

Kirk Mill (photo 001 and 002), which was built on the site of an older corn mill, dates back to the end of the eighteenth century and is reported to be among the oldest Richard Arkwright designed cotton mills in the country. Subsequent to the decline of the cotton industry at the end of the nineteenth century, the mill was operated by furniture manufacturer H.J. Berry Ltd until 2010 when it closed. The mill is currently vacant and awaiting re-development.

The complex is understood to solely have used water power until 1932 when at which time supplementary oil fired engines were installed. Water power ceased in 1943 when part of the water wheel was removed.

The mill and associated pond are Grade II listed.

3.0 Water Management System

3.1 Mill Pond

The mill is fed from a pond (photo 003 and 004) to the rear of Kirk Mill and is reported to have been enlarged to its current size in 1785 (English Heritage Listing). It is roughly oval in shape and lies on a north-west to south west axis and covers an approximate area of 0.33Ha. It is understood to be fed by two, presumably now culverted, streams of unknown location although a possible supply culvert may be identified on photo 005. An overflow is located to the north west tip of the pond (photo 006) and discharges into a tributary of Chipping Brook (photo 007) which itself circumvents the Mill site to the south. Water level in the pond is approx 125.300 AOD with the stream bed at the overflow location being at 121.800. The depth of the pond is unknown.

The pond is bounded to the north by a narrow secondary road, Malt Kiln Brow. At the north west end of the pond the road is some 500mm above the pond water level with a dry stone wall forming the boundary. The road then falls way, reaching a level of 122.00 AOD at the south east end of the pond. This level corresponds to the first floor level of the Mill with ground floor being at 119.500 AOD. The pond water level generally corresponds to the Mill's second floor level.





The pond is bounded to the south by Chipping Brook. The pond is formed behind an earth embankment which in part is retained by a 1.25m stone retaining wall (photo 009) at the base of the embankment on a line which is presumed to be the site boundary. At the north west end of the pond the gradient of the embankment is approx 1:2.5 and becomes less steep further along that boundary (photo 010).

To the rear of the mill itself the pond is dammed by an earth core of approx 6.0m thickness and vertically faced with natural coursed sandstone. This wall is at its highest point at the south-east corner of the pond and is approx 3.6m high (photo 011). The wall then decreases in height along the southern boundary past the adjacent Kirk House (photo 012) until it becomes simply an earth embankment noted above.

The English Heritage listing for the site suggests that part of the wall nearest the mill was taken down and rebuilt in 1982 although the location and extent of this was not apparent during our inspection.

An access path around the pond exists from the north-west overflow, along the southern edge of the pond, terminating at the pond head wall.

3.2 Mill Race and Water Wheel

Water was provided to the mill via a head race formed by a timber bridge culvert (photo 013) connected to the headwall located at the south west corner of the pond. The current head race channel appears a later addition as the remains of stone supports for a much larger culvert were noted (photo 014).

The head race culvert discharged water onto an over shot wooden water wheel the majority of which remains in-situ (photo 015 and 016). The water wheel, which is understood from the English Heritage listing to be the third to be installed at the mill, is approx 6.0m diameter and 1.5m wide enclosed within in a two storey high (ground and first) wheel pit. The structure of the wheel comprises a timber spokes with iron buckets (photo 017). The wheel gearing is also present.

Part of the wheel has been removed to allow the construction of a first floor bridge (photo 018) between mill accommodation either side of the wheel pit. Previous to that access across the building would have only been possible at ground and second floor.

The tail race is understood to run underground in an enclosed culvert and discharges downstream into Chipping Brook (photo 019).





4.0 Observations

4.1 Mill Pond

Our inspection of the pond and its environs noted the following:

- The area of the pond local to the north-west overflow is becoming silted up (photo 006).
- The 1.25m retaining wall to the southern boundary, whilst in reasonable condition, is heavily overgrown and there is evidence of tree roots growing through the structure (photo 009).
- There is what appears to be a vehicle impact to the dry stone boundary wall against Malt Kiln Brow (photo 020).
- There is water seepage occurring through the base of the wall toward the south east corner (photo 021 bottom right corner). It was noted that 2 No plastic pipes have been inserted through the wall presumably to act as weep holes to release water that has made its way to the back of the stone wall (photo 022). However a third point of seepage was noted through the stonework between the two plastic pipes (photo 022 and 023). The flow from these was constant at the time of the inspection and drains away alongside the base of the wall within a roughly formed channel, finally discharging into drainage gully at the south east tip of the pond wall. A conversation with a resident suggests this flow is constant.
- The stone faced retaining wall to the rear of the mill is uneven and shows evidence of various repairs, including crack re-pointing. More recent cracks are in evidence (photo 024) and the wall exhibits a noticeable lean outwards toward the top (photo 025). In areas, the stones appear loose and without pointing (photo 026).
- There are numerous and well established trees to the retained earth dam to the rear of stone wall and the movement noted at the top of the wall may be the result of tree root growth (photo 027).
- The existing timber head race culvert appears in poor condition although much of this is concealed by overgrowth (photo 028). Filter screens were noted at the headwall but the penstocks controlling the flow of water into the head race culvert could not be identified.
- The stone support of the earlier head race exhibit signs of distress and an acro prop has been provided under one of these as a result of cracking within the stone work. (photo 029) It is possible that these sections of stone may form a buttress effect between the mill pond wall and the mill building.





