"TEMPLES OF POWER" - SPACE, SOCIETY AND THE TEXTILE MILL, *c.*1780-1930

TWO VOLUMES: VOLUME TWO (APPENDICES)

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APPENDIX A
SITE DESCRIPTION : 1

AIREWORTH MILLS

DATABASE ENTRY:	975
NBR NUMBER:	BFO62297
NGR:	SE 0725 4195
TOWNSHIP:	Keighley
CIVIL PARISH:	Keighley
DISTRICT:	Bradford
COUNTY:	West Yorkshire
BRANCH:	(Cotton) Worsted
PERIOD:	Early

Plate 1.1 *Aireworth Mills, Keighley, from the southeast*

Originating as a water-powered cotton-spinning mill in the late eighteenth century, Aireworth Mills was one of a number of mills built in the Keighley area to support a booming cotton industry in the early nineteenth century. When first built the mill enjoyed a rural setting to the northeastern of Keighley on a flat site between the rivers Aire and Worth (RCHME 1988a, 3; Figure 1.1). In 1808 the mill was rebuilt and in 1813 converted from cotton to worsted spinning and thereafter the site expanded including the construction of attached and detached engine houses, boiler house, warehouses and sheds, resulting in the site as it appears today (Plate 1.1). An extensive mill dam and manufacturers mansion accompanied the site to the south, but both have subsequently been demolished. Presently the site is subdivided into light industrial units and

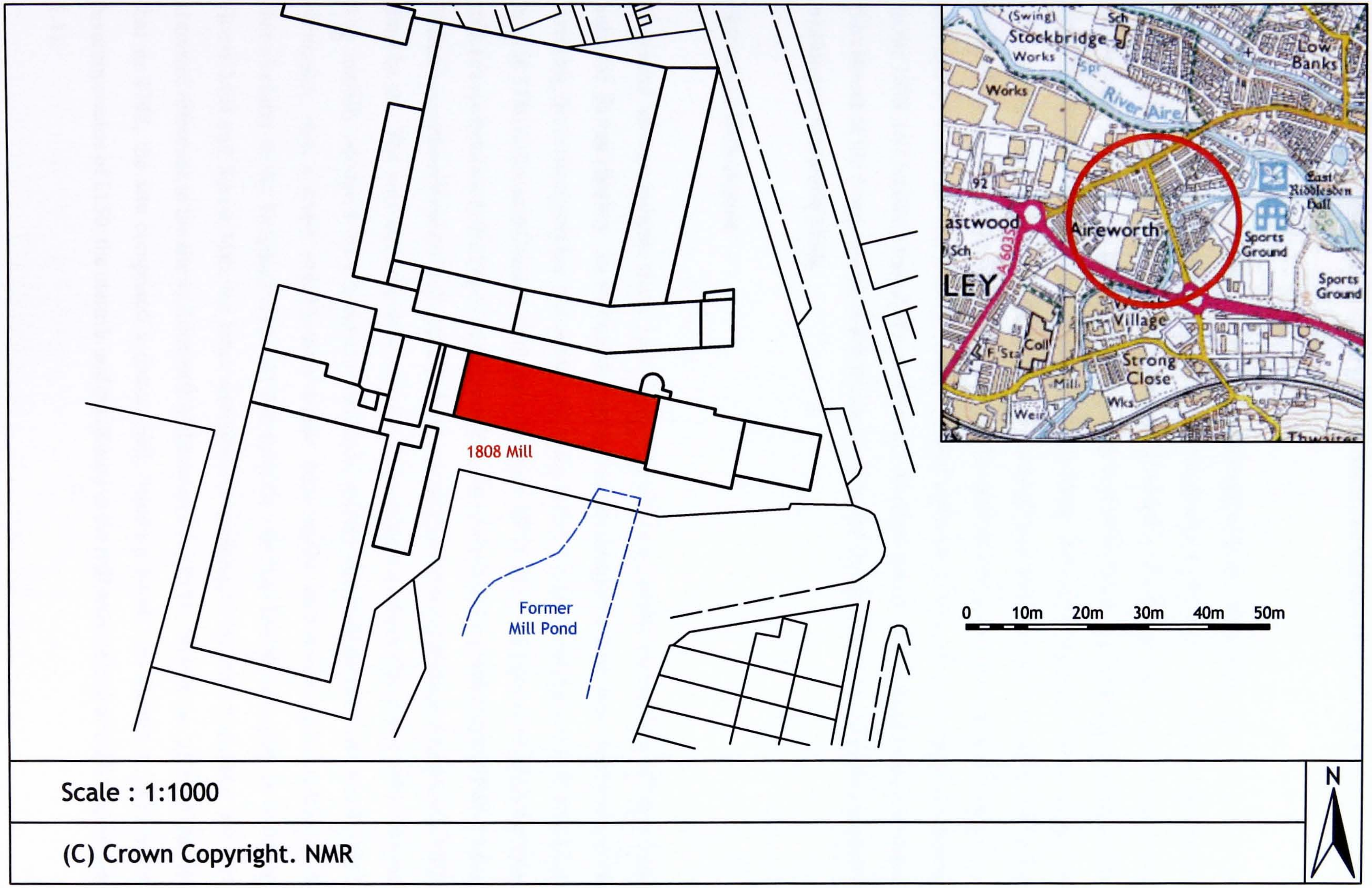


Figure 1.1 *Block plan, Aireworth Mills, Keighley*

the 1808 mill stands empty and in a derelict condition; the site is owned by Petros Textiles Ltd., Keighley.

The following site description is primarily concerned with the early 1808 mill surviving at the site. Much of the site was unavailable for inspection due to difficulties of access and detailed measured drawings only existed for the early mill building. Furthermore, access to much of the site was not possible due to multiple ownership and difficulties in gaining permission to the interior of individual buildings. However, the existing plans of the early mill were augmented with a full photographic record of the early mill and photographs of the site taken by the former RCHME in the late 1980s. This allowed the principals phases in the development of the early mill and the rest of the site to be discerned. Spatial and process recording was largely restricted to the 1808 mill building but where possible the development of this structure has been set in the context of the development of the site as a whole and the gradual move towards integrated working at Aireworth Mills.

HISTORICAL BACKGROUND

Historical sources indicate that a cotton-spinning mill was built at the site in 1787 by a local solicitor, Samuel Blakey. At the time, Keighley was emerging as an important centre for cotton spinning, the earliest purpose-built cotton-spinning mill in Yorkshire being Low Mill, Keighley, built in 1780 (Giles and Goodall 1992, 211; Hodgson 1879, 212). Blakey most likely built the mill as a speculation in the hopes of profiting from the local boom conditions (RCHME 1988a, 1) and it is within this historical and industrial context that the early history of Aireworth Mills must be set. The mill was originally run on a room-and-power basis (Baumber 1983, 44) and was initially occupied by a number of tenants, mostly cotton spinners, but one, Richard Hattersley, was a screw manufacturer whose firm would later becoming a leading loom manufacturer in the Keighley area. At this time the site was known variously as Stubbing House Mill and Screw Mill, the latter undoubtedly referring to Hattersley tenancy; the first recorded reference to the site as Aireworth Mills dates from 1851. An insurance policy records that in 1792, the site comprised a cotton mill, counting house and chambers and had an insurance value of £150; the utensils and machinery in the mill were valued at £820 (Document 1.1).

In 1808, and following the lapse of an initial 20 year lease on the site taken out in August 1787

(Hodgson 1879, 85-6), the mill was rebuilt (Baumber 1983, 53). The reason for the rebuilding is unclear. The original mill may have been destroyed by fire but, and unusually, no such catastrophe is recorded which is unusual. The more likely explanation is that the lapse of the lease afforded the opportunity for what was by contemporary standards a small mill to be rebuilt on modern principles. By 1809 the rebuilding was apparently complete and the mill is recorded as being occupied by Thomas Blakey, cotton spinner and perhaps a relative of the original builder. Ingle (1980, 502) records that by 1811 eight throstles were in use in the mill with a total of 384 spindles.

During the early nineteenth century the localised boom in the cotton industry came to an end many mills in the Bradford and Keighley areas converted to worsted production (Giles and Goodall 1992, 5). This decline partly reflected an inability to compete with the neighbouring industry in Lancashire and the distance from the important centres of Todmorden and Skipton as well as the major trading centres like Manchester (Giles and Goodall 1992, 5; Williams and Farnie 1992; RCHME 1988a, 1;). Accordingly, in 1813, Aireworth Mills converted to worsted spinning, first by Joseph Hey and then, from 1818, by the firm of Calvert and Clapham who 'turned Aireworth Mill [sic] into one of the most prosperous businesses in the town (Baumber 1983, 58). Of interest, Clapham's Christian names – Samuel Blakey – indicate that the Blakey family may have retained an interest in the property through marriage.

By 1819 the mill was operating on a greater scale than the pre-1808 cotton mill, for an insurance valuation of £1,900 indicates considerable growth (RCHME 1988a, 1; Document 1.2), and the resident partners – Lodge Calvert and Clapham – were described as worsted spinners and manufacturers, which implies integrated working. It is known that at this time the mill was being used for powered spinning, undertaken on 24 spinning frames, whilst combing was also being performed elsewhere at the site, perhaps in the attached warehouse (Jenkins 1969). However, weaving must have been undertaken off-site for there is no mention of the activity in the insurance policy. This represents a transitional stage between mill-based working and the traditional putting-out system, with some process carried out on the mill site and others in separate workshops or within a domestic setting. This situation was entirely typical of the worsted industry during the early nineteenth century and Hodgson (1879, *passim*) records that most of the early Keighley worsted mills were run by manufacturing concerns that employed out-weavers. The undertaking of on-site combing was again typical of the industry during the period, whereby manufacturers employed their own combers, sometimes at the mill site or alternatively in a separate comb shop, in order to avoid the commission services of the established master combers (RCHME 1988a, 2).

Between 1813 and the 1830s there were apparently few additions made to the mill. The rating assessments remain stable between 1828 and 1842 and a an illustrated bill head of 1830 shows the mill as a thirteen-bay, three-storey structure with an attached range, known from other sources to comprise a warehouse and cottages (RCHME 1988a, 2; Plate 1.2). The bill head also

Plate 1.2 *Illustrated letterhead dating from the 1830s showing the multi-storeyed spinning mill and attached range next to Aireworth ('Stubbin') House (after Baumber 1984)*

shows a manufacturer's mansion to the south of the mill. This house was certainly known in later years as Aireworth House, but it was originally been known as Stubbing or Stubbin House, for a lease dated 26-27 May 1809 records a 'messuage and cotton mill ... at Stubbing House...'. Whether the mansion was built by Blakey, one of the early cotton-spinning tenants or by the Clapham family is not known, but the close relationship of the house to the mill, both physically and through shared names, suggests a long-standing connection between the two.

In 1834, 91 people were employed at the mill, all of whom were employed by a single company for, by this time, the mill had ceased to operate on a room-and-power basis. A year later, in 1835, 58 worsted power looms were installed (Jenkins 1969) and this brought about integrated working at the site. The introduction of integrated working was common in the worsted industry during the 1830s, with many mills working power looms for the first time (Hodgson 1879).

The rateable value of the mill had increased to £200 by 1842, but given that the 1841 Tithe

Award map does not appear show an increase in buildings at the site it is possible that the 1842 valuation records the construction of a new attached warehouse to the north of the mill. This new warehouse, a replacement of an earlier attached structure is shown on an 1849 view of the site, together with an attached engine house at the south end of the mill (RCHME 1988a, 2). Unfortunately, it has not been possible to locate this source for a closer inspection. The introduction of steam power is not, however, formally recorded until 1851, when a rating assessment notes 'Steam power £40... Improvement Engine house, boiler house, smith's shop, staircase £13-5s' (Document 1.3). Contemporary historical sources indicate that during the middle decades of the nineteenth century that the firm of Lodge Calvert and Clapham gave way to a firm operating under the name of Samuel B. Clapham alone, and this firm continued to operate until the late 1860s, and apparently no later than 1870 when Thomas Laycock, worsted spinner and manufacturer, was assessed for rates (RCHME 1988a, 2; Document 1.4). Judging by the absence of later references to Clapham, the mill had been sold to Laycock, but the exact date of the transfer is unknown. Evidently, Laycock immediately set about an initial building campaign at Aireworth Mills for the 1870 assessment records for the first time a shed, warehouse and engine house, none of which are mentioned in previous assessment in 1867 (Document 1.4). Laycock's expansion of the site continued throughout the late nineteenth century, other 'improvements' including additions to the combing shed, construction of a dressing room and a detached engine house, and a spinning shed. Despite the existence of two engine houses by the turn of the twentieth century, waterpower was apparently still used at the site as late as 1903, when a set of engineering drawings show plans for repairs to the water wheel (Document 1.5).

The Laycock family continued to operate Aireworth Mills until at least the 1920s, but in the latter part of their occupancy concentrated on worsted spinning and by 1877 were using only part of the mills. In that year there were three other occupiers, a wool comber, a worsted spinner and a worsted manufacturer (Document 1.6). The mills had therefore reverted to operation on a room-and-power basis, giving the Laycock's a second interest in the property as landlords (RCHME 1988a, 2). By 1910, five firms occupied the mills, two involved in fancy cotton manufacture, two in worsted spinning and one in stuff manufacture.

The more recent history of the site is unclear but it is owned by Petros Textiles Ltd, Keighley and is subdivided into a series of light industrial units. The 1808 mill is unoccupied and has been in a derelict conditions since at least the mid-1980s when the former RCHME surveyed the building and found the interior 'almost entirely reamed out... the roof too is modern' (RCHME 1988a, 3). When the interior of this building was gutted and the roof replaced is not known but it seems likely that the replacement roof pre-dates the removal of the floors, perhaps to prolong the working life of the building.

ARCHITECTURAL DESCRIPTION

The following description is principally concerned with the 1808 spinning mill and, therefore, only superficial mention will be made of other buildings at the site. This not only reflects the desire to concentrate on the evidence for the early spinning mill but also practical issues concerning access to other buildings at the site. Because of the derelict state of the 1808 spinning mill, much of the description of the interior is based on the architectural description and photographic record compiled by the former RCHME in the 1980s. Four broad phases of structural activity can be discerned at the site (Figure 1.2).

- ### PHASE ONE

Documentary sources indicate that a cotton spinning mill was first built at the site in 1787 and was rebuilt in 1808. The rebuilt mill survives and forms the earliest and single largest building at the site (RCHME 1988a, 3). Located on the south side of the site, it is aligned east-west and is of three storeys and thirteen bays long (Figure 1. 3; Plate 1.3). For its date, it is a large and impressive structure (Giles and Goodall 1992, 23). The mill is built of coursed masonry, with some areas conspicuously watershot and others where the technique is less pronounced. These differences do not appear to relate to different phases of construction, but probably reflects the fact that some stone from the earlier mill was

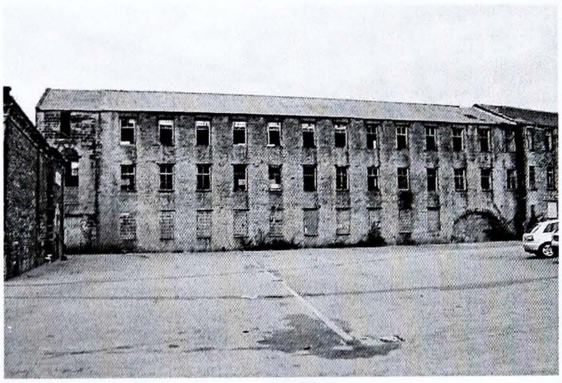


Plate 1.3 *The 1808 mill from the south*

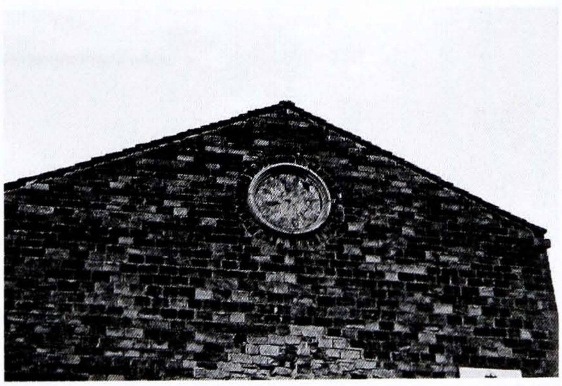


Plate 1.4 *Reset clock face in east gable of the mill extension*

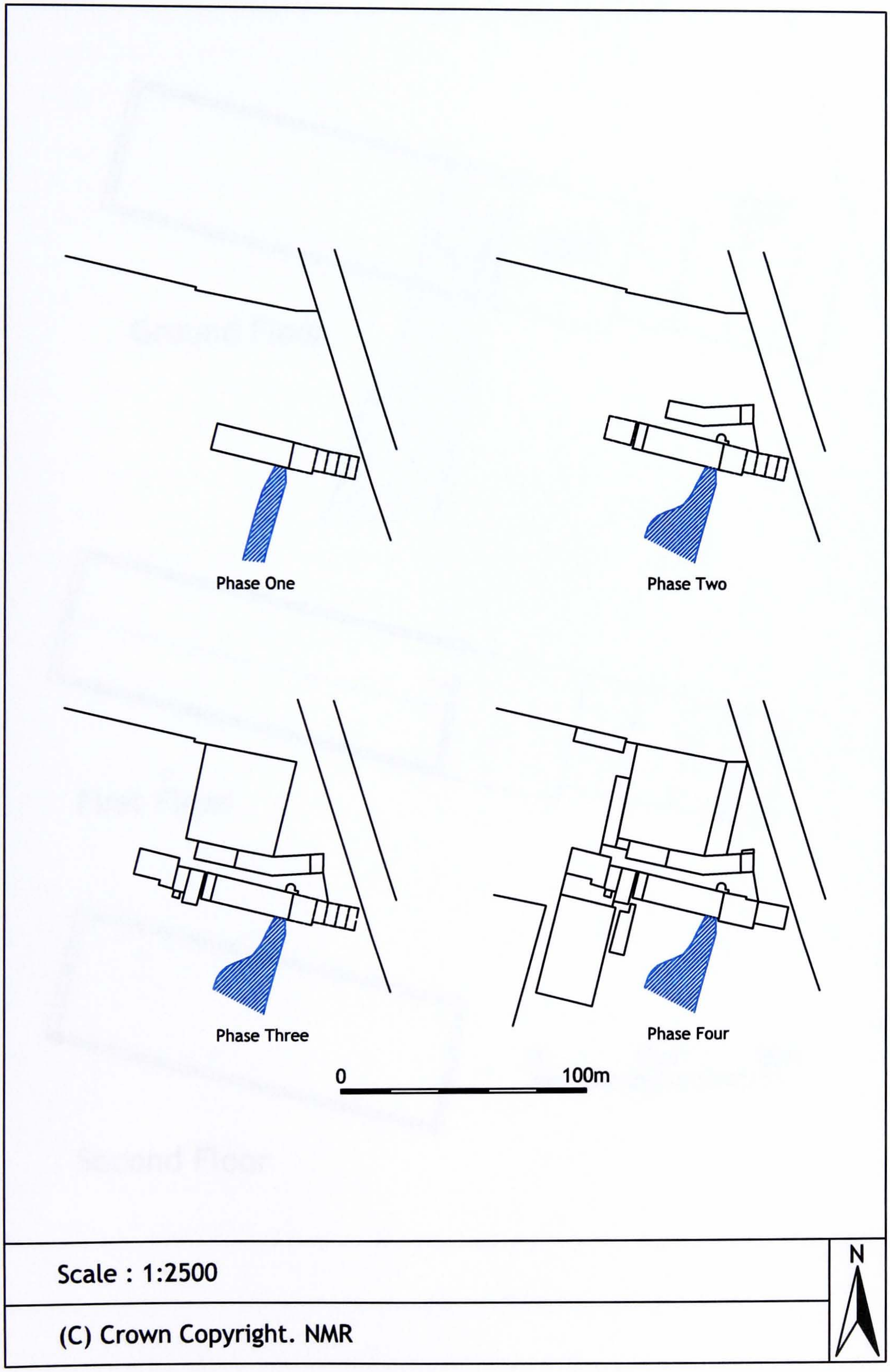


Figure 1.2 *Principal structural phases at Aireworth Mills, Keighley*

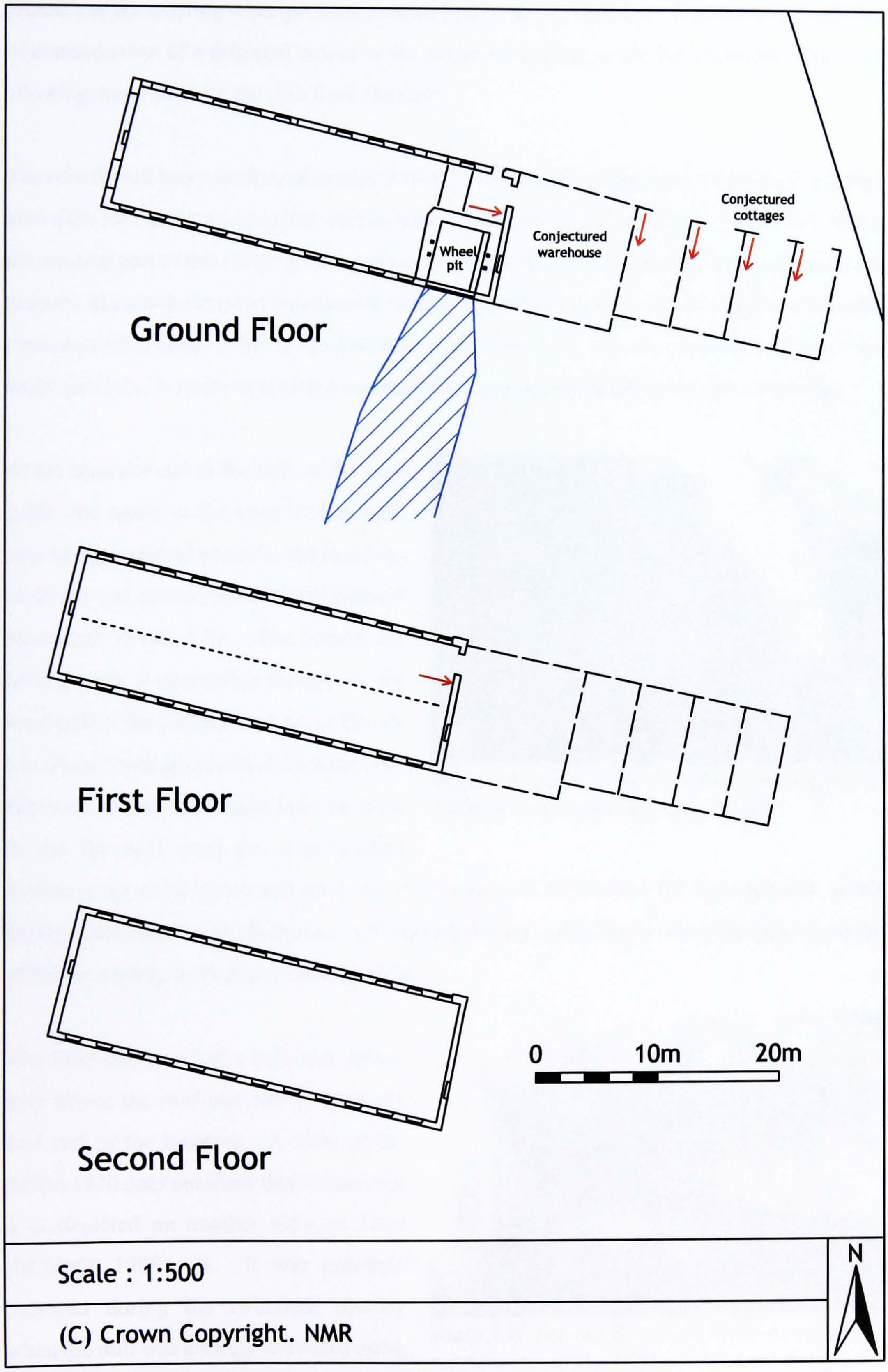


Figure 1.3 *Phase One, Aireworth Mills*

reused and the existing wheelpit incorporated into the news structure. The sills and lintels are of dressed stone of a different colour to the common walling, as are the voussoirs of the arch allowing water to enter the mill from the dam.

The rebuilt mill had a number of special features. On the east gable there was a clock, set high above the roof of what was at that time an attached cottage range (see below p. A14-15). When the western part of this range of cottages was replaced by a mill extension in the late nineteenth century, the clock face and mechanism were removed and reset in the east gable of the new extension (RCHME 1988a, 3; see below p. A26; Plate 1.4). The mechanism and dial of the clock survives, is made of tooled stone and has a simple moulding around its outer edge.

At the opposite end of the mill, in the west gable and again at the apex of the wall, was an ogee-arched window, the surround of which was carried out in raised dressed stonework (Plate 1.5). The reason for setting such a decorative feature in the west wall of the mill is not clear, as the site has always been approached from the east. However, it may have once been possible to see the mill from the road leading northeast out of Keighley and down the Aire valley, in which case the ogee window would highly visible and a notable feature. Of interest, this ogee window is one of the few examples of Gothic styling in Yorkshire textile mills.

Plate 1.5 *Ogee-arched window in west gable of 1808 mill (Crown Copyright. NMR)*

The 1808 mill also had a bell-cote, which rose above the roof one bay in from the east end of the building. A view of the mill in 1830 does not show this feature, but it is depicted on another view of 1849 (RCHME 1988a, 3). It was probably removed during the twentieth century when the mill was entirely re-roofed using modern trusses of angle-iron (Plate 1.6).

Plate 1.6 *Second floor and modern angle-iron roof trusses of the 1808 mill (Crown Copyright. NMR)*

Nothing more is known about the bell-cote and it has not proved possible to locate the 1849 view of the mill for further inspection.

The main entrance to the mill was originally through a door at the east end of the north wall. This door way had interrupted jambs and a segmental inner arch and is now obscured by a later external staircase tower (see below, p. A19). The majority of the interior of the mill has been reamed out and consequently little survives of the original internal structure (Plate 1.7). Most of the floor over the ground floor has been removed and that over the first floor is of twentieth century date, with steel girders in place of wooden beams. Depressions in surviving flagstones on the ground floor indicate that cross-beams were supported by cast-iron columns and this arrangement was probably repeated throughout the mill. The position or form of the original staircase is unknown, though given the lack of evidence for an early stair tower it was probably an internal, wooden structure rising against the inside of one of the walls, perhaps near to the wheel pit at the east end in order to minimise the impact of such features on the ground floor working space (RCHME 1988a, 4).

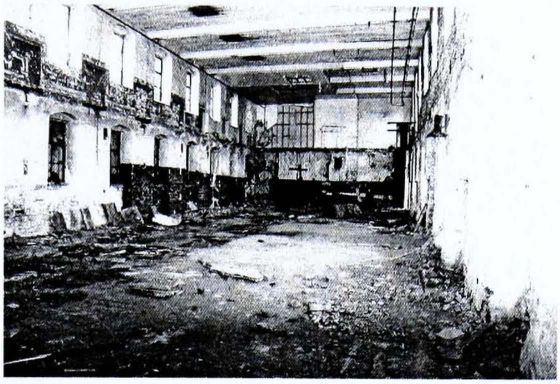


Plate 1.7 *Reamed-out interior of the 1808 mill (Crown Copyright. NMR)*

The walls of the mill diminish in thickness by about 10cm (*c*.4 inches) between floors and the windows are of the walk-in type with segmental inner arches. The only exception to the form of the windows occurs in the three bays adjacent to the wheel pit where the wall is of full thickness below the windows. This was perhaps an attempt to strengthen the walls near to the waterwheel or conceivably could be an area of the 1787 mill reused in the 1808 rebuilding, for it was common in rebuilt mills for the area of the wheelpit, which involved a greater degree of engineering and investment, to be retained. The mill was heated, and according to the insurance policy of 1819 there were three fireplaces, two of which where used for comb pots to heat the iron combs used for combing (Document 1.2). One of these may have been what is now a blocked fireplace in the west gable on the first floor, the opening of which is approximately 1.06 metres (3' 6'') wide and 0.91 metres (3') high. A flue projecting from the west wall on the ground floor and this may be evidence of a further fireplace. Both of these flues in the west wall would have had to curve round the ogee window above. A third fireplace may have been situated in the east wall, for a view of 1830 shows chimney stacks rising from both the east and west gables (RCHME 1988a, 4; Plate 1.2).

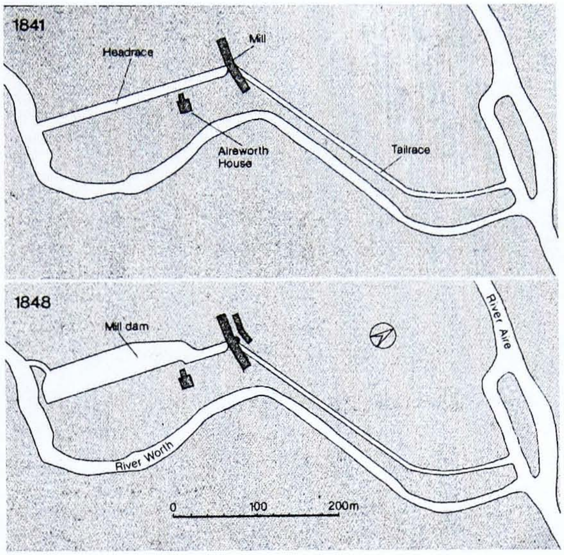


Plate 1.8 *Evolution of the water supply at Aireworth Mills (after Giles and Goodall 1992, 132)*

The mill was initially powered by a waterwheel sited at the east end of the building (Figure 1.3). There are two clear phases in the system of water supply at Aireworth Mills (Giles and Goodall 1992, 132; Plate 1.8). At first water was drawn from the River Worth by means of a straight headrace, but by 1853 this had been replaced by an extremely large mill dam with a massive storage capacity (RCHME 1988a, 4) and which, on the 1891 OS map appears to have also formed a feature of the garden of Aireworth House (Plate 1.9). Although the mill dam has been removed, part of stone and earth embankment that retained the water survives directly south of the mill. Water entered the mill via the wide arch at the east end of the south elevation (Plate 1.10) and passed onto the

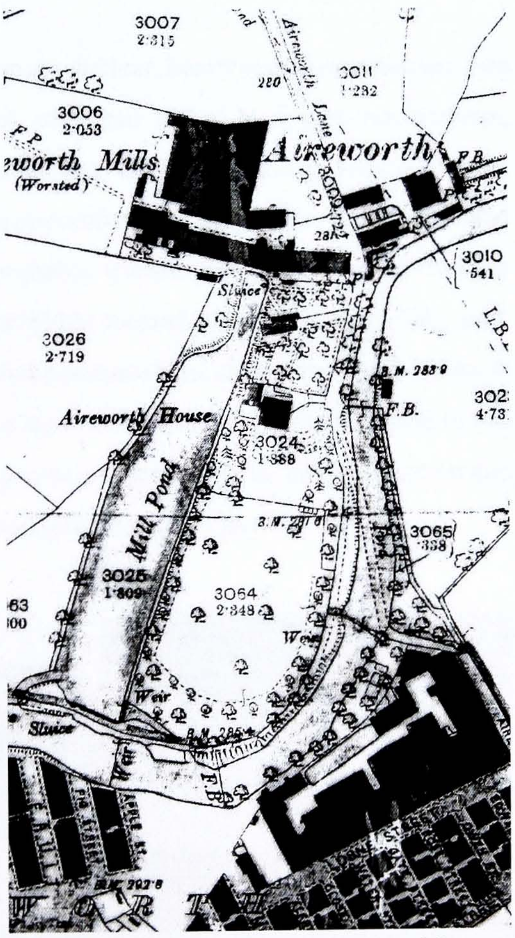


Plate 1.9 *Extract from 1891 OS map showing extensive mill pond to south of Aireworth Mills*

wheel housed in a substantial masonry wheel pit. The wheel has been removed, but the wheel pit remains and is formed from heavy ashlar masonry and its south wall is shaped to receive the curvature of the wheel. Recesses in the sidewalls of the pit indicate that the position of the wheel's axle, suggesting that the wheel was *c.*20 feet in diameter, and about 15 feet broad. A wheel of these dimensions, and its position low in the wheel pit, suggests that it would not have intruded into the floor above. The vertical setting of the wheel and its relationship to the milldam to the south indicates that the wheel was breast-shot.

Plate 1.10 *Headrace arch in south elevation of the 1808 mill*

Although details of the original power transmission are unclear, heavy square-section cast-iron columns, set in pairs either side of the wheelpit, each pair linked by a cast-iron transom, indicate that power transmission probably connected with the waterwheel by means of a rim gear wheel at the highest point of the waterwheel's circumference. In 1834 the wheel generated 20 horse power (Document 1.8). Power was probably transmitted to the ground floor by gearing to a principal vertical line shaft, most probably located at the east end of the mill, which transmitted power to each floor along smaller horizontal line shafts (RCHME 1988a, 4; Figure 1.4). Various blocked openings in the east wall of the mill are probably related to this system, but it is difficult to distinguish between provisions made for the original system and insertions for later systems, notably after the introduction of steam power.

At the time of the rebuilding of the mill in 1808, a terrace of cottages abutted the east wall of the mill. These tenements are first mentioned in 1828 and the range of buildings is shown on a billhead of 1830 (Plate 1.2), but it is unknown when the cottages were first built or exactly how many of them there were. If the cottages predated the 1808 mill, then their presence

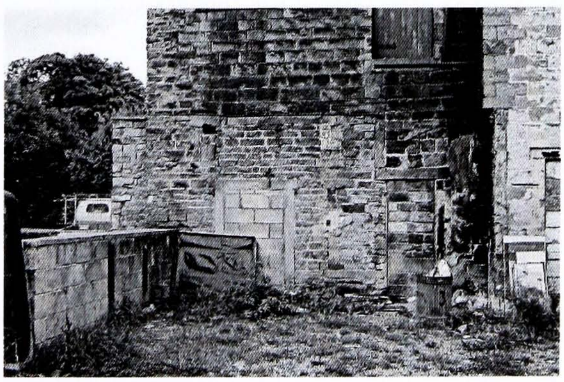


Plate 1.11 *Fragments of earlier cottage range incorporated into later mill extension*

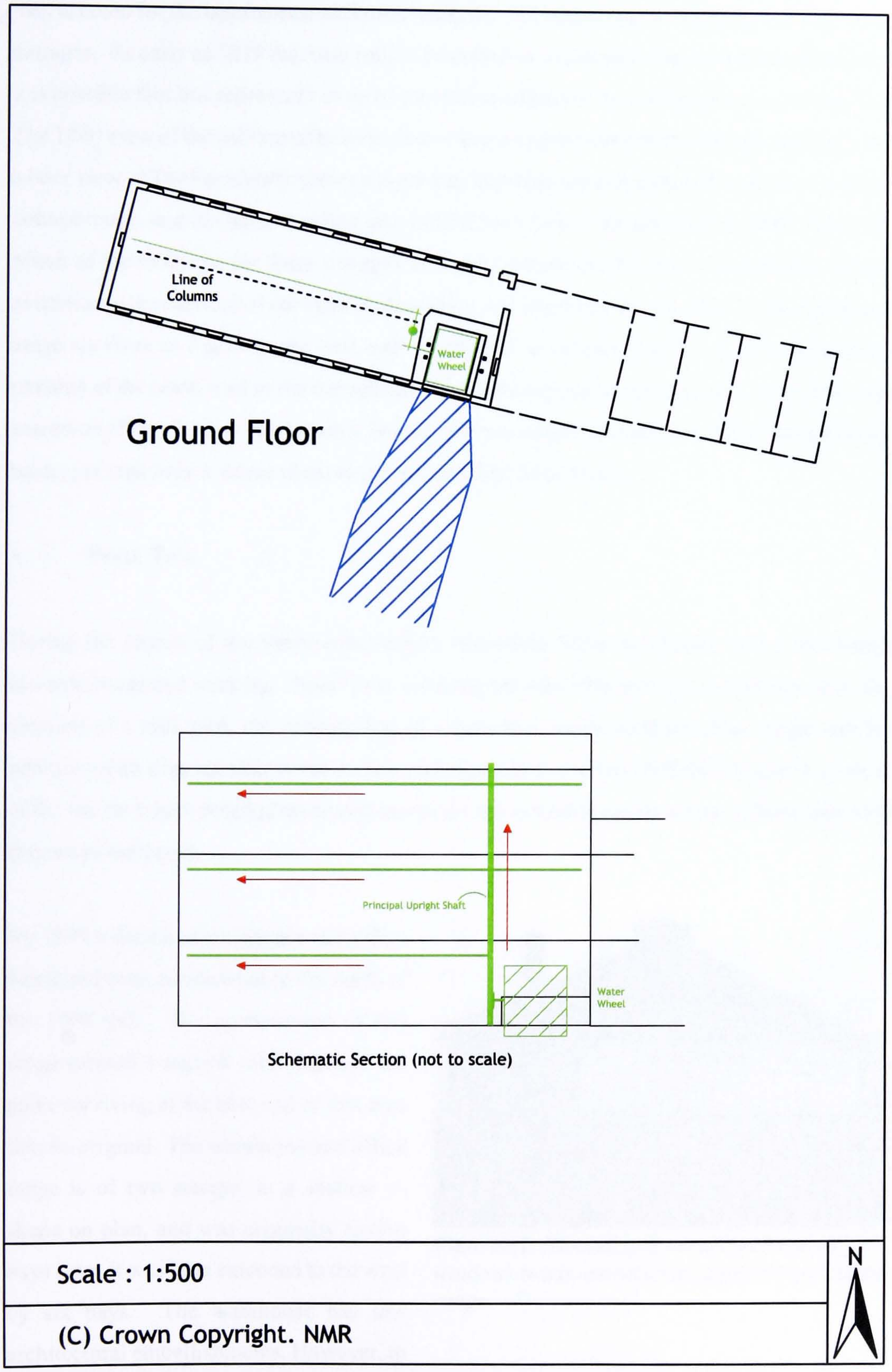


Figure 1.4 *Phase One, Aireworth Mills: probable system of power transmission*

may account for the tapered east wall of the mill, the mill respecting the alignment of the earlier cottages. As early as 1819 the main mill is described as communicating with a warehouse and it is possible that this represents an early conversion of part of the cottage range to storage use. The 1830 view of the mill insufficiently shows any division between the cottages and mill, but a later view of 1849 evidently shows a three-bay building adjoining the mill and the rest of the cottage range, and the taller building may indeed have been a warehouse (RCHME 1988a, 4). Much of the evidence for these cottages and early warehouse has been removed by a later extension at the east end of the main mill building, but internally the roof line of the warehouse range survives as a scar in the east wall of the mill at second floor level and fragmentary remains of the north wall of the cottages have been incorporated into the north wall of the mill extension (Plate 1.11). The internal layout of the cottages is unknown but it was probably basic, perhaps only a single room at ground and first floor levels.

- PHASE TWO

During the course of the nineteenth century Aireworth Mills developed with a movement towards integrated working. Phase Two, covering the mid-19th century, is represented by the creation of a mill yard, the construction of a detached warehouse and office range and the addition of an external stair tower and an end engine house to the 1808 mill (Figure 1.5; areas of the site for which detailed measured survey are not available are shown as outlines only with doorways indicated.

By 1849 a detached warehouse and office block had been constructed to the north of the 1808 mill. The construction of this range created a narrow mill yard and the gates surviving at the east end of this area may be original. The warehouse and office range is of two storeys, is a shallow v-shape on plan, and was originally twelve bays long; it was later extended to the west by six bays. The warehouse has few architectural embellishments. However, in the east wall two ogee windows (Plate 1.12), now blocked and partially obscured, link the

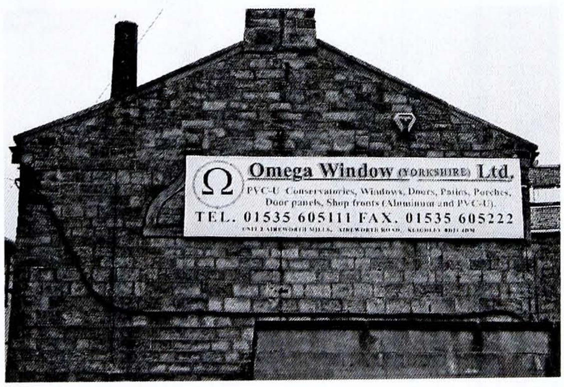


Plate 1.12 *Blocked and partially obscured ogee windows in east elevation of detached warehouse range*

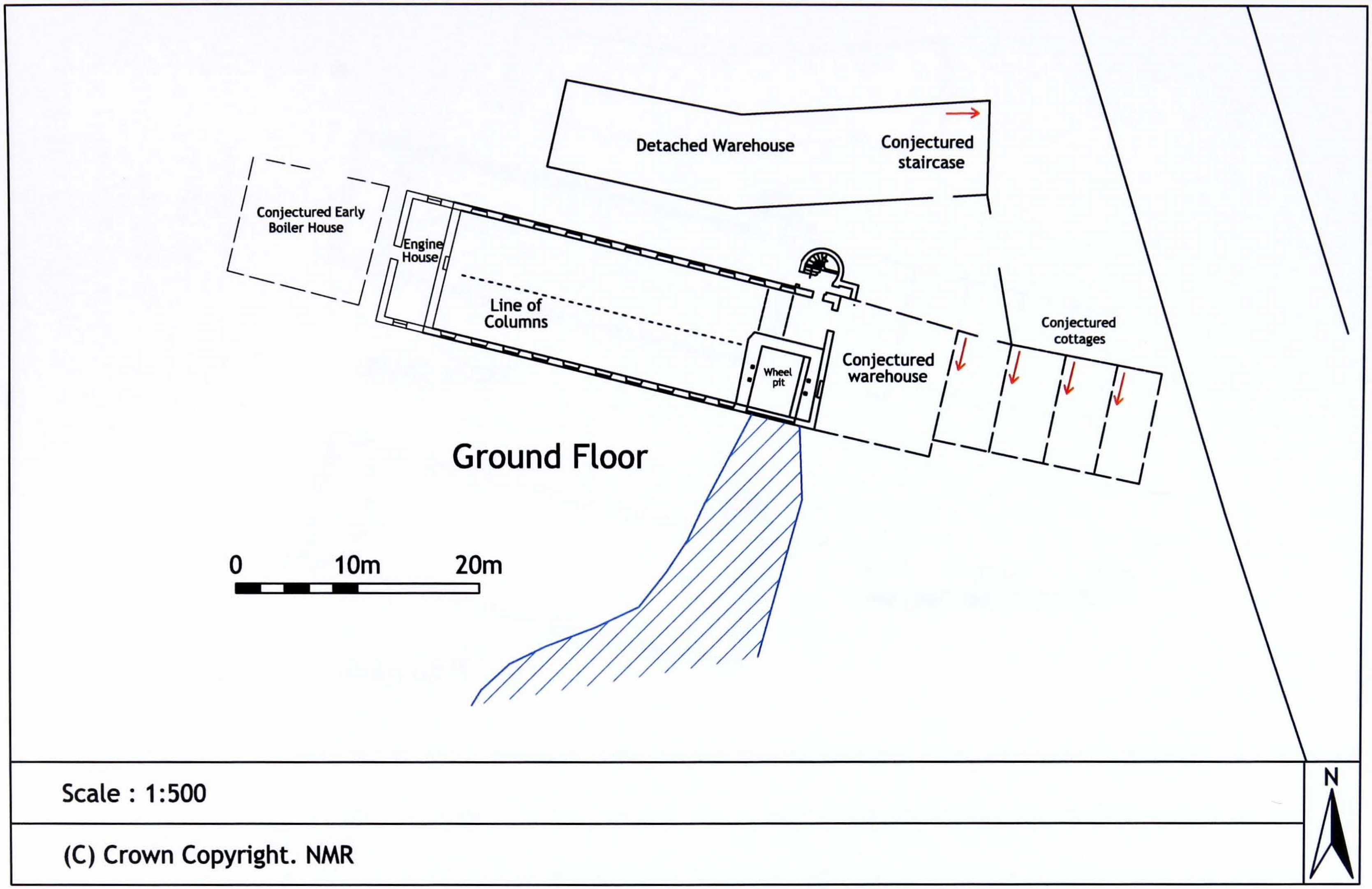


Figure 1.5 *Phase Two, Aireworth Mills*

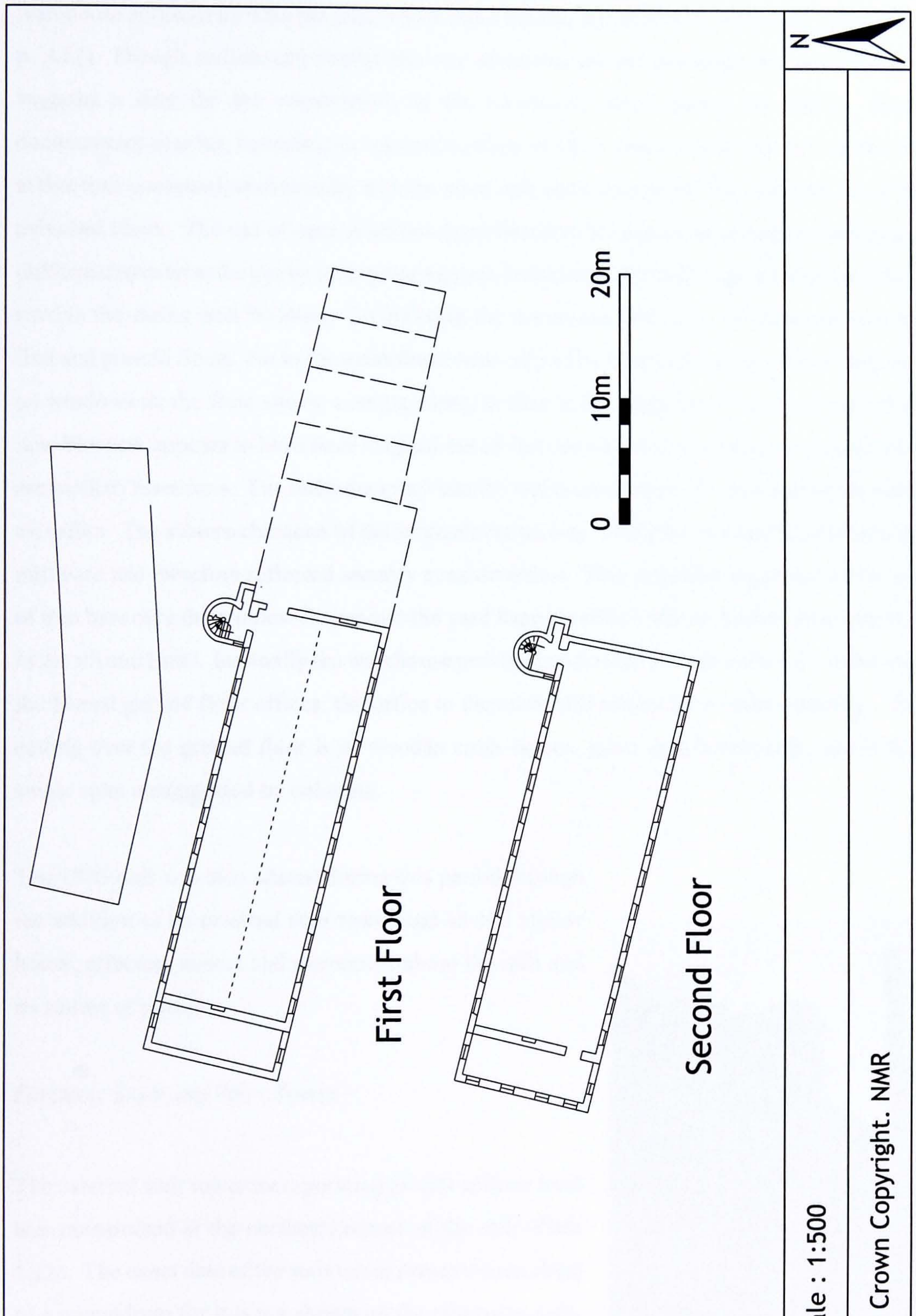


Figure 1.5 cont. *Phase Two, Aireworth Mills*

warehouse stylistically with the mill, which has a similar window in its west wall (see above, p. A11) Though stylistically similar the two structures are not contemporary and evidence suggests a date for the construction of the warehouse block during the 1840s. Early documentary sources, including an insurance policy of 1819, make it clear that the warehouse at that time communicated directly with the main mill and a map dated 1841 does not show the detached block. The use of ogee windows must therefore be seen as an attempt to maintain a uniform character at the site by incorporating such features in later buildings that matched those used in the earlier mill building. To the north the warehouse was lit by windows on both the first and ground floors, but to the south there were only a few openings on the ground floor and no windows on the floor above; a single taking-in door at the midpoint of the south elevation, now blocked, appears to have been original but all but one of the windows to the ground floor are modern insertions. The main doorway into the warehouse was at the east end of the south elevation. The austere character of the south elevation may reflect the fact that it faced into the mill yard and therefore reflected security considerations. This is further suggested by the use of iron bars over the window facing into the yard from the office, the sockets of which survive in the sill and lintel. Internally the warehouse provided undivided storage on two floors beyond the heated ground floor offices; the office to the north still retains its wooden paneling. The ceiling over the ground floor is of wooden cross-beams, joists and floorboards, and is of a single span unsupported by columns.

The 1808 mill was also altered during this period through the addition of an external stair tower and an end engine house, affecting access and movement about the mill and its source of power.

EXTERNAL STAIR AND PRIVY TOWER

The external stair tower incorporating privies at floor level was constructed at the northeast corner of the mill (Plate 1.13). The exact date of the stair tower presents something of a conundrum for it is not shown on the otherwise well-observed views of the site in 1830 and 1849 and does not feature on the 1853 OS map (RCHME 1988a, 5), but improvements, including a staircase, are mentioned in the

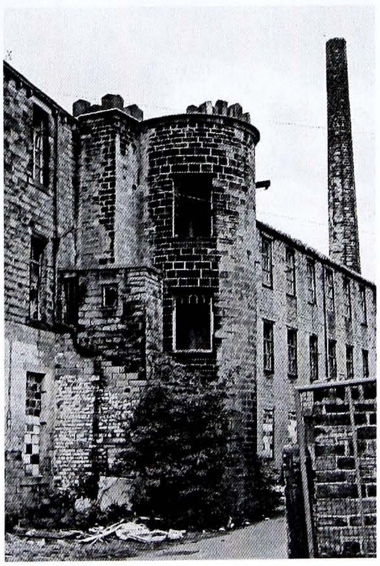


Plate 1.13 *External stair and privy tower added to the 1808 in the mid-19th century*

rating assessment of 1851 (Document 1.3). Furthermore, the late-nineteenth century mill extension to the east of the main mill building butts up against the structure of the stair tower suggesting a mid-nineteenth century date.

The tower is of an almost circular form and rises the full height of the mill. The masonry differs from that used in the 1808 and there is a straight joint between the north elevation of the mill and the tower. Access from the tower to the upper floors of the mill was contrived by breaking through existing windows, the lintels of which survive in the walling of the mill. The tower contains a newel stair, the steps and newel being of stone (Plate 1.14), and includes a privy, housed in a rectangular projection on the east side of the tower providing a water closet at each floor level accessed from landings off the stairs. Although the staircase and privy appear to be contemporary, as the masonry and overall style of both is similar, there is no consistent correspondence in the coursing between the two. However, this probably reflects the difficult junction between the circular section of the stair tower wall and the straight wall of the privy section rather than different phases of construction. Like the stair tower, the walls of privy tower abut the main mill with a straight joint and both projections a capped by a cyma-moulded cornice, above which there is crudely decorative crenellation. As the main stair tower was built directly in front of the original entrance to the mill, an entrance was provided in the tower, facing west into the narrow mill yard (Plate 1.15). It has a modestly decorative lintel and uninterrupted jambs.

Plate 1.14 *Internal view of the stair tower at first floor level (Crown Copyright. NMR)*

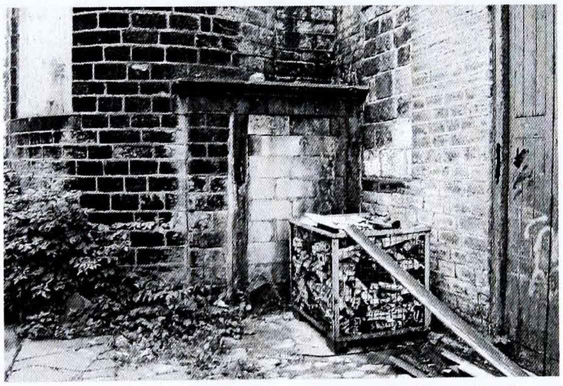


Plate 1.15 *Main entrance to the mill in the base of the staircase tower*

END ENGINE HOUSE, 1808 MILL

Rating assessments dating from 1851 provide the first certain evidence for the use of steam power at Aireworth Mills, when an improvement of engine house, boiler house, smith's shop and staircase is mentioned. (Document 1.3). The use of the word 'improvement' may indicate that alterations or repairs were being made to an earlier steam installation and the installation of 58 power looms at the site in 1835 may have necessitated some increment to the power already supplied by the waterwheel. Although this evidence is circumstantial, such an association between an increase in machinery and the installation of steam power at this time is known from other sites, for example, Woodlands Mill, Steeton with Eastburn (**BFO62288**). Further historical sources also suggest an early steam installation pre-dating the 1851 'improvement'. The 1849 view of the site shows a lean-to structure along the west wall of the main mill, which may have housed a single-beam engine. However, the same view shows no boiler house or chimney and this throws doubt on the use of the lean-to as a engine house (RCHME 1988a, 6).

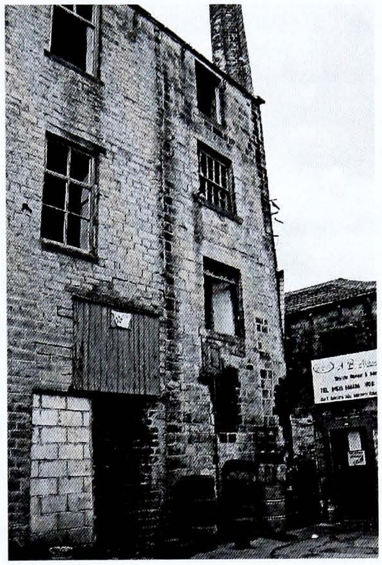


Plate 1.16 *North elevation of the attached end engine house at west end of the 1808 mill*

The attached end engine house at the west end of the mill that survives today bears no relation to the lean-to shown in the 1849 and this formal difference in itself may represent the 'improvement' by 1851. It is a single-bay addition rising the full height of the mill and is roofed as a continuation of the mill (though this configuration may have only come about when the mill was re-roofed with a modern structure during the twentieth century; Plate 1.16). Modern alterations, including the insertion of floors at the same level as those in the rest of the mill to the engine house have removed much of the evidence for its former use, in particular the layout of the engine or the system of power transmission. The dimensions of the engine house

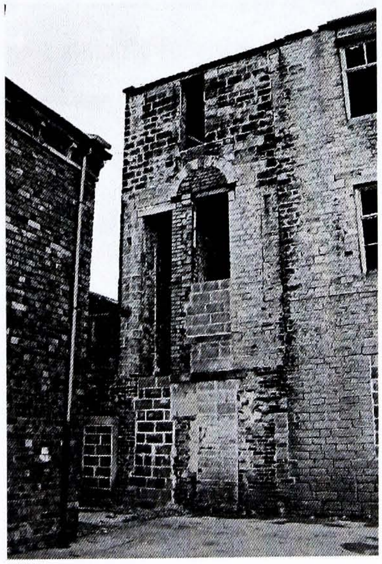


Plate 1.17 *South elevation of attached end engine house showing outline of round-headed window*

suggest that it housed a single-beam engine and externally the position of the beam pivot is shown by a group of ashlar blocks high in the west wall, slightly north of the centre. This suggests that the cylinder lay to the north and the flywheel to the south. The engine house was reached by means of a short flight of steps rising to a doorway on the west wall and was lit by two windows on the north wall, and a single, tall, round headed window to the south, which although much altered is still discernible (Plate 1.17); this feature is typical of engine houses built after 1825 (Giles and Goodall 1992, 139). The position of the windows suggests that the engine house rose through the ground, first and part of the second floors, whilst above it was a small room accessed from the second floor of the mill and lit by four windows in the west wall and a further window to the north.

The siting of the engine house at the west of the mill was necessary because a range of buildings (the earlier warehouse and cottages) existed at the east end, but it must have been an inconvenient arrangement since power generated in the engine house had to be linked to the existing drive system served by the waterwheel at the east end (RCHME 1988a, 6). As there is no evidence for a second upright shaft at the west end of the mill, the new power system driven by the steam engine must have been linked to the upright shaft at the east end, but how this was contrived and how water and steam power were used together is unclear; some of the heavy cast-iron wall boxes noted in the east wall of the mill may relate to the grafting together of the two systems. However, if the introduction of steam, was as suggested above, a response to the installation of power looms in the mill, it is possible that most of the power provided by the steam engine was used on the ground floor alone, the most suitable location for power looms in a multi-storeyed building. If so, then water and steam power were used for different purposes within the same building and the two systems of power and transmission would have remained separate.

No archaeological or historical evidence exists for a contemporary boiler house but it may have occupied the same position as the later boiler house (see below, p. A23-4) which has removed all trace of it. Certainly, it would have been logic to have positioned the boiler house close to the attached end engine house.

- PHASE THREE

This phase represents structural activity at the site dating to the *c.*1870s, principally the central boiler house, chimney, a a combined combing shed and warehouse to the west of the 1808 mill, and the construction of a large single-storey shed to the north of the detached warehouse and the creation of a small suite of offices at the east end of the warehouse block (Figure 1.6).

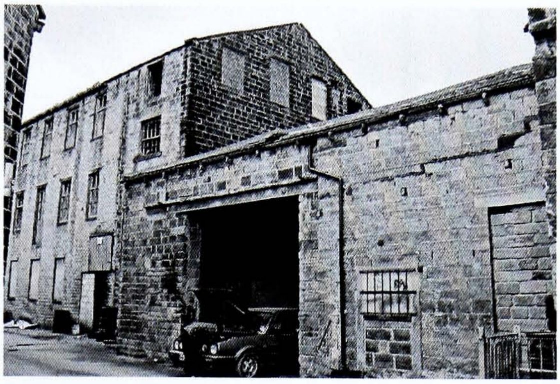


Plate 1.18 *The centrally located boiler house*

Although no evidence has been found for a boiler house serving the first phase of steam power at the site, the existing centrally placed boiler house had been built by 1878 (Document 1.9). The boiler house is an independent structure located immediately north of the 1808 mill with only a thin gap between the two structures maintaining access to the attached end engine house through a doorway in its west wall. It has doorways with monolithic jambs on the east and north walls and is roofed in two hipped ranges (Plate 1.18). The interior, currently used as a garage, does not reveal evidence for its former use. It is likely that the boiler plant was built as boiler house to the east and an attached shop to the west, though over time the shop became part of an enlarged boiler plant. The chimney, stylistically belonging to the late nineteenth-century and therefore most probably contemporary with the boiler house, stands behind the boiler house to the south. It is of stone and has an octagonal shaft on a square plinth; the original cap and cresting have been removed (Plate 1.19).

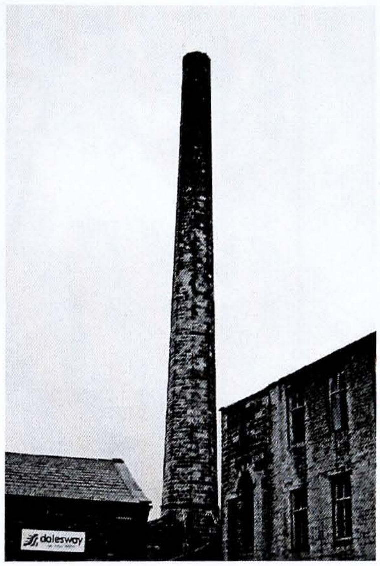
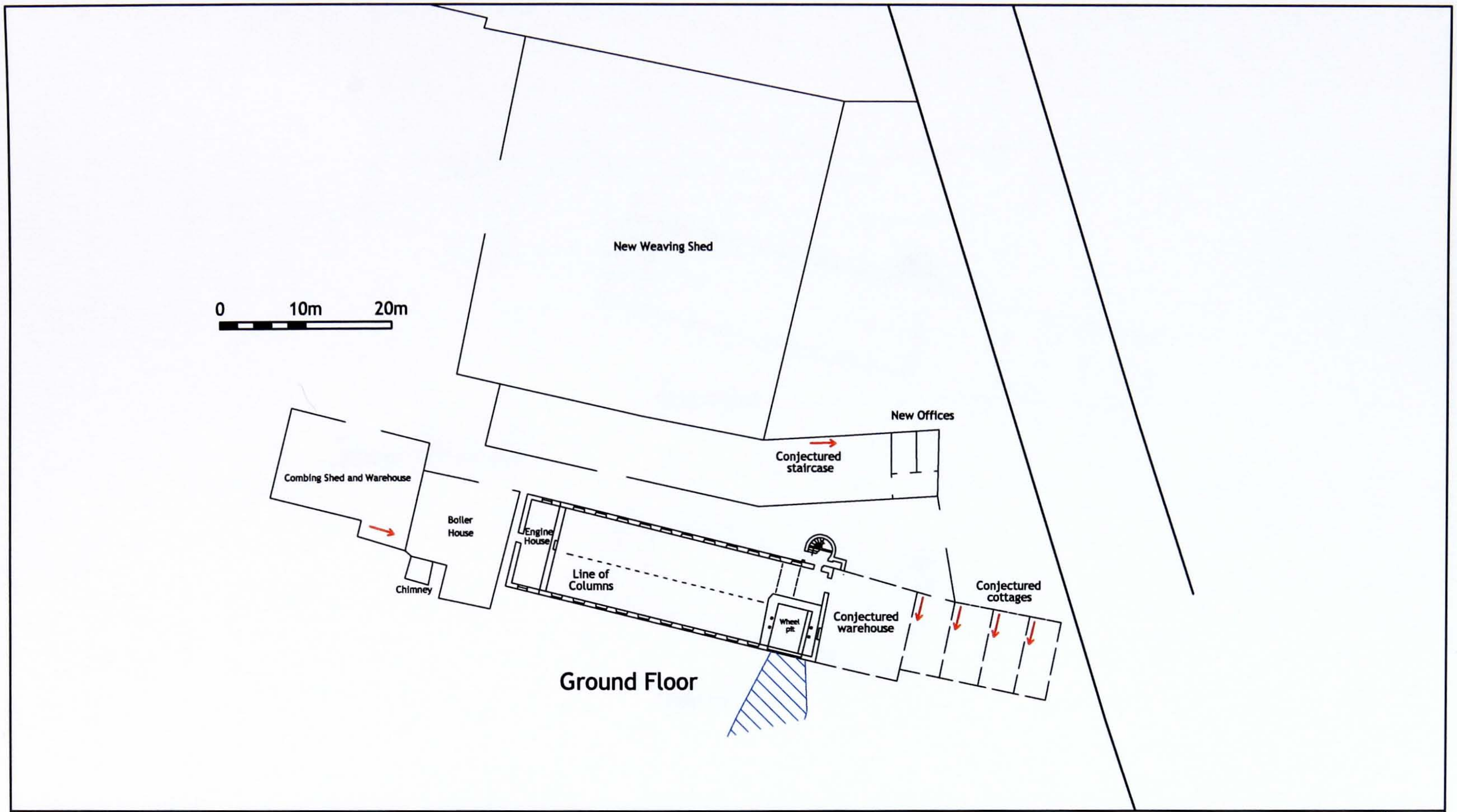


Plate 1.19 *Late nineteenth-century chimney*

Figure 1.6 *Phase Three, Aireworth Mills*



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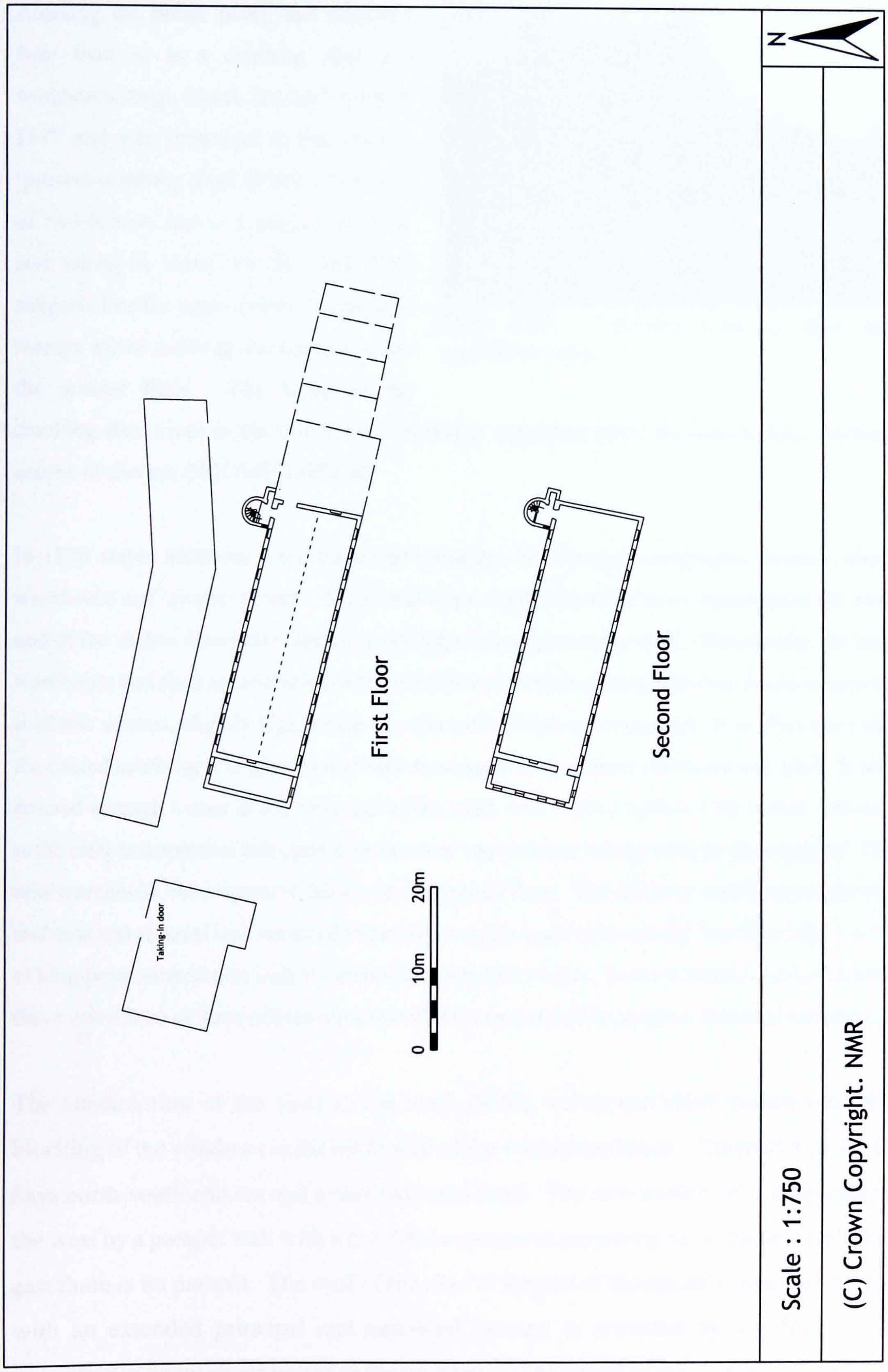


Figure 1.6 cont. *Phase Three, Aireworth Mills*

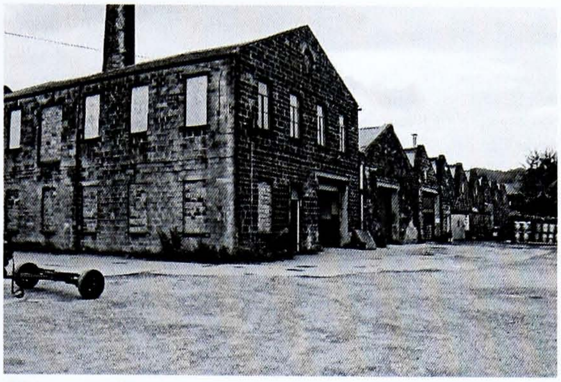


Plate 1.20 *Combined combing shed and warehouse range*

Abutting the boiler plant, and therefore later than it, is a combing shed and warehouse range which had been built by 1877 and was described at that time as 'present combing shed' (Plate 1.20). It is of two-storeys and is L-shaped on plan, and taking-in doors on the first floor suggests that the upper storey was used as storage whilst combing was undertaken on the ground floor. The siting of the combing shed close to the boilers was doubtless important given the need to heat machine combs of this era (RCHME 1988a, 8).

In 1870 major additions were made and contemporary ratings assessments record a shed, warehouse and 'engine power'. These buildings can be identified as an extension at the west end of the earlier detached warehouse and adjacent single-storey shed. Structurally, the new warehouse and shed are of one build with a brick wall dividing them. The warehouse extension is of two storeys, slightly higher than its adjacent and earlier counterpart. It is of six bays and the canted south-west angle allowed easy movement in an already restricted mill yard. It was entered through a door at the west end of the south wall (which replaced the earlier entrance to the east) and opposite that opening was a doorway communicating with the shed beyond. The new warehouse has original windows on the ground floor. The dividing wall between the old and new warehouses was removed to provide a single open space on the first floor; the roof is of king-post construction with V-struts and end-bolted purlins. It was probably also at this time that a small suite of three offices was created at the east end of the original detached warehouse.

The construction of the shed to the north of the warehouse block necessitated the blocking of the windows in the north wall of the warehouse block. The shed is of seven bays north-south and six and a half bays east-west. The saw-tooth roof is disguised to the west by a parapet wall with a moulded coping and projecting stone bands, but to the east there is no parapet. The roof of the shed is formed of triangulated wooden trusses with an extended principal and east-west bracing is provided by wooden beams supported in metal shoes bolted to the tie-beams. The whole of the roof is supported on cast-iron columns with square bolting heads. An area of slightly heavier masonry in the dividing wall between the shed and warehouse may indicate the site of an engine house (referred to in the 1870 assessment; Document 1.4). Because of the position of the shed in relation to the engine house in the 1808 mill it is likely that it had its own source of power and this is probably the 'engine power' referred to in the rating assessment (RCHME 1988a, 7). The shed was probably used for combing or weaving and tenancy during the late nineteenth century at Aireworth Mills shows that combers, spinners and manufacturers occupied parts of the site.

- PHASE FOUR

Phase Four represents changes to the site after *c.*1870 and includes the construction of a mill extension at the east end of the 1808 mill, additional sheds, a dressing room and a new engine house as well as numerous alterations to existing structures. (Figure 1.7).

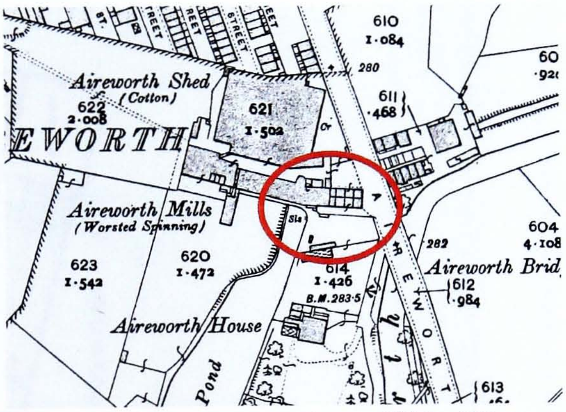


Plate 1.21 *Extract from 1908 OS map apparently showing mill extension*

Plate 1.22 *Mill extension built at the east end of the 1808 mill*

In the very late nineteenth or early twentieth century the warehouse range and cottages at the east end of the 1808 mill were demolished and a new mill extension built. It is not shown on plans of the site dating from 1893 (Document 1.10) but is apparently depicted on the 1908 OS map (RCHME 1988a, 9; Plate 1.21). It is of three storeys and of five and a half bays on the south front; to the north the walling is irregular, the width of the extension narrowing in two eastern most bays, producing a pronounced step in the north elevation (Plates 1.22). As mentioned above (p. A11), the clock originally situated in the east gable of the mill, was moved and placed in the east gable of the extension. The extension has wooden beams and floors and was used for powered processes, for there are wall boxes in the east wall. The

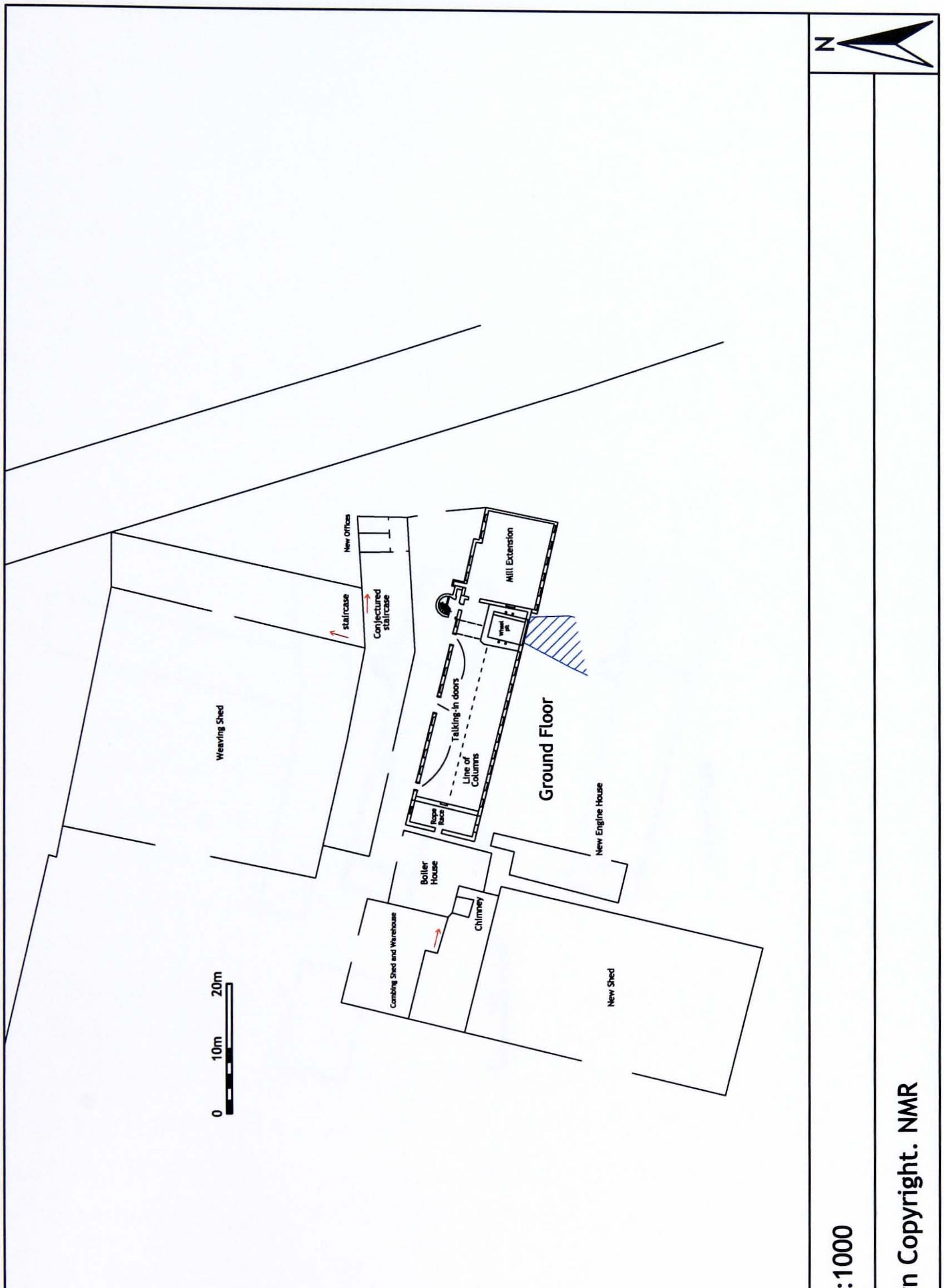


Figure 1.7 *Phase Four, Aireworth Mills*

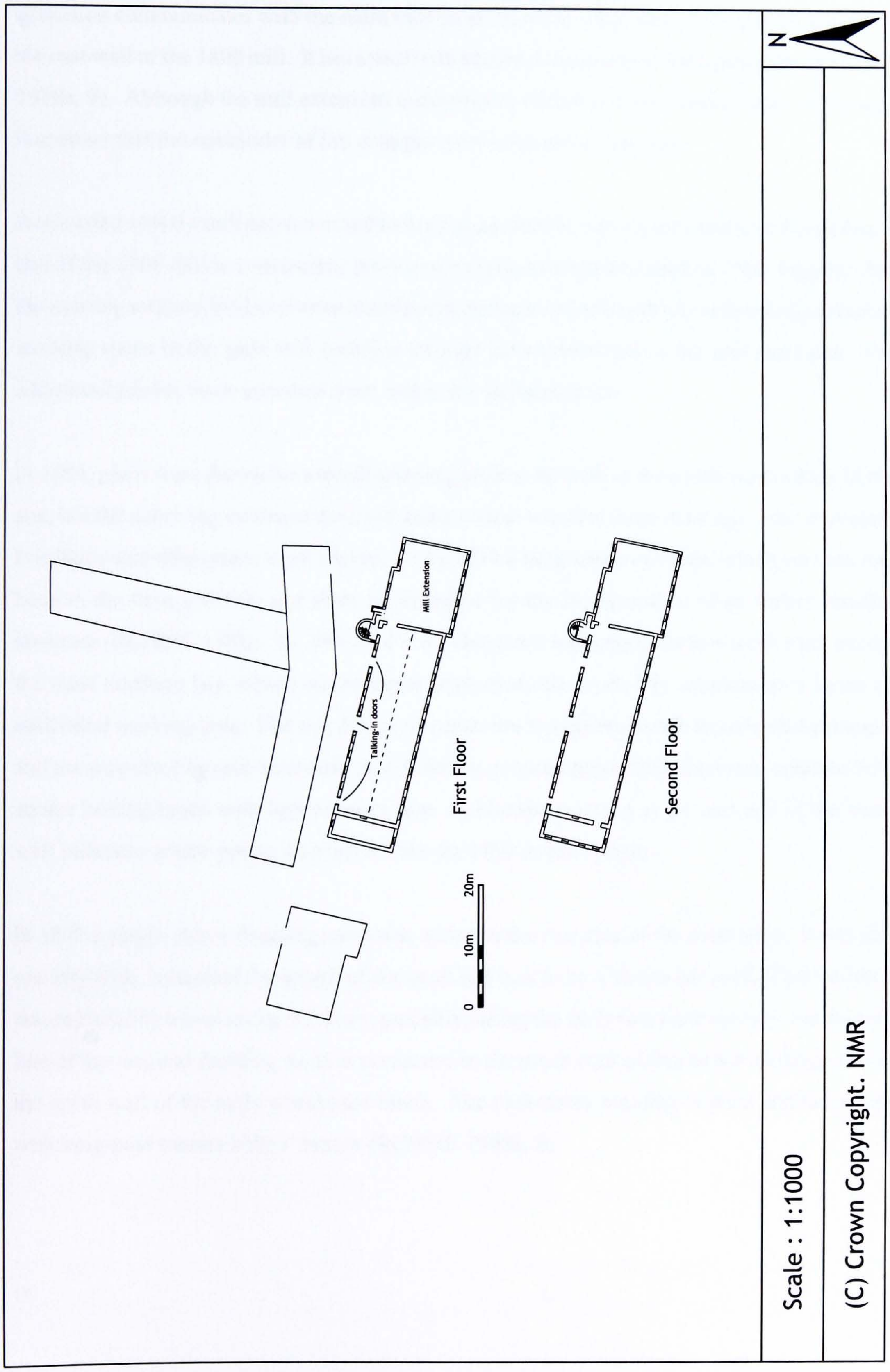


Figure 1.7 cont. *Phase Four, Aireworth Mills*

extension communicates with the main mill on all floors through doors in the north corner of the east wall of the 1808 mill. It has a roof with trusses of queen strut and brace form (RCHME 1988a, 9). Although the mill extension incorporates elements of the earlier range of cottages it appears that the remainder of the cottages were removed at this time.

Associated with the mill extension and butting up against the earlier privy tower at the northeast end of the 1808 mill is a secondary privy tower rising through two storeys. This suggests that the existing sanitary facilities were insufficient, perhaps reflecting the significant expansion of working space in the main mill building through the construction of the mill extension. The additional privies were accessed from within the mill extension.

In 1894, plans were drawn for a small spinning shed to be built in the south-west corner of the site, but the surviving evidence does not make it clear whether these drawings were executed. It is likely that these plans were altered, for by 1919 a large block of sheds, which survive, had been in the same position and show no evidence for the incorporation of an earlier, smaller structure (RCHME 1988a, 9). The shed is of 8 bays and has a north-lit saw tooth roof, except the most northern bay, which has an equal pitch roof; the seven bay southern area forms an undivided working area. The wooden roof trusses are triangulated with an extended principal and are supported by east-west steel or iron beams, in turn supported by cast-iron columns with square bolting heads with lugs on each face. A blocked opening at the east end of the north wall indicates where power was taken from the 1893 engine house.

In 1891 a single-storey dressing room was added to the east side of the main shed. It was just one bay wide, extended the length of the shed and was lit by a saw-tooth roof. This building was replaced by a two-storey structure, probably during the early twentieth century, but the roof line of the original dressing room is preserved in the south wall of this newer building and in the north wall of the early warehouse block. The two-storey building is plain and has a roof with king-post trusses with V braces (RCHME 1988a, 8).

A significant addition to the site occurred in 1893 with the construction a detached engine house to the south of the main mill. The construction of the new engine house allowed the rationalisation of the existing power system that had evolved in stages. The south elevation of the engine house is of stone and elsewhere is of red brick (Plate 1.23). Although not accessible internally, a heavy wall box at the north end of the east wall indicates the position of the flywheel and the long, low form of the building suggests that it housed a horizontal engine. A tall, narrow opening at the east end of the north wall allowed rope drive from the flywheel to pulley wheels housed in what had been the attached engine house at the west end of the main spinning mill (Plate 1.24). These pulley wheels turned horizontal shafts on each floor of the mill. The use of the former engine house as a rope race indicates that the original steam engine must have been removed at this time. A further, long and narrow opening (now blocked) in the north wall of the former attached end engine house suggests that power was also transmitted across the mill yard to the warehouse and shed located to the north, but the absence of any corresponding opening in the south wall of the warehouse and the impractical nature of having rope drive crossing the yard sheds doubt on this interpretation. An alternative explanation for this narrow opening is that it was created to provide room for a large pulley wheel at the north-west corner of the former engine house which turned a shaft entering the 1808 mill inside the north wall.

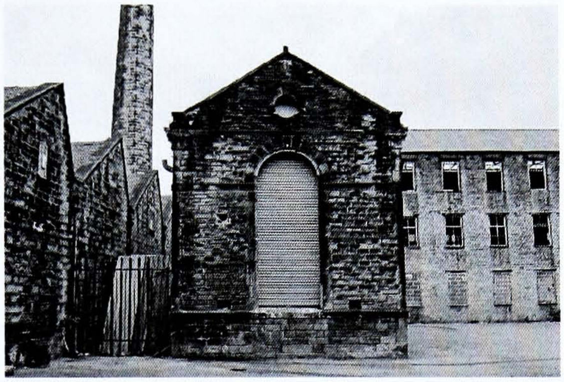


Plate 1.23 *South elevation of detached engine house*

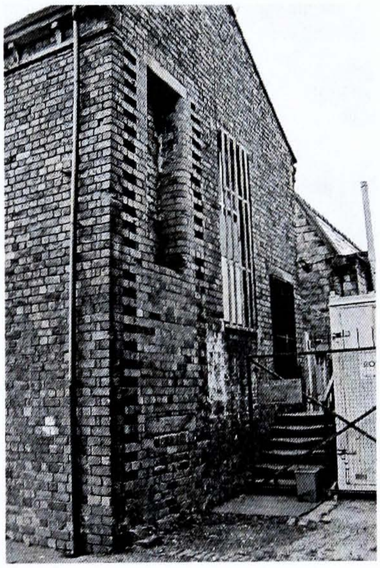


Plate 1.24 *North elevation of detached engine house showing red-brick construction and 'slot' for rope drive to 1808 mill*

In addition to these new buildings a number of miscellaneous alterations and additions were made during this period to existing buildings on the site, many of which were associated with

Plate 1.25 *Taking-in doors in the north elevation of the 1808 mill*

improving the movement of goods around the site. Of particular interest are a series of taking-in doors inserted into former windows in the 3rd and 7th bays from the east in the north elevation of the 1808 mill (Plate 1.25). The date of these alterations is uncertain but the use of a I-sectioned steel joist as a support for a hoist is typical of the late nineteenth and early twentieth centuries, as is the woodwork of the doors which appear to be original. Furthermore, the need for better access for materials into the mill may have been coeval with the increase in working space resulting from the construction of the mill extension.

SITE ANALYSIS

Each of the four phases outlined above are susceptible to process recording, spatial analysis and a qualitative assessment of their architecture. However, because detailed measured survey only exists for the 1808, other buildings at the site are treated as simple blocks into which doorways and other openings have been inserted in an appropriate position. This means that the following analysis is more detailed for the 1808 mill where the position of doorways and the overall configuration of space is clearest, but by being able to make some analysis of the overall spatial aspects of the site it is possible to not only consider the development of the early spinning mill, which is the primary focus, but also to assess it in the context of the evolving site and the move towards integrated working.

