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Mytholm Mill, Hebden Bridge

Archaeological Building Survey & Recording

ARCUS report 896b.1(1)

October 2009

Client: Moreton Deakin Associates

Archaeological Building Survey



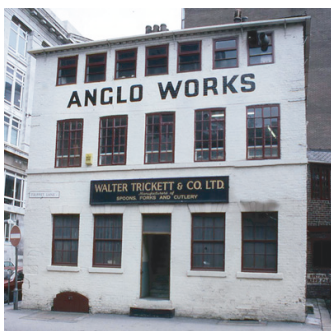
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Mytholm Mill, Hebden Bridge, West Yorkshire

Grid Reference: SD 9829 2731 (centred)

Archaeological Buildings Survey and Recording

Assessment Report No. 896b.1(1)

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Date:	Date:
Oliver Jessop MIFA <i>Project Manager</i>	Anna Badcock MIFA <i>Assistant Director</i>

OASIS SUMMARY FORM

PROJECT DETAILS		
OASIS identifier	arcus2-6609	
Project title	Mytholm Mill	
Short description of the project	<p>In September 2007 ARCUS were commissioned by Moreton Deakin Associates to undertake a scheme of archaeological survey and recording of the fragmentary remains of the former Mytholm Mill, King Street, Mytholm, West Yorkshire (centred on NGR: SE 9829 2733). The recording was undertaken to meet the terms of an archaeological condition placed an application for demolition and re-developemtent. This report incorporates 2 phases of recording on the site, initially undertaken in April 2005.</p> <p>The site of the former mill was approximately 2.2 hectares, with a level ground surface in the southern two-thirds, and the northern third steeply rising in a south-facing slope. Built into the slope were two reservoirs, possible tender fields or gardens, and at its foot: a series of upstanding fragments of masonry relating to a late 18th/early 19th-century textile mill. The largest structural elements represented the remnants of a three-storey wheel house, and warehouse.</p> <p>The remaining fragments of building were of little significance by themselves, although their survey proved valuable in interpreting their phasing and function. A significant amount of the infrastructure relating to water management system survived, and represented an important aspect of the history and character of the site.</p>	
Project dates	03-04-2007 to 16-10-2007	
Previous/future work	Building recording/unknown	
Monument type and period	Textile mill – post medieval	
Significant finds (artefact type and period)	none	
PROJECT LOCATION		
County/Parish	Calderdale	
Site address	Mytholm Mill, King Street, Hebden Bridge, West Yorkshire	
Site co-ordinates	NGR: SD 9829 2731	
Site area	2.2 hectares	
Height OD	50m to 80m AOD	
PROJECT CREATORS		
Organisation	ARCUS	
Project brief originator	WYAAS	
Project design originator	ARCUS	
Project supervisor	Mark Douglas	
Project manager	Oliver Jessop	
Sponsor or funding body	Moreton Deakin Associates	
PROJECT ARCHIVES		
Archive Type	Location/Accession no.	Content (e.g. pottery, metalwork, etc)
Physical	n/a	n/a
Paper	WYAAS WYAS: Calderdale	Report, and photographic archive Report, photographic contact sheets, field notes, plans and sections
Digital	WYAS: Calderdale & WYAAS	pdf copy of report
BIBLIOGRAPHY		
Title	Mytholm Mill, Mytholm, Hebden Bridge, West Yorkshire	
Report no	869b.1(1)	
Author	Thomson, J. & Jessop, O.	
Date	2009	

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NON-TECHNICAL SUMMARY

In September 2007 ARCUS were commissioned by Moreton Deakin Associates to undertake a scheme of archaeological survey and recording of the fragmentary remains of the former Mytholm Mill, King Street, Mytholm, West Yorkshire (centred on NGR: SE 9829 2733). The recording was undertaken to meet the terms of an archaeological condition placed on an application for demolition and re-development. This report incorporates 2 phases of recording on the site, the first undertaken in April 2005 and the second in September 2007.

The site of the former mill was approximately 2.2 hectares, with a level ground surface in the southern two-thirds, and the northern third steeply rising in a south-facing slope. Built into the slope were two reservoirs, possible tender fields or gardens, and at its foot: a series of upstanding fragments of masonry relating to a late 18th/early 19th-century textile mill. The largest structural elements represented the remnants of a three-storey wheel house, and warehouse.

Archaeological recording included a survey of water management systems, measured floor plans, sections, and rectified photography of the remaining fragmentary structures.

Mytholm mill was a multiple phased development, the earliest elements located along the foot of the slope were stone built structures of two to six stories dating from the late-18th to late-19th century. A brick built cottage in the south part of the site also dated to this period, although it had been extensively demolished during the construction and extension of a foundry and erecting shop in the late-19th to early 20th century.

The remaining fragments of building were of little significance by themselves, although their survey proved valuable in interpreting their phasing and function. A significant amount of the infrastructure relating to water management system survived, and represented an important aspect of the history and character of the site.

The extent of survival of subsurface archaeological features is likely to be high, especially in the vicinity of buildings 1, 4, and 5, where future investigation could provide important information for the location of the original rasping and chipping mill, and the development of the subsequent textile mill.

1 INTRODUCTION

1.1 Scope of Report

In September 2007 ARCUS were commissioned by Moreton Deakin Associates to undertake a scheme of archaeological survey and recording of the former Mytholm Mill. The recording was undertaken to meet the terms of an archaeological condition that was placed on a planning consent for an application for demolition and re-development. This report incorporates work initiated on the site in June 2005, and in accordance with a specification produced by West Yorkshire Archaeological Advisory Service (WYAAS) (**Appendix 3**). The scheme of recording was produced in accordance with government guidance as set out in Planning Policy Guidance Notes – Archaeology and Planning (PPG15 & 16).

1.2 Site Location

The site (centred on NGR SE 9829 2733), is located on King Street (A646), Hebden Bridge, West Yorkshire (**Illustration 1**).

2 AIMS AND METHODOLOGY

2.1 Aims and Objectives

The aims of the archaeological survey and recording were to collate all available information on, and images of, the site sufficient to create an historical record of the various structures, layout and function of the mill, and identify and objectively record by means of photographs, and annotated measured drawings any remaining significant evidence for the original form and functions of the complex.

2.2 Methodology

The recording methodology adopted during this survey has been undertaken in accordance with guidelines described in *Understanding Historic Buildings: A Guide to Good Recording Practice* (English Heritage 2006a).

Site fieldwork was undertaken between 11-09-07 to 16-10-07 and comprised metric survey, photography, rectified photography, a walk over survey of the water management system, and a watching brief during the clearance of the wheel pit. The photographic record comprised a series of general and detailed shots taken with 35mm and Medium Format cameras (**Appendix 2**). Where possible, photographs were taken of all elevations of the remaining structures and of all internal spaces. The drawn record consists of plans, elevations, and sections showing features of historic/archaeological significance. Phasing was recorded where appropriate. Standard RCHME drawing conventions were followed.

Earlier fieldwork undertaken between 03-04-05 to 05-04-05 comprised metric, descriptive and photographic survey of building 4, a 19th-century dwelling. The photographic record produced in this phase has been appended to the sequence of the later fieldwork as films 17-24 (**Appendix 2**). A large number of digital photographs were also taken of the entire site during site reconnaissance.

Relevant and readily available published and unpublished documentary sources were consulted, including historic maps and photographs. A number of photographs taken

in 1989 after the mill burnt down were provided by David Brown. Data was collected from the following sources:

- West Yorkshire Historic Environment Record (HER);
- West Yorkshire Archives: Calderdale;
- Hebden Bridge Local Studies Library;
- Hebden Bridge Alternative Technology Centre; and
- Swindon National Monuments Record.

3 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

3.1 Ownership

The earliest record of Mytholm Mill dates from 1789 when James King of Mytholm is recorded to have paid neighbouring land owner Sir George Savile 2s 6d (12.5p) for removing stone from his estate to build a cotton mill (Dewsbury public library ref: DD/S/1/140). Although there are no records of the mill prior to 1789, local historians have stated that there may have been a smaller cotton mill on the site prior to this date which was later used for “rasping and chipping” (Ingle 1997: 139). James King was a textile manufacturer who had formally held offices in Halifax Piece Hall c1787. By 1789 he had made a partnership with Alexander Turner, Richard Paley, and Richard Varley to build a mill within the grounds of his residence at Mytholm Hall. The partnership evidently proved successful with an insurance policy from 1792 estimating the value of their property and goods at £11,000 (Ingle 1997: 139).

On March 1st 1796 the original partnership was dissolved, and the mill was taken over by a new partnership formed by James King’s son-in-law, Alexander Turner, and the former chief salesman Hamlet Bent; creating Turner, Bent & Co. The mill remained in the ownership of James King until his death in 1818 when it was inherited by James Armitage Rhodes. Bent continued the business, trading as Hamlet Bent & Co. from 1825, until his death in 1832. The company was subsequently acquired by Binns and Wright in 1834, for cotton and silk spinning and manufacturing, remaining in occupation until 1868 when the mill was put up for auction with the Mytholm estate (**Illustrations 4-5**).

The mill was subsequently bought by William and Henry William Horsfall for cotton manufacture. The Horsfall’s instigated extensive modernisation works between 1869 and 1871 including a new scrutching mill for the processing of raw cotton, and a steam engine with adjacent boiler-house. Following the death of Henry William Horsfall in 1884, his son Frederick William Horsfall continuing to run the mill until 1901, when the entire Mytholm estate was sold to George Pickles, a local sawmill engineer from Hebden Bridge.

George Pickles adapted the buildings to suit the needs of his sawmill operation and the works grew progressively under the Pickles (**Illustration 10**), and later Pickles and Ransome, before changes in their target markets caused the firm to close in 1971. The site was then taken over by local firm, ‘Fred Brown Engineering’. A large fire in the 1980s destroyed the mill, after which it stood semi-derelict, although the cottage/office building and several of the sheds remained in use.

3.2 18th century Foundation and Early Construction

Little evidence has been found for the earliest mill of the early-mid 18th century, which

was believed to have been a cotton mill owned by James King prior to its use as a rasping and chipping mill after 1789 (Ingle 1997: 139). A rectangular structure located to the west of the mill on the 1868 auction catalogue (**Illustration 5**) has been tentatively identified as this mill which was located beside a culvert between the dam and the Calder recorded in 1920 (BIP/HB 741). This corresponded with alterations observed during fieldwork in the southern dam wall of the lower reservoir that could indicate the location of an earlier pentrough.

The first phase of construction at Mytholm Mill on record was in 1789 when James King bought materials for the construction of a new mill. By the beginning of the 19th century Mytholm Mill was five storeys high. The interior comprised 1,193 square yards of floor space occupied by 12 Crompton's mules each running 240 spindles and 12 thostles each running 120 (Ingle 1997:139). The mill was a local pioneer in the manufacture of fustians (a heavy woven, mostly cotton, fabric).

The c1789 mill manufactured and spun cotton, powered by a wheel that took water from the Lower Reservoir below Savile Road (**Illustration 2**) and that was fed by springs in Rawtonstall Wood. A second, Upper Reservoir, was added to the northeast of the original one, which was fed by a subterranean goit from the River Colden in a neighbouring valley to the northeast.

3.3 Early 19th-century Expansion

The mill was expanded in the early to mid 19th century with a large eastern range and a new wheel recorded as having measured 52ft 6in diameter by 9ft 6in wide. The wheel was one of the largest in the area and produced approximately 85 horsepower fed along pentroughs from both reservoirs at high and mid-level (Binns 1972: 76).

An engraving by Tait of the Todmorden Valley (**Illustration 3**) made in 1845 depicted Mytholm Hall and St. James's Church, with the mill standing below its two reservoirs at the foot of Rawtonstall Woods. The engraving depicted both the two-storey office range that stood on the west side of the mill lane, and the initial c1789 mill with a large eastern extension. The extended mill was portrayed with five storeys, apparently having no windows at ground floor level of the eastern extension, and no waterwheel or pen trough at the end of the extension. The engraving may, however, be slightly idealised as it does not concur with all the available historical evidence.