4.2 Water Wheel

Our inspection of the water wheel was limited by access and could only be visually inspected from the first floor link bridge.

- The water wheel, whilst generally intact, is in poor condition and several of the spokes have fallen away and are lying within the pit bottom. The remaining spokes all exhibit signs of deterioration. Standing water was noted in the bottom of the wheel pit.
- The iron buckets exhibit corrosion and again are in poor condition.
- Water flow is present to the rear of the wheel well. It is possible that the external gully, which is collecting the water flow from the pond identified above, drains into the wheel well. As a result, the continued presence of water may result in the continued deterioration of the wheel which we anticipate will be required to be preserved on conservation grounds.
- The condition of the tail race culvert is unknown although with no significant through flow of water its condition is less of a concern.

5.0 Recommendations

Our inspection of the mill pond and associated water management system has identified various areas requiring maintenance and further investigation and it is our recommendation that the following are actioned.

- The outfall to the north west end of the site should be cleared of silt to maintain an effective overflow. Inspection should be undertaken on a regular basis to ensure the outfall channel remains clear of debris.
- Consideration should be given to the construction of an alternative overflow to the pond which may allow the partial draining of the pond for maintenance work. An assessment of the pond depth and therefore water volume should be made.
- The undergrowth around the 1.25m high retaining wall to the northern end of the site should be cut back to clearly expose the structure. Several trees which are affecting the wall with root growth should be removed and repair to the wall undertaken. A more detailed inspection should be undertaken once the undergrowth has been removed. Regular inspection of the wall should be undertaken as part of any ongoing maintenance / monitoring regime.
- The undergrowth and numerous trees to the earth dam behind the main retaining wall need to be managed to prevent causing damage to the wall. Several trees which are affecting the wall with root growth should be removed. Once the undergrowth has been cleared then a more detailed inspection of the head wall, head race and any penstock needs to be undertaken.





- The condition of any penstock gate controlling the flow of water from the pond into the head race and onto the wheel is not known and repair work may be required. It is recommended that any channels between the pond and the wheel are permanently blocked to ensure that water never enters the building.
- The main retaining wall requires remedial work in the form of re-pointing and crack repair which should take the form of thixotropic resin injection. Regular inspection of the wall should be undertaken as part of any ongoing maintenance / monitoring regime.
- The stonework that formed the support for the earlier mill race should be repaired to provide effective buttressing between the mill and pond wall.
- The section of vehicle damaged boundary wall needs to be rebuilt.
- The yard gully which appears to discharge into the wheel well needs diverting to prevent water flow into this area.
- On the basis that the wheel itself will be required to stay in-situ due to its historical importance then a detailed inspection will need to be undertaken and proposals provided for its repair and conservation. This is outside our scope of expertise and advice should be sought from a suitable qualified specialist. As noted above the wheel housing should be made watertight to prevent water ingress and avoid further deterioration of the wheel.
- The water flow from the base of the wall needs investigating and remedial work undertaking however this may not be an easy issue to address. It would appear that local to this location water from the pond is making its way through the earth core of the dam and finding its way through the stone wall. The flow appears to have been ongoing for a while based on the fact that plastic pipes have been installed, presumably to direct the water through the wall at fixed points, although as noted above water is now flowing from a third location. The rough cut channel at the base of the wall has been formed to prevent the water running down the road and divert it to the gully adjacent the mill. It should be noted that water seepage is not occurring in other locations. It is our opinion that the clay liner to the pond has been compromised although this may not be in the same location as the leak and the identification of the defect may not be possible without partial or full draining of the pond which in itself is an issue as, without forming an alternative overflow as discussed above, the only route would be through the wheel pit and via the tail race, none of which are in a condition to accept this flow. It is possible that once the defect is known then remedial works in the form of a bentonite slurry wall could be introduced to reseal the pond.
- Notwithstanding technical issues, these matters would require further dialogue with the Environment Agency, English Heritage and the Local Authority Conservation Officer.

BSCP Ltd
13 June 2012

