QUEEN’S MILL,
NEW HALL STREET,
BURNLEY,
LANCASHIRE

Archaeological Building Investigation

Oxford Archaeology North
June 2013

Southdale
Planning Application: APP/2012/0536
Issue No: 2013-14/1406
OA North Job No: L10605
NGR: 384097, 434084
Document Title: Queen’s Mill, New Hall Street, Burnley, Lancashire

Document Type: Archaeological Building Investigation

Client Name: Southdale

Planning Application: APP/2012/0536
Issue Number: 2013-14/1406
OA Job Number: L10605

National Grid Reference: 384097, 434084

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SUMMARY

Burnley Council has granted planning permission for the redevelopment of Queen’s Mill on New Hall Street in Burnley, Lancashire (centred at NGR 384097 434084). The existing planning permission (APP/2012/0536) allows for the complete demolition of the former weaving mill, and the erection of 18 new houses. In order to secure archaeological interests, Burnley Council recommended that an appropriate programme of archaeological investigation of the mill was carried out in advance of demolition. Following consultation with the Lancashire County Archaeology Service (LCAS), it was recommended that an archaeological building investigation commensurate with an English Heritage Level 2/3-type survey should be carried out.

Queen’s Mill was erected as a steam-powered weaving mill in 1887-88 on New Hall Street in Burnley. The area immediately surrounding the mill is one of considerable industrial archaeological and historic interest, as it represents a moderately intact remnant of a textile-manufacturing nucleus that developed at Daneshouse in the late nineteenth and early twentieth centuries. No fewer than 12 mills operated in the area, with surrounding streets of terraced housing built in a tight grid-iron pattern. Daneshouse is considered in a recent heritage appraisal compiled by Burnley Council to have ‘…a wealth of historic buildings and features which have played and important part in its development and the lives of the people who have lived and worked in the area.’

The Queen’s Mill complex comprises a single-storey weaving shed constructed of local sandstone to the north of a two-storey preparation block and warehouse, with an attached engine house, boiler house and chimney, all of similar fabric. The layout of the mill exemplifies the refinement of the construction of cotton weaving mills through the second half of the nineteenth century, culminating in mills such as Queen’s Mill, where the layout of the structures, was calculated precisely to maximise efficiency, primarily by the placement of the primary motion shaft from the steam engine so that it transferred power directly into the weaving shed to power the individual line shafts. An economiser was almost certainly placed between the boiler house and chimney, within a compact power plant that occupied the south-west corner of the site.

The only major improvement in weaving shed design in later years was the use of I-section steel beams as transverse ceiling beams, placed perpendicular to the north-light roof, and allowing alternate column rows to be removed completely from weaving sheds. This process was undertaken latterly within the eastern part of the Queen’s Mill weaving shed, leaving a structure charting the final stages of weaving shed development.

Although all the major components of the power plant have been removed, the fabric of Queen’s Mill retains evidence for its placement within almost all parts of the complex. With the exception of the removal of the chimney stack, and the reduction in length of the boiler house, the site survives almost as it stood in the early twentieth century, representing a fine example of a weaving mill of this type.
ACKNOWLEDGEMENTS

Oxford Archaeology North (OA North) would like to thank Adrian Ford of Southdale for commissioning and supporting the project. Thanks are also expressed to Doug Moir, the Planning Officer (Archaeology) for Lancashire County Council for his advice and guidance, and Cecilia Whitaker of Burnley Council for her kind assistance with the documentary research.

The archaeological building investigation was carried out by Chris Wild and Graham Mottershead. The report was compiled by Chris Wild, and the illustrations were produced by Graham Mottershead and Mark Tidmarsh. The report was edited by Ian Miller, who was also responsible for the background research and project management.
1. INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT

1.1.1 Burnley Council has granted planning permission for the redevelopment of Queen’s Mill on New Hall Street in Burnley, Lancashire (centred at NGR 384097 434084). The existing planning permission (APP/2012/0536) allows for the complete demolition of a late nineteenth-century weaving mill, and the erection of 18 new houses.

1.1.2 The mill was erected in 1887 as a purpose-built weaving shed, and has been assessed during the current Lancashire Textile Mills Survey as being potentially of ‘high significance’ (OA North 2012). In order to secure archaeological interests, Burnley Council recommended that an appropriate programme of archaeological investigation of the mill was carried out in advance of demolition. Following consultation with the Lancashire County Archaeology Service (LCAS), it was recommended that an archaeological building investigation commensurate with an English Heritage Level 2/3-type survey should be carried out. In accordance with this recommendation, Burnley Council attached a condition to planning consent that stated:

*No demolition works shall start until the developer has secured the implementation of a programme of archaeological recording, in accordance with a written scheme of investigation which has been submitted to and approved in writing by the local planning authority. A copy of the archaeological record shall be lodged with the local planning authority within two months of its completion.*

1.1.3 In May 2013, Southdale commissioned Oxford Archaeology North (OA North) to undertake the required scheme of archaeological building investigation. In the first instance, a Written Scheme of Investigation (*Appendix I*) was produced, which outlined the methodology, timescale and staffing to be employed in the delivery of the project. Following the formal approval of the Written Scheme of Investigation by the Planning Officer (Archaeology) for Lancashire County Council, OA North carried out the building investigation in May 2013.
1.2 **LOCATION AND GEOLOGY**

1.2.1 Queen’s Mill is situated in the Daneshouse area of Burnley, which lies on the northern side of the town centre. Daneshouse developed an urban townscape from the 1860s onwards, and is characterised by rows of terraced houses built amidst textile weaving mills, many of which was established alongside the Leeds and Liverpool Canal on its route through Burnley.