PROCESS RECORDING

Documentary sources indicate that Aireworth Mills developed as a cotton spinning mill which was soon converted for worsted spinning. Therefore, and irrespective of the branch to which the mill belonged, the earliest buildings at the site were built to accommodate spinning machinery. In this respect, the form of the mill and its overall span of *c*.9.8m is typical of the first generation of Yorkshire textile mills and conforms to the dimensions of the 'Arkwright-type' mill and the earliest types of powered spinning machines (Giles and Goodall 1992). The development of the site with the gradual movement towards integrated working saw the mill yard increasingly important in integrating the processes of production and the movement of materials and the provision of increasing power and the rationalisation of the system of power transmission reflects increased productivity and a growing number of buildings at the site. The development of processes at the site and those spaces directly related to the production process can be expressed as flow charts and gamma maps.

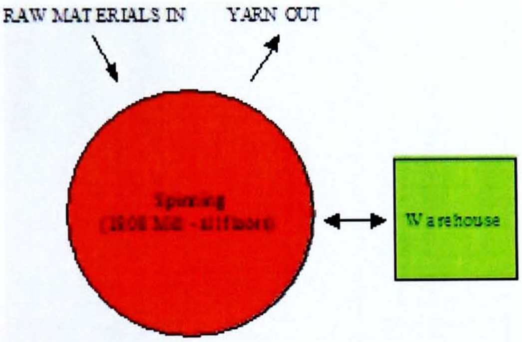


Plate 1.26 *Processes, Phase One, Aireworth Mills*

Plate 1.26 shows the basic movement of raw materials and finished goods in and out of the 1808 mill and processes in Phase One. The absence of a mill yard means that there was little distinction between the outside world and the mill itself. The movement of raw materials and finished goods around the mill is also plotted as a gamma map (Figure 1.8). The movement of materials and finished goods within the mill was based upon a simple tree-like structure with movement between the floors (spaces 1,3 and 5) directly from the mill yard or the floor below. This meant that goods on the top floor would have to have passed through the lower two floors of the mill before moving outside of the building. Similarly materials and goods stored in the warehouse (spaces 2 and 4) would have to have been moved into the main body of the mill before being moved elsewhere. This is also reflected in quantified values for the complex (Table 1.1).

Table 1.1 *Quantified values for Phase One 'materials/goods' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.600	1
1	0.200	3
2	0.600	1
3	0.200	3
4	0.600	1
5	0.600	1

Mean RA: 0.467 RR of Complex: 0

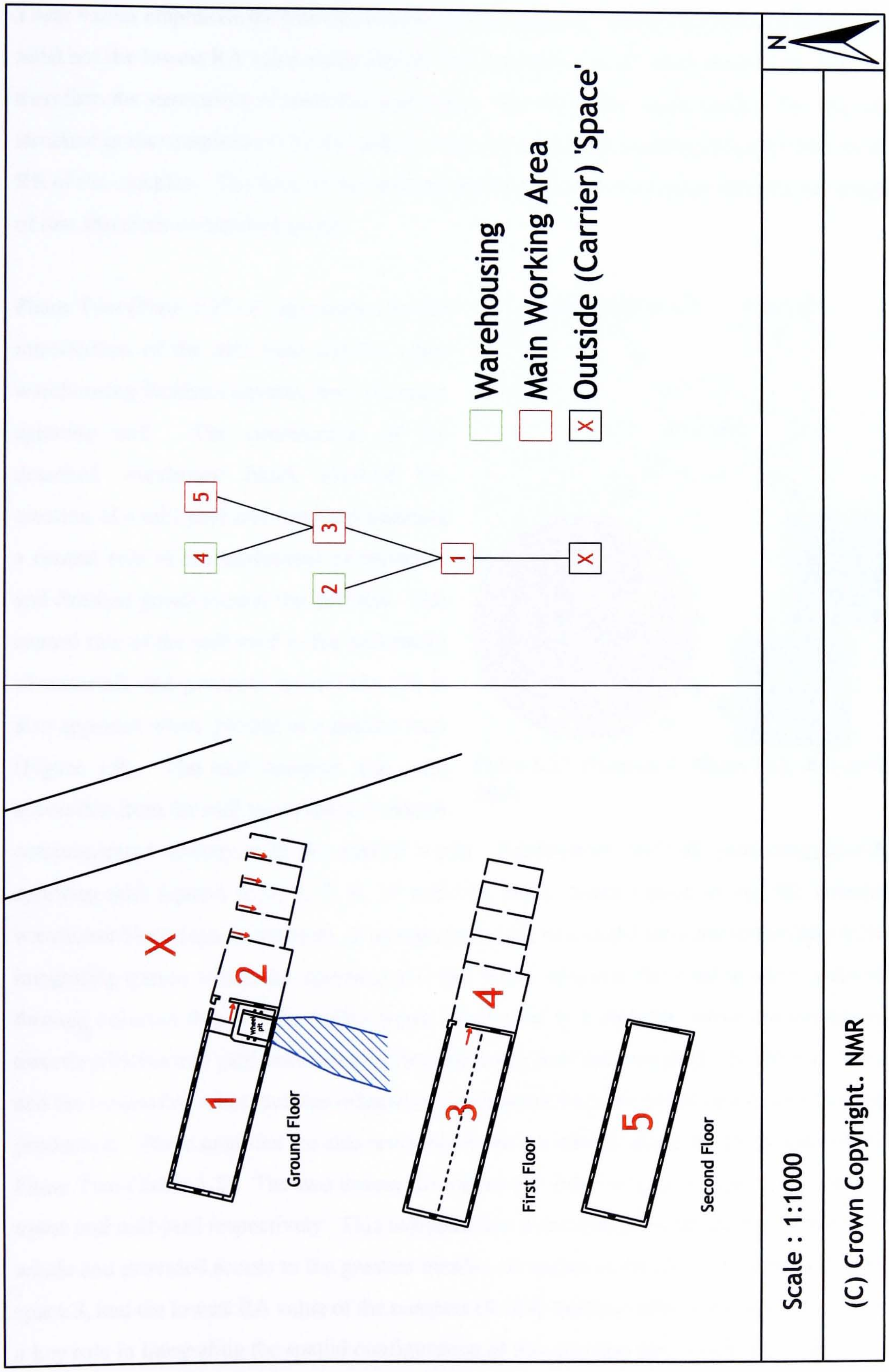


Figure 1.8 *Phase One: Gamma map of the movement of materials/goods*

These values emphasise the tree-like structure of the complex. Space 2 (the ground floor of the mill) has the lowest RA value reflecting the fact that access to all other areas in the mill, and therefore the movement of materials and goods, was from this single space. The tree-like structure is also emphasised by the lack of rings in the complex resulting in a nil value for the RR of the complex. The form of the building did therefore not encourage the easy movement of raw materials or finished goods.

Phase Two (Plate 1.27) is represented by the introduction of the mill yard and the extra warehousing facilities separate from the main spinning mill. The construction of the detached warehouse block allowed the creation of a mill yard and this yard assumed a central role in the movement of materials and finished goods around the mill site. The central role of the mill yard in the movement of materials and products around the site is also apparent when plotted as a gamma map (Figure 1.9). The mill complex was only accessible from the mill yard (space 4) which communicated directly with the outside world. Furthermore, the mill yard integrated the spinning mill (spaces 2, 3, 5, 7, 8, 10 and 11), boiler house (space 1) and the detached warehouse block (spaces 6 and 9). Also apparent is the role of the staircase tower (space 3) in integrating spaces within the spinning mill and which removes the need to move materials through adjacent floors. The boiler house is revealed as a separate entity communicating directly with the mill yard, reflecting the fact that it required easy access for the delivery of coal and the removal of ashes, but was otherwise independent from the actual processes of worsted production. These qualities are also revealed in the quantified values for the gamma map of Phase Two (Table 1.2). The two lowest RA values are those of spaces 3 and 4, the staircase tower and mill yard respectively. This indicates that these spaces integrated the complex as a whole and provided access to the greatest number of spaces at the site. The staircase tower, space 3, had the lowest RA value of the complex (0.164) and this reflects the fact that it played a key role in integrating the spatial configuration of the spinning mill which, at the time, was the largest building at the site and contained the most number of spaces. As with Phase One,

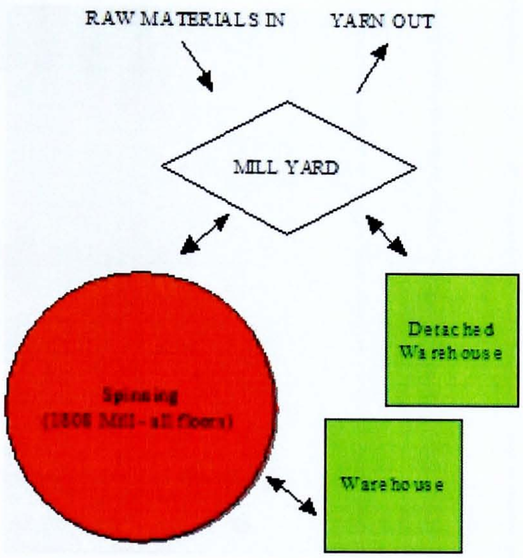


Plate 1.27 *Processes, Phase Two, Aireworth Mills*

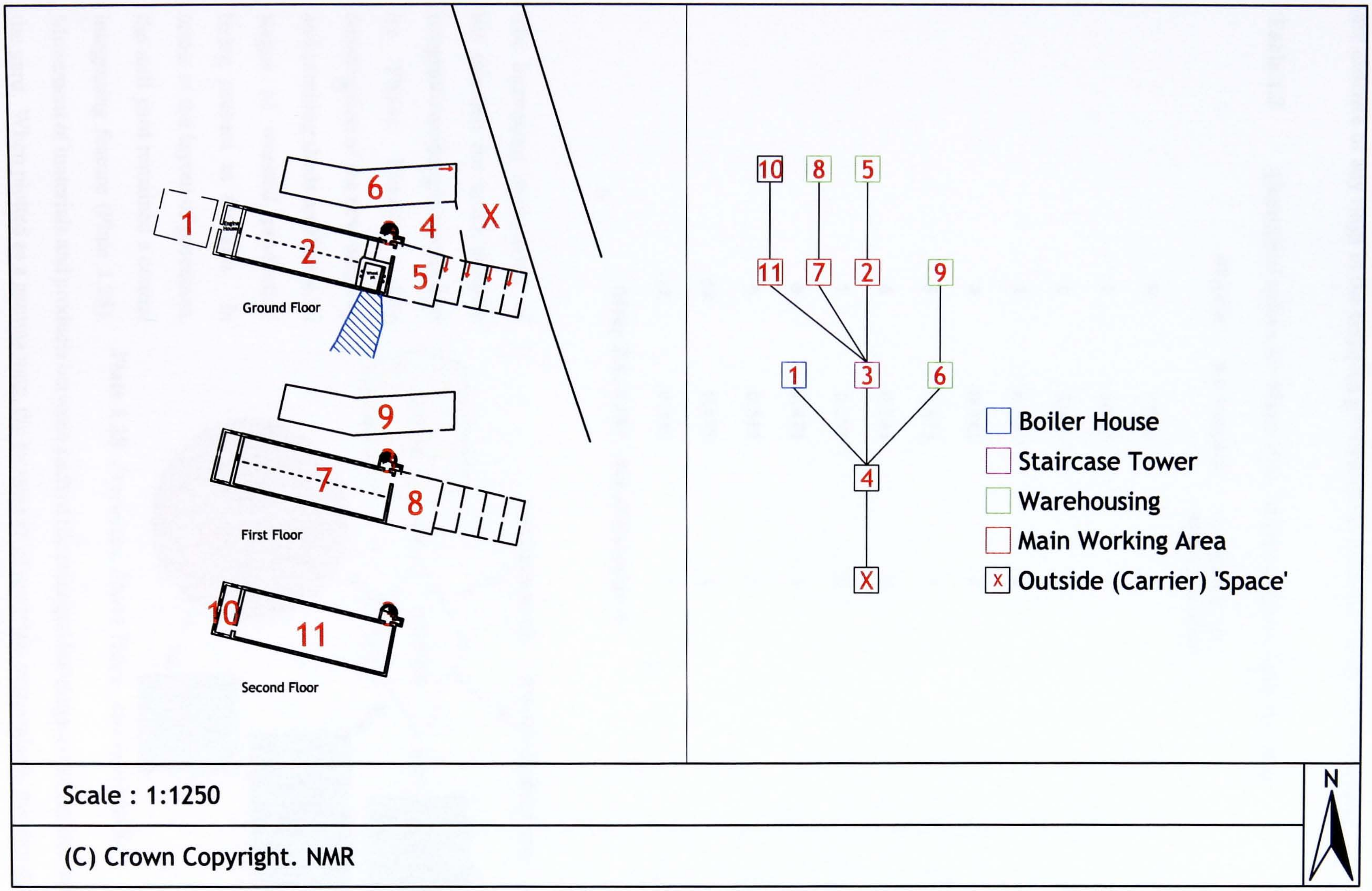


Figure 1.9 *Phase Two: Gamma map of the movement of materials/goods*

the absence of any rings in the complex provides a nil value for the RR of the complex.

Table 1.2 *Quantified values for Phase Two 'materials/goods' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.364	1
1	0.364	1
2	0.291	2
3	0.164	4
4	0.182	4
5	0.473	1
6	0.345	2
7	0.291	2
8	0.473	1
9	0.545	1
10	0.473	1
11	0.291	2

Mean RA: 0.355 RR of Complex: 0

The increasing productivity of the site and the move towards integrated working is represented by Phase Three. The construction of the new weaving and combing sheds resulted in all stages of worsted production being present at the site. In terms of the layout of processes, the mill yard remained a central integrating feature (Plate 1.28).

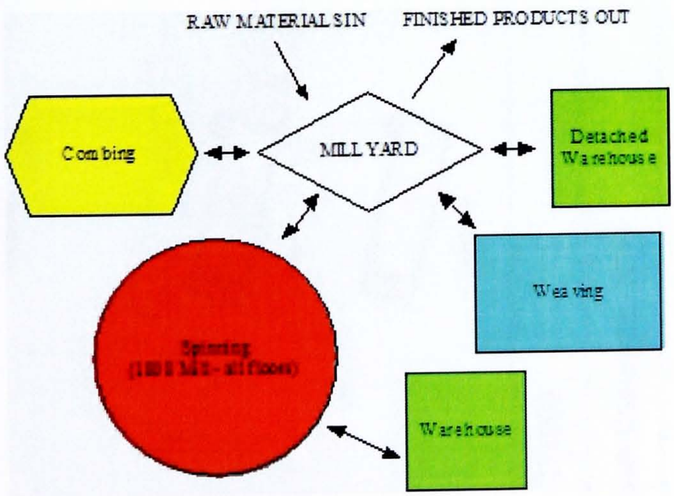


Plate 1.28 *Processes, Phase Three, Aireworth Mills*

Movement of materials and products between each of the principal buildings at the site was via the yard. When plotted as a gamma map, the movement of materials and products through the mill yard is all the more obvious (Figure 1.10) and quantified values for the complex (Table

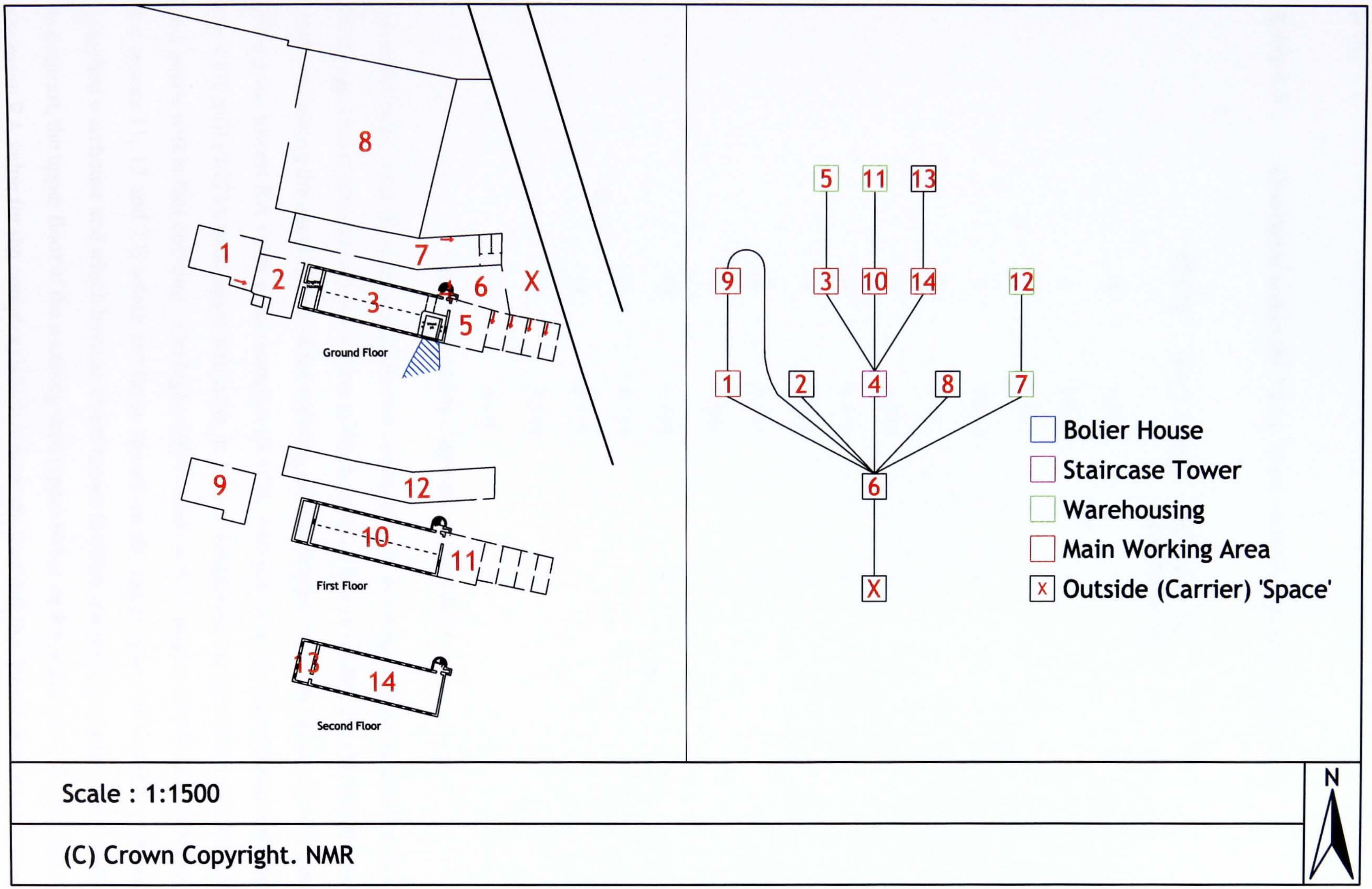


Figure 1.10 *Phase Three: Gamma map of the movement of materials/goods*

1.3).

Table 1.3 *Quantified values for Phase Three 'materials/goods' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.253	1
1	0.242	2
2	0.253	1
3	0.242	2
4	0.121	4
5	0.385	1
6	0.110	6
7	0.231	2
8	0.253	1
9	0.242	2
10	0.242	2
11	0.385	1
12	0.374	1
13	0.385	1
14	0.242	2

Mean RA: 0.264 RR of Complex: 0.050

As with Phase Two, the mill yard played an important role in integrating the spaces involved in the production process and an increase in the number of spaces leading directly off the mill yard (following the construction of the weaving and combing sheds) resulted in the mill yard having the lowest RA value of the complex (0.110). Second lowest is the staircase tower on the 1808 mill (0.121), once again reflecting its role in integrating the movement of materials and goods within that building. The highest RA values in the complex (0.385 and 0.374) are for spaces 11, 12 and 13) which are those spaces on the upper floors of spinning mill and detached warehouse and which have no direct access to either the staircase tower or mill yard. In contrast, the upper floor of the combing shed (space 9) has an RA value of 0.242 (just below the mean RA value for the complex) which reflects the fact that the first floor of this building was served by a taking-in door providing a direct link to the mill yard. This taking-in door created the first ring in the complex, resulting in an RR of value for the complex of 0.050. The use of taking-in doors on later buildings reduced the movement of materials and products within a building with an increased emphasis on movement within the vertical plane of the mill yard using an external hoist.

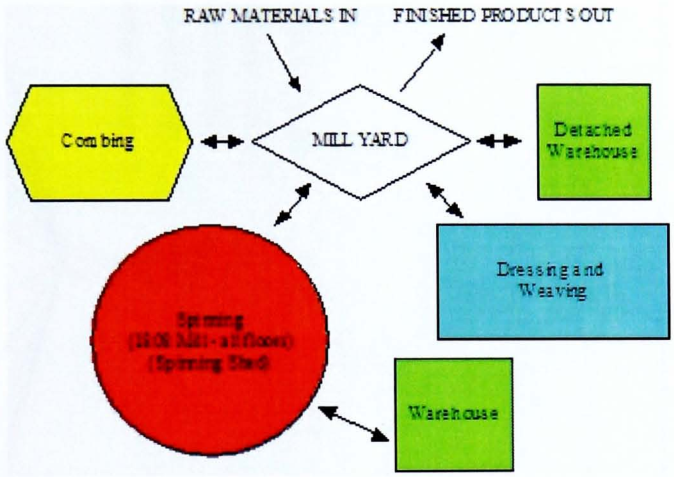


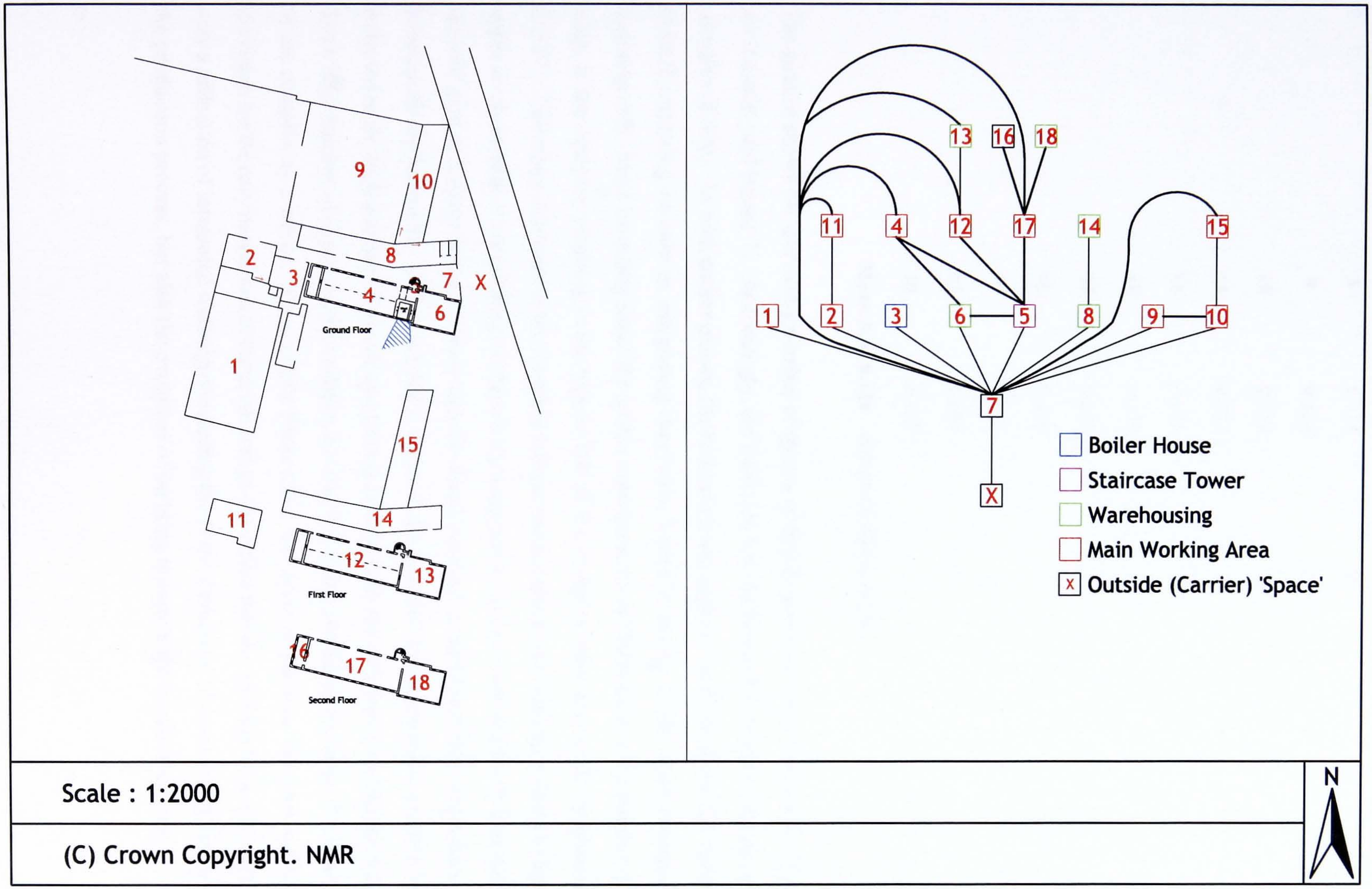
Plate 1.29 *Processes, Phase Four, Aireworth Mills*

Phase Four witnessed the construction of further sheds and buildings for dressing and spinning at Aireworth Mills and further alterations to the principal power source and system of power transmission, particularly in the southeastern side of the site following the erection of the second engine house in 1893. In terms of the processes of production, the extra sheds and other buildings had little effect on the general character of the site and the mill yard remained central to the overall integration of production (Plate 1.29). In contrast, the construction of extra buildings during Phase Four and, in particular, alterations to earlier buildings at the site including taking-in doors inserted into the north elevation of the 1808 spinning mill had a significant effect on the spatial character of the site (Figure 1.11; Table 1.4).

Table 1.4 *Quantified values for Phase Four 'materials/goods' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.131	1
1	0.131	1
2	0.124	2
3	0.131	1
4	0.118	3
5	0.092	5
6	0.118	3
7	0.020	14

Figure 1.11 *Phase Four: Gamma map of the movement of materials/goods*



8	0.118	2
9	0.124	2
10	0.118	3
11	0.124	2
12	0.118	3
13	0.124	2
14	0.229	1
15	0.124	2
16	0.209	1
17	0.098	4
18	0.209	1

Mean RA: 0.129 RR of Complex: 0.357

The gamma shows the increasing number of spaces at the site and access to all of them is first via the mill yard (space 7). Accordingly, the mill yard has the lowest RA value of the entire complex (0.020). As with earlier phases, the staircase tower (space 5) also has a low RA value (0.092) reflecting its role in integrating movement between spaces in the multi-storeyed spinning mill. Most revealing about the spatial configuration of Phase Four is the number of rings in the complex resulting in the highest RR of the complex value across all the phases (0.357). This ringy character to the complex reflects the introduction of taking-in doors to the upper levels in most of the buildings at the site allowing materials to be moved directly between the mill yard and upper floors and back again without the need to move materials or products between floors internally. This essentially 'flattens' the structure of the complex and this is reflected in the high number of spaces connecting directly with the mill yard (14) and the fact that a high number of spaces in the complex have an RA value similar to the mean RA value of the complex as a whole. Thus, unlike Phase One, this latest phase was characterised by provision for the easy movement of materials and goods within the site, and this is therefore not only a reflection of integrated working demanding the flow of products between each phase of the production process, but also the evolution of building design in the textile industries.

ACCESS ANALYSIS

Having considered the spatial aspects of processes and the movement of materials and products around Aireworth Mills, the remainder of this section will consider the potential movement of the workforce around the site.

The earliest phase of structural activity (Phase One) resulted in a basic spatial form with an inherent tree-like character (Figure 1.12). The spatial structure has two distinct parts, one concerned with the spinning mill, the other representing the adjacent range of cottages. Both parts are accessed directly from the outside 'carrier' space. The spatial structure of the mill (spaces 1, 2, 7, 8, and 13) reveals how the main working areas were central to overall movement around the building. These characteristics are also revealed in the quantified values for Phase One (Table 1.5).

Table 1.5 *Quantified values for Phase One 'workforce' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.059	5
1	0.180	3
2	0.333	1
3	0.256	2
4	0.256	2
5	0.256	2
6	0.256	2
7	0.283	3
8	0.436	1
9	0.410	1
10	0.410	1
11	0.410	1
12	0.410	1
13	0.436	1

Mean RA: 0.256 RR of Complex: 0

The outside 'carrier' space had the lowest RA value in the complex (0.059) reflecting its role

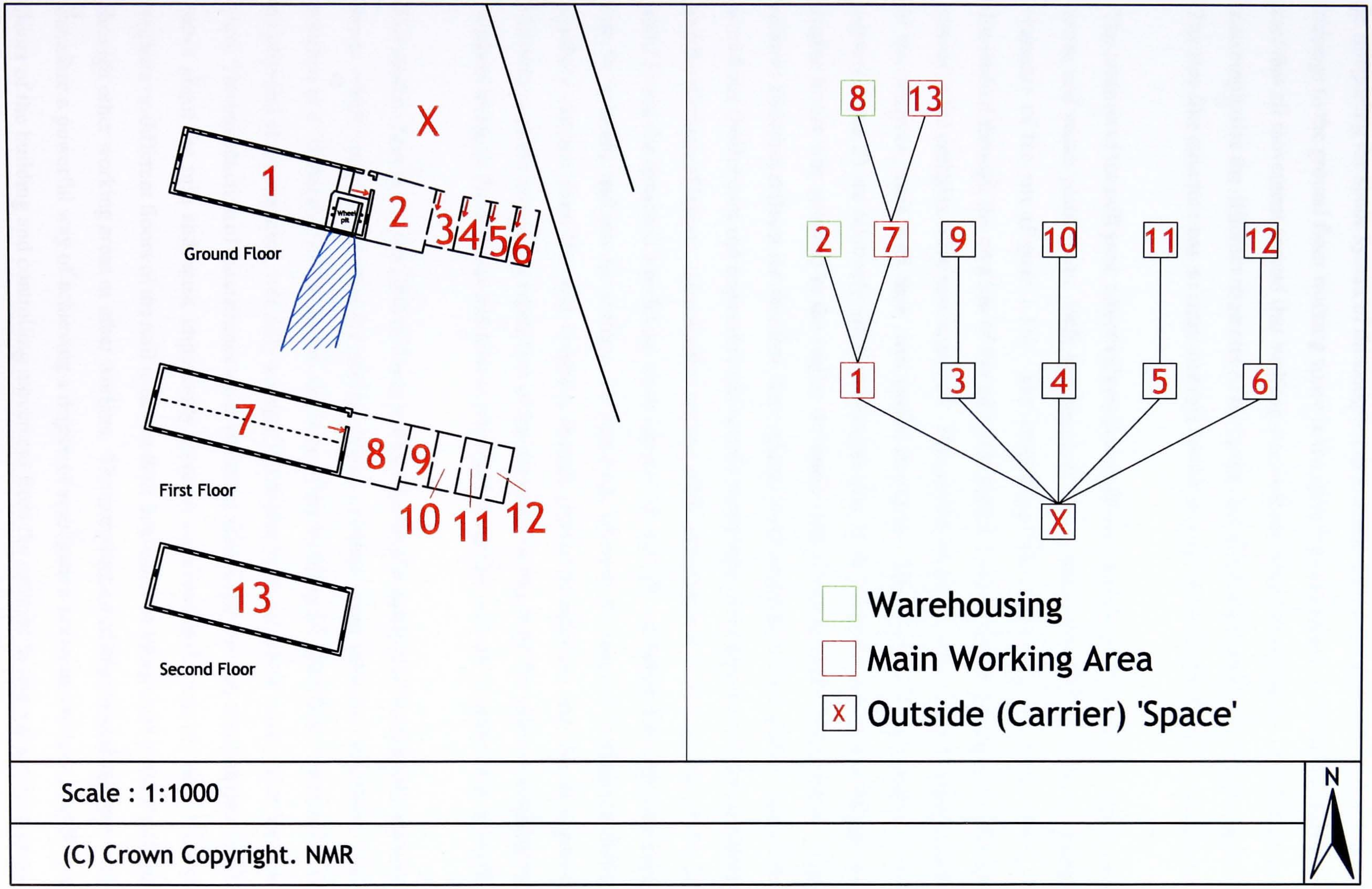


Figure 1.12 *Phase One: Gamma map of the movement of the workforce*

in integrating the space syntax of the complex as a whole, whilst the second lowest RA value belongs to the ground floor working space in the spinning mill (space 1: 0.180) revealing the fact that all movement around that building was initially from this one space. The RA values also emphasise the different character of the spaces in the cottage range and the spinning mill. The tree-like structure has no rings and this results in a nil value for the RR of the complex.

The creation of the mill yard, effectively enclosing the site, and the addition of an external stair tower and steam plant to the 1808 spinning mill had a pronounced affect upon the spatial character of the site (Figure 1.13). The integrating role of the outside 'carrier' space is diminished through the creation of the mill yard (space 5) from which the majority of other spaces in the complex were now accessed. The gamma map also clearly shows distinct parts of the complex, each with their own spatial character. Thus, the boiler and engine house (spaces 1 and 2) are relatively isolated from the rest of the complex and thus, although the engine house was attached to the end of the main mill, it was spatially independent. This relative isolation reflects the fact that these spaces were attended to by a distinct part of the workforce (boiler men and engineers) and reveals something of the structure of the workforce and the division of labour. Also distinct are the 1808 mill (spaces 4, 3, 6, 7, 13, 14, 15, 21, 22 and 23) and the detached warehouse block (spaces 12 and 20), reflecting their different uses, one for spinning and one for storage. Of particular interest, the range of cottages is shown spatially distinct from the mill complex though physically adjacent and this is a potent illustration of the increasing separation of the domestic setting from the place of working for workers living in the cottages had now to physically enter the mill site in order to go to work.

The spatial character of the 1808 mill was transformed by the addition of the external staircase tower which removed the need for internal flights of stairs rising between each floor. This resulted in a 'flattening' of the spatial structure of the building for each floor, irrespective of its physical characteristics, was only a single space (the staircase tower) away from the mill yard. The introduction of the staircase tower therefore altered the way that the workforce could move about the mill and, most importantly from an organisational point of view, allowed workers on different floors of the mill to access their individual working areas without passing through other working areas or other workers. The introduction of this integrating space was therefore a powerful way of achieving a degree of segregation between workers on different floors of the building and controlling movement from the exterior to internal working areas. Also noticeable in the 1808 mill is the provision of privies at each floor level (spaces 6, 14 and

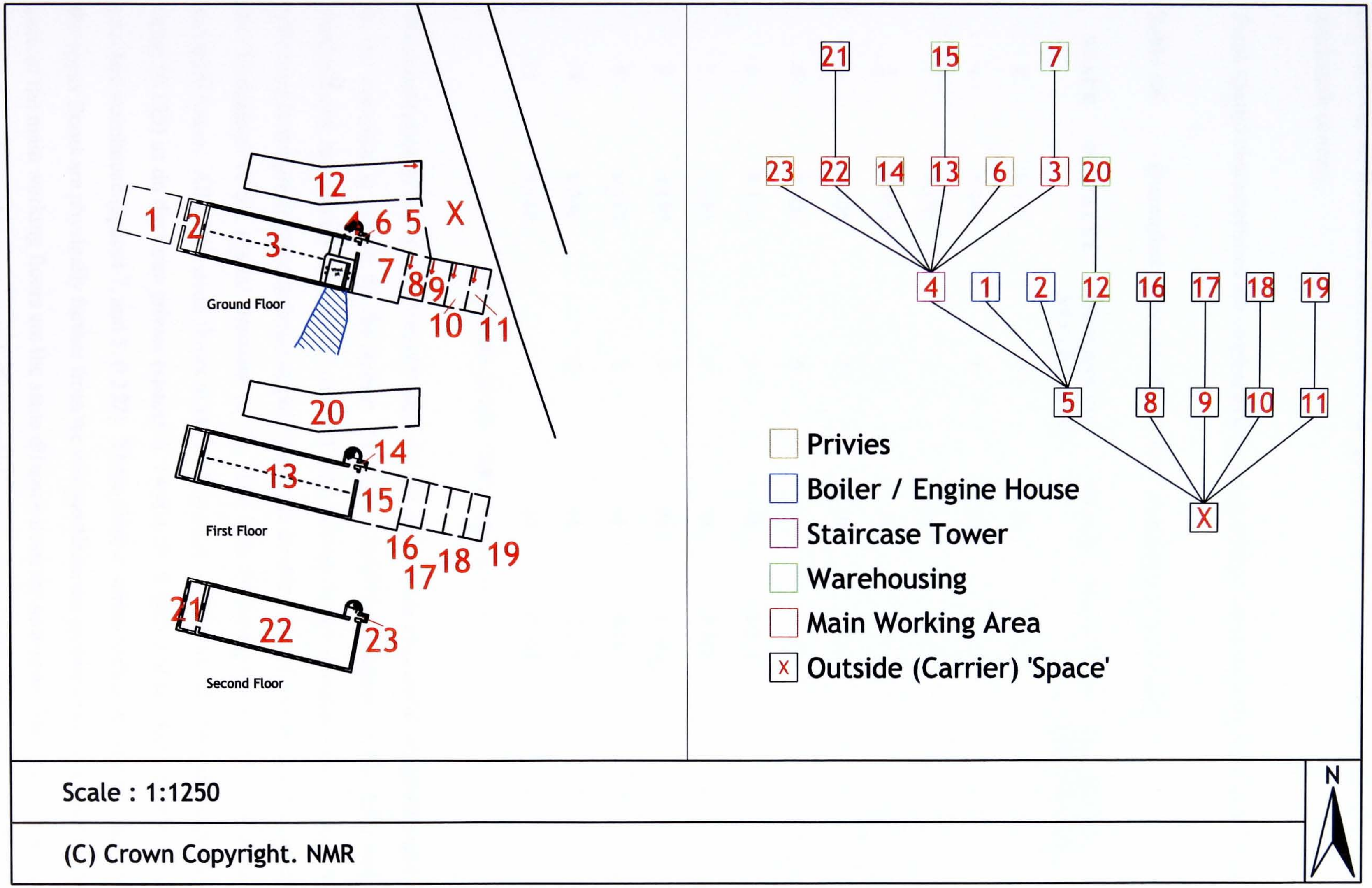


Figure 1.13 *Phase Two: Gamma map of the movement of the workforce*

22) showing an increased awareness of the provision of sanitary facilities from the mid-nineteenth century.

These spatial characteristics are emphasised in the quantified values for the site (Table 1.6).

Table 1.6 *Quantified values for Phase Two 'workforce' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.111	5	**12**	0.145	2
1	0.160	1	**13**	0.175	2
2	0.160	1	**14**	0.182	1
3	0.175	2	**15**	0.252	1
4	0.105	7	**16**	0.258	1
5	0.083	5	**17**	0.258	1
6	0.182	1	**18**	0.258	1
7	0.252	1	**19**	0.258	1
8	0.182	2	**20**	0.222	1
9	0.182	2	**21**	0.252	1
10	0.182	2	**22**	0.175	2
11	0.182	2	**23**	0.182	1

Mean RA: 0.191 RR of Complex: 0

The substitution of the outside 'carrier' space for the mill yard as the central integrating space in the complex is shown by the lowest RA value (0.083) belonging to the mill yard. Furthermore, the second lowest RA value (0.105) belongs to the staircase tower (space 4) reflecting its integrating role in the principal building at the site. The RA values also emphasise the 'flattening' of the spatial structure of the 1808 mill following the introduction of the staircase tower. All of the main floors in the mill (spaces 3, 103 and 22) share the same RA value (0.175) as do the three privies (spaces 6, 14 and 23: 0.182) and the three floors of the attached warehouse (spaces 7, and 5: 0.252). These similar values reflect the fact that despite the upper floors are physically further from the mill yard than the ground floor, in spatial terms each of the main working floors are the same distance from the mill yard. This means that the ground floor shares the same spatial characteristics and values as the first and second floors.

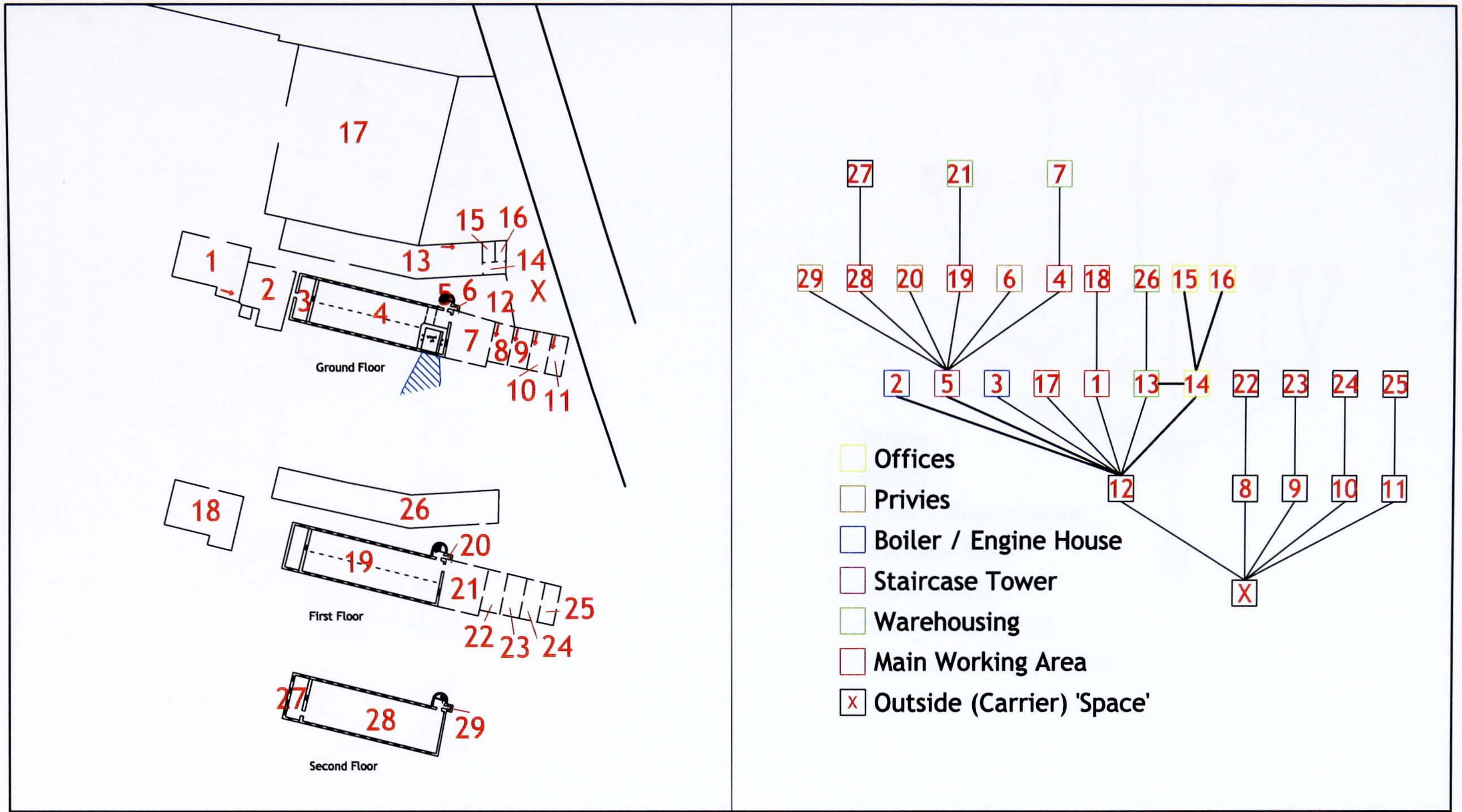
The gamma map of human movement in Phase Three shows only minor changes to the overall spatial configuration and these reflect an increase in spaces rather than alterations to the space syntax of the complex (Figure 1.14). The principal alteration is the creation of a suite of three small offices at the eastern end of the detached warehouse block (spaces 14, 15 and 16) which introduce a single ring into the complex. The combined combing shed and warehouse (spaces 1 and 18) and weaving shed (space 17) are represented by isolated spaces accessed directly from the mill yard (space 12) and do not alter the spatial properties of other structures at the site. These characteristics are also emphasised by the quantified value for the complex (Table 1.7)

Table 1.7 *Quantified values for Phase Three 'workforce' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.101	5	**15**	0.198	1
1	0.143	2	**16**	0.198	1
2	0.143	1	**17**	0.143	1
3	0.143	1	**18**	0.201	1
4	0.161	2	**19**	0.161	2
5	0.095	6	**20**	0.167	1
6	0.167	1	**21**	0.233	1
7	0.233	1	**22**	0.238	1
8	0.167	2	**23**	0.238	1
9	0.167	2	**24**	0.238	1
10	0.167	2	**25**	0.238	1
11	0.167	2	**26**	0.201	1
12	0.071	8	**27**	0.233	1
13	0.130	3	**28**	0.161	2
14	0.127	4	**29**	0.167	1

Mean RA: 0.172 RR of Complex: 0.021

Phase Four, like Phase Three, essentially represents the addition of extra spaces at the site rather than any significant changes to the basic space syntax of the complex (Figure 1.15; Table 1.8), reflecting the expansion of productivity at the site and progressively more integrated



Scale : 1:1500

Figure 1.14 *Phase Three: Gamma map of the movement of the workforce*

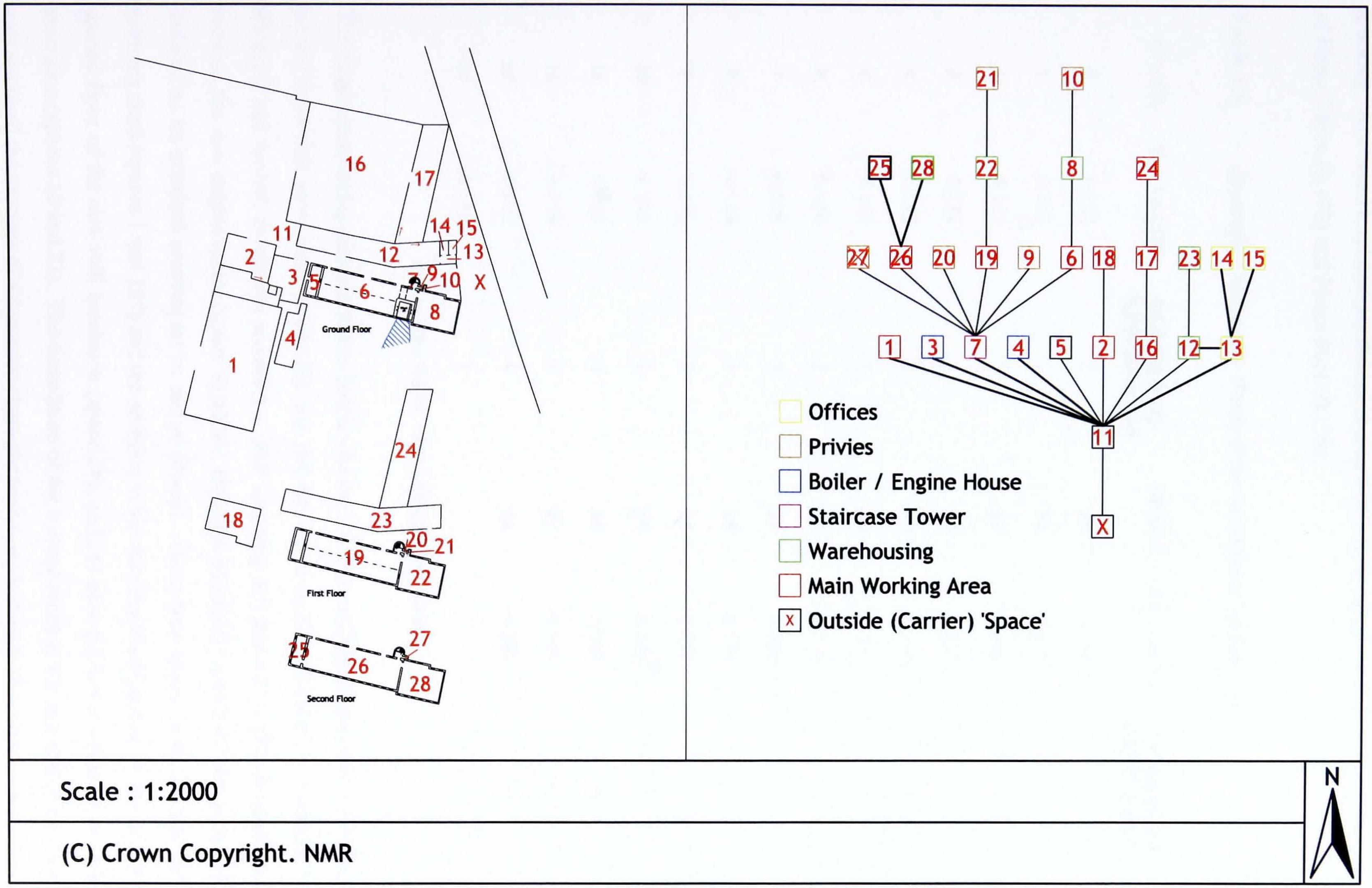


Figure 1.15 *Phase Four: Gamma map of the movement of the workforce*

working. At a broad level this is reflected in only 0.013 difference between the mean RA value of Phase Three (0.172) and Phase Four (0.159).

Table 1.8 *Quantified values for Phase Four 'workforce' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.132	1	**15**	0.188	1
1	0.132	1	**16**	0.122	2
2	0.127	2	**17**	0.196	2
3	0.132	1	**18**	0.198	1
4	0.132	1	**19**	0.140	2
5	0.132	1	**20**	0.151	1
6	0.140	2	**21**	0.278	1
7	0.079	3	**22**	0.206	2
8	0.124	3	**23**	0.188	1
9	0.151	1	**24**	0.270	1
10	0.193	1	**25**	0.206	1
11	0.063	11	**26**	0.140	3
12	0.119	3	**27**	0.148	1
13	0.116	4	**28**	0.209	1
14	0.188	1			

Mean RA: 0.159 RR of Complex: 0.042

The gamma map and quantified values for the site show that the mill yard (space 11) remained central to overall movement around the site and the staircase tower (space 7) continued to integrate and control movement around the 1808 spinning mill and new mill extension. Of interest, the new engine house (space 4) which, although physically detached, was as spatial isolated as its attached counterpart in earlier phases. Other new spaces included the new spinning shed (spaces 1 and 187) and the addition to the weaving shed (spaces 17 and 24), the second floor of the new mill extension (space 28), and the new privies attached to the mill extension (spaces 10 and 21). The demolition of the cottage range at the east end of the 1808 mill removed the vestiges of a domestic character to the site and made the distinction between the mill site and the outside 'carrier' site more acute.

PROCESS RECORDING AND ACCESS ANALYSIS :DISCUSSION

This analysis has found that the move towards integrating working at Aireworth Mills during the course of the nineteenth century had a far greater affect on the process of production and the movement of materials and goods around the site than it did on the potential movement of the workforce. The addition of extra buildings at the site, arranged a mill yard was a logical response to the need to house additional processes at an expanding site and although physically some of these buildings were at opposite ends of the site the mill yard nevertheless integrated movement of materials and products between process and ultimate the flow of production. The ease of moving materials and products around the site was finally resolved in the late nineteenth century when a large number of taking-in doors were added to all floors of the 1808 mill which emphasised the central role of the mill yard. Furthermore, it is noticeable that later buildings at the site were only 2 storeys high which resolved some of the difficulties in moving materials to and products from the top of tall buildings. Adding taking-in doors to each floor of the 1808 mill had the same effect and effectively, in the context of the production process and the movement of materials and products, made all of the main working spaces at the site only a single (at most two) spatial steps from the mill yard. Changes to power sources and power transmission at the site had no appreciable effect on the overall spatial character of the site.

In contrast, human movement around the site was rationalised by the mid-nineteenth century and the basic spatial configuration changed little after that time with the exception of some additional spaces being added and others removed. The major spatial changes, in the context of the movement of the workforce, therefore occurred in Phase Two when the central mill yard was created and the external end staircase tower added to the 1808, which allowed a greater degree of control over the movement of workers to and from the working areas in the main mill building.

ARCHITECTURAL SUMMARY

The architectural treatment of the 1808 spinning mill at Aireworth Mills is fairly typical of its date: the building has a relatively austere character and in its

Plate 1.30 *The general architectural form of the 1808 mill is typically austere*

surviving form has few embellishments (Plate 1.30). Furthermore, later phases of structural activity at the site are similarly plain and only the detached warehouse block with its pair of ogee windows and the second engine house dating to the 1890s display any definite ornamentation, whilst the south elevation of the engine house is built in brick in the tradition of the late red-brick mills of the Lancashire cotton industry which had only marginal influence in Yorkshire.

However, when first built the 1808 mill displayed a surprising amount of ornamentation including a bellcote, clock face and ogee window in the western gable. The bellcote and clock face are not atypical for mills from this period and conform to a broad Palladian and classical idiom. Both show a particular concern with time keeping and the resetting of the clock face in the late nineteenth century mill extension provides a measure of the importance of providing a time piece regulating the working day. However, the use of an ogee window in the western gable of the mill is an unusual example of a gothic motif used in an early mill. It has been suggested that this side of the mill was visible from the main road out of Keighley to the Aire Valley(RCHME 1998a, 3) but its visibility does not alone explain the use of a gothic style when the Palladian style was the dominant architectural idiom for mill buildings.

Plate 1.31 *The gothicised staircase tower is an unusual architectural form in the Yorkshire textile industry*

The gothic elements of the site were alluded to in later buildings including the detached warehouse and the gothicised stair tower added to the 1808 mill in the mid-nineteenth century (Plate 1.31). As with the early ogee window in the main mill, the use of gothic motifs is not easily explained and seems most likely to reflect the individual whim of the mill builder and owner rather than representing a strand of identifiable mill architecture. Certainly it stands in contrast to the use of Classical motifs across the majority of the Yorkshire textile industry and this in itself may have been the reason for its use at Aireworth Mills. However, given the early date of the 1808 mill, which may have been an enlarged version of the mill known to have been built on the site in the 1780s, it is possible that the gothic ogee windows in the western gable was an experiment in the use of architectural motifs in the textile mill, but

Plate 1.32 *Dalton Mills, Keighley, employs a number of overtly Gothic forms*

one that did not have widespread appeal and was never explored on any scale across the Yorkshire textile industry. In the context of this interpretation the use of gothic motifs in later buildings at the site must be seen as an attempt to introduce an element of architectural unity into the site rather than a reflection of a more widespread use of the style. It does not seem that Aireworth Mills sought to copy one of its more famous neighbours, Dalton Mills, Keighley, (**BFO62300**; Plate 1.32) which incorporates gothicised towers alongside more orthodox Classical motifs. Dalton Mills were well-known on account of their idiosyncratic style but as the site was mainly built during the mid-late nineteenth century, it post-dates many of the Gothic features at Aireworth Mills.

Despite these idiosyncrasies, other elements of the sites architectural more closely adhere to an established pattern within the Yorkshire textile industries. This is most noticeable in the two engine houses, both of which have tall, narrow arch-headed windows marking out their function to the discerning observer. Furthermore, the regular fenestration, the architectural treatment of the main entrance and the headrace arch on the 1808 mill are entirely typical of mill building in Yorkshire, as are the single-storey sheds and the chimney.

LIST OF DOCUMENTS

1.1 Insurance Policy, December 1792

Guildhall Library Royal Exchange 7253/23/131587 (also quoted in Ingle 1980), 502)

1.2 Insurance Policy, 'Stubbing House Mill, 19th May 1819

Guildhall Library Royal Exchange, Sun C.R. MS. 11937/127, No. 955 629

1.3 Rating Assessment, Aireworth Mill, 1851

Keighley Library, Rate Book 1851

1.4 Rating Assessment, Aireworth Mill, 1870

Keighley Town Hall, Keighley Rates, November 1870

1.5 Engineering Drawings for repairs to waterwheel at 'Screw Mill', for Edmund Laycock

Keighley Library, E.A. Roper & Co. Ltd. MSS.

1.6 *Post Office Directory* 1877, 481; 483

1.7 *Worrall's Textile Directory of Lancashire and Yorkshire* 1910/1, 153-157)

1.8 Rating Assessment, Aireworth Mill, 1834

Keighley Library Rate Books, May and July 1834

1.9 'Stubbing House Mill, Aireworth'

Keighley Library, Keighley Local Board of Health Plans, July 1878 by B.; Hopkinson: Sheet 8

1.10 Engine House Plans, Aireworth Mills, for Edmund Laycock Esq.

Keighley Library, Keighley Building Plan 3024, 23rd October 1893)

APPENDIX A
SITE DESCRIPTION : 2
EBOR MILL

DATABASE ENTRY:	704
NBR NUMBER:	BFO62649
NGR:	SE 0366 3765
TOWNSHIP:	Haworth
CIVIL PARISH:	Keighley
DISTRICT:	Bradford
COUNTY:	West Yorkshire
BRANCH:	Worsted
PERIOD:	Early

Plate 2.1 *Ebor Mills, Haworth (Giles and Goodall 1992, 130)*

The story of Ebor Mill, Haworth, is one of continued development and expansion during the nineteenth century. Originating in the early nineteenth century as a water-powered worsted spinning mill in a valley bottom site on the east bank of the Bridgehouse Beck, (Plate 2.1; Figure 2.1). The original mill was extended and further buildings built close to it during the second half of the nineteenth century resulting in a large and impressive complex capable of integrating working including spinning, weaving, and mending capabilities, as well as facilities for making gas, soap and extracting grease. For much of the history of the mill, the site was owned by the Merrall Brothers, worsted manufacturers who already owned mills in the Haworth area when they took over ownership of Ebor Mill in the late 1840s or early 1850s. It was under the Merrall Brothers that the site was continuously enlarged and they continued to

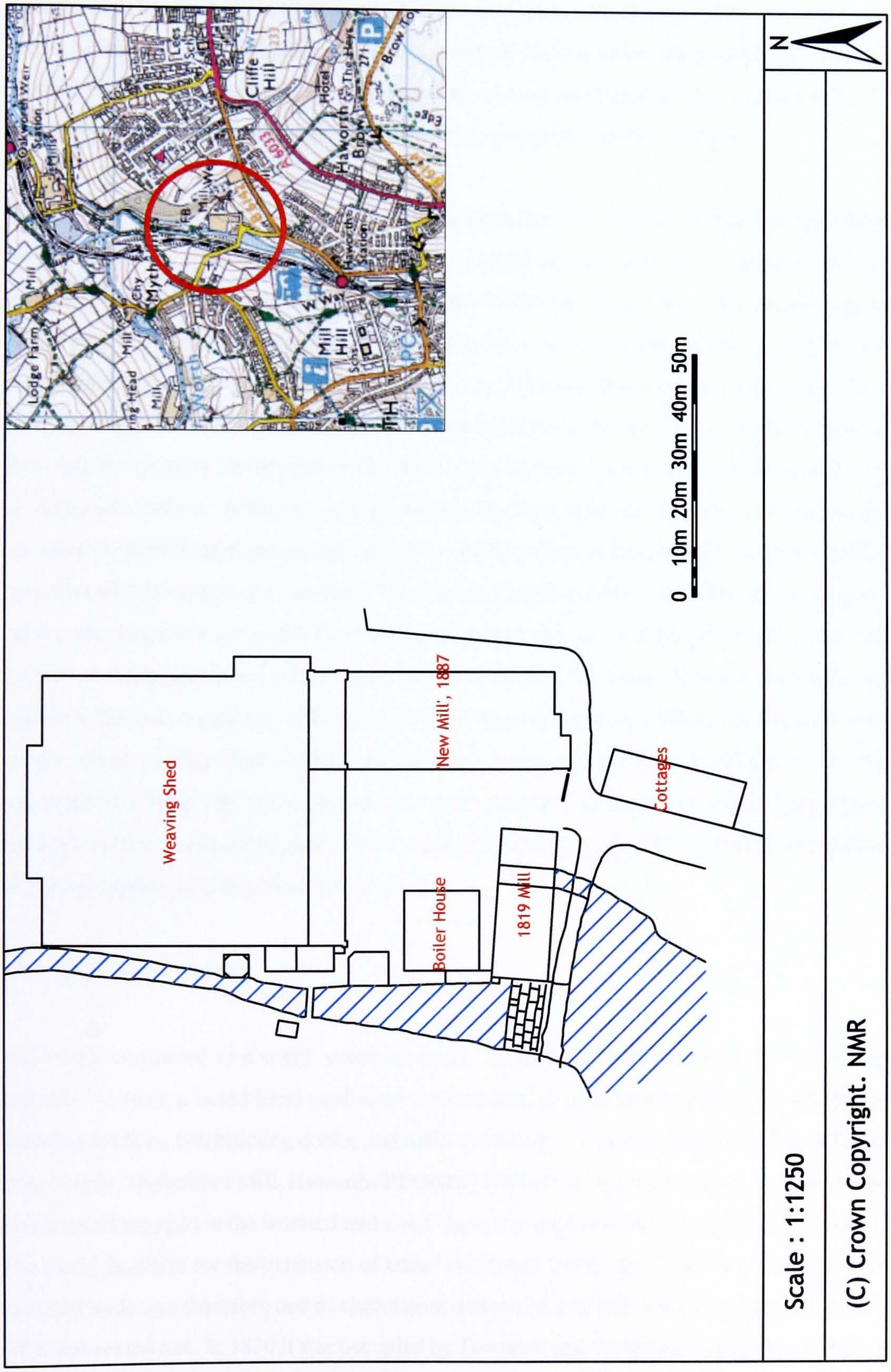


Figure 2.1 *Block Plan, Ebor Mill, Haworth*

operate from the site until 1966 when the site was acquired by the Jerome Group of Companies, who continued to spin in the largest mill, but sold off the rest of the other buildings. The site is now owned by two principal companies, the earliest and latest of the spinning mills by Airedale Springs Ltd, much of the rest of the site owned by a leisure company.

The earliest building at the site is the small spinning mill built *c.*1819 and it that building which forms the principal focus of the following description and analysis. Although the site underwent considerable expansion during the nineteenth century the early mill remained largely unaffected by developments at the site, in particular it remained water-powered despite two steam installations powering the rest of the site. The 1819 mill therefore offers the opportunity to study changes to an early spinning mill that did not reflect the use of a new source of power. It is rare for an early Yorkshire textile mill to have survived in this way and this alone is of considerable interest. Whilst it is recognised that this early mill was a part of evolving site and the move towards integrated production at Ebor Mill, for the purposes of this research only this structure will be examined in detailed. This decision is also made on the basis of existing plans of the site, restricted to the 1819 mill, the differential survival of different stages of the sites overall development (many of the mid-nineteenth century buildings have not survived), and access to the later buildings at the site which was not possible on the basis of health and safety or the whim of individual owners and tenants. However, the later buildings at the site, especially the large 1887 spinning mill (to which restricted access was permitted) are a good example of late architectural traditions in mill building and an assessment of their stylistic and formal properties will therefore be included.

HISTORICAL BACKGROUND

Ebor Mill originated as a small, water-powered worsted mill built in about 1819 by Hiram Craven. Craven, a noted local contractor who worked in partnership in his son, engaged in building bridges, constructing docks, and making railways. As well as building Ebor Mill, he also bought Mytholmes Mill, Haworth (**BFO62671**) which he enlarged. However, Craven was not himself engaged in the worsted trade, but 'from the number of worsted mills he possessed, [he gave] facilities for the extension of trade' (Hodgson 1879, 153). Craven's interest in the worsted trade was therefore one of speculation and profit, and following its construction Ebor Mill was rented out. In 1830 it was occupied by Townend and Company, worsted spinners and stuff manufacturers. However, their tenancy was short lived, for in 1834 the firm of Cravens and Sugden was formed and took over the running of Ebor Mill (Hodgson 1879, 154), which presumably reflects a heightened interest in the worsted industry on the part of the Craven family. The firm operated Ebor Mill in conjunction with Mytholmes Mill where it had its warehouse and offices and where they employed a considerable number of hand combers, undertook the sorting of wool and delivered out additional out work to combers and hand loom weavers. Wool was spun at both sites, but it is apparent that the firm also made early use of the power loom for they are recorded as having wove '6qr.mevinos, Orleans and coburgs, besides a very valuable and heavy class of goods called double twills' (Hodgson 1879, 154-55). The housing of power looms in storeyed-mills is unusual for this time and is perhaps best seen as an expedient in a period when single-storey sheds were uncommon. Hiram Craven, junior partner, resided at Ebor House, east of the mill, which he had probably built for himself (RCHME 1986a, 2).

Hodgson (1879, 155) records that the firm of Cravens and Sugden did not succeed in making money and experienced a series of losses and 'other disastrous circumstances, [and] they were ultimately brought to grief, on which account they gave up business about 30 years ago'. This indicates a date of *c.*1850 for the termination of Cravens and Sugden's occupation of Ebor Mill. Both the mill and Ebor House were purchased from Hiram Craven at this time by the partnership, Merrall brothers, one of whom, Edwin Merrall, moved into Ebor House. Merralls' occupation of Ebor Mill is confirmed by trade directory entries. White's trade directory (1853) records Cravens and Sugden, worsted spinners and manufacturers, operating at Ebor Mills, and Merrall Brothers, worsted spinners and manufacturers, at Ebor Mill and at Lees Mill, Haworth (**BF)62650**), and Springhead Mill, Keighley (**BFO62646**). The reference to Cravens and Sugden at Ebor Mill may represent an error by the directory compilers (RCHME 1986a, 2) or, and more unlikely, reflects a period of transition in ownership of the site by the two firms.

The firm of Merrall Brothers began to operate in 1830 by Hartley Merrall and his four sons Edwin, Michael, Stephen and Harry, were quick to expand Ebor Mill following its purchase. They enlarged the 1819 mill in two stages and also built a further, steam powered mill to the north of the earlier mill. The steam power mill was later replaced by a warehouse and large weaving shed (Hodgson 1879, 120) and *c.*1886 built a second engine house. In 1887 they constructed a large spinning mill along the eastern boundary of the site accompanied by a new boiler house, economiser house and chimney, gasometers and a grease recovery and soap works, transforming Ebor Mill into an extensive and impressive integrated works.

Merrall Brothers continued to operate from the site until the early 1960s and in 1966 Ebor Mill was acquired by the Jerome Group of Companies who continued to spin yarn in the large 1887 spinning mill, but sold off the other buildings for alternative uses. The site is presently owned by a number of different industrial and commercial concerns, but the 1819 and 1887 mills are owned by the principal owner, Airedale Springs Ltd, who commenced production at the site in the early 1990s.

ARCHITECTURAL DESCRIPTION

There are four principal phases of structural activity concerned with the 1819 spinning mill (Figure 2.2). Whilst developments across the rest of the site do not form the focus here, mention will be made of them in order to contextualise the evolution of the original spinning mill and in order, where appropriate, to provide an indication of the overall architectural character of the site, especially in its later phases.

- ### PHASE ONE

The earliest structure at the site is the 1819 spinning mill built by Hiram Craven (Plate 2.2; Figure 2.3). As first built it was seven bays long and of three storeys with a basement, attics and an internal end waterwheel. It has walls of watershot masonry, continuous sill bands, doorways with interrupted jambs, and rectangular lintels which are double except on the second floor, immediately under the paired gutter brackets of the eaves (RCHME 1986a, 4). The vertical tooling between tooled margins found on the lintels is repeated on the voussoirs of the round-headed opening of the headrace/pentrough serving the waterwheel. The interior of the mill has been heavily modernised and little of the internal structure can be seen or could be inspected. Consequently, much of our understanding of the interior form of this mill is dependent on the inspection of the mill undertaken by the RCHME in 1986 (RCHME 1986a, 4-6).

Plate 2.2 *The 1819 spinning mill from the south*

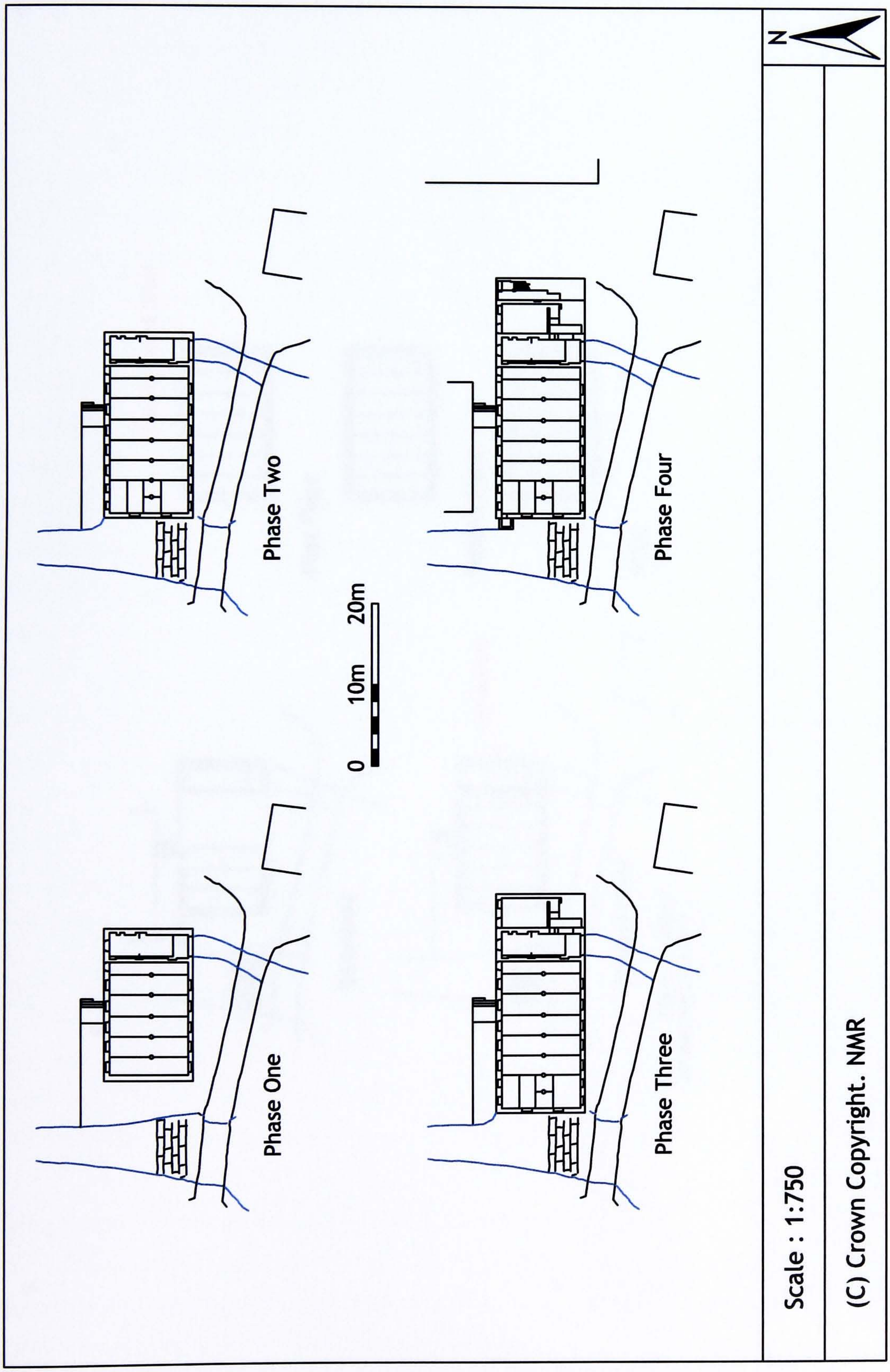
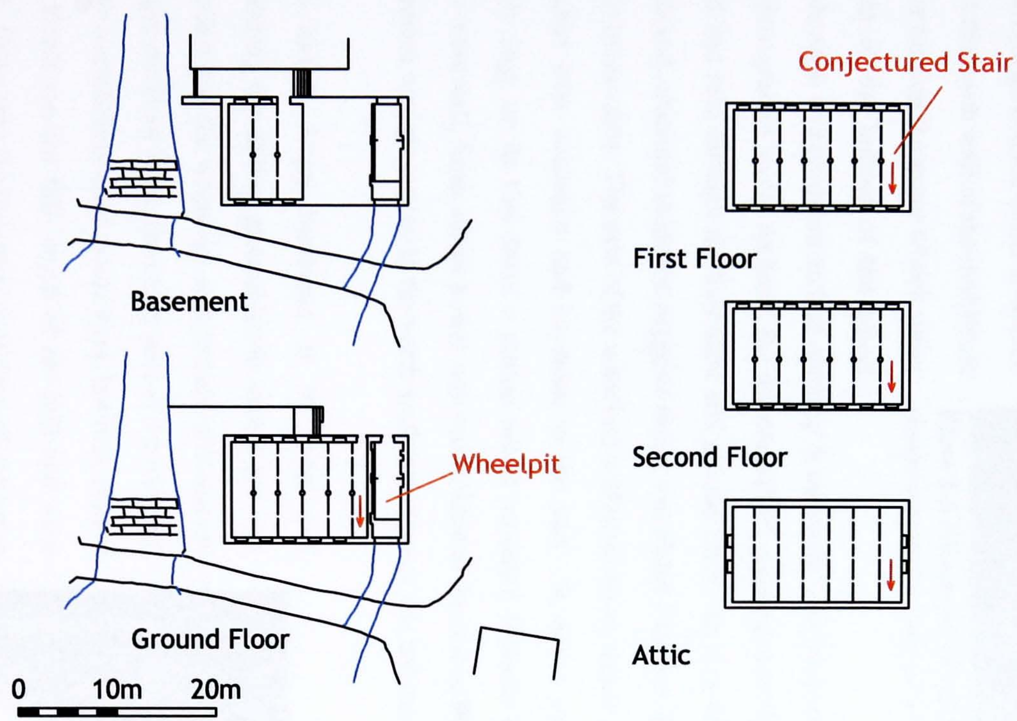


Figure 2.2 *Principal structural phases, Ebor Mill*

Figure 2.3 *Phase One, Ebor Mill*



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The mill was built water-powered and remained so throughout its working life. Water flowed from the through a sluice in the north east corner of the mill dam, which lay to the south of the mill, and into a headrace channel . Thereafter it flowed into the pentrough housed under an arched opening in the south wall of the mill (Plate 2.3). After turning the water wheel, water flowed out of the bottom of the wheel chamber through an equivalent arched opening in the north wall; this second archway is now hidden below ground level. As built, the internal wheel chamber was situated at the east end of the mill and rose through the basement and ground floor. An iron wheel was removed in about 1939,and structural evidence suggests that it was about 7 metres (23ft) in diameter, and overshot or breast-shot. The axle of the wheel sat within recesses, square to the west, taller and round-headed with voussoirs and keystone to the east. It was a suspension wheel and accordingly cogs on its rim drove a pinion wheel mounted towards the south end of the chamber's west wall, from where power was transmitted to the rest of the mill. Access to the wheel chamber was via a door in the north wall located over the tailrace.

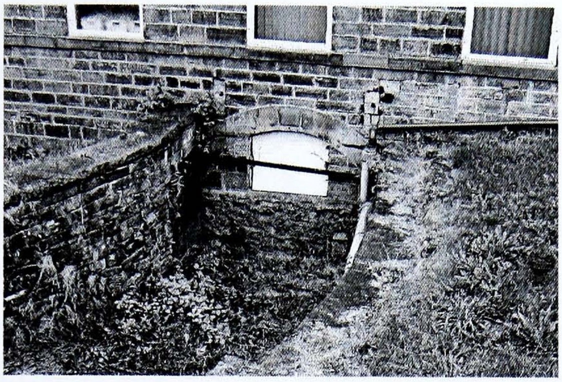

Plate 2.3 *Headrace channel and arch leading to pentrough and water wheel*

The mill had a 3-bay basement at its west end, accommodating the falling ground levels across the site, and at the east end the wheel pit was present at basement level. At ground floor level, the upper part of the wheelpit reduced the overall floor space to six bays, but first, second and attic floors ran the full length of the mill and were undivided. Entry into the basement was through a door in the north elevation, now blocked.

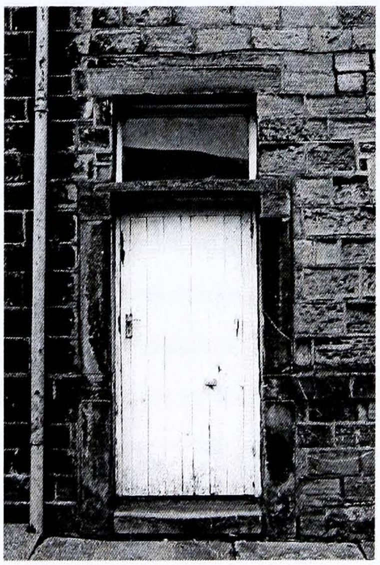

Plate 2.4 *Original entrance to the 1819 mill in the north elevation*

The original entrance to the ground floor of the mill was via a doorway in the north elevation immediately north of the entrance to the wheel chamber (Plate 2.4). The wider door immediately west of this doorway is a modern insertion formed out of an original window. The internal structure of the mill was of a traditional construction with timber cross-beams supported on all floors by a single, off-centre row of cast-iron columns. The columns are purely structural and there is no evidence to suggest that they support the system of power transmission and none had bolting heads to support brackets for that purpose (RCHME 1986a, 5). The form of the columns varies across the mill. Those on the ground floor have octagonal plinths, moulded bases and caps and shaped top plates, whilst those on the first floor have circular shafts, the lower half with four fillets, fluted caps and shaped top plates. There is no obvious explanation for this variety but it may reflect economic stringency with pre-cast columns used rather than columns cast specifically for the building of the mill. The roof comprises six queen post trusses with struts and collars (sawn-off) and tusk-removed purlins, with iron straps binding the post and rafters. Although the original gable walls have been taken down the form of the roof trusses suggests that the attic was a useable space and it is therefore likely that it was once lit by windows in each gable. There is no evidence for stairs in the original mill and it is therefore likely that they were wooden and rose out of each of the main floors. The most likely position for them would be in the narrow bay immediately west of the wheel chamber and here they would be well placed for the original entrance in the north elevation.

Evidence for the system of power transmission in the mill is minimal, since the interior has been modernised. However, it is clear that the basement was never powered, but all other floors in the mill undoubtedly were. On the ground floor that evidence which survived at the time of the RCHME survey included a small recesses high in the wheel chamber wall, indicating that power was taken along immediately south of the row of columns. As the columns do not have bolting heads, the lineshafts must have been supported on hangers attached to the cross-beams. On the first floor it appears that there were two lines of shafting either side of the line of columns and therefore more or less on the central line of the mill. A blocked wall box related to one of these lines of shafting was located in the west wall just over one and a half metres south of the line of columns. On the second floor less evidence survived but there was a wall box does survive in the east gable wall, some 60 centimetres to the south of the row of columns. This box, which was only visible on the outer face of the wall (from within the second eastern extension) was cast iron and, unusually, circular in form. In the attic, a small blocked box over the south window in the west gable lines up with paired holes in each principal rafter suggests that a line shaft was supported at each end in wall boxes and by hangers from each rafter. Because it was not possible to reinspect this evidence and the RCHME did not record it any detail it is impossible to reconstruct this system of power transmission, but the evidence suggests a relatively simple system with drive taken from the waterwheel and transmitted to principal vertical shaft and then to horizontal shafts on each floor.

Contemporary with the 1819 mill is a row of five workers' cottages outside of the main entrance to the site to the south (Plate 2.5). There were originally at least two more cottages to the northeast of the mill which are shown on plans for the 1887 mill at which time they demolished (RCHME 1986a, 10). These cottages were located on an extension of Ebor Lane which passed to the east of the original mill yard belonging to the 1819 mill. The cottages are built in a vernacular style of coursed dressed millstone grit and have stone slate roofs. They are stepped up the hillside to the south and are of two storeys with a single room at each floor level. Their location close to the mill, and the fact that similar cottages to the north were demolished to allow the expansion of the site, suggests that they were built to house workers at the site and owned by the firm operating the mill.

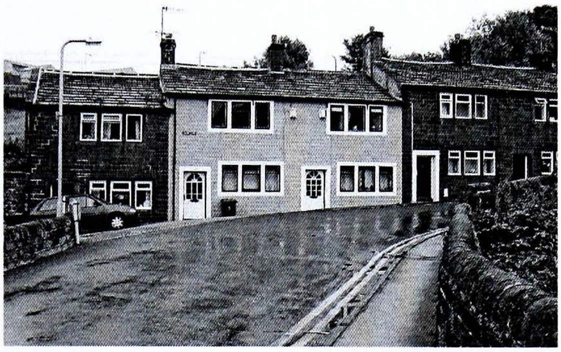

Plate 2.5 *Workers' cottages outside the main entrance to the site*

- PHASE TWO

By 1848, the 1819 had been extended to the west by two bays (Hodgson 1879, 119; RCHME 1986a, 4; Figure 2.4). The extension to the west maximised the available space between the existing mill building and the weir to the west to the extent that the new western elevation is built up against the weir. It was presumably built as a response to the need to increase the productivity of the mill and extending to the west, though necessarily limited, was deemed easier than extending to the east of the wheelpit. The extension was built in sympathy with the original mill, although only one of the windows at ground and first floor level have double lintels. A straight joint between the original mill and the western extension is clear on the south elevation with five courses of unbonded masonry beneath the eastern most of the windows in the extension (Plate 2.6). The eaves course of paired brackets from the main mill was repeated

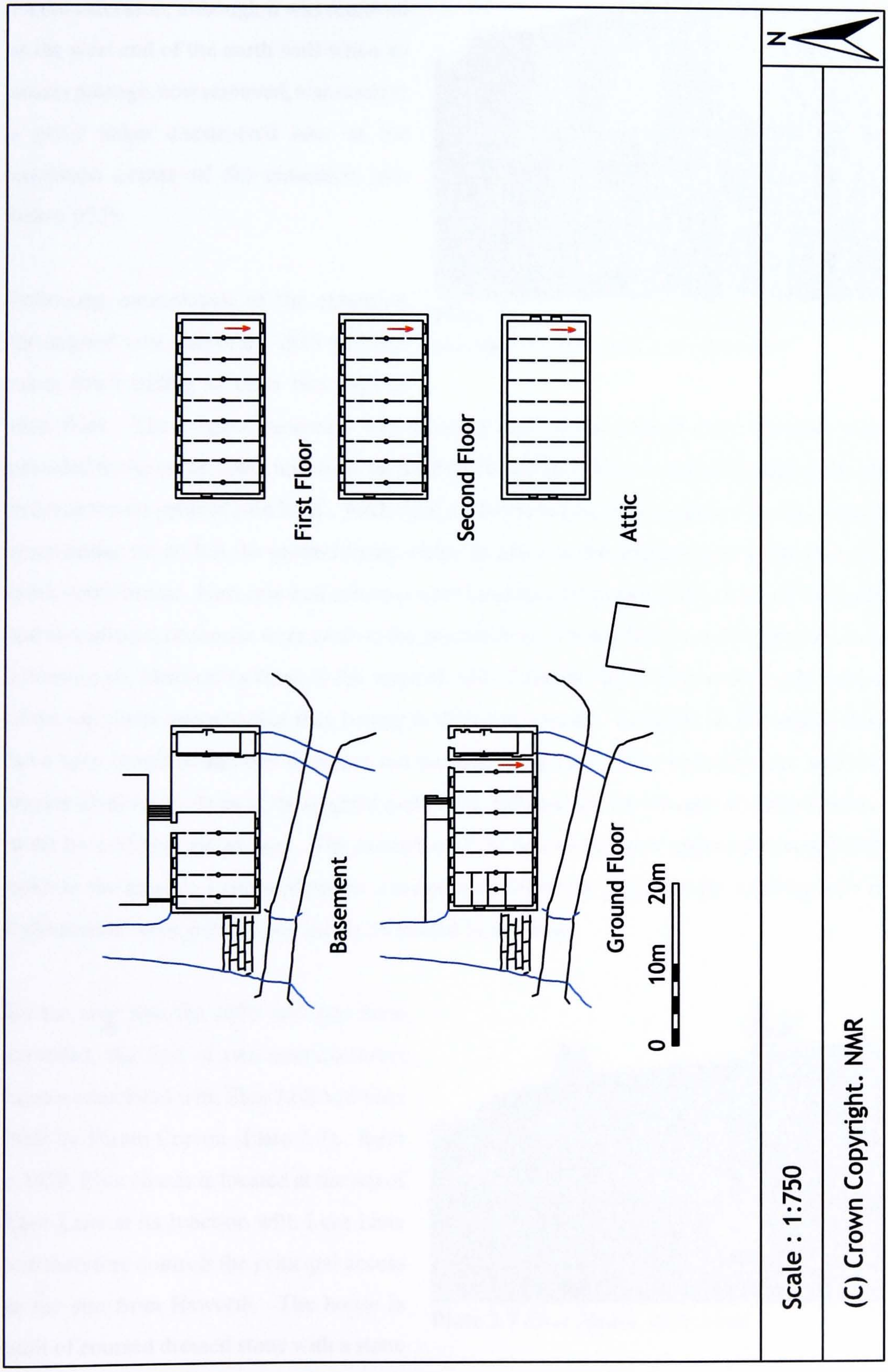

Figure 2.4 *Phase Two, Ebor Mill*

on the extension, although it was removed at the west end of the north wall when an access passage, now removed, was made to a privy tower constructed later at the northwest corner of the extension (see below p72).