The sale catalogue for the 1868 auction provides a more reliable picture of the mill and its surroundings. This includes a description of the mill describes the building and the water power management system:

"The mill is stone-built, 6 stories high and attic, about 130ft long, and part of it 39.5ft wide, has a first class Iron waterwheel 52' 6" in diameter and 9' 6" wide; the reservoirs are in good condition and chiefly supplied with water from the Colden brook, after the user thereof at the mills there, through or by means of a covered tunnel; there are also other and never failing springs of water running into the reservoirs....and a share or interest in Nodale dam" (1868 Sale Catalogue)

The map (**Illustrations 4-5**) accompanying the sale particulars depicted the mill as in Tait's engraving with a broader west section. It also delineated the waterwheel pit which overlapped the east section at front and rear. Of additional interest on the map are the outlines of waterways running both above and below ground across the site. Pentroughs were depicted leading from both reservoirs to this wheelpit, with a tail goit indicated, running from the pit to the River Calder, immediately beyond the turnpike road. A bye-wash was labelled at the west end of the lower reservoir, curving southeast before tuning south to run parallel to the wheel goit to join the River

Calder. The tail goit was joined mid-way by a second bye-wash serving the upper reservoir from the channel between the two reservoirs.

3.4 19th-Century Renovation

The subsequent acquisition of Mytholm Mill by William and Henry Horsfall in the auction of 1868 was accompanied by extensive modernisation work between 1869 and 1871. This included the construction of a separate three-storey scutching mill west of the main mill range, replacing the earlier rasping and chipping mill, the installation of a steam engine with three Lancashire boilers towards the east of the mill.

Records from May 1869 depicted the Scutching mill (WYAS ref: BIP/HB: 32) as a three-storey structure with a pitched roof and timber truss having only a collar beam. The structure was 30ft wide and 34ft high at the eaves. Each floor was divided into three bays by two rows of columns, supporting jack-arch ceiling structures. Building materials were not specified, but walls scaled at 60cm thick, so were presumed to be of masonry rather than brick.

Additional records from March 1871 included the sketch of the southern elevation of the building enclosing the eastern wheel pit, and the proposed engine house and boiler house. The engine house was 22ft wide and 23ft to the eaves with two tall round-head windows above a plain string course and a plinth. No doorway was depicted. The adjacent boiler house was 34ft wide and 14ft high to the eaves with three arched openings, each housing a Lancashire boiler 6ft 6ins diameter, set on a floor level which was 2ft below that of the engine house.

3.5 Pickles Saw Mill: 1901-1971

George Pickles converted the mill to an engineering works in 1901, and progressively added a series of workshop sheds along the mill frontage (**Illustration 10**). A number of drawings and documents detailing these additions are archived with WYAS: Calderdale (refs: BIP/HB: 49, BIP/HB: 680, BIP/HB: 687, BIP/HB: 700, BIP/HB: 707, BIP/HB: 741, BIP/HB: 1389, BIP/HB: 1394, & BIP/HB: 1741). The works produced specialised machinery for the lumber and wood-working industries including portable steam powered saws.

Work undertaken on the waterwheel in the mid 1930s was interrupted when a dam breach damaged it beyond repair consequently leading to the installation of a water turbine (HBATC: 13). By this point the steam engine installed under the Horsfalls had been replaced with an electrical generator which was presumably initially powered by a water wheel. Whether it was the 19th century wheel or not is unfortunately not recorded. By the time of survey all major components of the wheel, turbine, generator and steam engine had been removed.

From 1978 the site was occupied by a well established local firm, Fred Brown Engineering.

4 DESCRIPTION OF THE STANDING BUILDINGS

Within this chapter each structure is discussed in turn based on an assigned number (**Illustration 2**). Both survey information and archive research is considered for each structure to allow thorough description of structures where only fragments remained at time of survey.

4.1 Summary

The standing structures of Mytholm mill (**Illustration 2**) consisted of a number of buildings at the base of the slope within the southern two-thirds of the site (**Plates 1-4**). Along the foot of the slope were stone built structures including a two-storey scrutching mill (building 1), a six storey mill (buildings 5-8), a six storey tall wheel house (building 9), a two-storey engine house (building 10), a single storey boiler house (building 11), and a brick built economiser house (building 12) which connected via a long flue to a chimney at the northern end of the site. To the south of these structures was Building 4, a two-storey brick built cottage that had functioned as offices. The intervening space between the northern and southern structures was taken up by a large foundry and erecting shop dating to the early-20th century.

The majority of these structures were still standing by 1989, although damage caused by a fire in the older mill buildings during that year had resulted in their demolition (**Plate 5**). By 2005 buildings 1, 4 and 8-11 remained, with elements of buildings 5 and 12 (**Plate 6**). Although in 2007 (**Plate 7-9**) when the full site was surveyed, the majority of the structures had been demolished. Fragments of building 1, 8, 9, 10 and 12 remained along the foot of the slope, as well as numerous infrastructure features (referenced as IF throughout the report, see **Illustration 2**). The main entrance to the site remained to the south from King Street along a short driveway (**Plate 10**). And the original site boundary was still defined by a stone wall with rounded coping (**Plate 11**), although instances of repair were observed.

4.2 Mytholm Mill structural environs

The majority of the slope in the northern third of the site was taken by two mill dams (**Illustration 2**); the lower reservoir (IF 4) dating to the mid-18th century, and the upper reservoir (IF 16) created towards the 19th-century. The lower reservoir (**Plates 12-14**) was fed by springs in Rawtonstall Wood (IF 11) that were channelled along a small tributary valley (IF 7) which fed into a rectangular structure on the north bank of the lower reservoir (IF 5). This structure (**Plates 15-16**) appears to have functioned as a form of sediment trap to prevent silting of the reservoir, with a sump to retain debris washed down by a stream in spate. This would allow water to enter the reservoir but would impound the sediment where it could periodically be dug out.

The upper reservoir (**Illustration 14**) (**Plate 17-18**) was mainly fed from a head goit (**Plate 19**) running underground through a stone lined culvert (IF 20) from Colden Water to the northeast. A secondary supply of water was from springs in Rawtonstall Wood. The level of the water in the upper reservoir was regulated through an overflow and sluice gate (IF 10) to the western edge (**Plates 20-21**) which lead along a channel (IF 9) (**Plate 22**) to the lower reservoir. A secondary sluice (IF 12) (**Plate 23**) in the channel allowed water to be intercepted between the reservoirs and diverted along an underground culvert (IF 23) to the River Calder. The lower reservoir was regulated by a bye-wash to the western end that lead into a channel that curved south-east before turning south towards the Calder.

Water for the wheel in building 9 was taken from the southern edge of the upper reservoir (**Plate 24**), and the south east corner of the lower reservoir (**Plate 25**). From building 9 the water then entered a tail goit running south towards the River Calder (IF 24). The pentrough from the upper reservoir was integrated into building 9 (**Plate 26**), whereas the pentrough from the lower reservoir comprised of an inclined cast iron pipe (IF 13) (**Plate 27**) governed by a sluice gate in the lower reservoir (**Plates 28-29**). The two pentroughs entered building 9 at different levels indicating that the wheel could have been powered by both water falling from above and flowing

below. In addition there was an additional inserted sluice in the upper reservoir (**Plate 30-31**) which lead down a culvert to the economiser (building 12) where water was preheated for the boilers in building 11.

The southern dam wall of the lower reservoir exhibited signs of having been rebuilt towards the eastern end (**Plate 32**), behind and to the east of building 1. The altered portion of the dam wall was constructed of angular stone laid roughly to courses whereas the original fabric surviving to the west was of squared stones laid to regular courses. This could indicate that an earlier pentrough had been removed from where water was drawn for an earlier mill believed to have been located in the western half of the site. A second change in the fabric of the dam towards the eastern corner (**Plate 33**) suggests that the sluice and cast iron pipe there were later additions.

Movement of mill workers between the dams and sluice gates was facilitated by pathways up the hillside (**Plate 34**) as well as steps up on to, and a pathway along, the lower reservoirs' dam wall. There were also stone steps between the levels of the terraces (**Plate 35**).

Arranged north of the upper reservoir were two terraced fields (**Plate 36**). They were described on the 1868 Mytholm estate plan (**Illustration 5**) as gardens, with regularly spaced shrubs around their perimeter. The land was also shown on the c1900 postcard (**Illustration 9**) where the fields appear to have been divided into allotments. The use of the land for these purposes may have been provided for workers as an incentive to work for Mytholm mill. Since cotton production did not require a drying stage, it was very unlikely that these would have been tender fields.

The steam engine housed in buildings 10-12 was connected to a large 23m (75') high chimney towards the north-eastern corner of the site (**Plate 37**). The chimney was constructed of squared sandstone laid to regular courses with decorative torus moulding at the base and top and located on the highest point on the site where it would achieve a greater draw for the discharge of fumes. The flue between them was covered in stepped slabs creating a staircase along the eastern boundary of the site (**Plates 38-40**). A partially buried structure to the eastern side of the flue towards the chimney (**Plate 41**), appears to have been an inspection entrance into the flue. South of the upper reservoir the flue had blocked an entrance through the boundary wall from the houses to the east which had obviously predated the installation of the steam engine (**Plate 42**).

4.3 Building 1: Scutching mill

Building 1 was located in the western side of the site at the foot of the hill (**Illustrations 2 and 13**) (**Plates 43-63**). It was a rectangular stone built structure, measuring 9.2 x 12.2 m (30' x 40'), with a hipped slate roof. It dated to 1869, having replaced a smaller, possibly early-18th century, structure depicted on the 1868 Mytholm estate plan (**Illustration 5**). Archive records held in WYAS: Calderdale included a section of a scutching mill proposed for Mytholm Mill by Henry Horsfall in 1869 (archive reference: BIP/HB: 32) that was evidently building 1. The building was briefly accessed in 2005 during general site reconnaissance, though when surveyed in 2007 only remnants of the northern ground floor wall remained (**Plate 43**).

Scutching machines were used for cleaning opened raw cotton in order to form the fibres into sheets in preparation for processing into thread. The cotton was fed into a machine that beat out the dirt then used an air stream to lift the cotton fibres from heavier particles and to suck out the finer particles (Jones 2006: 327).

Exterior

Building 1 was a stone built structure of three-stories. The ground floor southern elevation (**Plate 44**) contained two windows with ashlar sills, lintels and jams that flanked a wide central entrance. The first floor had three windows identical to those of the ground floor, although a doorway had been inserted through the central window and an external steel staircase erected to access it. The second floor was also divided into three openings consisting of two windows and an original central taking in door. A projecting RSJ above the door indicated that there had been a hoist for lifting goods onto the second floor. The windows to either side of the taking-in door retained their original small-paned cast-iron frames.

The remaining elevations contained fewer openings. The eastern elevation (**Plates 45-47**) featured a first floor fire door to the north end of the elevation that was accessed from building 5 via a cantilevered stone walkway that connected the two buildings. A cast iron wall box above the door indicated that motive power was transferred to the building from the main mill. The western elevation (**Plate 48**) possessed three inserted first-storey windows. The lintel of the central window (**Plate 49**) possessed scars indicative of removed tie plates, possibly relating to internal line shafting. A blocked wall box to the north of this elevation corresponded with the wall box in the eastern elevation, and would have received the end of the line shafting.

The northern elevation (**Plate 50**) had three windows along both first and second floors, and a brick chimney stack just east of centre. Portions of this wall survived to be surveyed in 2007 (**Plate 51**) including two parallel walls that abutted the western end of the elevation (**Plates 52-53**) that were one storey high and connected to the dam wall of the southern reservoir. A blocked wide arched opening into building 1 was positioned between the walls at ground floor level (**Plate 54**) that was comparable to arches associated with the intake of water for a water wheel (see Giles and Goodall 1995: 129). To the east of the walls at ground floor level was a bricked up inserted window. The space created between the walls, building 1 and the dam is of indeterminate use, though may have encased a hopper, or tank, for the storage of materials or water used within building 1. It is possible that the rear wall of building 1, at ground floor level, predates the rest of the structure, since the joist sockets and eastern wall of building 1 appeared to have been keyed in at a later date. If so this may have been an associated wall fragment of the earlier rasping and chipping mill.

Interior

The Ground and first floors had brick jack arch ceilings supported on two rows of three cast iron columns (**Illustration 13**). The sockets for the supporting joists (**Plate 55**), and a single course of the brick springer arch (**Plate 56**) were still visible in building 1 in 2007, as was a brick foundation for a removed column (**Plate 57**).