1.2.2 Queen’s Mill (centred at NGR 384095 434090) is bounded by Elm Street to the west, New Hall Street to the south, Cameron Street to the north, and an alley to the rear of Spencer Street to the east (Fig 1). It occupies a rectangular-shaped plot that is set within an area of mixed terraced housing and former textile mills on the eastern bank of the canal (Plate 1).

![Plate 1: Recent aerial view across Daneshouse, with arrow marking the position of Queen’s Mill](image)

1.2.3 The underlying solid geology of the area consists of productive coal measures of the Carboniferous era, which contributed to the early industrial exploitation of the area. The drift cover consists primarily of Pennine drift with fine textured alluvium in the valley of the Calder. These are derived almost wholly from Carboniferous rocks and contain abundant sandstone and shale fragments. It is likely that locally quarried sandstone was the dominant building material from at least the sixteenth century.
1.3 **Survey Methodology**

1.3.1 The building investigation was carried out in March 2013. It aimed to provide an understanding of the historic fabric and key architectural features of the former mill complex, and to provide an archive record of the component structures. It has provided a drawn, photographic and textual record of the buildings to English Heritage (2006) Level III standard. Records were made of all principal structural elements, both internal and external, as well as any features of historical or architectural significance. Particular attention was paid to the relationship between the earliest and latest parts of the building, especially those that would show their development and any alterations.

1.3.2 **Photographic Survey**: a photographic archive of the buildings was compiled, consisting of both general and detailed interior photographs, which were captured using digital formats.

1.3.3 **Instrument Survey**: floor plans of the buildings were surveyed by means of reflectorless total-station survey, to produce plans and a cross section through the main mill buildings. The drawings were used as a basis for annotation to illustrate the phasing and development of the buildings. Detail captured by the annotation included features such as window and door openings, and changes in building material and phasing. The final drawings are presented through an industry standard CAD package (AutoCAD 2004).

1.3.4 **Interpretation and Analysis**: a visual inspection of the buildings was undertaken, and a description maintained to English Heritage (2006) Level III. These records are essentially descriptive, and provide a systematic account of the origin, development and use of the mill complex.

1.4 **Archive**

1.4.1 The results of all archaeological work carried out will form the basis for a full archive to professional standards, in accordance with current English Heritage guidelines (*Management of Research Projects in the Historic Environment*, 2006). The original record archive of project will be deposited with the Lancashire County Record Office.

1.4.2 The Arts and Humanities Data Service (AHDS) online database *Online Access to Index of Archaeological Investigations* (OASIS) will be completed as part of the archiving phase of the project.
2. HISTORICAL BACKGROUND

2.1 DEVELOPMENT OF BURNLEY’S TEXTILE INDUSTRY

2.1.1 As elsewhere in the western Pennine margins, the majority of the populace in Burnley were engaged in the processing, manufacture, and distribution of textiles during the early post-medieval period (Walton 1987). A survey of Lancashire in 1787 by Tunnicliffe listed several textile manufacturers in the Burnley area. The principal firms included Sugar Veevers, Henry Crook, Martha Crossley, Joseph Massey and Joseph Topper (Bennett 1948, 168). Textile production was dominated by the woollen industry until the early nineteenth century, and the processing and manufacture of woollen goods in the early period was carried out on a smaller, often domestic, scale.

2.1.2 The first steam-powered mill in Burnley is thought to have been Peel’s Mill at the bottom of Sandygate, erected in 1790; this mill was destroyed by fire in 1798 (Bennett 1948, 174). A directory of Burnley from 1792 notes several steam engines were in use for preparing and carding cotton, and by 1830 there were a total of 32 steam engines employed in the town’s textile mills. During the nineteenth century cotton became more predominant and several of the existing woollen mills were converted to cotton production. The borough was dedicated almost exclusively to the cotton trade by the late nineteenth century.

2.1.3 By 1850 Burnley was involved primarily with cotton spinning during the first half of the nineteenth century, with around 50 firms controlling some 400,000 spindles. None specialised solely in weaving, and whilst some 9,000 power looms were in operation by the middle of the nineteenth century, these were largely attached to spinning mills. The balance changed during the second half of the century (Ashmore 1982, 190), largely resulting from competition from Oldham, where cheaper and more efficient ring spinning had been introduced to supercede mules around 1880.

2.1.4 By 1902 weavers were predominant in Burnley, with 87 large firms involved with weaving only, 18 with both spinning and weaving and two that were spinners only (Bennett 1948). In terms of looms, the 9,000 of 1850 had swelled to 79,000 in 1900, and 13 new mills were built during that time, including Queen’s Mill on New Hall Street. The following decade brought further expansion to 99,000 looms, placing Burnley at the forefront of Lancashire’s weaving industry. Between 1844 and 1894 the number of weaving mills in Burnley increased from 24 to 67 (OA North 2010). Most of this development gravitated to the Leeds and Liverpool Canal corridor, as a source of water and transportation. The need for larger sites to accommodate bigger weaving sheds and cotton factories led to development on the fringes of the town, and that at Daneshouse, where 12 mills were ultimately sited, represents a significant concentration.
2.2 **DEVELOPMENT OF DANESHOUSE AND QUEEN’S MILL**

2.2.1 Daneshouse developed as a mixed industrial and residential suburb of Burnley from the 1860s onwards. Estate plans from the period show the planned layout of proposed streets, which were usually submitted by large landowners for approval by Burnley Borough Improvement Committee. One such plan, submitted in 1875 by R Townley Parker under the Burnley Borough Improvement Act 1871, allowed for a number of new streets, including New Hall Street (Plate 2). The streets were laid out on a grid-iron pattern shortly after this date, although the final layout does not conform precisely to the plan of 1875. The rows of houses were built one or two terraces at a time as details were submitted to the Burnley Borough Improvement Committee. The blocks of houses have a range of subtle architectural details in the window and door surrounds, size of windows and size and finish of stone (Burnley Borough Council 2004, 6).