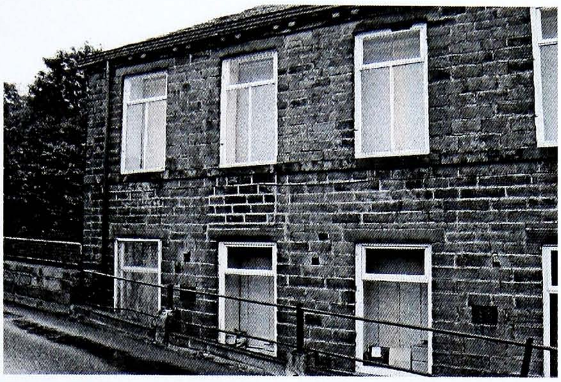

Plate 2.6 *South elevation of western extension showing straight joint with main mill*

Following construction of the extension the original west wall of the 1819 mill was taken down adding an extra two bays to each floor. The original basement was enlarged and on the ground floor windows were provided to the north, south and west, on the first and second floors to the north and south and in the new west gable at attic level.. Each floor of the extension were supported by two wooden cross-beams on all but the ground floor, where in place of the westernmost beam there are north-south beams. New cast iron columns were introduced throughout the enlarged basement and two identical columns were used on the ground floor. On the first floor the columns in the extension are identical to those in the original mill, although minor differences in the setting of the top plates suggests that they belong to different periods. Columns on the second floor have been boxed in and can therefore not be seen. The roof of the extension has two roof trusses identical to those in the original part of the mill, but for the absence of a small cut-out at the base of each queen post. The extension of the mill to the west apparently caused little upset to the existing system of power transmission within the mill, and the existing lines of transmission were presumably simply extended to the west.

By the time that the 1819 mill had been extended, the first of two manufacturers houses associated with Ebor Mill had been built by Hiram Craven (Plate 2.7). Built *c.*1829, Ebor House is located at the top of Ebor Lane at its junction with Lees Lane and therefore controls the principal access to the site from Haworth. The house is built of coursed dressed stone with a stone slate roof. It is of two storeys and five bays, the central three bays comprising the original

Plate 2.7 *Ebor House, Lees Lane*

house and those to either side later additions.

- PHASE THREE

By 1886, when plans for the new spinning mill along the eastern boundary of the site were drawn (Document 2.1) the 1819 mill was extended to the east in two phases. Although the time lapsed between each extension may have been slight they represent two distinct phases of structural activity and are therefore dealt as two individual phases. Phase Three therefore relates to the first eastern extension.

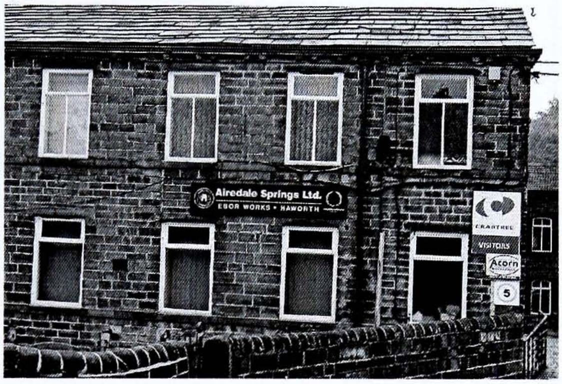

Plate 2.8 *Eastern extensions to the 1819 mill; the first extension is represented by the middle two bays shown*

The first eastern extension was of two bays and was built in a style sympathetic to the original 1819 mill (Plate 2.8; Figure 2.5). The proportions of the fenestration and openings in the extension copy those seen in the main mill but none of the lintels are double. There is a straight join between the original mill and the extension but this is partly obscured because the western most windows in the extension are built up against the original east elevation. The new east wall had centrally placed taking-in doors on the first, second and attic floors with two small windows flanking the attic doorway. The extension seems to have built to provide additional working space in the mill but because of the presence of the wheelpit in the eastern end of the original mill it was only on the first floor and above that the east wall of the earlier structure could be removed and the amount of working space increased. At ground floor level the new extension housed two rooms, one of an irregular shape owing to the topography of the bedrock at the southeast corner of the mill. On the ground floor the rooms are spanned by east-west cross-beams whilst on all other levels north-south beams are supported by cast-iron columns. The northern most of the two ground floor rooms was accessed by a doorway in its north wall. The function of these rooms is unclear but they may have been used storage. In the attic a queen post truss, without shaping or struts, was positioned on the line of the original east wall and purlins span from it to the east wall of the extension (RCHME 1986a, 5).

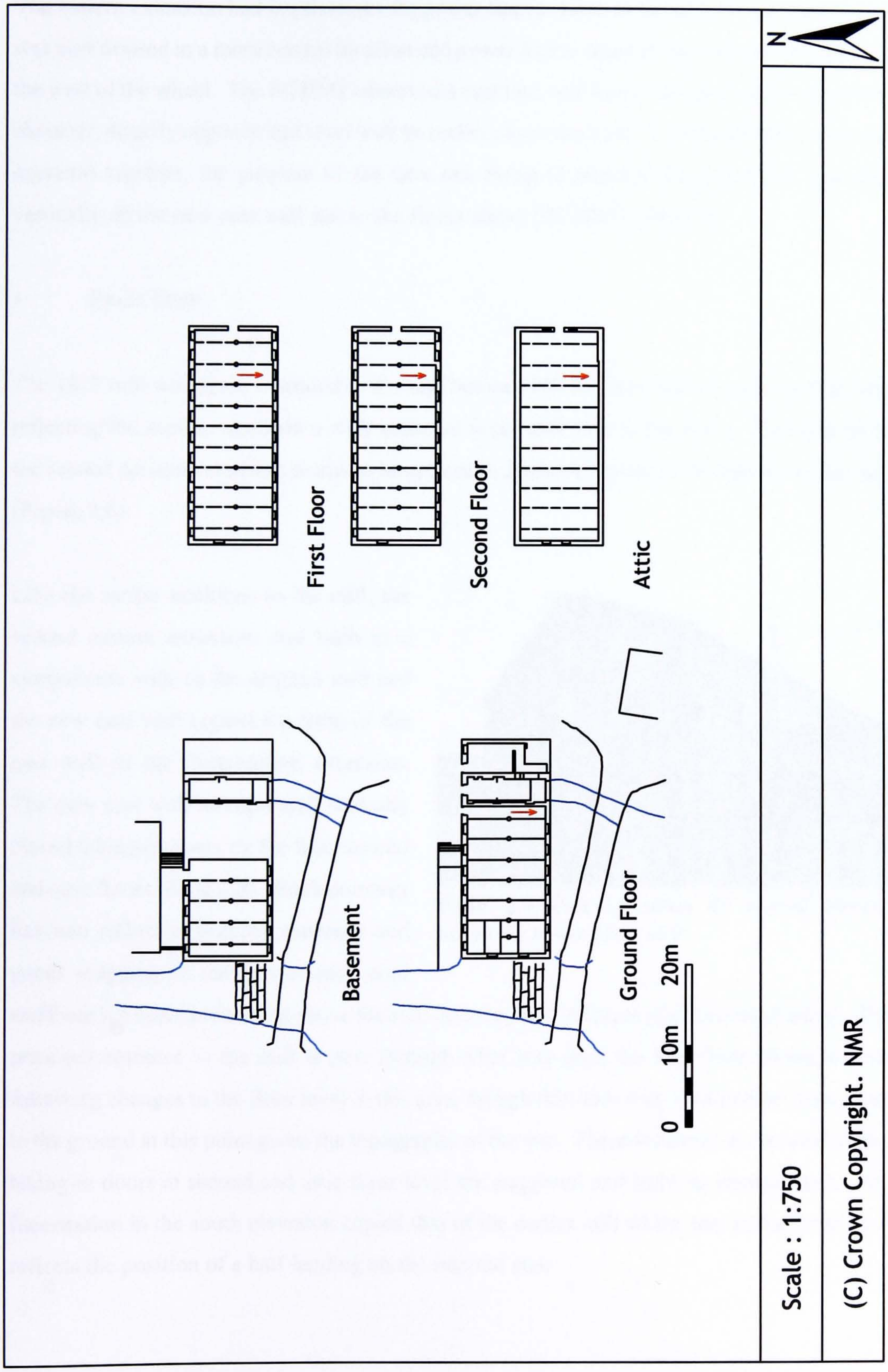

Figure 2.5 *Phase Three, Ebor Mill*

The eastern extension had implications for power transmission in the mill for the waterwheel was now housed in a more central location and power had to taken to the east and as well as to the west of the wheel. The RCHME observed a cast iron wall box in the east wall of the wheel chamber, directly opposite and level with an earlier one to the west. It seems that the two boxes operated together, the purpose of the new one being to transfer the drive east, and then vertically up the new east wall and to the floors above (RCHME 1986a, 4).

- PHASE FOUR

The 1819 mill was again extended to the east before 1886 but this time by only a single bay, reflecting the need to maintain a wide entrance to the mill yard to the north. The purpose of the second eastern extension seems to have been to improve access to the interior of the mill (Figure 2.6).

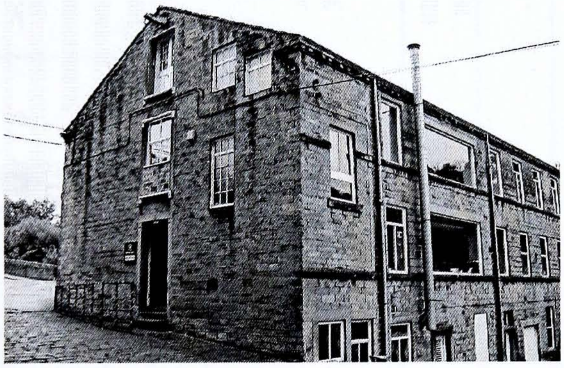
Plate 2.9 *East elevation of second eastern extension to the 1819 mill*

Like the earlier additions to the mill, the second eastern extension was built in a sympathetic style to the original mill and the new east wall copied the form of the east wall of the first eastern extension. The new east wall incorporated centrally placed taking-in doors on the first, second and attic floors (Plate 2.9). Each doorway has iron rollers to prevent materials and goods snagging on the sills of each door and there is a beam protruding above the attic doorway with remains of a hoist mechanism. The principal entrance to the mill is now through what was once the first floor taking-in door following changes to the floor level in this area, though this door may always have been close to the ground at this point given the topography of the site. Three windows to the north of the taking-in doors at second and attic floor level are staggered and light an internal stair. The fenestration in the south elevation copied that of the earlier mill whilst that in the north wall reflects the position of a half landing on the internal stair.

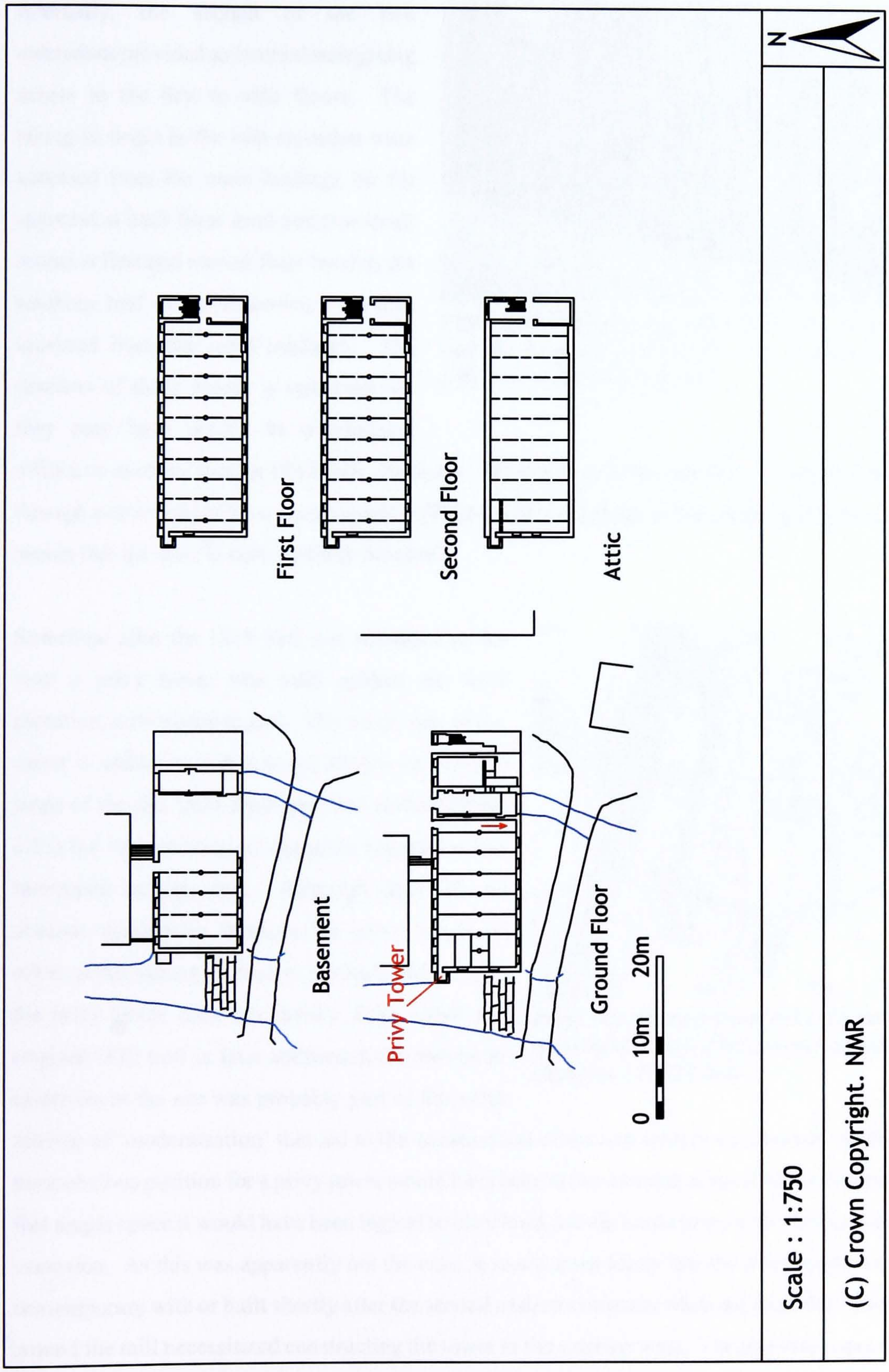

Figure 2.6 *Phase Four, Ebor Mill*

Plate 2.10 *Changes to ground levels have meant that the entrance to the eastern most extension left) is now partially blocked*

Internally, the second of the two extensions provided an internal stair giving access to the first to attic floors. The taking-in doors in the east elevation were accessed from the main landings on the staircase at each floor level and two small rooms at first and second floor level in the southern half of the extension were also accessed from the main landings. The function of these rooms is unknown but they may have served as overlookers offices or used for storage (RCHME 1986a, 6). The entrance to the extension was contrived through a door flanked by a square window (Plate 2.10) but changes to the outside ground level means that the door is now partially blocked.

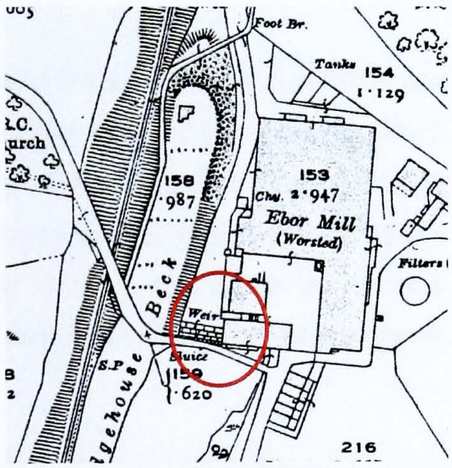

Plate 2.11 *Extract from 1934 OS map showing absence of privy tower on west elevation of 1819 mill*

Sometime after the 1819 mill was extended to the west a privy tower was built against the west elevation at its northern end. The exact date of the tower is unknown and it is not shown on any OS maps of the site until after the 1934 edition (Plate 2.11) but its architectural character suggests a late nineteenth century date. Although there are no obvious similarities between the privy tower or either of the eastern extensions (indeed, stylistically the privy tower does not borrow from either the original 1819 mill or later additions), the provision of privies at the site was probably part of the same scheme of 'modernisation' that led to the construction of the two eastern extensions. As the most obvious position for a privy tower would have been at the east end of the mill where there was ample space it would have been logical to have built it at the same time as the first eastern extension. As this was apparently not the case, it seems most likely that the privy tower was contemporary with or built shortly after the second eastern extension when the available space around the mill necessitated constructing the tower to the extreme west. The hygienic aspects of constructing the privy tower over the Leeshaw Beck may also have determined its position but given that all other privies at the site but this time were earth closets this may not have been a significant factor.

The privy tower rises the full height of the mill and provides a single closet at each floor level including the attic (Plate 2.12). Its walls are not bonded into the structure of the western extension and it is therefore stratigraphically later than that building. It had small windows at ground, first and second floor level in its south wall, some of which are now blocked. Access to each privy was from each floor level, though in the attic an intermediate truss in the last bay of the roof was inserted to allow the construction of the passage to the gable wall (RCHME 1986a, 6).

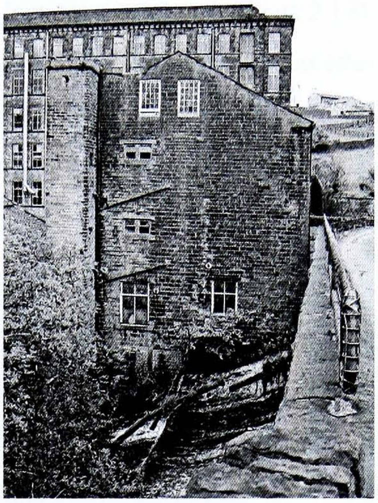

Plate 2.12 *Western elevation of 1819 mill and privy tower*

- EVOLUTION OF EBOR MILLS, MID - LATE NINETEENTH CENTURY

Following the purchase of the site by the Merrall Brothers in the mid-nineteenth century the site of Ebor Mills experienced significant expansion and moved towards integrated working. Much of the evidence for the mid-nineteenth century expansion of the site has not survived as many of those buildings were replaced by later buildings but something of the evolution of the site can be traced in the archaeological evidence that does survive. Although it has not been possible to analyses these later stages the architectural style of the site is of particular interest as an example of late period mill building.

The first change undertaken by the Merrall Brothers was to build a second spinning mill on the northern side of the mill yard to the 1819 mill and the construction of this second building may have be contemporary with the first extension to the 1819 mill (Phase Two). Little survives of the second spinning mill except sections of its ground floor south wall, reused first as the south wall of a weaving shed and later as the

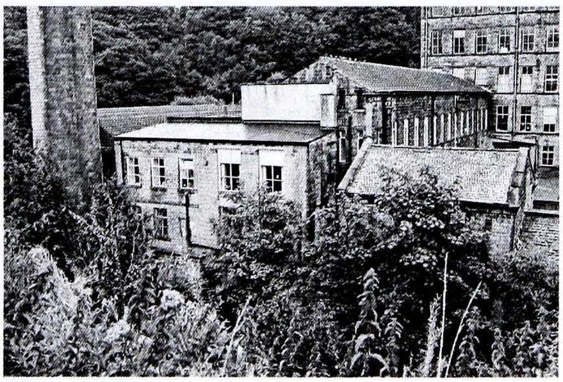

Plate 2.13 *Engine house formerly attached to the second spinning mill at Ebor Mill*

ground floor north wall of a warehouse block (see below; RCHME 1986a, 7). The second spinning mill was steam powered and the major survival from it is its engine house (Plate 2.13). It is a tall rectangular structure and probably housed a beam engine. It became redundant after the construction of the second engine house (see below p74) and a floor inserted to created two rooms. A storeroom to the north of the engine house is contemporary and may have been used as a mechanics shop (RCHME 1986a, 8).

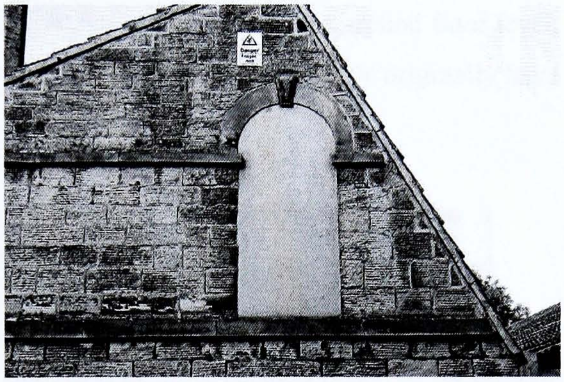

Plate 2.14 *Round-headed louvre openings in eastern gables of north-lit roof to weaving shed*

The second spinning had on a short-lived existence for before 1886 it had been replaced by a weaving shed. This quick succession of buildings perhaps represents the rapid move towards integrated working at the site after the mid-nineteenth century and given the topographic constraints of the site and the existence of cottages along its northern boundary, the site of the second spinning mill may have been the only suitable location for a weaving shed. The shed was extended to the north and privies provided along its northern elevation before 1886. It was powered by the engine house that had been built for the second spinning mill. The eastern gables of the north-lit roof incorporate round-headed louvred openings with finely tooled keyblocks and bands at their base and at impost level (Plate 2.14). This is an unusual concession to architectural detailing on a single-storey shed.

Plate 2.15 *Centrally placed taking-in door and wide Egyptian -style opening to warehouse block*

A warehouse block was built along the southern front of the weaving shed, probably in the 1870s; it had certainly been built by 1886 when it is shown and named as a warehouse on architects plan for the 'New Mill' (Document 2.1). Its is built of coursed rubble with interrupted horizontal tooling and is of two storeys with attics. The south wall of the weaving shed is used as its ground floor north wall. The south elevation, facing into the mill yard and entrance, was clearly designed as a display front. It is fourteen bays long with sill and impost bands, segmental arched openings which differ between the floors, a corbelled course and rusticated corner piers. A centrally-placed taking-in door was set above a wide, Egyptian-style opening and beneath a broken pediment, but this was taken down during the 1980s (RCHME 1986a, 9; Plate 2.15). A privy tower, stratigraphically later than the warehouse block, was built into the angle of the warehouse and the first engine house. It is of coursed rubble externally and brick internally. The rubble has interrupted horizontal tooling, with dressed sill and impost bands and window architraves. At ground floor level, opening into the basement of privy tower is a large opening that would have originally have taken a soil wagon.

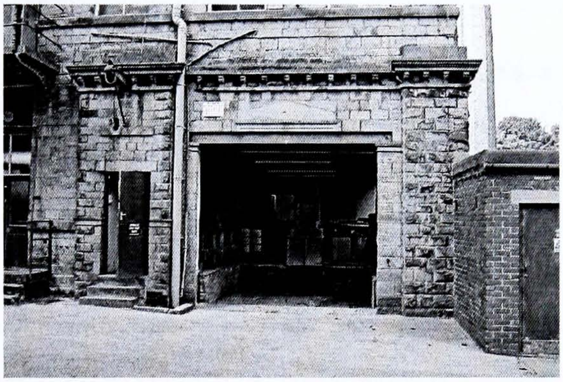

Plate 2.16 *East elevation of the second engine house*

Pre-dating the 'New Mill' of 1886 (which is built over it) is a second engine house. It was built to power the enlarged weaving shed but as it is stratigraphically later than the shed, the shed must have been run for a time from the first engine house. Although later than the warehouse block, the second engine house was clearly built to compliment it and is constructed of coursed rubble walls and employs corner piers and a corbelled cornice. The south wall originally had four segmental-headed windows linked by sill and moulded impost bands and a door at the west end. The door survives but the windows have blocked, presumably when the engine house was incorporated into the later 'New Mill'. The north wall has five, much altered plain segmental-headed windows. The east elevation, recently altered upon conversion of the engine house to a loading bay, originally had a three light opening, the middle light wider and slightly taller than the side lights and surmounted by a tablet-shaped block (Plate 2.16; RCHME 1986a, 10).

Internally, much of the evidence for the steam engine has been removed, the principal alteration being an inserted modern floor across the top of the stone engine bed, which is still partially visible at basement level. The ceiling retains five original cross beams with roll mouldings and moulded timber cornices. They support a series of joist rings associated with the former engine and were probably used during the construction of the engine and to enable parts of the engine to be removed and cleaned.

The last phase of expansion at the site saw the construction of the 'New Mill' *c.*1887. It was designed by W. and J.B Bailey, architects of Bradford and Keighley (Document 2.1). As built, the 'New Mill' is eighteen bays long, six bays deep and five storeys over a basement (Plate 2.17). It is built of brick walls throughout with a stone facing of coursed rubble with combined vertical and interrupted horizontal tooling, and has sill bands, rectangular lintels, a bracketed cornice and, to the east and west, a parapet with shaped ends which conceals a saw-tooth north-lit roof. All elevations of the mill are highly visible in the surrounding landscape and attention was therefore paid to the detail of all the elevations. Iron brackets and rings, intended to allow cradles to be hoist on the exterior to clean and paint windows occur over most of the bays. Internally, two main forms of construction have been used. The basement has a fireproof construction but the other floors adopt a more conventional construction combining timber and iron; all floors have identical cast-iron columns with square-sectioned upper parts capable of supporting brackets for power transmission on any face (RCHME 1986a, 10). On all floors, this row is positioned slightly off centre to the east of the mill, presumably allowing a horizontal lineshaft to pass down the centre line of the mill, support by brackets attached to the western face of the columns.

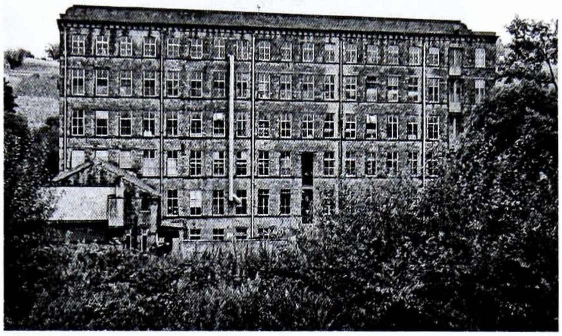

Plate 2.17 *West elevation of the 'New Mill', 1887*

The south elevation comprises two bays of the mill, a projecting end staircase tower and, in the angle between them, a combined privy and hoist tower (Plate 2.18). Three narrow openings, partly louvred, light three privies and a further one lights the hoist. At ground floor level there is an opening for a soil wagon (now blocked), reminiscent of that at the west

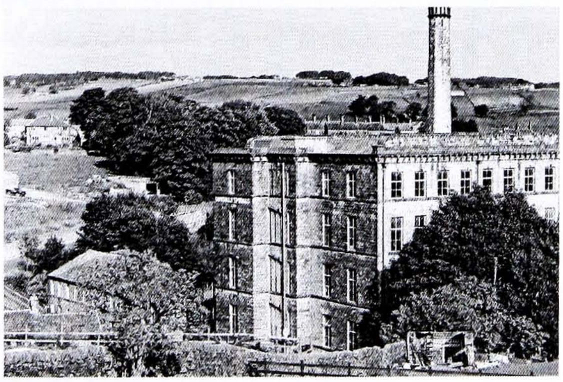

Plate 2.18 *South elevation of the 'New Mill' with projecting staircase and privy/hoist towers*

end of the warehouse block.

The east elevation incorporates the second engine house at its north end, but is otherwise plain except of the windows; a fire escape was added in the twentieth century necessitating conversion of windows in one of the bays into fire doors. The north elevation, built over the wall north of the second engine house, is six bays long with a pair of blind windows in the centre of the second and third floors. An external iron ladder enabled bearings in cast iron boxes at first, second and third floors to be greased and renewed from outside (Plate 2.19). Wheels taking rope drive on the inside made such a perilous arrangement necessary (RCHME 1986a, 11).

Plate 2.19 *North elevation of 'New Mill' with external ladders providing external access to wall boxes*

The mill is currently used for light engineering and the ground to third floors house modern machinery and much of the evidence for the former appearance of the mill has been removed; access to these floors was limited. However, the fourth floor is a rare survival of a mill floor that has remained relatively untouched since the 1930s. It is currently used only for storage as the north-light roof makes it too cold to work in during the winter months, and it retains its 1930s colour scheme with a royal blue painted dado with the walls painted dark grey below and lemon above. Whether this colour scheme is original or whether it continued throughout the mill is not known. The fourth floor also shows evidence for timber walkways consisting of areas of raised flooring demarcating square and rectangular areas where machinery was located (sources indicate that drawing machinery was housed on this floor (RCHME 1986a, 11) although much of this evidence is obscured by the storage of materials in the space, a central walkway running the

Plate 2.20 *'Raised' central walkway, fourth floor of the 'New Mill'*

length of the mill can still be clearly observed (Plate 2.20).

The mill was well lit by natural light, especially on the fourth floor where a combination of top and side lighting was used. The main windows of the mill are all three panes high, two wide and with the upper two panes opening inwards by means of an iron rod and u-shaped fitting. All floors were originally lit by gas carried in a pipe in an 18cm square recess up the inner face of the east wall (in the first pier in from the south end of the basement, tenth pier elsewhere) (RCHME 1986a, 11). Sanitation was provided on the ground to fourth floors by three closets at the south end with doors of two flush panels, each with beaded planks. The privies on the fourth floor retain their original appearance but elsewhere in the mill they have undergone modernisation. Originally they must have been dry since they emptied into a soil wagon at ground level. Immediately east of the privies is a hoist, now housing a passenger/goods lift, the front of which now protrudes into the mill (owing to its enlargement in modern times) but was originally flush with the inside south wall of the mill (RCHME 1986a, 11).

With the exception of the basement, access to all the floors in the mill was via a stair tower projecting from the south elevation. This has stone steps and rises with half landings, the central pier and side walls are of brick and the flights cross windows whose level is determined by the fenestration of the mill, not the staircase. On the fourth floor, the stair terminates and partly built over it is a small room with timber walls and glazed looking onto the stairs; it was perhaps used as a time or overseers office. The basement is entirely separate from the main floors of the mill, only communicating internally with the base of the hoist, via an angled passage leading to the basement.

Contemporary with the 'New Mill' and stylistically similar are the boiler and economiser houses and chimney located along the western boundary of the site. The boiler house was probably built on the site of an earlier boiler house serving the first engine house but no evidence for any such structure has survived. Both the economiser and boiler house are built of coursed rubble. The economiser house has a bracketed cornice and segmental-headed east window, which deliberately copies the style of the warehouse block - in contrast, the single window in the north wall and the south doorway are plainer with rectangular lintels. The roof has two trusses, originally king-post trusses whose tie beams have been sawn off at some later date and replaced with double collars. Iron bolts bind the beam and collar to the principal rafters, and the purlins and collar to the principal rafters (RCHME 1986a, 12).

The boiler house is located to the south of the economiser house; the relationship of the boiler and economiser houses and the chimney to the north is a logical arrangement with exhaust gases travelling from the boiler house through the economiser and towards the chimney (Giles and Goodall 1992, 152). The east elevation of the boiler house, facing into the mill yard, is four bays long and in each bay is a wide opening for the delivery of coal (Plate 2.21). The rusticated piers of this elevation and the moulded bands and pediment with a keyed-in circular window. The roof of the boiler house, with its apex raised slightly to provide ventilation, is carried on four iron trusses each comprising circular-sectioned horizontal and vertical tie rods and inverted T-section beams as principals and struts. Iron brackets support five timber purlins on each side (RCHME 1986a, 13). Workers entered the boiler house through a doorway at the east end of the north wall which has a square head and chamfered surround, which are twice interrupted. The boiler house was built to house four boilers with flues opening out of the west wall and leading off to the economiser and chimney. The seating for the two boilers in the northern half of the boiler house remain and the third and fourth boilers may never have been installed. The eastern third of the boiler was evidently left open, available perhaps for the storage of coal (RCHME 1986a, 13).

Plate 2.21 *East elevation of the boiler house*

To the north of the economiser house is the chimney, of coursed rubble with an octagonal-sectioned shaft rising from a gently battered, square-sectioned base; the shaft is crowned by a moulded and bracketed cap and cresting (Giles and Goodall 1992, 150-2). The date of the chimney is unclear. Stylistically it relates to the boiler and economiser houses and is probably therefore contemporary with them but it must therefore have replaced an earlier chimney serving the first engine house at the site.

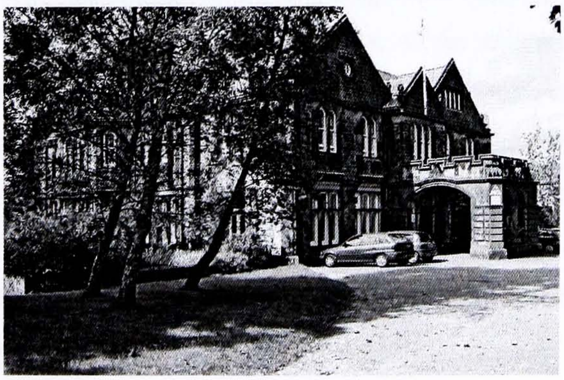

Plate 2.22 *Longlands House, Haworth*

Other structures at the site, such as the gas works, have not survived and much of the area to the north and northeast of the site has been cleared to provide a car park. Near contemporary with the last phase of structural activity at the site is Longlands House, a manufacturers mansion built high above the site to the east in 1884 by Edwin Merrall (Plate 2.22). The house is built in an Elizabethan style and includes some with Gothic detailing (Giles and Goodall 1992, 189). Ebor Mill, in particular the 1887 'New Mill', forms an impressive back-drop for the house; the close physical relationship between the house and the mill site was no doubt deliberate and both could be viewed from either site.

PROCESS RECORDING

As built, and as later altered and modified, the 1819 mill at Ebor Mill was used primarily for the spinning of worsted yarns (Plate 2.23). The layout of the mill suggests spinning on all floors with possible storage space in the basement and attic. The reference to the use of powerlooms in the mill intriguing and the only suitable place would have been in the basement or on the ground floor where the vibrations caused by the operation of the machinery could have been absorbed without causing major structural problems. By the late nineteenth century weaving sheds had been built at the site and presumably after this time the mill reverted solely to spinning yarn.

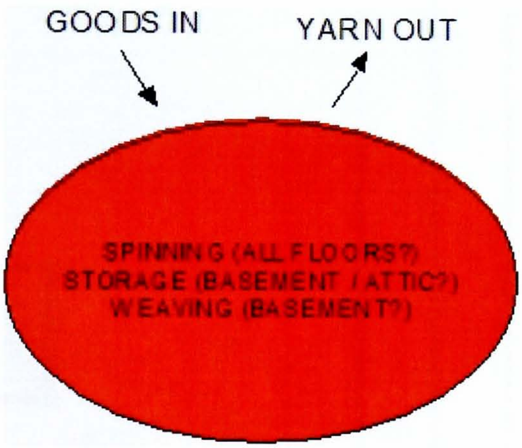

Plate 2.23 *Processes, Ebor Mill (all phases)*

For the earliest two phases at the site (Phases One and Two) the movement of materials and goods around the site was based on an inherently linear spatial structure (Figures 2.7 and 2.8: Table 2.1). Both phases had an identical spatial structure for the addition of the western extension (Phase Two) simply enlarged existing spaces within the mill rather than creating new spaces. The flow of materials and goods around the building was integrated by the ground working space of the mill (space 3) which has a low RA value of 0.333 and this reflects the fact that it was from this space that the all other floors of the mill could be accessed. The use of an internal stair rising between each of the floors therefore resulted in a linear structure within the complex placing the higher storeys of the mill in the deepest parts of the complex.

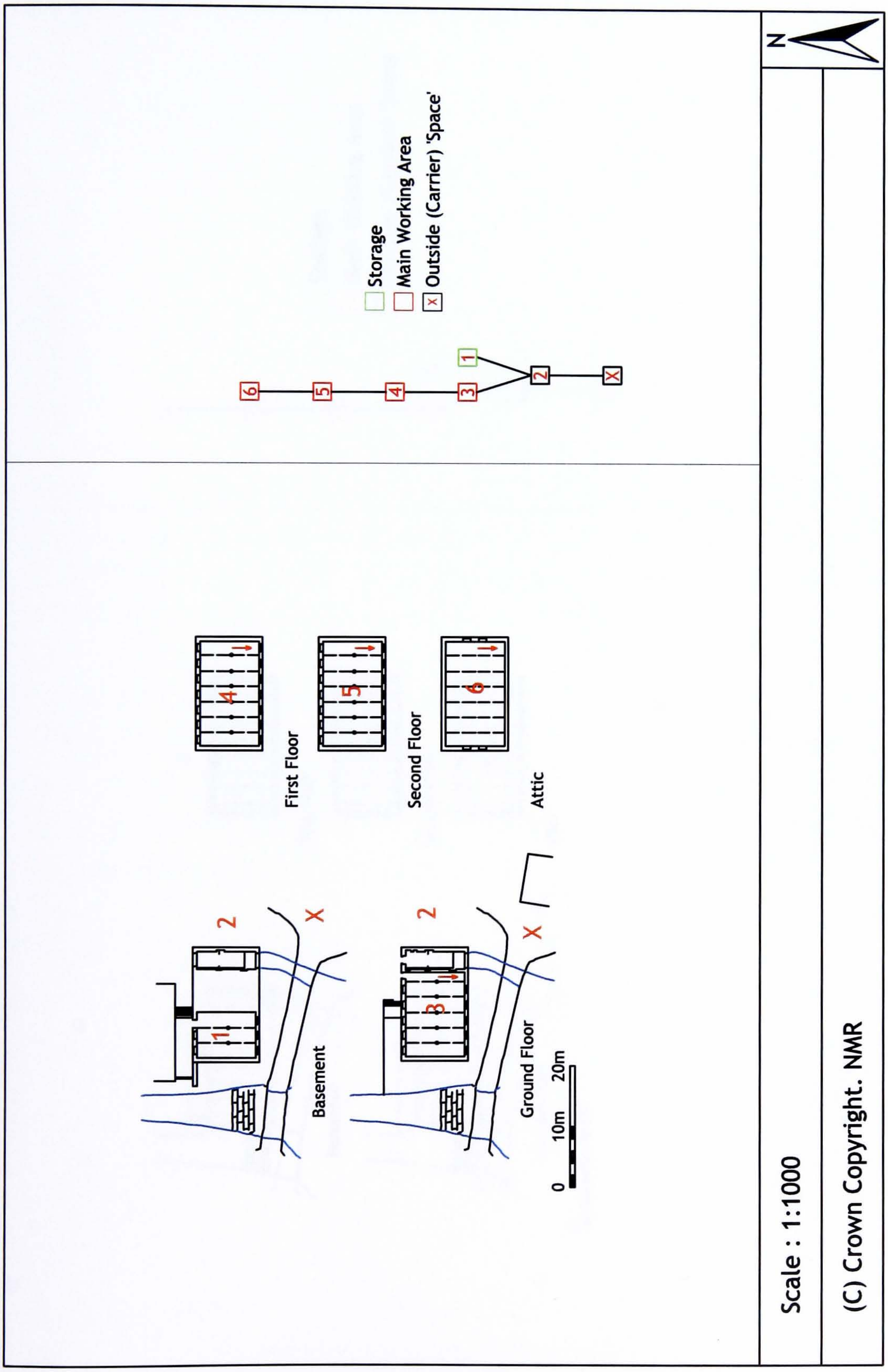

Figure 2.7 *Phase One: Gamma map of the movement of materials/goods*

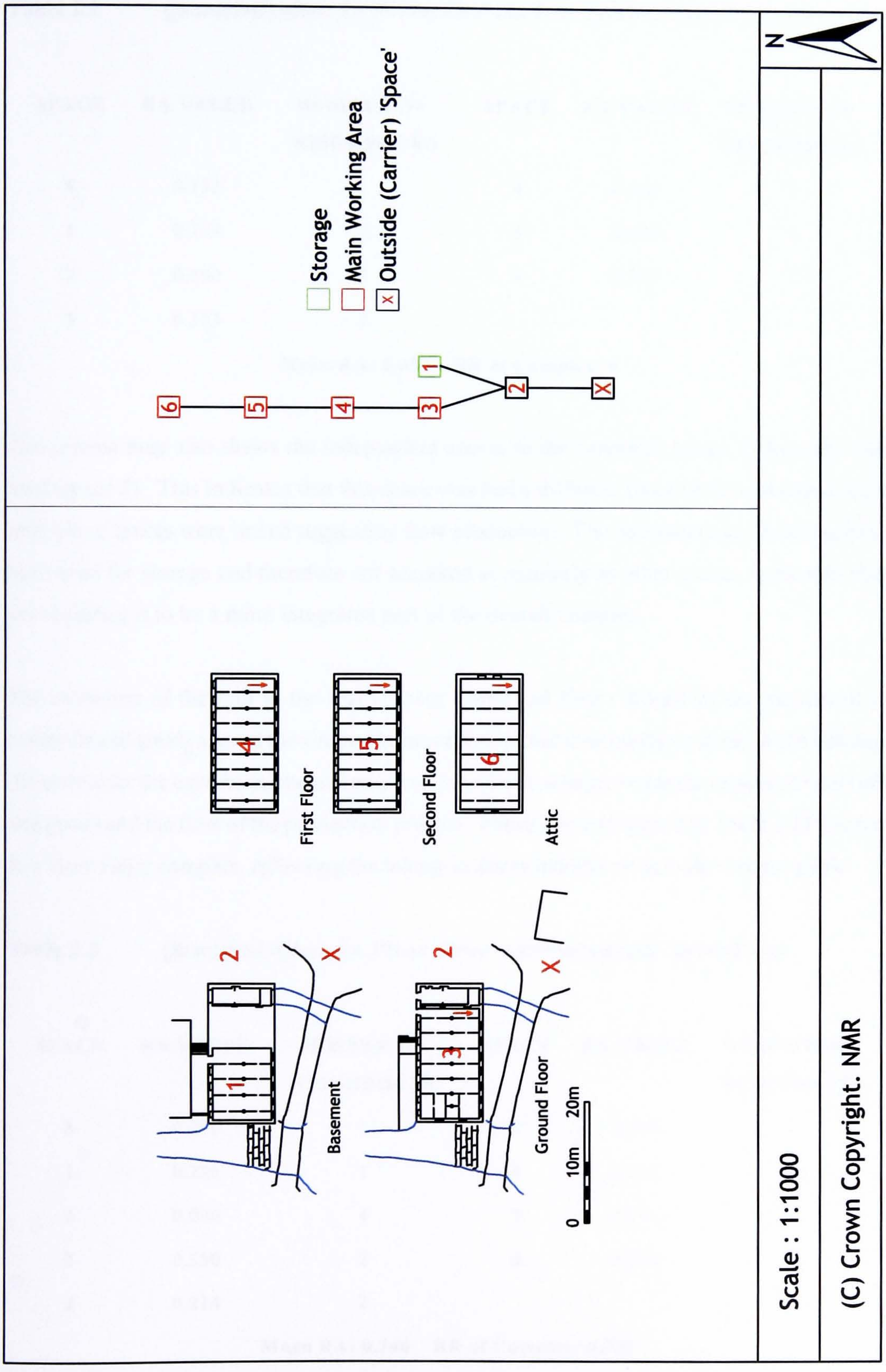

Figure 2.8 *Phase Two: Gamma map of the movement of materials/goods*

Table 2.1 *Quantified values for Phases One and Two 'materials/goods' gamma maps*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.733	1	**4**	0.400	2
1	0.733	2	**5**	0.600	2
2	0.400	3	**6**	0.933	1
3	0.333	2			

Mean RA: 0.688 RR of Complex: 0

The gamma map also shows the independent access to the basement (space 1) from the mill yard (space 2). This indicates that this space was had a different function from the rest of the mill where spaces were linked suggesting flow production. The basement may therefore have been used for storage and therefore not accessed as regularly as other spaces in the mill thus not requiring it to be a more integrated part of the overall complex.

The extension of the mill to the east (Phases Three and Four) did affect the movement of materials and goods around the site and because both introduced taking-in doors to the building the motive for the eastern extensions may well have been to improve the movement of materials and goods and the flow of the production process. Phase Three (Figure 2.9; Table 2.2) resulted in a more ringy complex, reflecting the taking-in doors introduced into the eastern gable.

Table 2.2 *Quantified values for Phase Three 'materials/goods' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.286	1	**5**	0.464	1
1	0.286	1	**6**	0.214	3
2	0.036	4	**7**	0.214	3
3	0.250	2	**8**	0.250	2
4	0.214	2			

Mean RA: 0.246 RR of Complex: 0.375

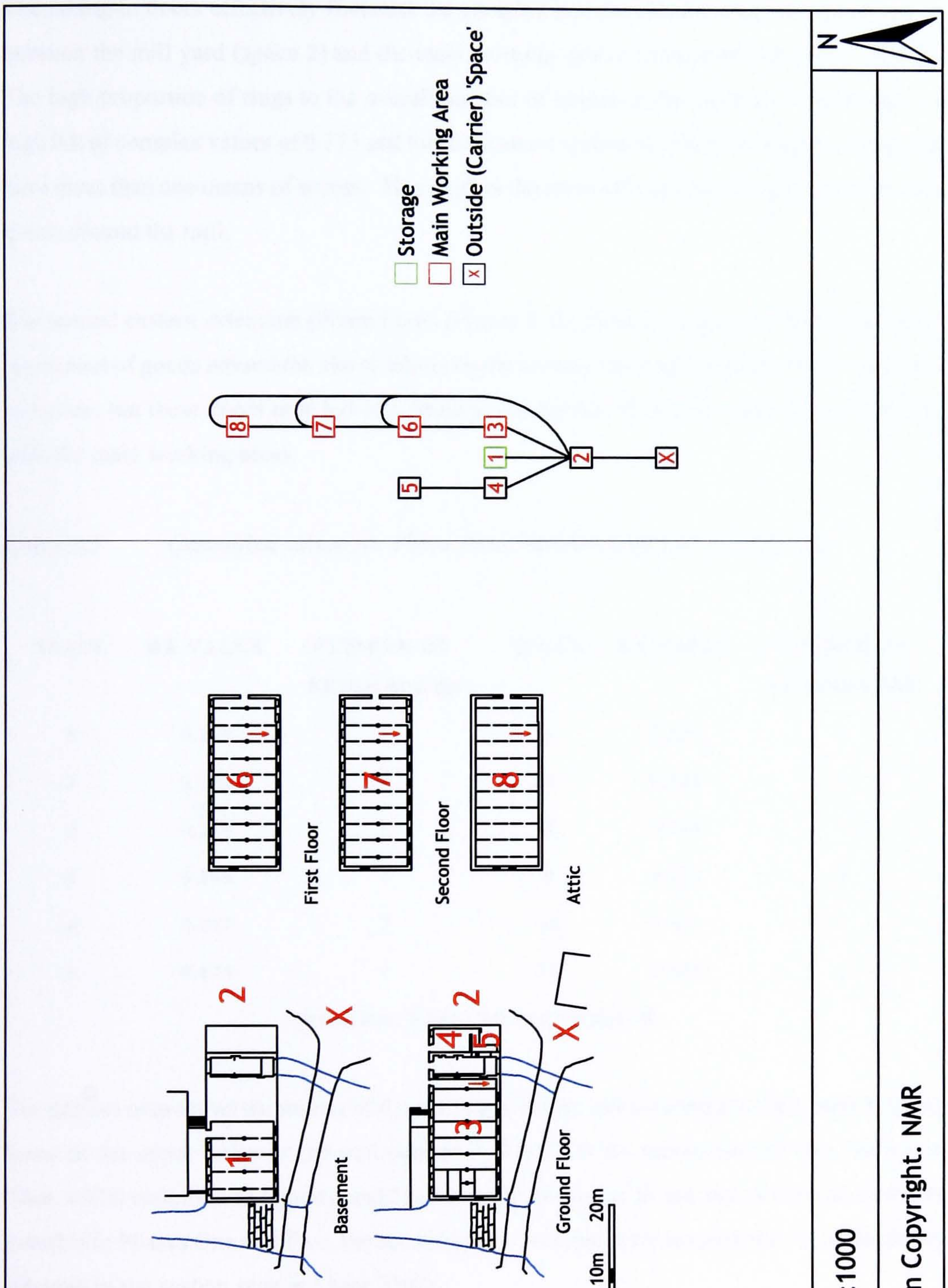

Figure 2.9 *Phase Three: Gamma map of the movement of materials/goods*

The taking-in doors effectively flattened the complex and provided a direct means of access between the mill yard (space 2) and the main working spaces in the mill (spaces 6, 7 and 8). The high proportion of rings to the overall number of spaces in the complex is reflected in a high RR of complex values of 0.375 and this indicates a system in which the majority of spaces have more than one means of access. This implies the more efficient handling of materials and goods around the mill.

The second eastern extension (Phase Four) (Figure 2.10; Table 2.3) also facilitated the easier movement of goods around the site as taking-in doors were once agin provided in the new east elevation, but these doors now led of a landing and did not, therefore, communicate directly with the main working areas.

Table 2.3 *Quantified values for Phase Four 'materials/goods' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.288	1	**6**	0.106	6
1	0.288	1	**7**	0.424	1
2	0.212	5	**8**	0.424	1
3	0.288	1	**9**	0.424	1
4	0.267	2	**10**	0.424	1
5	0.424	1	**11**	0.424	1

Mean RA: 0.332 RR of Complex: 0

The gamma map shows the impact of the landings clearly (space 6) and all of the main working areas on the upper floors of the mill (spaces 7, 9 and 11) are shown beyond this one space. Thus whilst materials and goods could more easily be moved in and out of the mill than was possible in Phases One and Two, the second eastern extension removed some of the flexibility inherent in the system seen in Phase Three.

ACCESS ANALYSIS

Access analysis of Phases One and Two reveals that the western extension did not alter the original spatial form of the mill which had an inherent linear character with the mill yard

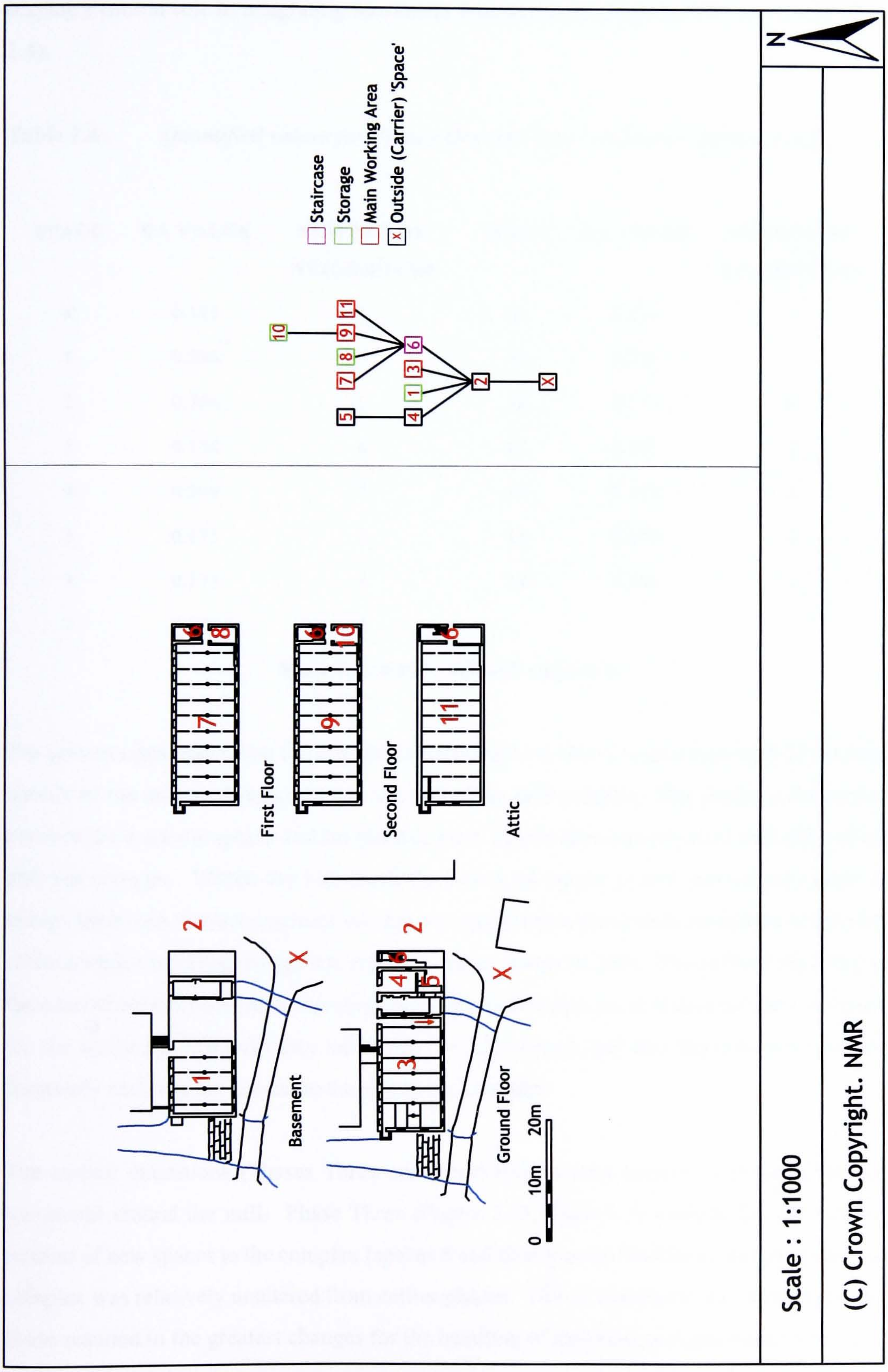

Figure 2.10 *Phase Four: Gamma map of the movement of materials/goods*

playing a central role in integrating movement around the site (Figures 2.11 and 2.12; Table 2.4).

Table 2.4 *Quantified values for Phases One and Two 'workforce' gamma maps*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.132	1	**8**	0.275	1
1	0.286	1	**9**	0.275	1
2	0.286	1	**10**	0.275	1
3	0.154	4	**11**	0.275	1
4	0.209	2	**12**	0.319	1
5	0.275	1	**13**	0.440	1
6	0.275	1	**14**	0.582	1
7	0.275	1			

Mean RA: 0.289 RR of Complex: 0

The gamma maps make clear the distinction between the workers houses (spaces 5-11) located outside of the mill yard (space 2) and the rest of the mill complex. This marks a distinction between the domestic sphere and the place of work despite the close physical proximity of the mill and cottages. Within the mill itself, the basement (space 1) and waterwheel (space 2) occupy their own distinct positions and are not integrated in movement around the remainder of the complex resulting in high RA values for these spaces (0.286). This reflects the fact that the waterwheel was not directly involved in the production process or human movement around the site whilst the basement may have been used for storage and was therefore not accessed frequently and thus not central to the rest of the complex.

The eastern extensions (Phases Three and Four) had varying impact on potential human movement around the mill. Phase Three (Figure 2.13; Table 2.5) essentially only added a number of new spaces to the complex (spaces 5 and 6) at ground floor level and otherwise the complex was relatively unaltered from earlier phases. This is significant for, in contrast, this phase resulted in the greatest changes for the handling of materials and goods (see above).

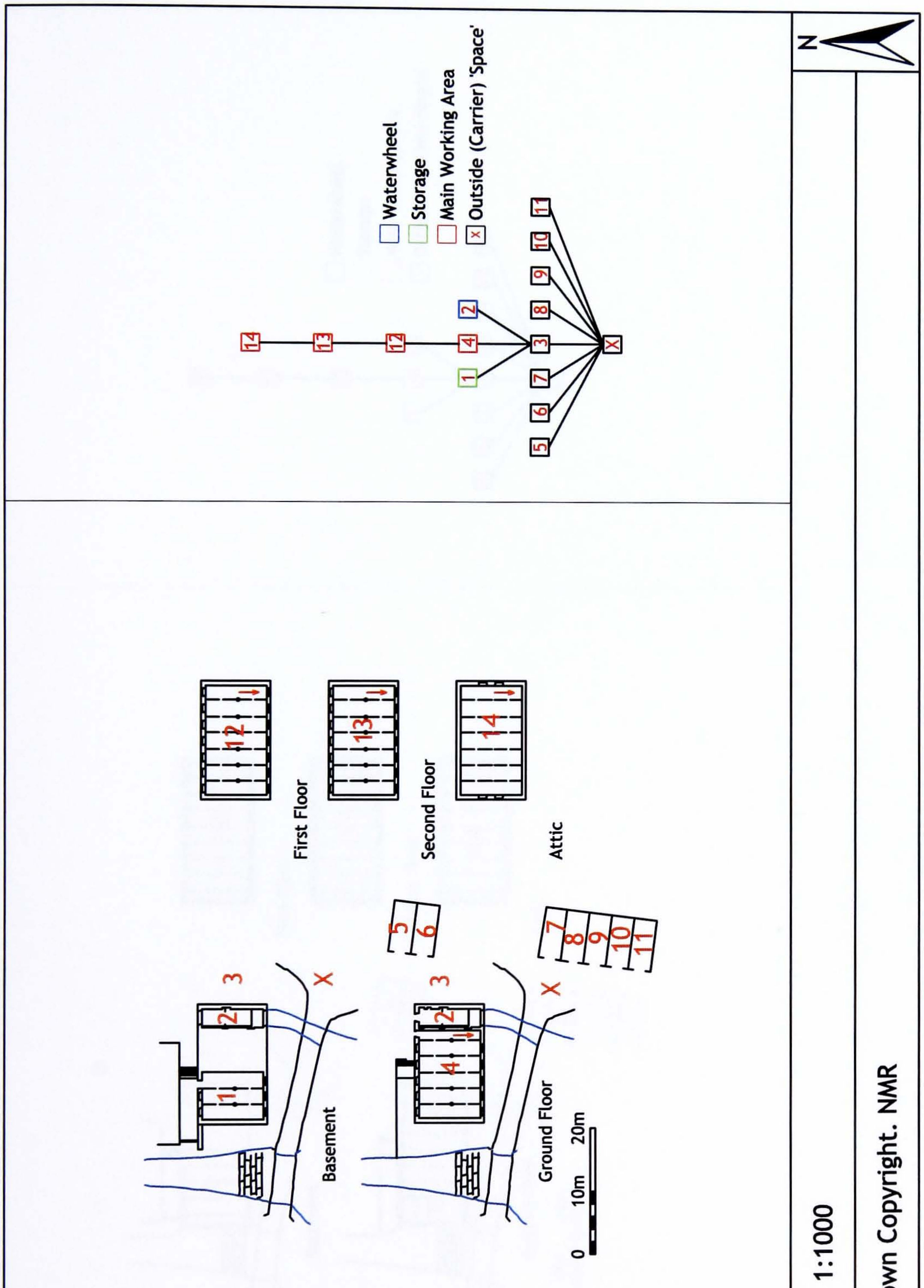

Figure 2.11 *Phase One: Gamma map of the movement of the workforce*

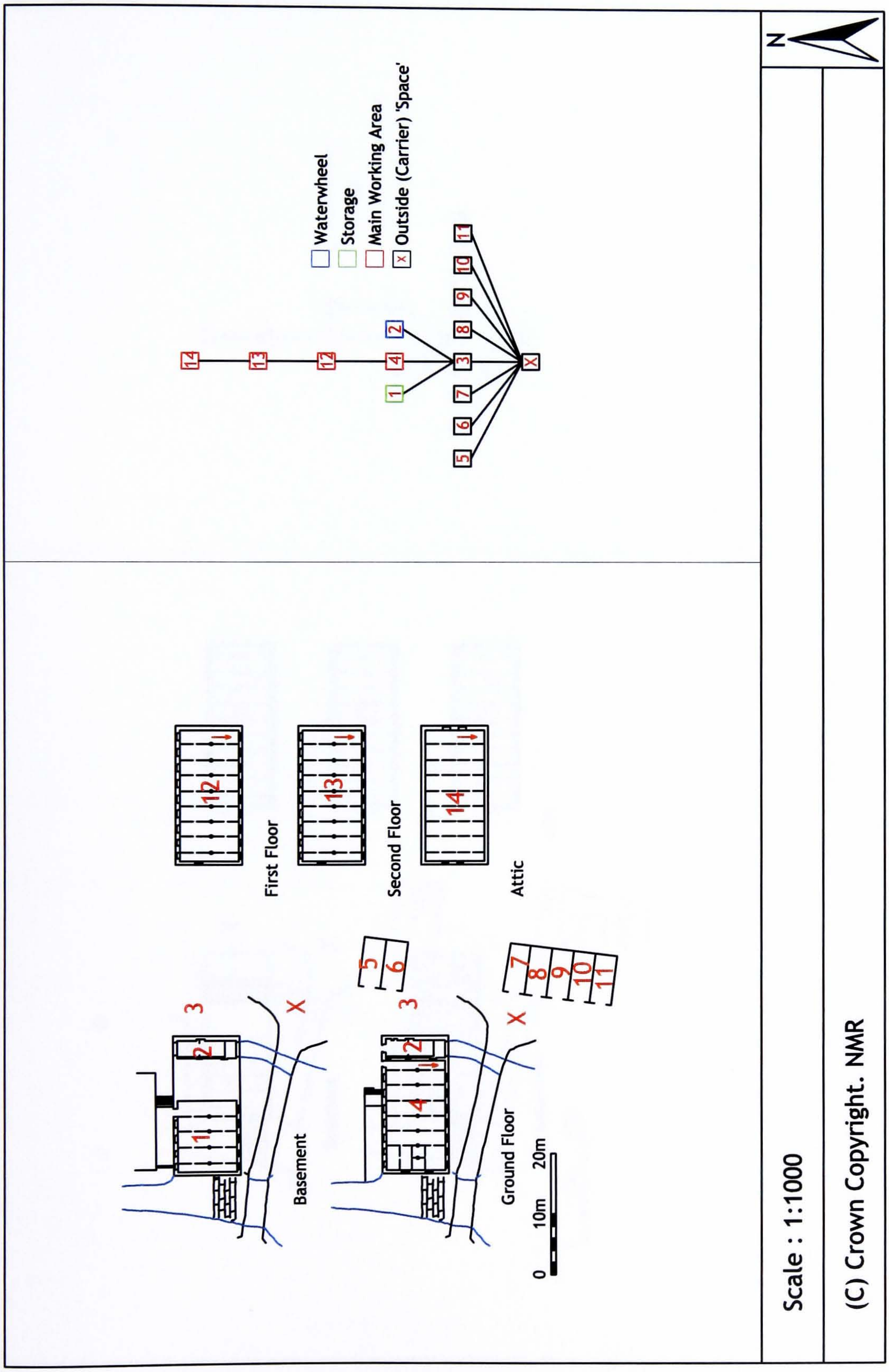

Figure 2.12 *Phase Two: Gamma map of the movement of the workforce*

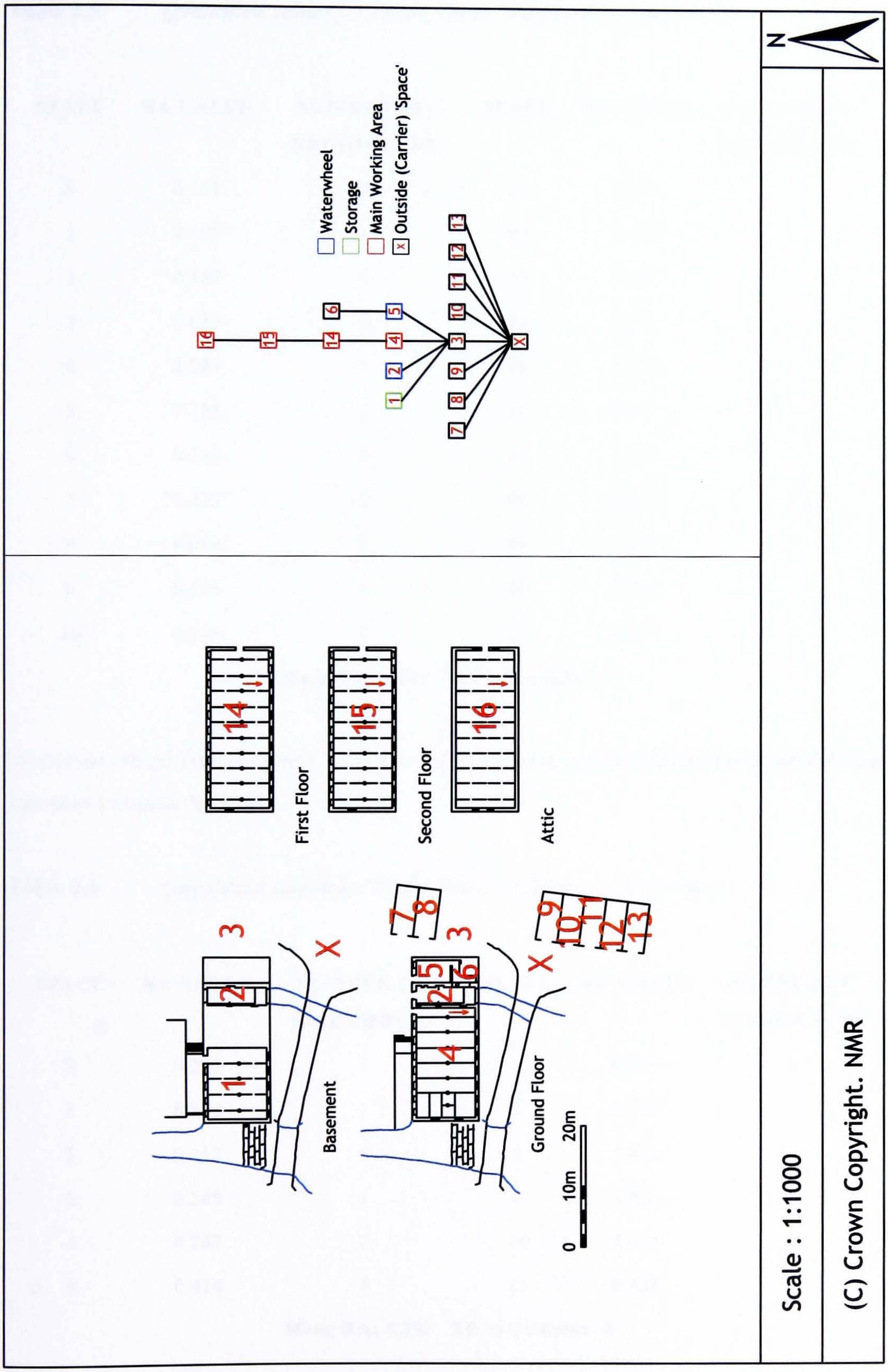

Figure 2.13 *Phase Three: Gamma map of the movement of the workforce*

Table 2.5 *Quantified values for Phase Three 'workforce' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.112	6	**11**	0.196	1
1	0.163	1	**12**	0.196	1
2	0.163	1	**13**	0.196	1
3	0.080	6	**14**	0.257	1
4	0.239	1	**15**	0.174	2
5	0.156	2	**16**	0.181	1
6	0.156	2	**17**	0.250	1
7	0.239	1	**18**	0.167	3
8	0.098	6	**19**	0.181	1
9	0.196	1	**20**	0.257	1
10	0.196	1	**21**	0.174	2

Mean RA: 0.187 RR of Complex: 0

In contrast, Phase Four (Figure 2.14; Table 2.6) resulted in a major change to potential human movement around the site.

Table 2.6 *Quantified values for Phase Four 'workforce' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.288	1	**6**	0.106	6
1	0.288	1	**7**	0.424	1
2	0.212	5	**8**	0.424	1
3	0.288	1	**9**	0.424	1
4	0.267	2	**10**	0.424	1
5	0.424	1	**11**	0.424	1

Mean RA: 0.332 RR of Complex: 0

The principal change saw the creation of a staircase (space 8) in the eastern most extension and

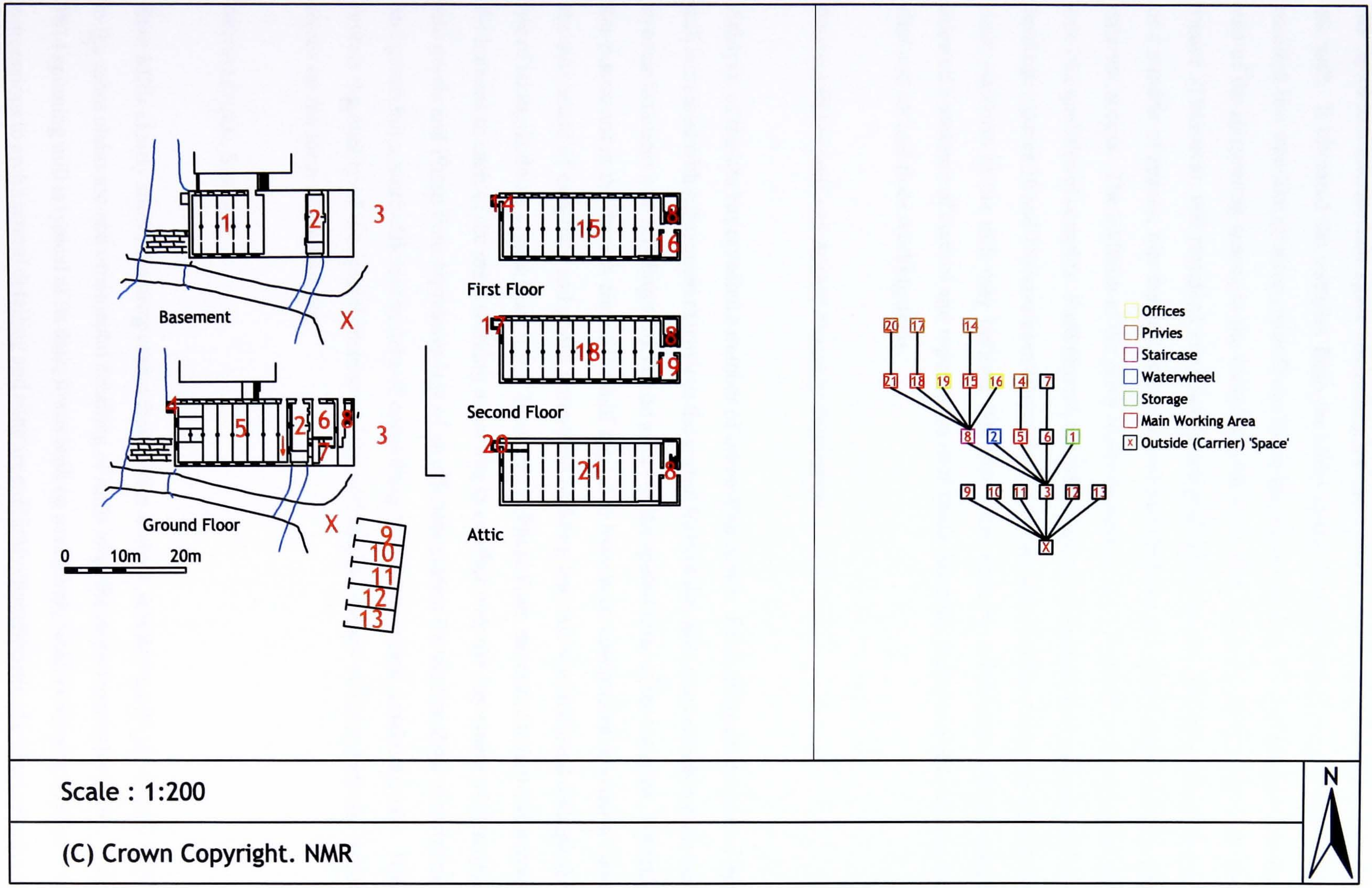

Figure 2.14 *Phase Four: Gamma map of the movement of the workforce*

this acted as a intermediate space controlling the movement of workers to the upper floors of the mill. It liberated the complex from the stairs rising between each floor and this inturn resulted in a tree-like structure with fewer linear sequences of spaces. The staircase became one of the integrating spaces in the complex with a low RA value of 0.098. The mill yard (space 3) however, still remained important in integrating movement, reflecting the existence of a number of spaces, like the basement and waterwheel (spaces 1 and 2 respectively) with external access. The addition of the privy tower (spaces 4, 14, 17 and 20) also increased the tree-like qualities of complex. Furthermore, the offices accessed from the first and second floor landings (spaces 16 and 19) have been interpreted as storage areas but there location next to the main staircase in the mill may indicate that they were used by overlookers and therefore allowed a measure of control and supervision over those using the staircase and accessing the first and second floor working areas.

PROCESS RECORDING AND ACCESS ANALYSIS: DISCUSSION

Analysis of the site has revealed a number of interesting issues. First, although the size of the mill increased with subsequent extensions the spatial form of the mill remained more static and in some instances new building work had no affect on the spatial form of the complex. Second, the extensions at the eastern end of the mill appear to have been constructed in order to ease the movement of materials and goods around the building and this was achieved through the use of taking-in doors at each floor level. However, in Phase Four, the desire to improve access for humans to each of the main working areas was in conflict with the movement of materials and goods and Phase Four represents less of an efficient system for the handling of materials and goods but a more efficient system of controlling human movement around the site. This reveals the duality of the spatial structure of the mill and the impact of functional and social issues on the form of the building.

ARCHITECTURAL SUMMARY

Ebor Mills clearly shows the progression from rather austere, architecturally plain early mills to the more elaborate and ornamental detailing of mills after the mid-nineteenth century. The 1814 spinning mill is typical of its date; it was built on a relatively small scale and displays few concessions to architectural detailing and none are explicitly characteristic of a Classical idiom.

In contrast, buildings at the site dating from the mid- and late nineteenth century display a proliferation of classical motifs including pilasters, pediments and moulded parapets. This provides an interesting case study in the development of mill buildings. It is also apparent that within these general trends there were some individual responses to mill architecture. At Ebor Mills this manifests itself as Egyptian-styled pediments on the later warehouse and weaving shed and the later of the two engine houses. This indicates that the mill owner, whilst conforming to an overall Classical idiom also imposed an element of individuality on his buildings which not doubt was intended to impress and to make the site more distinctive. Interestingly though, these pediments are not visible from outside of the site, and therefore from a distance the mill appears to adhere rigidly to a Classical tradition of mid- to late nineteenth century mill building.

A brief mention should also be made about Longlands House. Built shortly before the 'New Mill' the house is built in a high Victoria idiom of Gothic Elizabethan. Therefore, whilst the Merrall's chose to build the New Mill in an overtly Classical style, they chose a Gothic style for their own home and given the close physical relationship of the mill to the house the contrast in the two forms would have been marked. This suggests one rule of taste for mill buildings, in a classical style, and another for private buildings.

LIST OF DOCUMENTS

2.1 'Preliminary designs dated July 1886 for "Proposed New Mill, Ebor for Messrs. Merrall and Son" by W. and J.B. Bailey, architects of Bradford and Keighley
Private property of Airedale Springs Ltd

APPENDIX A
SITE DESCRIPTION : 3

GIBSON MILL

DATABASE ENTRY:	1704
NBR NUMBER:	BFO62218
NGR:	SD 9731 2985
TOWNSHIP:	Wadsworth
CIVIL PARISH:	Wadsworth
DISTRICT:	Calderdale
COUNTY:	West Yorkshire
BRANCH:	Cotton
PERIOD:	Early

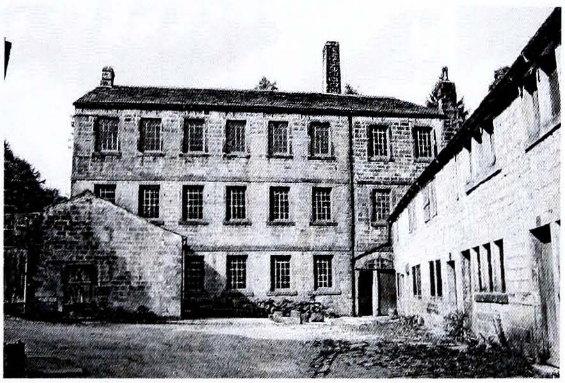

Plate 3.1 *Gibson Mill from the east*

Situated in a remote flat, valley bottom site on the east bank of the Hebden Water, Gibson mill was built *c.*1800 as a water-powered cotton-spinning mill and was one of the first generation of textile mills (Plate 3.1; Figure 3.1). During the late eighteenth and early nineteenth century the Upper Calder Valley became a major centre for the manufacture of cotton (Giles and Goodall 1992, 4-5) and it is in this context of a booming cotton industry that Gibson Mill must be set. The mill took advantage of the Hebden Water and a large mill dam and associated reservoirs were created to the north of the mill and a crossing made at this point. At times the site is referred to as Lord Holme Mill, but the origins of this name are unclear but it may refer to the original owner of the land. Production at the site ceased in the early 1900s and thereafter the mill was used as an 'entertainment emporium' for visitors to the Hardcastle Crags (National

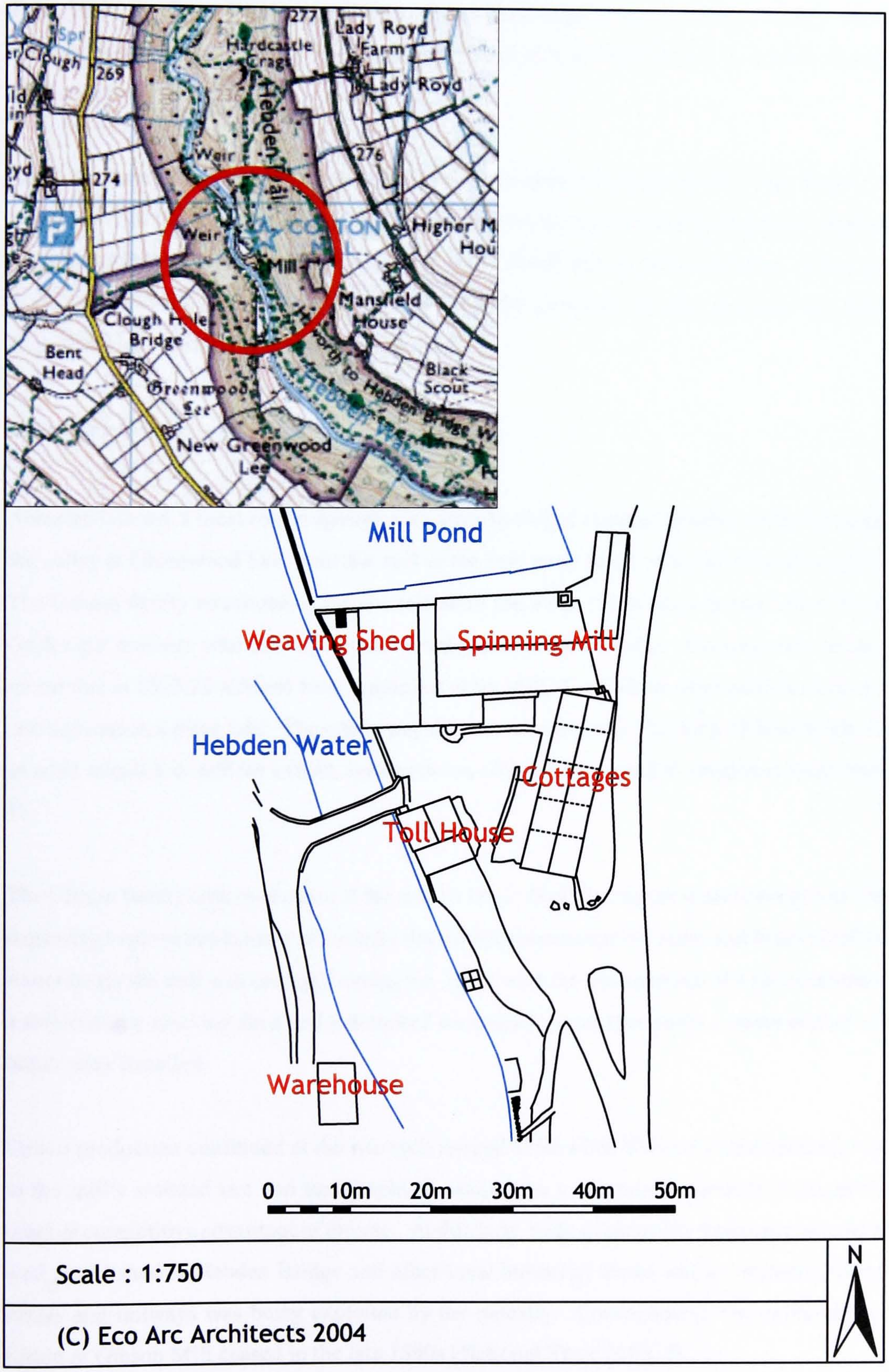

Figure 3.1 *Block Plan, Gibson Mill, Wadsworth*

Trust 2003, 1). Since World War II the mill has been largely disused but is currently being redeveloped as a visitor centre by the National Trust with an emphasis on renewable energy (National Trust 2004; 2005).

Although the mill was not one of those mills recorded in detail during the RCHME Yorkshire mills survey in the late 1980s it is a good example of an early cotton mill and despite adaptive reuse the preservation of original evidence is high. Furthermore, measured plans of the site were made available by the National Trust for the purposes of this research and were augmented by a photographic record of the site.

HISTORICAL BACKGROUND

Abraham Gibson, a local cotton spinner who already owned a cotton spinning business across the valley at Greenwood Lee, built the mill in the very early years of the nineteenth century. The Gibson family continued to run the mill until the early 1830s when it was leased to the Gaukroger brothers who also operated a nearby mill at New Bridge. Documentary sources reveal that in 1833 22 workers were employed at the mill, 21 of whom were paid on an hourly rate and one on a piece rate. The rate of pay for an adult male was 17/- for a 72 hour week; for an adult female 6/6- and for a child, aged between 10 and 12, a mere 2/6- (National Trust 2003, 1).

The Gibson family took over again at the mill in 1861. By this time the local water power was beginning to prove inadequate, especially since output was restricted in dry and frosty weather. Accordingly the mill was enlarged during the 1860s with the construction of a mill extension, a single-storey weaving shed and a detached warehouse; soon afterwards a steam engine and boiler were installed.

Cotton production continued at the site until around 1890 when the cost of transporting coal to the mill's isolated site and topographical constraints to expansion severely reduced the original competitive advantage of the site. At this time, large-scale textile producing sites were well established in Hebden Bridge and other local industrial towns and an infrastructure of canals and railways was being exploited by the industry. Consequently, the production of cotton at Gibson Mill ceased in the late 1890s (National Trust 2003, 2).

By 1900 the mill was taking on a new role. By this time, Hebden Dale was growing increasingly popular as a local beauty spot as a result of the growth of the railways and an increasingly affluent urban population. Abraham Gibson spotted an opportunity and built the Pavilion Restaurant some distance downstream from the mill to provide dining facilities to these new tourists and subsequently converted Gibson Mill as an 'entertainment emporium' with its own dining room, saloons, dance hall, roller skating rink, refreshment kiosks and boating on the mill pond. This use for Gibson Mill continued until the outbreak of World War II and then, for the remainder of the twentieth century, the mill became disused, save for occasional use by various public groups and as a venue for filming.

Lord Saville gave the area around Gibson Mill, known as the Hardcastle Crags, to the National Trust in 1950 and the last Abraham Gibson in 1961 bequeathed the mill itself to the Trust, together with 18 hectares of woodland. Until 1894 the mill and the woodlands were managed by the Local Authority, but since then have been under the direct management of the National Trust.

In October 2003 the National Trust revealed new plans for Gibson Mill, including proposals to renovate the mill in order to once again provide visitor facilities including a café, toilets, information about the site and the Hardcastle Crags and space within the building for use by the local community. These renovations will endorse the Trust's policy of sustainable development and all energy at the site will use renewable sources, including electricity generated by the original 1927 water turbine, which supplanted the original water wheel. Building work began in 2004 (National Trust 2004; 2005).

ARCHITECTURAL DESCRIPTION

There are three principal structural phases at the site covering the period *c.*1800 to *c.*1900 (Figure 3.2). Phase One is represented by the construction of the main multi-storeyed spinning mill, an adjacent row of workers' cottages and a Toll House. Phase Two saw the enlargement of the mill, after the 1860s, with a multi-storeyed mill extension and a weaving shed. The system of water management feeding the waterwheel was also altered at this time and a detached two storey warehouse constructed on the opposite bank of the Hebden Water. Phase Three saw the construction of additional cottage for workers and the addition of a steam power plant on the northeast side of the mill.