A series of inserted brick walls had been built within the ground floor dividing it into a smaller (**Plates 58-59**). The chimney stack to the north of the building was a later addition relating to these alterations, which must have included the insertion of a hearth. There was no internal staircase between the ground and first floors. Access onto the first floor had been from building 5 via a suspended walkway, or up the external staircase and through the inserted door in the southern elevation.

The first floor consisted of a single space (**Plates 60-61**) with a wooden staircase to the second floor along the eastern wall (**Plate 62**). The columns in this room had bolting faces for supporting line shafting (**Plates 61 & 63**). The presence of fewer windows in the eastern elevation indicated that the location of the internal staircase was probably original. Line shafting entered the first floor above the eastern doorway,

and ran across the northern wall. The removed tie plates above the window in the western wall could indicate that the line shafting continued along that wall.

The second floor was not accessed prior to its demolition, although it was observed to be open to the rafters with a lath and plaster ceiling (**Plate 62**). The roof trusses were timber, although their construction was not observed in detail.

No evidence for the various processes undertaken within building 1 were observed during the site reconnaissance in 2005, although it is probable that imported cotton bales were hoisted into the building where a scutching machine on the first floor, powered by line shafting from the water wheel, refined the cotton for further processing in the mill. The substantial construction of the building with brick arched ceilings and cast iron columns suggested a concern with fire-proofing the building. The storage and air sorting of cotton fibres is a dangerously combustible process, and so fire precautions such as brick ceilings and floors would have been necessary. It may also explain the building's location away from the main mill.

4.4 Building 4: Cottages

Building 4 (**Illustrations 2 & 15**) was a brick built two-storey structure towards the south of the site (**Plates 64-101**). It was rectangular in plan, measuring 6.5 x 21 m (21' x 69'), and orientated north-south with a central projecting gable from the western elevation and a pitched slate roof (**Plate 64**). There was also a further two-storey lean-to within the southern angle of the projecting gable and main building. A large rectangular brick built structure from the northern end of the western elevation was a later extension dating to the later 20th century (**Plate 65**).

Exterior

Externally the building was rendered and white washed obscuring any evidence within the fabric. The southern elevation (**Plate 66**) possessed a single entrance to the eastern side with a timber framed bottom hung upper opening window above. Neither window nor door are visible on the c1900 postcard (**Illustration 9**) and therefore likely to have been inserted during a rearrangement of internal space. The entrance in the southern elevation was inaccessible at time of the 2005 survey, and demolished before the room beyond was recorded. Within the eastern elevation (**Plates 67-68**) was a door with an arched fanlight, and stone architrave (**Plate 69**). Nine windows on the ground floor eastern elevation were repeated on the first floor, and featured stone sills and timber window frames with bottom hung upper openings. There were two large windows in the west elevation of the main building with brick sills and timber frames with two bottom hung upper openings (**Plate 70**). Windows in the projecting gable and lean-to (**Plate 71**) were irregular in size, all possessing later 20th-century frames. Located in the northern half of the projecting gable, adjacent to the abutting western extension, was a single doorway.

The western extension (**Plate 72-73**) was brick built of machined bricks in a stretcher bond. The roof was a single pitch rising to the north and covered with corrugated asbestos sheet punctuated by clear plastic skylights. The windows and doors had concrete lintels and sills and were all boarded.

Interior

Internally the building was divided into a series of rooms labelled G1-G12 on the ground floor, and F1-F8 on the first floor. Room G1 (**Plate 74**) was a small lobby space accessed through an external door within the eastern elevation, and partitioned from the main room, G2, by studwork wall with continuous glazing in the northern wall. G10

(**Plate 75**) was similarly partitioned from G2, providing a corridor to the staircase in G11. Blocked doorway and window in the southern wall of G10 had originally provided entry into G12. Room G2 (**Plates 76-77**) measured 5.5 x 4.7 m (18' x 15½'), including rooms G1 and G10. It had a panelled dado with a two light external window in the eastern wall, and a single timber framed window in the western wall that looked into the corridor G6.

Room G3 (**Plates 78-79**) was located to the north of G2, and measured 5.5 x 6m (18' x 19' 8"). There was a two light and single light window in the east elevation and a doorway in the western wall to G6. The walls were plastered and painted with a moulded timber skirting board, and the true ceiling was obscured by an inserted suspended ceiling. A chimney breast in the southern wall contained a large blocked stone hearth and a corniced mantelpiece (**Plate 80**).

G4 and G5 were to the north of G3. G4 was portioned from G3 by a glazed studwork wall (**Plate 81**), and lit by a two light window in the eastern wall. The northern wall of G4 was clad in MDF, behind which was an older wall consisting of timber panels with dwarf stone wall (**Plates 82-83**). G5 (**Plates 84-85**), a small room with brick partition walls, possessed a small window in the western wall that had been converted to shelves but behind which survived the original small paned iron window frame. The northern wall was panelled, covering a timber wall with stone foundation identical to that of G4, although with a battened timber panel door and small paned iron framed window.

Rooms G6-G9 were located in the projecting western gable and consisted of a north-south corridor (G6), a kitchen (G7) and two lavatories (G8 and G9). A blocked door at the southern end of G6 (**Plate 86**) had originally opened into G11, and a door at the northern end opened into the western extension. The kitchen (**Plate 87**) had painted brick walls and blocked door and window in the western wall. The toilets (**Plates 88-89**) had c1930 panelled timber doors and glazed brick dado. The jambs of the windows were in bull-nosed bricks. Room G11 (**Plate 90**) was located in the two-storey lean-to and contained a lavatory beneath a timber staircase. The lavatory was similar in fittings to G8 and G9 with a c1930s panelled door, glazed brick dado, and bull-nosed window jambs.

On the first floor, F5 (**Plates 91-92**) represented a landing and corridor providing access between the other first floor rooms. The walls in these rooms were plastered and painted with moulded timber skirting, and carpeted floors. F6, F7 (**Plate 93**) and F8 (**Plate 94**) were a lavatory, bathroom, and kitchen within the western projecting gable. All three rooms were fitted with modern furnishings.

Rooms F1-4 were square rooms of similar size, measuring 5.5 x 4.7 m (18' x 15½'). All of the rooms had been plastered and painted, with suspended lath and plaster ceilings within rooms F3 and F4. The floor level of room F1 (**Plate 95**) was approximately 40cm lower than the other rooms. It had windows in the south, west and east walls and a chimney breast east of centre in the southern wall into which had been inserted a gas fire. Two boxed joists crossed the room north-south. There was a low door in the northern wall with two steps up into room F2. Within room F2 (**Plates 96-97**) there was a two light window in the west wall, and a blocked fireplace and door in the north wall. Rooms F3 and F4 (**Plates 98-101**) were divided by an inserted stud work partition above of which was a boxed joist. The north wall of room F4 was similarly of stud work, presumably having replaced a panelled wall similar to those in G4 and G5.

The office building had been significantly truncated, having extended further north as

depicted on the c1845 Tait engraving (**Illustration 3**), and the 1868 sale plan (**Illustration 5**). Building 4 had originally represented what had been two rather grand equal size two-up two-down cottages. The northern most cottage had altered the most with the division between the rooms removed on both floors, and the front door in the eastern elevation converted into a window. The timber panelled construction of the northern wall of building 4 was inserted when the abutting buildings to the north were demolished to make way for an iron framed structure c1900.

The projecting western gable, and the lean-to were additions to the original building that was depicted on the c1845 Tait engraving (**Illustration 3**) and 1868 sale plan (**Illustration 5**) as having possessed two single-storey lean-to structures.

4.5 Building 5: Textile mill

Building 5 (**Illustration 2 & 13**) was a stone built six-storey structure measuring 17.1 x 18.4 m (56' x 60'). The construction of the mill is dated to c1789 when stone was recorded to have been bought by James King for the construction of a mill at Mytholm. The structure was heavily damaged by fire c1989 and the majority of it pulled down leaving only two-stories of the northern wall that were observed in 2004. By 2007 the entire structure had been demolished and the following description is largely based on available historic photographic evidence.

Exterior

The structure was built in ashlar masonry with string courses running mid way between the windows on all floors which had ashlar masonry architraves. The southern elevation (**Plates 102-106**) had five windows along each floor, with a larger margin between the edge of the elevation and the easternmost windows than on the western side. This discrepancy is due to the location of a large stone spiral staircase within the southeast corner of the building. By 1989 a two-storey entrance had been inserted in the centre of the elevation, which may have replaced an earlier smaller entrance in the same location. The north elevation (**Plate 107-110**) was divided by six equally spaced windows on each floor, the ground floor windows lit by a light-well sunk into the hillside which was accessible from a doorway within a wall between building 1 and 5 (**Plates 111-112**). The western wall (**Plates 113-114**) had five unevenly spaced windows across each floor. The central opening on each floor was an arched taking in door, which would presumably have related to a hoist above the door on the top floor. The flanking openings were all windows of identical size to those in the north and south elevations. The majority of the eastern elevation was removed during the construction of building 6, however the 4.8m of wall that projected beyond building 6 contained a single window on each floor that opened into the internal stair tower. These windows still retained cast iron frames divided into six panes.

The roof was covered in slate and pitched with an eastern hip. c1845 Tait's engraving of c1845 (**Illustration 3**) depicts the roof as lacking the hip suggesting that the roof had originally been fully pitched and altered sometime after building 6 was constructed. No evidence for the internal roof structure survived.

Interior

Little is known of how the internal space of building 5 was organised. It is suggested that there is likely to have once been a water wheel associated with the structure. Although its exact location is unknown the water wheel would likely have either been against the internal eastern elevation, or the external eastern elevation. It was possible that this wheel had been active until the 1860s when the larger wheel was

installed with building 9, since the new wheel did not utilise the lower reservoir until later.

Structurally the floor was of wooden joists running north-south, spaced 2.5m (8') apart, and probably supported on cast iron stanchions as was common on similar mills of this date (Giles & Goodall 1995: 64). The length of the floor span would have required multiple internal supports that could indicate there had been upwards of four columns on each floor dividing the building into three bays. The columns could also have served to support line shafting. A probable wall box in the west elevation at third floor level (**Plate 108**), is the only evidence visible in the historic photographs for the location of the line shafting that must have ran the length of the building. A first floor external metal fire door in the north end of the western wall accessed building 1 via a suspended walkway. A wall box above this door related to the transferral of power to building 1 from the water wheel in the main mill.

The numerous windows along the north and south elevations would indicate that it was against these elevations that the mill's machines worked, presumably with a concourse between them in the centre of the building. The taking-in doors in the centre of the western elevation (**Plate 114**) would have hoisted materials in and out of the floors.

The largest internal structural feature was a brick stair tower (**Plates 115-116**) containing a stone spiral staircase with landings at each floor level and windows to the south and west. Entry from each floor appeared to have originally been from the north, although additional eastern doorways had been inserted and a few of the original doors blocked.

The walls were plastered and whitewashed covering a rougher finish to the internal stonework, and structural details such as relieving arches above the windows (**Plate 117**).

4.6 Buildings 6-8: Textile mill extension

Between 1790-1845, building 6 (**Illustrations 2 & 13**) was constructed as a six-storey extension, measuring 24.5 x 13.4 m (80' x 44'), and adjoining building 5 to the east. The structure was heavily damaged by fire c1989 and the majority of it pulled down leaving only two-stories of the northern wall. By 2007 the entire structure had been demolished and the following description is largely based on available historic photographic evidence.

Exterior

The width of building 6 was slightly less than building 5 so that its southern façade was set back (**Plate 118**). Architecturally the extension was very similar to building 5 although the windows were slightly narrower. The north elevation (**Plate 119-121**) possessed an integral privy tower (building 7) projecting from the western end of the elevation, and a substantial solid stone built platform (building 8) to the eastern end. Equally spaced between these structures on all six floors were ten windows with small-paned cast-iron frames. The southern elevation (**Plates 122-123**) had eleven equally spaced windows on the third to fifth stories, identical to those in the northern elevation. Large two-storey doorways had been inserted at the base of the elevation cutting the majority of windows at these levels, and obscuring any evidence for earlier openings (**Plate 124**).

Building 7 (**Plates 125-126**) was a narrow privy tower accessed to the south by doors in all floors of building 6. A hatch at the base of the tower presumably facilitated the

removal of waste.