![Plate 2: The planned layout of proposed new streets on a plan dated 1875](image)

2.2.2 Queen’s Mill was built on New Hall Street in 1887 by John Spencer, in accordance with a plan submitted to the local authority on 9th June 1887 (Building Control Plan 3076). A further plan for a pipeline to the canal from the mill was submitted in February 1888 (Building Control Plan 3191), presumably in preparation for the installation of the steam-power plant. It thus seems unlikely that the mill was put into production before 1888. The layout of the mill at that date is captured on the Ordnance Survey 25”: 1 mile map of 1893, which was surveyed in 1890 (Plate 3). This shows the preparation block along the New Hall Street frontage with the power plant occupying the south-western corner and the weaving shed to the rear. This housed 600 looms (Worrall 1891, 77).
2.2.3 The Ordnance Survey map of 1893 clearly shows the development of Daneshouse as a mixed industrial and residential area, with a concentration of weaving mills established between Elm Street and the eastern bank of the Leeds and Liverpool Canal. These included North Bridge Mill and New Hall Shed, both established during the 1860s and surviving extant, New Hall Mill of 1877 (demolished), Livingstone Mill of 1887-8 (demolished in 2010), and Old Hall Mill of 1902.

2.2.4 In October 1890, John Spencer submitted a plan for a small extension to the weaving shed (Building Control Plan 3923). This extended the weaving shed up to Cameron Street, which formed the northern boundary of the mill complex, creating the basic layout that survived up to the present day. The extended weaving shed is depicted on the Ordnance Survey map of 1911 (Fig 2). The extension allowed the capacity of the mill to be expanded to 857 looms (Skinner 1923).

2.2.5 Minor alterations to the mill complex that were carried out during the following decade included the addition of a new coal store in 1900, and a new office in 1901. Plans for a new sprinkler tower were submitted in 1919 (Building Control Plan 8618), presenting the final significant addition to the textile-mill complex. However, a suite of alterations to the building were carried out in the early 1960s (Building Control Plan 18983), and the mill chimney was demolished in 1972.
Plate 4: Recent aerial view of Queen’s Mill, showing the two-storey warehouse/preparation block along the New Hall Street frontage with the weaving shed to the rear
3. RESULTS

3.1 INTRODUCTION

3.1.1 The Queen’s Mill complex is a well-preserved example of a Victorian steam-powered weaving mill. Although the chimney has been reduced to the height of its plinth, the complex survived almost intact at the time of the present survey, and was in a very good state of repair.

3.1.2 The complex comprises a two-storey preparation block/warehouse on the New Hall Street frontage, with attached engine and boiler houses on its western side, and with a chimney to the rear of the boiler house (Plate 4). A two-phase weaving shed fill the plots behind these structures, bounded by Elm Street to the west, Cameron Street to the north, and an alleyway between the weaving shed and terraced houses fronting Spencer Street to the east (Fig 3).

3.1.3 All principal facades were faced with rusticated local sandstone, built in regular courses, and bonded in pale, lime-based mortar (Plate 5). The façade to the alleyway housed the downpipes from the valley gutters of the weaving shed, and was faced in roughly coursed sandstone rubble (Plate 6).

Plate 5: Queen’s Mill preparation block façade from New Hall Street
3.2 Preparation Block / Warehouse

3.2.1 The two-storey preparation block comprised 11 x 5 bays, with the principal façade and entrance to the complex fronting New Hall Street (Plate 5). Each bay of the southern and eastern elevations, with the exception of the two western bays of the ground floor of the façade, originally had 5’ (1.53m) wide, five-light, top-vent, vertical windows, many of which survive (Fig 4). The penultimate bay of the ground floor at the east end of the façade had the window remodelled into a second doorway, whilst the northern ground floor window of the east elevation had been remodelled into a much smaller window for an inserted cloakroom. The western bay of the principal façade housed a raised loading door, stepped two courses above street level into the consistent floor level throughout the interior of the complex (Fig 4). It had rolled-edge dressed sandstone jambs, below a cast-iron channel-section lintel, typical of the region at this period (Plate 5). The original door had been replaced with roller-shuttering, whilst a further loading door with roller shutters was latterly inserted into the southern two bays of the west wall, below an I-section steel lintel (Plate 6).

3.2.2 Principal access into the block was through a doorway in the second bay (Fig 3). This was relatively ornate, with projecting dressed sandstone block jambs, below a small pediment, capping a segmental fanlight above the replaced door (Plate 7). Further decoration to the façade comprised pairs of small, tiered concave sandstone corbels to the projecting capping stones of all elevations except those of the weaving shed (Plates 5 and 6). None of these elevations carried external gutters, as the roofs were of north/south-aligned saw-toothed construction, and drained northwards onto the weaving shed roof. Internally, the roof was sealed on the south by lath and plaster, but obscured below late suspended ceiling (Plate 8). The east elevation of the block did have several external pipes, relating to sanitary drainage, and also retained the large cast-iron landing of the fire escape, placed below the sill of the northern first-floor window, and manufactured by C Mills and Co, Radcliffe (Plate 9).
Plate 7: Principal entrance from New Hall Street
Plate 8: Lath and plaster ceiling of saw-toothed roof of preparation block

Plate 9: Preparation block fire escape gantry
3.2.3 Internally, the preparation block was of non-fireproof construction with the ground-floor ceiling of beaded plank construction (Plate 10). This was carried on large scantling rectangular-section timber beams, each stop chamfered around the heads of two rows of 6" (0.15m) diameter hollow cylindrical cast-iron columns (Plate 11), which supported each beam at one-third spans. These were relatively plain, with a simple astragal below flanged ribs to a cruciform section head (Plate 11), that not only carried the beam, but the bifurcated foot of the column above, which formed a crush box around the timber beam (Plate 11).