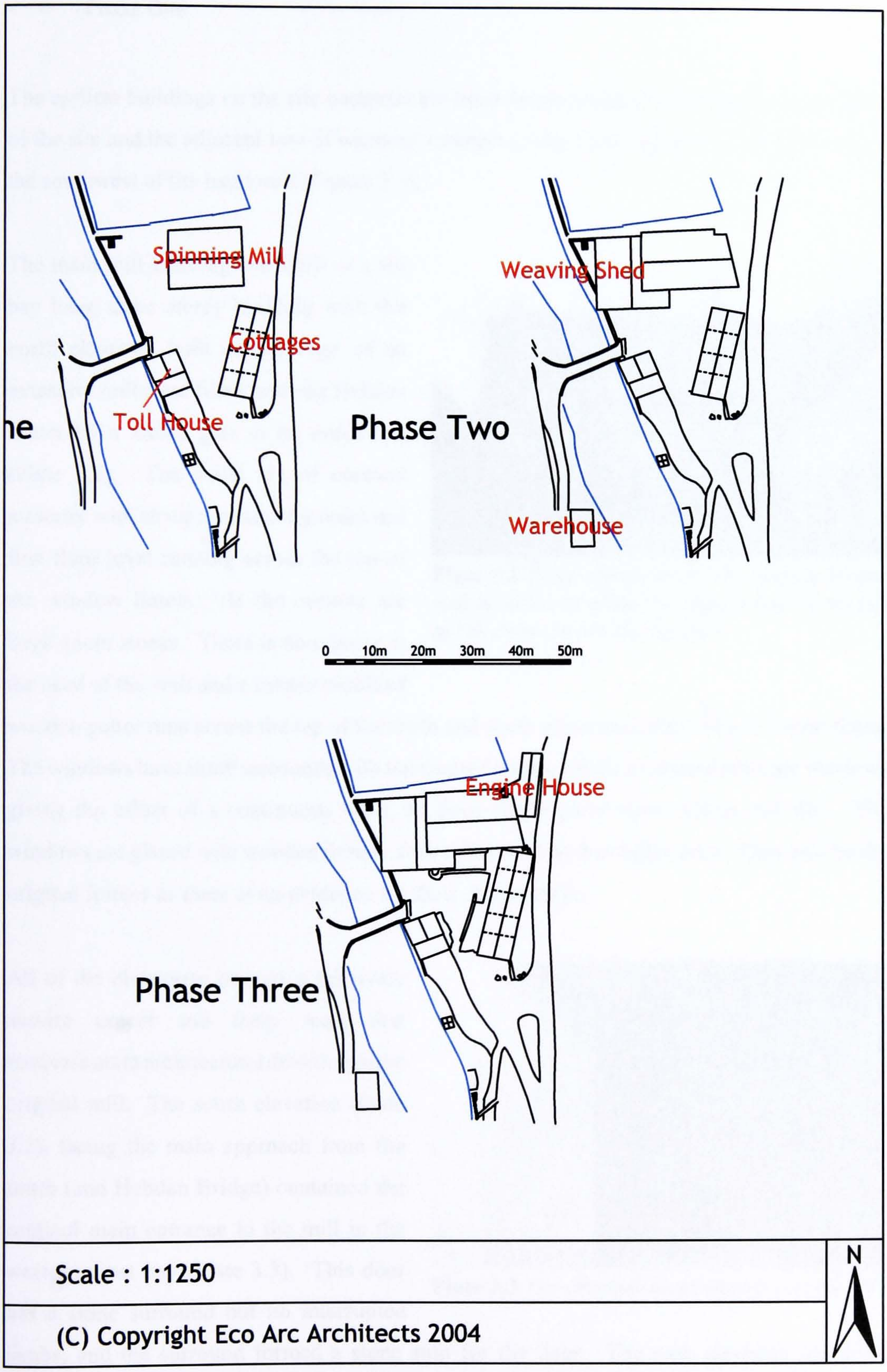

Figure 3.2 *Principal structural phases, Gibson Mill*

- Phase One

The earliest buildings on the site comprise the main multi-storeyed spinning mill at the heart of the site and the adjacent row of workers' cottages. Also contemporary is the toll house to the southwest of the main mill (Figure 3.3).

The main mill building was built as a six bay long, three storey building with the north elevation built on the edge of an extensive mill pond filled from the Hebden Water by a sluice gate at its north end (Plate 3.2). The walls are of coursed masonry with string courses at ground and first floor level running across the top of the window lintels. At the corners are large quoin stones. There is no cornice at the head of the wall and a simply moulded wooden gutter runs across the top of the north and south elevations; the roof is of stone slates. The windows have stone surrounds with interrupted jambs, which are shared between windows giving the effect of a continuous band; all have single piece stone lintels and sills. The windows are glazed with wooden frames, four lights wide by five lights deep. They may be the original frames as there is no evidence for their replacement.

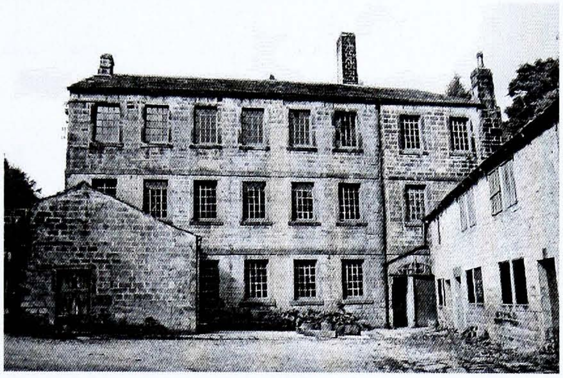

Plate 3.2 *South elevation of the early spinning mill at the heart of the site; the six bays to the left of the chimney are the earliest*

All of the elevations present a relatively austere aspect and there were few concessions to architectural detailing in the original mill. The south elevation (Plate 3.2), facing the main approach from the south (and Hebden Bridge) contained the original main entrance to the mill in the western most bay (Plate 3.3). This door has a stone surround but no interrupted jambs, and the surround formed a stone stop for the door. The west elevation has three windows at second floor level and a further three windows lighting the attic, the outer ones

Plate 3.3 *The original main entrance to the mill*

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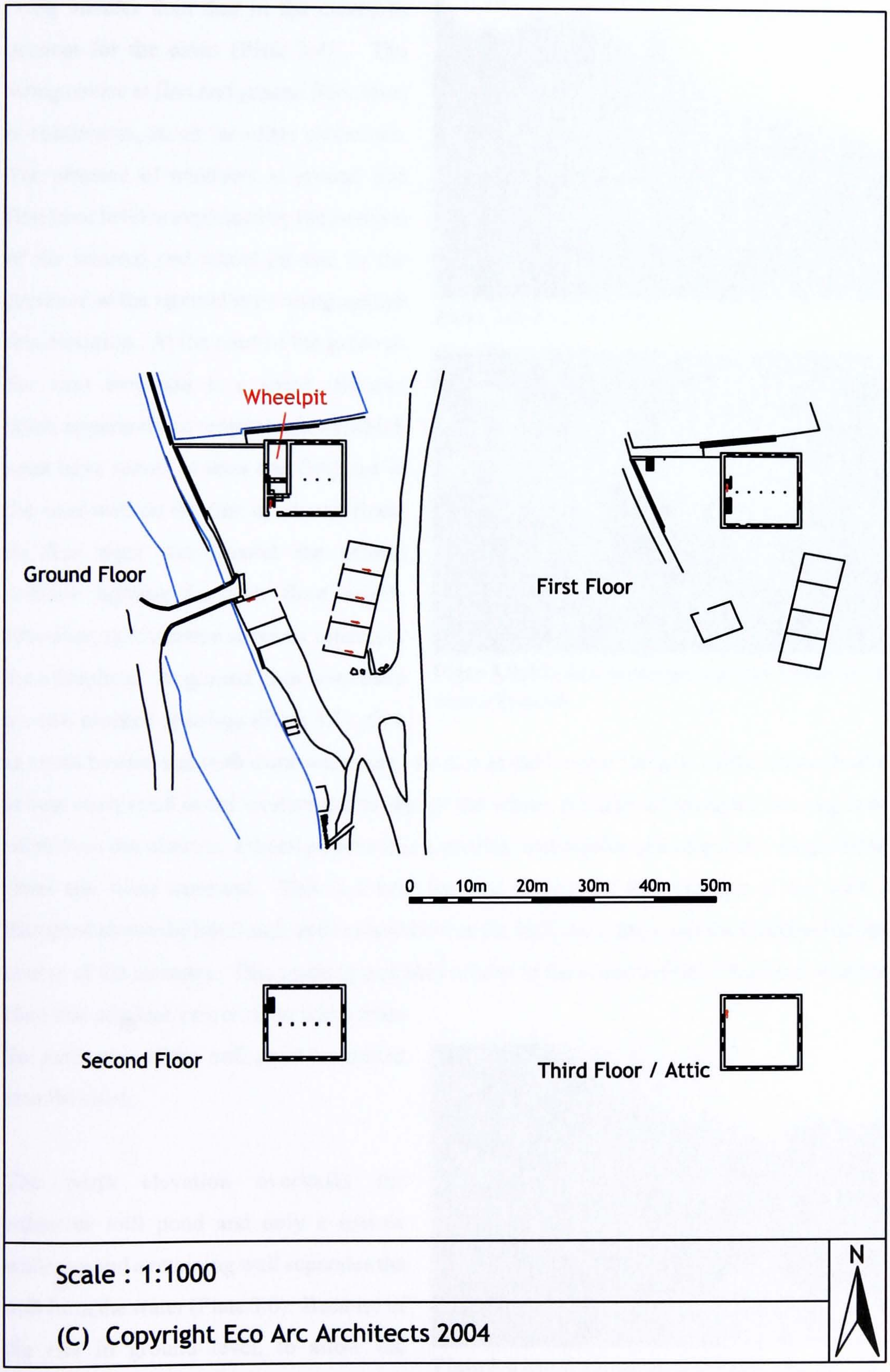


Figure 3.3 *Phase One, Gibson Mill*

being smaller than that in the centre to account for the eaves (Plate 3.4) . The string course at first and ground floor level is continuous, as on the other elevations. The absence of windows at ground and first floor level is explained by the position of the internal end wheel pit and by the presence of the internal stair rising against this elevation. At the apex of the gable on the west elevation is a small chimney stack, apparently an original feature which must have served at least one fireplace in the west wall on the first or second floor; its flue must rise around the central window lighting the attic floor below. However, no evidence survives internally for a fireplace. At ground floor level there are two blocked openings (Plate 3.5). One is round headed and with stone voussoirs. As it is at the level of the axle of the waterwheel it is best interpreted as the western mounting for the wheel, perhaps allowing the bearing to be oiled from the exterior. Directly above it is a smaller, rectangular opening with a single stone lintel and stone surround. This is a later inserted feature for the coursing of the wall is disrupted above the lintel and, unlike elsewhere in the mill, the lintel is not the thickness of one course of the masonry. This opening probably relates to the construction of the later weaving shed and allowed power to be taken from the main part of the mill and transmitted into the shed.

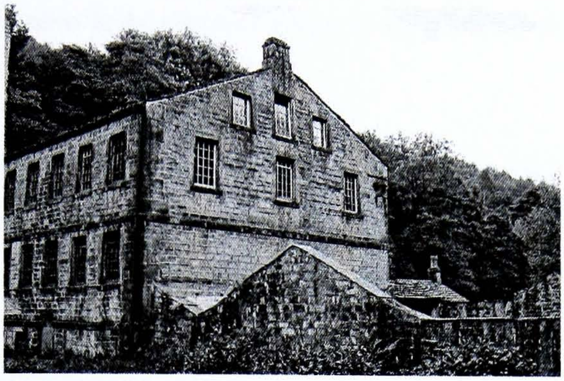


Plate 3.4 *West elevation, Gibson Mill*

Plate 3.5 *Blocked openings at ground floor level, west elevation*

The north elevation overlooks the extensive mill pond and only a narrow walkway and a retaining wall separates the mill from the water (Plate 3.6). Because of the rise in ground level, to allow the creation of the mill pond and a head of

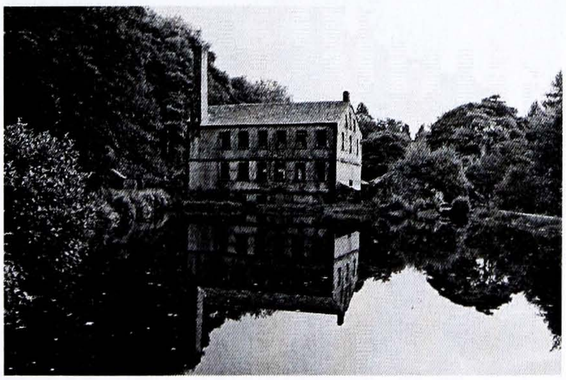


Plate 3.6 *North elevation of the spinning mill and extensive mill pond*

water for the water wheel, the ground floor windows in the elevation are partly below the level of the retaining wall.

The east elevation of the mill is almost completely obscured by the later mill extension and the only evidence for it is a series of openings inside the mill. The east wall was retained when the mill was extended and those features still visible suggests that it contained three windows at first, second and attic floor level producing an elevation similar in character to the west elevation.

Internally, the original mill building is of traditional construction with timber floors supported on timber cross beams and cast-iron columns. On the second floor the cast iron columns have been replaced by timber uprights, and although the date of this alteration is unknown it is probably a relatively modern solution to strengthening the attic floor above. The ground floor surface is made of stone flags. The form of the cast-iron columns used throughout the mill varies at each floor level and there is no ready explanation for this idiosyncrasy. On the ground floor, three cast-iron columns with moulded bases and D-section bolting heads are used, the flat section of the bolting heads facing north and suited to supporting a centrally positioned east-west horizontal line shaft leading from the waterwheel (Plate 3.7). Two further cast-iron columns to the north of the eastern most principal column, one with a moulded band and base and set on to a small stone plinth are later insertions intended to support the cross beams at this point. On the first floor the columns have square-section bolting heads and no bases, and the top socket of the column is visible as it passes into a bolting plate, with semi-circular shaped side pieces, carrying the timber cross beams (Plate 3.8). There are no structural reasons for

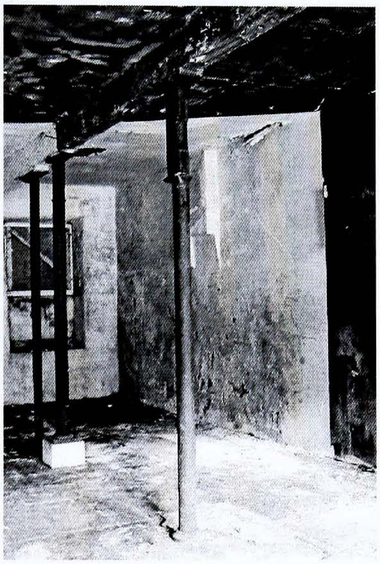


Plate 3.7 *Ground floor columns with D-section bolting heads*

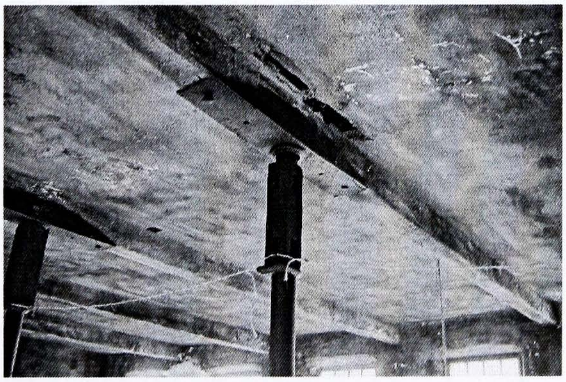


Plate 3.8 *Square-section bolting heads on first floor columns*

these differences and given the relatively small size of the mill there is no reason to suggest that either the waterwheel or the later steam engine gave rise to a system of power transmission of such sophistication that a variety of bolting head forms were required. The use of different column forms is perhaps therefore best interpreted as an economic expediency at the time of the mill's construction, perhaps using second-hand columns or columns cast for other mills but never used for their intended project.

Each floor of the spinning mill are currently accessed by wooden stairs enclosed by timber partitions rising against the inside of the west elevation. The lowest flight rises from immediately in front of the main mill entrance to a short landing at first floor level before continuing to rise to the second floor. There is no access to the attic from the main part of the mill. Although these stairs, and especially the timber partitions, probably date from the conversion of the mill for visitors in the early twentieth century, they are likely to be replacements of similar stairs that rose in the same place. There is no evidence in the timber floors for openings suggesting the position of stairs anywhere else in the mill and by placing the stairs in the same bay as the main entrance and waterwheel on the ground floor, the maximum amount of floor space was left available for machinery. As three large windows from the west light the attic it is likely that it was originally used, either for machinery, or, and more likely, for storage. It is therefore likely that when the mill was in use for the production of textiles that a flight of stairs led from the second floor to the attic, probably rising on the inside of the west wall, and that sometime during the twentieth century, when the attic became disused, these were removed. It was not possible to view the attic storey or to examine the roof trusses.

The spinning mill was built water-powered and the waterwheel was housed in a self-contained wheel chamber on the ground floor. The wheel chamber occupies the two western most bays of the ground floor, apart from a small area to the south where the main mill entrance and stairs are located. The main entrance is screened off from the main floor of the mill by a narrow stone wall, but as this crosses an original window in the south wall it must be a later feature and indicates that this part of the mill originally opened onto the main ground floor working space. The area of the wheel chamber is split into two parts, the smaller part of which (known as the generator pit) to the south is set much lower than the main floor of the mill and is accessed by a small flight of stone steps. This part of the wheel chamber housed a water turbine in the later life of the mill as a visitor attraction. The main part of the wheel chamber is screened off by low walls from the rest of the chamber and a stone ramp leading from the mill pond to the north fed water onto the wheel.

Later alterations to the system of water power at the site (Phase Two) has removed much of the evidence for the earlier system. However, it seems that the wheel was originally only accessible from within the mill (perhaps screened off from the rest of the ground floor) and was lit by two windows in the west wall. The lintels and surrounds of these windows survive above the shallow archway currently allowing water onto the wheel. It is clear, then, that the water level of the pond has been raised as the presence of these windows means that originally water entered the wheelpit at a lower level. The original wheel may therefore have undershot and was probably located further east which would place it in-line with possible axle recess observed in the south wall (see above, p102). Water flowed away from the wheel through an underground tunnel and re-entered the Hebden Water some distance down stream to the south and the arched outlet of the tailrace tunnel is still clearly visible (Plate 3.9). The system of power transmission is unclear, but drive was no doubt taken from the wheel through a system of gears and then transmitted to a principal vertical shaft from which horizontal shafts on the line of the columns took the drive to individual machines on each floor.

Plate 3.9 *Tailrace tunnel discharging water back into the Hebden Water downstream from the mill site*

Workers Cottages, Toll House and Privies

To the south of the spinning mill and contemporary with it is a row of four workers' cottages (Plate 3.10). to the south of the spinning mill. The terrace was extended by one cottage to the north at a later date. Each of the original cottages is of two storeys with a single room at each level. The cottages are lit by windows in

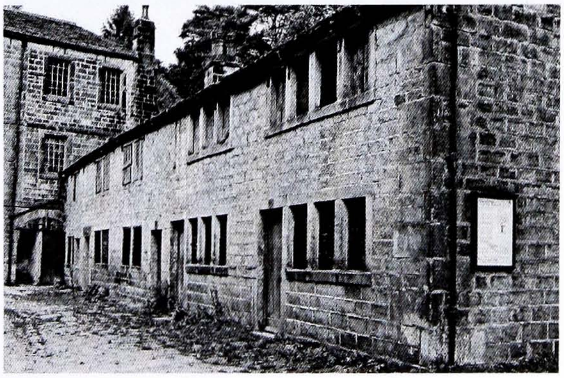


Plate 3.10 *Workers' Cottages*

the east and west elevations which have stone surrounds and mullions.

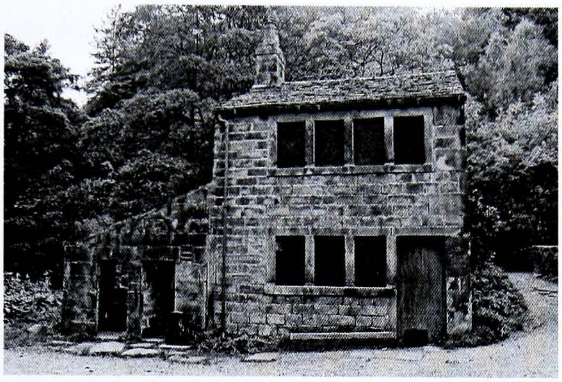


Plate 3.11 *Toll House from the east*

Opposite the workers cottages and built on the bank of the Hebden Water and directly next to the stone bridge crossing the stream is a two-storey toll house (Plate 3.11). Built in a style similar to the workers cottages and the main mill, it may be contemporary with them both. The north, east and west walls are of coursed masonry, but the south wall is of coursed rubble suggesting that originally the building was larger and that this was once an internal wall. This evidence is supported by a ragged join in the east wall between the ground floor of the toll house and the single-storey extension to the south and the presence of an interrupted stone jam for a door at the junction between the toll house and the extension to the south. Furthermore, two blocked, ground floor doors between the toll house and lean-to suggest that the toll house had an adjoining building at some time, probably forming a cottage and toll house which communicated with each other. The toll house is lit by narrow windows with stone mullions in the east wall, four to the first floor and three at ground floor level flanking a doorway with stone surround. A further window in the west wall lit the ground floor. At first floor level a door opens onto the bridge, accessed by a short flight of steps and this was presumably the 'business' door of the tollhouse. A sign next to this door provides details of tolls for crossing the bridge.


Plate 3.12 *Pair of privies to south of Toll House*

Situated to the south of the tollhouse are a pair of privies (Plate 3.12). They are housed in a small, single-storey building of coursed masonry and roofed with a single stone slab. The privies are located on the bank of the Hebden Water into which waste presumably discharged. These facilities were presumably used by workers in the mill and those living in the adjacent cottages.

- PHASE TWO

Phase Two saw the expansion of the site with the construction of a mill extension and a weaving shed as well as alterations to the system of water power and construction of a detached warehouse (Figure 3.4). Documentary sources indicate that the mill was enlarged during the 1860s and soon afterwards steam power was added. Stratigraphic evidence from the site indicates that the engine house is later than the mill extension against which it is built and the addition of steam power is therefore attributed to a further phase of structural activity (Phase Three, see below p). Whether the mill extension and weaving shed are contemporary is difficult to ascertain. They have both been built in a style sympathetic to the main mill building but the most compelling evidence suggesting that they are contemporary is the fact that the construction of the weaving shed altered the means of access to the main entrance of the mill and in the mill extension a new means of access was provided.

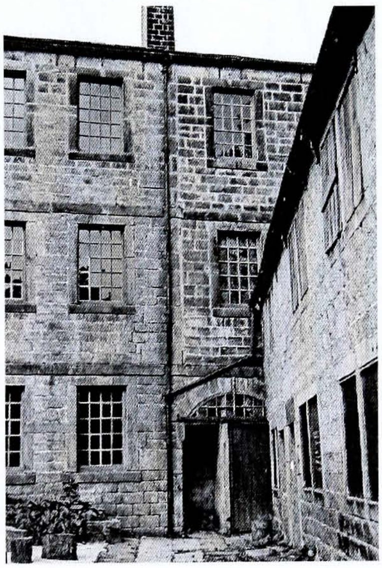


Plate 3.13 *Mill extension from the south*

The mill extension is a three storey addition at the east end of the mill (Plate 3.13). It has an irregular footprint and is two bays wide on the south front (the bays are wider than in the main part of the mill), tapering to just over one bay to the north. Stylistically, the extension copies the main mill building – all windows have stone surrounds with interrupted jambs and single piece stone lintels and sills; the string courses at ground and first floor level are continued in the extension as is the use of large stone quoins at the corners of the coursed masonry walls. The extension shares a common stone slate roof with the main mill building.

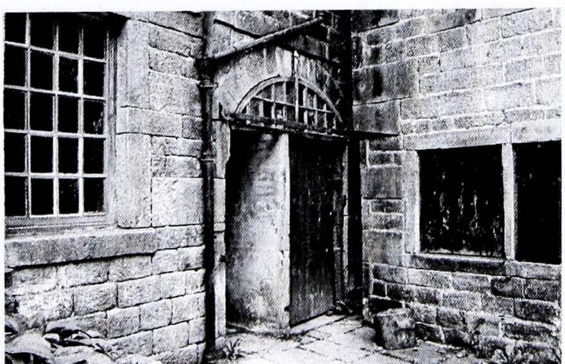


Plate 3.14 *Arched entrance to mill in mill extension*

The south elevation has a wide doorway at ground floor level which formed a new main entrance to the mill (Plate 3.14). It is built against the corner of the main

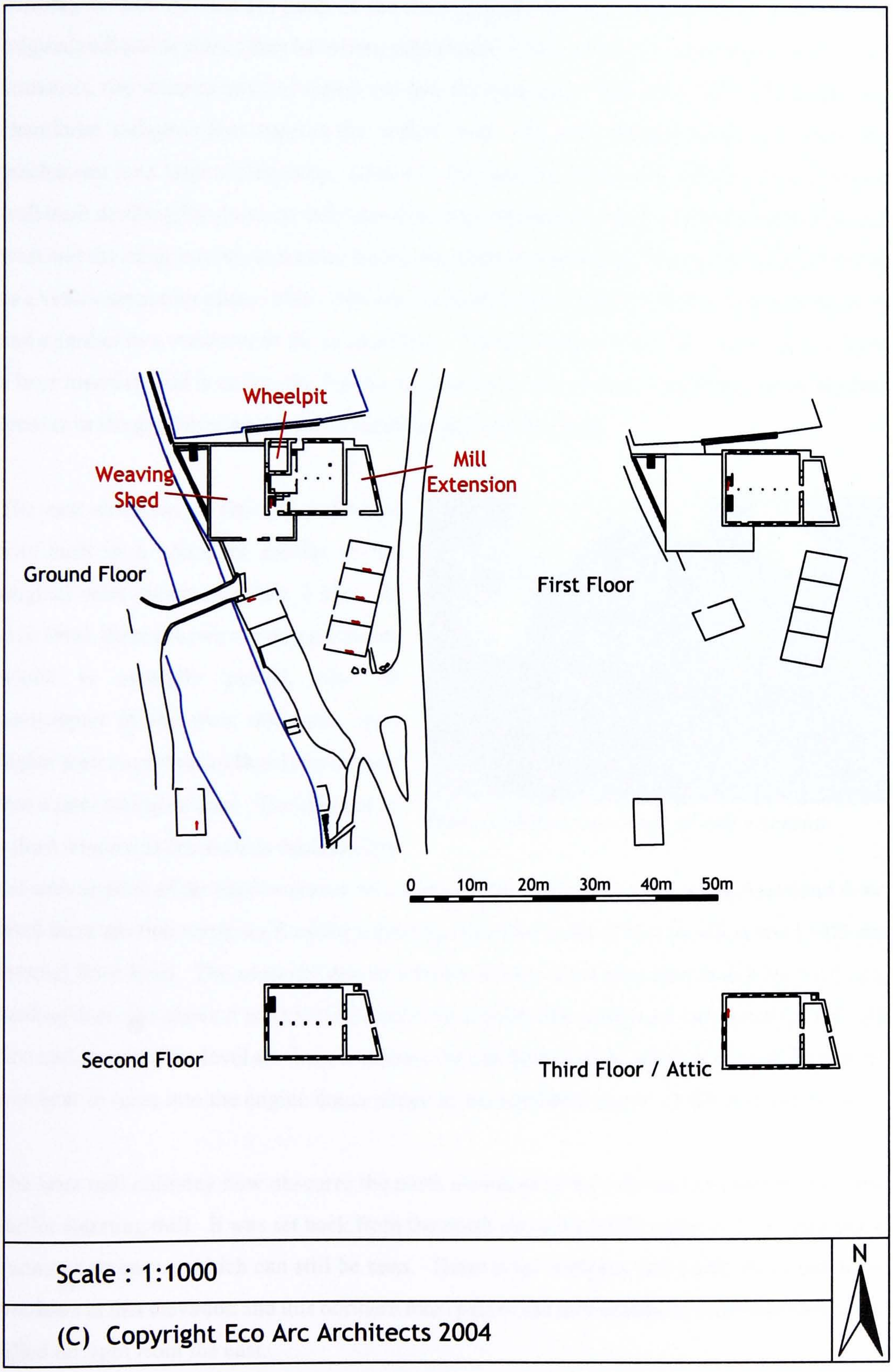


Figure 3.4 *Phase Two, Gibson Mill*

building so that the western jamb of the door is built into the existing stone quoins of the original mill and in places they have been substituted. The doorway is round-headed with stone voussoirs, the western most of which cut into the coursing of the main mill. The jambs are chamfered and shoulders support the arched head. An iron fanlight survives as does the mechanism for a large sliding door. However, the door has been removed and a narrow stone wall built dividing the doorway into two with one half open to a door into the main mill to the west and the other into the extension itself; this alteration probably dates to the use of the mill as a visitor attraction after *c.*1900. The south elevation has a single window at first floor level and a further two windows to the second floor. The chimney stack in the south-east corner is a later insertion and is in fact the flue for the nearest of the cottages and lower down the flue crosses in the gap between the mill extension and this dwelling.

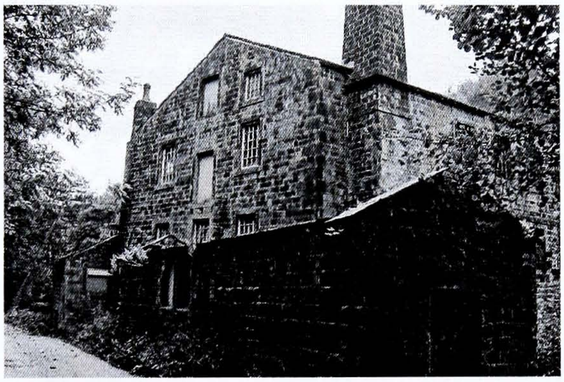


Plate 3.15 *East elevation of mill extension*

The east elevation of the mill extension was built in a character similar to the original west elevation (Plate 3.15). At attic level, there are two windows, but that which is centrally placed, like its counterpart in the west elevation, rises higher than its partner and has been formed into a later taking-in door. The absence of a third window at this level is explained by the uneven pitch of the mill extension on account of the angle of the east wall. At second floor level there are two windows flanking a loading door that is set so that its sill is level with the internal floor level. The centrally placed window at attic level may also have been used as a loading door and above it is a blocked socket for a beam that must have supported a hoist. At first and ground floor level are three windows, the northern most of which at ground floor level was later to open into the engine house added to the northeast corner of the mill extension.

The later mill chimney now obscures the north elevation of the mill and its junction with the earlier spinning mill. It was set back from the north elevation of the main mill and had stone quoins at its corner which can still be seen. There is no evidence internally that there were windows in this elevation and this northern most part of the mill extension must therefore have relied on light from the east.

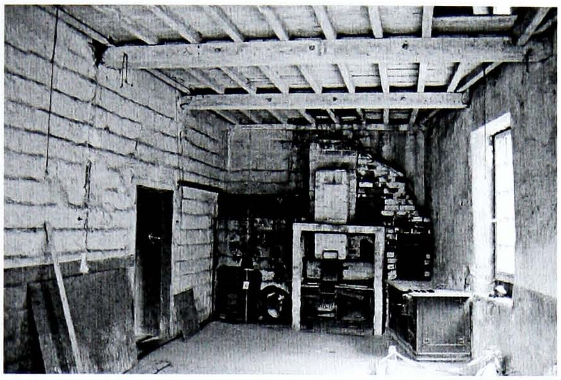


Plate 3.16 *Interior of mill extension, second floor*

Internally the mill extension was structurally similar to the main mill, but there are no supporting columns and the crossbeams span the extension. Later fixtures and fittings have obscured much of the evidence for the internal appearance of the mill extension, associated with the use of the mill as a visitor attraction, including timber partitions forming water closets on the ground floor, a dumb waiter in the west wall and a kitchen on the second floor (Plate 3.16). Furthermore, some of the floors appear to be later replacements and the cross beams for the first floor have a newer appearance than elsewhere in the building. However, it is clear that the original east wall of the main mill was retained when the extension was built and communicating doors on each floor inserted, some formed out of earlier window openings. The dumb waiter, an insertion associated with the use of the mill as a dining room, also uses original window opening. At ground floor level a doorway was created at the south east corner of the main mill building leading directly to the new main entrance in the south wall of the extension.

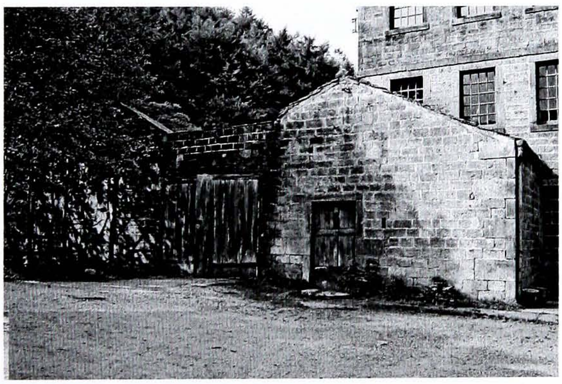


Plate 3.17 *Weaving shed from the east*

The weaving shed at the west end of the mill, like the mill extension to the east, was built in a style sympathetic to the original main mill building (Plate 3.17). It is a single-storey shed, which based on the surviving gables, was two bays wide to the south and one and half bays to the north. The gables survive to their full height in both the north and south walls, although to the south the intermediate valley gutter has been partly blocked with coursed masonry. The span of the shed must have necessitated some sort of internal support for the roof structure but no evidence for this has survived, nor does the roof structure. However, a lack of windows in the walls suggests that the shed was top-lit. The stone flag floor survives *in situ*. The shed is clearly later to than the original mill building for its north wall butts up to the northwest corner of the mill and the returning east wall of the shed butts up to edge of one of the mills ground floor south-facing windows with a straight join (Plate 3.18). Nowhere does the coursing of shed and mill match and the string course of main mill is discontinued in the shed walls.

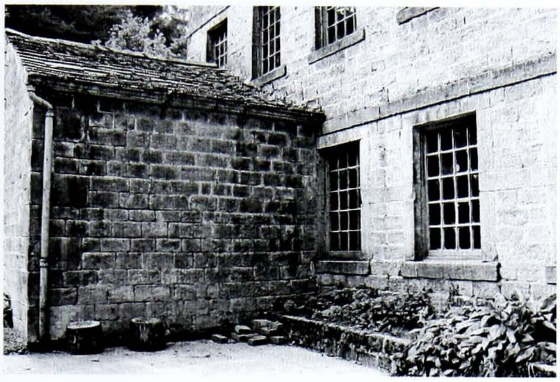


Plate 3.18 *Junction between the weaving shed and spinning mill*

The shed is L-shaped on plan, with half of the eastern most bay covering the two western most ground floor bays of the original mill. The shed has two doorways in its south wall, one of which is almost certainly a later insertion. The smallest of these doors has stone surrounds and interrupted jambs similar to those elsewhere in the mill complex and it is situated immediately in front of what was originally the main entrance to the mill. Centrally placed in the south wall of the weaving shed is a further, wide doorway. Although the masonry either side of this door is relatively undisturbed it is almost certainly a later feature – it does not share any of the characteristics of any of the original openings in the mill, such as stone surrounds or stone lintels, and the rebuilding and raising of the wall above this door where previously the valley gutter of the weaving shed roof had been located suggests that it is a later feature, perhaps relating to the use of the weaving shed by visitors after *c.*1900.

The system of power transmission in the shed is difficult, if not impossible to reconstruct, especially since any columns or the roof structure have been removed. However, the rectangular opening, now blocked, in the west wall of the mill (see above, p102: Plate 3.5) presumably relates to the point at which drive from the main mill building entered the shed. Furthermore, two blocked openings in the north wall of the shed, below the level of the roof trusses, may once have provided support o the end of line shafts running north-south.

The enlargement of mill appears to have necessitated alterations to the system of water power at the site. It is clear that the level of the mill pond was raised and a new headrace arch

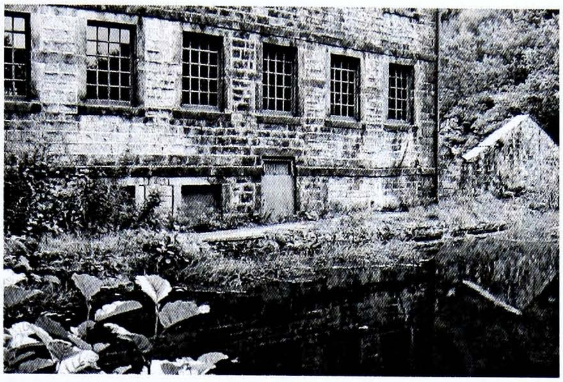


Plate 3.19 *Wheelchamber doorway, north elevation*

constructed in the north elevation of the spinning mill. The wheelpit was reconstructed to the north and the wheel converted into a pitchback arrangement with water entering the wheelpit at a higher level. The pitchback arrangement would have provided more power than the earlier undershot wheel which is consistent with the enlargement of the mill. At the same time an independent means of access into the wheel chamber was contrived in the north elevation (Plate 3.19). The doorway rises above the string course at this level by two courses, below which are the remains of a stone lintel which is consistent with the form of the original windows lighting the ground floor to the east. This suggests that this doorway, like the headrace, replaced earlier windows. The creation of an independent means of access to the wheelchamber was probably consistent with the screening off of the wheelchamber and the timber screens surviving in the mill may be original. There is a single doorway in these screens providing access to the ground floor of the mill. The system of power transmission from this wheel is unclear, but it probably replicated or reused the earlier system of vertical and horizontal line shafts with an additional spur to the weaving shed.

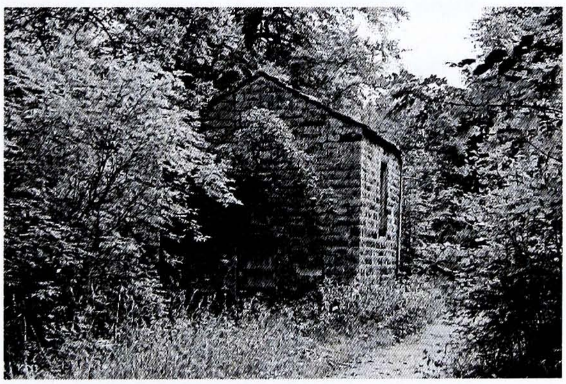


Plate 3.20 *Detached warehouse*

Documentary sources indicate that at the same time that the mill was enlarged a detached warehouse was constructed on the opposite bank of the Hebden Water to the southwest of the main mill complex (Plate 3.20). The warehouse is of two-storeys and shares none of the architectural features characteristic of the main mill complex, such as string courses, stone surrounds to the window openings and doors, or stone quoins. The absence of windows, a single door at ground floor level in the north wall and a taking-in door at first floor level in the east wall suggests a building constructed purely for the function of providing additional storage for the main site.

- PHASE THREE

Phase Three is represented by the addition of steam power to Gibson Mill and the construction of an additional workers' cottage (Figure 3.5).

Steam power was added to Gibson Mill after the construction of the mill extension and the weaving shed; it may therefore have reflected both the inadequacy of the water supply to generate sufficient power for a mill that had almost doubled in size. The constraints of the site to the west, which had already been developed along the bank of the Hebden Water, to the north, where the mill pond lay, and to the south, where a row of cottages were built close to the mill, mean that a engine house and chimney could only be built at the northeast corner of the mill extension.

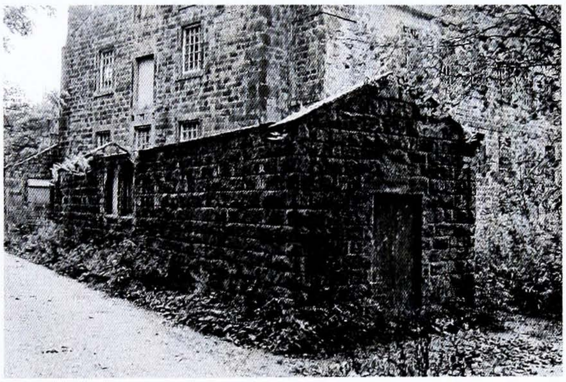


Plate 3.21 *Engine House, from the north*

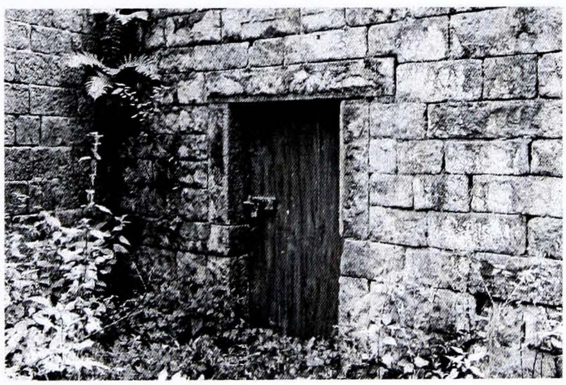


Plate 3.22 *Rusticated lintel and surround to south doorway of engine house*

The engine house is a single-storey building narrow building of an irregular shape and set at a sight angle to the mill extension, its east wall respecting the adjacent lane (Plate 3.21). It is later than the mill extension for it shares straight joins with on its south wall and it incorporates a window from the mill extension that must have once been an external feature. It has coursed masonry walls but is stylistically different from the rest of the mill in several ways. The masonry is not water-shot as elsewhere in the complex and the stone surrounds of the south door are slightly rusticated with tooled edges (Plate 3.22). The engine house was lit by a windows in its east and west walls; the door in the north wall is a later insertion and has a concrete lintel and no surrounds. The building had a low pitched roof but the trusses do not survive. The engine house communicated with the mill extension via an inserted doorway at its southwest corner.

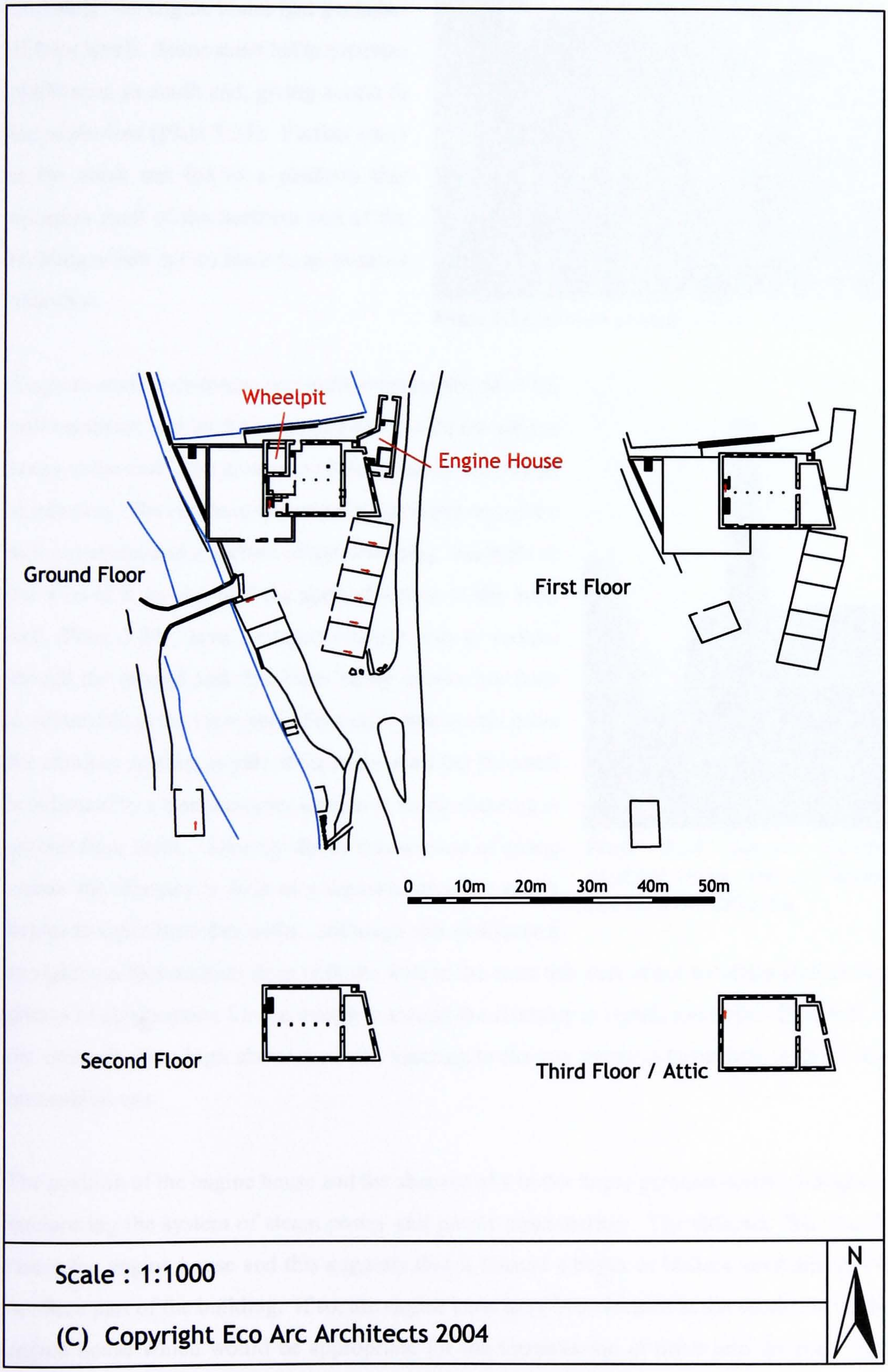


Figure 3.5 *Phase Three, Gibson Mill*

Internally, the engine house had a number of floor levels. Stone stairs led to a narrow platform at its south end, giving access to the south door (Plate 3.23). Further stairs at the north end led to a platform that occupies most of the northern end of the building which in turn leads to an external doorway.

Plate 3.23 *Interior of engine house looking south*

A square-section chimney, was built at the north end of the mill extension and its flue communicated with the engine house to the east. The area around the chimney is difficult to interpret. The chimney was added to the north end of the mill extension and a section of solid walling was built to the west of it, in line with the north elevation of the main mill (Plate 3.24); here a ragged straight join is visible, though the ground and first floor string course has been continued from the main part of the mill. Above this point the chimney appears as part of the main walls but the shaft is indicated by a discontinuous section of string coursing at second floor level. Directly above this section of string course the chimney is built as a separate structure and it begins to taper from this point. Although this produces a straight join four courses deep with the wall to the west this should not be interpreted as two phases of construction for the masonry around the chimney is clearly cut to fit. The shaft of the chimney rises high above the mill, tapering to the top where it terminates without any ornamental cap.

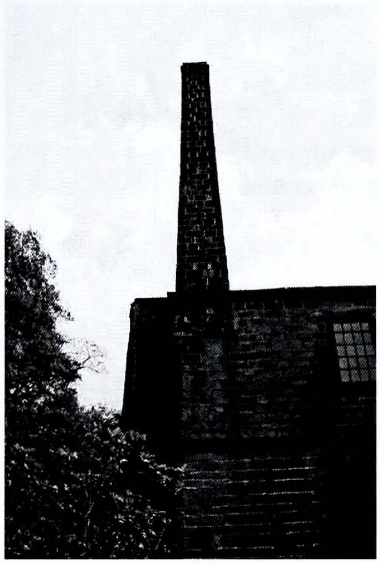


Plate 3.24 *Square section chimney rising out of eastern end of north elevation*

The position of the engine house and the absence of a boiler house presents some problems in interpreting the system of steam power and power transmission. The chimney flue clearly enters the engine house and this suggests that it housed a boiler or boilers, probably in the northern part of the building. If so, the engine must have been located at the south end of the engine house which would be appropriate for the transmission of drive into the main mill building. This suggests a relatively small engine and it may therefore have been installed to augment the existing water power at the site rather than to supplant it, perhaps only powering the ground floor which may have been dedicated to preparatory processes with water-powered spinning on the upper floors.

At some point after the construction of the mill extension (Phase Two) and perhaps contemporary with the erection of the engine/boiler house a a further cottage was built at the north end of the range evidenced by straight joints in the east and west walls (Plate 3.25). Construction of this cottage left only a narrow gap between the mill and mill extension and it partly obscures the wide, arched entrance to the latter. Furthermore, the chimney of the new cottage proved inadequate and a flue had to be built in the southeast corner of the mill extension in order to provide the necessary draw and this connects with the cottage via an angled stone pipe across the passage. The need for a further cottage undoubtedly reflects the increased productivity of the site following its enlargement after *c.*1860.

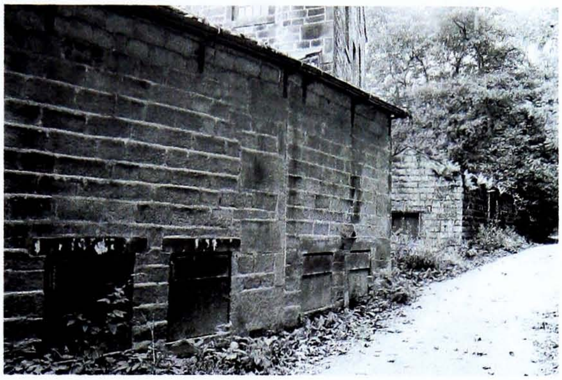


Plate 3.25 *Straight joint between earlier cottages (left) and later cottage (right) in east elevation of cottage range*

PROCESS RECORDING

When first built(Phase One) Gibson Mill was intended as a cotton spinning factory (Plate 3.26). It is not known if preparatory processes were undertaken at the site but given the early date it is likely that the site only accommodated powered spinning processes, perhaps supported by out workers.

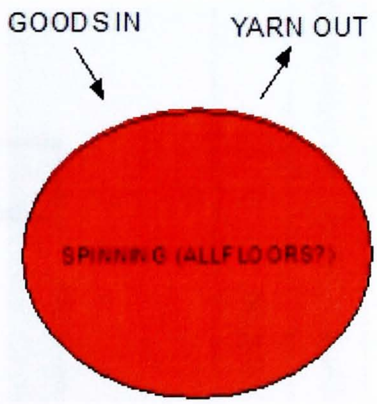


Plate 3.26 *Processes, Phase One, Gibson Mill*

The spatial form of the early mill did not encourage the easy movement of materials and goods around the mill (Figure 3.6; Table 3.1). The mill had an inherently linear structure which meant that materials entering the mill at ground floor level then had to be carried up the internal stairs through each of the upper floors and finished products had to make

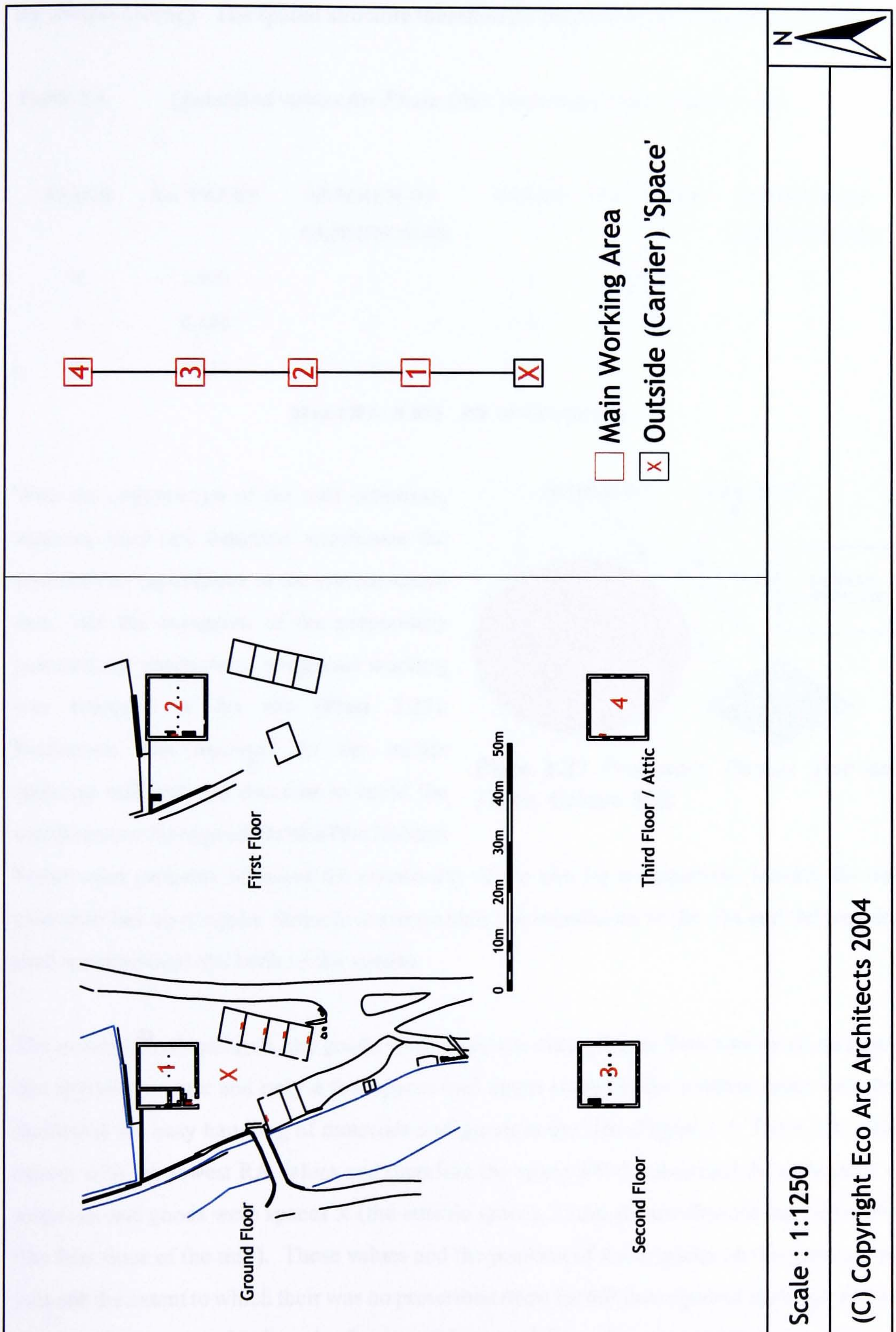


Figure 3.6 *Phase One: Gamma map of the movement of materials/goods*

the reverse journey. The spatial structure therefore mirrors the physical character of the mill.

Table 3.1 *Quantified values for Phase One 'materials/goods' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	1.000	1	**3**	0.500	2
1	0.500	2	**4**	1.000	1
2	0.333	2			

Mean RA: 0.666 RR of Complex: 0

With the construction of the mill extension, weaving shed and detached warehouse the productivity capabilities of the site increased and, with the exception of the preparatory processes of production, integrated working was achieved at the site (Plate 3.27). Production was focussed on the earlier spinning mill and the decision to build the warehouse on the opposite bank of the Hebden Water most probably reflected the constraints of the site for enlargement, Indeed, the mill extension had an irregular shape to accommodate the boundaries of the site and the weaving shed was built into the bank of the stream.

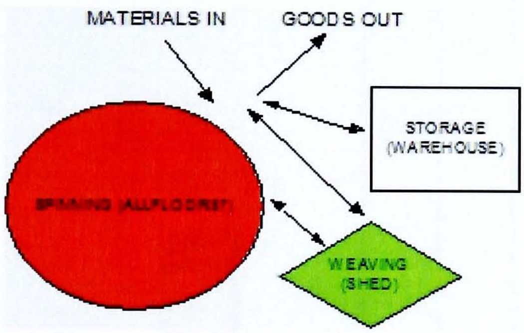


Plate 3.27 *Processes, Phases Two and Three, Gibson Mill*

The movement of materials and goods around the site during Phase Two was based on a tree-like spatial structure and only a few spaces had direct access to the exterior space and thus facilitated the easy handling of materials and goods at the site (Figure 3.7; Table 3.2). The spaces with the lowest RA values and therefore the space which integrated the movement of materials and goods were spaces X (the outside space), 3 (the ground floor of the mill) and 6 (the first floor of the mill). These values and the position of these spaces on the gamma map indicate the extent to which their was no prescribed route for the movement of materials around the site, that is to say that in order for materials to be delivered to a set working area they had to travel through a number of other spaces first. The taking-in door at second floor level in the mill extension helped ease the movement of goods at this level and provided a link between the

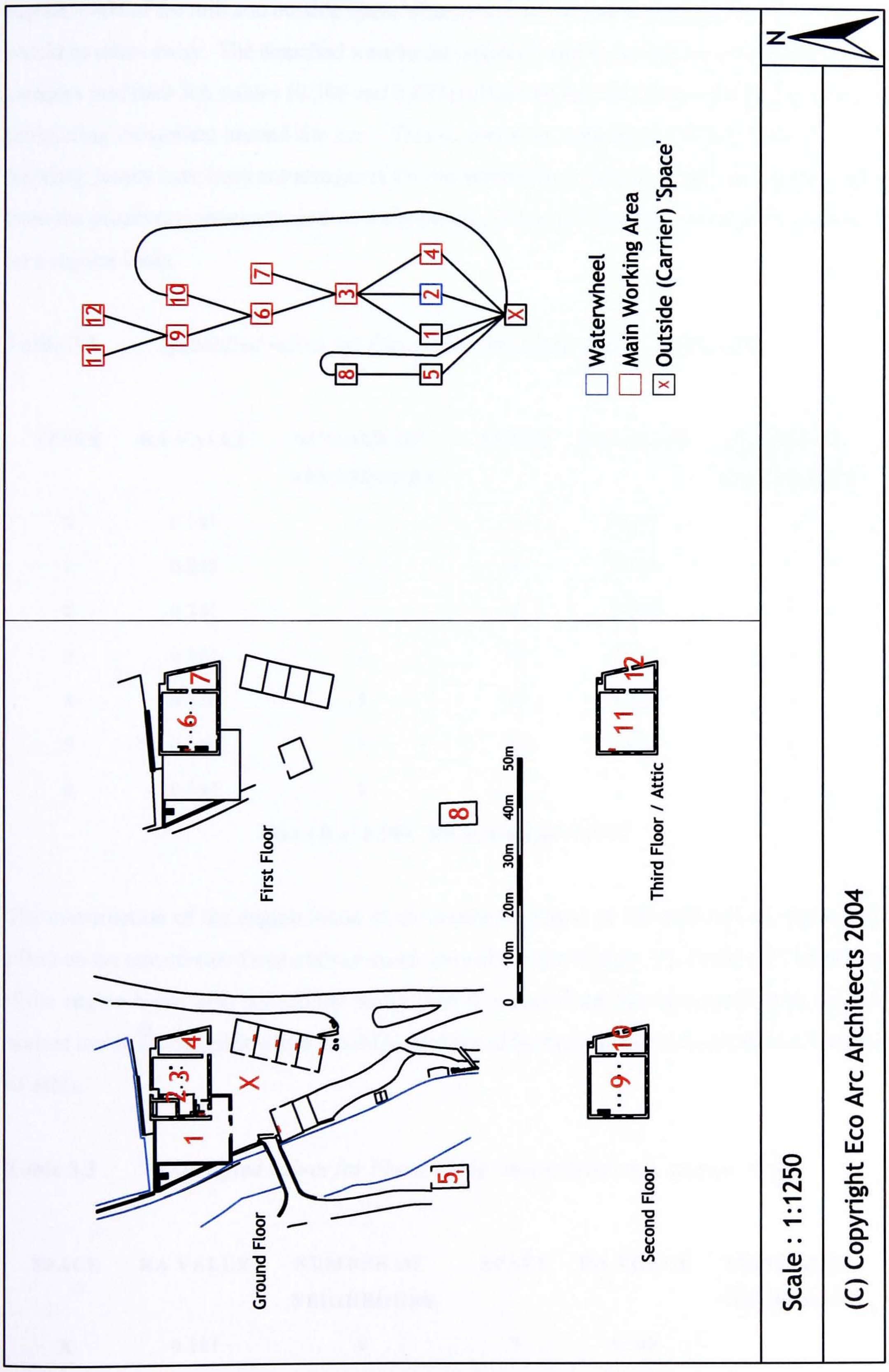


Figure 3.7 *Phase Two: Gamma map of the movement of materials/goods*

higher levels of the mill and outside space where materials would arrive and finished products would be taken away. The detached warehouse (spaces 5 and 8) occupy an isolated part of the complex and their RA values (0.380 and 0.485) reflect the fact that they did not play a role in integrating movement around the site. This is, however, appropriate to the function of the building; it may have been advantageous for raw materials or finished goods to be stored away from the production processes and, as a warehouse, it may not have been accessed by workers on a regular basis.

Table 3.3 *Quantified values for Phase Two 'materials/goods' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.181	6	**7**	0.349	1
1	0.242	2	**8**	0.485	2
2	0.242	2	**9**	0.288	3
3	0.181	2	**10**	0.197	2
4	0.236	5	**11**	0.455	1
5	0.380	2	**12**	0.439	1
6	0.181	2			

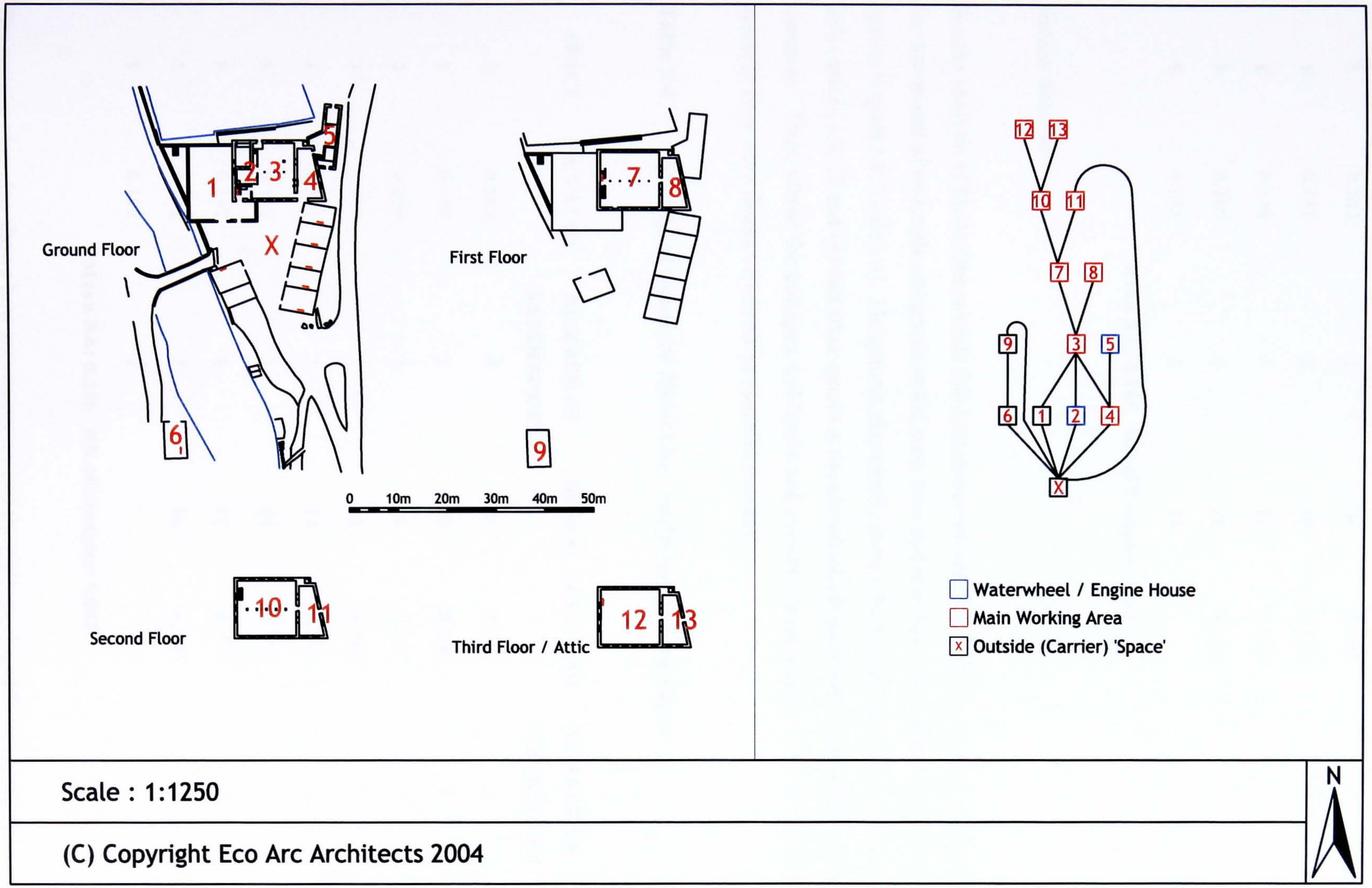
Mean RA: 0.299 RR of Complex: 0.437

The construction of the engine house at the northeast corner of the mill had no appreciable effect on the movement of materials or goods around the site (Figure 3.8; Table 3.3). However, if the engine house also housed the boiler then it is significant that this space (space5) was housed low in the complex which would have allowed for the easy delivery of coal and removal of ashes.

Table 3.3 *Quantified values for Phase Three 'materials/goods' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.181	6	**7**	0.349	1
1	0.242	2	**8**	0.485	2

Figure 3.8 *Phase Three: Gamma map of the movement of materials/goods*



2	0.242	2	**9**	0.288	3
3	0.181	2	**10**	0.197	2
4	0.236	5	**11**	0.455	1
5	0.380	2	**12**	0.439	1
6	0.181	2	**13**		

Mean RA: 0.265 RR of Complex: 0.389

ACCESS ANALYSIS

Access analysis of Phase One reveals that human movement in around the site was similar to the movement of materials and goods at the same time and was based on a linear sequence of spaces (Figure 3.9; Table 3.4). The gamma map clearly shows the distinction between the main mill (spaces 1,9, 15 and 16) and other spaces at the site which all inhabit the lowest parts of the complex. Thus, whilst the cottages, toll house and privies are physically close to the mill, spatially they were distinct from the production process.

Table 3.4 *Quantified values for Phase One 'workforce' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.083	9	**9**	0.250	2
1	0.158	2	**10**	0.200	2
2	0.200	2	**11**	0.317	1
3	0.208	1	**12**	0.317	1
4	0.208	1	**13**	0.317	1
5	0.192	2	**14**	0.317	1
6	0.192	2	**15**	0.358	2
7	0.192	2	**16**	0.483	1
8	0.192	2			

Mean RA: 0.246 RR of Complex: 0.042

The gamma map also shows how movement around the mill continued to be on the basis of successive spaces, meaning that anyone wishing to access the attic had first to pass through all

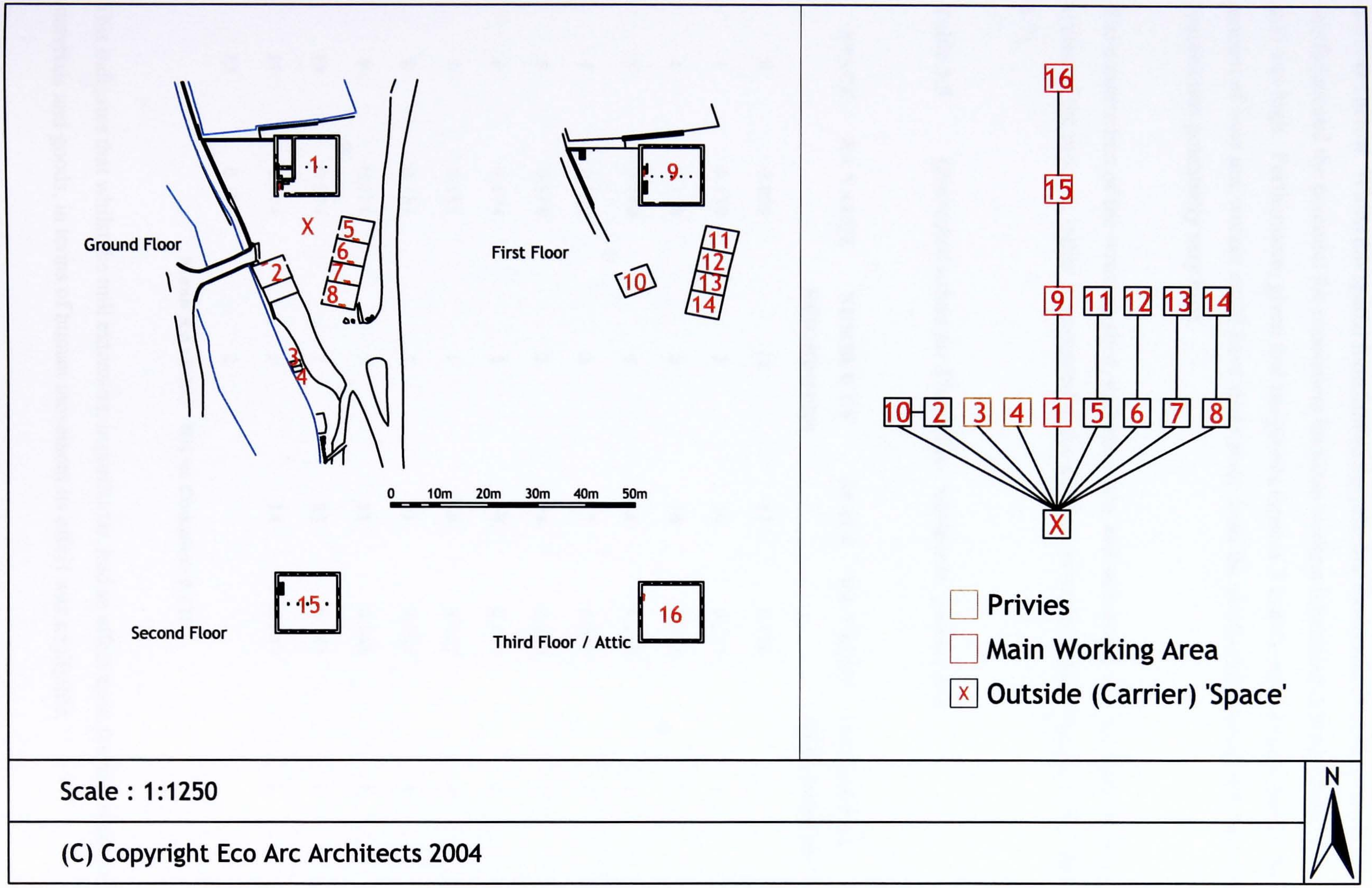


Figure 3.9 *Phase One: Gamma map of the movement of the workforce*

the floors below. Whilst this spatial form limited the potential movement of workers it was also inefficient and the potential for encounters between workers inhabiting different parts of the mill was high. Furthermore, given that the privies (spaces 3 and 4) were located outside the amount of time one worker could have spent away from the production process for sanitary reasons was potentially very high.

The construction of the weaving shed, mill extension and warehouse did not alter the basic syntax of the process, rather it amounted to the addition of extra spaces (Figure 3.10; Table 3.5).

Table 3.5 *Quantified values for Phase Two 'workforce' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.099	12	**13**	0.196	3
1	0.130	2	**14**	0.275	1
2	0.130	2	**15**	0.178	2
3	0.149	4	**16**	0.239	1
4	0.130	2	**17**	0.257	1
5	0.178	2	**18**	0.257	1
6	0.174	2	**19**	0.257	1
7	0.181	1	**20**	0.257	1
8	0.181	1	**21**	0.265	3
9	0.174	2	**22**	0.348	1
10	0.174	2	**23**	0.341	2
11	0.174	2	**24**	0.147	1
12	0.174	2			

Mean RA: 0.203 RR of Complex: 0.125

This indicates that whilst the mill extension, in particular, had an affect upon the movement of materials and goods, in terms of human movement its effect was negligible.

Phase Three is represented by the construction of the engine house and this, like earlier

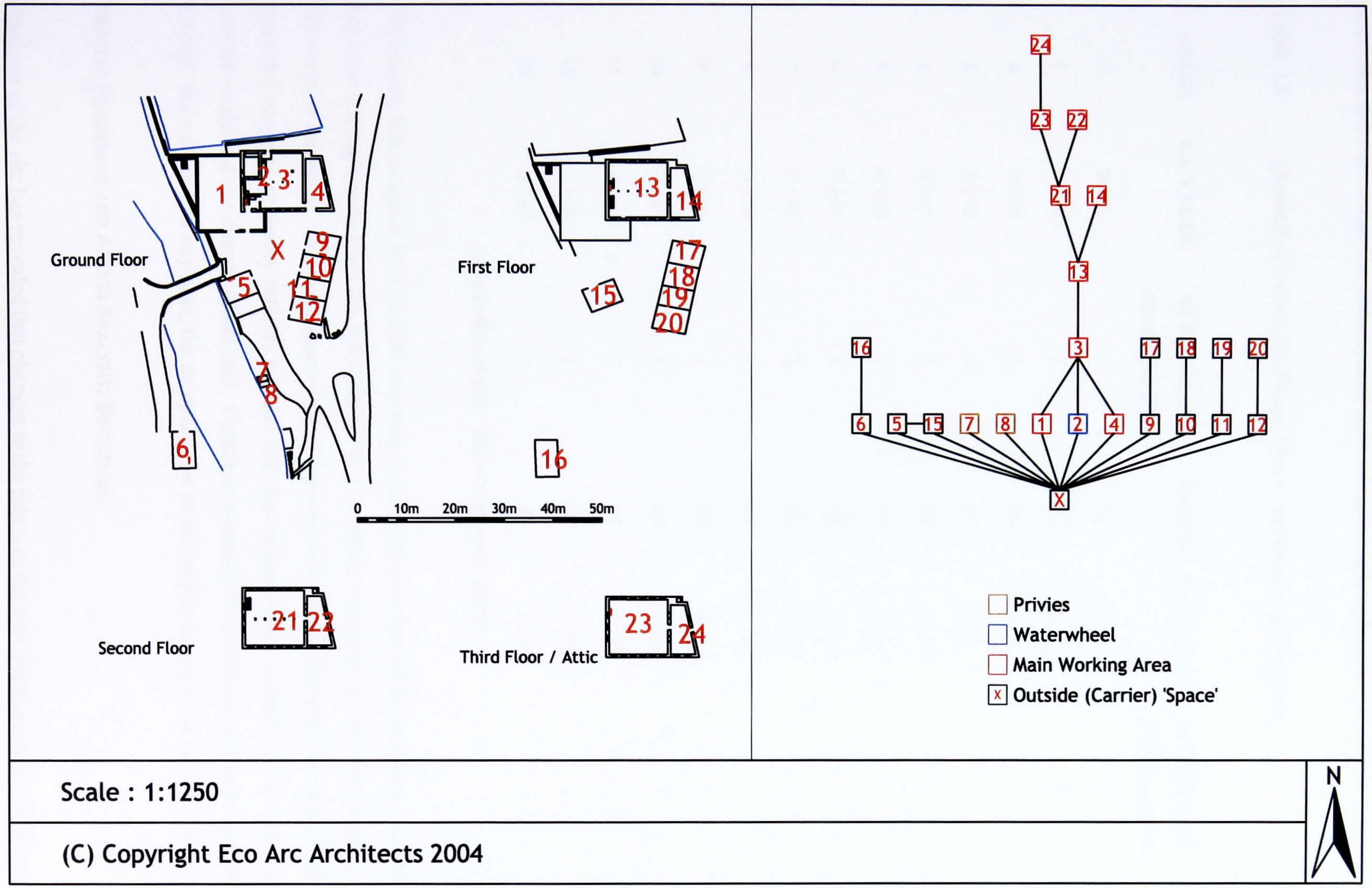


Figure 3.10 *Phase Two: Gamma map of the movement of the workforce*

additions, did not change the basic spatial form of the complex (Figure 3.11; Table 3.6).

Table 3.6 *Quantified values for Phase Three 'workforce' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.101	14	**14**	0.148	2
1	0.114	2	**15**	0.182	2
2	0.114	2	**16**	0.256	1
3	0.140	4	**17**	0.151	2
4	0.111	3	**18**	0.217	1
5	0.125	2	**19**	0.217	1
6	0.151	2	**20**	0.217	1
7	0.148	2	**21**	0.217	1
8	0.154	1	**22**	0.217	1
9	0.154	1	**23**	0.217	1
10	0.148	2	**24**	0.242	3
11	0.148	2	**25**	0.316	1
12	0.148	2	**26**	0.311	2
13	0.148	2	**27**	0.385	1

Mean RA: 0.185 RR of Complex: 0.152

The engine house (space 5) is located on a ring in the shallower part of the complex and does not have a significantly high RA value (at 0.125 it is below the mean RA for the complex). However, it cannot be consider a space central to movement around the mill and instead this syntactic property probably reflects the fact that the engine house communicated with the outside world and the interior of the mill. Certainly it cannot be considered as a thoroughfare through the mill and, in any case, the compact size of the engine house would preclude this.

PROCESS RECORDING AND ACCESS ANALYSIS: DISCUSSION

Analysis of the site has revealed that changes to the fabric of the mill could result in alterations to the movement of materials and goods but not necessarily to the movement of the workforce.

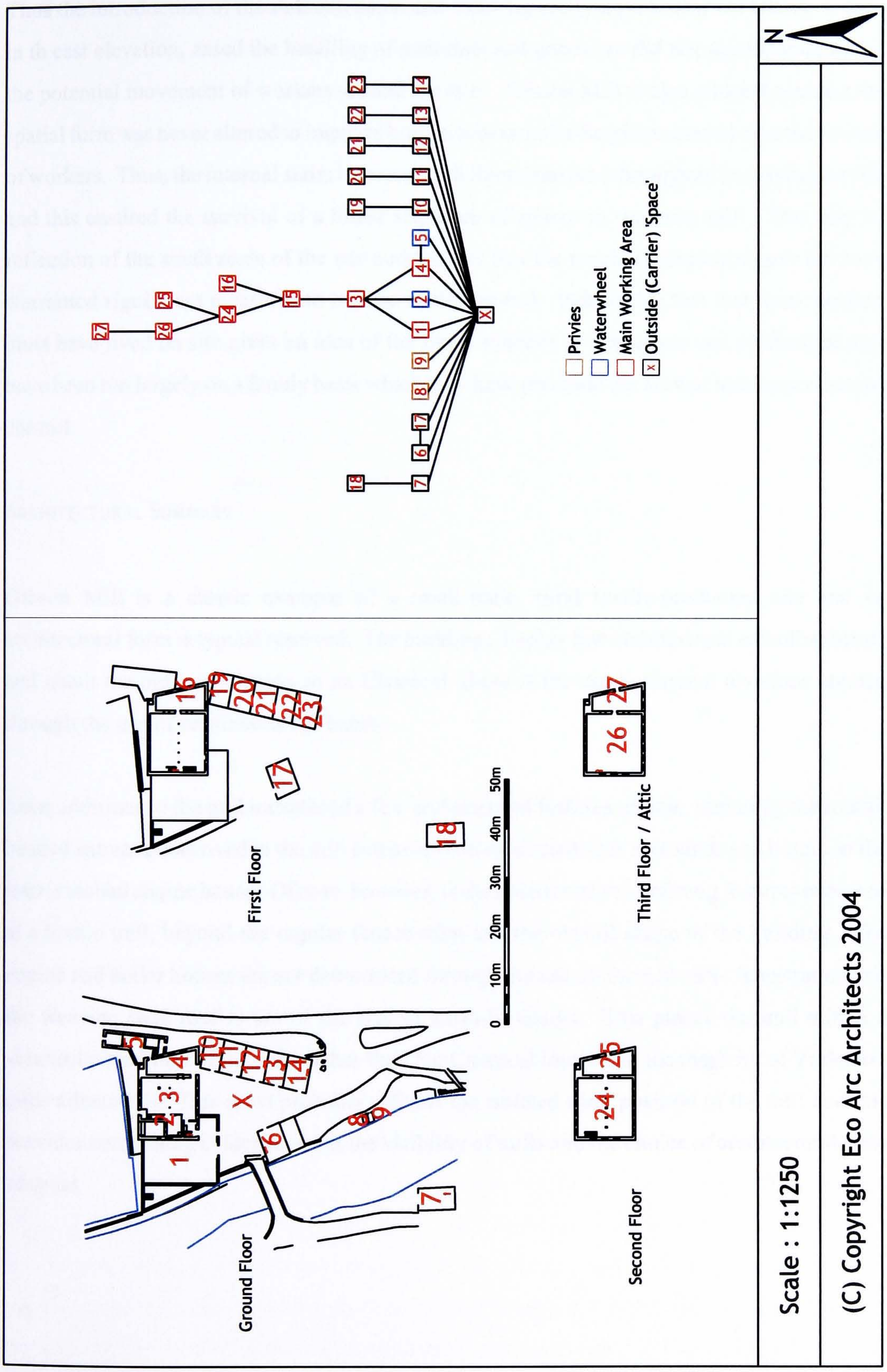


Figure 3.11 *Phase Three: Gamma map of the movement of the workforce*

Thus the introduction of the mill extension and weaving shed, in particular the taking-in door in th east elevation, eased the handling of materials and goods but did not significantly affect the potential movement of workers around the site. Gibson Mill is also unusual because the spatial form was never altered to improve human access and to heighten control over the actions of workers. Thus, the internal stairs between each floor remained throughout its productive life and this ensured the survival of a linear sequence of spaces in the main mill. This may be reflection of the small scale of the site and the fact that the numbers employed may not have warranted significant measures to impose social control. Indeed, the fact that most workers must have lived on site gives an idea of the likely number of operatives and production may have been run largely on a family basis which may have preclude the normal measures of social control.

ARCHITECTURAL SUMMARY

Gibson Mill is a classic example of a small-scale, rural textile-producing site and its architectural form is typical reserved. The buildings display few architectural embellishments and about the only concession to an Classical idiom is the use horizontal divisions created through the use of continuous sill bands.

Later additions to the mill introduced a few architectural features of note, including the round-headed entrance contrived in the mill extension and rusticated door surrounds and lintels on the later attached engine house. Of note, however, is the absence of any defining features expected at a textile mill, beyond the regular fenestration and the overall shape of the building. The engine and boiler houses are not demarcated through the use of characteristic fenestration and the weaving shed roof is not of the typical north-lit design. This places the mill within a vernacular tradition of building rather than the Classical idiom that the majority of Yorkshire mills adhered to. This most probably reflects the isolated rural position of the mill and this provides compelling evidence about the visibility of mills and the choice of architectural style adopted.

Appendix A
Site Description : 4

Old Lane Mill

Database Entry:	1357
NBR Number:	BFO62765
NGR:	SE 0860 2635
Township:	Northowram
Civil Parish:	Halifax
District:	Calderdale
County:	West Yorkshire
Branch:	Worsted
Period:	Early

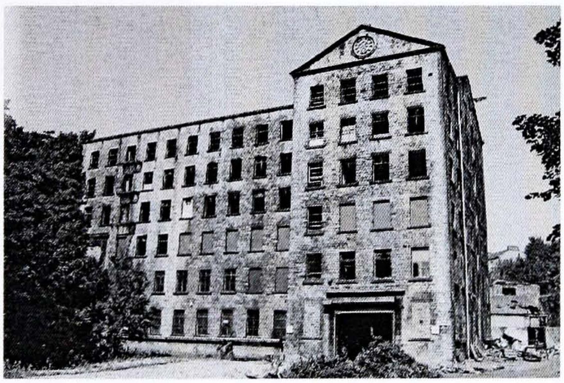
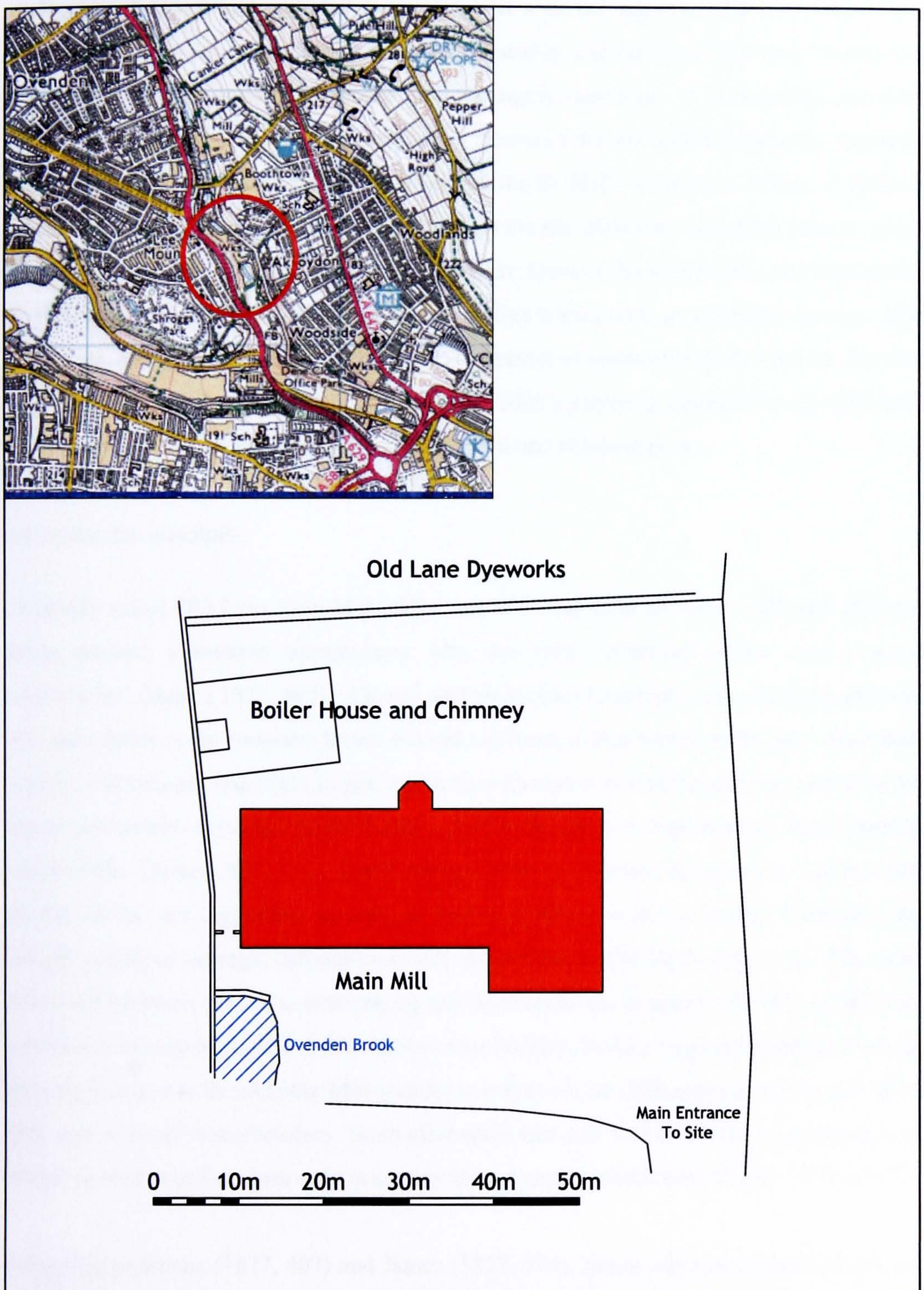


Plate 4.1 *Old Lane Mill, Northowram*

Built by James Akroyd in the early nineteenth century, Old Lane Mill represents an important and early experiment in integrated working in the worsted industry, for it was apparently designed both for spinning and weaving (Plate 4.1). The mill occupies a constricted valley bottom site with steeply rising ground to the east and west, on the northern outskirts of Halifax (Figure 4.1). It is partly built over the Ovenden Brook, which flows along the western boundary of the site, but was built as a steam-powered mill. During the mid-nineteenth century, ownership of the site changed and the site was converted for woollen production and thereafter sheds were built to the north of the main mill building, and a warehouse to the east. In the early twentieth century ownership of Old Lane Mill changed once more and during the occupancy of the Canal and Dyeing Company was used for the



Scale : 1:750

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Figure 4.1 *Block Plan, Old Lane Mill, Northowram* production of cotton and operated in conjunction with the adjacent Old Lane Dyeworks (**BFO62945**). However, despite changes in ownership and function, the early nineteenth century mill and detached boiler house survive largely unaltered. It is therefore suited to archaeological investigation and a photographic record of the site was undertaken to augment existing measured survey of the site produced by the RCHME in the late 1980s. A limited amount of documentary sources, largely relating to the site during the twentieth century, were consulted at Calderdale Archives, Halifax. However, some of the documents consulted by the RCHME were no longer retrievable and have therefore been quoted as secondary sources. The site has became disused during the 1990s and is currently in a state of mild dereliction. It is the property of Lazarus Properties Ltd., and in Spring 2003 a planning application was submitted for the conversion of the site for mixed commercial and residential use.