Building 8 (**Plates 127-129**) was in the northern angle between building 9 and building 6 was a solid stone built platform. A plan archived in WYAS: Calderdale depicted building 8 as a single room in 1901 with a doorway to building 9, and possible blocked opening to the west (archive reference: BIP/HB:491). Building 8 appears to have been contemporary to building 6, thus predating building 9. Suggesting that it had been converted to support the pentrough pipe to building 9 from the lower reservoir (**Plate 130**), and that it had not been its original function. Hold down bolts visible within the structure indicated that machinery may have originally been fixed to the top (**Plates 131-133**). Retaining walls for the embankment abutted the structure to the west (**Plate 134**), the lowest creating a pathway along the northern elevation of building 6. The top of the structure had been disturbed, although brickwork within it and a vertical joint between it and building 9 were observed (**Plates 135-136**).

Interior

The floors of building 6 were of thick timber joists at regular intervals of 2.2m (7'), and supported on cast-iron columns down the centre of the building (**Plates 137-138**). In 1989 the ground floor of the building appeared to have been double height, incorporating the original first floor for which the original joist sockets were visible along the northern and southern walls. The columns supporting the ground floor ceiling were two stories tall and were therefore unlikely to have been original to the building. However a single storey column visible on the third floor indicated that cast-iron columns had been used (**Plate 137**).

The northern and southern elevations had almost continuous glazing (**Plate 139**) consistent with other mills buildings where the provision of good light for working was a major consideration. Consequently it was likely intended for work stations to be set along these elevations. The eastern wall of building 6 featured several large wall boxes relating to the transmission of motive power to the upper five stories (**Plate 140**). Power entered in through the largest box in the centre of the first floor where it was transferred vertically to the floors above. On the first floor the power was also transferred horizontally to the north and south elevations. Alterations to the stonework around these wall boxes suggested that they may have been moved or replaced during the developments in power generation. In 1811, by the time buildings 6 had been constructed, the mill was recorded to have held 12 mules and 12 throstles (Ingle 1997: 139). Scars in the northeast corner of the building possibly indicated that a vertical drive had provided power to the ground floor of the building (**Plate 141**), although the absence of any substantial wall boxes suggest the floor may have been intended for storage. The vertical joint between buildings 6 and 9 (**Plate 142**) suggests that these wall boxes must have been inserted, and that several of the blockings may have originally represented windows.

The tiled roof was supported by queen-strut trusses (**Plate 143**) arranged to create a large attic space presumably used for storage. A practice common in other mills (Giles & Goodall 1995: 70).

4.7 Building 9: Wheel House

Building 9 was an ashlar built six-storey extension to the east of the mill (**Illustrations 2 & 13**), measuring 5.6 x 20 m (18' x 66') (**Plates 144-201**). Built in the mid 19th century abutting the eastern wall of building 6 (**Plate 144**), it provided a large wheel house within the lower five floors that extended below ground, with the sixth floor and attic being extensions to those of the building 6. The building was slightly

wider than building 6 and so projected beyond it to the south. The mills roof was continued over building 9, with the southern eave of the building consequently being lower due to the extra width of the building.

When observed in 2005, building 9 had been truncated to fourth floor level and left unroofed (**Plates 145-148**). By 2007 the majority of building 9 had been demolished (**Plates 149-152**), leaving only the northern wall, pentrough, and sub-ground level portion of the wheel pit.

External

Windows in the southern elevation at fifth and sixth floor level indicate that there were floors within the building at these levels. The projected circumference for the water wheel (**Illustration 23a**) indicated that it would have risen partially through any floor at fifth storey level, suggesting that the floor may have been a partial floor within the southern end of the building. The windows at these floors were square with small paned iron frames and stone lintels and sills. Large segmental stone arched windows lower down the southern elevation (**Plate 153**), and in the western elevation south from building 6, were not in line with the floor levels and may have related to internal walkways around the wheel. A vertical change in the stone work was evident within the southern elevation where the ground floor was constructed of rough finished stone. In addition the arched doorway in it (**Plate 154**) was positioned off centre, suggesting that this portion of wall had been rebuilt.

In the eastern elevation there were two arched windows at fourth and sixth floor level, and further windows at second and first floor that had been blocked during the construction of building 10 including a line of three blocked arched windows extending from the north of building 10 at first floor level (**Plate 155-156**). Opposite those windows in the western elevation was a doorway onto building 8. A blocking of an inserted opening visible in the wall abutting building 10, at upper ground floor level, corresponded with a similar blocking in the western wall of building 9 (**Plate 157-158**). The function of these blockings was uncertain as they had been truncated during the demolition of building 9, although they were possibly related to the transmission of power to the mill from the steam engine in building 10. Large cast iron wall plates towards the back of the wheel house, and across the pen trough, provided additional structural support to the structure (**Plate 159**).

The pentrough from the upper reservoir was a stone structure extending from the north of building 9 (**Plate 160**). The walls of the pentrough consisted of two ashlar walls secured with iron pins and filled with a compacted clay core (**Plate 161**). Across the intake into the trough was a footbridge consisting of two stone slabs (**Plate 162**), below which was a trash grill. Within the centre of the pentrough there were an inclined iron grill with slots within both east and west elevation for its removal (**Plate 163**), and two brackets towards the southern end that also appeared to have supported a grill (**Plates 164-165**). This system of grills would have protected the water wheel by preventing debris from getting to it. Internally the pentrough had been significantly altered with concrete alterations made to the base of the trough and the sluice leading into the wheel pit related to the insertion of the water turbine c1901. The opening through which there had would have been a timber trough projecting over the wheel had been blocked with shuttered concrete (**Plate 166**), and a steeply inclined iron pipe inserted (**Plate 167**).

Internal

The sub-ground level wheel pit (**Plate 168**) exhibited four phases of development relating to the advancement of power production. The original fabric of the wheel pit

was of sandstone blocks with chiselled square margins and recurrent masons marks (**Plates 169-174**). Initially the phase 1 pit appears to have been squared and level based (**Plate 175**), possibly with a different outlet into the tail goit. Stone supports jutting out of the northern wall of the wheel house were possibly platforms to take supports from phase 1's pentrough (**Plate 176**). Based on measured survey of abrasion scars on the side of the wheel pit from the water wheel (**Plates 177-178**) the wheel had a diameter of approximately 16 m (52' 6"). The absence of a similar scar on the western elevation of the wheel pit (**Plate 179**) indicated that the wheel had been under 3.5m (11½') wide. This is corroborated by historic sources that claim the wheel at Mytholm mill was 52' 6" in diameter and 9' 6" wide (Ingle 1997: 140). This extra space would allow for power transmission and a walkway on the western wall. Judging by the size of the wheel and the position of the pen trough, it is likely that the wheel was of a pitchback design, whereby the water was dropped onto the side nearest the pentrough causing the wheel to turn anti-clockwise. At first floor level the walls of the wheel pit stepped in by about a foot to the east and west, which when taken in conjunction with the documented width of the wheel it is possible to estimate that there would have been around 2½ ft of space to the west of the wheel. Amble room for there to have been a walkway beside the wheel that would have been necessary to facilitate maintenance. A series of tie plates up the centre of the western elevation related to a vertical drive shaft in building 6 (**Plate 180**).

Phase 2 alterations were made in squared sandstone blocks with lewis holes in their visible face (**Plate 181**), and consisted of a ramp within the northern half of the wheel pit (**Plate 182**). The inserted ramp increased the amount of wheel circumference in close proximity to the base of the wheel pit allowing the wheel to be powered in the low breastshot method, whereby water entered the wheel below the level of the axle turning the wheel anti-clockwise. This alteration would likely have been in conjunction with the creation of pentrough to the wheel pit from the lower reservoir. The cast iron pipe (IF 13) from the southeast corner of the lower reservoir to the wheel pit, although likely on the same line as the lower pentrough created during these alterations, is quite possibly related to the later turbine development. Both pitchback and breastshot could have worked in conjunction. This could have been used to increase the power of the wheel, or alternatively one could have acted as secondary 'turbo' in times of low water level in the others reservoir.

The phase 3 development to the wheel pit would have been as a result of the construction of the stream engine c1870, but appeared to have had little effect on the fabric of building 9. It is possible that the wheel was removed at this time, although it may have been kept as a backup if the steam engine broke down. Power transmission from the engine to the mill would still have had to pass through building 9, and although it is not clear exactly where or how this was achieved, there are several possible openings (**Plates 157 & 183**) may have been used. If the wheel was kept the power transmission from the engine would not have been able to interfere with the movement of the wheel and therefore may have shared the same drive shaft through the axle of the water wheel.

The phase 4 development to the wheel pit appears to have been the replacement of the water wheel with a turbine, and the insertion of timber floors at ground and second floor level (**Plates 184-185**). These alterations are believed to date to the mid-20th century while the mill was owned by George Pickles. A platform supported on RSJs was inserted above the ramp in the northern end of the wheel pit to take the turbine (**Plate 186**), and a sump was sunk east of centre at the base of the ramp presumably to accommodate the turbines water outlet (**Plate 187**) (see Binns 1972 for historic photo of similar arrangement installed in Calvert's Mill, Wainstalls). The

modifications made to the pentrough increased the water velocity to maximise power output from the turbine. Further alterations within the wheel pit were around the exit of the feed pipe through the north wall (**Plates 188-190**), and a channel in the top of the wheel pits northern wall relating to the steep angle of the intake pipe (**Plate 191**). Inserted iron brackets in the eastern wall (**Plates 192-193**) and a large inserted opening in the western wall (**Plate 194**), both adjacent to the RSJ platform, were related to the turbine. Incised in the northern wall were instructions of 'Open ←' and 'Shut →' (**Plates 195-196**), presumably related to a valve positioned on the wall for the turbine.

The arched opening of the tail goit in the south of the wheel pit (**Plates 197-199**) had been rebuilt with the alterations marked by the use of rougher quality stone than that of the rest of the building. The original opening may have been in line with the southern wall of building 9 since the eastern and western walls appeared to have continued down alongside the later structure. The narrow stone staircase appeared to be original however (**Plates 200-201**). The reasons for this alteration is unclear, though probably relate to the fourth phase.

4.8 Building 10: Engine house

The engine house was a rectangular stone built structure of two-stories, measuring 6.2 x 16.5 m (20' x 54'), with a tile roof hipped towards the south (**Illustrations 2 & 13**) (**Plates 202-229**). Along with buildings 11 and 12, building 10 represented a significant investment by the new owners of the mill c1870 of a new steam engine. A steam engine was not merely an improved method for power generation, but a prestigious addition to the works that was reflected in the architecture and visibility of the engine's encompassing structures. The steam engine was eventually removed when it was replaced by a water turbine in building 9 c1901.

Exterior

The southern elevation of the engine house was distinguished from the rest of the mill by its rough finished stone construction and ornamental rusticated window surrounds and quoins (**Plate 202**). Above a string course on the façade were two large arched windows with ornamental cast iron frames. Centred beneath the stringcourse was a doorway with ashlar jambs continuing. Although the doorway was not included on the archived drawings of the building (archive reference: BIP/HB:40), there are no indications that it was a later addition. An opening beneath the eastern window was inserted and entered into a narrow space that extended to the back wall of the building. Centred in the eastern elevation at first floor level were a doorway with ashlar surround and an external stone cantilever staircase with cast iron banisters (**Plate 203**). A series of joist sockets at regular intervals along the wall above first floor level related to the roof structure of building 11. The wall beneath the sockets was whitewashed. The northern elevation was gabled with two blocked first floor arched windows (**Plate 204**). A steel frame structure (**Plate 205**), and a sunken revetment (**Plate 206**) extending from the rear of the elevation were of indeterminate use.

Interior

The ground floor of building 10 consisted of three narrow channels the full height of the ground floor separated by thick ashlar walls. This structure represented an ashlar machine base for possibly two horizontal steam engines, the eastern and western channels relating to the location of fly wheels. The entrances in the southern elevation entered the central and eastern channels, although the central entrance

entered onto a timber staircase to the first floor (**Plate 207-208**). Numerous cavities (**Plates 209-211**) and hold down bolts (**Plate 212**) were observed between the channels, relating to the removed steam engine. The remnant of this large machine base was recorded in 2007 (**Plates 213-215**), where it was observed to have had been repaired using shuttered concrete (**Plate 216**) probably at the same time the concrete first floor was added c1901. Hold down bolts (**Plates 217-218**) and a wall box (**Plates 219-220**) within the structure confirmed its association with the steam engine.