3.2.4 Each of the ground-floor columns also had a bolting face for a line shaft hanger on its southern side, with through-bolt holes, and vertical slits to allow adjustment of the hanger, above a retaining bolt in a projecting sill (Plate 11). At first-floor level, the columns were encased in late shuttering, and it remains unclear whether they incorporated bolting plates (Plate 12).

Plate 10: View across the ground floor of the preparation/warehouse block
Plate 11: Column detail on ground floor of the preparation/warehouse block

Plate 9: View across the first floor of the preparation/warehouse block
3.2.5 In the north wall of the preparation block, each bay had similar windows to those in the other elevations at first-floor level, but had 5'6" (1.68m) wide, 11'9" (3.58m) high, segmentally-arched three-rowlock openings in the 23" (0.58m) thick partition to the weaving shed. Many windows had been remodelled, but some retained five-light timber framed windows (Plate 13), several of which were obscured by late stud walling. The window of the western bay was widened recently to form a wide loading door between the preparation block and weaving shed, with grey brick piers and I-section lintels. The window placed two bays to the east was remodelled into a doorway for a timer stair to the upper floor of the preparation block from the weaving shed (Plate 14).

Plate 13: A five-light timber-framed window in the preparation/warehouse block

3.2.6 A through-hoist tower, manufactured by EA Foulds Ltd of Colne, was installed in the position of the adjacent window, with a pitched roof to the headgear, which projected above the saw-toothed roof (Plate 4). Further doorways between the preparation block and shed were inserted three bays to the east of the hoist, and in the eastern two bays, where access was created into a stud partition cloakroom block (Fig 3), inserted into the south-eastern corner of the weaving shed. Further stud partitions within the north-eastern corner of the preparation block created an office, and a straight stair to the upper floor. A lobby, stair and partial dividing wall were also inserted latterly in the southern part of the block, forming the principal entrance and access to the first floor. The position of any original stair remains unclear, although it was possibly placed in an adjacent two-bay link block on the western side of the preparation block.
3.2.7 The two bays of the link block formed a continuation of the preparation block, recessed on the southern side, to the extent of the attached engine house. The northern column row and ceiling were continuous from the preparation block, and although the west wall housed a wide, open doorway into the engine house, this represented a late alteration, with no apparent communication between the two structures within the original build. A narrow door at the western end of the south wall was, however, probably original, suggesting that this formed the principal access for workers into the weaving shed, probably down a timber stud corridor, with offices on its eastern side. The northern part of the link block was converted into a toilet block, with the use of full-brick thickness walls suggesting that this was undertaken before the cloakrooms were inserted to the east.
3.2.8 Other than the line shaft bolting plates on the columns of the preparation block, the only evidence for the power system within this part of the complex comprised an internal scar of a probable bearing box adjacent to the fourth beam in the north wall. This presumably carried a drive shaft from the primary motion shaft, which ran along the south wall of the weaving shed. No ceiling or beam scars were observed for further bevel gear translating power to the line shafts carried on the southern sides of the two column rows, and it is possible that these may never have been used, the columns being selected for potential to carry power shafting, rather than for an actual need within the original build.

3.3 **WEAVING SHED**

3.3.1 The stone-built weaving shed comprised two phases of construction, with the original weaving shed, placed on the northern side of the preparation block and power plant (Fig 5). This was extended subsequently by four bays up to the present position of Cameron Street, in accordance with a plan of 1890 (Building Control Plan 3923).

3.3.2 The earlier phase of the weaving shed comprised 14 x 10 bays in rusticated stone block construction with rubble internal face above a 3'9" (1.41m) brick plinth in six stretcher English Garden Wall bond (Plate 15). The north-light roof was of typical cast-iron and timber construction, with timber ridges and galvanised iron transoms to the wide north-light glazing panels, which had between three and four panels per rafter interval (Plate 16).

3.3.3 The roof was of Welsh slate, with collared, interlocking V-section ceramic ridge tiles (Plate 17). The valleys of the roof were of V-section cast iron, and were timber shuttered below, with late chipboard covers to integral hanger bolting plates within the casting of each beam at the mid-point of each east/west-aligned bay (Plate 18). These had slot mountings for the bolts either side of a central square socket (Plate 18).

3.3.4 The western bay had an additional line shaft, placed approximately 5'6" (1.68m) to the west of the column, with slit hangers clasping the valley beam. Two similar brackets in the northern bay of the original shed were placed approximately 8' (2.44m) from the west wall, and were used latterly to house I-section beams carrying a ventilation fan (Plate 19). The valleys drained through the parapet wall to the eastern side of the shed, into downpipes for each valley, rather than a longitudinal external gutter. All of these were replaced subsequently with plastic downpipes (Plate 20).
Plate 15: Internal construction of weaving shed, with broken bearing mount and butt-joint between original shed and extension
Plate 16: General view of weaving shed

Plate 17: Weaving shed roof
Plate 18: Partially shuttered line shaft hanger bolting plate on valley beam

Plate 19: Additional hanger bolting plates
Plate 20: Replaced downpipe and quoined return of original extent of weaving shed
3.3.5 The valley beams were carried on 4¾" (0.12m) hollow cylindrical cast-iron columns with rolled astragals to a shallow V-shaped head, which clasped the valley (Plate 21), but appeared to have had no bolts within this joint. The columns were placed below each valley of the saw-toothed roof, forming bays of 10’6” (3.20m) width on the north/south alignment, but spaced at double the distance along the length of the beams to form 21’ (6.40m) wide bays on the opposite axis.