HISTORICAL BACKGROUND

Originally called Old Lane New Mill, Old Lane Mill was built between 1822 and 1828 by James Akroyd, a worsted manufacturer who was both 'inventive genius' and a 'good mechanician' (Baines 1877, 407). Akroyd, and his brother Jonathan, were originally partners with their father in the company James Akroyd and Sons, a firm which, by the late nineteenth century, had become one of the largest textile manufacturers in Halifax and was noted for the 'many new articles brought into the market, and for the spirit of improvement they imparted into the trade' (James 1857, 374). James Akroyd senior, a yeoman manufacturer, had founded the firm in the late eighteenth century, at first as a partner with his brother Jonathan, and initially produced lastings, calimanicoes and low wildbores (RCHME 1987a, 1). His sons, James and Jonathan, proved as enterprising and determined and in about 1805 they established a water-powered spinning mill at Brookhouse near Halifax. Before long the brothers had added weaving facilities to Brookhouse Mill in order to overcome the difficulties of selling machine-spun yarn to small manufacturers. Soon afterwards that mill was noted for its production of marine (a stout woollen cloth used primarily for curtains) commenced (Baines 1877, 406-7).

According to Baines (1877, 407) and James (1857, 374), James Akroyd withdrew from the Brookhouse concern in about 1811 and established an independent manufactory at Old Lane near Halifax. The move is dated more precisely by a set of Deeds, which record that in 1813 one James Akroyd, woollen yarn spinner, took a twelve year lease of a 'lately erected capital building in Ovenden, hitherto in use as a cotton mill, with engine house adjoining, later in the possession of Thomas Smith', and of 'that more ancient building situate in Ovenden formerly used as a fulling mill and known as Old Lane Mill, and two smaller buildings, one formerly a cotton mill, the other lately a fulling mill, with dams, weirs, etc.' (RCHME 1987a, 1). These buildings are to be equated with Old Lane Old Mill (later Lee Bank Mill, **BFO62938**, and now demolished), which stood on the Ovenden Brook immediately downstream of what was to become the site of the mill now known as Old Lane Mill, but originally called Old Lane New Mill. About this time, Akroyd entered into a partnership with another Halifax manufacturer, John Garlick, and turned from woollen to worsted production (RCHME 1987a, 1). Garlick relinquished the partnership in 1818, and a resulting agreement refers to a 'capital building' described as a 'worsted mill' in the possession of the two men, 'and also all those newly erected buildings near the mill used by them as warehouses and other places of trade' (RCHME 1987a, 1). This evidence suggests that Ackroyd and Garlick had developed several textile-producing sites in the Old Lane area between 1811 and 1818.

Following the move to Old Lane, Akroyd introduced into the market a 'species of stuff termed "dobby"... woven by the aid of a wood machine with that appellation placed across the loom' (James 1857, 374). Baines, referring to the same development, records that as early as 1818, Akroyd had turned his attention to the manufacture of damasks, assisted by two weavers from Paisley and Stockport. The result was an improved damask loom 'which he carefully guarded upon the shop "system" by having both looms and weavers under lock and key' (Baines 1877, 412). Because of these covert operations, Akroyd retained a monopoly over his invention until 1824. These records attest to Akroyd's prowess in the industry, his inventive nature and mechanical knowledge, and further indicate that he had once operated as a clothier within the local worsted putting-out system (or 'shop' system). Akroyd's rises within the textile industries therefore tells the story of the transition from pre-industrial to proto- and fully-industrialised scales of production. Ironically, James Akroyd's monopoly on the Damask trade, which was to become so important to the local economy in the Halifax area, ended in 1825 when his fathers company, James Akroyd and Son commenced manufacture of the same product and rose to pre-eminence in the industry (James 1857, 390).

In 1822, 'wholly unprovided with money', and unable after the death of John Garlick to meet the payments the latter had been making, James Akroyd conveyed his premises to members of the Rawson family of merchants and bankers (RCHME 1987a, 2). Baines (1877, 407) records that it was about this time that Akroyd first introduced power looms and by 1825 was supplying Messrs. Macintosh of Manchester (inventors of a new process of rendering cloth waterproof by a coating of India-rubber) with a light worsted fabric suitable for their process (RCHME 1987a, 2). Akroyd also introduced the jacquard engine for weaving damasks and other goods, setting one up in March 1827, the year in which Baines (1877, 407) records that he opened a weaving factory regarded as 'the greatest undertaking of the period in the worsted manufacture', and to be equated with the mill now known as Old Lane Mill. Akroyd himself recorded in 1834 that he had begun to build his new mill at Old Lane in 1825, finishing it ready for working in December 1828. Akroyd's own account of the building of this factory notes that the mill was used for spinning and manufacturing and this is consistent with the description of the site as a 'weaving factory'. We may therefore assume that Old Lane Mill was designed to accommodate both the processes of spinning and weaving (RCHME 1987a, 2).

Baines' (1877, 407) records that 'encouraged by the success of his experiments, he [James Akroyd] proceeded to erect the large fire-proof mill in Old Lane, aided pecuniary by his bankers – Messrs. Rawson, the founders of the present Union Banking Co., Halifax'. Baines' account of the mill records that it opened in 1827 with a supper and dance for the weavers, but this contrasts with a plan included as part of a Deed of Covenant, registered 17th October 1827, which does not show the detached boiler house and chimney to the north of the main mill building (Document 4.1). Furthermore, a lease registered on the same day as the Deed of Covenant from Rawsons and Akroyd to Jeremiah Rawson of Shay, merchant, refers to 'buildings now being erected or erecting late' (Document 4.2). On balance, Baines must therefore have been referring to celebrations for the completion of the multi-storeyed mill building, but not the commencement of working, which would have required the completion of the steam-power plant. Structures such as the boiler house and chimney must therefore have been completed at a slightly later date. According to the evidence from the Factories Inquiry Commission Production, published in 1834, production at the site commenced in 1828. In the commission's report, Akroyd reported that he had personally been involved in worsted production for upwards of 30 years, and described his mill at Old Lane as steam-powered, with an engine of 60 h.p (Document 4.3).

Old Lane Mill became the core establishment at the centre of Akroyd's business empire and the base for his continuing inventions and innovations. About 1830-32, Akroyd turned his attention to the manufacture of mixed goods of cotton and worsted, and especially to the difficult art of dyeing both materials 'in the piece' (Baines 1877, 402). At the same time, Akroyd also introduced the use of cotton warps in other products, especially cotton and worsted damasks of various shades and for which his firm were noted (RCHME 1987a, 3).

The building of Old Lane Mill likely reflects the inadequacy of the earlier mills at the site that had come into Akroyd's possession in the original lease of 1811. Furthermore, the large six-storey fireproof steam-powered mill was undoubtedly intended as an overt expression of Akroyds success in the industry. For a mill of the period (1825-28) its scale is impressive – compared with other mills of the same date and from across the Yorkshire textile industries it is only to be matched by Armitage Bridge Mills (**BFO63076**) and Marshall Mills (**BFO41529**) both of which had been established by long-standing manufacturers in the woollen and flax industries, respectively.

The use of a multi-storeyed mill for weaving is worthy of remark, even if the scale of operation is unknown (RCHME 1987a, 2). During the course of the nineteenth century it was common for power looms to be housed in purpose-built single-storey sheds, the first such shed in Yorkshire probably built in 1829 at Waterside Mill, Langfield (**BFO38205**). During the following few decades, this structural form was widely adopted for weaving (Giles and Goodall 1992, 39). Instances of handlooms being installed in early nineteenth-century spinning mills are known, for instance, in the early worsted mill at Ebor Mill, Haworth (**BFO62649**), but it is likely that at Old Lane Mill Akroyd was using power looms. The installation of power looms in the multi-storey mill at Old Lane may therefore be initially seen as an expedient. Trigg (1933, 159) notes that Akroyd 'also built on the north side of the mill a weaving shed, which was probably the first in the area to be erected in the district solely for power-looms, though both Peter Bold, at Grove Mill, had been running a few power-looms for two or three years then… a portion of the shed is derelict'. However, in attributing the shed at Old Lane to Akroyd, Trigg is almost certainly making a mistake. Buildings to the north of the mill and boiler house are known to have existed by 1849, but whether they were built by Akroyd Akroyd or the Rawsons is unclear. Rawson's took over the mill in 1835, buying it for £4,000 and Akroyd died the following year aged 51. A new lease drafted at that time mentions, in legal rather than actual plurality, the 'warehouses, engine houses, gas houses, workshops, counting houses, offices attached and detached'. The site had clearly developed since the construction of the main mill, boiler house and chimney, and buildings to the north may have included the gas house and workshop, the latter no doubt extensive given Akroyd's inventive nature (RCHME 1987a, 3). However, on balance it is likely that the shed recorded by Trigg dates to Rawsons occupation of the site, perhaps to accommodate an increasing number of power looms which were not especially suited to the multi-storeyed mill. Whether or not weaving by power loom was undertaken in a shed, or more likely in the main mill building, it is a fact that Akroyd was instrumental in introducing powered weaving in to the worsted industry – when Old Lane Mill was built in the mid-1820s, power looms for worsted weaving were experimental and confined to a small number of firms (Sigsworth 1958, 34).

Following its purchase by the Rawson's in 1835, Old Lane Mill was leased to W.H. Rawson, merchant. How the Rawson's operated Old Lane Old and New Mills in the years immediately after 1836 is unknown, but by 1849 the former was being leased out as a cotton mill, and Old Lane Mill is recorded as a woollen mill. This is perhaps unsurprising, given that the Rawsons had a long-standing connection with the woollen rather than the worsted trade, and owned other woollen mills, including, Mill House Mill (**BFO62717**) and Brockwell Mill (**BFO62716**), both at Sowerby, Sowerby Bridge. Therefore, if the shed recorded by Trigg (1933, 159) was built by the Rawson's, then it served the woollen industry. According to Porritt (1936, 36), William Henry Rawson II 'took up occupation of his business at the Old Lane Mill in Halifax' in 1870, and experimented with reducing the smoke from the boilers, installing a patent 'Smoke Consumer' in the chimney. Accompanying Porritt's description is a plan which shows that the shed had been enlarged to the east and south and that a warehouse had been built to the east of the mill. W.H. Rawson & Co., are listed as woollen manufacturers at Old Lane Mill in 1893, and Pike (1895, 45-6) records that goods manufactured there were sent to Mill House Mill for finishing. Old Lane Mill was evidently bought by Bowman Brothers of Lee Bank Mill, cotton spinners in 1914-15, and is identified as a cotton mill by Trigg (1933, 159-60). In 1938, the site was sold to the Spindles Board, and until recently the site was owned by the Canal and Dyeing Company Limited, Old Lane Mill having been subsumed into the greater mass of the Old Lane Dyeworks which had developed immediately north of the site. The site, along with the dyeworks, now lies derelict and in the ownership of Lazarus Properties Ltd and in Spring 2003 an application was made and approved for conversion of the site for mixed commercial and residential use.

ARCHITECTURAL DESCRIPTION

There are three principal structural phases discernible at Old Lane Mill, but only the first phase is of interest in the context of this thesis. Phase One concerns the construction of the main mill building and detached boiler house *c.*1825-28 for worsted spinning and weaving. Phase Two is concerned with additions and alterations at the site *c.*1835-1910 during which time the site was occupied by the Rawson family and the site was used for woollen production, whilst Phase Three covers those alterations at the mill apparently carried out in the mid-twentieth century and are therefore outside of the temporal limits of this research. Consequently, neither Phases Two or Three are relevant to this thesis and will only be briefly mentioned below and will not be subject to spatial or architectural analysis. The principal interest of Old Lane Mill is as an example of a large-scale early worsted mill and experimental mill design.

- PHASE ONE

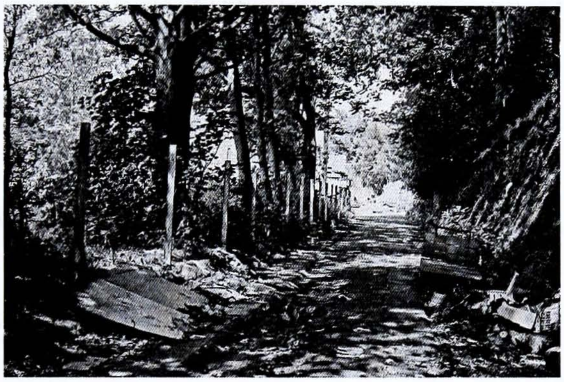

Plate 4.2 *Main road entrance to Old Lane Mill from the south*

The earliest surviving buildings at the site comprise the multi-storeyed steam-powered mill and its detached boiler house to the north, built between 1825 and 1828. Although documentary evidence indicates that Old Lane Mill was built on the site of or close to earlier structures no remains of any such buildings survives. The site is bound on all sides either by the natural topography (east and west) or a low stone wall. To the north the original boundary has been obscured by the Old Lane Dyeworks but to the south the boundary wall survives as does the gateway and cobbled road forming the main entrance to the site (Plate 4.2).

Old Lane Mill is built of local stone and is six-storeys high with an attic, L-shaped in plan, fifteen bays long by four bays deep and has with a pedimented wing four bays wide and two bays deep at its southeast corner (Figure 4.2). A two bay wide internal end engine house rises through three floors at the west end, and a polygonal tower (probably designed to house a series of privies) projects from the central bay of the north elevation. The mill has an austere appearance, which is typical of its date (Giles and Goodall 1992, 23) but the use of architectural motifs such as the pediment and rusticated surrounds shows a notable concession to architectural detailing. The sheer scale of the mill places it amongst the largest of its time and its design and construction represents an important and early experiment in integrated working

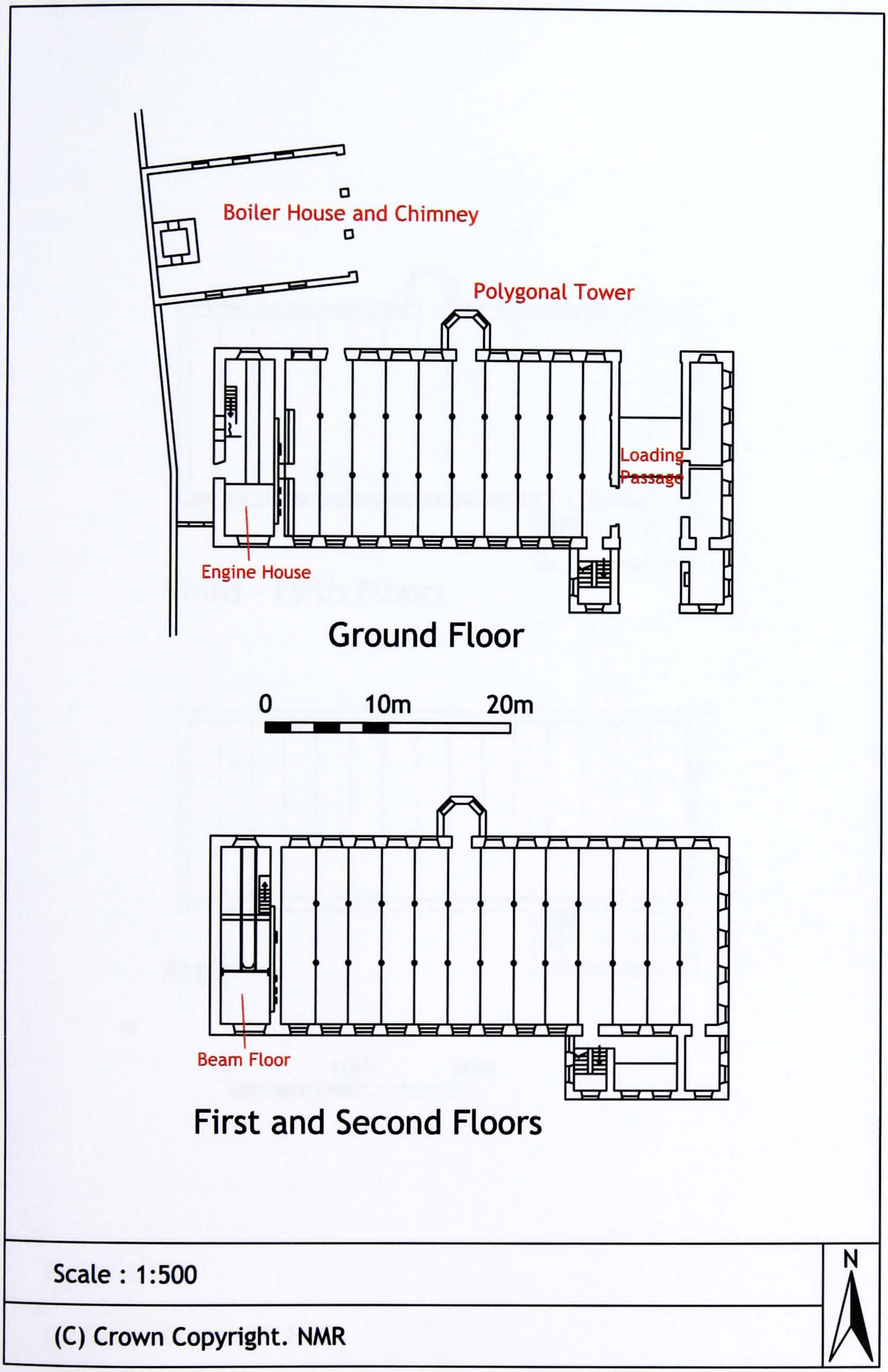

Figure 4.2 *Phase One, Old Lane Mill*

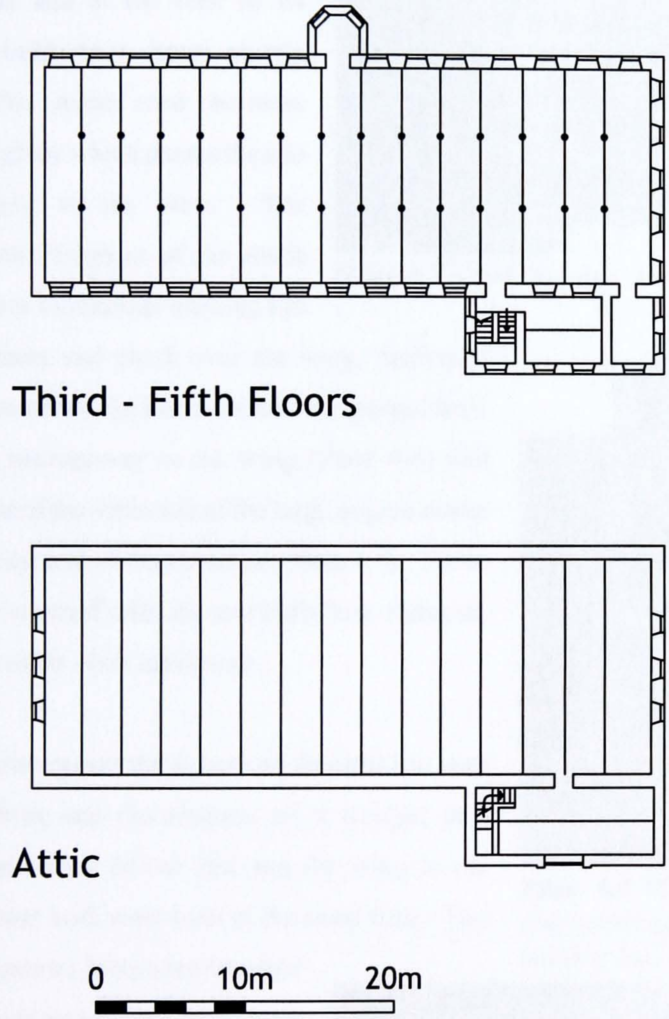

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Figure 4.2 cont. *Phase One, Old Lane Mill* in the worsted industry. The walls are of coursed masonry, the windows have rectangular lintels and individual sills, and on the north and south elevations there is a slender moulded eaves course.

The south elevation was clearly intended as a display front (Plate 4.3) – it faces the town of Halifax and at the time of its construction would have been clearly visible from the main road between Halifax and Keighley which passes the site on rising ground to the west. The architectural embellishment of the south elevation includes mouldings framing the triangular pediment and clock over the wing, rusticated surrounds with moulded flat hoods around the ground floor opening to the passageway in the wing (Plate 4.4) and similar treatment of the surround of the large engine house window at the west end of the elevation (Plate 4.5). These embellishments contrast with the markedly less elaborate character of the mills other elevations.

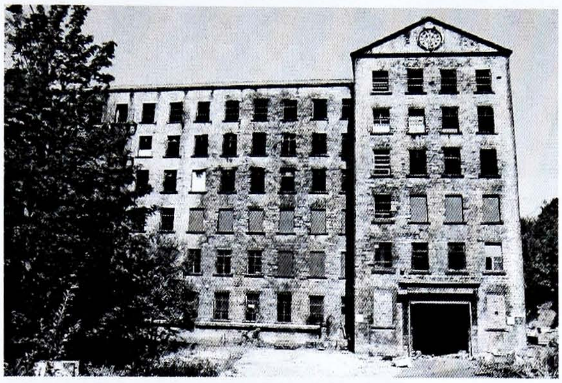

Plate 4.3 *South 'display' elevation*

Plate 4.4 *Wing with pediment, clock and rusticated surround to loading bay*

The east elevation repeats the pattern of fenestration seen on the south front and the absence of a straight join between the main body of the mill and the wing to the south indicates that both were built at the same time. The ground floor windows have been blocked and the central windows of the main body of the mill have from the first floor to the attic been converted to loading doors (Plate 4.6) The west elevation is similar to the east elevation, but the regular pattern of windows is not present at ground, first or second floor level, reflecting the position of the internal engine house. At

Plate 4.5 *Rusticated surround to engine house window*

just above ground floor level, a blocked door and single window gave access to and lit the engine house from the west, their elevated position respecting the height of the engine bed inside.

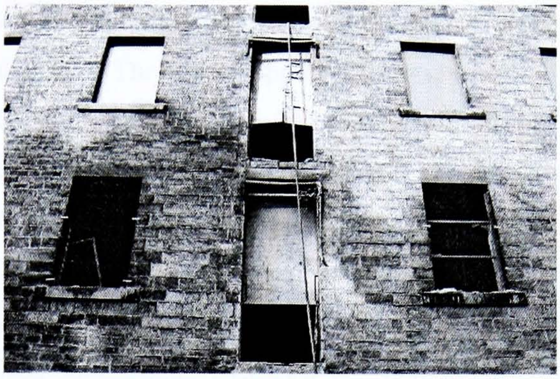
Plate 4.6 *Windows converted into taking-in doors in the east elevation*

The north elevation is similar in character to the south elevation, but the wing does not project beyond the line of the elevation. A polygonal tower projects from the centre bay of the north elevation (Plate 4.7). There is no evidence to suggest that the polygonal tower is a later addition – both internally and externally the masonry is coursed through and the doors into the tower at each floor level are original. The function of the tower is unclear but it most likely housed privies, one for each floor of the mill. The housing of privies in a projecting tower, often polygonal, is known from other, later mills in Yorkshire (for instance, Barkerend Mills, Bradford **BFO62549** (1852), and Manningham Mills, Manningham **BFO62439** (1871-3). The base of the tower at Old Lane Mill is obscured by later accretions, but if built as a privy tower it would probably have had an opening at its base for the removal of soil by bucket or cart (Williams and Farnie 1992, 56-7).

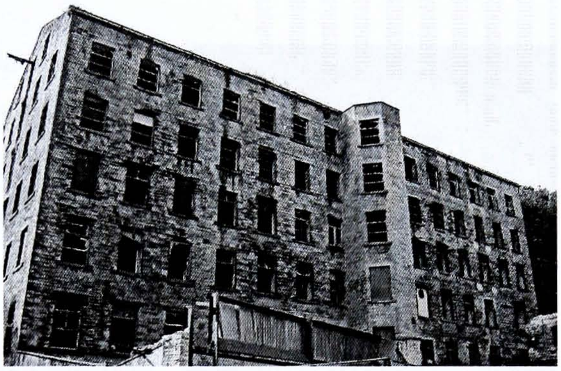
Plate 4.7 *Polyogonal tower projecting from north elevation*

On plan the mill has a logical, if experimental design. Each of the six, large working floors is free of subdivisions and obstructions (Plate 4.8). Internally, the mill of fireproof construction, and in the main part of the mill, on the ground to fifth floors, two-rows of cast-iron columns with moulding rings but no bolting heads,

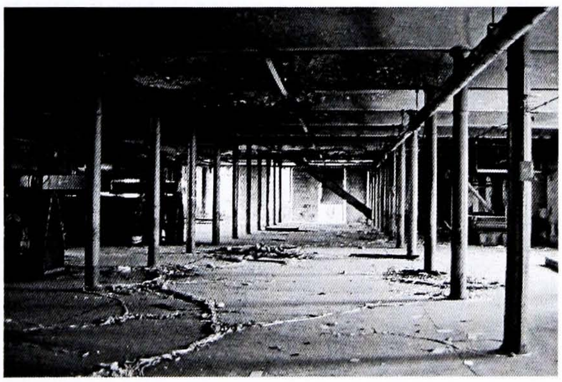
Plate 4.8 *Interior view of first floor showing rows of cast iron columns and jack-arch ceiling*

support north-south cast-iron beams of an inverted T-section with parallel-sided lower flanges and a curved upper profile with a slightly moulded top. The beams support shallow north-south brick vaults; the tie-rods of some of these jack arches are partially visible below the brickwork (RCHME 1987a, 5). On all levels the mill originally had limestone flag floors; in recent years and since the mill has stood empty, many of these slabs have pillaged making visible the layer of sand placed on top of the brick jack arches. The wing, like the main part of the mill, was also of fireproof construction, but here the direction of the jack arches reflect the rooms into which the wing was divided, the two-bay central room vaulted east-west, the room to the east vaulted north-south.

At ground floor level the mill has four main component areas; an internal end engine house at the west end, the main working floor, a loading passage running the width of the mill and wing to the east, and a stair-tower and offices within the wing (Figure 4.2).

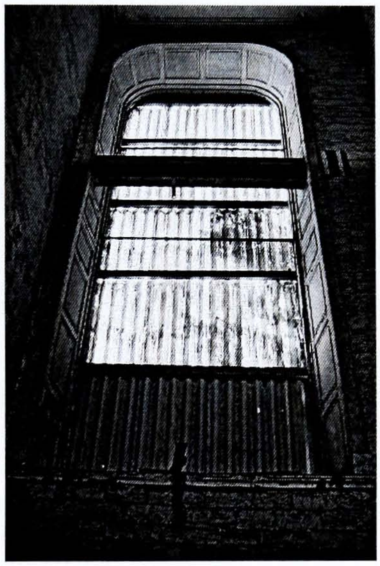

Plate 4.9 *Paneled reveal and moulded architrave around southern engine house window*

The internal end engine house is two-bays wide and rises through three storeys. The engine house originally had a door in its west wall (the door in the north wall is a modern insertion, see below) and was lit from the north and south. Internally the engine house had a number of stylistic elements. Whilst the windows in the north wall were plain, the tall and wide south window had a panelled reveal and moulded architrave (Plate 4.9). The ceiling of the of the engine house is particularly ornate. It is underdrawn below a series of east-west beams and brick vaults, it has a reeded cornice and, at the south end, moulded plasterwork incorporating a floral motif, concentric ribs and outer swags (Plate 4.10). The engine bed has been removed and a modern concrete floor inserted, but stubs projecting from the south and north walls,

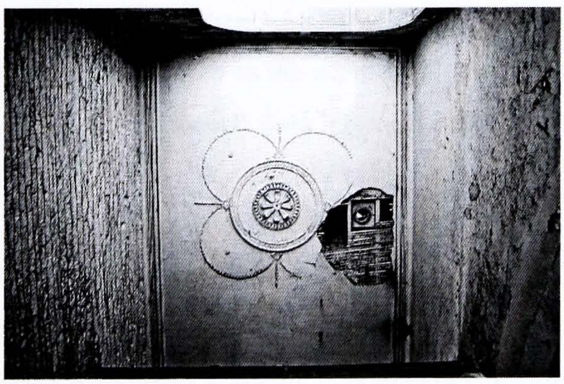

Plate 4.10 *Ornate plasterwork engine house ceiling*

a recess for the flywheel and a cast-iron beam floor indicate that it once housed a single-beam engine with its flywheel towards the south east and cylinder at the north end, towards the boilers (Figure 4.3). Stone steps, most of which have been removed but which are still evident from scars in the east and west walls, led up to the beam floor, with the entablature beam, which survives complete but for its south railing and incorporates moulded cast-iron sections supported on stone brackets (Plate 4.11).

Plate 4.11 *Decorative beam floor*

Power from the steam engine was transmitted from the flywheel within the engine house, situated in a recess in the east wall, through the east wall to a substantial vertical gear wheel on its east side, where its position is indicated by a thickened area of ashlar masonry with a curved recess in its upper surface facing the main ground floor working space (Plate 4.12). There is no evidence for any dividing walls forming a partition around this gearing and separating it from the ground floor working area, but it is probable that there once existed some sort of timber stud work or grillage separating the two as the drive shafts and associated gearing where a potential hazard when in operation. From this point the drive was taken across the mill to the north wall, then via a vertical shaft in the angle of the engine house, up to the second floor. Here the drive was diverted a further two bays east, from where it rose to the attic only to return two bays west (Figure 4.4). The evidence for this system of power transmission is now ephemeral and takes the form of boltholes for the iron mounts and transoms that supported the vertical shaft and its associated cogwheels. The iron surrounds for the traps in the brick arches, which allowed drive to be transmitted between the floors, also survive (RCHME 1987a, 6). This system of power transmission seems unduly complex and deviates from the more usual arrangement of a vertical shaft rising through the centre of a mill. However, corner shafts, such as that seen at Old Lane

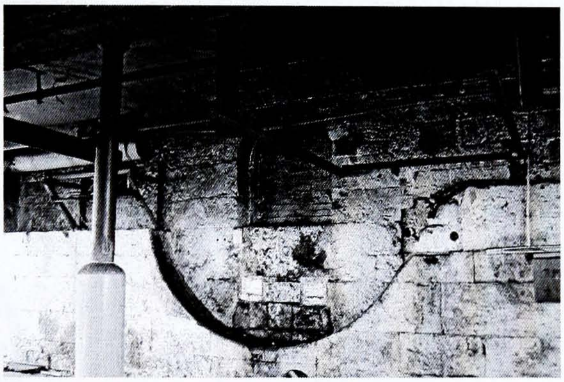

Plate 4.12 *Recess for vertical gear wheel within ground floor working space*

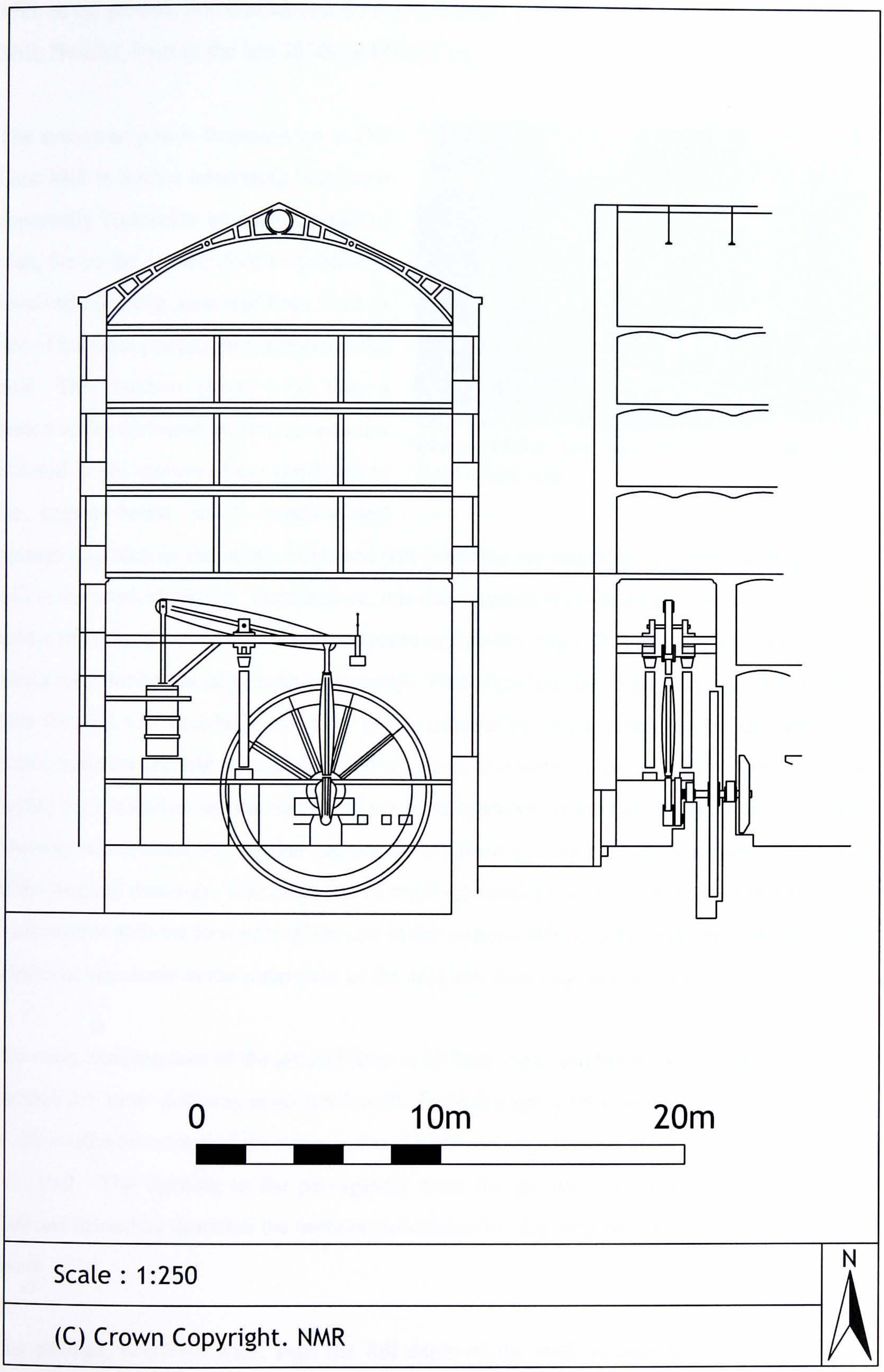

Figure 4.3 *Reconstructed arrangement of engine house and gearing*

Mill on the ground, first and second floors, are known in some early mills, including Hunslet Mill, Hunslet, built in the late 1830s (**BFO63376**).

The system of power transmission at Old Lane Mill is further interesting because it apparently represents an early change of plan, for on the ground floor it involved it involved blocking what had been built as one of the main pedestrian entrances to the mill. This doorway (Plate 4.13), with a tooled ashlar surround, which represents a watered-down version of the surrounds to the engine house south window and passageway seen on the south front, and was probably envisaged as the main entrance to the mill in the north elevation. Furthermore, it is the only doorway on the ground floor – all other means of entry were through the passageway or into the engine house. It was blocked and a rebate for a horizontal cog created internally. This alteration must have been carried out soon after the mill was first built and prior to the installation of the steam engine and system of power transmission for there is no evidence of an alternative system of power transmission having been installed and the mill could not have operated with a door in this position. A new doorway was created out of what had previously been a window in the bay immediately east of the original doorway. The character of made-up masonry around the base of this doorway is consistent with the character of the rest of the original fabric of the mill, indicating that the alteration was made at the same time as the adjacent doorway was blocked.

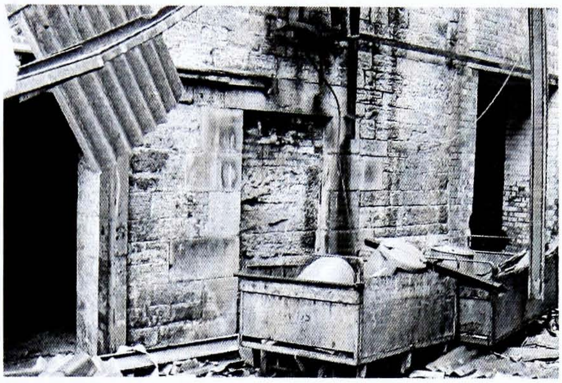

Plate 4.13 *Blocked 'main entrance' to the ground floor of the mill*

The main working area of the ground floor is 10 bays long, and the principal access to it was through the 'new' doorway in the north wall. From this space there was access to the staircase in the southwest corner of the wing and to the internal passageway via a wide opening in the east wall. The opening to the passageway from the ground floor working area has been widened in modern times but the north reveal retains the stop for a pair of large, hinged wooden doors.

The passage, two-bays wide, runs the full depth of the mill, is specifically identified and entitled 'Archway' on the 1827 plans for the mill (RCHME 1987a, 5). The main entrance to the passage from the south has a rusticated stone surround, and internally this entrance had a rusticated surround of flat wood. The north end was originally similar to that in the south wall of the wing, but without the rusticated surround; it has since been altered but the sidewalls are recessed at this point for double-leaf doors appropriate for an uninterrupted opening so that originally traffic could pass through the mill in this passage. Above the passageway are east-west beams supporting brick vaults, an arrangement necessary to span its width and to provide support for the columns on the floors above. The use of an internal loading passage is unusual in the Yorkshire textile industry until the late nineteenth and early twentieth century but is use at Old Lane Mill represents an experiment with easing the movement of goods and materials to and from the site.

Beyond the passageway, in the main body of the mill is a narrow, one-bay wide room, and in the wing a heated office with a fire-place in its west wall, though the route taken by the flue is unclear, and there is no external chimney. In the southwest corner of the wing is the staircase. There is an entrance to the staircase from the outside at ground floor level in the west wall but this is a later addition formed out of an original window; this is evidenced by modern infill of the window opening above the door and the external flight of stairs leading to this door, which are built out of concrete blocks. The stairs were therefore originally accessed only from the main ground floor working area and provided access to all upper areas of the mill.

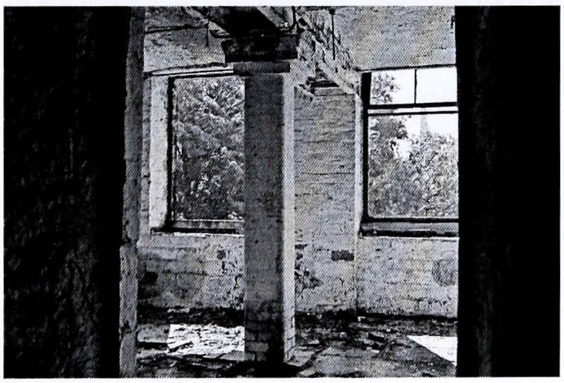

Plate 4.14 *View into former offices in the wing from the first floor working area, showing removal of partition wall and inserted brick pier*

The remaining floors of the mill were originally identical in character, except that, due to the internal end engine house, the first and second floors were shorter by two bays at the west end. How each floor was used, whether for spinning or weaving is not known, but the extra weight and vibration during operation of the powerloom may have meant that they were located on the lower floors. In the wing there were originally two rooms, one entered directly from the staircase with two windows borrowing light from the main body of the mill, whilst the other smaller room was apparently entered directly from the mill floor. On all floors this arrangement has been altered and the dividing wall replaced by I-shaped steel joists and a central brick pier but the original arrangement is preserved in the brick jack-arch ceilings of each room, the two-bay vault over the central room orientated east-west, whilst that over the smaller room goes north-south (Plate 4.14). These rooms may have served as storage or as overlooker's offices (RCHME 1987a, 5), the larger room with its windows facing the working floor would have been particularly suited to the latter function.

The staircase rises into the attic over the wing, and from there the attic of the main mill is accessed. In the wing attic there would have originally been a clock mechanism, but all that survives is the cast-iron clock face. The attic floor of the mill, lit from the east and west gables, has fourteen arched trusses of cast-iron, each of four sections bolted together through lap joints (Plate 4.15). The spandrels of each section have struts, and at the centre form a circular shape. The trusses support cast-iron purlins of inverted T-section with fish-bellied common rafters. The latter, like the principals, have racked backs to support laths. The roof was at one time covered with welsh slates, but these have been removed and replaced with modern corrugated asbestos; it is likely that the welsh slates themselves replaced earlier stone slates, as was common in the area. It is not known whether glazed skylights in the roof provided additional lighting. The form of the trusses relates the mill to a wider group dating to the 1820s, 30s and 40s, including Carlinghow Mills, Batley (**63484**), and Folly Hall Mills, Huddersfield (**63095**). However, the full arched cast-iron trusses at Old Lane Mill may be the earliest in Yorkshire (Giles and Goodall 1992, 73). The height of the trusses above the floor indicates that the attic provided additional working space and there is a remarkable similarity between the form of the attic at Old Lane Mill and an illustration of an attic housing spinning mules published by Baines (1835, pl 11; Plate 4.16), which suggests how this space may have been used.

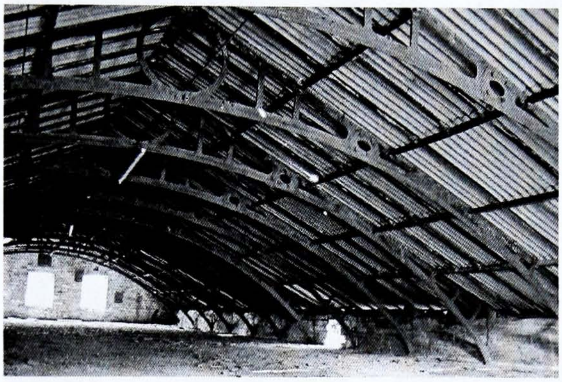

Plate 4.15 *Cast-iron roof trusses and attic working area*

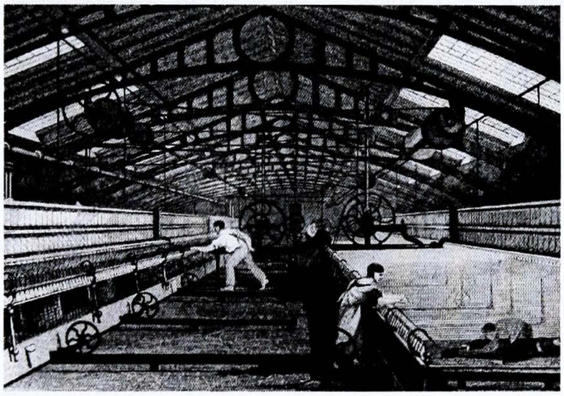

Plate 4.16 *Spinning mules operating in attic space (Baines 1835, pl 11)*

To the north of the mill stands the detached boiler house, which although not shown on the plan of 1827, must have been complete for the mill to have begun to operate in 1828 (Plate 4.17). With space for up to three boilers, it incorporates an internal chimney against its west wall, which now lowered, has a square base with a massive cornice, supporting a circular shaft. The east wall of the boiler house, next to what would have been the firing place, has a rusticated ground floor with three wide arched openings (Plate 4.18). These arched openings are typical of the characteristic form of boiler houses in the textile industries, and their round form allowed the easy installation of prefabricated boilers and facilitated the movement of coal (Giles and Goodall 1992, 148). At the upper level, as also to the north and south, there are three windows, but there is no evidence of an internal floor. The roof, hipped and supported by cast-iron trusses, is similar to that in the main mill. There are three full arched trusses with a central circle and struts in the spandrels span the roof, and three half trusses form each hip. The purlins and common rafters are also of cast-iron, the former fish-bellied like those in the mill, and both with racked backs for laths. The base of each truss is linked by tie beams, and vertical rods run down from their centres. The boilers took there water from a large dam constructed upstream of the mill above the site of the adjacent Old Lane Dyeworks.

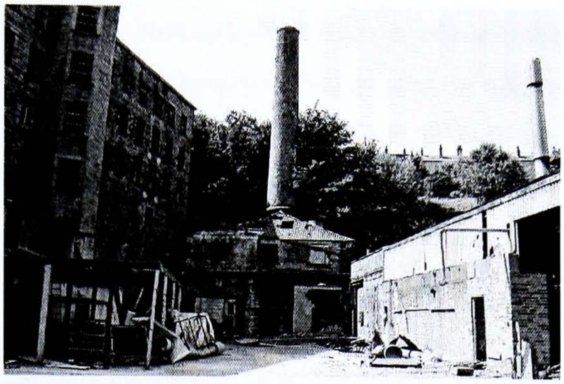

Plate 4.17 *Detached boiler house and chimney to north of the main mill building*

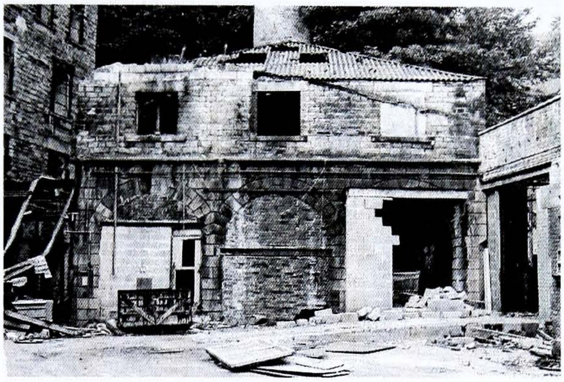

Plate 4.18 *Detail of rusticated arches providing access to the boiler house*

- PHASE TWO

The second principal phase of structural activity at Old Lane Mill is principally concerned with additions and alterations made whilst the mill was owed by the Rawson family after *c.*1835 and run as a woollen factory. The principal changes to the main mill included the insertion of a hoist shaft in one of the offices next to the loading passage which rose the full height of the mill and serviced each floor, including the attic. The hoist is built up against the jamb of one of the windows in the east elevation and its insertion necessitated changes to the layout of the offices in the wing on the ground. It is therefore stratigraphically later than the original mill building. Adjacent to the hoist and most probably contemporary with it, are a series of taking-in doors in the east elevation which allowed goods to be hauled into and removed from the mill directly from and to the mill yard below.

The other major structural change at the site at this time is represented by the construction of a shed to the north of the mill and a warehouse, apparently of two storeys, to the northeast. Little survives of either of these structures although the shed may be represented by a stretch of its north wall now part of a larger shed and part of Old Lane Dyeworks (Plate 4.19). Nothing structural survives of the warehouse but it was evidently built against a revetment wall holding back steeply rising land to the northeast of the main mill which must have been contemporary with the 1825-8 mill for it allowed passage around the east end of the mill and to the boiler house.

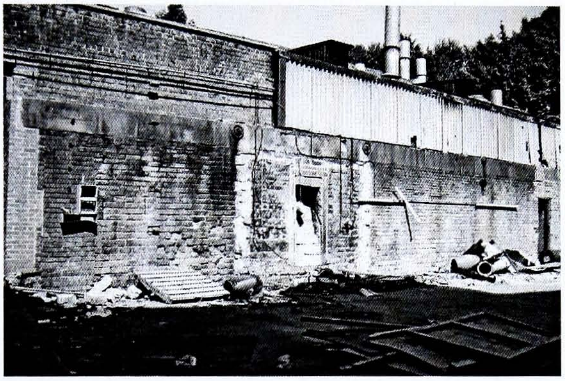

Plate 4.19 *Surviving section of north wall of former shed located north of the main mill*

- PHASE THREE

Phase Three is represented by a series of changes undertaken during the twentieth century, including the blocking of the former loading passage at its northern end and removal of the steam engine from the internal end engine house. Following the removal of the steam engine a new entrance was contrived in the north wall of the engine house and a new concrete staircase inserted providing access from the ground floor of the engine house to the

Plate 4.20 *Inserted concrete staircase in engine house and scar of treads of earlier stone stair leading to beam floor*

first floor of the mill. The insertion of this staircase involved the removal of substantial parts of the original stair leading to the beam floor (Plate 4.20). Access between the former loading passage and ground floor of the mill was also improved by widening the original intermediate doorway. Further alterations at the site included the removal of the boilers from the detached boiler house and its use for an alternative function involving the blocking of the arched entrances. All of these changes are contemporary with the amalgamation of Old Lane Mill with the adjacent Old Lane Dyeworks.

PROCESS RECORDING

Its is known that Old Lane Mill was built as a worsted factory and documentary sources indicate that the mill was designed to house spinning and weaving. It has been commented already that it was not common in the Yorkshire textile industry for powerlooms to be housed in multi-storeyed buildings because the amount of vibration arising out of their operation. However, if Old Lane Mill did, initially at least, house powerlooms then it is reasonable to suggest that they were housed on the ground floor to minimise the impact of their operation on the structural integrity of the mill. This, however, would have meant that the number of looms operating at the mill was much less than the spinning capacity on the other floors and weaving may therefore have also been undertaken off-site, perhaps on a domestic basis. It was not until the mid-nineteenth century that a shed was built at the site to house powerlooms and it was presumably at this point that full-integrated working was achieved. This development, however, apparently took place when the mill was converted to woollen production under the ownership of the Rawson family.

The design of the mill was innovative by early standards because of the inclusion of an internal loading passage in the wing. This allowed materials to be brought inside the mill before being unloaded. However, until the insertion of an internal hoist and taking-in doors in the east elevation in the mid-nineteenth century, goods arriving at the site had to be moved around the main mill building via the ground floor working area and the staircase in the wing. Thus, whilst the loading passage was an innovative design allowing goods from the exterior world to easily enter into the mill, the internal movement of goods was still dependent on manual power. Furthermore, because access to the staircase was from within the ground floor working space, materials and goods had to be unloaded from the passage into the ground floor and then into the staircase, a rather protracted arrangement. movement of materials and goods around the site and the processes represented by Phase One are shown in Plate 4.21.

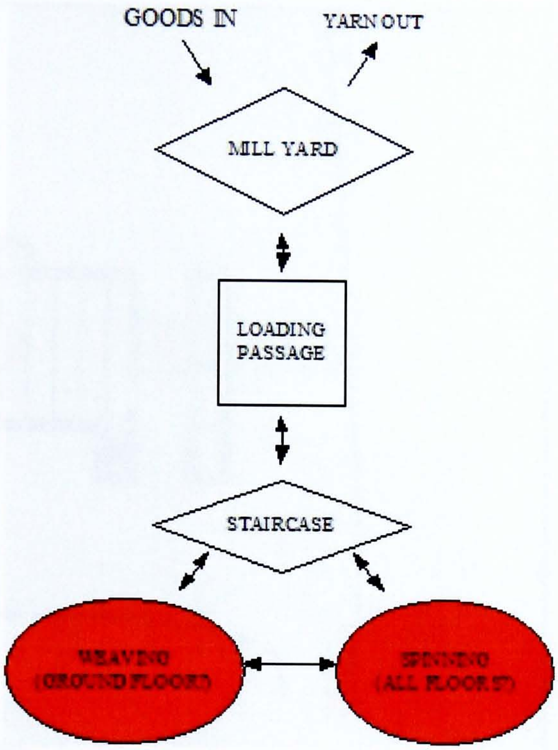

Plate 4.21 *Processes, Phase One, Old Lane Mill*

The central role played by the mill yard, loading passage, ground floor working space and staircase in the movement of materials and finished goods around the mill is made more explicit when drawn as a gamma map (Figure 4.4). The role of the ground floor working space (space 3) and the staircase (space 5) is particularly obvious from the gamma map and the passageway is shown as a single space on a ring(space 4), rather divorced from the rest of the complex despite its central role in the initial movement of materials into and goods away from the building. Furthermore, the gamma map makes clear the extent to which materials and goods entering and leaving each floor of the mill had a relatively long journey to and from and the outside of the building. This reflects an inherently inefficient system which results in a dendritic complex with only a single ring. Spaces 7, 9, 11, 13 and 15 are located in the deepest parts of the complex and are those rooms which were used for the storage of materials and finished goods. This function is suggested by the gamma map for these spaces have direct access to each of the main working floors (spaces 6, 8, 10, 12, and 14; except the ground floor and attic working areas) and the provision of a storage area next to the majority of the main working areas probably reflects the inherent difficulties of moving goods and materials around

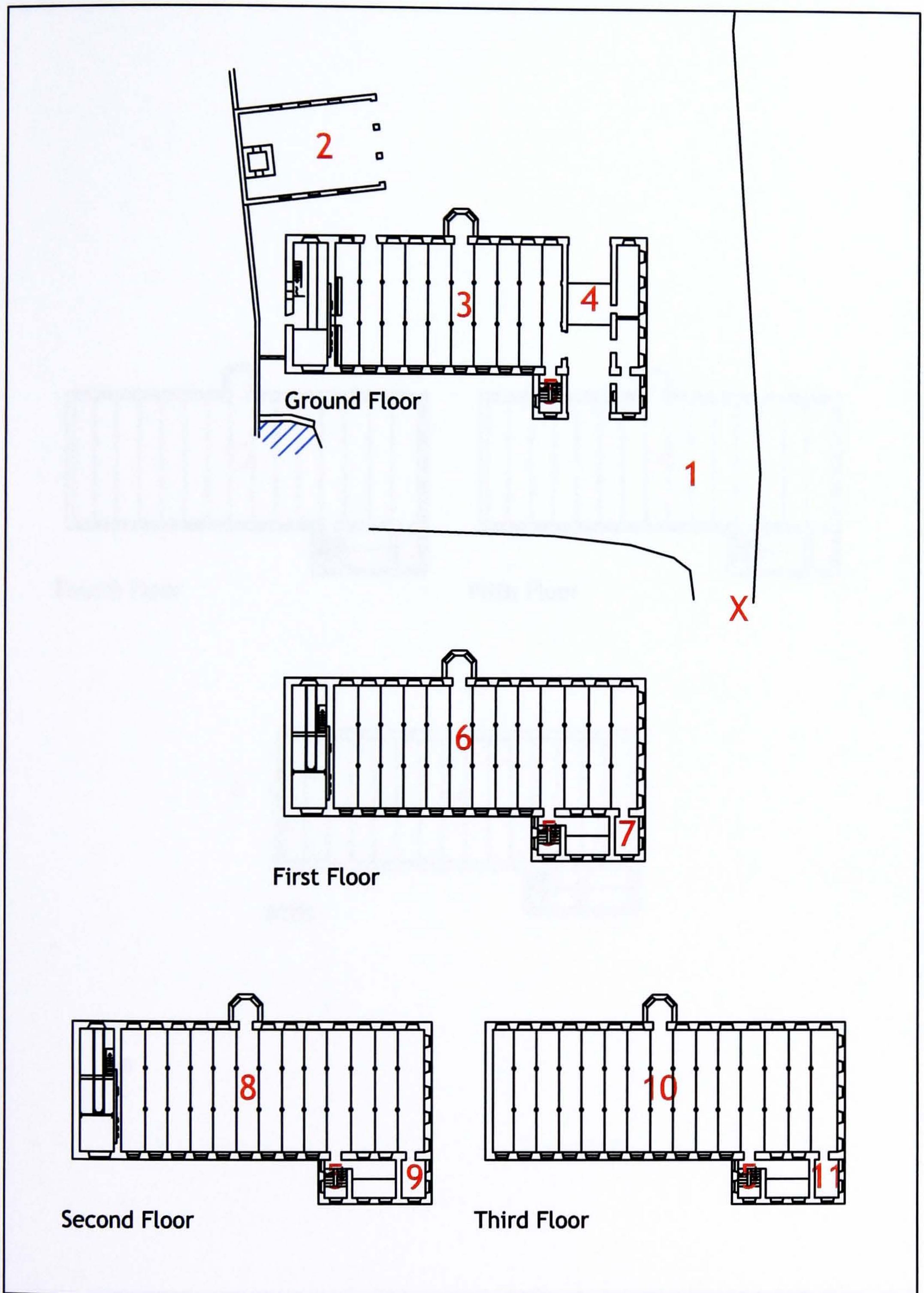

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Figure 4.4 *Phase One: Gamma map of the movement of materials/goods*

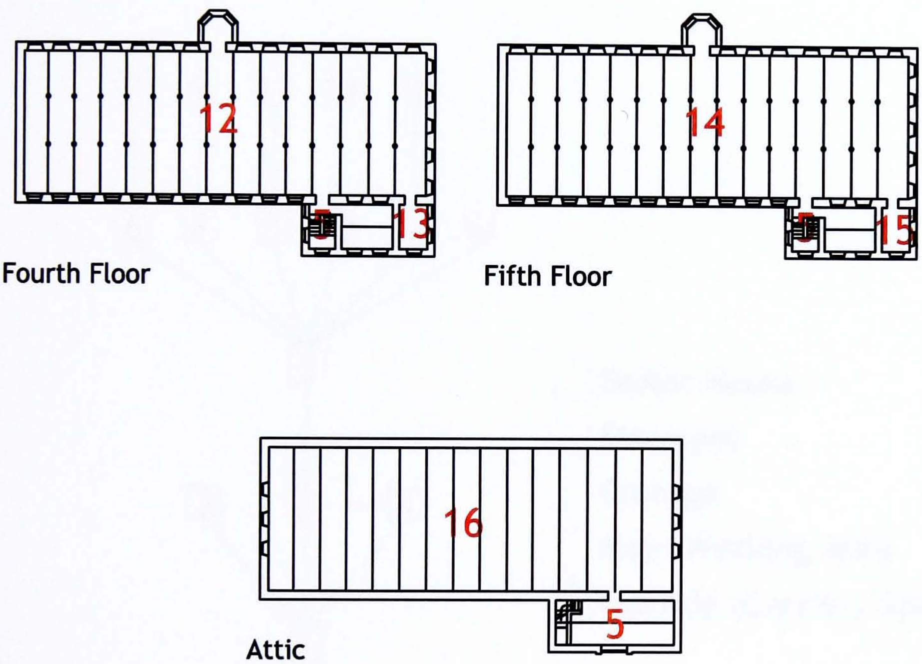

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Figure 4.4 cont. *Phase One: Gamma map of the movement of materials/goods*

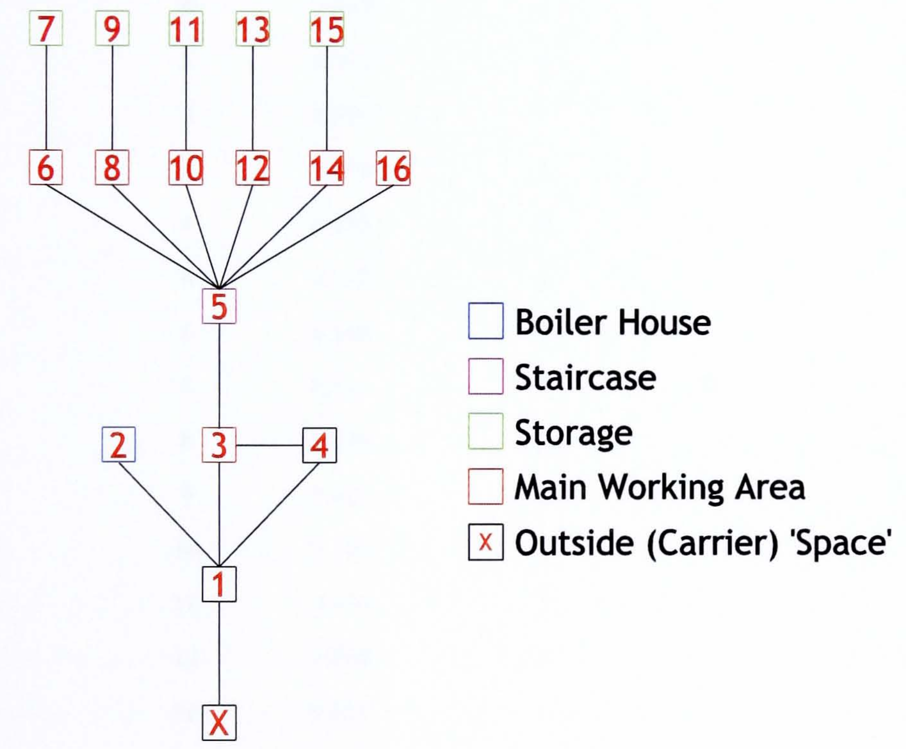

Figure 4.4 cont. *Phase One: Gamma map of the movement of materials/goods*

the mill and provided a holding area for such items (many of these logistical difficulties were resolved when the mill was converted to woollen production by the Rawson family through the insertion of an internal hoist and taking-in doors in the east elevation). These syntactic properties are also reflected in quantified values for the site (Table 4.1).

Table 4.1 *Quantified values for Phase One 'materials/goods' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.358	1
1	0.233	4
2	0.358	1
3	0.150	3
4	0.250	2
5	0.132	7
6	0.200	2
7	0.325	1
8	0.200	2
9	0.325	1
10	0.200	2
11	0.325	1
12	0.200	2
13	0.325	1
14	0.200	2
15	0.325	1
16	0.217	1

Mean RA: 0.254 RR of Complex: 0.042

These values show the important integrating role of the staircase (space 5) in the complex and this space has the lowest RA value of the complex and the most number of neighbours. Despite its role in the initial movement of materials and goods in the mill, the loading passage (space 4) has one of the higher RA values of the complex. The highest RA value in the entire complex (o.358) is for space 2, the boiler house, and this reflects the fact that the boiler house was not directly involved in the production process and only required good access from the mill yard for the delivery of coal and the removal of ashes.

Access Analysis

The basic spatial form of Phase One, Old Lane Mill, with regard to the movement of the workforce, has a dendritic character (Figure 4.5). One of the major differences between the gamma map of the movement of materials and goods (Figure 4.4) and that concerning the movement of the workforce is the number of extra spaces (an increase of 51%) and these extra spaces are represented by privies in the polygonal tower and offices. These spaces are therefore not in the direct service of the production process but have a 'human' function. Also apparent is the relative absence of rings in the complex which results in the staircase (space 9) playing a major role in movement around the site as a whole.

The configuration of space in the mill is regular, reflecting the repetition of floor plan across the mill. It also illustrates succinctly the fact that although the first and second floors of the mill have a smaller working area due to the presence of the engine house in the western most two bays, their spatial form is identical to the other, uninterrupted floors above. Of particular interest is the regular pattern of a privy (spaces 3, 11, 15, 19, 23, 27) and storage spaces/offices (spaces 14, 18, 22, 26 and 30) accessed from the main working areas on the first to fifth floors (spaces 12, 16, 20, 24 and 28). The presence of the storage area has been considered above but the provision of a privy is of particular interest to this research. Gamma maps inherently suggest that the deepest spaces in a complex are the most private and this accords with the position of privies at Old Lane Mill in the complex. However, by providing privies next to each working area (spaces themselves located in the deepest parts of the complex) time away from the production process could be minimised and interaction between workers on different floors of the mill or different parts of the production minimised. This has important implications for the control and supervision of the workforce and suggests an organisational logic to places privies deep in the overall spatial complex. The repetition of the basic floor plan across the upper floors of the mill also allowed the segregation of workers for their was no need for a worker to leave the floor they worked during shifts and this reduced the potential interaction of workers working in different parts of the mill. Furthermore, the privy was big enough for only one person and its entrance was highly visible from all parts of the main working area as well as from the overseer's office located in the wing. Persons using the privy were therefore

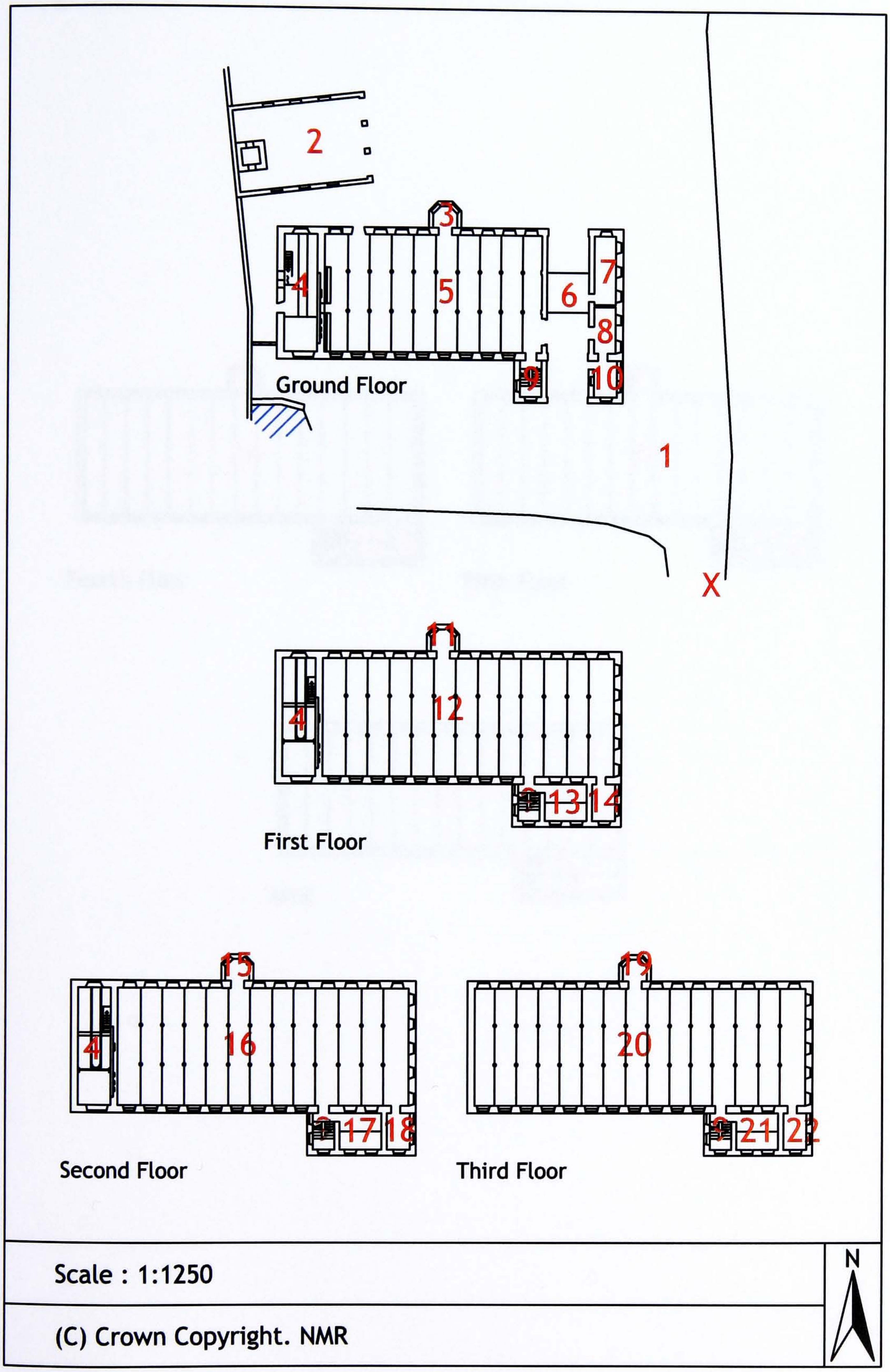

Figure 4.5 *Phase One: Gamma map of the movement of the workforce*

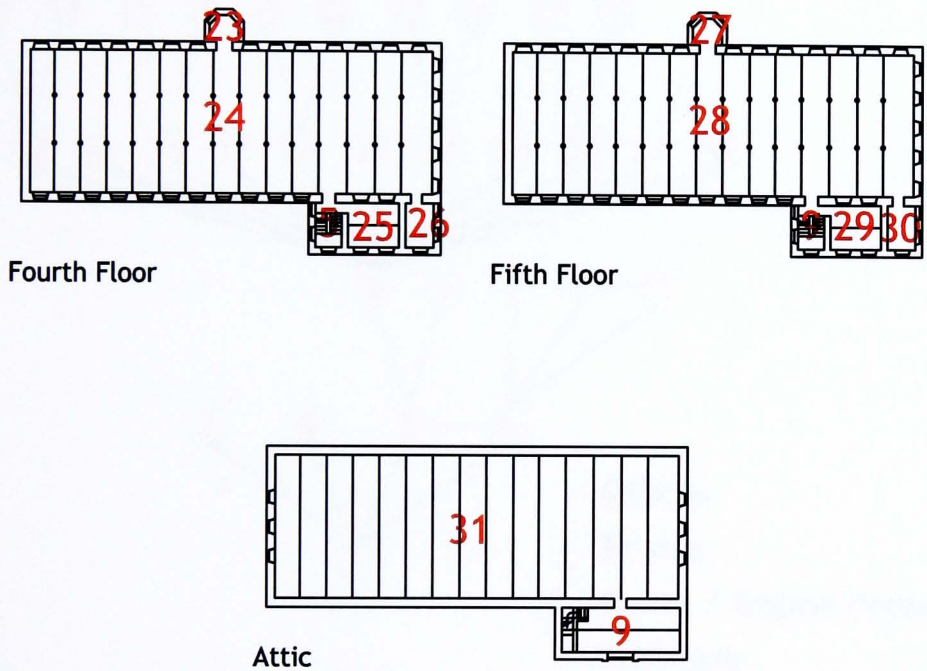

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Figure 4.5 cont. *Phase One: Gamma map of the movement of the workforce*

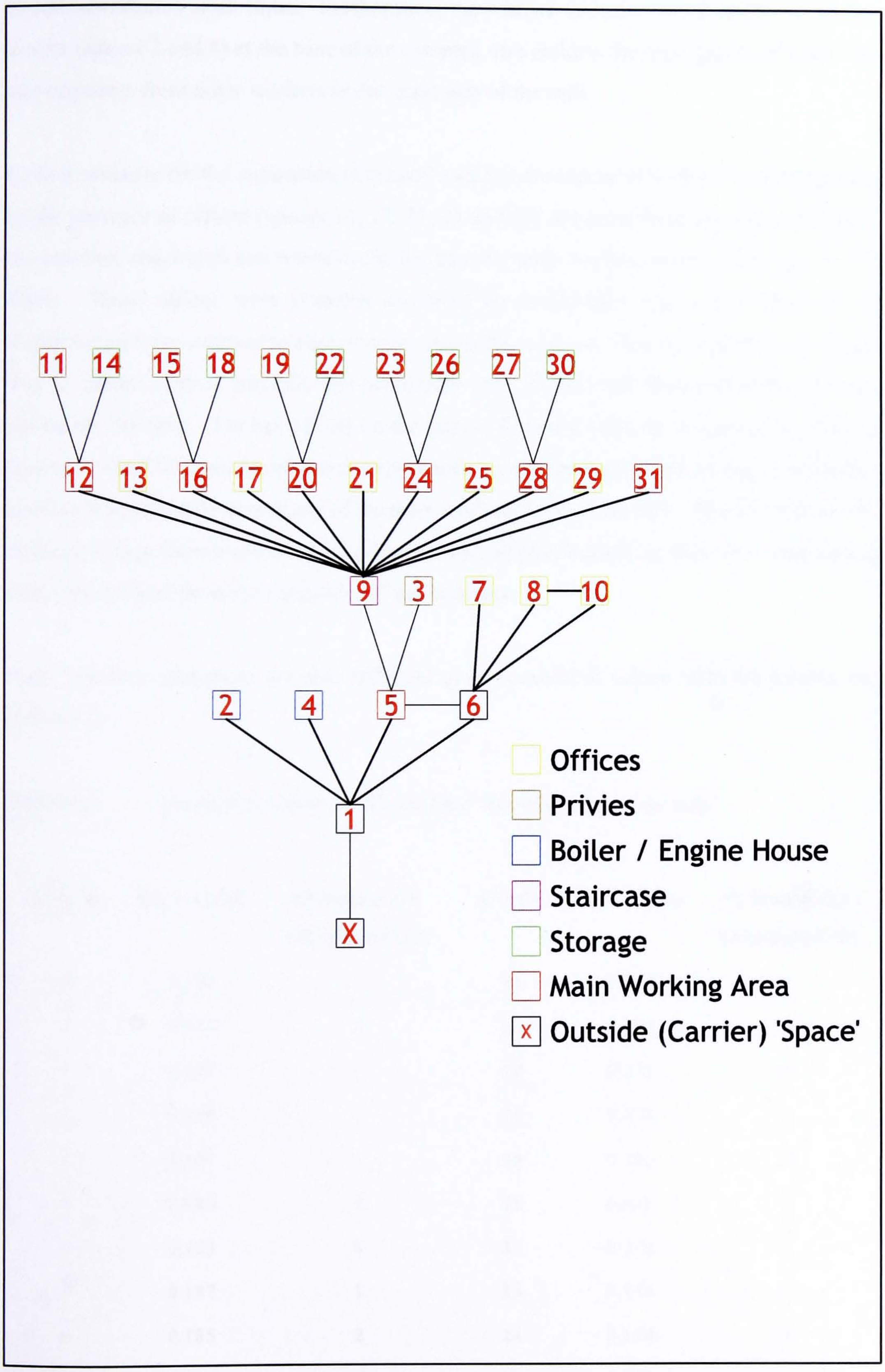


Figure 4.5 cont. *Phase One: Gamma map of the movement of the workforce*

under surveillance at all times. Furthermore, the relative isolation of the boiler and engine houses (spaces 2 and 4) at the base of the complex also reflects the segregation of boiler men and engineers from other workers in the main part of the mill.

Further evidence for the imposition of control over the movement of workers is also suggested by the presence of offices (spaces 13, 17, 21, 25 and 29) accessed from the main landings of the staircase and which had windows facing into the main working areas on the first to fifth floors. These offices were probably occupied by overlookers who could supervise the workforce and also over-see workers moving about the staircase. This was therefore a powerful way to impose control, formally and intuitively over workers and their potential movement around the building. Further offices on the ground floor and adjacent to the loading passage (spaces 7, 8 and 10) must have been used primarily for administration concerning materials and goods as they did not overlook any of the main working areas in the mill. These offices and the loading passage form a self-contained part of the complex located on their own ring and are relatively isolated from the remainder of the complex.

These syntactic properties are also reflected in the quantified values from the gamma map (Table 4.2)

Table 4.2 *Quantified values for Phase One 'workforce' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.187	1	**16**	0.110	2
1	0.123	5	**17**	0.118	1
2	0.187	1	**18**	0.174	1
3	0.144	1	**19**	0.174	1
4	0.187	1	**20**	0.110	2
5	0.080	4	**21**	0.118	1
6	0.123	5	**22**	0.174	1
7	0.187	1	**23**	0.174	1
8	0.185	2	**24**	0.110	2
9	0.054	12	**25**	0.118	1

10	0.185	2	**26**	0.174	1
11	0.174	1	**27**	0.174	1
12	0.110	2	**28**	0.110	2
13	0.118	1	**29**	0.118	1
14	0.174	1	**30**	0.174	1
15	0.174	1	**31**	0.118	1

Mean RA: 0.145 RR of Complex: 0.056

The quantified values emphasise the repetition in spatial structure across the mill and the main working areas, storage offices and privies above first floor level share the same RA values regardless of their physical position in the building. The integrating role played by many of the spaces is also clear. The staircase (space 9), for example, has the lowest RA value of the entire complex (0.054) and the highest number of spaces. It is therefore at the heart of movement around the mill and provides a means of access to 38% of all spaces in the complex. Similarly, and by virtue of providing access to the staircase, the ground floor working space (space 5) has the second lowest RA value (0.080) of the entire complex. This area, which provided the main means of access for workers into the mill, and the means of transferring materials and goods around the building, as well as accommodating the main gearing for the system of power transmission, must have been a very busy and congested space and this throws doubt on its use to house machinery. At any rate, any machinery housed in this area must have been located in the central part of the floor and if, as is suggested, it housed powerlooms, the number of looms operating must have been very few indeed.

PROCESS RECORDING AND ACCESS ANALYSIS: DISCUSSION

The analysis of the site has shown that there were close similarities between the systems of moving materials and goods and the movement of workers around Old Lane Mill. Both systems relied on the ground floor working space and the staircase located in the wing and this results in a dendritic, tree-like spatial structure. Social control and supervision of the workforce was achieved by placing overlookers' offices accessed from the main landings of the staircase from where workers on the staircase and in the main working areas could be observed and controlled. Given the importance of the staircase to overall movement of materials, goods and workers about the building this was the most suitable place for an overlookers' office. The provision of privies next to each of the main working areas from the first to fifth floors minimised the need for workers to leave the production process and negated the need for them to move away from the floor that they worked on and their reduced possible interaction between workers in other parts of the mill.

ARCHITECTURAL SUMMARY

The architecture of Old Lane Mill is best considered as a showpiece and therefore it represents an exaggeration of early mill building styles. The style of the mill is overtly Classical and includes a pedimented wing, clock face (centrally placed in the pediment in the same position as a oculus window would be expected), rusticated quoins and surrounds and the wing, which although not centrally placed, breaks-forward in much the same manner as would be expected by the central bays of a Palladian house. In particular, the greatest attention has been paid to the south elevation facing the town of Halifax, marking this elevation as a show facade and providing an impressive vista to those approach the site.

The use of Palladian motifs at the site may be considered as experimental as the layout of the mill, but in truth many of these motifs are known on earlier and contemporary Yorkshire mills (Giles and Goodall 1992, 22-28; for instance, Sowerby Bridge Mills, Warley, built *c.*1792 (**BFO8280**; Plate 4.22) and Armley Mills, Armley, *c.*1805-7 (**BFO63320**) and. However, the use of these motifs in such an explicit way at Old Lane Mill, a mill clearly built as a model for mill design, reflects a general movement towards the use of overtly Classical motifs in mill buildings pre-dating Fairburn's call for 'improved mill building' (Fairburn 1863).

Plate 4.22 *Use of a pediment and oculus window at Sowerby Bridge Mills, Warley, c.1792*

The use of architecture at Old Lane Mill is also of considerable interest for it is a good example of the use of Classical motifs to explicitly draw attention to specific parts of the building and to indicate the character of the site from the exterior. All of the major entrances, including the intended workers entrance have rusticated surrounds, with the doorways to the boiler house and loading bay and the surround to the engine house window especially picked-out through raised quoins. From the exterior of the mill, it is therefore possible to 'read' something of the internal layout of the building and to identify specific parts of the structure. The formal aspects of the mill therefore provide an indication of the source of motive power and its experimental design (as loading bays were unusual at such an early date) and therefore allowed the observer to draw conclusions about the mill, the source of power, its builder and the company operating it prior to even entering the site. If nothing else, the sheer scale of the mill for its date was bound to impress and the use of Palladian motifs therefore emphasised the special character of the site.

The ornate engine house is also worthy of comment. Undoubtedly the engine house was intended to be viewed, presumably by visitors to the mill and its relative spatial isolation from the remainder of the mill meant that it could be accessed without entering the main working areas of the mill. The embellishment of the engine house suggests the desire to show off the steam engine which was presumably seen as a reflection of the company operating the mill and the products that they produced.

LIST OF DOCUMENTS

4.1 'Deed of Covenant, Registered 17th October 1827 - Property near Old Lane " Mr. Ackroyd's warehouse and worsted spinning mill'

Records of Frederick Walker, Son and Dickie, Solicitors (FW 96/2), WYAS Calderdale

4.2 'Lease for one year 28th September 1827, Registered 17th October 1827. Rawsons and Akroyd to Jeremiah Rawson of Shay, merchant'

Records of Frederick Walker, Son and Dickie, Solicitors (FW 96/2), WYAS Calderdale

4.3 'James Akroyd, Old Lane, Northowram. Worsted spinning and manufacturing. Steam power, sixty horse power, none let off. 550 employees'

Factories Inquiry Commission, Supplementary Report, 1834. C.I. Part II, mill No. 219

APPENDIX A
SITE DESCRIPTION :5

BRITANNIA MILLS

DATABASE ENTRY:	1181
NBR NUMBER:	BFO 63030
NGR:	SE 1260 1598
TOWNSHIP:	Lockwood
CIVIL PARISH:	Huddersfield
DISTRICT:	Kirklees
COUNTY:	West Yorkshire
BRANCH:	(Woollen) Cotton
PERIOD:	Middle

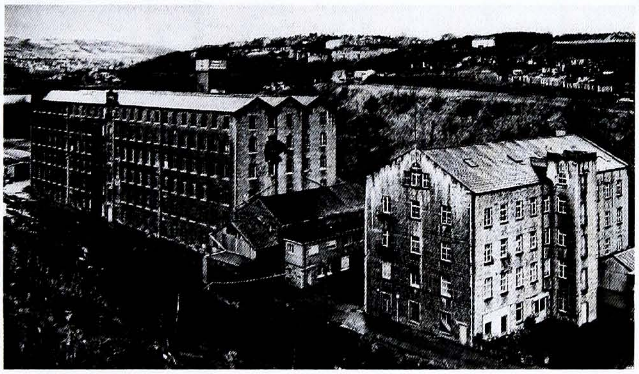


Plate 5.1 *Britannia Mills, Lockwood*

Situated in a valley bottom site and on a narrow strip of land (known as Mark Bottoms) between the river Colne to the north and the Huddersfield Canal to the south, Britannia Mills originated in the second quarter of the nineteenth century with the construction of a steam-powered woollen mill known as Firths Mill (Plate 5.1; Figure 5.1). In 1861, the owners, John Firth and Sons, extended the site by constructing Britannia Mill, a very large fireproof and steam-powered mill on land to the west of Firths Mill. Although at least part of the new mill was used by John Firth and Sons for their own purposes, most of the mill was let out to tenants and over time the changing activity of the tenants gradually shifted the balance from woollen to cotton yarn production, a shift entirely symptomatic of the booming cotton industry in the Colne Valley after 1850 which

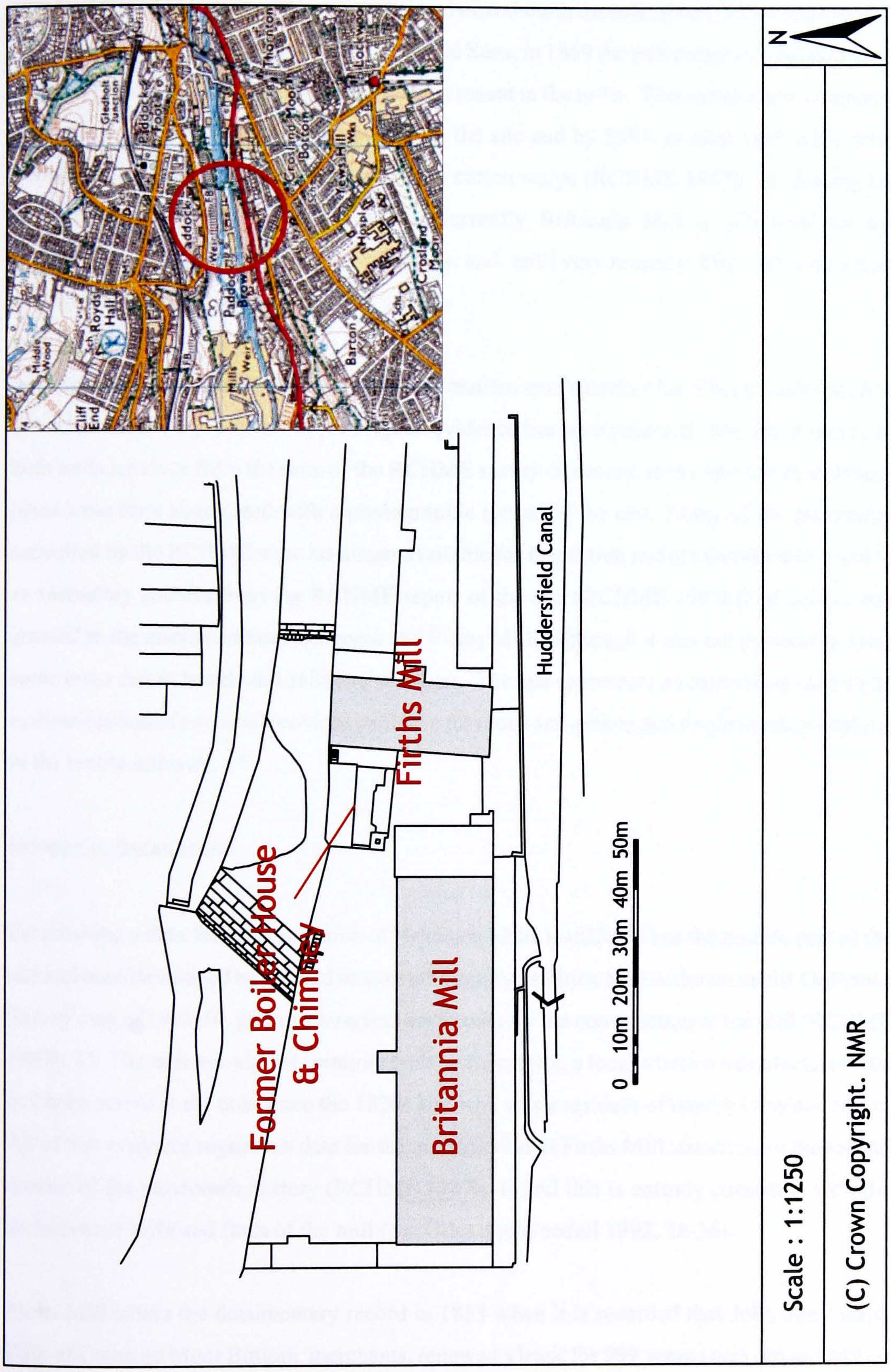


Figure 5.1 *Block Plan, Britannia Mills, Lockwood*

was well placed to supply cotton warps to local mixed-cloth manufacturers (Giles and Goodall 1992, 5). Following the failure of John Firth and Sons, in 1869 the mill complex was taken over by John Priestley, cotton spinner and already a tenant in the mills. Thereafter a new company, the Britannia Mills Company, operated from the site and by 1895, at least, both mills were being run as a single, unified concern making cotton warps (RCHME 1987b, 1). During the twentieth century the site was split, and currently Britannia Mill is still used for the manufacture of textiles by Bradbury's Fabrics, and, until very recently, Firths Mill by a firm of engineers, Elliott Hallas.