The first floor had been significantly altered after the removal of the steam engine. The insertion of a concrete floor had obscured any fixings from its former use, and blocked off the channels that had extended into the ground floor. The only visible part of the machine base on the first floor was a large sandstone block that had been retained against the southern wall (**Plate 221**). The doorway in the eastern elevation was original (**Plate 222**), although the arched opening in the western wall had originally been a window within building 9 and later converted to a doorway (**Plate 223**). It could possibly have been kept unblocked to be used in the transmission of power from the engines into the main mill. Inserted along the western wall were electrical switchboards and capacitors that demonstrated the turbine was producing electrical rather than motive power (**Plates 224-225**). A disconnected mercury vapour rectifier for the conversion of alternating current to direct current (**Plate 226**), also indicated that building 10 may have been used for battery charging. A RSJ hoist in the northwest corner of the room was related to the turbine phase of the building rather than the steam engine (**Plate 227**).

The slate roof was supported on three timber king post trusses resting on stone corbels (**Plates 228-229**). The rafters were covered in lath and plaster, and there were inserted skylights along the eastern side of the ridge.

4.9 Building 11: Boiler house

The boiler house was located adjacent to the east wall of building 10 (**Illustration 2 & 13**) and was a single storey structure, measuring 9.6 x 16.6 m (31' x 54½'). The rusticated ornamentation of the engine house was continued along the southern elevation of building 11. Although observed and photographed in 2005, nothing remained of the structure above ground by the time of the 2007 survey.

Exterior

The southern elevation of the building (**Plates 230-231**) was divided into three large openings with arches of rusticated segmental stone voisoirs, segmented timber vertically folding doors, and small paned iron frame fanlights (**Plate 232**). The opening in the southern end of the eastern elevation had been enlarged from a smaller doorway, preserving part of the original jamb and inserting an RSJ lintel (**Plate 233**). The opening had a segmental timber horizontally sliding door (**Plate 234**). An iron bracket on this elevation (**Plate 235**) indicated that there had been a telephone line into the structure. The northern elevation (**Plate 236**) consisted of one and a half gables with stone slab coping.

Interior

The structure had originally contained three Lancashire boilers (archive reference BIP/HP:40) to provide steam for the engine in building 10, although there was no evidence remaining above ground to indicate whether there had actually been three or fewer boilers in operation. Few internal features remained in building 11 by 2005 (**Plate 237**) besides a low rectangular brick walled cement lined structure/base in

the northeast corner (**Plates 238-239**) and a small riveted iron boiler in the northwest corner (**Plates 238 & 240**). A line of cast iron columns supported a valley gutter in the western and central third of the building. Attached to the capital of the southernmost column was a pulley wheel (**Plate 241**). A brick blocked opening with ashlar surround was located at the northern end of the eastern wall (**Plate 242**), presumably once entering into building 12. Its blocking appeared to have been the same phase as the adjacent brick structure indicating that neither were original features. In the western wall was a first storey entrance and stone cantilever staircase into building 10 (**Plate 243**).

4.10 Building 12: Economiser house

Building 12 was a rectangular rough stone built structure located to the east of building 11 (**Illustration 2 & 13**), measuring 10.2 x 4.2 m (33½' x 17'), and built c1860 (**Plate 244**). The building is believed to be an economiser house since it lay between the boiler house and the chimney – at the beginning of the exhaust flue. From the 1840s, economisers became common additions to steam engines, using the exhaust gases from the boilers to preheat boiler feed water and therefore reduce the quantity of fuel required to produce steam (Giles and Goodall 1995: 149). The economiser house provided shelter and support for the economiser installation that would have consisted of a closely packed array of vertical pipes through which water passed and between which exhaust gasses were drawn. From the mid 19th century economiser production in Yorkshire was dominated by Edward Green of Wakefield, and it was therefore likely to have been one of his that was installed at Mytholm Mill. By 2005 the economiser had been removed, and the majority of the brick structure demolished by 2007 (**Plate 245**).

The exterior of the structure had a rounded corner to the southeast, and very few external openings. The blocked opening in the western wall was likely to have been the former exhaust entrance from the boilers (**Plate 242**), whereas the stone blocked doorway in the southern elevation had presumably been an entrance to facilitate maintenance (**Plate 246-247**). The southern wall of the structure was higher than the northern wall indicating that the structure had possessed a single-pitched roof, although nothing of the roof structure remained by the 2005.

Although the economiser had been removed, the exhaust flue to the western end of the building (**Plates 248-250**) and a sluice gate in the northwest corner from the upper reservoir (**Plate 251**) both remained. These structures were both brick built from unfrogged machine made bricks (measuring 23 x 12 x 7 cm). Brick rubble within the structure consisted of frogged bricks stamped with 'Kirkheaton Brickworks' (measuring 23 x 7 x 11 cm).

5 DISCUSSION

5.1 Location and layout of mill

Mytholm Mill was not an isolated site, but was part of a larger industrial landscape of dams and mills strung out along the Colden Valley. This valley possessed a plentiful and consistent supply of water from the surrounding Colden Clough watershed, regulated by the Noah Dale Dam, and was steep enough to be ideally suited for the operation of water wheels.

As would be expected, the form of Mytholm Mill was largely affected by practical considerations. All of the 18th and 19th century mill buildings were situated in line along

the base of the slope into which two reservoirs were sunk, with the cottages and offices forming a range perpendicular to the mill beside a lane from the main road to the south. The development of the mill building (**Illustration 24**) was illustrative of site planning in which minimising the complexity of power transmission was an important consideration. The constructing the mill buildings in line with the water wheel, the line shafting from the wheel could be run the length of the mill with few necessary directional changes. These considerations also effected the location of the later steam engine installation which was built in order to exploit the power transmission system already in place. Subsequent developments of the site in the 20th century gradually built up against the mill to the south, mainly comprising of single storey steel framed sheds.

5.2 Power

Power in Mytholm Mill progressed through several phases as a result of both wider technological developments and the continued growth of the mill (**Illustration 24**). The developments within the wheel house were a direct consequence of continued improvements made to the method in which power was being generated. The improvements incrementally improved the horse-power and reliability of the generated power, reflecting the growing level of mechanisation within the mill and an increasing reliance on powered machines.

The earliest power system at the Mytholm Mill site had been associated with an early 18th century mill which had likely comprised of a water wheel that drew water from a single reservoir. The size of the lower reservoir represents a considerable investment of labour that seems at odds with the initially small mill on the site and may therefore in fact be an expansion of an earlier reservoir coinciding with the construction of the larger second mill to the east. The second mill was considerably larger consisting of six storeys and would have required a larger wheel and therefore a larger reserve of water to power it.

Although nothing remained of the earlier incarnations of water-power at the mill, it is possible to establish the form of the last mid-19th century wheel built in conjunction with a large extension to the mill and a second reservoir. Initially the wheel was turned from water taken from the upper reservoir and it is unclear what the lower reservoir would have been used for before it was put to the wheel. It is possible that the earlier wheel thought to have been in building 5 was still operational at that time, being later abandoned in favour of increasing the power of the wheel in building 9. Alternatively the reservoir may have just fallen into disuse.

Judging from abrasion scars within the wheel pit of building 9 and documentary sources the wheel at Mytholm Mill was 52' 6" in diameter and 9' 6" wide. In its last iteration the wheel was powered by water taken from both the upper and lower reservoirs which turned the wheel anti-clockwise through a combination of pitchback and low breastshot methods. The rotation of the wheel would have directly turned a 'first motion shaft' (Giles and Goodall 1995: 155) connected by bevel wheels to an upright shaft that transferred the power vertically between floors. Although the power transmission system did not survive in Mytholm Mill, the large number of wall boxes in the centre of the eastern wall of the mill (**Plate 140**) indicated where the upright shaft had been located. From the upright shaft horizontal secondary shafting transferred the power along the floors most likely supported on cast iron columns.

In 1870 a steam power plant was constructed to replace water power at Mytholm Mill, although references to the water wheel in c1930 (HBATC: 13) suggest it may have been retained. The power plant comprised of an engine house, a boiler house, an

economiser, and a chimney. The broad, deep, and relatively low form of the engine house, coupled with the ashlar footings, suggest that the engine in building 10 had been a cross-compound horizontal beam engine which would consist of two parallel high and low-pressure cylinders either side of a flywheel. The steam for the engine was generated in boilers in the adjacent boiler house. The three arched openings in the southern wall of building 11 were typical of a boiler house, allowing the installation of pre-fabricated boilers and facilitating the movement of coal (Giles and Goodall 1995: 148). Historic documentation (WYAS Calderdale ref: BIP/HB: 40), and the depth and width of building 11, indicate that the building had accommodated three Lancashire boilers.

The water turbine of the mid 20th century heralded the most drastic change within the mill, indicating that direct motive power transmission had been replaced by electrical power. At this time the entire water wheel and steam engine systems were stripped out, allowing the boiler and economiser buildings to fall into disrepair and creating space for a generator and associated electrical cabinets.

By the late-20th century the works was powered by externally generated electricity, and consequently at the time of survey virtually no components of the various earlier power systems employed at Mytholm Mill remained other than the buildings that had accommodated them.

5.3 Construction techniques

The construction techniques employed in Mytholm Mill deviated little from the typical pattern observed in other mills of the same date. The mills in the area had followed a consistent architectural style, such as Eaves, Bank Foot, and Waterside mills which were all constructed of ashlar masonry, with continuous smooth ashlar bands running between the windows of each floor. Furthermore such features as the frequent regularly spaced fenestration, large open plan floors, and high loft spaces were both common and essential for maximising working space and providing adequate illumination by which to work. Despite many similarities between mills their water wheels were often unique, specially tailored to fit the individual mills requirements. An extreme example of how water wheels could differ was at Lumbutts Mill, Langfield, where a 98 ft tall wheel house contained three overshot water wheels arranged one above the other (see Giles and Goodall 1995: 128).

Additional structural considerations related to the specific function of the wheel house where construction had to be of sturdy, water resistant elements capable of withstanding significant weights and pressures. The pentrough from the upper reservoir to the wheel house was an comprehensive example with large squared stone blocks laid wider at the base with a gradual batter, a compacted clay core, large cast iron tie plates, and cast iron stapling between stones. Those responsible for the construction of the mill were visible in the seven different mason's marks observed on the internal face of the wheel pit, which generally took the form of arrows and crosses (**Illustrations 18 & 20**) (**Plates 169-174**). The mason mark served as a signature, cut it into each stone a mason prepared, so that he might be given credit and receive wages for his labour, and thus also be held responsible for the quality and proper execution of the work.

Few precautions appeared to have been made to safeguard the main buildings at Mytholm Mill against fire. Timber framed textile mills were highly susceptible to fire due to the flammable nature of the materials used, and the lubricants and oils used on the machinery which would over time soak into the floor boards (Giles and Goodall 1995: 63). Consequently from the late 18th century there had been growing

impetus to develop fire-proof construction methods. Initially these methods were crude and insufficient, often comprising of iron plating timber structures. By 1800 true fire-proof buildings were being built of iron framed structures with brick or stone floors, which by the middle of the century had become the typical method of fire-proof mill construction. Despite the dangers and developments, timber framed mills continued to be built throughout the 19th and 20th centuries, of which Mytholm Mill appears to have been an example.

Both architecturally and structurally, Mytholm Mill was very utilitarian in its execution, conforming to a style that was repeated up and down the Calder Valley. However design was occasionally a factor as is seen in the evident prestige associated with the steam engine installation that was revealed in the increased architectural merit of the housing buildings. Such pride had not previously been demonstrated in water wheel structures and nor was it expressed later in the installation of the water turbine indicating the particular significance steam engines had in the late 19th century.

5.4 Community

The construction of the mill buildings were only a part of the wider influence the developing textile industry had on the community of Mytholm. The growth of the industrial centre was paralleled by the construction of a range of community buildings including worker's housing, schools and churches.