Plate 21: Original cast-iron column incorporating bolting plate for line shaft hanger

3.3.6 Each column had a bolting plate for a line shaft hanger on its western face, with through-bolt apertures and rectangular slots in the face to allow for adjustment of the hanger. The hanger also had a bolt from its protruding sill into the base of the hanger (Plate 21). Each of the extant original columns, which only survived in the western five bays, had a stamp above the bolting plate denoting the row number, commencing with ‘1’ on the western column and ‘5’ at the eastern surviving extent. However, the north column of the third row was stamped ‘4’.
3.3.7 The original roof survived within the eastern five bays of the weaving shed, but the columns were replaced with slender 2½" (0.06m) diameter columns with flat heads, and with four mounting bolts into the base of 10 x 6" (0.25 x 0.15m) I-section steel beams (Plate 22). These were placed longitudinally, in alternate bays, and were jointed above each column by a plate and eight bolts. All beams had ‘Lanarkshire Steel Coy Ltd Scotland 10 x 6’ rolling stamps, and also bore a ‘British Steel’ rolling mark (Plate 23).
3.3.8 Line shafts were also originally placed along the east and west walls, with bearings to each bay carried on 15 x 9" (0.38 x 0.23m) rectangular moulded sandstone corbels. Those of the east wall had been cut flush subsequently with the sandstone pads above and below, which were 31 x 8½" (0.79 x 0.22m) and projected slightly from the wall face. Those of the west wall projected to their original 20" extent, below further pad stones of similar proportions to those of the east wall (Plate 24).
3.3.9 The power plant, placed to the south-west of the weaving shed, projected 7'6" (2.29m) into the western two bays of the shed, and had three corbels carrying the valley of the roof above, similar to those originally carrying line shaft bearings in the west wall (Plate 25). It also housed 18" (0.46m) square bearing boxes for each of the five line shafts placed on 4' x 13" (1.22 x 0.33m) pad stones.

3.3.10 The eastern return of the engine house wall within the weaving shed was of brick construction, with a bull-nosed return to the north wall. It had an inserted door at its southern end below the sandstone pads for a substantial 2'6" (0.76m) square bearing aperture (without side panels or lintel; Plate 26), for the primary motion shaft, powered directly by a pinion wheel driven by the flywheel of the engine. Each bay of the south wall of the weaving shed originally had a slightly larger 20 x 16" (0.51 x 0.41m) moulded sandstone corbel for each line shaft, although these had all been removed subsequently, or cut back to within 5" (0.13m) of the wall face. Each corbel had 5' x 10" (1.52 x 0.25m) sandstone pads above and below, with the lower pad having two bolts, 20" (0.51m) apart for a 2' x 2½" (0.61 x 0.06m) cast-iron plate, relating to the bevel gear mounted above.

Plate 25: Corbels carrying valley beam and bearing boxes for line shafts, north wall of engine house
Plate 26: projecting engine house with bearing box for primary motion shaft (top left)
3.3.11 The shed was expanded subsequently by five bays on its northern side, in accordance with a proposal plan submitted in October of 1890 (Building Control Plan 3923). This extension is not shown on the Ordnance Survey first edition 25”: 1 mile map of 1893, surveyed in 1891 (Plate 3), by which time construction of the extension may not have commenced. It is shown clearly on the subsequent edition of 1912.

3.3.12 The side walls and roof of the extension were of similar construction to the earlier shed to the south, but the north wall was faced internally with brick, to full wall height in five-stretcher English Garden Wall bond. Butt joints were clearly visible, both internally and externally, between the two phases of weaving shed, with dressed quoins to the original build in the eastern rubble wall. Oily wall scars and sandstone pads marked the only evidence for the end bearings of each line shaft within the new north wall, and suggested they had rounded base plates. The north wall had a 6'6" (1.98m) wide doorway in the fifth bay with a 2'6" (0.76m) wide, 8' (2.44m) high blocked aperture above, only visible on the external elevation (Plate 27). This possibly represented the aperture for the jib of a travelling crane. The only other feature of this large blank wall was a 7' (2.13m) wide patch of recent rebuilding at the base of the wall in the second bay.

3.3.13 The columns of the weaving shed extension were similar to those to the south, but had a full astragal at the level of the bolting plate base, and no row stamp above (Plate 28). The northern bay had only a single shallow pitch, which was carried on I-section principal rafters below timber common rafters above (Plate 29), and incorporated a glazing band below a single purlin. The I-section rafters bore a ‘Cargo-Fleet-England’ rolling stamp.
Plate 28: Secondary weaving shed column with moulding to base of hanger bolting plate
3.3.14 A loading bay was added to the weaving shed, probably concurrently with its change of use from a weaving shed to a warehouse, with a deposited building plan for the work submitted in 1956 (Building Control Plan 16868). It was two bays wide, and was placed almost centrally on the western side of the weaving shed. It comprised walls of single-skin thickness, with the columns encased within brick piers (Plate 30). Additional brick piers carried I-section steel beams which supported the rail of a travelling crane, placed centrally above a 1m deep, 9 x 3m loading area, with double-doors to the Elm Street façade (Plate 30).
3.3.15 An electricity substation was inserted into the weaving shed in 1963 (Building Control Plan 20977), placed towards the southern end of the west elevation of the weaving shed. It was of full-brick thickness construction, but to only a height of approximately 2m, and with access only afforded by two external doorways on Elm Street. The fuse array for the mill complex was placed on a panel on the southern wall of the substation, within the weaving shed.

3.3.16 Between the substation and loading bay, a partitioned office was inserted, with shuttered column and suspended ceiling. This may have related to the last use of the weaving shed as a warehouse, or may alternatively have been part of an attempted recent refurbishment of the weaving shed.