Although both sites have been altered to suit modern needs neither have been modernised to the extent that a large amount of the original evidence has been removed. Measured survey of both mills survives from the time of the RCHME survey of the site in the late 1980s and these plans have been augmented with a photographic record of the site. Many of the documents consulted by the RCHME were no longer available for inspection and are therefore referred to as secondary sources from the RCHME report of the site (RCHME 1987b)Full access was granted to the interior of both Britannia and Firths Mills, although it was not possible to view some areas due to health and safety restrictions. The site represents an interesting case study in the evolution of a site and provides evidence for room-and-power and single tenancy working in the textile industry.

HISTORICAL BACKGROUND

Establishing a date for the foundation of Britannia Mills is difficult but the eastern part of the site had been developed by the mid nineteenth century as Firths Mill is shown on the Ordnance Survey map of 1848-50, giving a *terminus ante quem* for the construction of the mill (RCHME 1987b, 1). The mill was almost certainly built by John Firth, a local woollen manufacturer who had been active in the area since the 1820s and who was a resident of nearby Crosland Moor. All of this evidence suggests a date for the construction of Firths Mill sometime in the second quarter of the nineteenth century (RCHME 1987b, 1) and this is entirely consistent with the architectural style and form of the mill (see Giles and Goodall 1992, 28-36).

Firths Mill enters the documentary record in 1853 when it is recorded that John and Joseph Firth of Crosland Moor Bottom, merchants, renewed a lease for 999 years taken out in 1848 on land at Mark Bottoms 'together with the erections... set up thereon... then in the occupation of the said John Firth and Joseph Firth'. The dimensions of the plot given in the lease identify with reasonable certainty that the land in question was the eastern part of the present Britannia Mills, on which the mill known as Firths Mill already stood (RCHME 1987b, 1).

Although active from the 1820s, little is known of the firm John Firth and Sons. In the 1853 lease, John and Joseph Firth are described as merchants, but this was probably a dignitary title as earlier and later descriptions principally record them as woollen manufacturers. It is likely that the company began on a domestic basis and the construction of Firths Mill represents the investment of accumulated profits in a single, centralised site of production and new machinery. The expansion of the site in 1861 with the construction of Britannia Mill on the western half of the site indicates that the Firths experienced a period of success and prosperity and accordingly invested in buildings and machinery. The site at Mark Bottoms was ideal, next to a constant water supply (used primarily for processing rather than power as the site was always steam-powered) and with access to the transport infrastructure in the form of the adjacent Huddersfield Canal (built in 1811) and the main road between Huddersfield and Oldham, and ultimately Manchester. It is unclear whether, like the later Britannia Mill, the Firths ran Firths Mill on a room-and-power basis, or whether the company occupied the mill entirely for their own purposes.

The apparent financial success experienced by the Firths during the middle decades of the nineteenth century led to the construction of Britannia Mill. The mill is dated 1861 and in the following year the Firths took out a mortgage for £4,000 on the security of the mill, either to pay for its construction or perhaps to equip it with new machinery. In 1864 they took out a lease on the plot (Document 5.1); the plot was 4,343 square yards with the 'mill or factory erections... set up upon the said plot of land... then in the occupation of the said John Firth and Joseph Firth'.

Upon construction the mill was named Britannia Mill and thereafter it becomes increasingly difficult to discern whether the whole site, including Firths Mill, or just the western half of the site upon which the new mill had been built, is the subject of legal and other documents. During the 1860s the property was increasingly mortgaged and this may indicate that the Firths were engaged in equipping the mill with the latest machinery or, and more likely, that the company were experiencing financial difficulties (RCHME 1987b, 2). By 1869 the Firths position had become untenable and they sold the mills to a holding group (which included a bank manager, a dyer and an ironfounder) who had the power to dispose of the premises. This process took three years and in 1872 John Priestley, a cotton yarn spinner and an existing tenant in Britannia Mill (who was by far the largest of the tenants listed, with a tenancy worth £2,083-15s-8d) purchased the complex.

Documents relating to the sale of the mills to John Priestley provide an invaluable insight into the way in which the Firths had run the mills in the years prior to their demise, although it is unclear whether the sale included Firths Mill or not. However, a conveyance dated 1939 refers to land totalling 3283 square yards including Mark Bottoms (the name by which Firths Mill was sometimes known) and Britannia Mill, and the 1872 sale document records the same square footage, indicating that it too refers to both Firths and Britannia Mills. Despite this uncertainty, the sale documents detail the tenants at the site in 1872 and record the machinery in use and other miscellaneous fixtures and fittings. Of particular interest, John Priestley was obliged to continue nine existing leases and tenancies, one of which was held by John Firth and Sons; their right to continue in business was apparently upheld. Evidently, the Firth's had been using only used a small amount of space in Britannia Mills by 1872, their tenancy valued at £770. This tenancy may have referred to their occupation of Firths Mill, or maybe space in both Britannia and Firths Mill. It is, however, clear that although John Firth and Sons built Britannia Mill they never used for their sole use. If the Firths originally intended the mill to use the mill for their own means its construction must have marked a hiatus in the firms aspirations and prosperity. Alternatively, and perhaps more likely, Britannia Mill was constructed as a means of providing additional working space for the Firths as well as providing a significant rental income by principally operating it on a room-and-power basis. The history of Britannia Mills also tells another story, the changing fortunes of John Priestley – his tenancy at the mills and then his purchase of the site illustrates the way in which manufacturers were able to rise in the textile industry by virtue of the freedom of heavy fixed capital expenditure, through initially renting space in a room-and-power mill (RCHME 1987b, 2).

Following his purchase of the site it appears that John Priestley formed a new company to run the mills, for in 1876, and in subsequent legal documents, the owner is recorded as the Britannia Mills Company Huddersfield Ltd. Although little is known of the company, which was known at times by a number of variant names, it is likely that Priestley was a principal partner and that, under the new management, the mills converted fully from woollen to cotton production. The site is described as engaged in cotton spinning and doubling in 1881 and in

1894 is listed amongst the counties cotton spinners. In the second half of the nineteenth century the cotton spinning trade was well established in the Colne valley and Huddersfield, some of the products being sent to Lancashire and others used in the local mixed fibre worsted union cloths (Giles and Goodall 1992, 5; RCHME 1987b, 2). It would appear that Britannia Mills was therefore following the local trend.

The site continued to be heavily mortgaged and in 1895 the Britannia Mills Company Ltd was described as being in liquidation and the property was taken over by the Queens Benefit Building Society to allow a new company to be formed. The lease to the new company contains a detailed schedule of the contents of the mills, listed room by room: four mills made up the factory, the unnamed main mill (probably Britannia Mill), Cross Mill (probably Firths Mill), the long mill (attached to Firths Mill and now demolished) and Gledhill Mill (probably a building parallel to and south of long mill and also demolished). The mills were heavily stocked with cotton spinning machinery, much of it dating from the 1870s but some from the 1860s, indicating and early drift from woollen to cotton production at the site (RCHME 1987b, 2). The reference to two other mills at the site indicates that the Britannia Mills Company Ltd had also purchased or controlled production in two other mills that occupied the island site, but as this is the first reference to them in conjunction with Britannia and Firths Mills, the nature of their operation and their relationship with the earlier parts of the site is entirely unknown. Interestingly, the reference to Gledhill Mill raises the name of Edwin Gledhill, a tenant of Britannia Mills recorded in the 1872 sale documents. Its is perhaps possible that like Priestley, Gledhill's changing fortunes allowed him to build a new mill on neighbouring land and that later still this came to be run by the Britannia Mills Company Ltd. Later documents indicate that during the twentieth century Gledhill and Long Mills ceased to be associated with Britannia and Firths Mills, and the dissolution presumably coincided with the formation of the new company in 1895.

The new company established after the 1895 liquidation also encountered financial difficulties and in1928 the site was sold to Messrs. Wimpenny, a local firm of building contractors. Wimpennys sold the western half of the site (Britannia Mill) to the Wood family in 1934 were yarn spinning continues; the eastern half of the site (Firths Mill) was sold to the engineering firm, Elliott Hallas in 1939 who continued to occupy the mill until late 2003.

ARCHITECTURAL DESCRIPTION

Because of the difficulties establishing whether those mills known to have existed to the east of Firths Mill where actually part of the site known as Britannia Mills the following architectural description (and subsequent analysis of the site) will concentrate on those mills known as Firths Mill and Britannia Mill (and collectively known as Britannia Mills). Documentary and archaeological sources indicate that these two mills evolved as part of the same site and other mills in the vicinity may only have been incorporated into the Britannia Mills Company at a later date. Structurally, therefore, Firths and Britannia Mills represent the evolution of site as envisaged by its original owners and builders.

There are three principal phases of structural activity at Britannia Mills (Figure 5.2): Phase One is represented by the construction of Firths Mill; Phase Two is characterised by the construction of Britannia Mill; and, Phase Three represents minor additions made at the east end of Britannia Mill providing accommodation for preparatory processes at the site and reflecting a shift towards more integrated working at the site.

- ### PHASE ONE

Built as a steam-powered woollen mill in the second quarter of the nineteenth century, Firths Mill is of stone with a stone slate roof and a simple block cornice at eaves level (Figure 5.3). It is four storey plus an attic, eleven bays long and three bays wide. The north gable of the mill rises from the bank of the River Colne and the modest size of the mill was perhaps determined by the need to leave room for access between it and the canal to the south in order to service the boiler house that originally stood to the west of the mill (RCHME 1987b, 3). The gables of the

Plate 5.2 *Firths Mill from the southeast*

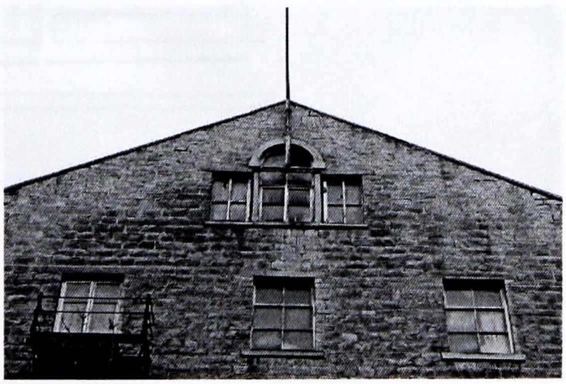


Plate 5.3 *Venetian window in southern gable, Firths Mill*

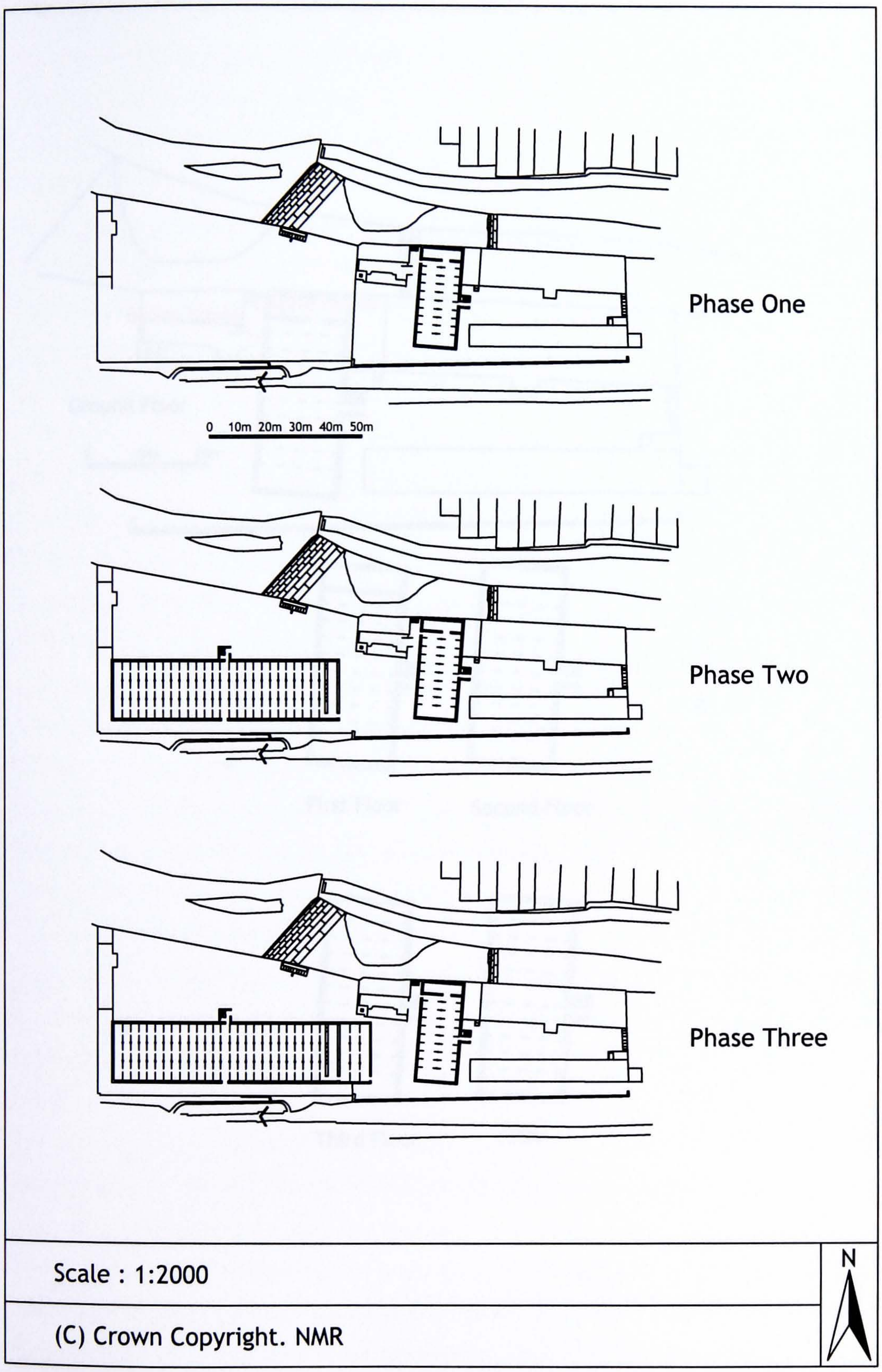


Figure 5.2 *Principal structural phases, Britannia Mills*

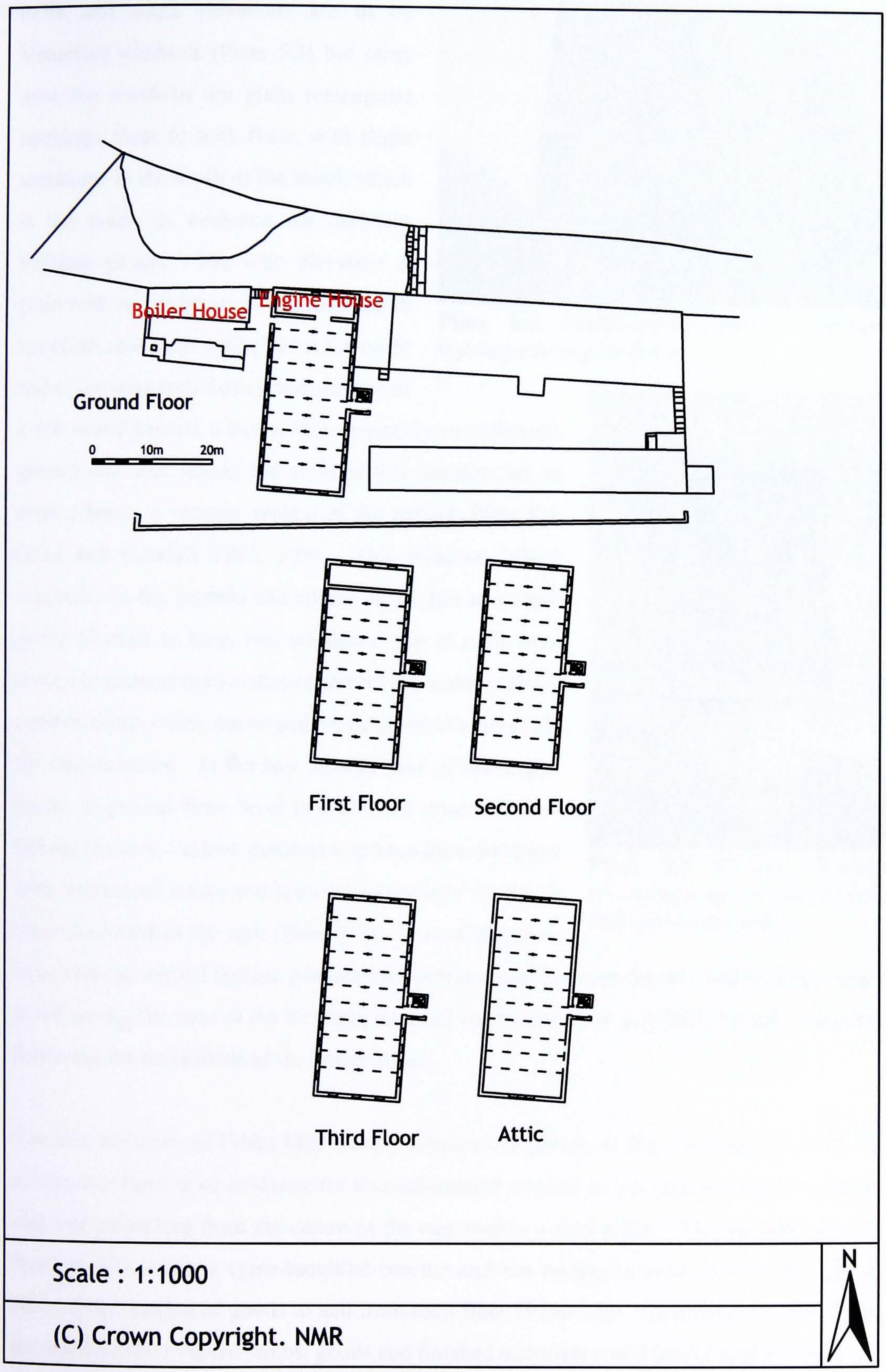


Figure 5.3 *Phase One, Britannia Mills*

north and south elevations are lit by Ventetian windows (Plate 5.3) but other wise the windows are plain rectangular openings, three to each floor, with slight variations in the depth of the lintel, which is not taken as evidence for different building phases. The west elevation is plain with the fenestration matching that in the north and south walls, but at the north end of the west wall there is the remains of a tall round-headed window that originally rose through ground and first floors; the style of this window for an engine house is entirely typical of the period (Plate 5.4; Giles and Goodall 1992, 139). This window, which originally lit the internal end engine house has now been partly blocked to form two windows, one at each floor level, a modern alteration that must have coincided with the removal of the steam engine and the insertion of a floor into the engine house. In the bay directly east of the engine house, at ground floor level is a blocked doorway, now fashioned into a window; this doorway has a stone surround with interrupted jambs and is therefore stylistic similar to other doorways at the mill (Plate 5.5). It must therefore have been an original feature, probably providing access between the mill and the boiler house to the west. The date of the blocking is unknown but the door may have become redundant following the demolition of the boiler house.

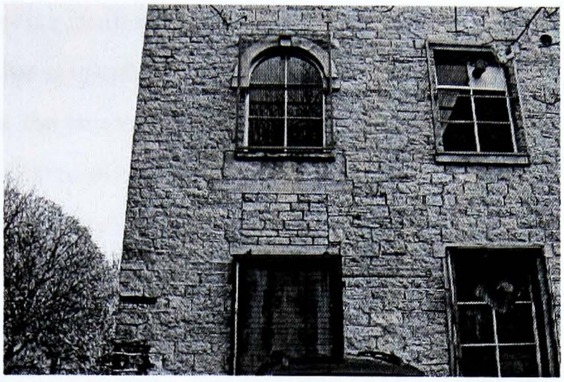


Plate 5.4 *Round-headed window formerly lighting end engine house*

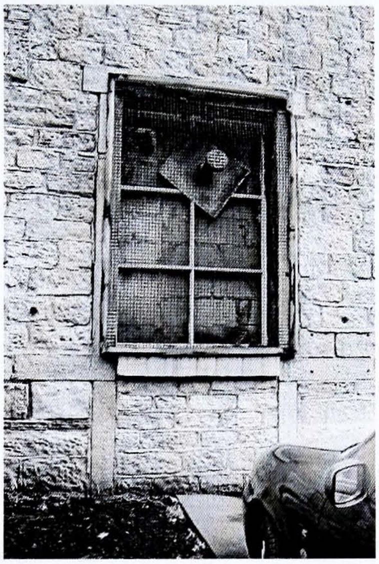


Plate 5.5 *Former doorway providing access between Firths Mill and boiler house*

The east elevation of Firths Mill closely follows the pattern of the west wall but with two exceptions: there is no evidence for a round-headed window to the engine house at the north end, and projecting from the centre of the east wall is a stair tower. The staircase tower is finished with a heavy cyma-moulded cornice and has taking-in doors in its east wall that allowed the loading of goods to and from each floor (Plate 5.6). Each doorway has a stone surround and interrupted jambs; goods and finished materials could thus loaded directly from the mill yard. The tower also contained the main entrance to the mill at ground floor level, for the wide doorway to the south of the stair tower is a modern insertion and the lintels of the two windows that originally stood in the this position are retained above the modern wooden lintel of the door. The door and associated office at the south end of the east elevation is also a modern insertion. Inside the office space is created out of modern wooden partition wall and although the area around the door and office window on the exterior of the east elevation have been stuccoed, the smaller size of the window and door compared with other openings in the mill suggest a modern date. Although the stair tower is original to the rest of the mill, it is only bonded into the main building at ground floor level; above this point the bonding becomes intermittent (RCHME 1987b, 3). At the north end of the east elevation is a single storey structure made of corrugated iron with some stone walling to the north and east; there is a straight joint between this structure and the north wall of the mill suggesting that the former is a later structure; its function is unknown, but at least part of it has at some time been used as a garage. It is conceivable that this structure may incorporate parts of a third mill, Long Mill, that once stood in this area (see below for a more detailed discussion of Long Mill).

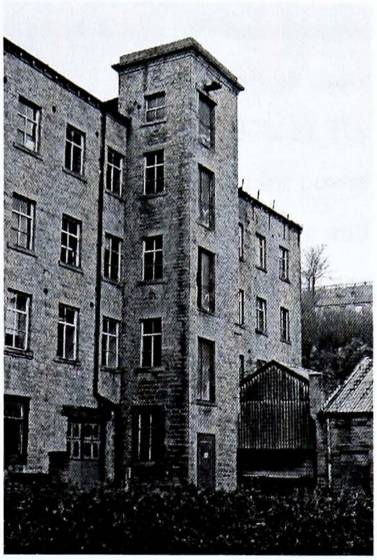


Plate 5.6 *Staircase tower, Firths Mill*

The mill is traditionally built, with wooden beams, joists and floorboards; cast-iron columns support the beams centrally. A curious feature is the use of a number of different types of column throughout the mill; on the ground and first floor a D-section bolting head is used (Plate 5.7), but on the third floor the columns have square bolting heads. There is also further variation in the length of the neck between the bolting head and the top plate. There is no ready explanation for this variety, although the square-section bolting heads suggest two parallel lines of line shafting either side of the column, for which there is no other evidence. The variety in column form perhaps therefore reflects the fact the columns came from a number of different sources, possibly second-hand,

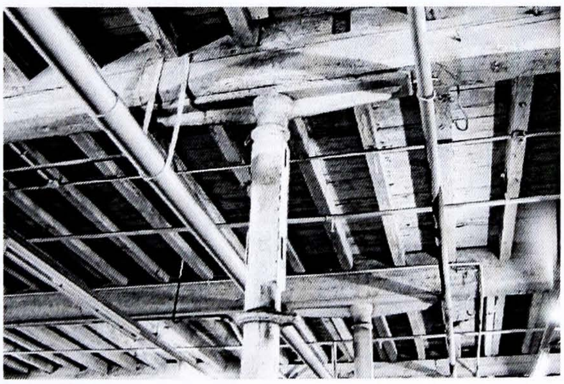


Plate 5.7 *D-section bolting head on ground floor column*

as an economic stringency. The roof is of principal rafter and collar form, with tusk-tenoned purlins; each truss is raised on cast-iron brackets, of an elegant design with a slender outer pillar and a diagonal strut secures principal rafter and tie-beam below (RCHME 1987b, 3). The nature of the roof trusses provided a unobstructed working space and the evidence for power transmission in the attic suggests that it was used for mechanised processes. As built the mill provided five floors of unobstructed working space; presently, some of the floors have been subdivided into smaller areas, including a number of offices on the first floor, but these are modern creations dating to the use of the mill by a firm of engineers. A lift hoist on the inside of the east wall at the north end is also a modern insertion.

The northern bay of the mill was occupied by the engine house, which rose through the ground and first floors. Much of the evidence in this area has been lost and at first floor level and modern floor has been inserted and the dividing wall between engine house and mill removed. At ground floor level a thick stone divides the engine house from the main working area and in it survives a thick iron fire door. The proportions of the engine chamber suggest that it accommodated a single-beam engine, but no further details of the engine are recorded. The engine was steamed from boilers in a small detached boiler house to the west of the mill; a building in this position is shown on a map dated 1848-50 and again in 1889 (Plate 5.8) shows a chimney in this area. Both boiler house and chimney were demolished at an unknown date and the area is now used for car parking.

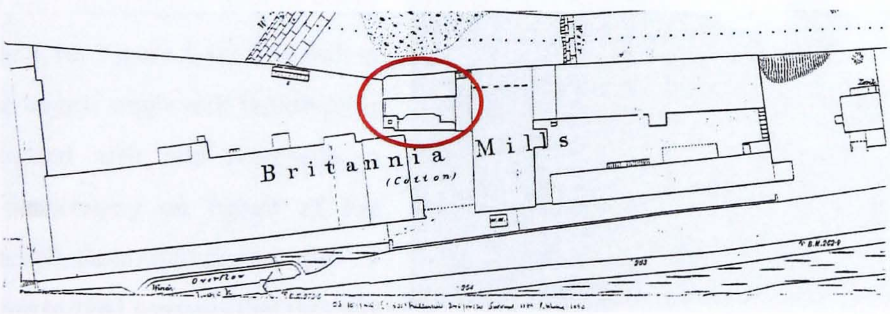


Plate 5.8 *Extract from 1889 OS map showing chimney and boiler house to west of Firths Mill and north of Britannia Mill*

The evidence for power transmission in the mill suggests that all floors were used for powered processes (RCHME 1987b, 4). Machines were driven by central line shafts supported on rows of cast-iron columns, each line shaft being turned by an upright shaft rising the full height of the mill in the bay immediately south of the engine house. The upright shaft was supported by shaped cast-iron beams between the column to the south and the stone wall dividing the engine house and working area, and part of one of this support system survives (Plate 5.9); on the upper floors it was supported by beams slung between the columns to the north and south of the shaft. The absence of trapdoors in most of the floors suggests that the shaft rose between the joists in each floor and therefore required only a small opening in the floorboards; only the ceiling over the third floor has a properly formed, small trap and this allowed the shaft to pass into the attic space above. In the attic, the collars of the roof trusses supported a horizontal shaft leading from the upright shaft.

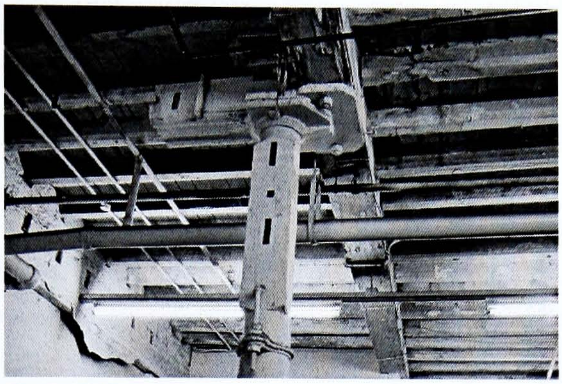


Plate 5.9 *Additional support for the principal vertical shaft at ground floor level*

The range of operations in the mill when first built is not known, but analogy with other contemporary woollen mills suggests that the Firth's conducted scouring and fulling on the ground floor with spinning on the floors above (RCHME1987b, 4).

- PHASE TWO

Phase Two comprises the construction of Britannia Mill immediately west of Firths Mill (Plate 5.10; Figure 5.4). The mill is one of the largest single mill buildings in the Lockwood area and represents a massive undertaking on behalf of the Firth's; indeed, their rapid demise after its construction in 1861 suggests that they did not possess the necessary resources to exploit the mill to the full. Although the difference in scale between the two mills is profound, the buildings share many features; this either reflects the desire to exert some sort of continuity across the site or is an indication of the personal preferences of the Firths as mill builders.

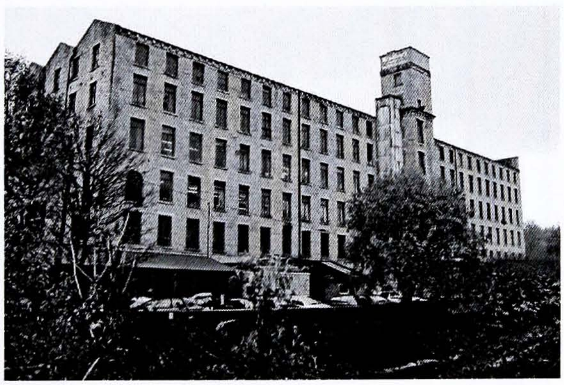


Plate 5.10 *Britannia Mill from the northeast*

Named and dated 'Britannia Mill 1861' by a stone centrally placed high on the south wall, the new mill was built as a large, fireproof structure. It is aligned east-west, perpendicular to Firths

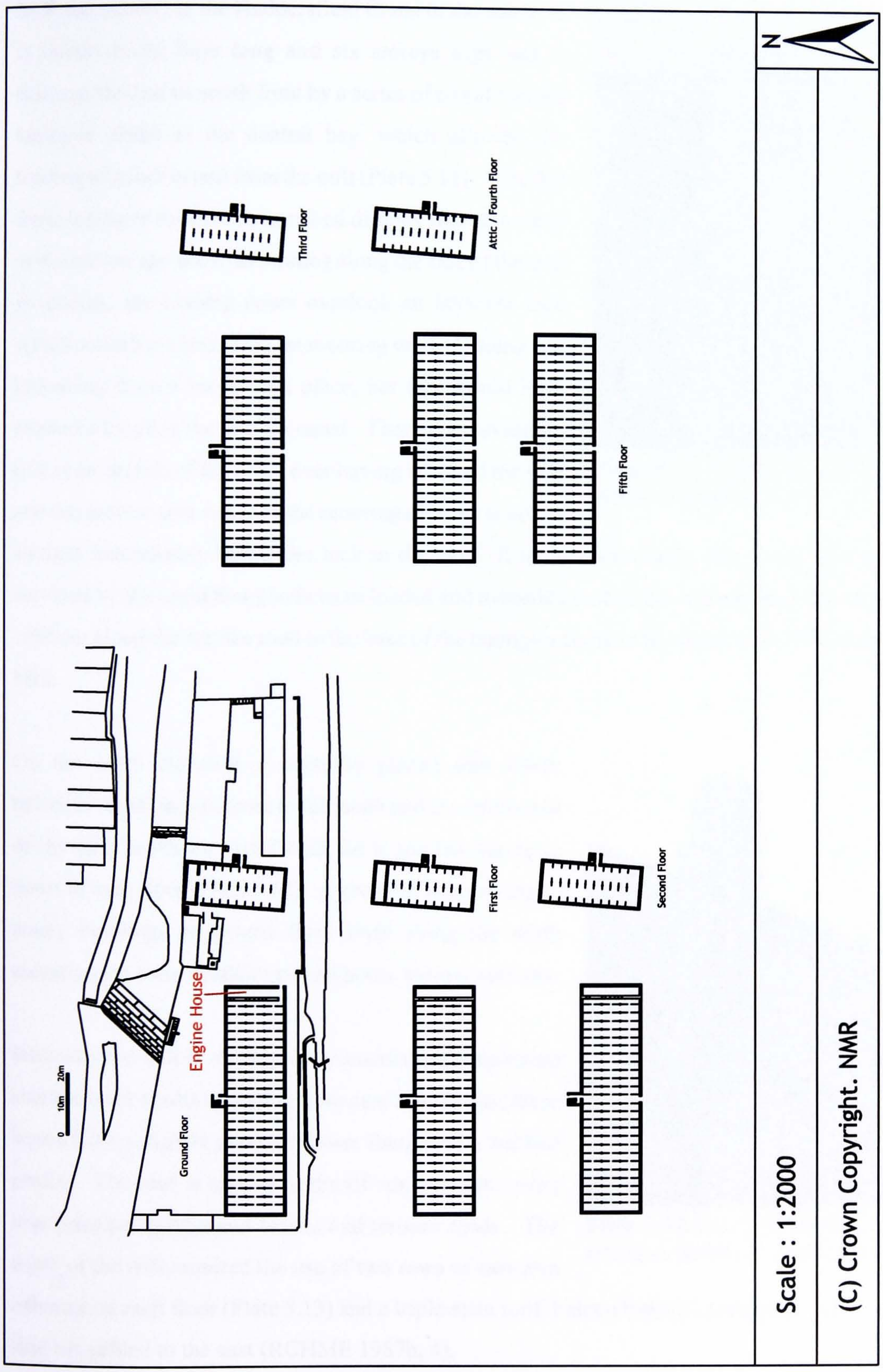


Figure 5.4 *Phase Two, Britannia Mills*

Mill and parallel to the Huddersfield Canal to the south. It is twenty-seven bays long and six storeys high and is distinguished on its south front by a series of round-headed taking-in doors in the central bay, which allowed the loading of goods to and from the mill (Plate 5.11). Whether these taking-in doors were serviced directly from the canal or the narrow service road running along the side of the mill is unclear; the loading doors overlook an adjacent lock which could have been used for mooring whilst loading and unloading from a barge took place, but this would have created a block in the narrow canal. There is no evidence of a short branch of the canal ever having serviced the mill and the nearest area suited to the mooring of boats is on the straight immediately below the lock to the east. It is therefore likely that if the mill was serviced by the canal that goods were loaded and unloaded east of the mill and then drawn on vehicles along the service road to the base of the taking-in doors in the south wall of Britannia Mill.

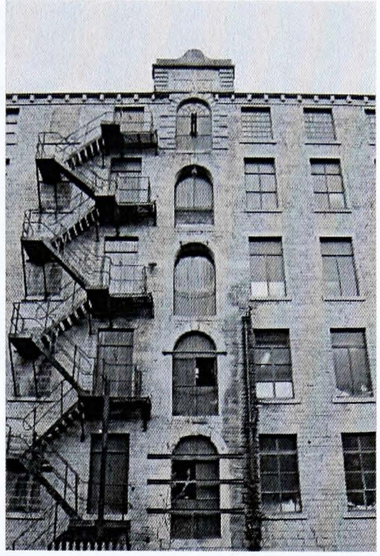


Plate 5.11 *Taking-in doors in centre of south elevation*

On the north elevation a centrally placed stair tower balances the taking-in doors to the south and is reminiscent of the stair tower on Firths Mill for it too has taking-in doors to each floor (Plate 5.12). A group of lean-to single-storey buildings at ground floor level along the north elevation are modern additions and house various services.

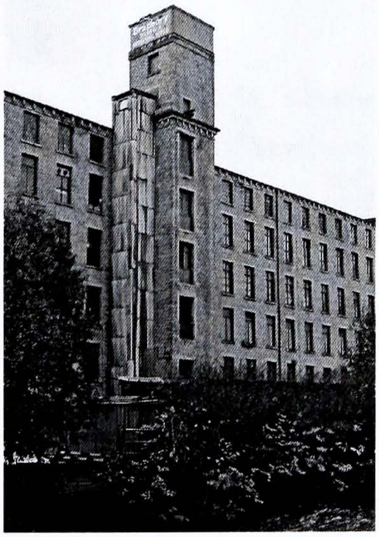


Plate 5.12 *Staircase tower with taking-in doors, Britannia Mill*

Internally the mill is of fireproof construction, employing shallow brick vaults springing from cast-iron beams; these beams have a slightly parabolic lower flange and a webbed profile. The roof is also of fireproof construction, using iron principal rafters and braces and tension roads. The depth of the mill required the use of two rows of cast-iron columns on each floor (Plate 5.13) and a triple-span roof, hidden behind a parapet on the west side but gabled to the east (RCHME 1987b, 4).

Apart from the lower three floors at the east end of the mill forming an internal end engine house, the rest of the mill provided a single unobstructed working area. The letting of areas to tenants is therefore not reflected in the mills design beyond the fact that each floor provided a self-contained working area.

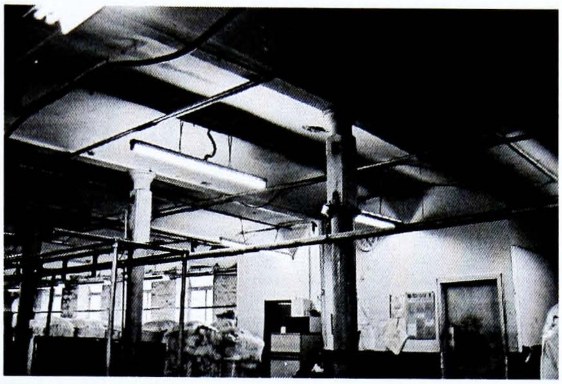


Plate 5.13 *The internal structure of the mill is fireproof with cast-iron columns, cross-beams and brick jack-arches*

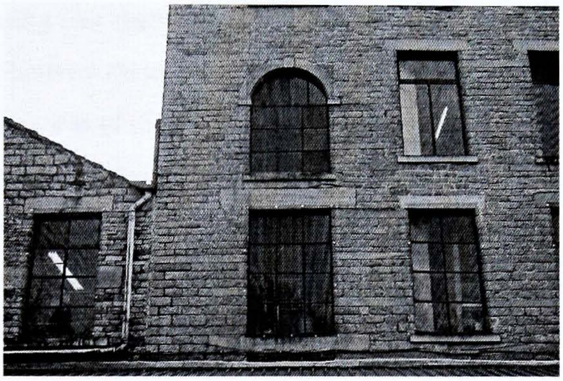


Plate 5.14 *Round-headed engine house window, Britannia Mill*

Power was supplied by a steam engine housed in an engine house rising through ground, first and second floors in the eastern bay of the mill. The engine house ceiling comprises transverse vaults of different spans, and the room is lit from the north by a round-headed window. This window is similar of proportions to that lighting the engine house in Firths Mill and the similarity of the arched surround, shoulders and keystone creates a marked continuity between the two sites which must have been deliberate (Plate 5.14). The window has now been divided into two smaller windows but originally rose through all three storeys. In 1895 the chamber was occupied by a 'Beam condensing Steam engine' with 'large fly and spur driving wheels', by Vemson and Thompson, and this was presumably the original engine installed in 1861. The engine bed has been removed in modern times and the engine room opened out into the small area to the south on the ground and first floors. In the engine house the only evidence of the former arrangement is revealed by an area of ashlar walling in the west wall and the stub of a cast-iron beam pivot, indicating that the cylinder was to the north and the flywheel to the south. Unless a contemporary boiler house was attached to the east wall of the mill and occupied the site of the present, later two-storey east block, the engine was probably steamed from the boiler house, perhaps extended in or after 1861 to cope with the new demand, sited to the west of Firths Mill (RCHME 1987b, 5).

Power was transmitted from the engine into the mill by a system of upright shafts, sited in the bay to the west of the engine house. Modern alterations mean that the precise nature of the system is beyond recovery but at least one of the upright shafts rose the full height of the mill on the line of the southern row of columns, evidenced by traps in the brick vaults; the cast-iron beams have been designed to permit openings for this purpose. A second upright shaft appears to have risen on line with the northern row of columns for here again the cast-iron beams are designed for the passage of a shaft. However, although the vaults in the ground, first and second floor have traps in this position, the upper floors are devoid of any such openings. This suggests that the second shaft existed, rose only part way through the mill (RCHME 1987b, 5). On the ground floor, the columns immediately west of the engine house are of markedly heavier scantling than the common columns, indicating that they were used to support the upright shafts. The east and west faces of the engine house west wall were strengthened by the use of large, heavy iron plates bolted through the thickness of the wall. This may not be an original feature but it was probably designed to support a northern vertical shaft and the pivot of the original beam engine. The upright shafts were probably bevel-geared to line shafts running east-west on each floor of the mill, most likely supported by hangers attached to the bolting heads of the cast-iron columns (RCHME 1987b, 5).

The system of power transmission was altered during the late nineteenth century, when a rope drive was introduced. High in the southwest corner of the engine house a wall box was inserted to link with the second floor of the mill (Plate 5.15). A pulley wheel inside the engine house turned a shaft running through the wall box, the pulley wheel being supported by an inserted hanger slung from a cast-iron beam at vault level. The size of the pulley wheel necessitated a recess to be contrived within the south wall of the engine house. This wheel was presumably powered by rope from a wheel in the northern part of the engine house and accordingly some minor alteration to the existing system of power transmission must have taken place. The introduction of rope drive does not seem to equated to a wholesale reorganisation of power transmission at the mill and the surviving evidence suggests that it only affected drive to the second floor of the mill. It must

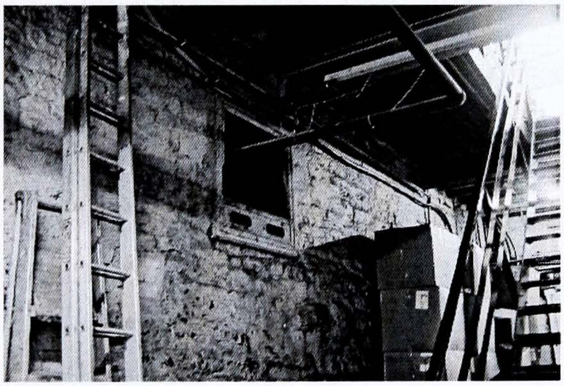


Plate 5.15 *Inserted pulley box in southwest corner of engine house*

therefore be assumed that the upright shafts continued to supply the larger part of the power requirements in the mill.

Although much of the detail about the operation of Firths and Britannia Mills is unclear, the granting of a lease to a new Britannia Mills Company in 1895 (Document 5.2) provides information about the working of the site in that year for it includes a comprehensive schedule of the contents of both mills.

Britannia Mill is not mentioned in the schedule by name, but it may be deduced that the list of contents begins either in this mill or in the buildings linked to it for all other mills mentioned are named and are identifiable with known structures at the site. The schedule records a Cotton Chamber used for storage and for the breaking of the bales of raw cotton, and a Lapping Place stocked with further breaking equipment. These two areas may be equated with the two-storey addition at the east end of Britannia Mill. The ground floor of the mill is probably to be identified as the Card Room, stocked with grinding and drawing frames dating from the 1860s and 1870s. The first floor was probably the 'Speed and Spinning Room' equipped with spinning mules dating from the 1870s, and the upper floors were all devoted to cotton spinning on mules ranging in date from1860 to 1881. In the schedule Firths Mill is named Cross Mill, probably because of its position across the site. The two upper floors of the mill were apparently used for twining (doubling), but the fact that the lower floors are not assigned a name or contents suggests that they were largely unused.

The schedule also records those mills that once stood to the east of the site and which, beyond very fragmentary survival at ground floor level, have not survived. To what extent these other mills operated as part of Britannia Mills, or for how long and on what basis is not known. To the east of Firths Mill was Long Mill, part of which may survive in the range running east from Firths Mill along the edge of the River Colne. Long Mill was of six storeys and was used mainly for twining, with one floor set aside for winding, warping and reeling. The final major group in the complex was Gledhill Mill, located to the south of Long Mill. It was a two-storey building used primarily for warping. Other minor buildings recorded in the schedule include a Weighing Place (including a steam oven for the use of employees), Lodge, Offices, and a Mechanics' Shop. The picture presented by the schedule is one of a large cotton spinning works with a possible specialisation in cotton warps for use in the local mixed fibre cloths (RCHME187g, 6-7).

Also detailed in the schedule is the nature of power and power transmission at the site. Four Lancashire boilers housed in a single boiler house (presumably that which formerly stood to the west of Firths Mill) generated steam for the plant. The boilers were dated 1877, 1878 (2) and 1881 and the dates, together with their grouping, suggests that the steam plant had been rationalised since the construction of the main mill in 1861 (RCHME 1987b, 7). The site had three steam engines, the Vemson and Thompson beam engine in the 1861 mill, a compound engine in Cross (Firths) Mill (a replacement of the original beam engine), and a vertical high pressure engine in Long Mill;. Transmission was by a system of shafts and rope drive. The 1861 mill (Britannia Mill) had an upright shaft, but the mention of rope pulleys indicates at least partial conversion to this system by 1895 and confirms the evidence for pulleys in the engine house. The different floors were powered by drive shafts and cross shafts; the longest drive shaft is given as 198 feet, well short of the length of the mill, which appears, therefore, to have require a series of shorter shafts rather than a single shaft running the length of each floor. Cross shafts of 60 feet length gave drive at right angles to the main shafts (RCHME 1987b, 7).

- PHASE THREE

The third phase of structural activity at Britannia Mills is represented by the addition of a two-storey block attached to the east wall of Britannia Mill (Plate 5.16; Figure 5.5). It is of three bays on the south and north walls and the similarity in style between it and the mill suggests that it may have been an early addition. This addition is also of fireproof construction, but unlike in the main mill, the cast-iron beams supporting the brick vaults have a parallel-sided bottom flange. The inside of this block has been dry-lined to adapt it for use as a modern office range and subsequently much of the original character of the building has been disguised. However, at the tine of the RCHME's inspection of the site in 1987, they recorded a straight joint, visible internally, in the east wall of the block. This was interpreted as possible evidence for the earlier buildings in this position, noting that such buildings are shown on a plan dated

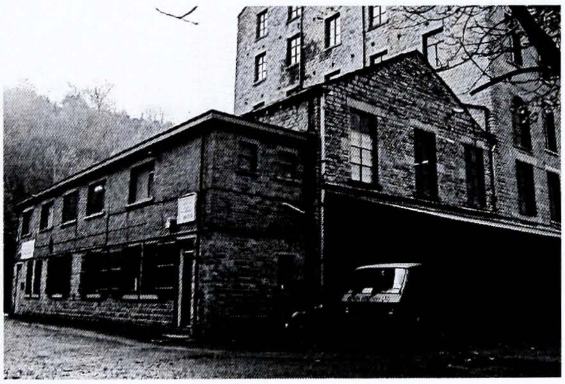


Plate 5.16 *Two storey extension at east end of Britannia Mill; the flat-roofed building is a later addition*

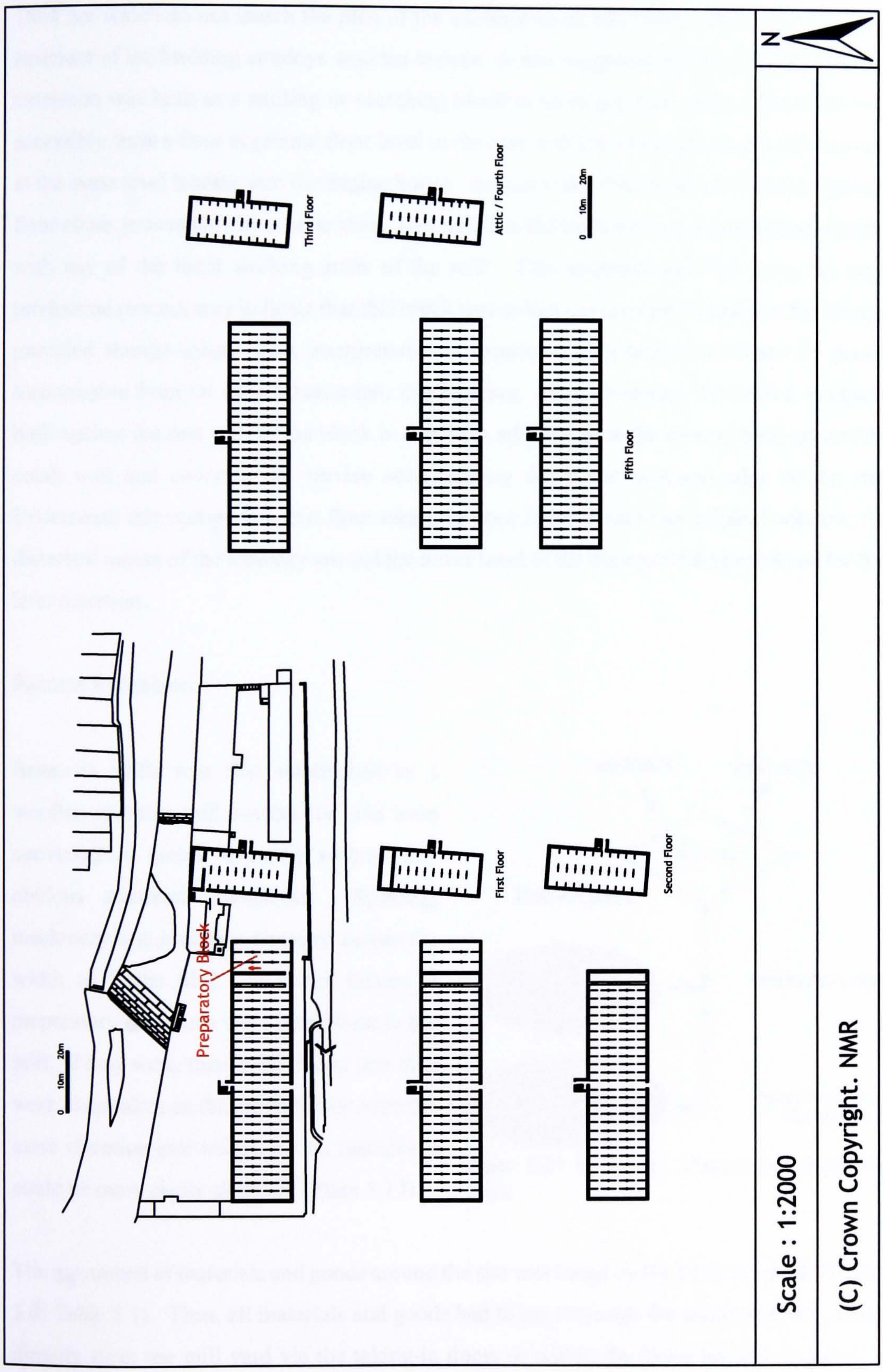


Figure 5.5 *Phase Three, Britannia Mills*

1864 but which do not match the plan of the existing block (RCHME 1987b, 5). The roof structure of the building employs wooden trusses. It was suggested by the RCHME that this extension was built as a carding or scotching block to serve the main mill. This block was accessible from a door at ground floor level in the east wall and communicated with doorway at the same level leading into the engine house. Access to the first floor was from the ground floor alone, presumably by a basic stair. This addition did therefore not communicate directly with any of the main working areas of the mill. This apparent isolation from the main production process may indicate that this block was in fact not used for production but instead provided storage space. This interpretation is supported by a lack of evidence for power transmission from the engine house into this building. The two-storey, flat-roofed extension built against the east wall of the block is a modern addition as is the canopy built against the south wall and covering the service road running down the southern edge of the site. Underneath this canopy is a first floor taking-in door formed out of an original window; the disturbed nature of the masonry around the lower level of the door providing evidence for this later insertion.

PROCESS RECORDING

Britannia Mills was first established as a woollen-spinning mill but the site was soon converted to cotton spinning without any obvious structural alterations. Spinning machinery was probably arranged across the width of Firths Mill. It is not known if preparatory processes were carried out in the mill. If they were, then it was likely that they were undertaken on the ground floor were the extra vibration and weight of the machinery could be more easily absorbed (Plate 5.17).

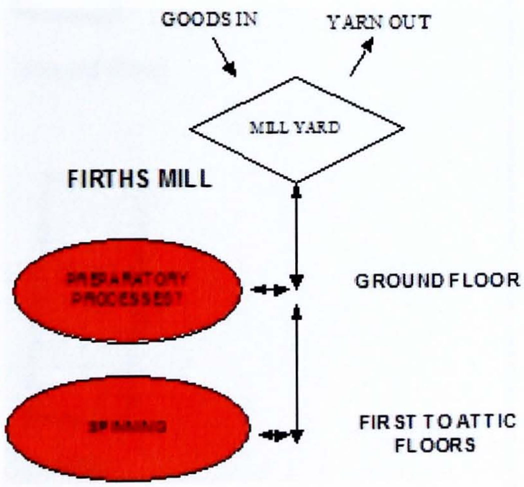


Plate 5.17 *Processes, Phase One, Britannia Mills*

The movement of materials and goods around the site was based on the staircase tower (Figure 5.6; Table 5.1). Thus, all materials and goods had to pass through the staircase tower, either directly from the mill yard via the taking-in doors or within the tower itself in order to be moved to any of the main working areas (spaces 5, 6, 7 and 8). The boiler house (space 2)

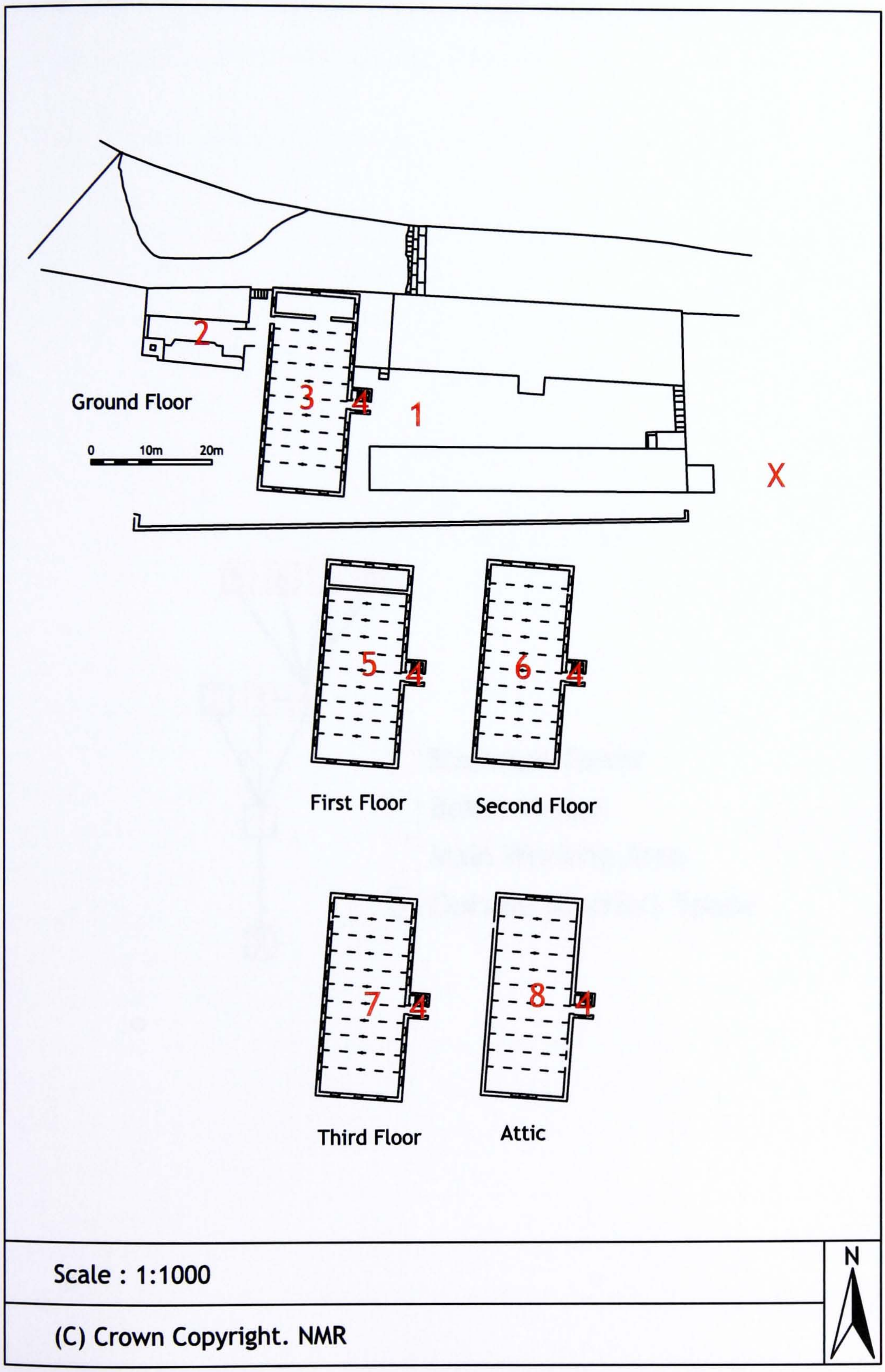


Figure 5.6 *Phase One: Gamma map of the movement of materials/goods*

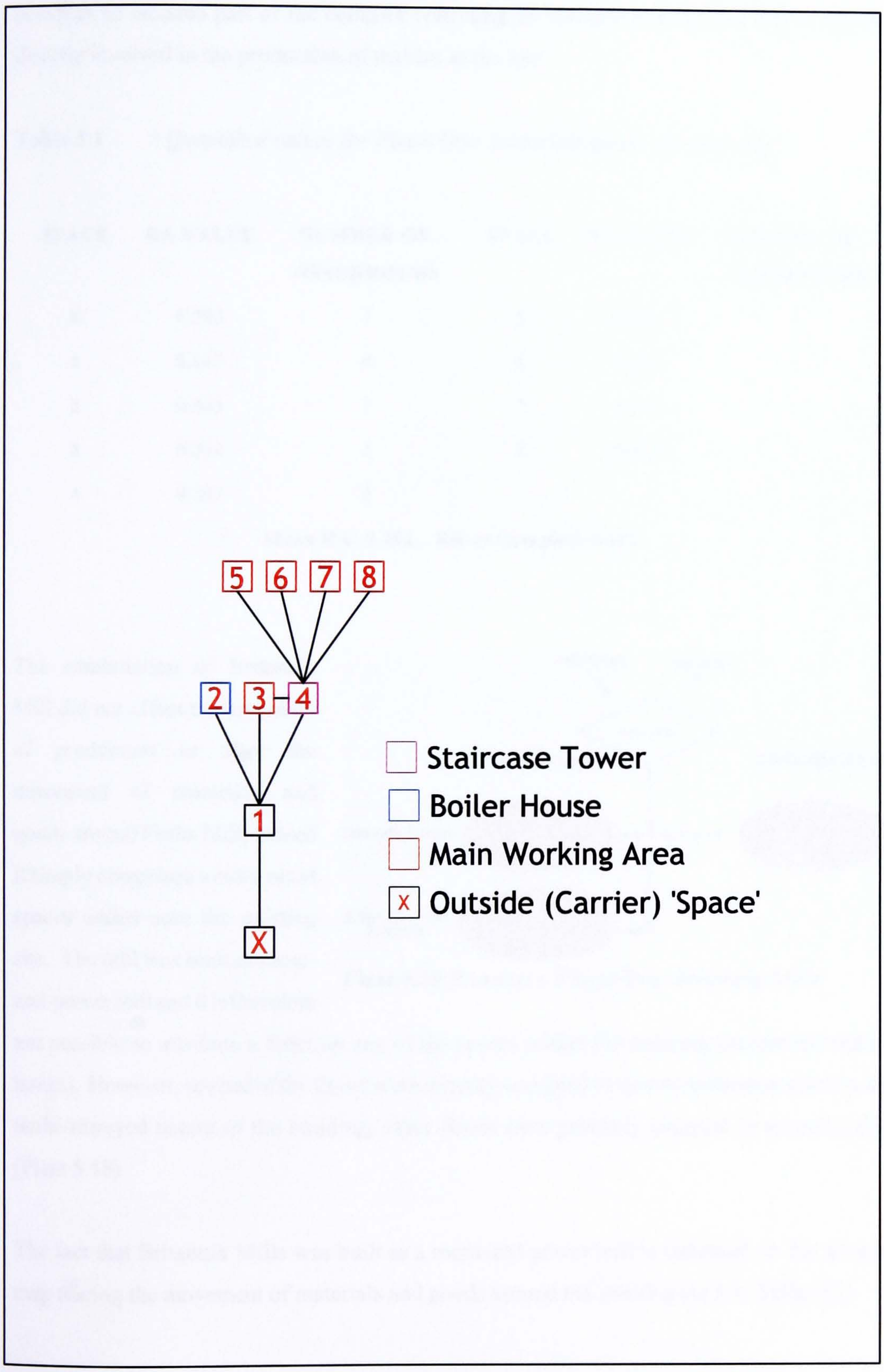


Figure 5.6 cont. *Phase One: Gamma map of the movement of materials/goods*

occupies an isolated part of the complex reflecting its function and the fact that it was not directly involved in the production of textiles at the site.

Table 5.1 *Quantified values for Phase One 'materials/goods' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.393	1	**5**	0.321	1
1	0.143	4	**6**	0.321	1
2	0.393	1	**7**	0.321	1
3	0.214	2	**8**	0.321	1
4	0.107	6			

Mean RA: 0.282 RR of Complex: 0.125

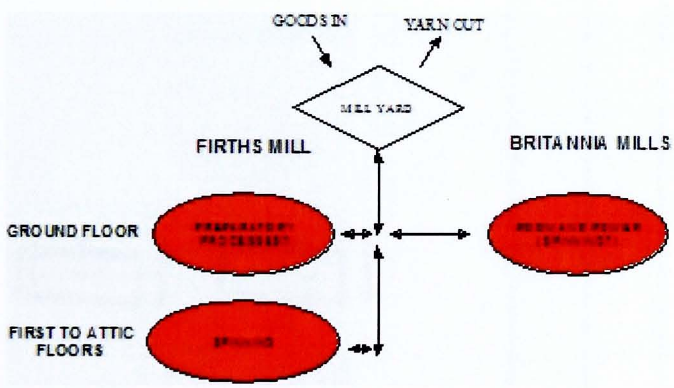


Plate 5.18 *Processes, Phase Two, Britannia Mills*

The construction of Britannia Mill did not affect the processes of production or alter the movement of materials and goods around Firths Mill, indeed it simply comprised a extra set of spaces added onto the existing site. The mill was built as room-and-power mill and it is therefore not possible to attribute a function any of the spaces within the building (except the engine house). However, several of the floors were initially occupied by cotton spinners and given the multi-storeyed nature of the building, other floors were probably engaged in spinning also (Plate 5.18).

The fact that Britannia Mills was built as a room-and-power mill is indicated on the gamma map tracing the movement of materials and goods around the site (Figure 5.7; Table 5.2).

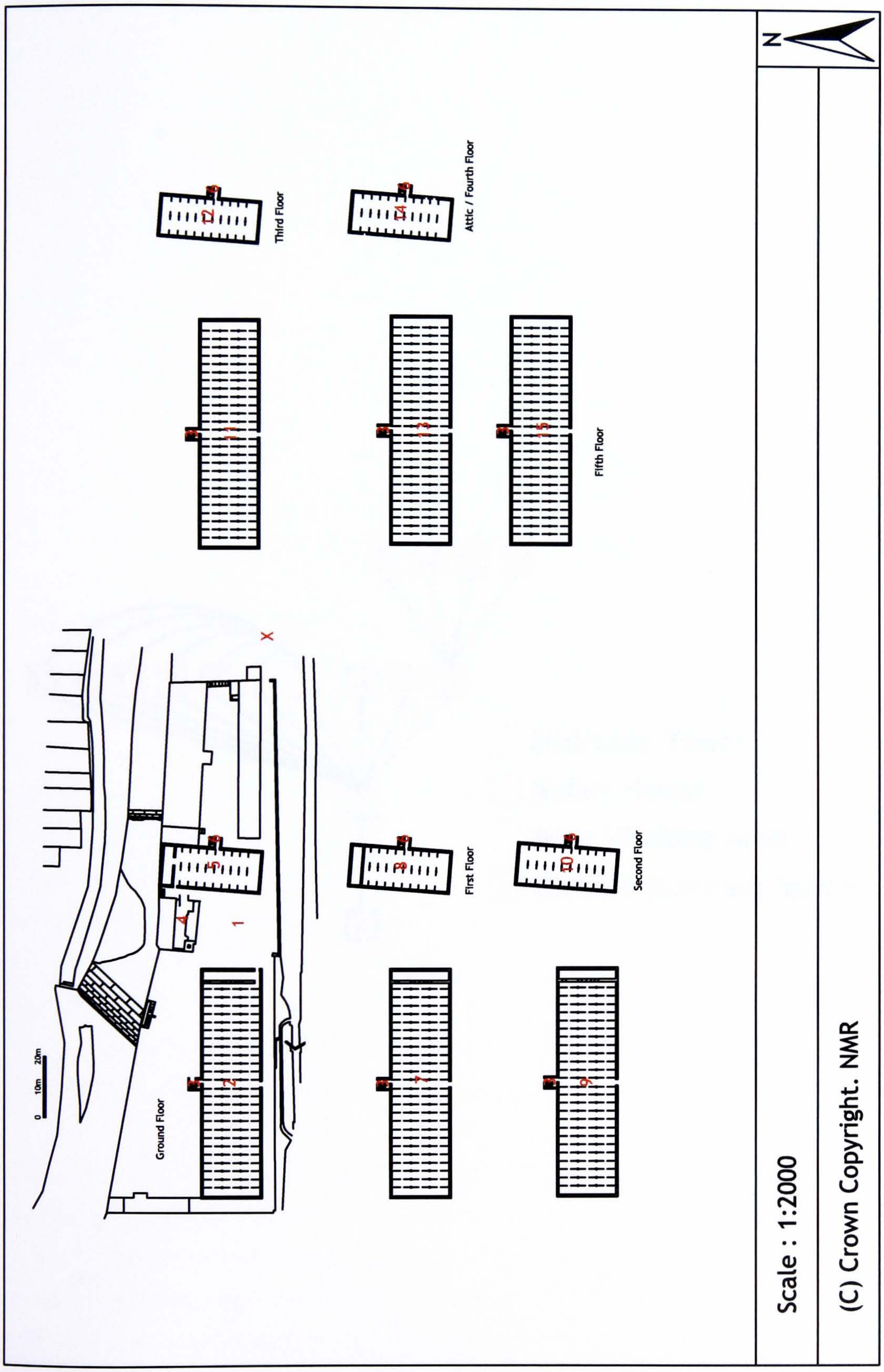


Figure 5.7 *Phase Two: Gamma map of the movement of materials/goods*

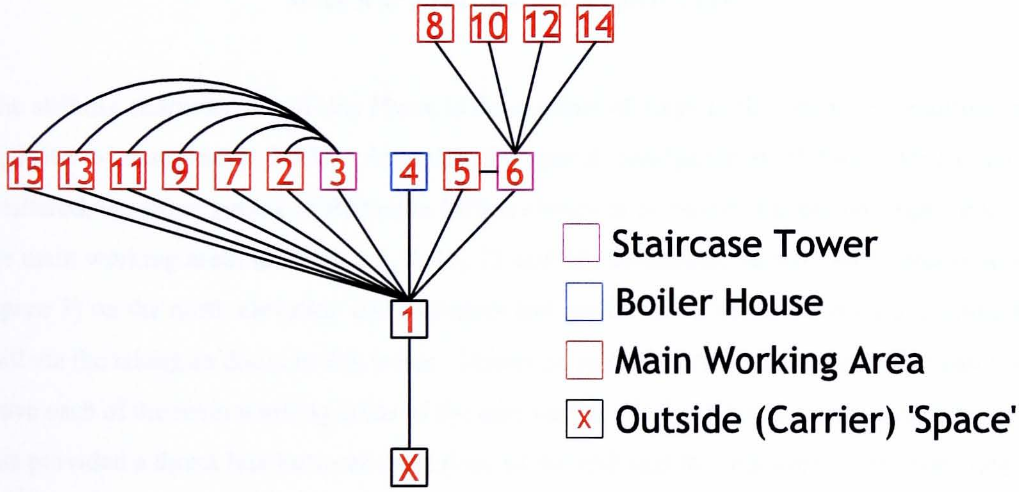


Figure 5.7 cont. *Phase Two: Gamma map of the movement of materials/goods*

Table 5.2 *Quantified values for Phase Two 'materials/goods' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.171	1	**8**	0.229	1
1	0.038	11	**9**	0.162	2
2	0.200	2	**10**	0.229	1
3	0.114	7	**11**	0.162	2
4	0.171	1	**12**	0.229	1
5	0.124	2	**13**	0.162	2
6	0.086	6	**14**	0.229	1
7	0.162	2	**15**	0.162	2

Mean RA: 0.164 RR of Complex: 2.455

The striking characteristic of this Phase is the number of rings in the complex, resulting in a high RR of complex of 2.455. Although the spatial configuration of Firths Mill remains unaltered, the space syntax of Britannia Mill is shown to be based entirely on rings. Each of the main working areas (spaces 2, 7, 9, 11, 13 and 15) communicate with the staircase tower (space 3) on the north elevation and materials and goods could therefore enter and leave the mill via the taking-in doors in this tower. However, materials and goods could also enter and leave each of the main working areas of the mill via the taking in doors in the south elevation; this provided a direct link between each floor of the mill and the mill yard. This extra degree of flexibility in the movement of materials and goods is best interpreted as an example of the extra requirements of a room and power mill and by providing numerous taking-in doors different companies operating in different parts of the mill could access materials and remove finished goods from the mill without compromising the actions of other tenants.

Phase Three saw Britannia and Firths Mill occupied by a single tenant and both used for the spinning of cotton but a schedule recorded in 1895 suggests that much of Firths Mill was unused except for the doubling (twining) or yarns on its upper floors. The lower floors may have been empty or perhaps used for occasional storage. Certainly, it appears that the emphasis on production had moved to Britannia Mill and the new two-storey mill extension at the east end of the mill was known to have been used for the breaking of cotton bales. Other space in the mill was being used for preparatory processes and spinning (Plate 5.19).

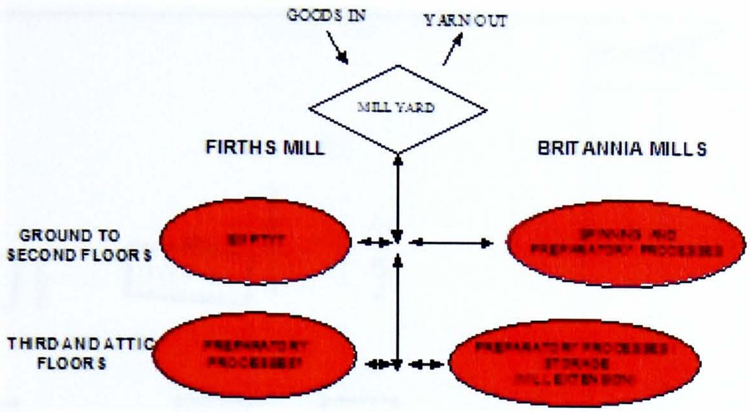


Plate 5.19 *Processes, Phase Three, Britannia Mills*

Although Phase Three saw changes in the layout of production across the site, the movement of materials and goods remained much as it had for Phase Two (Figure 5.8; Table 5.3).

Table 5.3 *Quantified values for Phase Three 'materials/goods' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.154	1	**9**	0.257	1
1	0.037	11	**10**	0.183	1
2	0.154	2	**11**	0.137	2
3	0.140	2	**12**	0.183	1
4	0.118	7	**13**	0.137	2
5	0.137	2	**14**	0.183	1
6	0.118	2	**15**	0.137	2
7	0.078	6	**16**	0.183	1
8	0.137	2	**17**	0.137	2

Mean RA: 0.145 RR of Complex: 2.078

The only change to the system is the presence of the two spaces in the mill extension (spaces 3 and 9) which results in minor changes to the RA values and RR of value of the complex but does not alter the basic syntactic form of the complex. The specialist function of the mill extension is reflected by the fact that they occupy a distinct part of the complex and they did not enjoy good communication with the remainder of the site, partly because of the presence of the engine house to the west through which materials and goods could not be carried. These

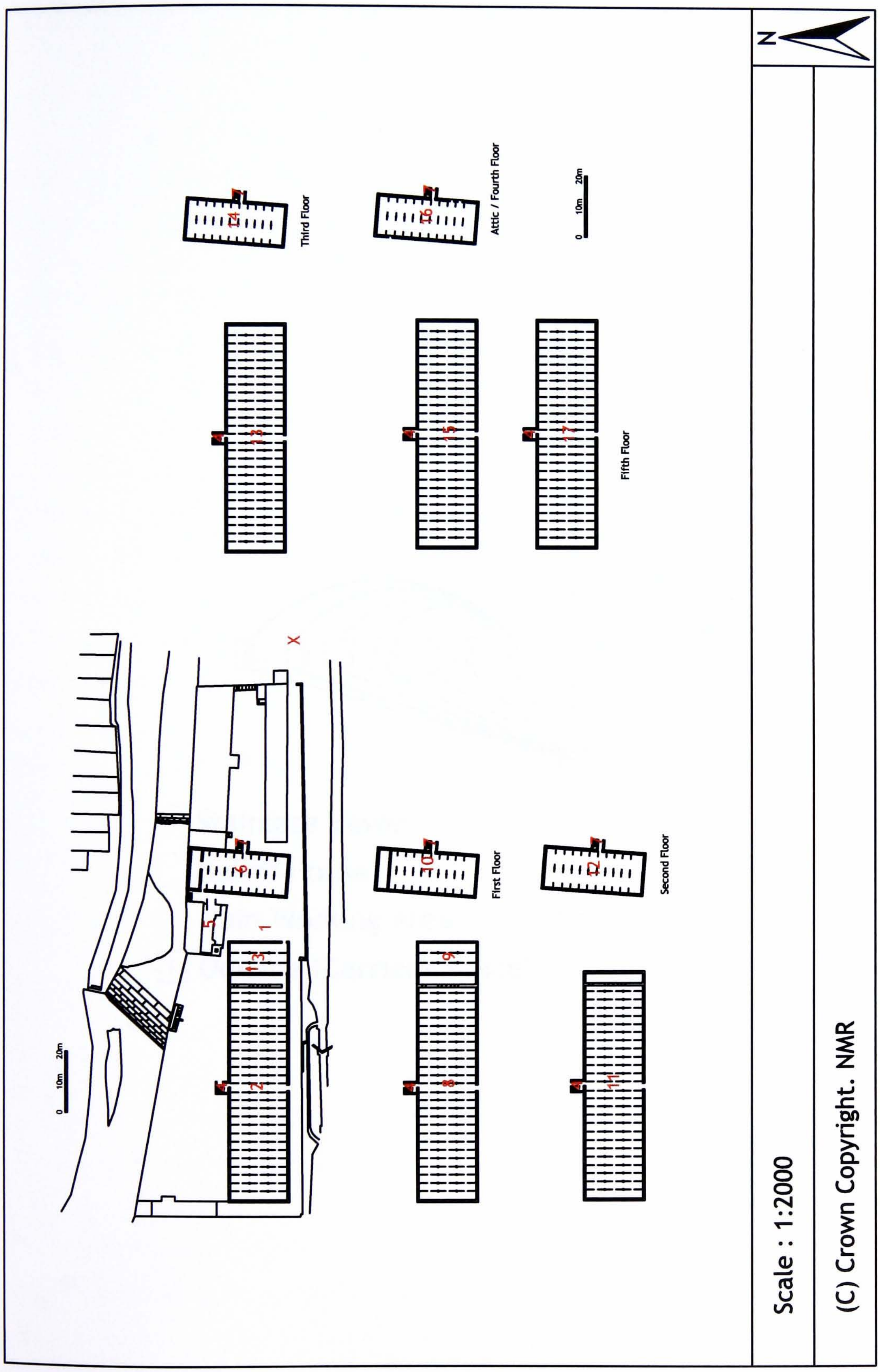


Figure 5.8 *Phase Three: Gamma map of the movement of materials/goods*

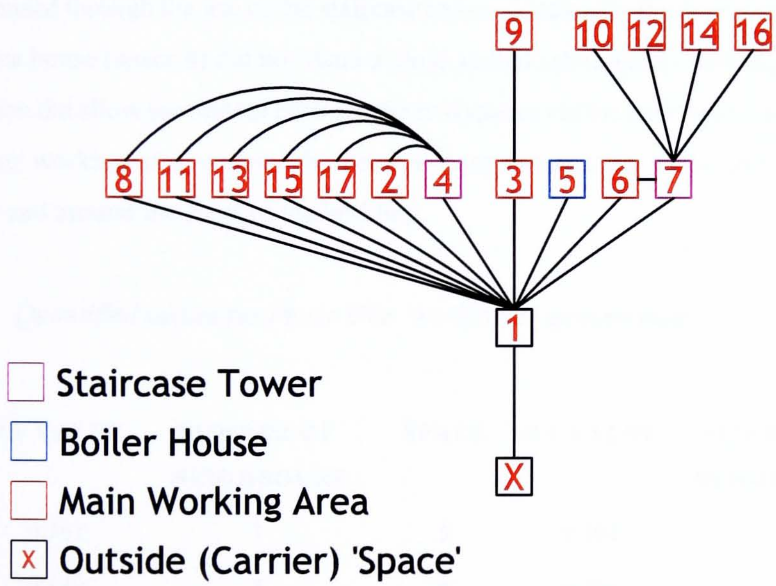


Figure 5.8 cont. *Phase Three: Gamma map of the movement of materials/goods*

spaces therefore communicated with other areas of the mill via the mill yard (space 1).

ACCESS ANALYSIS

Access analysis of the three phases of structural activity at Britannia Mills shows a degree of similarity between Firths and Britannia Mills despite differences in their size. The gamma map of the movement of workers for Phase One (Figure 5.9; Table 5.4) shows that the basic spatial structure of Firth's Mill was based on a tree-like structure suited to the control of human movement. All spaces in the mill were accessible from the staircase tower (space 2) which, with a low RA value of 0.083, integrated movement about the complex. Workers were therefore, regardless of which floor they worked on, only two spatial steps from their place of work when stood outside of the mill. Their potential movement about the complex was therefore minimised through the use of the staircase tower. Unusually the boiler house (space 5) and the engine house (space 4) did not share a close spatial relationship, although a door in the west elevation did allow movement between the two spaces via the mill yard to the west and the ground floor working area without the need to pass through the main entrance in the staircase tower and around the front of the building.

Table 5.4 *Quantified values for Phase One 'workforce' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.361	1	**5**	0.306	1
1	0.139	4	**6**	0.306	1
2	0.083	6	**7**	0.306	1
3	0.167	3	**8**	0.306	1
4	0.389	1	**9**	0.306	1

Mean RA: 0.272 RR of Complex: 0.100

The construction of Britannia Mill did not alter the spatial form of Firths Mill and despite their different sizes, both mills shared a remarkably similar spatial structure (Figure 5.10; Table 5.5).