When James King built Mytholm Mill to the east of his residence of Mytholm Hall in the late 18th century he also saw to the construction of a row of terrace houses to the southwest of the mill on the newly formed King Street soon after (**Illustration 4**) (Uttley 1997: 3). Further cottages were located closer to the mill which likely provided accommodation for managers and site caretakers.

James Armitage Rhodes, coming into ownership of the Mytholm Estate in 1818 following the death of James King, further expanded the community facilities of Mytholm. In addition to undertaking work on his new residence at Mytholm Hall, constructing Erringden Grange, expanding Eaves Bottom Mills, and improving thoroughfares (Hebden Bridge Times and Gazette; 22nd May 1908); James Rhodes donated the land and stone to build St James's Church in 1833 which was otherwise one of the 'Million Pound Churches' funded by reparations from the Napoleonic War. The extension of the mill in the early-to-mid 19th century, while under the ownership of Rhodes, included the construction of two terraced gardens to the north of the upper reservoir which could possibly have provided allotment space for workers, which appears to be the case in the c1900 post card of the mill (**Illustration 9**). His patronage continued even after the sale of the mill to the Horsfalls in 1869 with the donation of land and funds for the construction of a school for the education of children of the labouring, manufacturing, and poorer crafts (1870 Trust Deed ref in CHG).

Whilst the owners of Mytholm Mill invested in the local community, it was not to the same extent as larger Yorkshire mills such as Glass house Mill in High and Low Bishopside, Meltham Mills in Meltam, and Saltaire Mill in Shipley (Giles and Goodall 1995: 172). At those mills the owners sought to not only provide buildings but to tackle the appalling living conditions with their attendant social, political and moral problems through the construction of entire villages that would encourage the middle-class virtues of thrift, sobriety and self-improvement (*ibid.*). However Mytholm Mill would have been largely responsible for the growth and shape of the community around it, and the provision of facilities reflected that the owners recognised, appreciated, and felt obliged to improve the community that served it.

6 CONCLUSIONS

Mytholm Mill had a huge influence not only in shaping the landscape around it, but also in changing the community that lived in it. Although the mill is now largely gone its influence is still evident in the buildings that remain outside of the works, and in the hillside behind it. The mill was typical in its utilitarian appearance, and the prominence it held in the landscape, evident in the illustrations and photographs before its demolition (**Illustrations 3 & 9**). Furthermore its historical development reflected the changes in local industry and the wider influences of the growing world economy and technological innovations.

The two phases of archaeological building recording at Mytholm Mill, in conjunction with the available archive material, has enabled the works layout and historical development to be established. Future development on the site has the potential to expose related subsurface features, which may provide a greater understanding of the earlier mill possibly located beneath building 5.

7 ARCHIVE

The photographic archive will be deposited with WYAAS. The remaining fieldwork material, containing a fully indexed archive of primary written document, plans and photographic contact sheets, will be deposited with the West Yorkshire Archive Service (WYAS) in Calderdale. The archive will be prepared by ARCUS staff in accordance with the requirements specified in Management of Research Projects in the Historic Environment (English Heritage 2006b) and with UKIC guidelines (1990). In addition, copies of the completed report will be deposited with WYAAS, WYAS, West Yorkshire HER, circulated to the client, and retained in the offices of ARCUS.

8 ACKNOWLEDGEMENTS

ARCUS would like to thank the staff of Hebden Bridge Alternative Technology Centre for their assistance in the historical research of the site; David Brown for supplying historic photographs; Helen Gomersall of WYAAS for offering advice and background information; and Denis Deakin for providing access.

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- BIP/HB: 40 Henry William Horsfall, engine house etc. at Mytholm Mill 1871, March
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- BIP/HB: 700 J Pickles & Son – amended plan of extensions at Mytholm Works. February 1919.
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- BIP/HB: 741 J Pickles & Son Ltd. – foundry extension at Mytholm Works. October 1920
- BIP/HB: 1389 J Pickles & Son Ltd. – Alterations at Mytholm Works, Hebden Bridge. August 1939.
- BIP/HB: 1394 J pickles & Son Ltd. – Electrical substation at Mytholm Works. October 1939
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1907 Ordnance Survey, 28' to the mile, sheet: Yorks. 229-4
1931 Ordnance Survey, 1:10,560, sheet: Yorks. 230NW
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1956 Ordnance Survey, 1:10,560, sheet: SD92NE
1964 Ordnance Survey, 1:2,500, sheet: SD9827
1968 Ordnance Survey, 1:10,560, sheet: SD92NE
1984 Ordnance Survey, 1:2,500, sheet: SD9827
1987 Ordnance Survey, 1:10,000, sheet: SD92NE

11 APPENDIX 1: ARCHITECTURAL FRAGMENTS

WS No.:	Description:	Measurements (m):	Features
01	Rectangular roughly hewn sandstone block	0.51 x 0.24 x 0.66	Tooling on all faces & lip on 1 edge
02	Rectangular roughly hewn sandstone block	0.90 x 0.22 x 0.38	Roughly hewn on all faces except 1 which has tool marks and metal fixing
03	Damaged dressed rectangular sandstone block	0.66 x 0.325 x 0.38	Tooling on all faces except damaged end and on one face which has bevelled edges
04	Rectangular roughly hewn sandstone block	1.12 x 0.315 x 0.29	All faces roughly hewn except 2 dressed faces with tool marks. 1 face has diagonal cutting 5cm deep
05	Fairly roughly hewn sub-rectangular sandstone block	0.56 x 0.56 x 0.405	All faces tool marked top face has hole 2.5cm x 8cm. Bottom face has been diagonally cut on one end.
06	Roughly hewn trapezoidal sandstone block	0.62 x 0.64 x 1.07	All faces roughly hewn and tool marked except for 1 dressed face with bevelled edges and cut 4.5cm deep
07	Rough hewn sub-rectangular sandstone block	0.23 x 0.17 x 0.91	Top face has diagonal tool marks
08	Rectangular roughly hewn sandstone block	0.72 x 0.61 x 0.36	3 faces have tool marks, 1 face has 2 holes with a single hole on the opposite face
09	Roughly hewn trapezoidal sandstone block	0.54 x 0.645 x 0.81	2 faces have tool marks, with 1 dressed face, and 1 face with hole 8cm x 4cm
10	Roughly hewn rectangular sandstone block	0.98 x 0.85 x 0.47	Tool marks visible on all but 1 face
11	Fairly roughly hewn rectangular sandstone block	1.02 x 0.695 x 0.65	Tool marks visible on all but 1 face. Channel cut across its width and lip cut into stone.
12	Fairly roughly hewn rectangular sandstone block	0.70 x 0.67 x 0.465	Tool marks visible on 3 faces. Top face has hole cut 3cm x 8.5cm, and 1 face has steps cut into it
13	Roughly hewn trapezoidal sandstone block	0.78 x 0.375 x 0.455	Tool marks on all faces. Channel cut into stone and rectangular hole on top face
14	Dressed trapezoidal sandstone block	0.93 x 0.65 x 0.54	Tool marks visible on 3 faces. 'v' shaped channel cut into 1 dressed face
15	Roughly hewn sub-rectangular sandstone block	0.95 x 0.46 x 0.66	3 holes cut into 1 face and tool marks visible on this face and 1 other
16	Roughly hewn rectangular sandstone block	1.09 x 0.355 x 0.28	Tool marks visible on 1 face and 1 end face
17	Roughly hewn rectangular sandstone block	0.68 x 0.54 x 0.37	Tool marks on all faces and rectangular hole cut into top
18	Roughly hewn rectangular sandstone block	0.82 x 0.45 x 0.31	Tool marks visible on all faces and holes for metal fittings on top face
19	Roughly hewn rectangular sandstone block	0.42 x 0.23 x 0.21	Tool marks visible on 1 side. Socket on top face and curved on 1 side
20	Roughly hewn rectangular sandstone block	0.46 x 0.57 x 0.20	Tool marks visible on 1 side face and partial socket on 1 side face

12 APPENDIX 2: PHOTOGRAPHIC REGISTERS

Film 01					
Format	35mm	Type	Black and white	Photographer	I. Kendall
Film & frame	Description	Direction	Date	Plate	
1.1	Void	-	15.09.07		
1.2	Void	-	15.09.07		
1.3	Detail of added wall NW tower of wheel pit	N	15.09.07		
1.4	Detail of added wall NW tower of wheel pit	N	15.09.07	134	
1.5	Detail of concrete in remains of engine house	N	15.09.07	216	
1.6	Detail of concrete in remains of engine house	N	15.09.07		
1.7	Detail of hold down bolts in remains of engine house	N	15.09.07	218	
1.8	Detail of hold down bolts in remains of engine house	N	15.09.07		
1.9	Detail of hold down bolts in remains of engine house	N	15.09.07	217	
1.10	Detail of hold down bolts in remains of engine house	N	15.09.07		
1.11	General view of remains of engine house	N	15.09.07	213	
1.12	General view of remains of engine house	N	15.09.07		
1.13	Detail of cast-iron fragment from wheel pit	-	15.09.07		
1.14	Detail of cast-iron fragment from wheel pit	-	15.09.07		
1.15	Detail of cast-iron fragment from wheel pit	-	15.09.07		
1.16	Detail of cast-iron fragment from wheel pit	-	15.09.07		
1.17	Detail of cast-iron fragment from wheel pit	-	15.09.07		
1.18	Detail of cast-iron fragment from wheel pit	-	15.09.07		
1.19	Detail of worked stone recovered from wheel pit	-	15.09.07		
1.20	Detail of worked stone recovered from wheel pit	-	15.09.07		
1.21	Detail of worked stone recovered from wheel pit	-	15.09.07		
1.22	Detail of worked stone recovered from wheel pit	-	15.09.07		
1.23	Detail of worked stone recovered from wheel pit	-	15.09.07		
1.24	Detail of worked stone recovered from wheel pit	-	15.09.07		
1.25	Detail of worked stone recovered from wheel pit	-	15.09.07		
1.26	Detail of worked stone recovered from wheel pit	-	15.09.07		
1.27	Detail of worked stone recovered from wheel pit	-	15.09.07		
1.28	Detail of worked stone recovered from wheel pit	-	15.09.07		
1.29	Detail of worked stone recovered from wheel pit	-	15.09.07		
1.30	Detail of worked stone recovered from wheel pit	-	15.09.07		
1.31	Detail of worked stone recovered from wheel pit	-	15.09.07		
1.32	Detail of worked stone recovered from wheel pit	-	15.09.07		
1.33	Detail of worked stone recovered from wheel pit	-	15.09.07		
1.34	Detail of worked stone recovered from wheel pit	-	15.09.07		
1.35	Detail of worked stone recovered from wheel pit	-	15.09.07		
1.36	Detail of worked stone recovered from wheel pit	-	15.09.07		

Film 2

Format	400 speed	Type	Medium format	Photographer	Simon Jessop		
Film & frame	Description			Direction	Date	Plate	
2.1	General view of lower mill pond wall			N	03.10.07	8	
2.2	General view of lower mill pond wall			N	03.10.07		
2.3	General view of lower mill pond wall			N	03.10.07	9	
2.4	General view of lower mill pond wall			N	03.10.07		
2.5	General view of lower mill pond wall			N	03.10.07	7	
2.6	General view of lower mill pond wall			N	03.10.07		
2.7	General view of rear north wall of demolished wheel house			N	03.10.07	51	
2.8	General view of rear north wall of demolished wheel house			N	03.10.07		
2.9	Detail of rear north wall of demolished wheel house			NW	03.10.07	54	
2.10	Detail of rear north wall of demolished wheel house			NW	03.10.07		

Film 3

Format	400 speed	Type	Medium format	Photographer	Simon Jessop		
Film & frame	Description			Direction	Date	Plate	
3.1	Detail of blocked door in north wall between buildings 1 and 5			N	03.10.07	112	
3.2	Detail of blocked door in north wall between buildings 1 and 5			N	03.10.07		
3.3	Detail of blocked door in north wall between buildings 1 and 5			SW	03.10.07	111	
3.4	Detail of blocked door in north wall between buildings 1 and 5			SW	03.10.07		
3.5	General view along hillside rear below lower reservoir			W	03.10.07	52	
3.6	General view along hillside rear below lower reservoir			W	03.10.07		
3.7	General view of retaining wall of lower reservoir			E	03.10.07	43	
3.8	General view of retaining wall of lower reservoir			E	03.10.07		
3.9	Detail of over flow from lower reservoir			N	03.10.07		
3.10	Detail of over flow from lower reservoir			N	03.10.07		