3.4 **POWER PLANT**

3.4.1 The weaving shed and preparation block/warehouse were powered originally by a steam engine, placed in the south-west corner of the complex. The steam was raised in a single boiler, almost certainly of ‘Lancashire’ type, placed on its western side, and with a short flue into a tapering cylindrical chimney immediately to the rear. Whilst the stack of the chimney was demolished in July 1972, its rectangular-section base survived intact, measuring 18 x 13’ (5.49 x 3.96m), and complete with rolled sandstone collar.

3.4.2 **Engine House:** the five-bay engine house was placed adjacent to the narrowed link block, and was of similar continuous build, but stepped four courses higher than the adjacent structure. The main southern elevation had a central, vertical 13-light window at engine deck level, with dressed sandstone surround (Plate 31). The lower part of the window originally formed a doorway, providing the principal access into the engine house, with the broken flagstone of the external stair landing protruding slightly from the extant elevation (Plate 31). A doorway below, stone blocked subsequently, afforded access to the engine bed beneath an external cast-iron stair, which was also removed (Plate 31).

3.4.3 The long walls of the engine house were devoid of fenestration, which was often included to the upper storey. Three timber-shuttered infilled sockets on the western external face denote the position of rafters carrying the original roof of the adjacent boiler house, and the lack of large sandstone pads within the upper wall face demonstrate that the engine was a horizontal cylinder engine, rather than a vertical beam engine which would have been supported by the structure of the engine house itself. The north gable wall housed a shorter seven-light round-headed window, of similar width to that in the southern wall, and which would have not originally included a doorway below.
3.4.4 Internally, the engine and bed had been removed, with a gantry, carried on I-section beams with the rolling stamp ‘B.S.C A.F Gt Britain’ inserted at deck level (Plate 32). The structure was relatively plain, with a beaded lath and plaster ceiling, and fully-rendered walls, possibly undertaken following the conversion of the engine house for a later use, particularly as all related features within the side-walls were masked by the render. Only two features relating to its original use survived, comprising an internal large diameter down pipe placed in the south-east corner, and a cast-iron grill platform, and associated ladder, placed below the ceiling in the south-west corner of the engine house (Plate 33). The ladder afforded access to the roof, which was similarly of saw-toothed construction, but housed a rectangular water tank at its southern end (Plate 4), the down pipe forming the only surviving element of the feature, which appears to have been installed in 1919 (Building Control Plan 8618).
Plate 32: Rolling stamp on gantry inserted into engine house

Plate 33: Stair to water tower
3.4.5 The northern end of the engine house projected into the southern bay of the weaving shed, allowing efficient transfer of power from the engine directly into the shed. Although blocked internally, an aperture in the north-east corner of the weaving shed, placed marginally below deck level, housed the primary motion shaft, which would have been driven by a pinion wheel connected to the flywheel of the engine. This demonstrates that the flywheel was placed against the east wall of the engine house.

3.4.6 **Boiler house:** the boiler and its associated features had also been removed, and the roof of the building replaced with a corrugated cementitious asbestos cat-slide roof. The structure was originally open-fronted, although the detail provided by the Ordnance Survey map of 1893 suggests that the boiler house had extended to the southern boundary of the complex (Plate 3). The shortened structure was infilled subsequently with a roller-shutter and panelling above, following the removal of the boiler. Personnel access was afforded by a door in the west wall, from Elm Street, with similar rolled sandstone jambs, stop-chamfered to a flat lintel as the doorways into the engine house and link block (Plate 34). This was blocked with brick subsequently.

*Plate 34: Doorway into boiler house from Elm Street*
3.4.7 Internally, the boiler house was of sandstone rubble construction, and was partially rendered internally (Plate 35). The north wall was rebuilt in brick, below the dressed sandstone blockwork of the top of the chimney base (Plate 36). This was presumably undertaken following the removal of the boiler, blocking the flue into the base of the chimney. Dressed quoins of the southern return of the chimney wall were also observed in the north-west corner of the boiler house (Plate 36), demonstrating that the base of the chimney was constructed prior to the boiler house, which was butted onto its southern face. A single small end bearing box survived in-situ in the west wall (Plate 37), and possibly housed the end of a line shaft controlling the pipe scrapers for an economiser. All other features relating to the supply of steam to the engine were blocked and obscured, as were external features associated with the engine housing.

![Plate 35: Internal aspect of the extant boiler house](image-url)
Plate 36: Rebuilt flue wall with original quoins of chimney
Plate 37: Bearing box in west wall of boiler house
4. DISCUSSION

4.1 Queen’s Mill represents a well-preserved example of a late nineteenth-century weaving complex. Although it would have required substantial financial outlay, the mill was of a size typical within Burnley and the wider area, and such concerns were generally operated by single owners or small consortiums and cooperatives. This type of textile-manufacturing complex represents a refinement of the cotton weaving process to a high degree of efficiency, with the placement of individual buildings and elements designed to provide power to each machine with the minimum shafting. Offsetting the engine house into the corner of the weaving shed meant that fewer looms could be accommodated, but this was far outweighed by allowing the primary motion shaft from the engine to drive the majority of line shafts within the shed directly. This resulted in less loss of power through gearing, and a more easily maintained and reliable shafting system.

4.2 Many such mills were erected in available spaces within the industrialised towns of East Lancashire. Methods of constructing weaving shed that could affordably house several hundred looms had been established by the mid-nineteenth century, and they were erected in such a way as to allow easy expansion once more capital had been generated by the business. The drop in cost and the improvements in the efficiency of steam engines and boilers during the second half of the nineteenth century allowed relatively large weaving sheds to be powered by increasingly smaller power plants, and the layout of the power-transfer systems was also becoming increasingly sophisticated, minimising loss of power, and offering further improvements to the efficiency of the power plant. Preparation blocks and warehouses were also becoming more ordered and uniform in their layout, allowing smaller structures to perform all necessary functions.