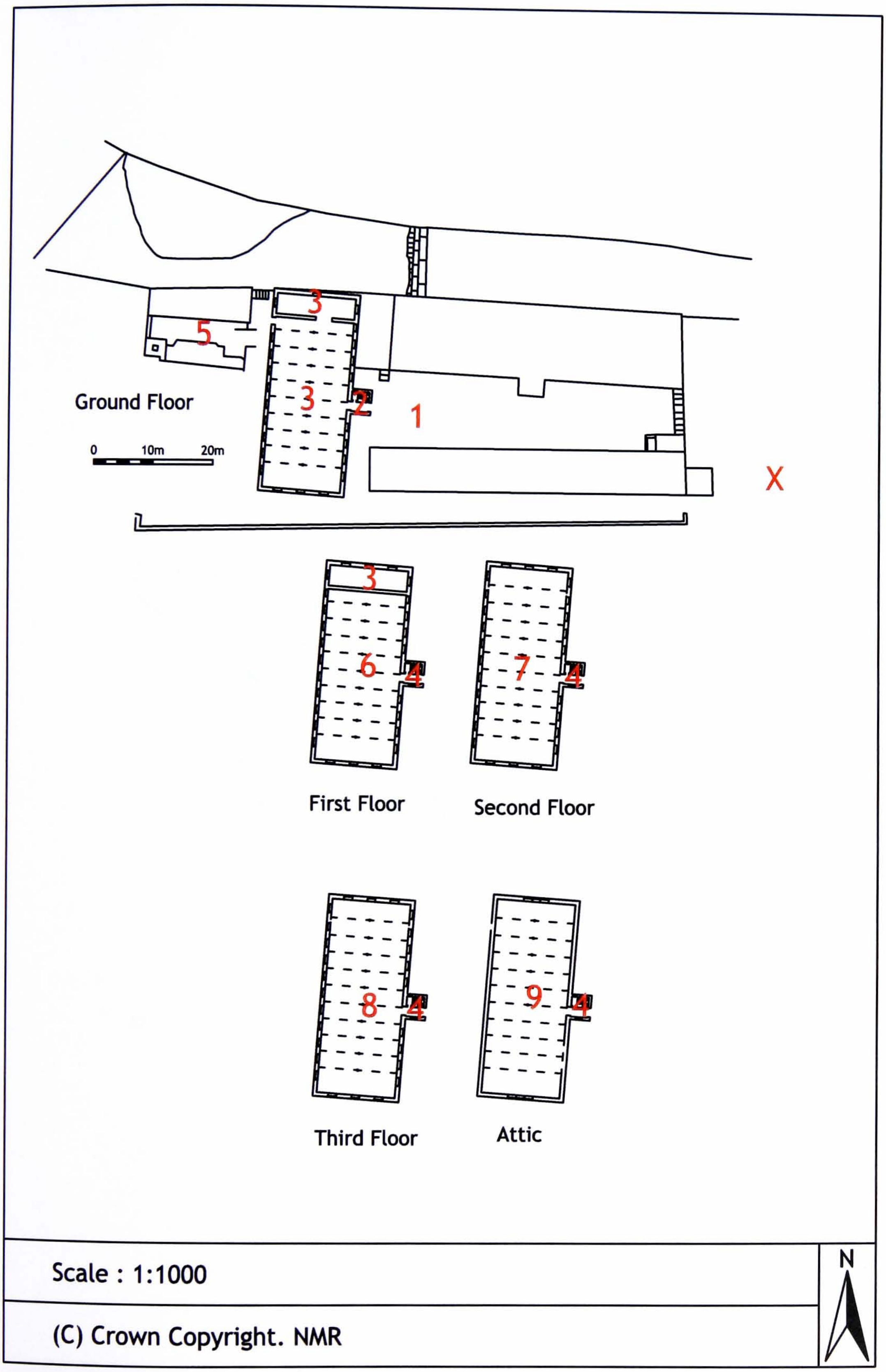


Figure 5.9 *Phase One: Gamma map of the movement of the workforce*

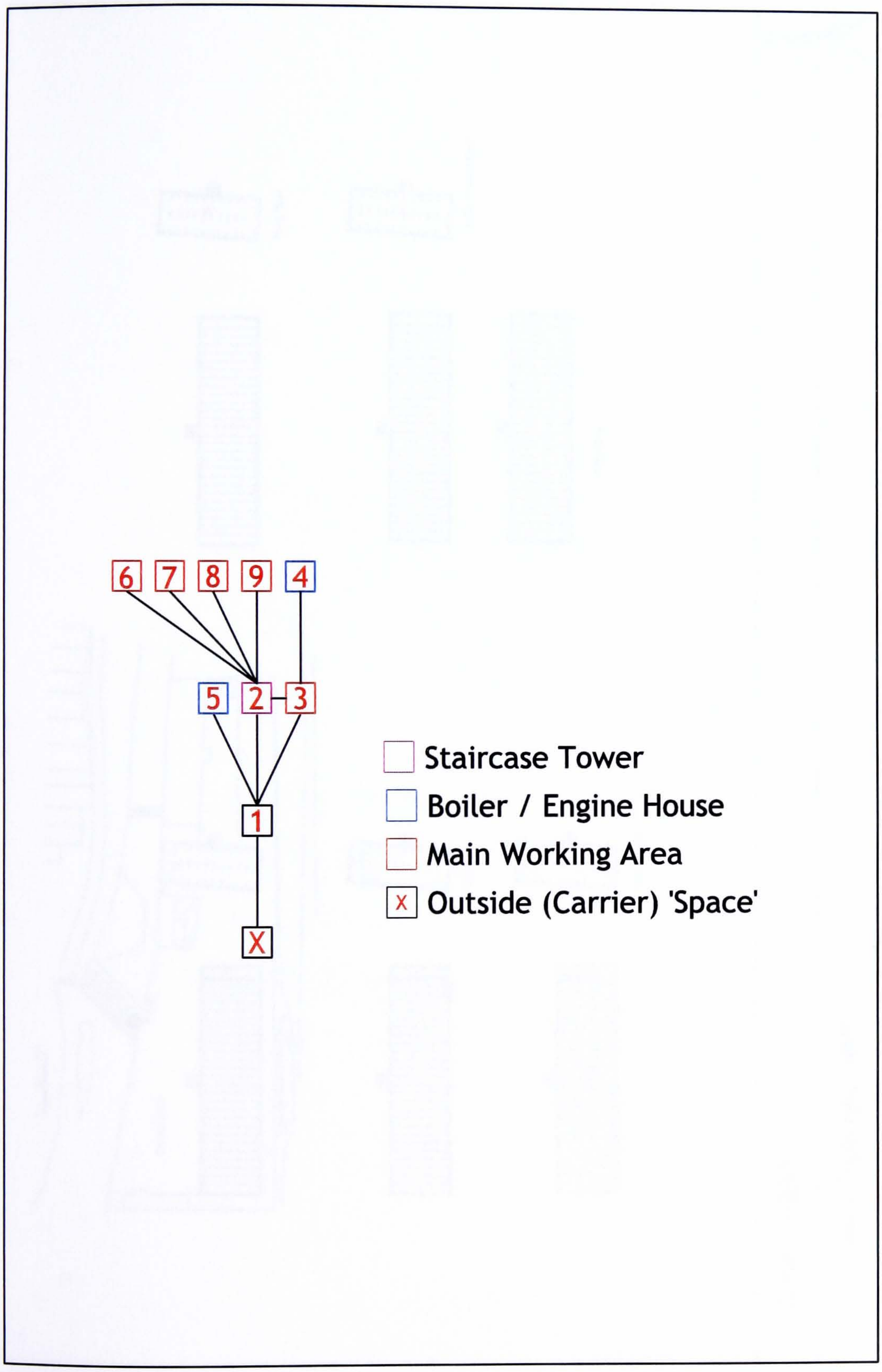


Figure 5.9 cont. *Phase One: Gamma map of the movement of the workforce*

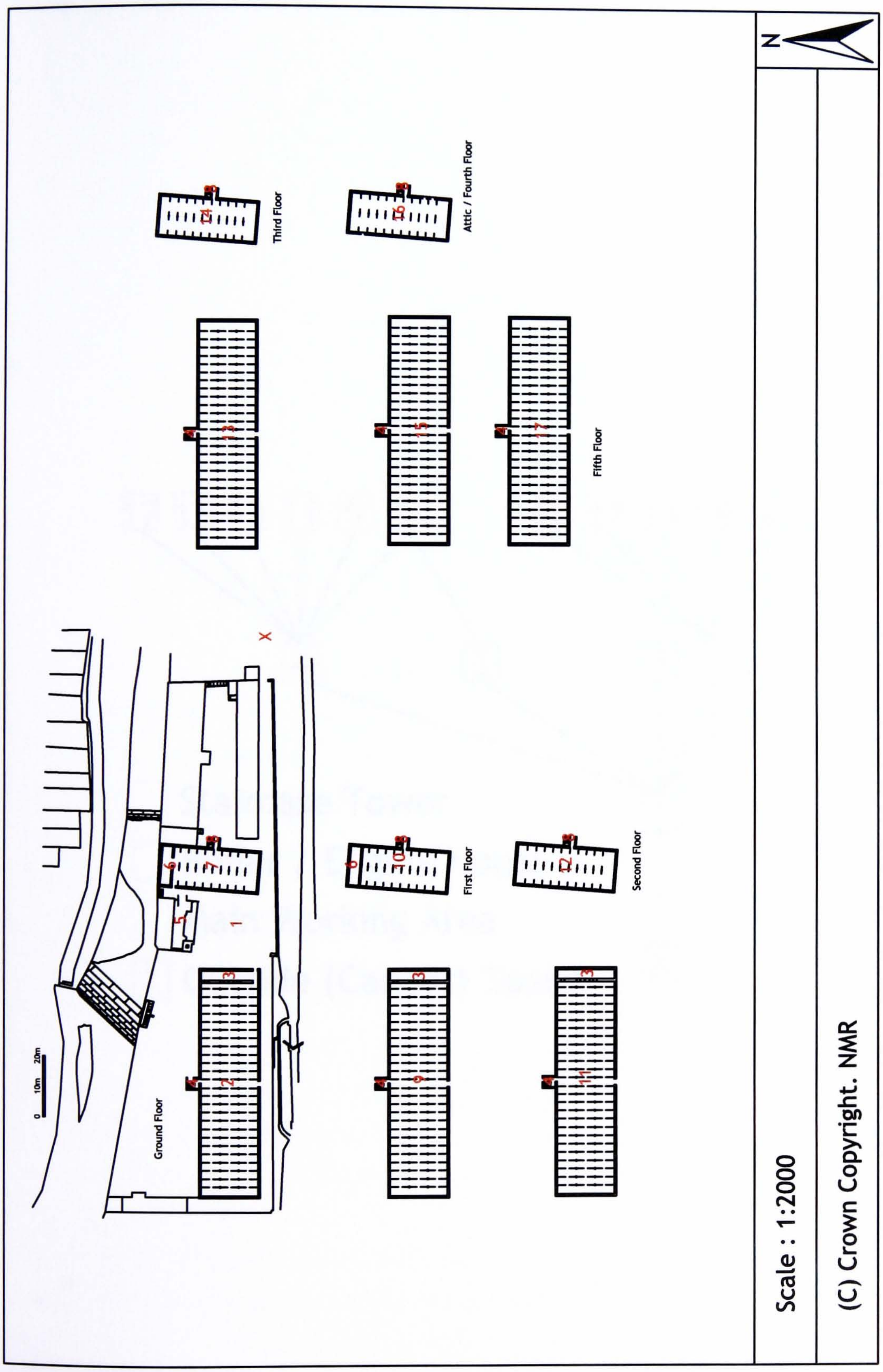


Figure 5.10 *Phase Two: Gamma map of the movement of the workforce*

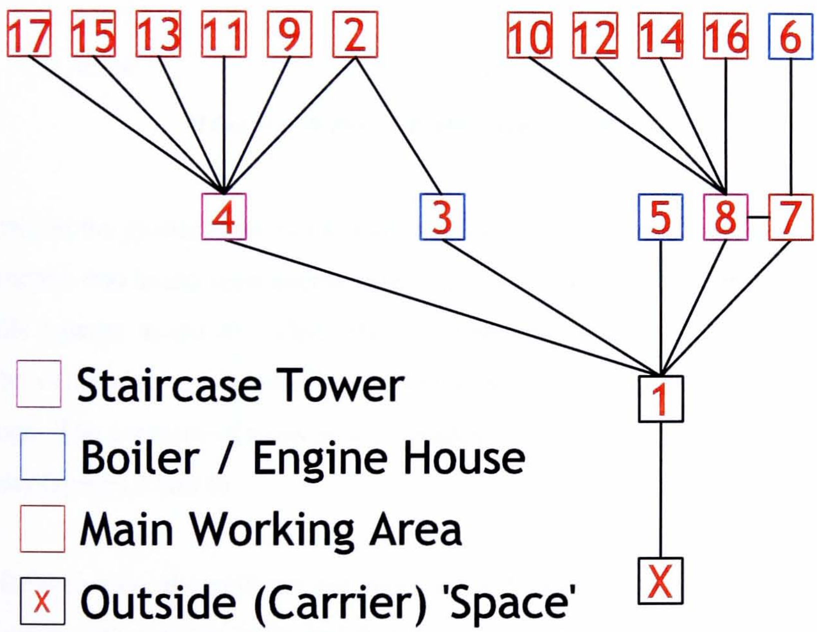


Figure 5.10 cont. *Phase Two: Gamma map of the movement of the workforce*

Table 5.5 *Quantified values for Phase Two 'workforce' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.199	1	**9**	0.228	1
1	0.081	2	**10**	0.243	1
2	0.213	2	**11**	0.228	1
3	0.184	7	**12**	0.243	1
4	0.110	1	**13**	0.228	1
5	0.199	1	**14**	0.243	1
6	0.265	3	**15**	0.228	1
7	0.147	6	**16**	0.243	1
8	0.250	1	**17**	0.228	1

Mean RA: 0.209 RR of Complex: 0.077

The similarity in the spatial form of the mill is most obvious from the gamma map and the inherent structure was based upon access to the main working areas from the staircase towers in both mills (spaces 4 and 8). Thus, the movement of workers around both mills was controlled by virtue of having to pass through one single space in order to enter or leave their place of work. The presence of rings in the complex is related to movement to and from the engine houses (spaces 3 and 6).

Unusually for their date, the mills are not provided with privies. There is certainly evidence for privies inside either of the mills and they may therefore have been accommodated in a separate building which has not survived or been identified. The absence of privies means that the main working areas in the mills form the deepest parts of the complex. Therefore, workers inhabited those spaces to which access was regulated by the presence of other spaces. This in itself allowed a degree of control over human movement.

The construction of the mill extension at the east end of Britannia Mill had little affect on the movement of workers around the site (Figure 5.11; Table 5.6).

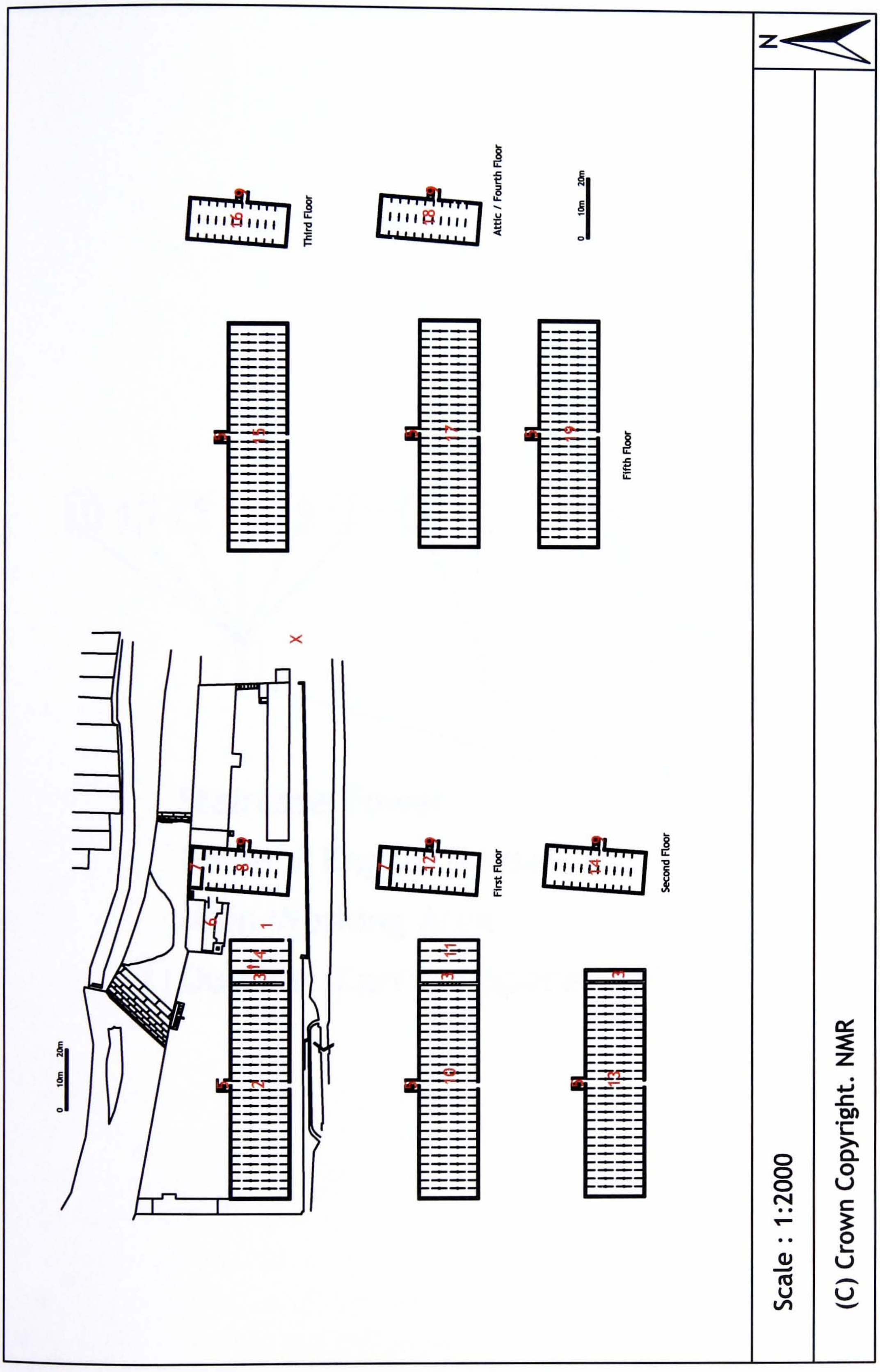


Figure 5.11 *Phase Three: Gamma map of the movement of the workforce*

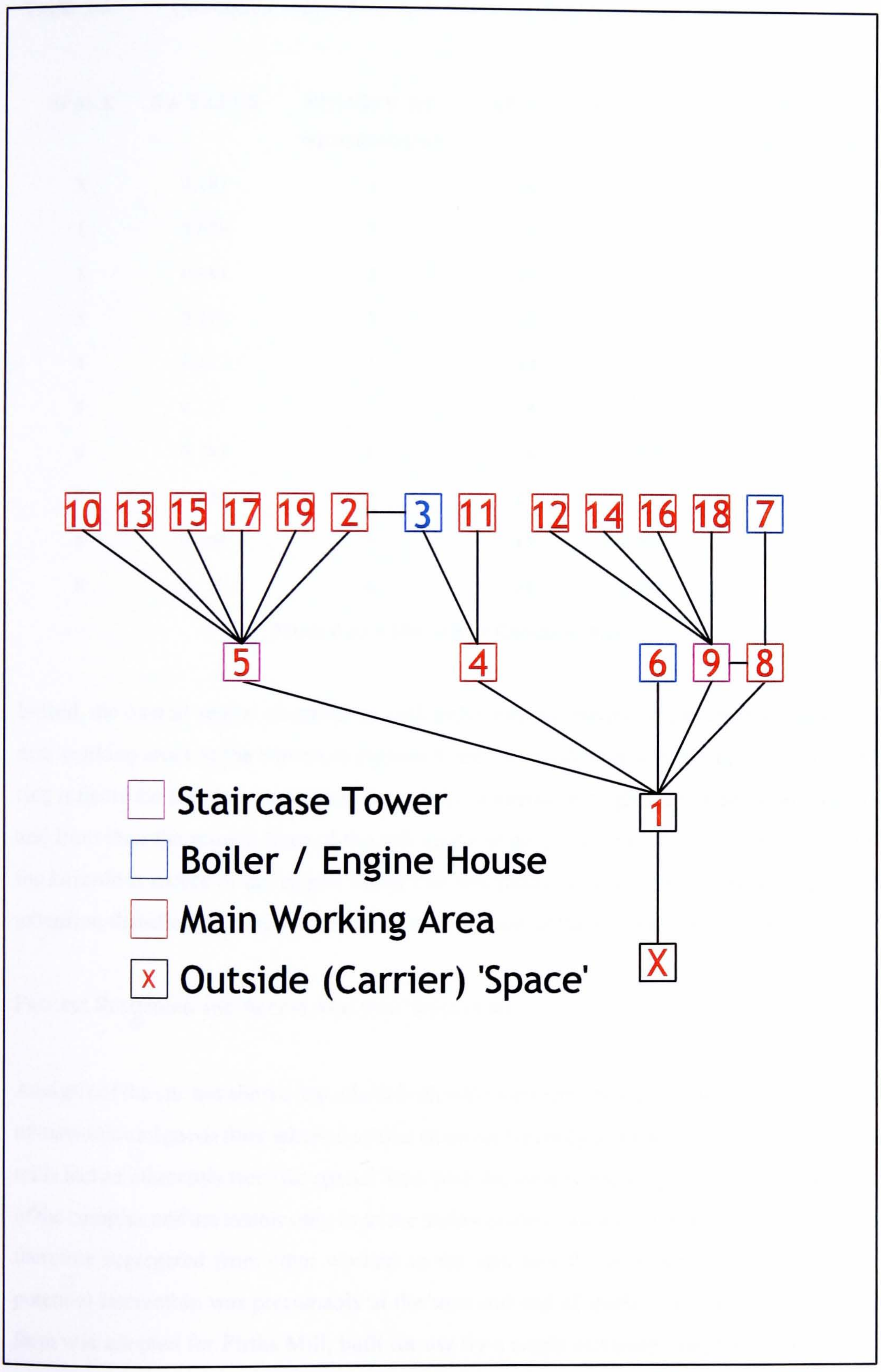


Figure 5.11 cont. *Phase Three: Gamma map of the movement of the workforce*

Table 5.6 *Quantified values for Phase Three 'workforce' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.181	1	**10**	0.210	1
1	0.076	7	**11**	0.257	1
2	0.181	2	**12**	0.228	1
3	0.216	3	**13**	0.211	1
4	0.152	1	**14**	0.228	1
5	0.111	7	**15**	0.211	1
6	0.187	1	**16**	0.228	1
7	0.246	1	**17**	0.211	1
8	0.104	3	**18**	0.228	1
9	0.123	6	**19**	0.211	1

Mean RA: 0.190 RR of Complex: 0.067

Indeed, the overall spatial character of both mills was unchanged and the introduction of the new working areas in the extension (spaces 4 and 11) resulted in a new ring occurring. This ring reflects the fact that the extension could be accessed through the engine house (space 3) and from their the ground floor of the mill could be accessed. However, it is unlikely, given the hazardous nature of the engine house that this means of access was regularly used. The extension therefore primarily communicated with rest of the mill via the mill yard.

PROCESS RECORDING AND ACCESS ANALYSIS: DISCUSSION

Analysis of the site has shown that whilst both mills were designed to allow the easy movement of materials and goods their inherent spatial structure limited potential human movement. Both mills had an inherently tree-like spatial form with the main working spaces in the deepest parts of the complex and accessible only from the main staircase towers. Workers on each floor were therefore segregated from other workers in the mill and the only point at which their was potential interaction was presumably at the start and end of shifts. The fact that this spatial form was adopted for Firths Mill, built for use by a single company, and for Britannia Mill, built as a room-and-power mill to be used by numerous tenants shows the flexibility in mill design and that the segregation of workers was achieved in the same way in both instances of mill use. This has obvious implications for our understanding of team working in the textile mill and by segregating workers the transfer of skills and a team ethic was more easily achieved.

ARCHITECTURAL SUMMARY

The architectural character of Firths and Britannia Mills is of interest for although both built during the same period they show different aspects of thinking about mill design. Firths Mill is similar to many early sites and there is only minimal use of architectural motifs, such as the moulded cornice on the staircase tower and Venetian windows in the north and south gables. In contrast, the architectural styling of Britannia Mill and its sheer size is impressive. Although essentially the same footprint as Firths Mill, particular attention was paid to the publically visible parts of the mill and as a consequence the west and south elevations were treated differently to the north and east elevations. Particularly ornate are the series of taking-in doors centrally placed on the south elevation which have rusticated surrounds and are surmounted by a shaped pediment and inscription. In contrast, the north elevation is relatively plain and even the staircase tower, usually a point of interest, is largely unadorned. However, given the restricted access to the site it is unsurprising that attention was paid to those elevations visible from the main thoroughfare, the Huddersfield Canal. The particular attention paid to the appearance of Britannia Mill probably also reflects the desire on the part of its builders of John Firth and Sons to express their success in the industry, that is being able to construct a second, large mill at the site, as well as to encourage potential tenants by providing a building that looked and was built to the latest standards and tastes in mill design.

LIST OF DOCUMENTS

Document 5.1	Lease, 28th July 1864. 'Radcliffe to J. & J. Firth. 4343 sq. yards, with factory at Mark Bottom' *Private property of Bradbury's Fabrics*
Document 5.2	'Conveyance, 11th October 1895. The Britannia Mills Company., in liquidation (Creditors: The Queen's Benefit Building Society, £ 7, 874-10-3) to the Britannia Mills Co., Huddersfield, Ltd., incorporated 8th August 1895 - the new company. Paid £1,146-7-10 (Deeds)' *Private property of Bradbury's Fabrics*

Appendix A
Site Description : 6
Dunkirk Mill

Database Entry:	703
NBR Number:	BFO62638
NGR:	SE 0200 3519
Township:	Haworth (Oxenhope)
Civil Parish:	Keighley
District:	Bradford
County:	West Yorkshire
Branch:	Worsted
Period:	Middle

Plate 6.1 *Dunkirk Mill, Oxenhope, from the south*

Located in a remote, rural site to the north of Oxenhope, Haworth, Dunkirk Mill was probably established as a water-powered worsted mill in the late eighteenth or very early nineteenth century. The mill occupies flat ground between the Dunkirk Beck and steeply rising ground to the north and is located close to a small but self-contained settlement clustered along the Hawksbridge Lane (Plate 6.1). The mill is largely a rebuilding during the 1870s with later alterations, including the addition of a steam plant and an extension for corn milling. Worsted production was undertaken at the site until 1908 and the mill was then used to manufacture spindle tape until 1972. The current owners, the Heaton family, have begun to re-use parts of the ground-floor of the mill for the production of transmission ropes as part of 'Bond-A-Band Transmissions Ltd.', but much of the building stands empty. The site comprises the main water-powered mill building, cottages, a mill extension and rooms associated with a steam plant (Figure 6.1).

Although for much of the twentieth century the mill has not been used for the production of textiles, the standing fabric has not been significantly altered, all of the principal phases of construction are clearly discernible and many original features have survived. The mill is therefore suited to archaeological study.

HISTORICAL BACKGROUND

The early history of Dunkirk Mill is unclear, but it seems likely that a mill was built at the site in the late eighteenth or early nineteenth century. Previously the site seems to have been occupied by buildings of a domestic character. A set of deeds dated 2nd February 1805 (Document 6.1) refer to 'Dunkirk Croft', which had passed into the ownership of James Hartley, and record 'one croft whereon an old cottage house formerly stood and on which a mill or factory is now building'. Fourteen years later a further set of Deeds, dated 20th November 1819, (Document 6.2) refer to 'that mill and buildings lately erected' as well as '2 cottages and a croft'. However, although the earliest reference to a mill is made in documentary sources dating from the early nineteenth century, another set of deeds, dated 1798, record the making of a watercourse at the site (Document 6.3). This raises two possibilities: either the watercourse related to the improvement of the Leeshaw Beck, running through the site, for use by other mills erected along its course lower in the valley, or, it relates to watercourses to power a mill at Dunkirk Croft, which may have existed by that time or was planned for the future. However, it is clear that by 1820 a mill and cottages stood at the site and it is therefore the case that the character of the site has changed little since that time.

The Hartley family are recorded as owners of Dunkirk Mill for much of the nineteenth century. A mill, warehouse and shop (probably a finishing shop or workshop) are recorded in the Haworth Rate Books starting in 1831 with a rateable value of £17-12-19d and the owner Bernard Hartley. Hartley B & Son are recorded as worsted manufacturers in White's Trade Directory, 1838 and at this time the mill was owned by Bernard and Sarah Hartley but occupied by John Hartley, probably one of their sons. Bernard Hartley evidently died sometime between 1842 and 1851 for in 1851 the Haworth Valuation records the owners of Dunkirk Mill as James and Bernard Hartley's executors. The valuation also records a worsted mill, warehouse, water

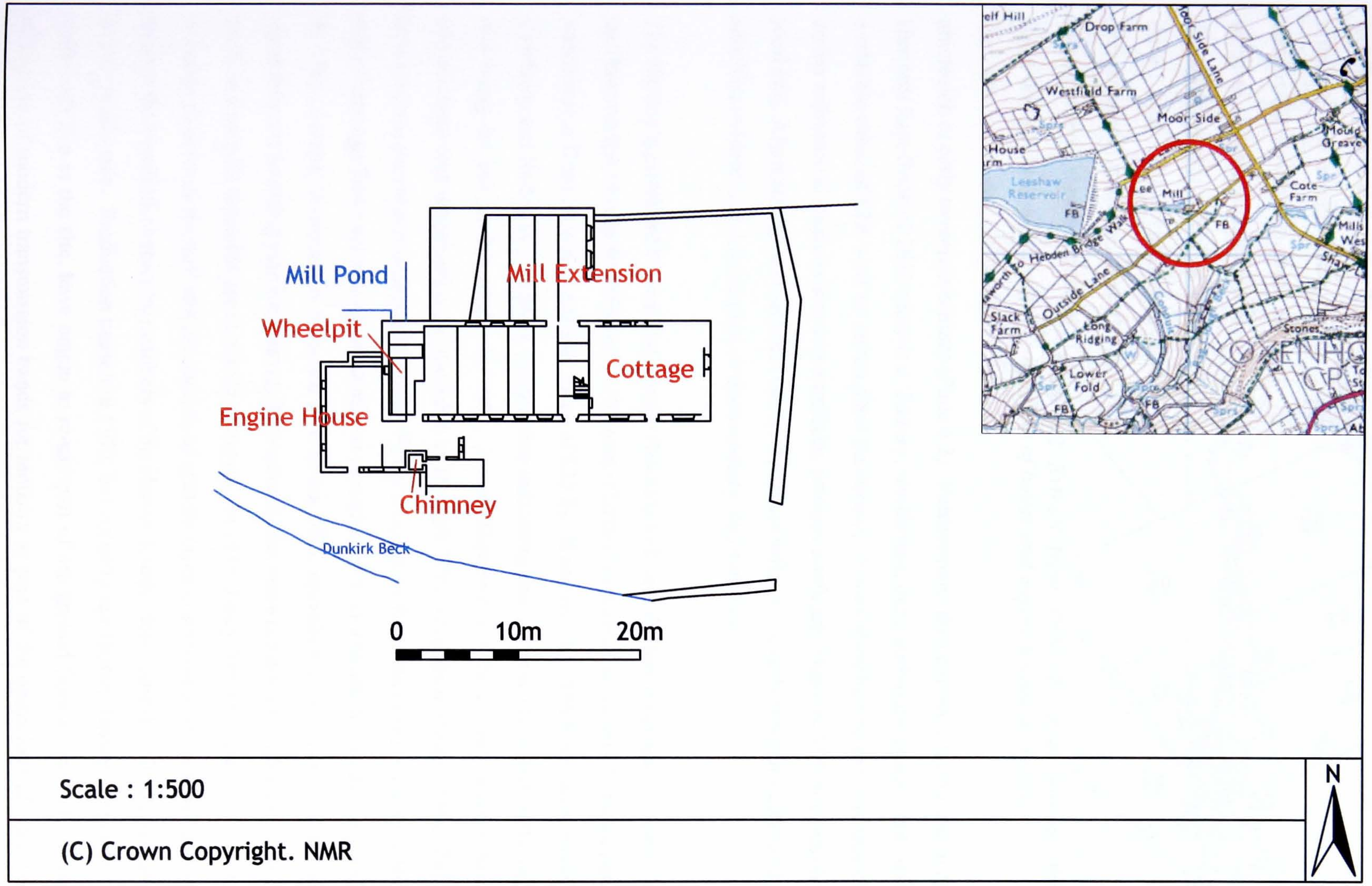


Figure 6.1 *Block Plan, Dunkirk Mill, Oxenhope*

and steam power at the site. The reference for steam power is curious for no other mention is made to a steam installation in the documentary record at this date and the surviving archaeological evidence, as well as cartographic sources, indicate that steam power was not used at the site until the very late nineteenth or early twentieth century (Plate 6.2). Furthermore, the next entry for the site in the Haworth Rate Book of 1853 records a 'factory, warehouse, dam, outbuildings and yard' with a rateable value of £29, with no steam plant mentioned. It may therefore be the case that the earlier reference to steam power was a mistake, perhaps confusing Dunkirk Mill with another local mill. Alternatively, an much less likely, it perhaps refers to an early steam installation for which no evidence, archaeological or documentary, has survived.

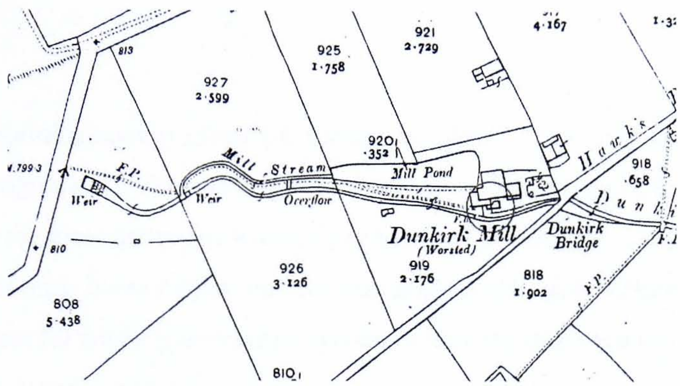


Plate 6.2 *Extract from 1906 OS map showing first depiction of boiler and engine houses at the site*

The Hartley's continued to own and occupy Dunkirk Mill into the late nineteenth century. In the Haworth Rate Books of 1869 and 1875, James Hartley is recorded as owner of a factory and warehouse at Dunkirk with a rateable value of £25 8s. However, the 1869 Rate Book records Gawthorp and Bailey as occupiers, presumably indicating that space in all or part of the mill was being let out at this time. In 1891, Joseph Dewhirst (or Dewhurst), cotton band manufacturer and woolcomber, is recorded at Dunkirk Mill, Oxenhope (Slater 1891, 288). Dewhirst was previously occupier of nearby Fisher's Lodge Mill and the move to Dunkirk Mill might represent Dewhirst having accumulated enough capital as a tenant to buy his own mill. By 1901, Joseph Dewhurst is recorded at Dunkirk Mill, operating as a cotton doubler but apparently not doubling yarn for weaving but rather for the manufacturer of double loop cotton bands and spindle tapes for use in textile factories. In 1912, Mary Ann Dewhurst is recorded as cotton doubler at the mill and production of spindle tapes continued at the site throughout much of the twentieth century by members of the Heaton family, descendents of the Dewhurst's on the female side. Production ceased in 1972, but recently the Heaton family, members of which still live at the site, have begun to re-use part of the ground floor of the mill for the production of modern transmission bands for industry as part of the operations of 'Bond-a-Band' Transmissions Ltd.

ARCHITECTURAL HISTORY

There are four principal phases of building activity identifiable at Dunkirk Mill. The first three phases are related to successive programmes of rebuilding, alterations and additions made to the mill whilst it was still used for the manufacture of worsted products, whilst the last phase is concerned with that period in the mills history when the site was used for the manufacture of cotton loop bands and spindle tapes for power transmission systems within the textile sector. Of these four phases, only phases 2 and 3 will be discussed in detail and analysed for the purposes of this research. This reflects the fact that insufficient evidence survives from the earliest phase whilst the final phase of activity at the site relates to that period in the mill's history when it was not used for the production of worsted products.

- ### PHASE ONE

The earliest phase of building activity at Dunkirk Mill is represented by the fragmentary remains of a water-powered mill probably built in the early nineteenth century and parts of the cottages attached at to the east end of the main mill building (Figure 6.2).

The remains of the early mill survive as the ground floor section of the west wall of the current mill, and about four metres of return wall in the north and south walls, as well as the wheelpit situated inside the west wall. Externally, these reused walls are of squared watershot masonry with pecked tooling (RCHME 1987c, 1) which contrasts with the watershot masonry with channelled tooling used in the later, rebuilt mill. The wheelpit, located in an internal position at the west end of the mill, was built of similar masonry, though the upper edge of each stone had been dressed back to remove the true watershot effect. It is therefore probably also a survival from the earlier mill. It was 1.10 by 6.60 metres, shortened at its north end by a later, inserted wall, and was about 2 metres deep. Water entered from above ground floor level at its north end, through a pentrough (above which was a small window), turned the wheel and then flowed out of the mill through an outlet channel in the bottom southeast corner of the wheelpit. The point at which the tailrace outlet flowed back into the Dunkirk Beck is no longer visible for the area has become heavily overgrown. At the time of the RCHME report the wheelpit was open and the outlet flow visible. Since that time the wheelpit has back-filled with concrete and the only evidence for it is a change in the concrete flooring.

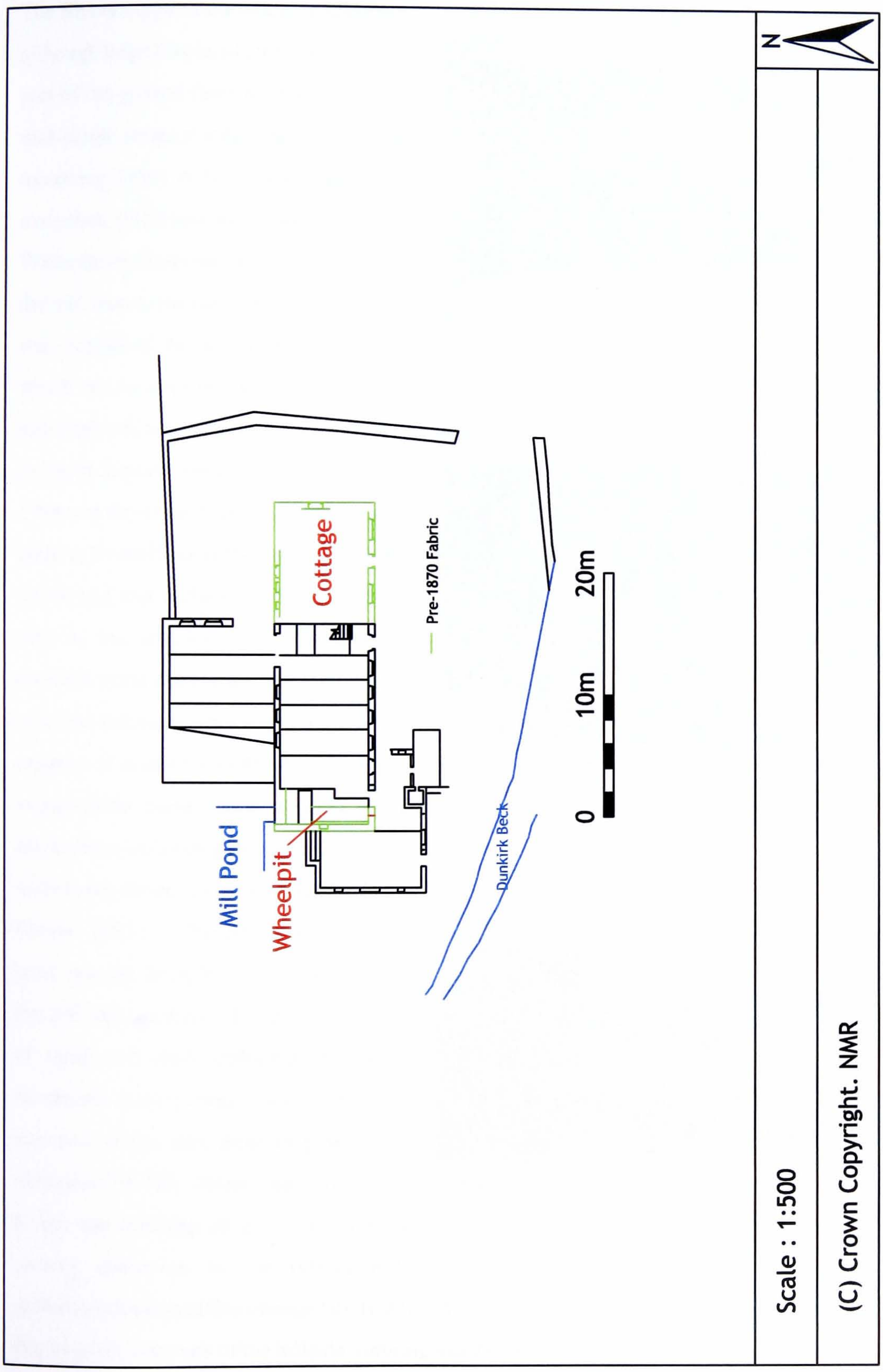


Figure 6.2 *Block Plan, Dunkirk Mill, Oxenhope, showing surviving pre-1870 fabric*

The size and type of the wheel is unknown, although large blocks of stone in the lower part of the ground floor west wall below a mid-height internal ledge may relate to its mounting (Plate 6.3). This suggests an over-shot, pitchback or breastshot wheel. Water flowed onto the wheel directly from the mill dam to the north west and the flow was regulated by a simple iron sluice which has survived *in situ* (Plate 6.4). The mill pond and associated watercourse must be those features recorded in deeds dated 1798 and the close relationship of the mill pond to the mill suggests that the first mill on the site was probably built at the same time as the watercourses. The present owner is led to believe that the sluice, head race and mill dam were constructed at the expense of a number of local mill owners as part of the management of water in the Beck and to facilitate power to a number of mills lower down the valley (Heaton *Pers. Comm.* 2003). The mill pond is partly built into the hillside to the north and to the east and south its sides are constructed of stone and earth embankments. Mid-nineteenth century maps indicate that the east end of the mill pond originally ran obliquely SW-NE. It now runs closer to N-S and the building of a late nineteenth century extension to the rebuilt mill probably occasioned this change (RCHME 1987c, 2). The mill pond is fed by a long head race that hugs the contours of the hillside, running a distance of some 50 metres to the Dunkirk Beck beneath the Leeshaw Reservoir (Plate 6.5). At that point, ironwork survives from a sluice gate

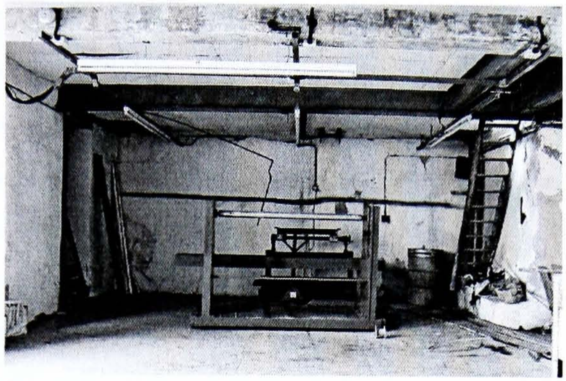


Plate 6.3 *The presence of a mid-height ledge may reflect the position of the mounting of the waterwheel. Water flowed from the top right of the picture, onto the wheel and then exited bottom left into the tailrace*

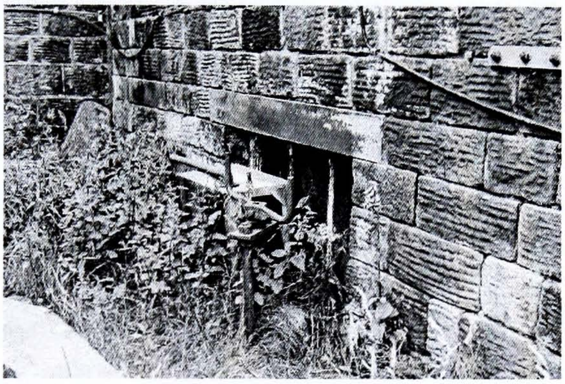


Plate 6.4 *Iron sluice apparatus controlling water into the pentrough survives in situ*

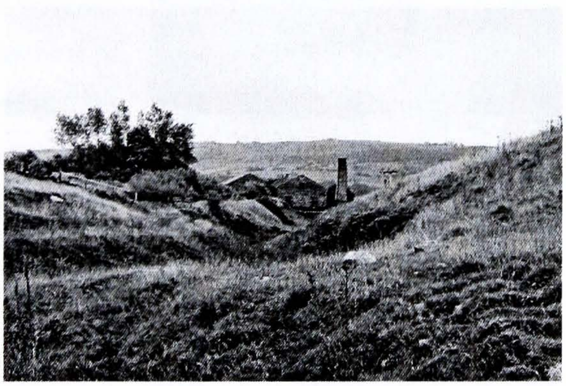


Plate 6.5 *The tailrace travels a distance of c.50m from upstream and hugs the contours of the hillside to the north and west of the mill (right)*

controlling the flow of water into the headrace. The Dunkirk Beck was once known as Leeshaw Water, but following the construction of the Leeshaw Reservoir in 1879 by the Bradford Corporation (www.yorkshire.com/web/RecDist.nsf/Leeshaw?OpenpPage; 30/07/04) some 100 metres upstream from the mill, the beck below the reservoir was renamed the Dunkirk Beck (RCHME 1987c1), perhaps taking its new name from Dunkirk Mill. However, the construction of the reservoir does not appear to have affected the provision of water to Dunkirk Mill, which continued to be water-powered into the early twentieth century.

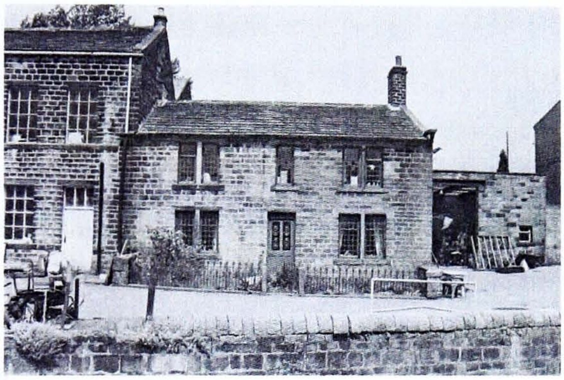


Plate 6.6 *Cottages at east end of Dunkirk Mill*

Archaeological evidence at the site indicates that the cottages (now a single dwelling) at the east end of the main mill building survive from an early phase of activity at the site and may pre-date the production of textiles at the site (Plate 6.6). At the junction between main mill building and the cottages in the south elevation there is a ragged straight joint, seven courses of masonry forming an unbroken straight joint at first floor level which lines up with the inner east wall of the mill, and differences between the masonry used in the mill and the cottages (Plate 6.7). This evidence indicates that the western end of the south elevation of the cottages incorporate masonry which predates the rebuilt mill. The unbroken straight join may indicate that the early mill was of only one storey, or, alternatively and less likely, the straight join may once have been one side of an upper floor window (RCHME 1987c, 2). Whether this window belonged to the early mill or to a cottage demolished in order to allow construction of an enlarged mill in the late nineteenth century is unknown. The latter interpretation is supported by the existence of a blocked fireplace at first floor level in the present mill (RCHME 1987c, 3), a feature apparently not associated with the rebuilt mill

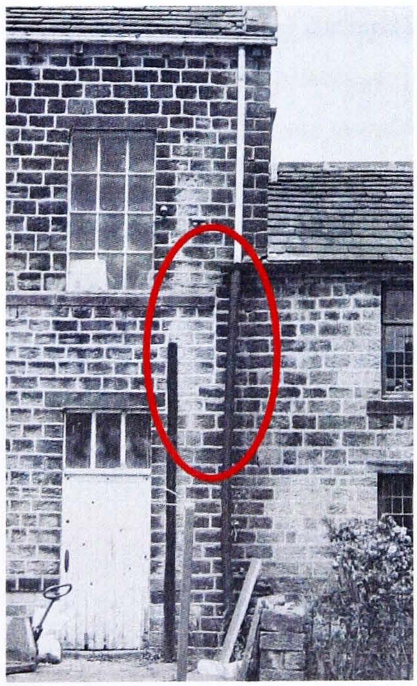


Plate 6.7 *Straight joint between mill and cottages*

and perhaps a vestige of a domestic building on the site; this feature is no longer visible.

- PHASE TWO

During the late nineteenth century the earlier mill was rebuilt, most probably d during the 1870s. The reasons for the rebuilding are unknown, but if the cottages were once larger (see above p212) it may have been the case that there was a need to increase productivity at the site by erecting a larger mill which incorporated the earlier wheelpit but necessitated demolition of some of the adjoining domestic accommodation. The RCHME have suggested that the rebuilding dated to the 1870s when ownership of the site changed to the Joseph Dewhurst. This is consistent with documentary evidence that indicates that Dewhurst had previously been a tenant at another local mill, Fisher's Lodge Mill, until 1884, and then bought Dunkirk Mill, perhaps rebuilding it as part of the expansion of his own manufacturing concern. However, James Hartley is recorded as owner of Dunkirk Mill in 1875 and the earliest secure date for Dewhurst's ownership of the site is in 1891. This would suggest that Dewhurst undertook the rebuilding of the mill between 1884 and 1891.

However, as Dunkirk Mill and the Hartley's are not found in either the local trade directories or Rate Books after 1875 it is possible that they were responsible for the rebuilding during the late 1870s and that during this time the mill was not operating as a factory, perhaps because it was being rebuilt. Perhaps the rebuilding was undertaken prior to the sale of the site in order to secure a higher price for the property, or the rebuilding proved more expensive than anticipated and the sale of the site by the Hartley's was a response to financial difficulties. Alternatively, Dewhurst may have been re-building the from 1875 whilst continuing to occupy Fisher's Lodge Mill in order to cause minimal disruption to production by his firm. Either way, this would suggest a date for the rebuilding of Dunkirk Mill in the late 1870s. Given the documentary evidence available, this date seems most likely.

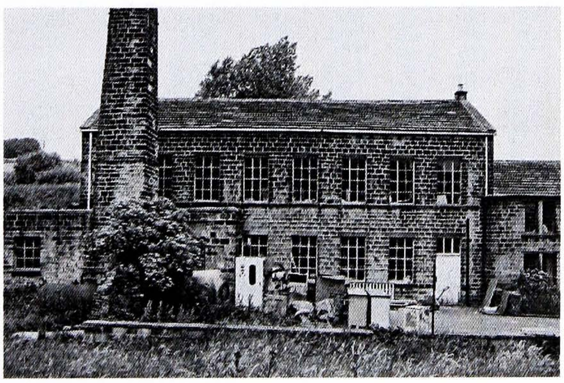


Plate 6.8 *Dunkirk Mill, as rebuilt in the 1870s*

The rebuilt mill (Plate 6.8; Figure 6.3) was eight bays long, of two storeys with an

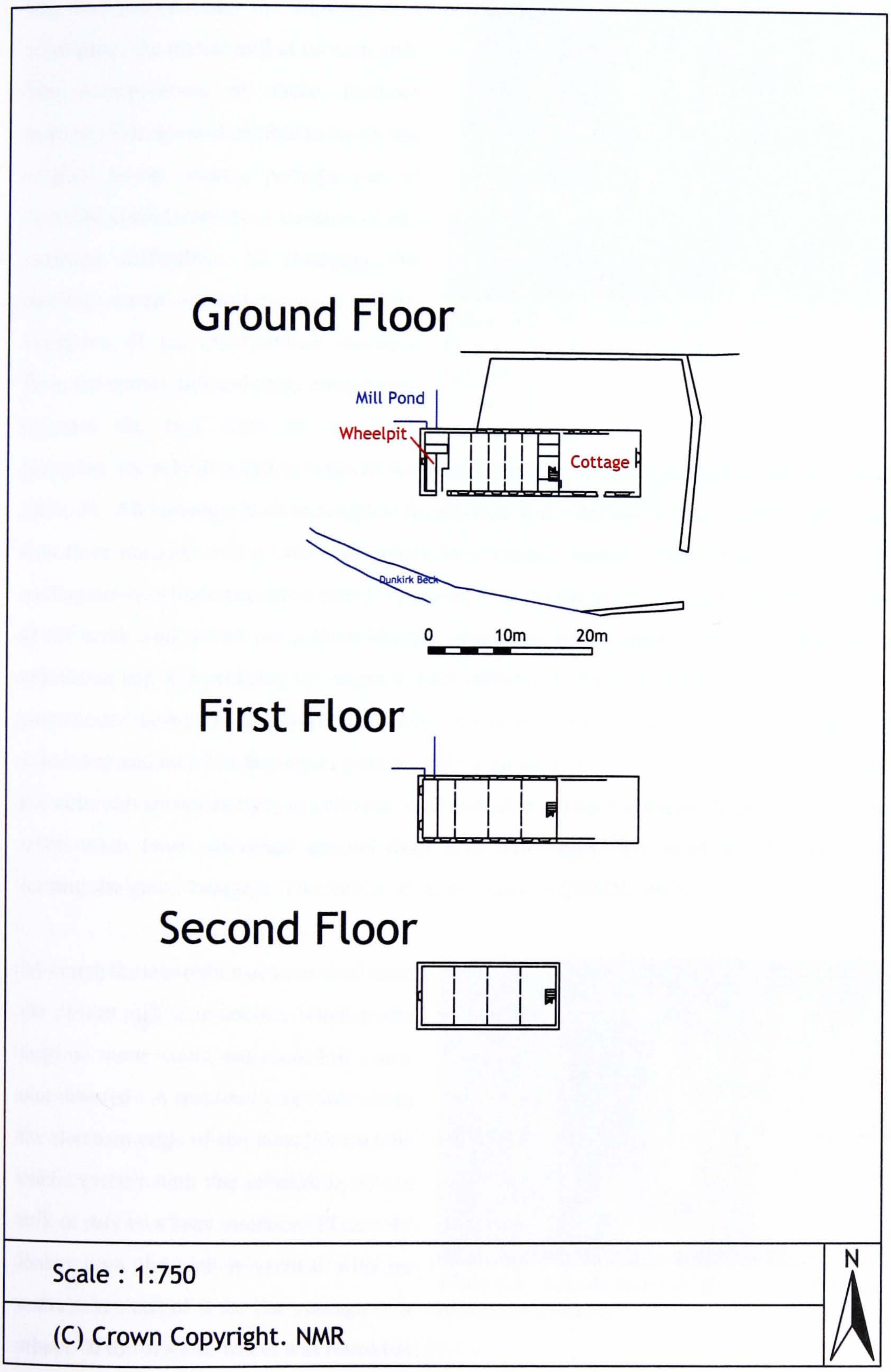


Figure 6.3 *Phase Two, Dunkirk Mill*

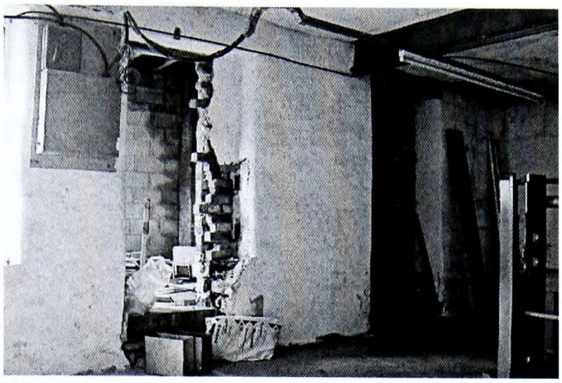


Plate 6.9 *The blocked door on the far right formed the original entrance to the mill when rebuilt.*

attic and incorporated the masonry and wheelpit of the earlier mill at its west end. The incorporation of these features indicates that it was desirable to retain the original power source, perhaps out of financial considerations or because of the potential difficulties of changing the existing system of watercourses. With exception of the incorporated masonry from the earlier mill and some reset stones between the first floor in the west elevation, the rebuilt mill has walls of watershot masonry with channelled tooling (RCHME 197a, 2). All openings have rectangular lintels with fine diagonal tooling, except for the two first floor windows in the west wall, which have slightly narrower reset lintels with vertical tooling between tooled margins, probably reused from the earlier mill. The door at the west end of the south wall, which has a lintel like the latter type, was probably inserted at the time of rebuilding and was probably the original main entrance to the mill (Plate 6.9). A door in the penultimate western most bay of the south wall was originally a window, later converted into a doorway and then blocked again (and recently unblocked!), whilst the door at the east end of the same elevation was built as a window and opened into a door at a later stage. The north and south walls have individual ground floor and continuous first floor window sills, and rectangular gutter brackets. The roof is of stone slates (RCHME 1987c, 2).

Plate 6.9 *Inserted masonry pier at northern end of former wheelpit*

Although the wheelpit was a survival from the earlier mill it is unclear whether the original water wheel was reused or a new one inserted. A masonry pier built along the northern edge of the wheelpit may be contemporary with the rebuilding of the mill or may be a later insertion (Plate 6.9). Either way, the pier is vertical with no curve taken out of it for the passage of a wheel. If the original wheel was reused in the later mill it must have been of sufficiently small diameter to pass this pier; alternatively, a smaller wheel was inserted. Another possibility is that the pier post-dates the use of a waterwheel at the mill but as it partly supports the remains of the pentrough, set in the lower half of an opening in the first bay from the west of the north wall, this is unlikely. The position of the pentrough implies either an overshot or breast shot wheel, which, particularly in the case of the latter type of wheel, must have risen into the first floor of the mill and was probably screened off from the main working area at that level (RCHME 1987c, 2). No evidence of a partition survives, presumably reflecting its ephemeral nature, and the replaced floorboards at the west end of the first floor are a modern feature and are not evidence for this area once having been opened through two storeys.

At ground floor level it is likely that the wheel was separated from the rest of the mill by a wall, and scars in the north wall and inserted modern steel joists to support the first floor would support the former existence of such a physical division. Access to the wheelpit, for maintenance, must have been from within the ground floor as there is no evidence for a doorway in the exterior walls. The position of an internal door is impossible to reconstruct now that the division between wheelpit and ground floor has been removed, but the easiest access to the wheelpit would have been from the south end because of the pentrough to the north and wheel bearings in the middle (see Figure 6.3). It seems likely that the wheelchamber narrowed at its southern end allowing a door on an angle immediately north of the original entrance to the mill. The wheel bearings and gearing taking drive from the wheel could have been located at the north end of the chamber where wall scars indicate it was wider, about twice the width of the wheel.

The interior of the mill has been altered, particularly since the RCHME visit in the mid-1980s, largely reflecting the desire to continue to use the mill for modern process (Heaton *pers. comm.*, 2003). The ground floor has pine cross beams upon which tongue groove floorboards sit directly; there are no joists (RCHME 1987c, 2). At first floor level the original roof structure has been altered by truncating the tie beams at their edges in order to allow the insertion of crossbeams about half a metre below the position of the original tie beams (Plate 6.10). In its original form the roof had tie beams, principals with a collar, three trenched purlins and a ridge piece. The principals have a second member between the short lea and collar, giving in effect a diminishing principal. Iron bolts with screws secured the tie beam to the principal, and collar and purlins to principal. When the tie beams where cut back the inserted cross beams acted as tie beams and short pieces of timber were placed between the cross beam and original tie beam to ensure some integrity between the new and old roof structure. All but one of the crossbeams have been removed, but that which remains retains evidence for joists and indicating the presence of a former attic floor. Photographs taken during the 1980s by the RCHME show skylights in the roof, one in each bay and located near to the apex of the roof; these have since been removed but are evidence for the lighting of the attic storey. A small window high in the west gable would also have lit the attic. No evidence for access to the attic survives, probably removed when the roof structure was altered, but was probably by a wooden stair. More recently, in about 1984, the roof structure was strengthened with inserted steel members in order to counteract the spreading effect of the roof caused by the missing original tie beams (Heaton *pers comm.* 2003).

Plate 6.10 *Altered roof trusses*

Access between the ground and first floors is currently by a stair rising against the inside of the east wall. It is of a basic wooden construction and supported by a joist running between the eastern most cross beam and the east wall (Plate 6.11). The treads have recently been replaced (Heaton *pers comm.* 2003). It is not necessarily the original access to the first floor since it rises against a blocked stone fireplace on the first floor (RCHME 1987c, 3). However, the stair rises immediately in front of the inserted doorway at the east end of the south wall and it may therefore be contemporary with that alteration. If not in this position, then the means of access to the first floor is unclear as there is no other evidence to suggest an alternative means of access (RCHME 1987c, 3).

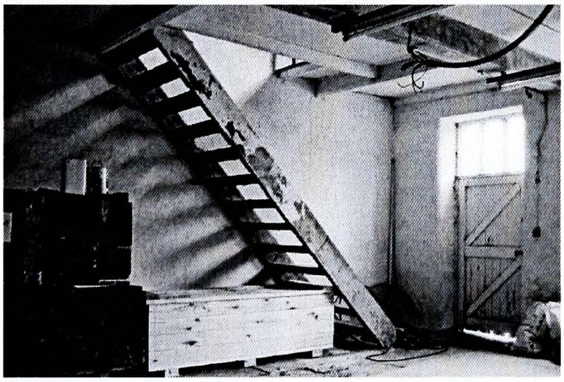


Plate 6.11 *Wooden stair at east end of the mill*

The interior walls of the mill were rendered during the 1980s but in one area the render has been removed, allowing their original appearance to be viewed. In these places the archaeological evidence suggests that the walls were whitewashed masonry (Plate 6.12). The original floor, now largely replaced by concrete, survives in part at the east end of the ground floor of the mill in the form of stone flagstones. The existing windows have wooden frames, forming twelve lights; none of the windows have openings. Though not necessarily original there is no evidence for them having been replaced. On the ground floor there were originally 10 windows, with windows in the north and south walls. As the ground level rises steeply to the north of the mill there was a retaining wall built to the north of the mill so that windows could be provided at ground floor level in this elevation of the mill and one is apparently shown on the local 1853 Tithe Map (Doucment 6.4). On the first floor there were at least eleven windows, though the evidence for the fenestration on the north wall has been removed by later alterations. On the first floor there is also a small window in the west gable, and a further two windows at first floor level in the west wall.

Plate 6.12 *Original whitewashed masonry revealed beneath later rendering*

Evidence for the means of power transmission at Dunkirk Mill is slight. At the time of the RCHME report on the mill, recesses were visible in the inner west wall, one central at ceiling level, blocked with modern red brick, and another lower and at the south end with an wall box within it. Whether these recesses related to the waterwheel or the steam engine was not established (RCHME 1987c, 3). The central box was found to line up with holes for brackets or hangers to support the drive along the centre of the ground floor and which are still visible. This indicates that a series of brackets, or hangers, were bolted to the side and underneath of each timber, running centrally the length of the ground floor. These brackets

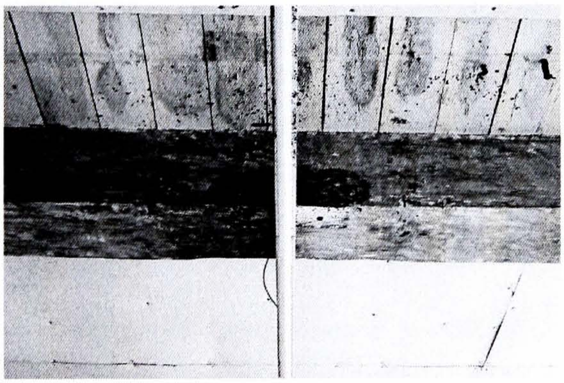


Plate 6.13 *Surviving bolt holes for hangers supporting horizontal line shafts at ground floor level*

would have supported a line shaft. The wall box at the south end of the inner west wall had next to it a bracket to support a drive, which probably led to the first floor (RCHME 1987c, 4). Although the wall boxes have not survived, the bolt holes for the hangers are still visible (Plate 6.13).

On the first floor, the surviving cross beam that supported the attic floor shows further evidence for brackets supporting a line shaft, situated just under a metre from the inner south wall (Plate 6.14). Prior to the rendering of the walls, this related to a cast iron wall box in the south end of the east wall. The RCHME also noted a mount in the northern part of the east wall at attic level and suggested that this may be evidence for power transmission in the attic floor; it may however, also relate to the adjacent taking-in door in the mill extension below (RCHME 1987c, 4). The nature of evidence for power transmission at the first floor is different in size and style to that on the floor below and may indicate that they are of different dates. However, it may also reflect that the shaft on the first floor was of a different size to that below, and that they are contemporary. Given that the rebuilt mill was initially used for worsted spinning, and later for combing, cotton doubling and band production, the different size of the line shafts may reflect the powering of different process on each floor of the mill, or successive systems of power transmission suited to the different processes undertaken at the mill over time.

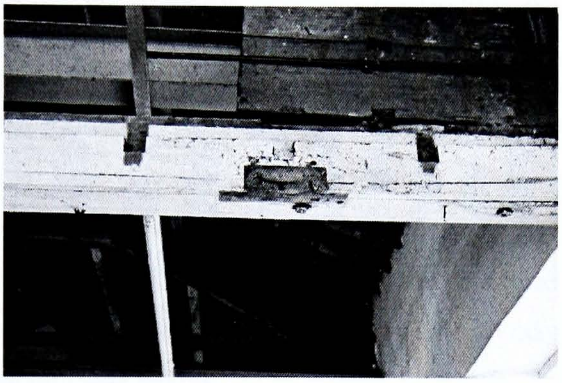


Plate 6.14 *Outline and bolt holes for hanging bracket supporting line shafting at first floor level*

Given the insubstantial nature of the evidence for power transmission it is difficult to reconstruct the way in which the mill was powered or precisely to which phase of structural activity each system relates. However, the evidence for line shafting at each level was certainly in place when the turbine was operating (Phase Four) for the present owner recalls rope drives leading from the turbine to each line (Heaton pers comm. 2003).

The overall impression is of a small stone water-powered powered mill, which did not stand out in the local landscape. In many ways the mill, though dating to the mid-late nineteenth century, is characteristic of an earlier mill and this is likely the result of the rebuilding in the late 1870s having closely followed the form of the early nineteenth century mill that it replaced.

- PHASE THREE

Between the the late nineteenth and early twentieth centuries a number of alterations were made to Dunkirk Mill (Figure 6.4). These included the construction of a mill extension, and an attached engine and boiler house with chimney. Map evidence indicates that these additions had been made by 1906 (see Plate 6.2) but dating them more closely is difficult as no further historical evidence concerning their construction has been found. Archaeologically, the three structures are stratigraphically later than the rebuilt mill but stylistically are similar and may therefore have been constructed soon after the mill was rebuilt.

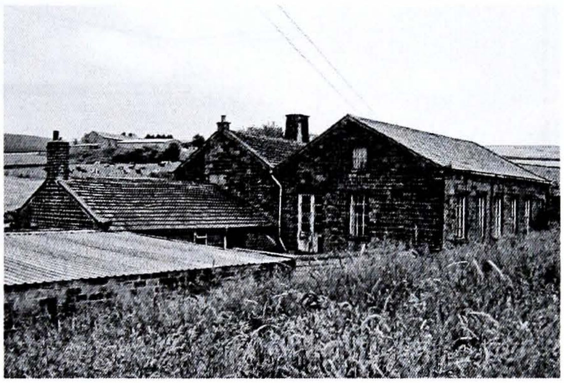


Plate 6.15 *Mill extension (right) from the northeast*

Sometime after the rebuilding of the main mill building in the 1870s and before 1906 (on the basis of map evidence) a six bay long, two storey building with attics was added to the north side of the mill (Plate 6.15). Because of steeply rising ground level the ground floor of the extension is dug into the hillside and has no windows to the north or west. It was built within retaining walls that had originally formed an open area to the north of the earlier mill. At ground floor level the extension is smaller than at first floor level and has an angled west wall where it is built up against the mill pond, presumably a measure designed to allow retention of the embankment at the east end of the mill pond. To the south the ground floor borrowed light from the main mill and what had been the northern windows of the main mill were left in position and glazed. A wide modern opening at the east end of the north wall of the main mill, with steel lintels, has removed evidence for an earlier doorway which was fashioned out of the eastern most window in the north wall. This modern opening occupies the position of two former windows and the surrounding masonry made good with modern red bricks. The northern extension was also accessible from the east – a wide doorway at the south end of its east wall leads to a small yard, now covered, and

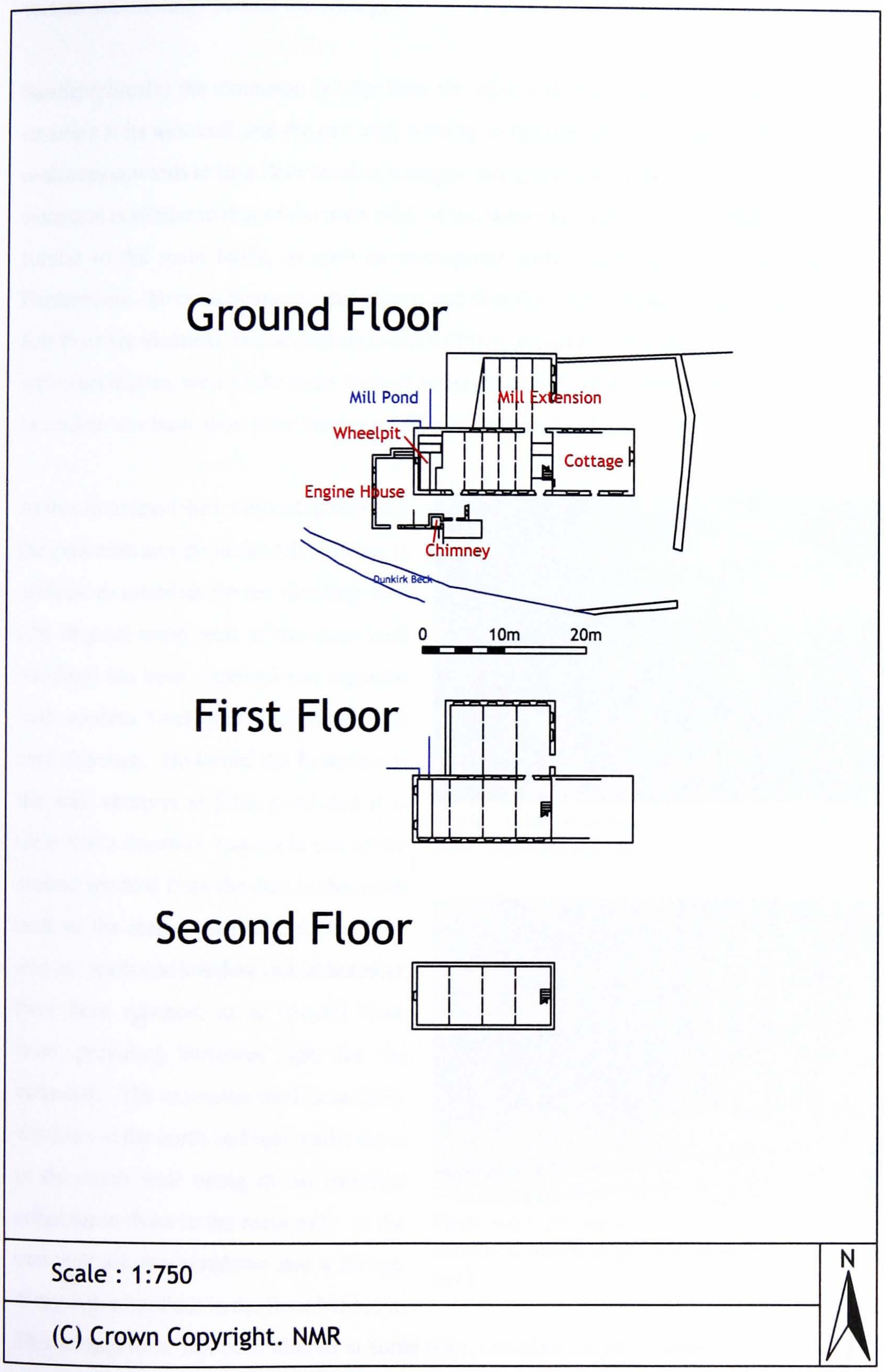


Figure 6.4 *Phase Three, Dunkirk Mill*

various outbuildings behind the cottage.

Stratigraphically the extension is later than the main mill building for it butts to the earlier structure at its west end, and the east wall butts up to the cottage wall at ground floor level and continues upwards at first floor level as a ragged straight-joint. However, the form of the mill extension is similar to that of the main mill. It has watershot masonry with channelled tooling similar to the main block, as well as rectangular gutter brackets and a stone slate roof. Furthermore, the cross beams on the ground and first floor are similar, the six windows on the first floor are identical, and according to the RCHME report the roof trusses, recently replaced with steel trusses, were of the same form as in the main mill. These similarities suggest that the extension was built soon after the main mill and perhaps by the same builder.

At first floor level the relationship between the extension and the main mill building is difficult to establish for the dividing wall (the original north wall of the main mill building) has been removed and replaced with modern brick piers supporting the roof structure. However, the footprint of the wall survives at floor level and it is clear that a doorway was made out of the second window from the east in the north wall of the main mill (Plate 6.16). The original walls and windows must therefore have been retained, as at ground floor level, providing borrowed light for the extension. The extension itself was lit by windows in the north and east walls, those in the north wall being of an identical character to those in the main mill. In the east wall are two windows and a taking-door, with a trapdoor in the floor behind it. This arrangement has been altered at some time, revealed on the exterior elevation, and the height of the taking-door was once greater than it is now (Plate 6.17). In both the east and west

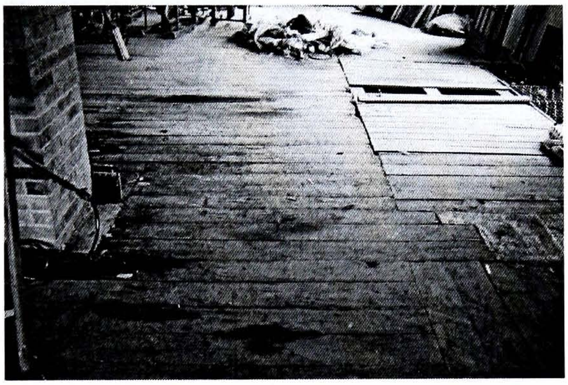


Plate 6.16 *Footprint of former first floor doorway between main mill and mill extension*

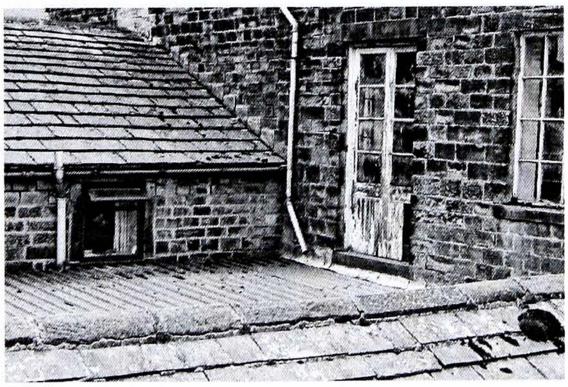


Plate 6.17 *Taking-in door to first floor of mill extension which originally opened on to an open yard*

gables are small square windows, both now blocked. This indicates the possible existence of an attic in extension and skylights in the roof may have provided additional light, as in the main mill building. However, the replacement of the roof trusses and re-slating of the roof has removed any evidence for these.

Documentary sources indicate that the extension was added to provide facility for corn milling, which continued until the Second World War – at that time a turbine was powering line shafting and a half-twist belt to drive the millstones (RCHME 1987c, 3). The specialised function of the building probably accounts for the degree of separation between the extension and the main mill when first built.

The buildings added to the southwest corner of the main mill, comprising engine house, boiler house and chimney, are although shown on maps by 1906 no specific reference to them has been found in the documentary record. They may be contemporary with the mill extension to the north and together may represent an overall enlargement of the site and its power capacity and perhaps reflecting the change of use of the site from worsted production to the production of cotton bands and spindle tapes or the need for additional power flowing the addition of corn milling to the site. Alternatively, they may predate the northern extension and may have been built directly after the main mill was built and therefore be associated with the last few years of textile production at the site.

The individual function of these buildings is hard to ascertain and there are no obvious architectural features indicating which of the structures was used as an engine or boiler house. The present owner refers to the building along the west side of the main mill as the engine house (Heaton *pers comm.* 2003) implying that the thinner building returning along the western part of the south front, with attached chimney, was the boiler house. This arrangement would allow power from the steam engine to be delivered to the mill from the west end, in much the same way as with the waterwheel. It is not known whether the steam engine and waterwheel operated together, perhaps powering different processes, but on balance it would appear that steam power replaced water-power at the site only to be supplanted by power from a water turbine positioned in the original wheelpit.

The engine house (Plate 6.18) is of several builds and in several places there are ill surviving straight joints. This indicates successive rebuilding or alteration during the twentieth century. Three windows from the west and a single window from the south lit the engine house. External access was from a blocked doorway in the south elevation (Plate 6.19). At the north wall of the engine house there is a large recess and this may have been built in order to provide room for a flywheel or gearing of some sort allowing drive to transmitted into the main mill on much the same alignment of the centre axis of the waterwheel. This would suggest that the waterwheel had been removed following the installation of the steam engine, as its presence would have compromised the system of power transmission from the engine. The engine house originally had a pitched roof, but this has been replaced with a modern flat roof; the walls are mainly of watershot masonry but some channelled tooling included in the structure may have been derived from the walls of the main mill when alterations were made following the construction of the mill extension to the north (RCHME 1987c, 3). This would make the steam installation later than the mill extension.

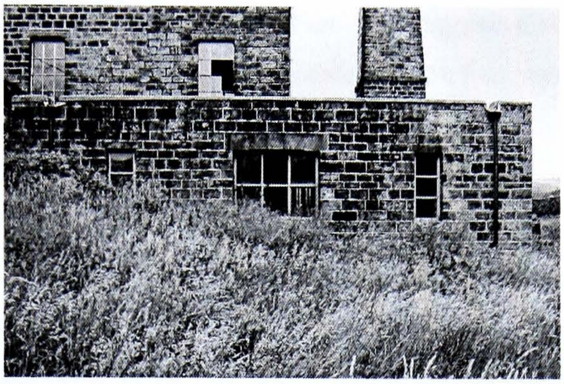


Plate 6.18 *Engine house viewed from the west*

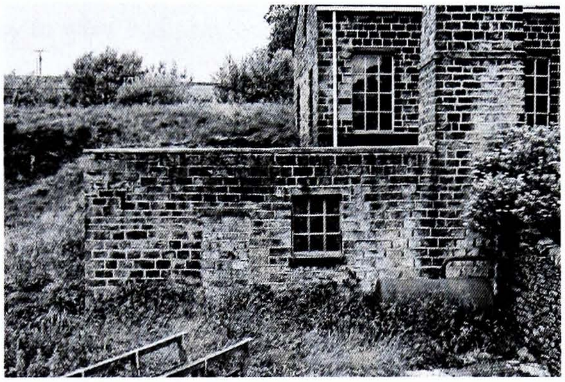


Plate 6.19 *South elevation of engine house with original doorway, now blocked, to left of the window*

The boiler house, which in recent times housed a small diesel engine to power the mill (shown on RCHME pictures of the mill in the 1980s) and attached chimney are of squared rubble are later than the engine house, and there is a ragged straight joint between the two buildings in the south elevation (Plate 6.20). The chimney, of square-section with a tapering shaft over a square base, is bonded into the boiler

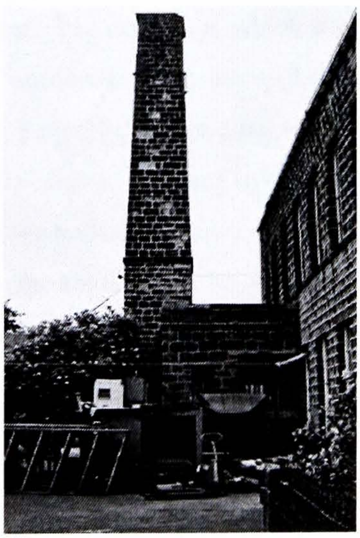


Plate 6.20 *Boiler house and chimney from the east*

house in the wall to its west, but has a straight joint with the wall to the east. This suggests that the boiler house was extended to the east, and these alterations probably date to phase four (see below). Therefore, the boiler house, which would have been half its original size, was probably built as part of the engine house with access to both rooms from the south.

The building of the engine and boiler houses would have blocked the original entrance to the mill at the west end of the south elevation of the main mill. This doorway, which was recently blocked with modern concrete blocks, was probably left open, providing internal access to the power plant from the mill. However, the loss of an external entrance to the mill evidently necessitated the creation of a second doorway in what had previously been a window, at the east end of the south wall of the main mill, which still forms the principal entrance to the mill. Cartographic sources and a surviving section of wall to the south of the chimney, indicate the presence of a further building southeast of the power plant, added between 1906 and 1934. This may have been used as a coal store.

- PHASE FOUR

This phase is concerned with alterations made to the mill after it had ceased to be used for the production of worsted products. It is therefore of only minimal interest to this research.

Sometime after the engine and boiler house had constructed the boilerhouse was extended to the east. Although this alteration is not obvious on maps, a straight join between the east extension and the chimney reveals the sequence of construction. The extension, which was built across one bay of the main mill and covered an original window in the south wall, has windows in its south and east walls and a doorway from the east. Recently, the window into the main mill has been removed and opened into a new doorway, the original doorway in the next bay west having been blocked. The reason for the extension of the boiler house is unclear but it may have been constructed of stone taken from a building to the south of the boiler house, which is shown on maps between 1906 and 1934 (see above) This would roughly date the boiler house extension to post-World War II.

When the steam engine was removed from the mill is unknown, but within living memory auxiliary power was provided by a small diesel engine housed within the boiler house. Power was also provided during the twentieth century by a water turbine inserted across the northern end of the wheelpit. It was common, during the late nineteenth century, that many mills installed a water turbine either in place or as a supplement to their waterwheel, due to the increased efficiency of that type of power source (Giles and Goodall 1992, 132). At Dunkirk Mill, the position of the turbine precludes the possibility that the turbine and waterwheel co-existed, though the steam or diesel engine may have run in conjunction with it.

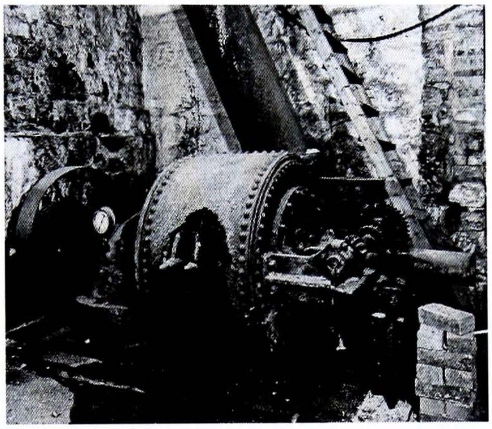


Plate 6.21 *Water turbine at Dunkirk Mill prior to its removal (Giles and Goodall 1992, 135)*

The turbine, a Francis turbine with angled blades to direct the water, was made by Warburtons of Halifax (Plate 6.21). Although now removed to Halifax Industrial Museum, at the time of the RCHME inspection in the 1980s, it was still *in situ*; it was reported to have been in use until the 1960s, and retained fittings to drive belts to a electricity generator, and ropes, one per floor, to machinery operated by line shafts on both floors of the mill (RCHME 1987c, 3). The only evidence for the turbine surviving is to be found on the first floor where a large iron pipe, c. 0.5 metres in diameter, enters the mill through a masonry pier in the north west pier (Plate 6.22). The pipe is angled down towards the ground floor and the original arrangement of the pipe and turbine shows the pipe entering the back of the turbine and water being carried away through a further pipe into the former wheelpit. On the exterior, the point at which the pipe took water from the mill pond is marked by the original sluice apparatus which served the earlier waterwheel and a window which is not visible on the interior. The blocked window lies, at least partly, behind an extension of the stone pier observed at the north end of the wheelpit on the floor below. This upper section of the pier must therefore postdate

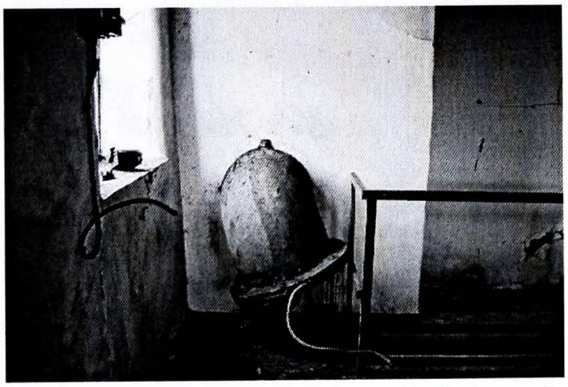


Plate 6.22 *Large diameter pipe which formerly fed water into the water turbine below*

the window and the window must have lit the original wheelhouse with the pentrough entering directly below it.

PROCESS RECORDING

Little is known about the processes at Dunkirk Mill but when it was rebuilt in 1870 (Phase 2) it was intended as worsted-spinning factory (Plate 6.23). Given the small-scale of the site it is unlikely that any processes other weaving were employed at the site and preparatory processes like combing were probably undertaken at another site or even at a domestic level in the surrounding area.

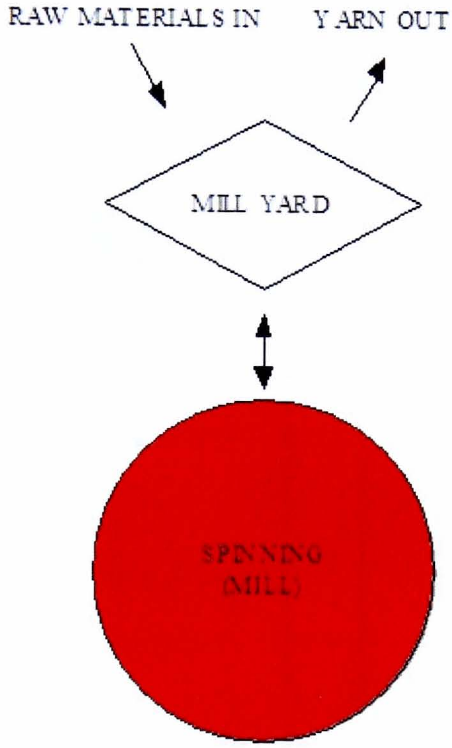


Plate 6.23 *Processes, Phase Two, Dunkirk Mill*

The movement of materials and goods around the site was based on a linear spatial structure (Figure 6.5; Table 6.1). Materials entering the site followed a linear progression through the site and, in the absence of any internal hoists or trapdoors and external taking-in doors, they would have to have been carried through each successive floor. The second floor working area in the attic (space 4) was therefore located in the deepest part of the complex and did not integrate movement around the site (reflected in its high RA value of 1.000). However, the RA values for the complex are somewhat misleading for they imply that the space which integrated movement around the site as a whole was the ground floor working space (space 2; RA value of 0.333). However, this value and syntactic property merely reflects its physical position in the site and the fact that out of the five spaces it is located in the very centre of the complex. This is entirely typical of a linear spatial structure. In terms of the movement of materials and goods the spatial structure did not allow for the easy flow of processes, materials or goods.

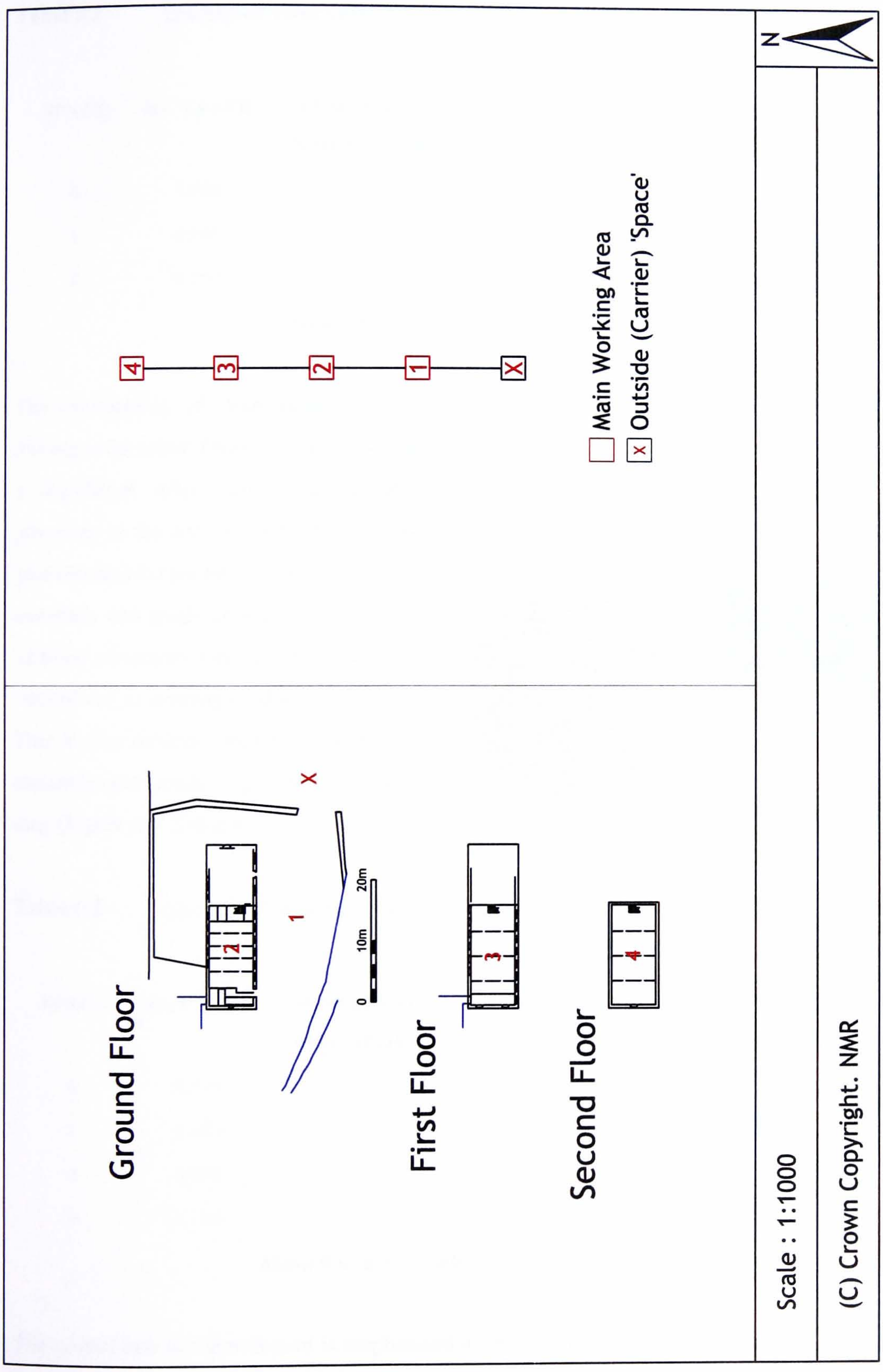


Figure 6.5 *Phase Two: Gamma map of the movement of materials/goods*

Table 6.1 *Quantified values for Phase Two 'materials/goods' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	1.000	1	**3**	0.500	2
1	0.500	2	**4**	1.000	1
2	0.333	2			

Mean RA: 0.666 RR of Complex: 0

The introduction of steam power and corn milling at the site in Phase Three did not have a significant affect upon the layout of processes at the site (Plate 6.24). The mill yard remained at the heart of the movement of materials and goods around the site and the addition of corn milling facilities was simply 'tacked-on' to existing production at the site. This is also evident when the movement of materials and goods is plotted as a gamma map (Figure 6.6; Table 6.2).