Film 4

Format	400 speed	Type	Medium format	Photographer	Simon Jessop			
Film & frame	Description				Direction	Date	Plate	
4.1	Detail of access steps west of lower reservoir				W	03.10.07		
4.2	Detail of access steps west of lower reservoir				W	03.10.07		
4.3	General view of feeder stream west of lower reservoir				N	03.10.07	13	
4.4	General view of feeder stream west of lower reservoir				N	03.10.07		
4.5	General view of lower reservoir				NE	03.10.07	14	
4.6	General view of lower reservoir				NE	03.10.07		
4.7	Detail of overflow of lower reservoir				E	03.10.07		
4.8	Detail of overflow of lower reservoir				E	03.10.07		
4.9	Detail of rectangular tank, adjacent north edge of lower reservoir				NE	03.10.07	15	
4.10	Detail of rectangular tank, adjacent north edge of lower reservoir				NE	03.10.07		

Film 5

Format	400 speed	Type	Medium format	Photographer	Simon Jessop		
Film & frame	Description			Direction	Date	Plate	
5.1	General view along east end of lower reservoir			E	03.10.07	149	
5.2	General view along east end of lower reservoir			E	03.10.07		
5.3	Detail of remains of building 1			SW	03.10.07	53	
5.4	Detail of remains of building 1			SW	03.10.07		
5.5	General view along east end of lower reservoir			W	03.10.07	12	
5.6	General view along east end of lower reservoir			W	03.10.07		
5.7	Detail of curved leat between reservoirs			NE	03.10.07	22	
5.8	Detail of curved leat between reservoirs			NE	03.10.07		
5.9	View across slope to wheel pit			SE	03.10.07	130	
5.10	View across slope to wheel pit			SE	03.10.07		

Film 6

Format	400 speed	Type	Medium format	Photographer	Simon Jessop				
Film & frame	Description				Direction	Date	Plate		
6.1	Detail of sluice bypass channel				SW	03.10.07	63		
6.2	Detail of sluice bypass channel				SW	03.10.07			
6.3	View up remnant steps below upper reservoir				E	03.10.07	34		
6.4	View up remnant steps below upper reservoir				E	03.10.07			
6.5	Detail of outflow from upper reservoir				N	03.10.07	21		
6.6	Detail of outflow from upper reservoir				N	03.10.07			
6.7	General view of upper reservoir				SE	03.10.07	20		
6.8	General view of upper reservoir				SE	03.10.07			
6.9	Detail of grilled entrance to pentrough				S	03.10.07	24		
6.10	Detail of grilled entrance to pentrough				S	03.10.07			

Film 7

Format	400 speed	Type	Medium format	Photographer	Simon Jessop			
Film & frame	Description				Direction	Date	Plate	
7.1	General view of terraces and steps above upper reservoir				N	03.10.07		
7.2	General view of terraces and steps above upper reservoir				N	03.10.07	36	
7.3	Detail of head goit into upper reservoir				E	03.10.07	18	
7.4	Detail of head goit into upper reservoir				E	03.10.07		
7.5	General view of upper reservoir				W	03.10.07	17	
7.6	General view of upper reservoir				W	03.10.07		
7.7	General view up steps to chimney				NE	03.10.07	40	
7.8	General view up steps to chimney				NE	03.10.07		
7.9	Detail through doorway from terrace to chimney steps				NE	03.10.07	35	
7.10	Detail through doorway from terrace to chimney steps				NE	03.10.07		

Film 8

Format	400 speed	Type	Medium format	Photographer	Simon Jessop		
Film & frame	Description			Direction	Date	Plate	
8.1	Detail of subterranean structure by chimney steps			N	03.10.07	41	
8.2	Detail of subterranean structure by chimney steps			N	03.10.07		
8.3	Detail of base of chimney			N	03.10.07	38	
8.4	Detail of base of chimney			N	03.10.07		
8.5	General view of chimney from top road			SW	03.10.07	37	
8.6	General view of chimney from top road			SW	03.10.07		
8.7	General view of steps and chimney			N	03.10.07	39	
8.8	General view of steps and chimney			N	03.10.07		
8.9	Detail of blocked door east of steps			E	03.10.07	42	
8.10	Detail of blocked door east of steps			E	03.10.07		

Film 9

Format	400 speed	Type	Medium format	Photographer	Simon Jessop		
Film & frame	Description			Direction	Date	Plate	
9.1	General view of pentrough from upper reservoir			SW	03.10.07	151	
9.2	General view of pentrough from upper reservoir			SW	03.10.07		
9.3	General view along pentrough			S	03.10.07	160	
9.4	General view along pentrough			S	03.10.07		
9.5	General view up pentrough			NE	03.10.07	163	
9.6	General view up pentrough			NE	03.10.07		
9.7	Detail of south end of east elevation of pentrough			E	03.10.07		
9.8	Detail of south end of east elevation of pentrough			E	03.10.07		
9.9	Detail of south end of east elevation of pentrough			E	03.10.07	164	
9.10	View of pentrough side wall construction			N	03.10.07	161	

Film 10

Format	400 speed	Type	Medium format	Photographer	Simon Jessop			
Film & frame	Description				Direction	Date	Plate	
10.1	General view of flue to east of boiler house				NE	03.10.07	249	
10.2	General view of flue to east of boiler house				NE	03.10.07		
10.3	Detail of flue leading to chimney				E	03.10.07		
10.4	Detail of flue leading to chimney				E	03.10.07	250	
10.5	Detail of cast iron door				NW	03.10.07	251	
10.6	Detail of cast iron door				NW	03.10.07		
10.7	Detail of features east of boiler house				E	03.10.07	245	
10.8	Detail of features east of boiler house				E	03.10.07		
10.9	External east elevation of engine house				W	03.10.07	219	
10.10	External east elevation of engine house				W	03.10.07		

Film 11

Format	400 speed	Type	Medium format	Photographer	Simon Jessop		
Film & frame	Description			Direction	Date	Plate	
11.1	Detail of south elevation of engine house			N	03.10.07	214	
11.2	Detail of south elevation of engine house			N	03.10.07		
11.3	Detail of central section of wheel pit			NW	03.10.07	188	
11.4	Detail of central section of wheel pit			NW	03.10.07		
11.5	General view of wheel pit tail goit			S	03.10.07	152	
11.6	General view of wheel pit tail goit			S	03.10.07		
11.7	General view of wheel pit tail goit			N	03.10.07	168	
11.8	General view of wheel pit tail goit			N	03.10.07		
11.9	General view of wheel pit			N	03.10.07	150	
11.10	General view of wheel pit			N	03.10.07		

Film 13

Format	400 speed	Type	Medium format	Photographer	Simon Jessop			
Film & frame	Description				Direction	Date	Plate	
13.1	Detail of north elevation of wheel pit				N	03.10.07	182	
13.2	Detail of north elevation of wheel pit				N	03.10.07		
13.3	Detail of cut slot in wheel pit				NW	03.10.07	187	
13.4	Detail of cut slot in wheel pit				NW	03.10.07		
13.5	Detail of wheel scar in east elevation of wheel pit				SE	03.10.07	177	
13.6	Detail of wheel scar in east elevation of wheel pit				SE	03.10.07		
13.7	Detail of tail goit in south elevation of wheel pit				S	03.10.07	198	
13.8	Detail of tail goit in south elevation of wheel pit				S	03.10.07		
13.9	General view of south elevation of wheel pit				S	03.10.07	197	
13.10	General view of south elevation of wheel pit				S	03.10.07		

Film 14

Format	400 speed	Type	Medium format	Photographer	Simon Jessop		
Film & frame	Description			Direction	Date	Plate	
14.1	General view of west elevation of wheel pit			SW	03.10.07	179	
14.2	General view of west elevation of wheel pit			SW	03.10.07		
14.3	Detail of section of west wheel pit wall			N	03.10.07	142	
14.4	Detail of section of west wheel pit wall			N	03.10.07	186	
14.5	Detail of inserted girders in wheel pit			NE	03.10.07		
14.6	Detail of inserted girders in wheel pit			NE	03.10.07		
14.7	Detail of sockets in west elevation of wheel house			NE	03.10.07	132	
14.8	Detail of sockets in west elevation of wheel house			NE	03.10.07		
14.9	General view of wheel pit remains			NE	03.10.07	128	
14.10	General view of wheel pit remains			NE	03.10.07		

Film 12

Format	35mm	Type	Black and white	Photographer	J. Barnes
Film & frame	Description	Direction	Date	Plate	
12.1	General view of wheel pit	NW	03.10.07		
12.2	General view of wheel pit	NW	03.10.07		
12.3	Detail of steps down into wheel pit	S	03.10.07	201	
12.4	Detail of steps down into wheel pit	S	03.10.07		
12.5	Detail of stone floor of wheel pit	S	03.10.07	175	
12.6	Detail of stone floor of wheel pit	S	03.10.07		
12.7	Detail of metal fixings in northeast corner of wheel pit	E	03.10.07	193	
12.8	Detail of metal fixings in northeast corner of wheel pit	E	03.10.07		
12.9	Detail of bearing block in northeast corner of wheel pit	E	03.10.07	192	
12.10	Detail of bearing block in northeast corner of wheel pit	E	03.10.07		
12.11	Detail of fixings on ramp in wheel pit	N	03.10.07		
12.12	Detail of fixings on ramp in wheel pit	N	03.10.07		
12.13	Detail of alcove in northwest corner of wheel pit	W	03.10.07	194	
12.14	Detail of alcove in northwest corner of wheel pit	W	03.10.07		
12.15	Detail of mason's mark in wheel pit	E	03.10.07	169	
12.16	Detail of mason's mark in wheel pit	E	03.10.07		
12.17	Detail of mason's mark in wheel pit	E	03.10.07	170	
12.18	Detail of mason's mark in wheel pit	E	03.10.07		
12.19	Detail of carved word in north wall of wheel pit	N	03.10.07	195	
12.20	Detail of carved word in north wall of wheel pit	N	03.10.07		
12.21	Detail of carved word in north wall of wheel pit	N	03.10.07	196	
12.22	Detail of carved word in north wall of wheel pit	N	03.10.07		
12.23	Detail of lewis hole in masonry forming ramp in wheel pit	N	03.10.07	181	
12.24	Detail of lewis hole in masonry forming ramp in wheel pit	N	03.10.07		
12.25	Detail of mason's mark in wheel pit	E	03.10.07	171	
12.26	Detail of mason's mark in wheel pit	E	03.10.07		
12.27	Detail of mason's mark in wheel pit	E	03.10.07	172	
12.28	Detail of mason's mark in wheel pit	E	03.10.07		
12.29	Detail of mason's mark in wheel pit	W	03.10.07	173	
12.30	Detail of mason's mark in wheel pit	W	03.10.07		
12.31	Detail of mason's mark in wheel pit	W	03.10.07	174	
12.32	Detail of mason's mark in wheel pit	W	03.10.07		
12.33	Detail of tail goit from wheel pit	S	03.10.07	199	
12.34	Detail of tail goit from wheel pit	S	03.10.07		
12.35	Detail of wheel scar in east elevation of wheel pit	NE	03.10.07	178	
12.36	Detail of wheel scar in east elevation of wheel pit	NE	03.10.07		