4.3 The extant remains of Queen’s Mill include almost all the features associated with this type of mill, with the fabric clearly charting these improvements to mill layout. Indeed, not only does Queen’s Mill have an early extension to the weaving shed, which retains significant evidence for the power systems, but it also has a sizeable area of column replacement, undertaken using I-section steel beams below the cast-iron valleys, a method of weaving shed roof construction typical of the weaving sheds of the early twentieth century.

4.4 The cartographic sources available indicate that the boiler house was originally much larger, which implies that a more substantial boiler have been employed than suggested by the extant remains. It also seems likely that an economiser had been placed between the boiler and the chimney, further maximising the efficiency of the power plant. Below-ground remains of the boiler, flue and economiser are likely to survive below the late concrete skim floor.
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APPENDIX 1: WRITTEN SCHEME OF INVESTIGATION

May 2013

QUEEN’S MILL,
NEW HALL STREET,
BURNLEY,
LANCASHIRE

Recent view of Queen’s Mill

ARCHAEOLOGICAL BUILDING INVESTIGATION

WRITTEN SCHEME OF INVESTIGATION

Proposals

The following Written Scheme of Investigation is offered in response to a request from Adrian Ford of Southdale, for an archaeological building investigation in advance of the proposed redevelopment of the site of the Queen’s Mill in Burnley.
1. INTRODUCTION

1.1 Project Background

1.1.1 Burnley Council has granted planning permission for the redevelopment of Queen’s Mill on New Hall Street in Burnley, Lancashire (centred at NGR 384097 434084). The existing planning permission (APP/2012/0536) allows for the complete demolition of a late nineteenth-century weaving mill, and the erection of 18 new houses.

1.1.2 The mill was erected in 1887 as a purpose-built weaving shed, and has been assessed during the current Lancashire Textile Mills Survey as being potentially of ‘high significance’. In order to secure archaeological interests, Burnley Council has recommended that an appropriate programme of archaeological investigation of the mill is carried out in advance of demolition. Following consultation with the Lancashire County Archaeology Service (LCAS), it was recommended that an archaeological building investigation commensurate with an English Heritage Level 2/3-type survey should be carried out. In accordance with this recommendation, Burnley Council attached a condition to planning consent that stated:

No demolition works shall start until the developer has secured the implementation of a programme of archaeological recording, in accordance with a written scheme of investigation which has been submitted to and approved in writing by the local planning authority. A copy of the archaeological record shall be lodged with the local planning authority within two months of its completion.

1.2 Oxford Archaeology North

1.2.1 OA North has considerable experience of the interpretation and analysis of buildings of all periods, having undertaken a great number of small and large-scale projects during the past 24 years. Such projects have taken place within the planning process, to fulfil the requirements of clients and planning authorities, to very rigorous timetables. In recent years OA North also has extensive experience of archaeological work in Northern England. In particular, OA North undertook a rapid appraisal of the surviving structures of the Lancashire Textile industry, which identified all the surviving textile-manufacturing sites in the modern county of Lancashire (OA North 2010), and is presently carrying out a second, more detailed, study of the county’s former textile mills.

1.2.2 OA North has the professional expertise and resources to undertake the project detailed below to a high level of quality and efficiency. OA North is an Institute for Archaeologists (IfA) registered organisation, registration number 17, and all its members of staff operate subject to the IFA Code of Conduct.
2 OBJECTIVES

2.1 The archaeological building investigation aims to provide a drawn, photographic and textual record of the complex prior to its demolition. The complex contains five main elements, comprising a two-storey preparation/warehouse, attached engine and boiler houses and the base of a demolished chimney, and a single-storey weaving shed. To achieve these objectives, the following listed specific aims are proposed:

- **Building Investigation:** to provide a drawn, photographic and textual record of all the buildings to English Heritage (2006) Level 2/3 standard, which will provide a lasting record of the structures in their present state. In addition, the investigation will ascertain if further archaeological investigation will be necessary, prior to or during any demolition work;

- **Report and Archive:** to complete a written report, which includes information about the building’s age, fabric, form and function. This will be followed by a discussion of the sequence of development, process layout and use over time, and its relationship with other buildings in the vicinity, in terms of architecture and function. Suggested recommendations for additional archaeological investigation will also be included, where appropriate.

3. METHOD STATEMENT

3.1 Building Investigation

3.1.1 **Historical Research:** cartographic sources relating to the area will be consulted, in order to produce a map regression to provide an appraisal of the archaeological or historical significance and development of the complex. In addition, any relevant documents relating to the building will also be examined to provide a broad historical context for the building investigation.

3.1.2 **Photographic Archive:** a photographic archive will be produced utilising a high-resolution digital camera. A full photographic index will be produced and the archive will comprise the following:

(i) The external appearance and setting of the buildings, including a mixture of general shots and detailed views taken from perpendicular and oblique angles;

(ii) General shots of the surrounding landscape;

(iii) The general appearance of principal rooms and circulation areas;

(iv) Any external or internal detail, structural or architectural, which is relevant to the design, development and use of the buildings, and which does not show adequately on general photographs;

(v) Any internal detailed views of features of especial architectural interest, fixtures and fittings, or fabric detail relevant to phasing the buildings.
3.1.4 **Site Drawings:** architects’ plans (supplied by the client) will be annotated on site to produce the drawings. These drawings will then be used as the basis of CAD drawings, which will be included within the final report as figures:

(i) a ground-floor plan for each building;
(ii) a cross-section through the short axis of the weaving shed;
(iii) principal elevations.