Film 15

Format	35mm	Type	Black and white	Photographer	I. Kendall	
Film & frame	Description			Direction	Date	Plate
15.1	Sandstone pier east of lower reservoir			W	17.10.07	25
15.2	Detail of pipe protruding from lower reservoir			W	17.10.07	
15.3	Detail of pipe protruding from lower reservoir			NW	17.10.07	27
15.4	Detail of sandstone recess south of lower reservoir			NE	17.10.07	
15.5	Detail of sandstone recess south of lower reservoir			NE	17.10.07	28
15.6	South facing elevation of retaining wall of lower reservoir			NW	17.10.07	
15.7	South facing elevation of retaining wall of lower reservoir			NW	17.10.07	
15.8	Detail of valve to east of lower reservoir			W	17.10.07	29
15.9	Detail of valve to east of lower reservoir			W	17.10.07	33
15.10	General view of silt trap adjacent north side of lower reservoir			NW	17.10.07	
15.11	General view of silt trap adjacent north side of lower reservoir			NW	17.10.07	
15.12	Detail of cast iron base for former overflow control			NW	17.10.07	
15.13	Detail of cast iron base for former overflow control			NW	17.10.07	
15.14	Detail of culvert opposite overflow pipe from lower reservoir			S	17.10.07	
15.15	Detail of culvert opposite overflow pipe from lower reservoir			S	17.10.07	
15.16	Detail of overflow pipe from lower reservoir			N	17.10.07	16
15.17	Detail of overflow pipe from lower reservoir			N	17.10.07	
15.18	Detail of lower reservoirs retaining wall behind building 1			N	17.10.07	
15.19	Detail of lower reservoirs retaining wall behind building 1			N	17.10.07	32
15.20	Detail of remnant of brick arch to west end of building 1			NW	17.10.07	56
15.21	Detail of remnant of brick arch to west end of building 1			NW	17.10.07	
15.22	Detail of column base within former building 1			N	17.10.07	57
15.23	Detail of column base within former building 1			N	17.10.07	
15.24	Detail of former arch support in north wall of building 1			N	17.10.07	55
15.25	Detail of former arch support in north wall of building 1			N	17.10.07	
15.26	Detail of fabric of west wall of wheel house			N	17.10.07	144
15.27	Detail of fabric of west wall of wheel house			N	17.10.07	
15.28	Detail of wall boxes in south wall of building 8			NE	17.10.07	141
15.29	Detail of wall boxes in south wall of building 8			NE	17.10.07	
15.30	General view General view of west wall of building 8			N	17.10.07	129
15.31	General view General view of west wall of building 8			N	17.10.07	136
15.32	Detail of hole exposing hold down bolt in building 8			NE	17.10.07	
15.33	Detail of hole exposing hold down bolt in building 8			NE	17.10.07	131
15.34	Detail of hold down bolt in building 8			E	17.10.07	133
15.35	Detail of hold down bolt in building 8			E	17.10.07	
15.36	I.D shot			-	17.10.07	

Film 16

Format	35mm	Type	Black and white	Photographer	I. Kendall	
Film & frame	Description			Direction	Date	Plate
16.1	General view of north wall of pentrough			SW	17.10.07	
16.2	General view of north wall of pentrough			SW	17.10.07	
16.3	Detail of pipe from south wall of pentrough to wheel pit			S	17.10.07	167
16.4	General view of south wall of pentrough			S	17.10.07	
16.5	General view of south wall of pentrough			S	17.10.07	166
16.6	General view of west wall of pentrough			W	17.10.07	
16.7	General view of west wall of pentrough			W	17.10.07	165
16.8	Detail of footbridge over channel to pentrough			W	17.10.07	
16.9	Detail of footbridge over channel to pentrough			W	17.10.07	162
16.10	Detail of sluice from upper reservoir to economiser house			SE	17.10.07	30
16.11	Detail of sluice from upper reservoir to economiser house			SE	17.10.07	
16.12	Detail of sluice from upper reservoir to economiser house			S	17.10.07	
16.13	Detail of sluice from upper reservoir to economiser house			S	17.10.07	31
16.14	Detail of culvert from upper reservoir to economiser house			E	17.10.07	
16.15	Detail of culvert from upper reservoir to economiser house			E	17.10.07	19
16.16	General view of remnant of engine base			NW	17.10.07	215
16.17	General view of remnant of engine base			NW	17.10.07	
16.18	Detail of wall box in east wall of ashlar engine base			W	17.10.07	220
16.19	Detail of wall box in east wall of ashlar engine base			W	17.10.07	
16.20	Detail of metal wall bracket in east wall of wheel house			W	17.10.07	
16.21	Detail of metal wall bracket in east wall of wheel house			W	17.10.07	159
16.22	Detail of blocking in east wall of wheel house			W	17.10.07	157
16.23	Detail of blocking in east wall of wheel house			W	17.10.07	
16.24	General view of east facing wall of wheel pit			W	17.10.07	190
16.25	General view of east facing wall of wheel pit			W	17.10.07	
16.26	Detail of hatch in south facing wall of wheel house			NW	17.10.07	
16.27	Detail of hatch in south facing wall of wheel house			NW	17.10.07	191
16.28	Detail of slot for turbine pipe in south facing wall of wheel pit			NW	17.10.07	
16.29	Detail of slot for turbine pipe in south facing wall of wheel pit			NW	17.10.07	189
16.30	Detail of hatch in south facing wall of wheel house			NE	17.10.07	
16.31	Detail of hatch in south facing wall of wheel house			NE	17.10.07	
16.32	General view of west facing elevation of wheel pit			E	17.10.07	158
16.33	General view of west facing elevation of wheel pit			E	17.10.07	
16.34	General view of west wall of wheel pit			S	17.10.07	135
16.35	General view of west wall of wheel pit			S	17.10.07	
16.36	I.D shot			-	17.10.07	

Film 17 (896 film 1)

Format	400 speed	Type	Medium format	Photographer	Simon Jessop				
Film & frame	Description				Direction	Date	Plate		
17.1	External south elevation of building 4				N	04.04.05	66		
17.2	External south elevation of building 4				NE	04.04.05			
17.3	External southwest elevation of building 4				NE	04.04.05	64		
17.4	External southwest elevation of building 4				NE	04.04.05			
17.5	External west elevation of building 4				E	04.04.05	70		
17.6	External west elevation of building 4				E	04.04.05			
17.7	External northwest elevation of building 4				E	04.04.05	71		
17.8	External northwest elevation of building 4				E	04.04.05			
17.9	External north end of ridge line of building 4				NE	04.04.05	72		
17.10	External north end of ridge line of building 4				NE	04.04.05			

Film 18 (896 film 2)

Format	400 speed	Type	Medium format	Photographer	Simon Jessop			
Film & frame	Description				Direction	Date	Plate	
18.1	External southeast elevation of building 4				NE	04.04.05		
18.2	External southeast elevation of building 4				NE	04.04.05	73	
18.3	External west elevation of building 4				E	04.04.05		
18.4	External west elevation of building 4				E	04.04.05	65	
18.5	External east elevation of building 4				SW	04.04.05		
18.6	External east elevation of building 4				SW	04.04.05	68	
18.7	External east elevation of building 4				N	04.04.05		
18.8	External east elevation of building 4				N	04.04.05	67	
18.9	Detail of external ground floor door in east elevation of building 4				W	04.04.05		
18.10	Detail of external ground floor door in east elevation of building 4				W	04.04.05	69	

Film 19 (896 film 3)

Format	400 speed	Type	Medium format	Photographer	Simon Jessop			
Film & frame	Description			Direction	Date	Plate		
19.1	North panelled elevation of room G4, building 4			NE	04.04.05			
19.2	North panelled elevation of room G4, building 4			NE	04.04.05	82		
19.3	View through glazed partition in room G4, building 4			SW	04.04.05			
19.4	View through glazed partition in room G4, building 4			SW	04.04.05	81		
19.5	View of blocked window in room G5, building 4			N	04.04.05			
19.6	View of blocked window in room G5, building 4			N	04.04.05	84		
19.7	General view of room G4, building 4			SE	04.04.05	78		
19.8	General view of room G4, building 4			SE	04.04.05			
19.9	General view of room G4, building 4			N	04.04.05	79		
19.10	General view of room G4, building 4			N	04.04.05			

Film 20 (896 film 4)

Format	400 speed	Type	Medium format	Photographer	Simon Jessop		
Film & frame	Description			Direction	Date	Plate	
20.1	Detail of stone fireplace in room G3, building 4			S	04.04.05		
20.2	Detail of stone fireplace in room G3, building 4			S	04.04.05		
20.3	Detail of stone fireplace in room G3, building 4			S	04.04.05	80	
20.4	Detail of stone fireplace in room G3, building 4			S	04.04.05		
20.5	General view of room G2, building 4			SW	04.04.05	77	
20.6	General view of room G2, building 4			SW	04.04.05		
20.7	General view of room G2, building 4			SW	04.04.05		
20.8	General view of room G2, building 4			SW	04.04.05		
20.9	General view of room G2, building 4			E	04.04.05	76	
20.10	General view of room G2, building 4			E	04.04.05		

Film 21 (896 film 5)

Format	400 speed	Type	Medium format	Photographer	Simon Jessop			
Film & frame	Description				Direction	Date	Plate	
21.1	Interior of lobby/entrance door, room G1, building 4				SE	04.04.05	74	
21.2	Interior of lobby/entrance door, room G1, building 4				SE	04.04.05		
21.3	View along corridor, room G6, building 4				S	04.04.05	86	
21.4	View along corridor, room G6, building 4				S	04.04.05		
21.5	View of kitchen, room G7, building 4				N	04.04.05	87	
21.6	View of kitchen, room G7, building 4				N	04.04.05		
21.7	View of male toilet, room G6, building 4				SW	04.04.05	88	
21.8	View of male toilet, room G6, building 4				SW	04.04.05		
21.9	View of female toilet, room G9, building 4				N	04.04.05	89	
21.10	View of female toilet, room G9, building 4				N	04.04.05		

Film 22 (896 film 6)

Format	400 speed	Type	Medium format	Photographer	Simon Jessop			
Film & frame	Description			Direction	Date	Plate		
22.1	Detail of exposed panelling in room G4, building 4			NE	03.05.05			
22.2	Detail of exposed panelling in room G4, building 4			NE	03.05.05	83		
22.3	Detail of exposed window/door, room G5, building 4			N	03.05.05			
22.4	Detail of exposed window/door, room G5, building 4			N	03.05.05	85		
22.5	View along inserted corridor, room G10, building 4			NW	03.05.05			
22.6	View along inserted corridor, room G10, building 4			NW	03.05.05	75		
22.7	Interior of toilet under stairs, room G11, building 4			SW	03.05.05			
22.8	Interior of toilet under stairs, room G11, building 4			SW	03.05.05	90		
22.9	View of banister/1 st floor corridor, room F5, building 4			NE	03.05.05	91		
22.10	View of banister/1 st floor corridor, room F5, building 4			NE	03.05.05			

Film 23 (896 film 7)

Format	400 speed	Type	Medium format	Photographer	Simon Jessop		
Film & frame	Description			Direction	Date	Plate	
23.1	General view of room F1, building 4			SE	03.05.05	95	
23.2	General view of room F1, building 4			SE	03.05.05		
23.3	General view of room F2, building 4			SW	03.05.05	96	
23.4	General view of room F2, building 4			SW	03.05.05		
23.5	General view of room F2, building 4			NW	03.05.05	97	
23.6	General view of room F2, building 4			NW	03.05.05		
23.7	View along 1 st floor landing, room F5, building 4			SW	03.05.05	92	
23.8	View along 1 st floor landing, room F5, building 4			SW	03.05.05		
23.9	Detail of 1 st floor bathroom, room F7, building 4			W	03.05.05	93	
23.10	Detail of 1 st floor bathroom, room F7, building 4			W	03.05.05		

Film 24 (896 film 8)

Format	400 speed	Type	Medium format	Photographer	Simon Jessop			
Film & frame	Description			Direction	Date	Plate		
24.1	General view of 1 st floor kitchen, room F8, building 4			N	03.05.05	94		
24.2	General view of 1 st floor kitchen, room F8, building 4			N	03.05.05			
24.3	Inserted partition in room F3, building 4			NE	03.05.05			
24.4	Inserted partition in room F3, building 4			NE	03.05.05	99		
24.5	Blocked doorway in room F3, building 4			SE	03.05.05	98		
24.6	Blocked doorway in room F3, building 4			SE	03.05.05			
24.7	Detail of covered glazed partition, room F4, building 4			NE	03.05.05	100		
24.8	Detail of covered glazed partition, room F4, building 4			NE	03.05.05			
24.9	Detail of windows in room F4, building 4			E	03.05.05			
24.10	Detail of windows in room F4, building 4			E	03.05.05	101		

12 APPENDIX 3: WYAAS SPECIFICATION

13 ILLUSTRATIONS

14 PLATES

Consultancy
Planning Advice
Field Services
Historic Buildings Analysis
Parks & Gardens
Cultural Resource Management
Material Culture
Brownfield & Industrial Archaeology
Palaeoenvironments
Osteology
Historic Landscapes
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