3.1.5 Where architects drawings are not available (*e.g.* for cross-sections and elevations), the following survey techniques will be applied as appropriate:

3.1.6 **Reflectorless Electronic Distance Measurer (REDM) survey:** the proposed elevations and cross-sections will be surveyed by means of a reflectorless electronic distance measurer (REDM). The REDM is capable of measuring distances to a point of detail by reflection from the wall surface, and does not need a prism to be placed. The instrument to be used will be a Leica TCR805. This emits a viable laser beam, which can be visually guided around points of detail. The digital survey data will be captured within a portable computer running TheoLT software.

3.1.7 Detail captured by the instrument survey will include such features as window and door openings, evidence for power transmission, outline of decorative detail, evidence for machinery, an indication of ground and ceiling level, and changes in building material. The drawings will usually be produced at a scale of 1:50. The existing drawings will be digitised into an industry standard CAD package (AutoCAD MAP 2004) for the production of the final drawings.

3.1.8 **Photographic Survey Techniques:** large elements of the principal elevation can be captured by a process of rectified photography. These photographs will be tied into the survey data produced by the instrument survey, to produce more a detailed elevation drawing.

3.1.9 **Manual Survey Techniques:** hand-measured survey techniques will be utilised to record areas that are not accessible for instrument or photographic survey. The drawings will be tied into the remained of the survey through the use of a survey control established by the instrument survey.

3.1.10 **CAD System:** the drawings will be manipulated in AutoCAD MAP 2004. The advantage of a CAD system is that it allows for efficient manipulation and editing of drawings. The adoption of a layering system has significant benefits during the analysis stage as it allows for the display of information such as feature types, fabric and phasing as necessary to the requirements of the analysis, without the necessity to produce further drawings.

3.1.11 **Visual Inspection:** a visual inspection of the building will be undertaken utilising the OA North building investigation *pro forma* sheets. A description will be maintained to English Heritage (2006) Level 2/3 standard. The records will be essentially descriptive and provide a systematic account of the origin, development and use of the building, which will include a description of the plan, form, fabric, function, age and development sequence of the complex.
3.2 REPORT

3.2.1 Report: the content of the report will comprise the following:

(i) A site location plan related to the national grid;
(ii) A front cover to include the planning number and the NGR;
(iii) A brief account of the building investigation results. This will include a description of the buildings’ layout, as well as their age, fabric, form and function. This will be followed by a discussion of the sequence of development, process layout and use over time, its relationship with other buildings in the vicinity, in terms of architecture and function;
(iv) An explanation to any agreed variations to the brief, including any justification for any analyses not undertaken;
(v) A description of the methodology employed, work undertaken and results obtained;
(vi) Copies of plans, photographs, and other illustrations as appropriate;
(vii) Recommendations for further archaeological investigation where appropriate;
(viii) A copy of this project design, and indications of any agreed departure from that design;
(ix) The report will also include a complete bibliography of sources from which data has been derived.

3.2.2 The report will be in the same basic format as this project design; a copy of the report can be provided on CD, if required. Two copies of the report will be supplied to the client as requested, and further digital copies will go to the appropriate repository.

3.2.3 Archive: the results of all archaeological work carried out will form the basis for a full archive to professional standards, in accordance with current English Heritage guidelines (Management of Archaeological Projects, 2nd edition, 1991). The project archive represents the collation and indexing of all the data and material gathered during the course of the project. The deposition of a properly ordered and indexed project archive in an appropriate repository is considered an essential and integral element of all archaeological projects by the IfA in that organisation's code of conduct. OA North practice is to deposit the original record archive of projects with the County Record Office.

3.2.5 The Arts and Humanities Data Service (AHDS) online database project Online Access to index of Archaeological Investigations (OASIS) will be completed as part of the archiving phase of the project.

3.2.6 Confidentiality: all internal reports to the client are designed as documents for the specific use of the Client, for the particular purpose as defined in the project brief and project design, and should be treated as such. They are not suitable for publication as academic documents or otherwise without amendment or revision.
4. HEALTH AND SAFETY

4.1 OA North provides a Health and Safety Statement for all projects and maintains a Unit Safety policy. A written risk assessment will be undertaken in advance of project commencement and copies will be made available on request to all interested parties.

5 PROJECT MONITORING

5.1 Access: liaison for basic site access will be undertaken through the client. Whilst the work is undertaken for the client, LCAS will be kept fully informed of the work and its results and will be notified a week in advance of the commencement of the fieldwork. Any proposed changes to the project design will be agreed with LCAS in consultation with the client.

6 WORK TIMETABLE

6.1.1 Historical Research: one day in the field will be required to complete this element.

6.1.2 Building Investigation: approximately one week in the field will be required to complete this element.

6.1.3 Report/Archive: the report and archive will be produced within eight weeks of completion of the fieldwork. OA North can execute projects at very short notice once a formal written agreement has been received from the client.

7 STAFFING

7.1 The project will be under the overall charge of Ian Miller BA FSA (OA North Senior Project Manager) to whom all correspondence should be addressed. Ian has considerable experience and particular research interests in Industrial Archaeology and, amongst numerous other projects, managed the Lancashire Mills Textile Survey.

7.2 The project will be directed in the field by Chris Wild BSc (OA North Project Officer), who specialises in building recording, and was also involved in the Lancashire Textile Mill Survey.

8 INSURANCE

8.1 OA North has a professional indemnity cover to a value of £5,000,000; proof of which can be supplied as required.
ILLUSTRATIONS

LIST OF FIGURES

Figure 1: Site location

Figure 2: Extract from the Ordnance Survey 25”: 1 mile map of 1911

Figure 3: Ground-floor plan of Queen’s Street Mill complex

Figure 4: External elevations of Queen’s Mill complex

Figure 5: Cross-section of Queen’s Mill weaving shed
Figure 1: Site location
Figure 3: Ground-floor plan of Queen's Mill complex
Figure 5: Cross-section of Queen’s Mill complex