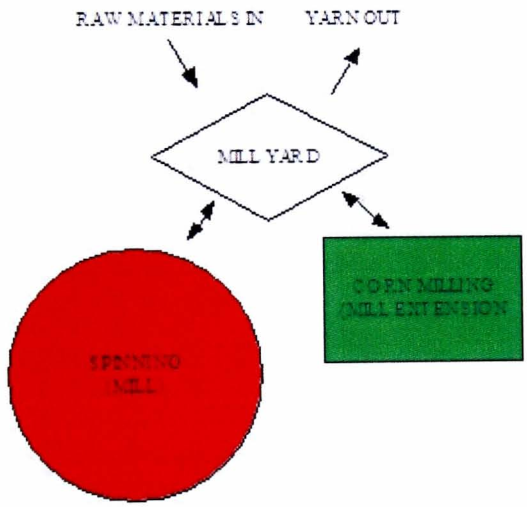


Plate 6.24 *Processes, Phase Three, Dunkirk Mill*

Table 6.2 *Quantified values for Phase Three 'materials/goods' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.429	1	**4**	0.429	1
1	0.143	5	**5**	0.238	2
2	0.286	2	**6**	0.333	3
3	0.190	4	**7**	0.570	1

Mean RA: 0.327 RR of Complex: 0.500

The central role of the mill yard is emphasised by its low RA value (0.143) indicating that it was the space which integrated movement around the site. This reflects the fact that this space

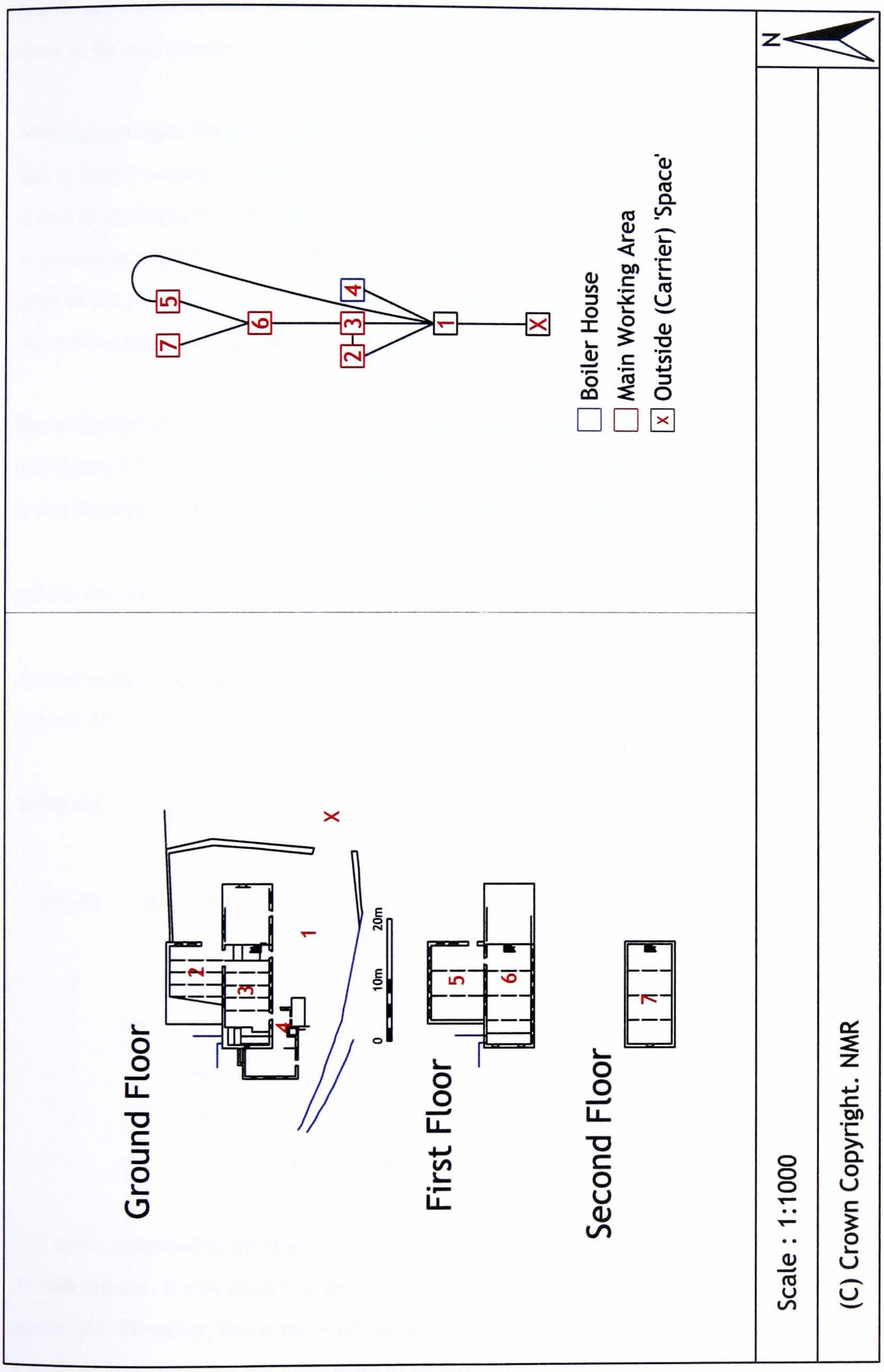


Figure 6.6 *Phase Three: Gamma map of the movement of materials/goods*

had the most number of neighbours (5) and communicated directly with 3 of the main working areas in the mill (spaces 2, 3 and 5).

Although set aside for the purpose of milling corn, the spaces in the mill extension (spaces 2 and 5) do not occupy a distinct part of the complex. This reflects the fact that they had good access to other spaces in the complex and were serviced by their own doorways and taking-door at ground and first floor level. This lack of distinction probably arises because of the small-scale of the site and the fact that the small number of workers were probably responsible for supervising spinning and milling machinery.

The boiler house is shown as an isolated space on the periphery of the complex and has one of the highest RA values of the entire complex (0.429). This reflects its function and the fact that it was directly involved in the milling or corn or the production worsted yarn.

ACCESS ANALYSIS

Access analysis of Phase Two, Dunkirk Mill, reveals a basic, tree-like structure (Figure 6.7; Table 6.3)

Table 6.3 *Quantified values for Phase Two 'workforce' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.600	1	**4**	0.533	1
1	0.267	3	**5**	0.400	1
2	0.600	1	**6**	0.733	1
3	0.200	3			

Mean RA: 0.476 RR of Complex: 0

The space responsible for integrating the complex as a whole is space 3, the ground floor working space. It was from this space that the majority of other spaces in the complex were accessible. However, this is more of a reflection of the basic physical layout of the mill than a strategy for controlling the movement of workers. Because each successive floor in the mill was only accessible from the floor below, the ground floor was naturally going to play an

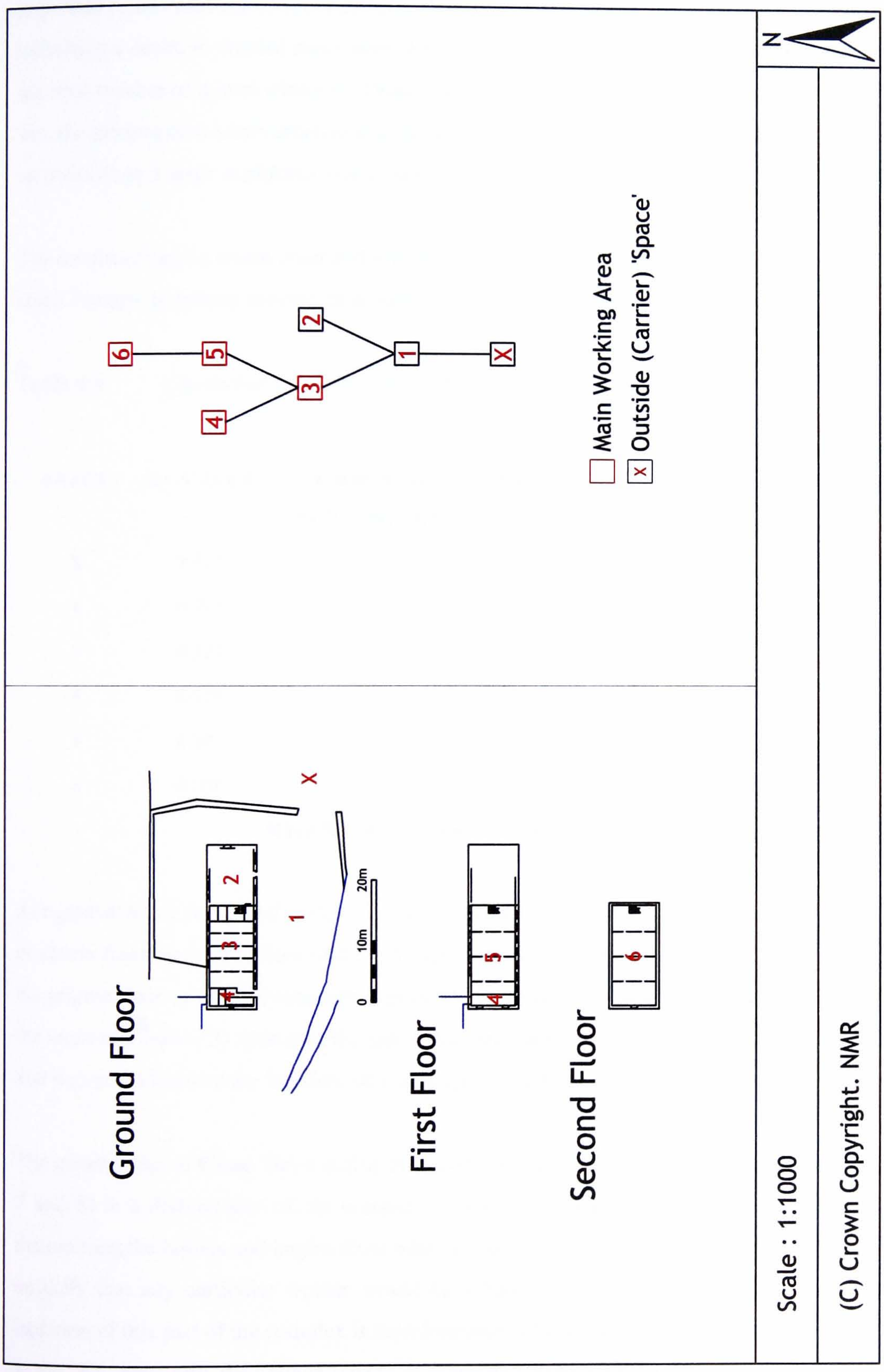


Figure 6.7 *Phase Two: Gamma map of the movement of the workforce*

important role in movement about the site. The lack of any of any particular spatial evidence indicating a desire to control movement about the site is also a reflection of the mill and the minimal number of spaces within it. Therefore, and as a consequence of the small-scale of the site, the number of workers employed in the mill would have been few and therefore the onus on controlling a large workforce was removed.

The construction of a steam plant and mill extension at the site (Phase Three) resulted in only slight changes to human movement around the mill (Figure 6.8; Table 6.4).

Table 6.4 *Quantified values for Phase Three 'workforce' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.327	1	**6**	0.164	4
1	0.145	5	**7**	0.345	1
2	0.327	1	**8**	0.345	1
3	0.109	5	**9**	0.218	3
4	0.291	1	**10**	0.400	1
5	0.236	2	**11**	0.400	1

Mean RA: 0.276 RR of Complex: 0.214

At a general level, the spatial complex gained a number of rings and these reflected new means of access from the ground floor of the mill (space 3) to the steam plant (spaces 6, 7 and 8) and the ground floor of the mill extension (space 5). However, the ground floor working space in the main mill (space 3) remained the space that integrated overall movement around the mill and was at the heart of the tree-like structure upon which the complex was based.

The gamma map of Phase Three is also of interest because it shows the steam plant (spaces 6, 7 and 8) in a distinct part of the complex. This would imply the segregation of workers maintaining the boilers and engine from other workers at the site but at Dunkirk Mill it seems unlikely that any particular worker would have had such a responsibility and the relative isolation of this part of the complex is therefore more of a reflection of their physical position at the site. Similarly, the cottage (space 2) is isolated from the complex as a whole which is typical for a domestic dwelling on an industrial site.

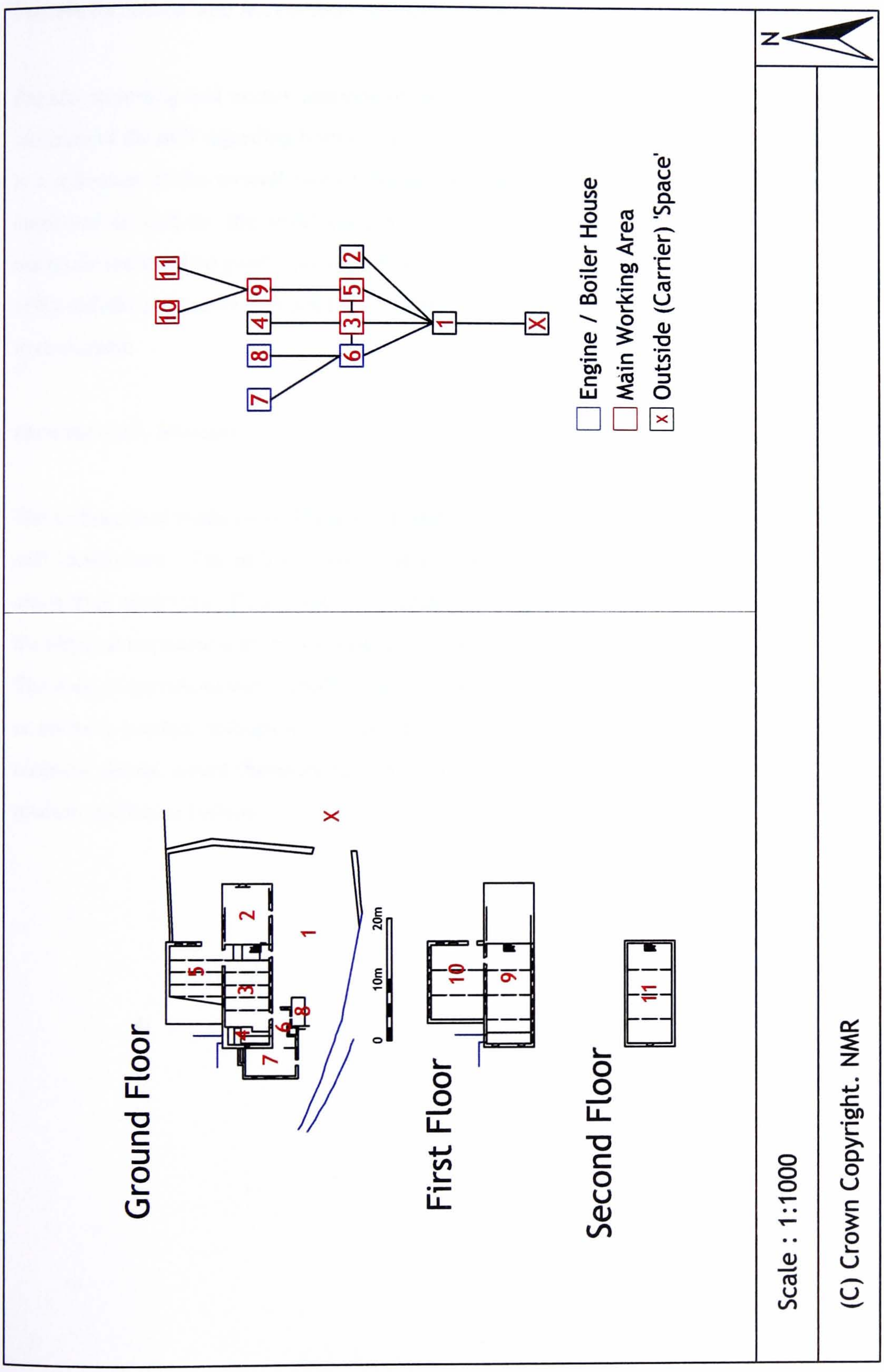


Figure 6.8 *Phase Three: Gamma map of the movement of the workforce*

PROCESS RECORDING AND ACCESS ANALYSIS: DISCUSSION

Process recording and access analysis of Dunkirk Mill has revealed the very basic spatial structure of the mill regarding both the movement of workers and materials and goods. This is a reflection of the overall size of the site and the minimal number of workers probably employed as well as the small-scale of production which meant that the volume of raw materials and finished goods moving about the site was little. Therefore, the spatial structure of the mill did not necessarily need to facilitate the easy movement of goods or to exert control over workers.

ARCHITECTURAL SUMMARY

The architectural character of Dunkirk Mills does not fit an establish pattern of middle period mill architecture. The mill is severely plain and does not feature any architecture motifs, classical or otherwise. This absence of architectural detailing is most probably a reflection of the physical remoteness of the site rather than any economic choice on the part of the builder. The scale of operations was probably such that the mill worked in conjunction with another site or served a limited, perhaps local, market. The number of visitors to the site, in particular business clients, would therefore have been minimal. Consequently, the mill was built in a modest, utilitarian fashion.

LIST OF DOCUMENTS

6.1 Deeds, Hartley to Hartley; 'Memorial of Indenture, 2nd February 1805'

WYAS ER 727 914

6.2 Deeds; 'Memorial of Indenture, 20th November 1819'

WYAS HC 246 250

6.3 Deeds; 1798

Personal property of Heaton Family

6.4 'Tithe Map of hamlet near Oxenhope, 1853'

WYAS Leeds, Farrer & Co. (58), 1853

APPENDIX A
SITE DESCRIPTION : 7

PECKET WELL SHED

DATABASE ENTRY:	1712
NBR NUMBER:	BFO62228
NGR:	SD 9975 2969
TOWNSHIP:	Wadsworth
CIVIL PARISH:	Wadsworth
DISTRICT:	Calderdale
COUNTY:	West Yorkshire
BRANCH:	Cotton
PERIOD:	Middle

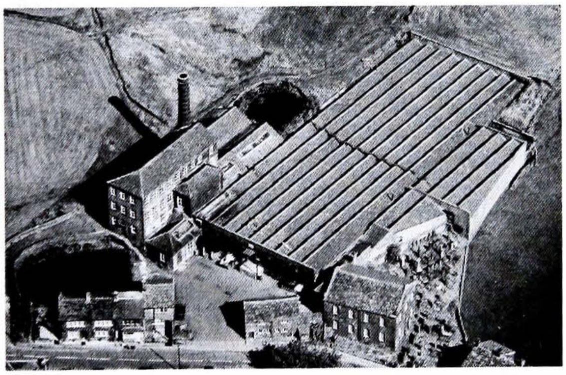


Plate 7.1 *Pecket Well Shed, Wadsworth (Giles and Goodall 1992, 111)*

Situated on hillside site in the hamlet of Pecket Well, on the edge of the moors above Hebden Bridge and the Calder Valley, the Pecket Well Shed was built as a speculation in 1858 by the Pecket Well Weaving Shed Co. Ltd (Plate 7.1; Figure 7.1). The site comprises a steam-powered weaving shed, with later extensions, a storeyed sizing place, warehouse, offices, engine and internal boiler houses and other miscellaneous buildings. It has two reservoirs and associated cottages, and all buildings are built of local stone.

The site is particularly suited to archaeological study for few changes have been made to the original fabric. Furthermore, measured survey of the site carried out by the RCHME exists and

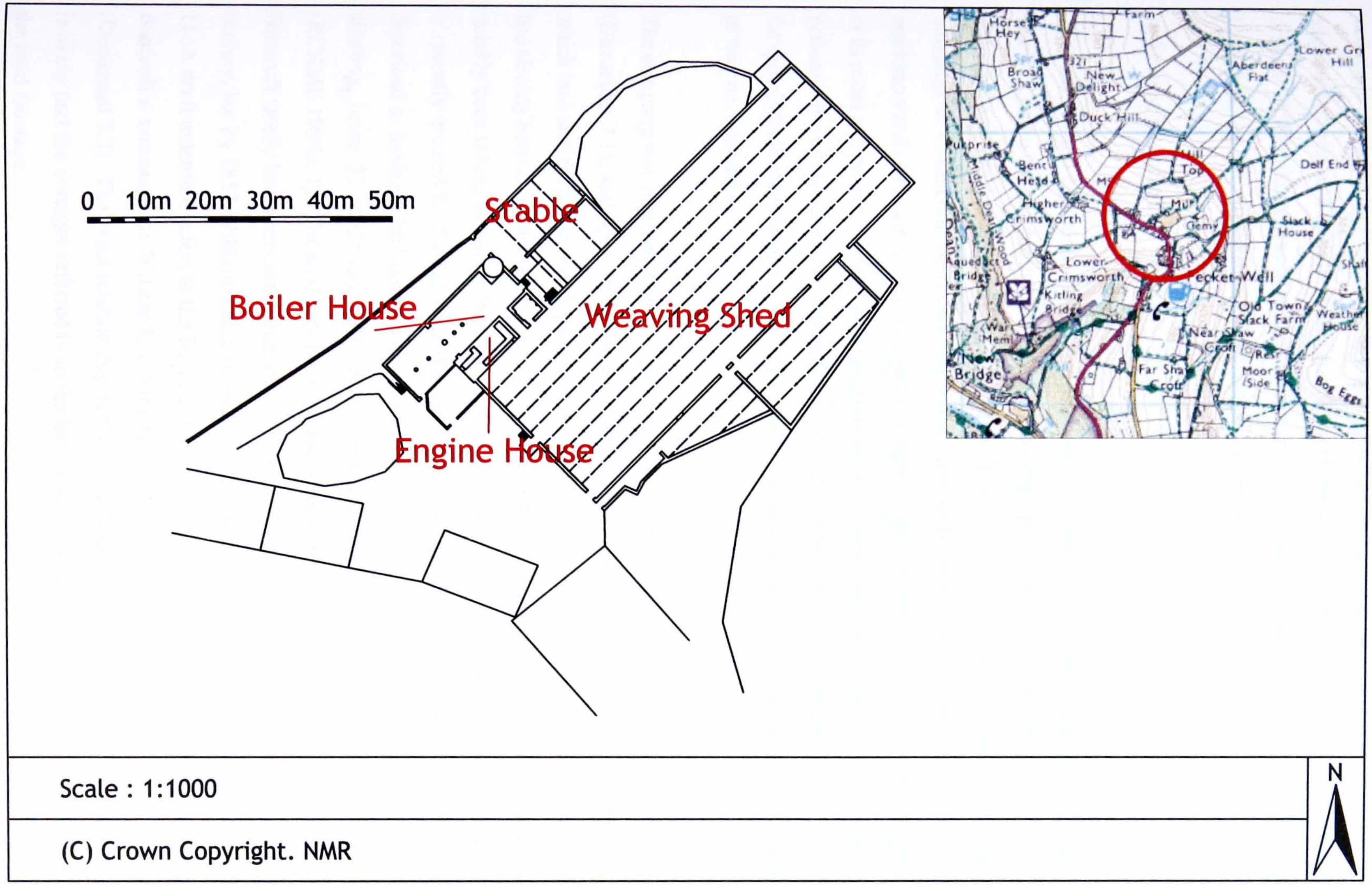


Figure 7.1 *Block Plan, Pecket Well Shed, Wadsworth*

was made available for this research, augmented by a new photographic record of the site. The site is of interest as a middle period specialist cotton weaving shed and although much of the original 1858 building was destroyed by fire in 1873, it was immediately rebuilt and therefore the rebuilt site still reflects middle period mill building.

Historical Background

The Articles and Memorandum of Association of the Pecket Well Weaving Shed Company Limited, published in March 1858, record that the purpose of the company was to contract for and purchase land on which to erect 'a Power Loom or Weaving Shed or Sheds and other buildings in connection therewith'. The site was to be provided with steam power, other machinery and gear, dams, reservoirs and water privileges, 'and to let the same either altogether or as room and power, in small or large portions or sections, and either one or more person or persons'. It was also considered that, if thought advisable, parts of the building might be used for spinning and manufacturing 'or such other business or employment as the said erections are, or may be, adapted to'.

The company was registered on 5th April 1858, under the Joint Stock Companies Act of 1857 (Document 7.1), and upon the publishing of their prospectus in April 1958 (Documen7.2), which included the same wording as the Articles of Associations, shares of £3,000 or upwards had already been taken of the nominal capital of £5,000. The remainder of the shares must have quickly been taken, for on 8th January 1859 a 'large power loom weaving shed and premises ...recently erected by *Pecket Well Weaving Shed Co. Ltd.* was advertised for sale. It was described as having a 20 horse power steam engine, a 35 horse power boiler, main and cross shafting, being 33 yards long, 30 yards broad, and capable of holding about 270 looms (RCHME 1988b, 1). The shed was built on land bought from William and Mary Bancroft; the Bancroft family had been cotton manufacturers in the Wadsworth area in the early nineteenth century, but by 1853 William Bancroft was recorded as a relieving officer (RCHME 1988ba, 1). A draft indenture refers to the land only, but one dated September 1858 also refers to the Bancroft's messuage of Willcroft, a barn and three cottages, and some 18 acres of land (Document 7.3). The exact relationship of these buildings to the present site is unclear, but it is likely that the cottages referred to in the indenture are probably those that still stand along the road frontage.

In 1861, the firm of John Wilcox [sic] and Sons, cotton manufacturers, occupied Pecket Well Shed and in 1862 the Wilcock's, namely John and his sons William and Thomas bought the site from the Pecket Well Weaving Shed Co. Ltd. It therefore seems that the shed was never let on a room or power basis. John Wilcock died in 1866, and in 1871 his son William is recorded as a cotton manufacturer employing 240 people. In 1873, a newly erected sizing house is recorded as being burnt down, and the shed is reported to contain 600 looms; by 1879, the number of looms had increased to close to 690. The increasing number of looms would have required extra workers and a greater working area, and it is clear that by 1873 the shed had been extended to the northeast. Certainly expansion had taken place at the site in 1871, for that was when the building destroyed in the 1873 fire is recorded as being constructed. The replacement buildings was of four storeys and used as a sizing place, incorporating a stable, office and drying room. The fire destroyed some 225 warps and apparently the boiler and engine installed at the site, but it did not spread to the weaving shed or warehouse (Document 7.4). The cost of the fire was estimated at £11,318: building £1,400; warps £8,718; boiler and engine £800; flour etc, £400. No documentary evidence survives detailing the necessary rebuilding after the fire.

By the time of the fire it is possible that William Wilcock was running Pecket Well Shed by himself for Thomas Wilcock was known to be involved with the cotton manufacturing and oil merchanting business at Scar Bottom Mill (**BFO62691**) and Square Shed (**BFO62691**), both in Sowerby. In October 1885, and upon the dissolution of the partnership of William, John and Frank Wilcock, Thomas' executors, as cotton manufacturers at Pecket Well and cotton manufacturers and oil merchants at Scar Bottom Mill and Square Shed, Sowerby. Thereafter, William Wilcock ran the Pecket Well business alone and John Wilcock managed the mills in Sowerby. In 1888, William was named managing director in the Memorandum and Articles of Association of the Wilcock Patent Cord and Calico Manufacturing Co. Ltd, which in 1892 acquired the Pecket Well Shed. In 1906 the company was taken over by The Norden Cotton Co. Ltd. of Brown Street, Manchester. The Norden Co. Ltd. changed its name to Cords Ltd. in late 1906, and in 1922 that company bought land adjacent to the 'Pecket Well Mill'. Pecket Well Mill then passed into the ownership of M. Chapman and Sons (Textiles) Ltd. (now known as 'The Chapman Group'), specialist weavers of fustians, corduroys, moleskins and allied fabrics (RCHME 1988b, 2). Production continued at the shed until the late 1980s when 96 looms were still in operation, one of which remains at the rear of the shed. The Chapman

Group were using the site for the storage of textiles at the time of this research but in Spring 2005 work began to convert the site for residential use.

ARCHITECTURAL DESCRIPTION

There are three principal phases of structural activity at the site but only the later two are well represented at the site. Phase One represented the site as built in 1858, comprising a weaving shed, engine house, boiler house, 'and other buildings'. However, following the fire in 1873 most of the buildings associated with the phases, with the exception of the engine house and weaving shed were destroyed. Phase Two therefore represents the site as built in the early 1870s and Phase Three subsequent additions and alterations in the late nineteenth century. Of these phases, only Phases Two and Three are of interest here (Figure 7.2) on account of the survival of evidence. Earlier buildings surviving at the site will be included in the discussion of Phase Two: these are the main weaving shed, engine house and chimney.

- ### PHASE TWO

When the site of Pecket Well Shed was rebuilt after the fire of 1873, it comprised a weaving shed with an attached engine house, boiler house and combined sizing place, warehouse and offices (Figure 7.3). To the south of the site is a small mill yard which warps around the western side of the site. Fronting the road are cottages which may originally have been associated with the site.

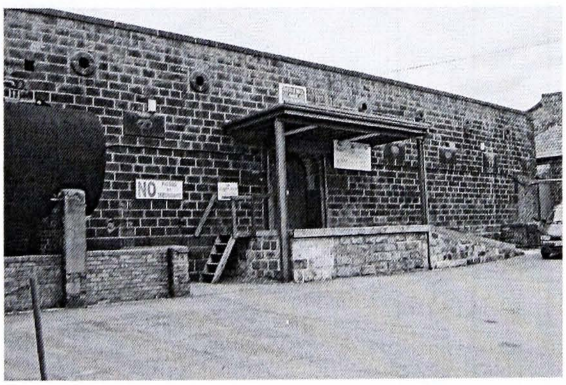


Plate 7.2 *South elevation of the 1858 weaving shed*

The weaving shed, a single-storeyed building built of coursed masonry and with a north-light roof, was built with a main facade facing the main road (Plate7.2). This south wall has two doorways, both with interrupted jambs, the central one being round headed, with coursed-in voussoirs and surmounted by a stone inscribed 'Pecket Well Shed Built AD 1858'. A further door at the southeast corner, now blocked, provided the main entrance to the shed for workers. At the southeast end

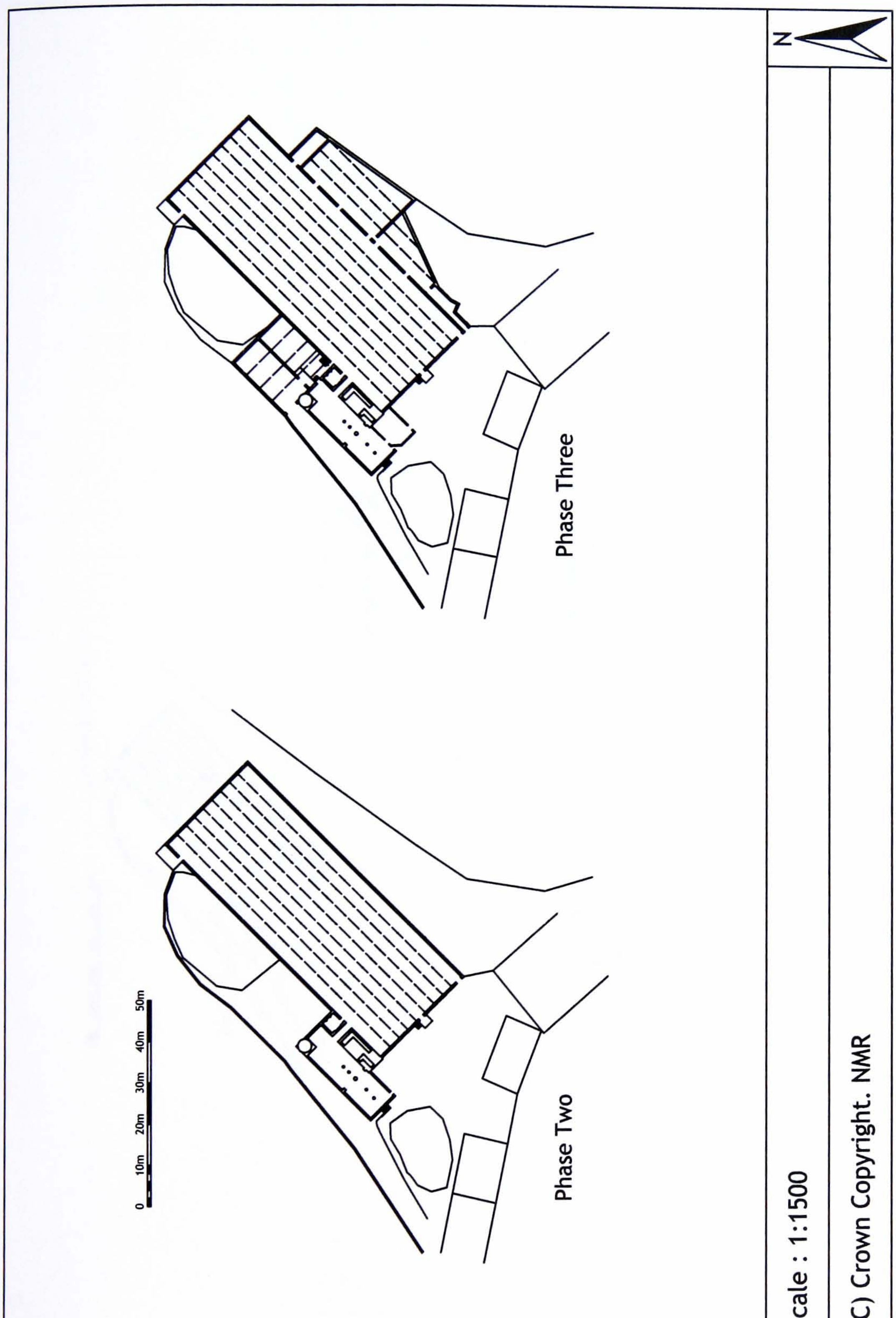
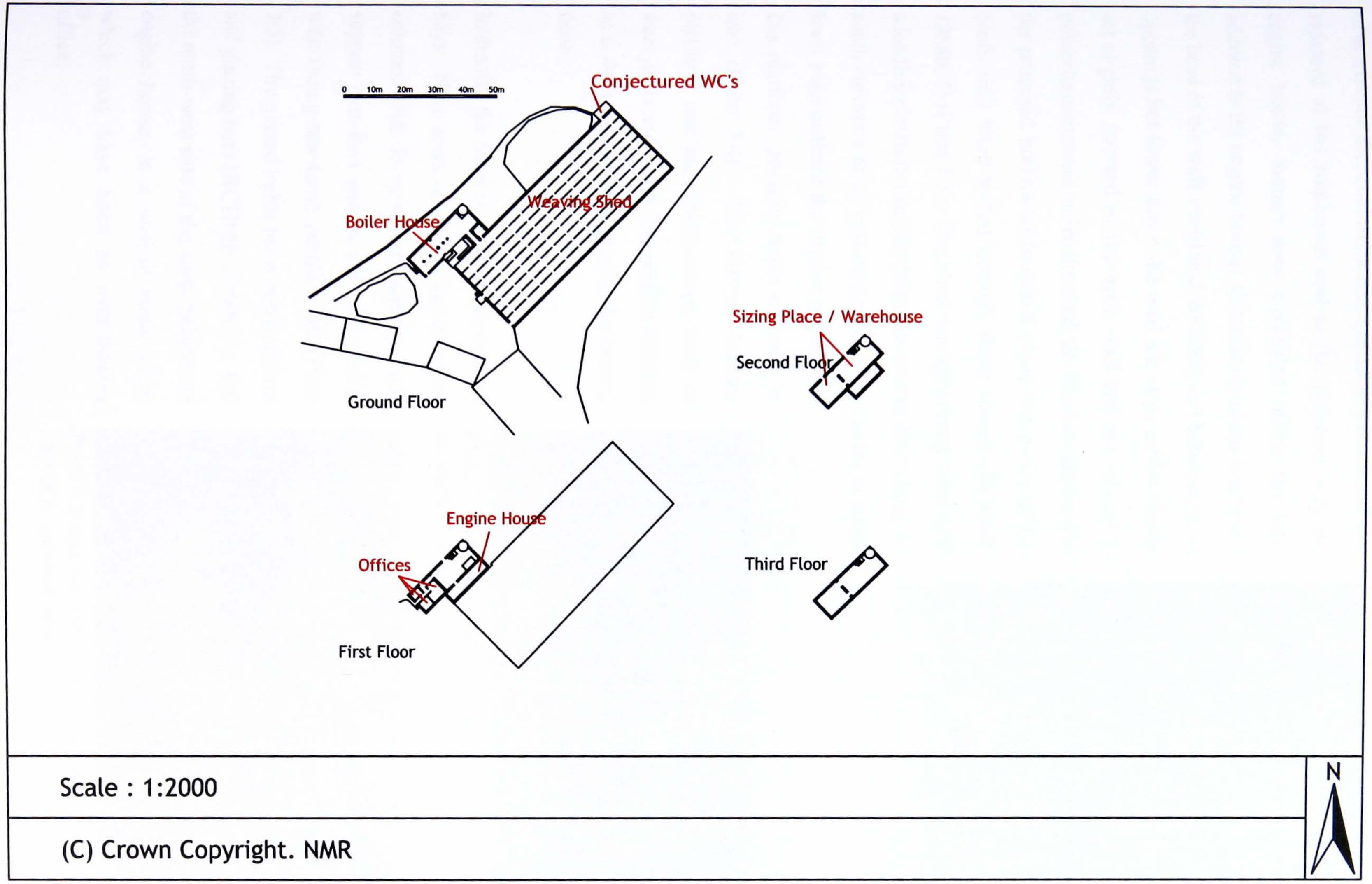


Figure 7.2 *Principal structural phases surving at Pecket Well Shed*

Figure 7.3 *Phase Two, Pecket Well Shed*



of this facade there are rusticated quoins and this motif was repeated at the southwest end at the junction with the engine house, though now concealed inside the later addition to the engine house. Circular openings just below the head of the wall ventilated the shed, and between these openings but lower down the wall are large ashlar blocks set slightly forward of the main wall and are related to power transmission inside the shed; the brackets supporting the principal horizontal lineshaft along the inside of the south wall were bolted through these blocks (RCHME 1988b, 3) (Plate 7.3). The shed was apparently built with a loading platform running from the central door along the south elevation to its east corner, and joist holes at plinth level must indicate the former position of this platform, possibly made of wood or iron (Plate 7.4). The current loading platform and associated cover, built of steel joists and wood is a modern addition as is the steel shutter covering the central door.

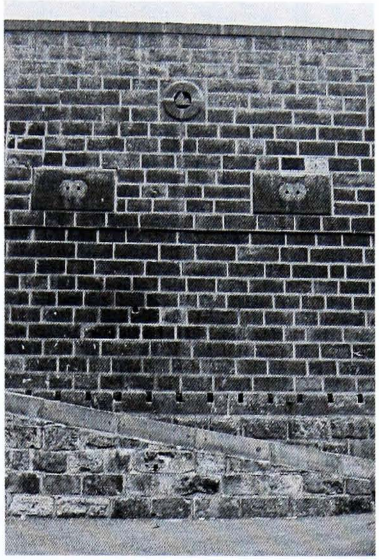


Plate 7.3 *Ventilation openings and 'bolting blocks' for internal power transmission*

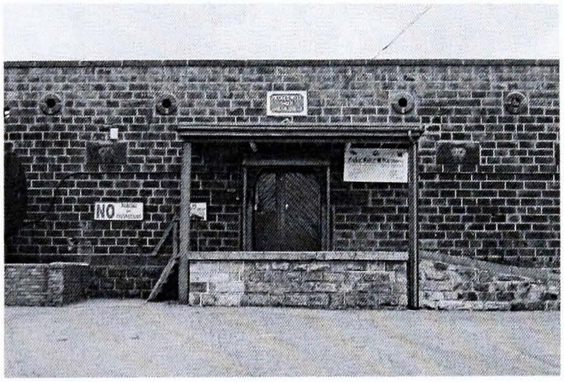


Plate 7.4 *Loading platform and central doorway in south elevation*

Internally the shed is seven bays by nine bays. Nine rows of closely set cast-iron columns with D-sectioned bolting heads support cast-iron gutters and nine north-west facing saw-tooth profile roofs (Plate 7.5). The glazed lights have iron mullions and glazing bars (RCHME 1988b, 3). Off the north-west side of the shed, behind the engine house, is a well-lit small room which may have been an over-lookers office.

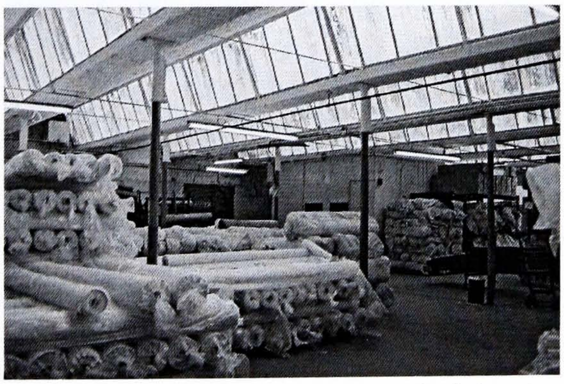


Plate 7.5 *Internal view of weaving shed showing cast-iron columns and north-lit roof structure*

The shed had a pair of privies, which according to the RCHME were situated outside its northwest corner along the west wall, close to the rear reservoir (RCHME 1988b, 3). No evidence for these privies survives and as the shed it terraced into the hillside at this point the area they must have occupied must have been back-filled.

Plate 7.6 *One of the original hangers which supported countershafts running the length of the shed*

The shed was powered from the engine house attached to the west corner of the shed and drive was taken along a line shaft that ran against the inner face of the south-west wall of the shed, and by countershafts leading from this and supported on brackets along the northwest wall, and along the northwest side of each row of columns. The bevel gears transferring the drive were mounted on the inside of the large ashlar blocks in the sheds south-west wall, the scars for the back bolting plates and holes for the blots for which can still be viewed externally. Support for the line shafts was provided by each column and further intermediate support offered by brackets hung from plates attached to the gutters; one of these brackets or 'hangers' survives, but presumably not in its original position as it is currently placed immediately next to one of the columns (Plate 7.6).

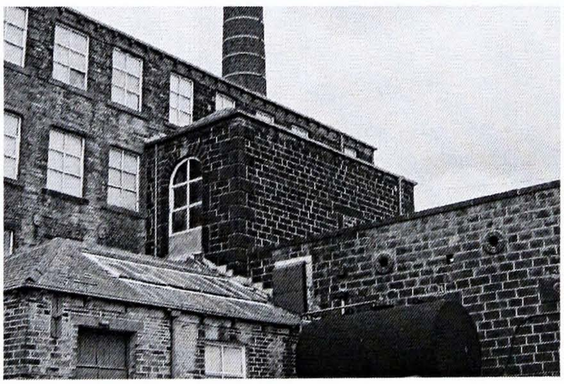


Plate 7.7 *End engine house at southwest corner of the weaving shed*

The tall, narrow engine house to the southwest of the weaving shed has round-headed windows at each end and rusticated quoins externally, and this architectural treatment of the engine house is typical of mill design after *c.*1825 (Giles and Goodall 1992, 139) (Plate 7.6). Internally, many of the features of the engine house have survived, though largely obscured by the installation of modern shelving for the storage of fabric. It has the proportions appropriate to the installation of a single-beam engine; the ashlar engine bed survives, with the cylinder block at the north-east end and the flywheel set against the south-east floor and an ashlar bound opening, now blocked, indicates that power was taken off its rim (RCHME 1988b, 3). The supports for the entablature beam survive, the ashlar bound bearing blocks are visible from outside, and the cast-iron supports for either end of the beam floor, with decorative brackets, remain *in situ*. Some of the original plaster on the walls has also survived.

The boiler house was attached to the northwest side of the engine house at ground floor level with the chimney located at its northern end. Later enlargement has removed most of the evidence for its front wall, though the spring of an arch may indicate that originally, the boiler house had characteristic round openings on its south-west wall. It probably housed just one boiler and was long and narrow on plan. The chimney has been lowered, but retains a square base and a circular shaft with a moulded base; it was originally free-standing and the later warehouse and sizing block is built around it (Plate 7.8). To the north and south of the site are two small reservoirs which once supplied the boilers and cotton processes with water – the smaller of the two reservoirs to the front of the site may have received the hot water condensate from the steam engine.

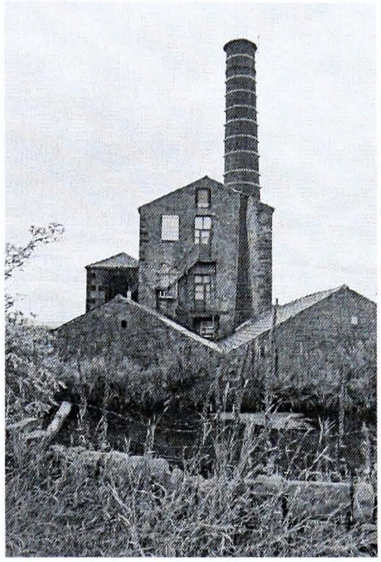


Plate 7.8 *The chimney was originally free-standing but was later incorporated into the warehouse block*

Deeds, dated 1862, specify a warehouse, which based on the description of the 1873 fire must have been close to the engine house and boiler house. Parts of the building may survive in the present multi-storey block to the west of the engine house. The west elevation is particularly multi-phase in character. Four bays north of the south elevation a straight joint marked by quoins and rising to second floor level indicates the former extent of an earlier building (Plate 7.9). Internally this survives as a cross wall which has been largely removed to create a single space on each floor level. In the southern part of the west elevation are a set off loading doors, one on each floor, each with interrupted jambs. On the south-east elevation there is

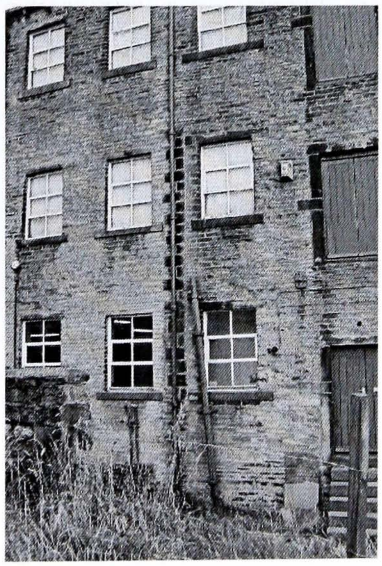


Plate 7.9 *A straight joint and quoins in the west elevation indicate the extent of the former sizing block and warehouse*

further evidence for the incorporation of earlier masonry, particularly in the area next to and behind the engine house at second floor level. Here the masonry is distinct from the rest of the building, but matches that used in the south-east elevation of the engine house and chimney. This area of masonry returns on to the north elevation.

After the fire of 1873 the sizing block and warehouse was rebuilt in its present form. The building is of four storeys, nine bays long and three bays wide (RCHME 1988b, 3-4) (Plate 7.10). The boiler house and economiser occupy the ground floor of the building. At first floor level are a suite of three small offices. The offices are entered through a central door, accessed via a flight of stairs from the mill forecourt. The main doorway has a distinctive stone hood and shaped lintel (Plate 7.11). The office to the south has a corner fireplace; both have moulded door architraves and underdrawn ceilings, features absent elsewhere in the building (RCHME 1988b, 4). Above ground floor level the building is of traditional construction with timber beams and joists – the roof has wooden trusses of tie beam construction open to the third floor. Each floor is accessed via wooden staircases rising out of the floor below.

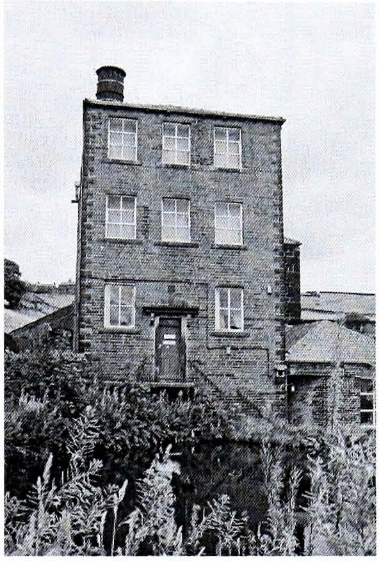


Plate 7.10 *South elevation of rebuilt sizing and warehouse block*

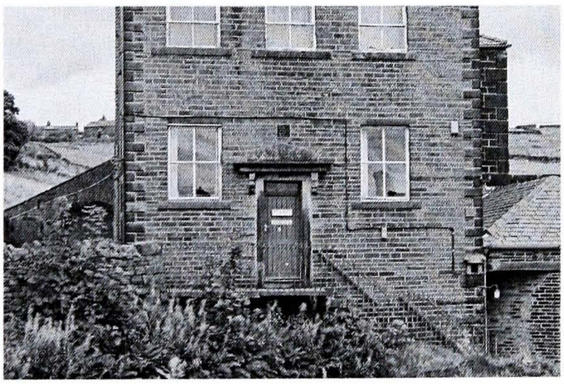


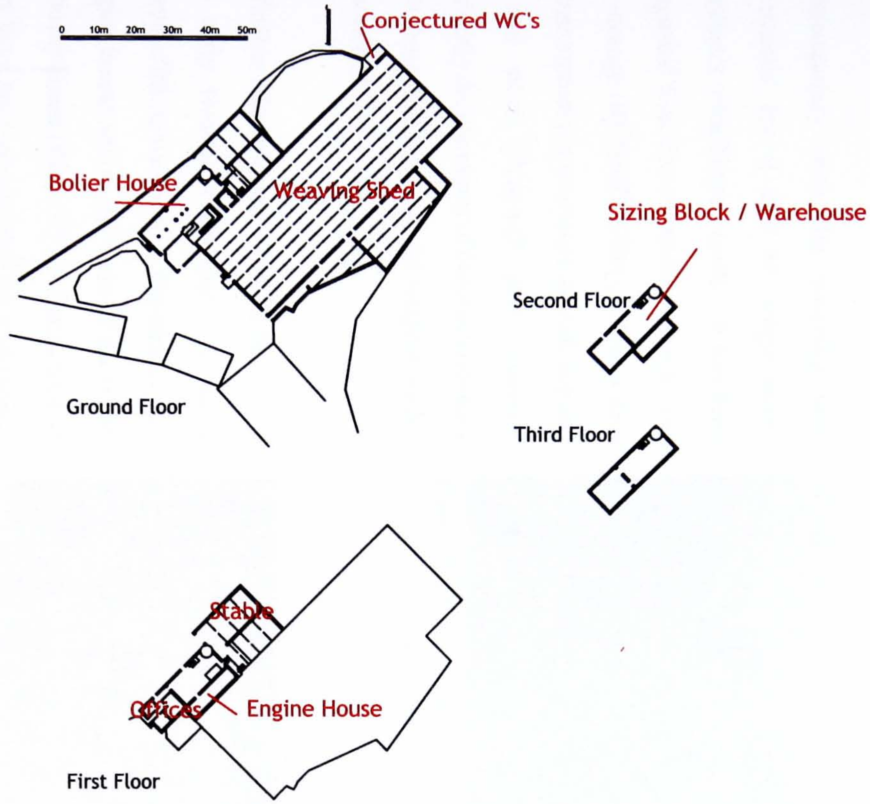
Plate 7.11 *Entrance to offices in the south wall of the sizing and warehouse block*

- Phase Three

Phase Three (Figure 7.4) is represented by extensions to the weaving shed, the addition of stables to the north of the sizing and warehouse block and changes to the system of power transmission at the site resulting in an extension to the east of the boiler house.

Sometime before 1905, when they are shown on OS data, additions were made to the weaving shed. A small shed trapezoid on plan and four bays long and three to four bays wide was added at the east side of the shed. A further room to the north of this new shed was created along with

Figure 7.4 *Phase Three, Pecket Well Shed*



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a further shed to south which was four bays long and two bays wide (RCHME 1988b, 4). The shed to the south was accessed by a small passage way from the front of the site via a door in the south elevation. The function of these rooms is unclear and they were not big enough to substantially increase the number of looms at the site. It is therefore possible that they were used for storage or alternatively for preparatory processes prior to weaving such as winding (RCHME 1988b, 4).

Contemporary with the weaving shed extensions are a pair of single-storey structures with hipped roofs. It has been suggested that these buildings were used for storage (RCHME 1988b, 4) but within recent memory it was used as stabling and a fuel store (Pragnell pers. comm.). Certainly the character of the main opening into these buildings would suggest such a function (Plate 7.12).

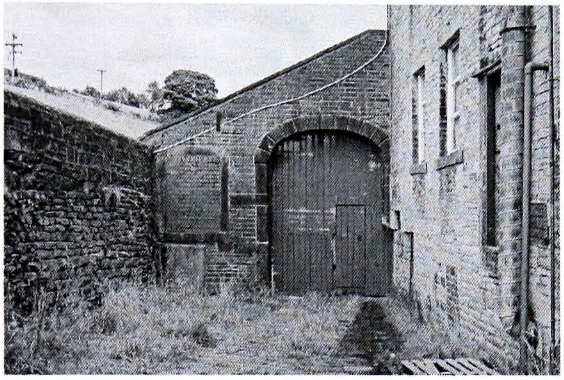


Plate 7.12 *Possible fuel store and stables to north of the sizing block and warehouse*

A further addition was made to the site in the early twentieth century. A single storey addition was built to the south of the engine house and to the west of the boiler of boiler house (Plate 7.13). The extension may have been occasioned by a change to the system of power transmission at the site. A slot was cut in the wall of the engine house at ground floor level and was probably housed a rope-driven flywheel enabling a system of power transmission that was more efficient than the earlier system of gearing between the engine and principal lineshaft in the shed. Part of this rope drive system may have protruded into the single-storey extension. In more recent times this extension housed a small auxiliary engine, though whether steam or diesel is not known, but which seems to have taken the place of the original steam engine (Pragnell pers. comm.).

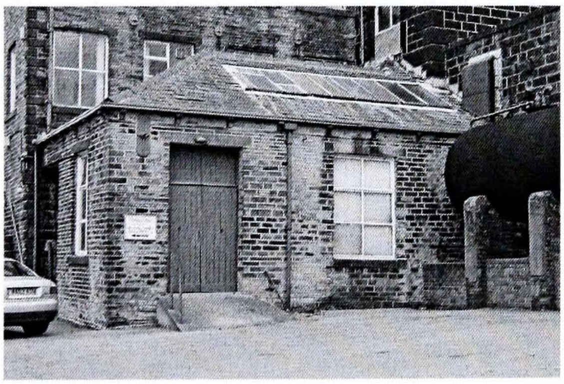


Plate 7.13 *Single-storey extension to south of engine house*

PROCESS RECORDING

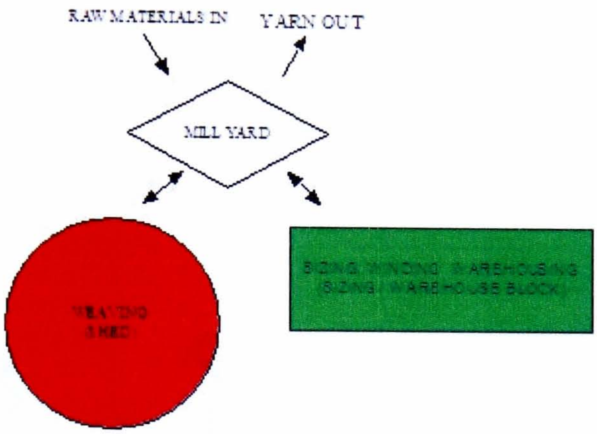


Plate 7.14 *Processes, Phase Two, Pecket Well Shed*

As rebuilt following the 1873 fire (Phase Two) Pecket Well Shed provided space for weaving, preparatory process of winding and sizing, warehousing and offices (Plate 7.14). The mill yard played a central role in the movement of materials and goods around the site and this emphasised when the flow of materials and goods is plotted as a gamma map (Figure 7.5) and the resulting space syntax is quantified (Table 7.1).

Table 7.1 *Quantified values of Phase Two 'materials/goods' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.333	1	**4**	0.267	2
1	0.000	6	**5**	0.200	3
2	0.333	1	**6**	0.267	2
3	0.333	1			

Mean RA: 0.217 RR of Complex: 1.500

The gamma map reveals a tree-like spatial structure with an elongated section (spaces 4, 5 and 6) representing the various floors in the sizing and warehouse block. The complex has a number of rings which reflects the presence of taking-in doors in the sizing and warehouse block and because this means that every space in the complex is linked to the mill yard (space 1) that space has the lowest possible RA value (0.000). It is the mill yard, therefore, that is central to the movement of processes around the site and between different parts of the production process.

The various additions and alterations made to the site during Phase Three did not significantly alter either the processes at the site or the movement of materials and goods. The function of

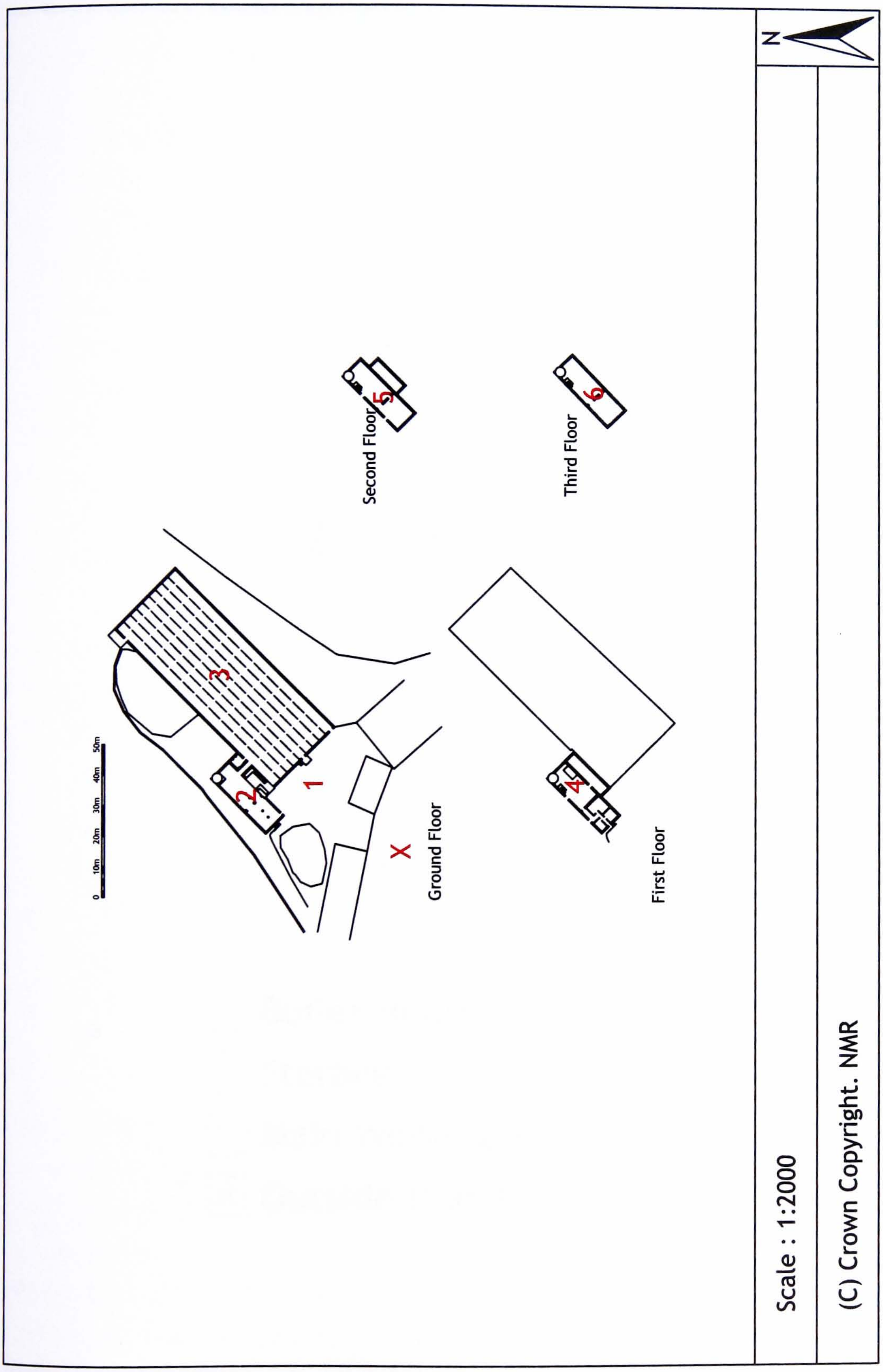


Figure 7.5 *Phase Two: Gamma map of the movement of materials/goods*

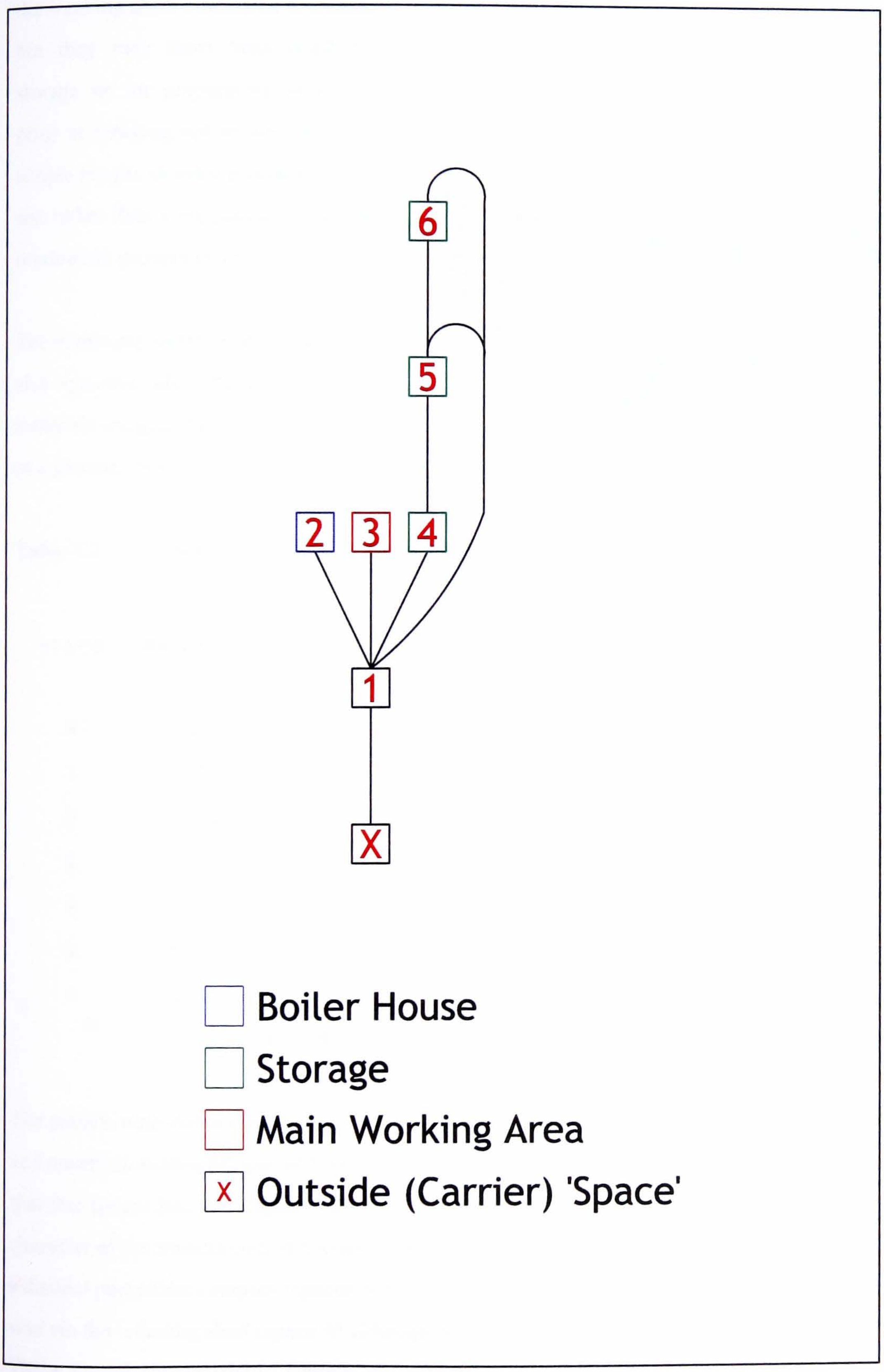
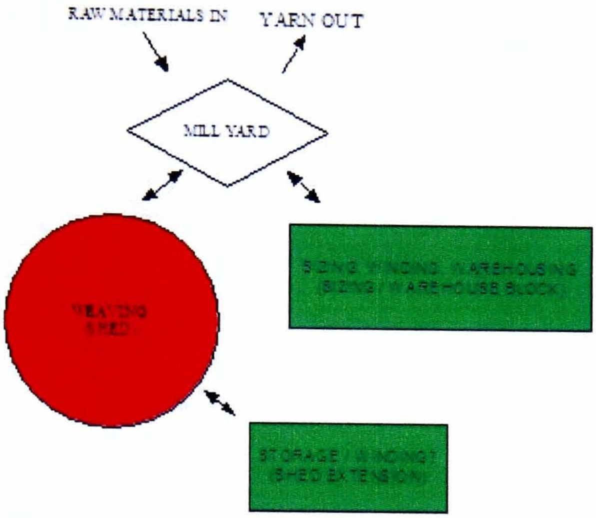


Figure 7.5 cont. *Phase Two: Gamma map of the movement of materials/goods*

the weaving shed extensions is unclear but they may have been used for storage or for preparatory processes prior to weaving but in any case this simple results in extra processes at the site rather than a reorganisation of the production process (Plate 7.15).



The continuity in terms of processes is also apparent when the movement of materials and goods at the site is plotted as a gamma map (Figure 7.6) and quantified (Table 7.2).

Table 7.2 *Quantified values of Phase Three 'materials/goods' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.250	1	**7**	0.180	2
1	0.051	8	**8**	0.269	2
2	0.180	2	**9**	0.244	3
3	0.205	3	**10**	0.269	1
4	0.192	2	**11**	0.167	3
5	0.192	2	**12**	0.167	3
6	0.128	3	**13**	0.192	2

Mean RA: 0.189 RR of Complex: 0.667

The gamma map shows that the mill yard (space 1) remained central to the movement of goods and materials around the site and this is also reflected in its low RA value (0.051) and the fact that this spaces has the highest number of neighbours in the complex (8). The 'tacked on' character of the extensions to the weaving shed is also revealed. Spatially, these spaces occupy a distinct part of the complex (spaces 7, 8, 9 and 10) and the principal means of access to them was via the weaving shed (space 6) although further access was possible from the mill yard. These spatial characteristics support the idea that these spaces had a function that was an adjunct to the main weaving process.

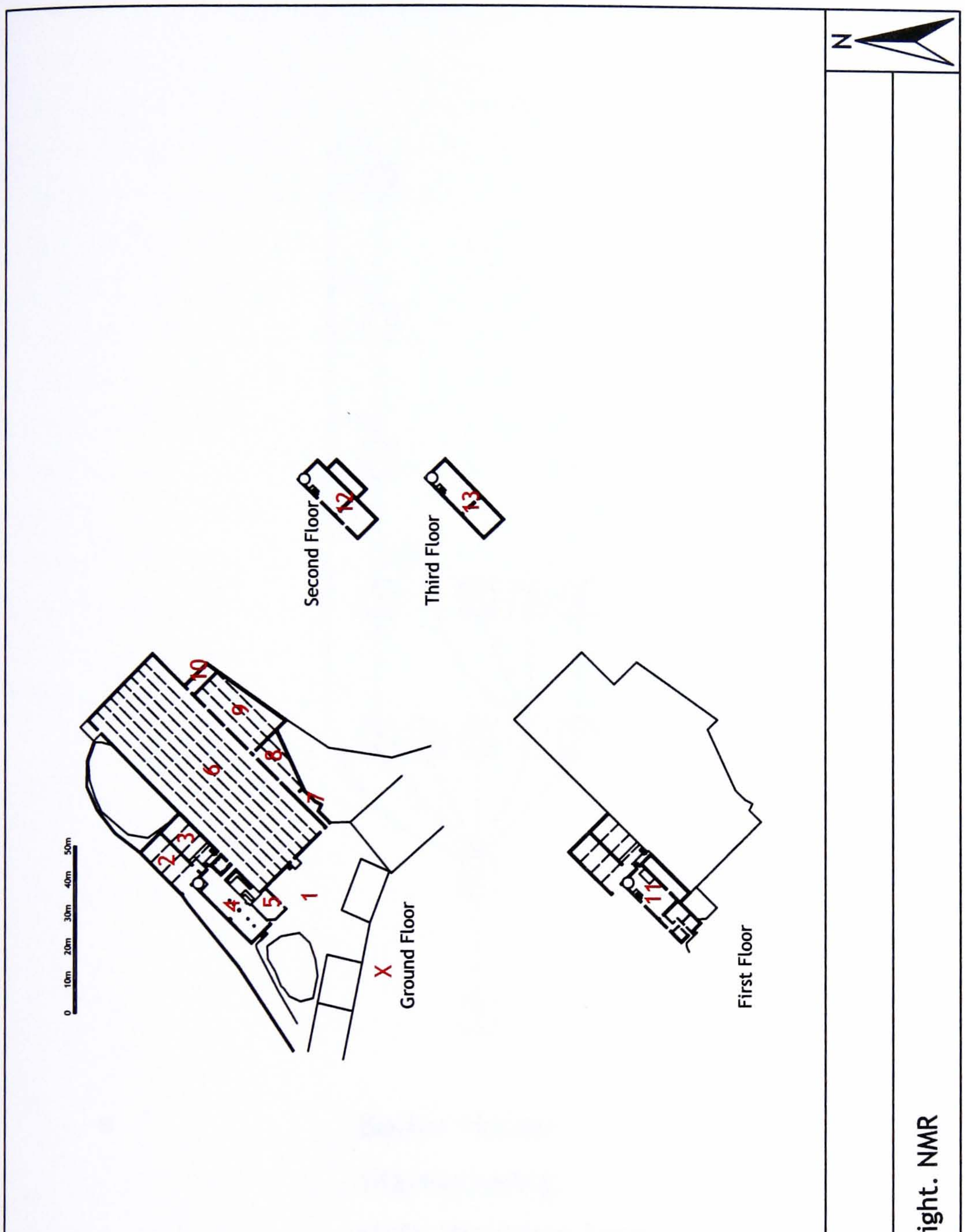


Figure 7.6 *Phase Three: Gamma map of the movement of materials/goods*

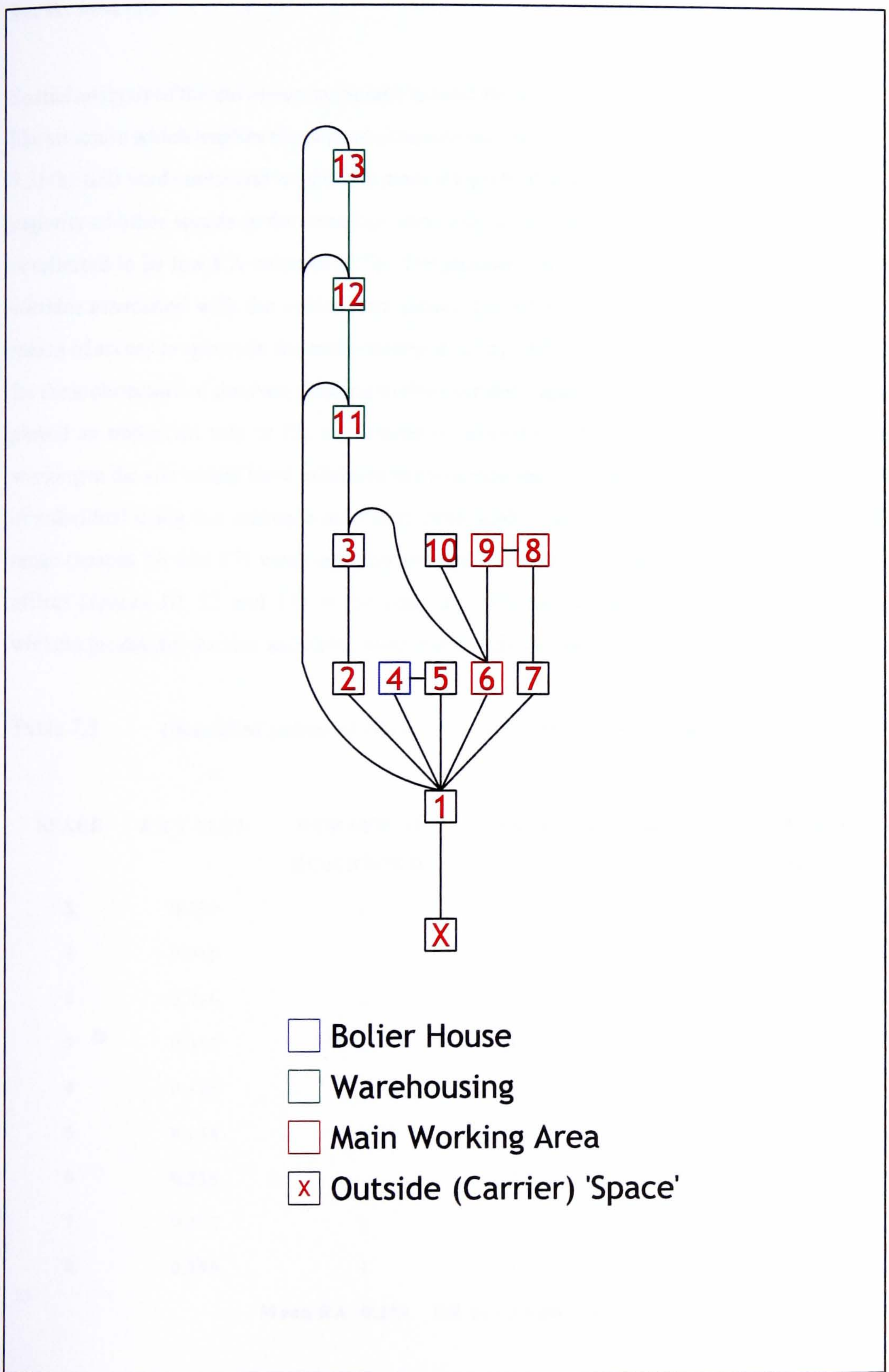


Figure 7.6 cont. *Phase Three: Gamma map of the movement of materials/goods*

ACCESS ANALYSIS

Spatial analysis of the movement of people around Pecket Well Shed reveals an inherently tree-like structure which implies the control of human movement. For Phase Two (Figure 7.7; Table 7.3) the mill yard continued to play the main integrating role in the complex and access to the majority of other spaces in the complex were only accessible from this external space which is reflected in its low RA value (0.125). The gamma map also reveals the central role of the corridor associated with the office suite (space 11) which provided access one of the main means of access to spaces in the multi-storeyed sizing and warehouse block. This is of interest for the architecture of doorway leading to this corridor suggests a public entrance yet it clearly played an important role in the movement of workers. Of course, the majority of people working at the site would have inhabited the weaving shed (space 8) and therefore the number of individual using this entrance may have been slight, particularly if the upper floors of the range (spaces 16 and 17) were used for storage. Furthermore, the relative isolation of the offices (spaces 10, 12 and 13) in the complex indicates a degree of segregation between workers producing textiles and those involved in administration and management.

Table 7.3 *Quantified values of Phase Two 'workforce' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.199	4	**9**	0.316	1
1	0.316	1	**10**	0.257	1
2	0.316	1	**11**	0.139	5
3	0.316	1	**12**	0.257	1
4	0.125	4	**13**	0.257	1
5	0.154	2	**14**	0.213	2
6	0.316	1	**15**	0.331	1
7	0.302	2	**16**	0.316	2
8	0.199	4	**17**	0.434	1

Mean RA: 0.254 RR of Complex: 0.038

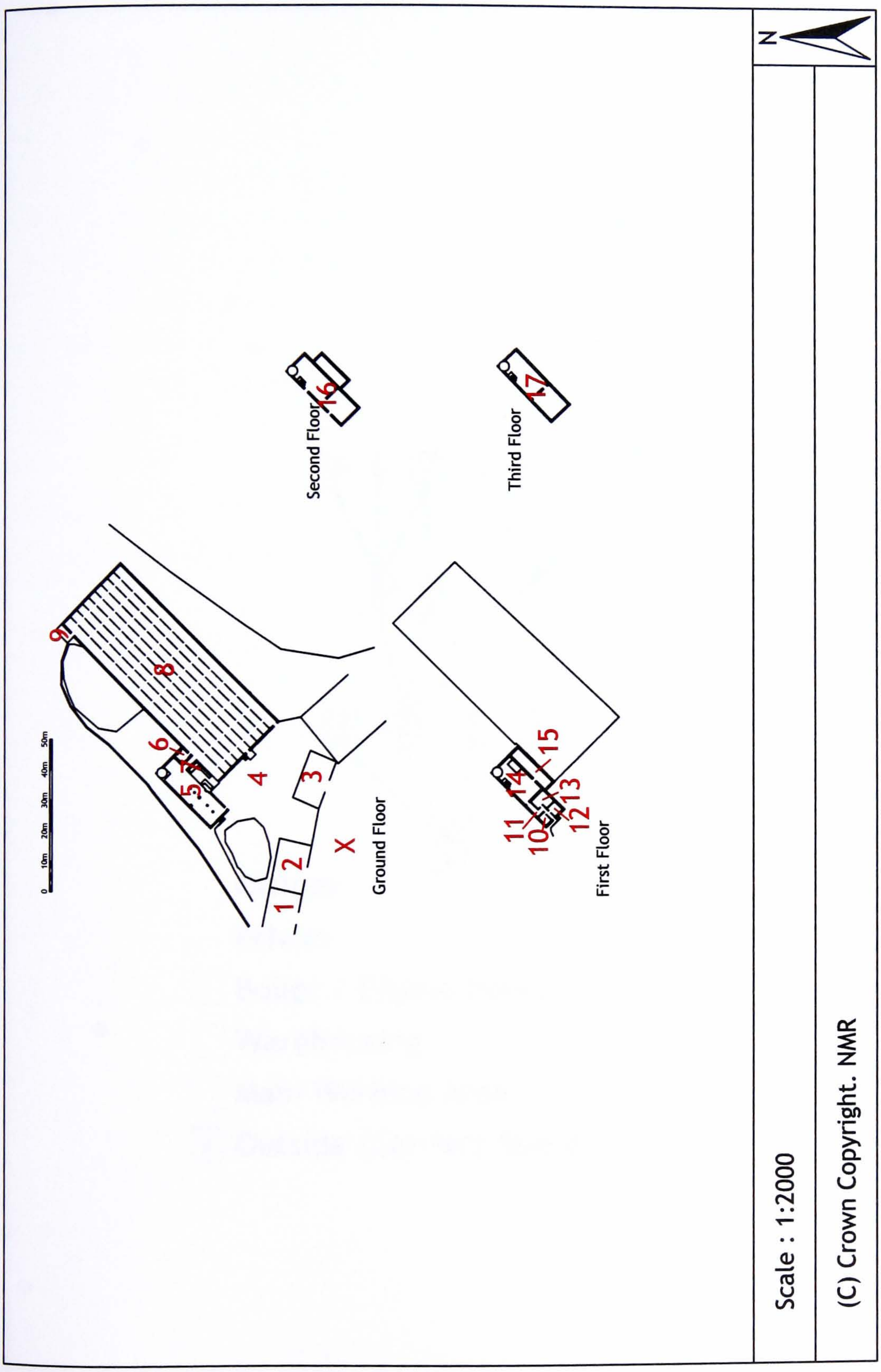


Figure 7.7 *Phase Two: Gamma map of the movement of the workforce*

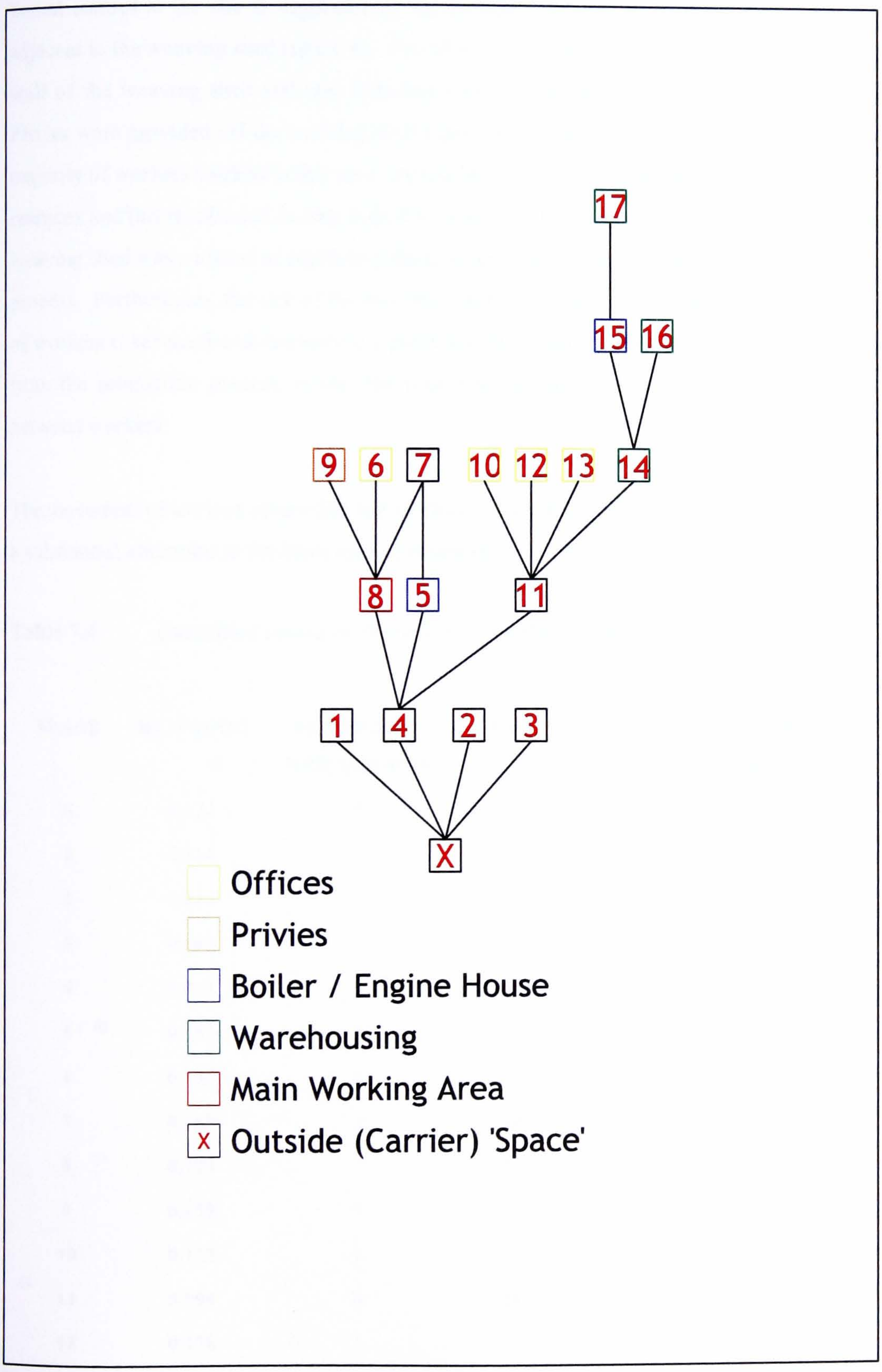


Figure 7.7 cont. *Phase Two: Gamma map of the movement of the workforce*

Social control at the site is suggested by the presence of an overlooker's office (space 6) adjacent to the weaving shed (space 8). The office is located roughly halfway down the west wall of the weaving shed and was therefore well situated for the supervision of weavers. Privies were provided off the weaving shed (space 9) presumably reflecting the fact that the majority of workers worked in this area. Spatially, the privies occupy the deepest parts of the complex and this is reflected in their high RA value (0.316) but their physical proximity to the weaving shed was a means of regulating the time spent by workers away from the production process. Furthermore, the size of the privies must have been disproportionate to the number of workers it serviced and therefore the potential for a large number of workers to be absent from the production process at any one time was minimised as was potential interaction between workers.

The movement of workers around the site in Phase Three (Figure 7.8; Table 7.4) does not show a substantial alteration to the basic spatial structure.

Table 7.4 *Quantified values of Phase Three 'workforce' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.130	5	**13**	0.152	2
1	0.214	1	**14**	0.170	3
2	0.214	1	**15**	0.174	2
3	0.080	1	**16**	0.181	1
4	0.214	6	**17**	0.192	1
5	0.152	3	**18**	0.119	5
6	0.156	2	**19**	0.192	1
7	0.167	1	**20**	0.192	1
8	0.178	1	**21**	0.130	4
9	0.152	3	**22**	0.214	1
10	0.112	2	**23**	0.207	2
11	0.094	8	**24**	0.290	1
12	0.178	1			

Mean RA: 0.170 RR of Complex: 0.350

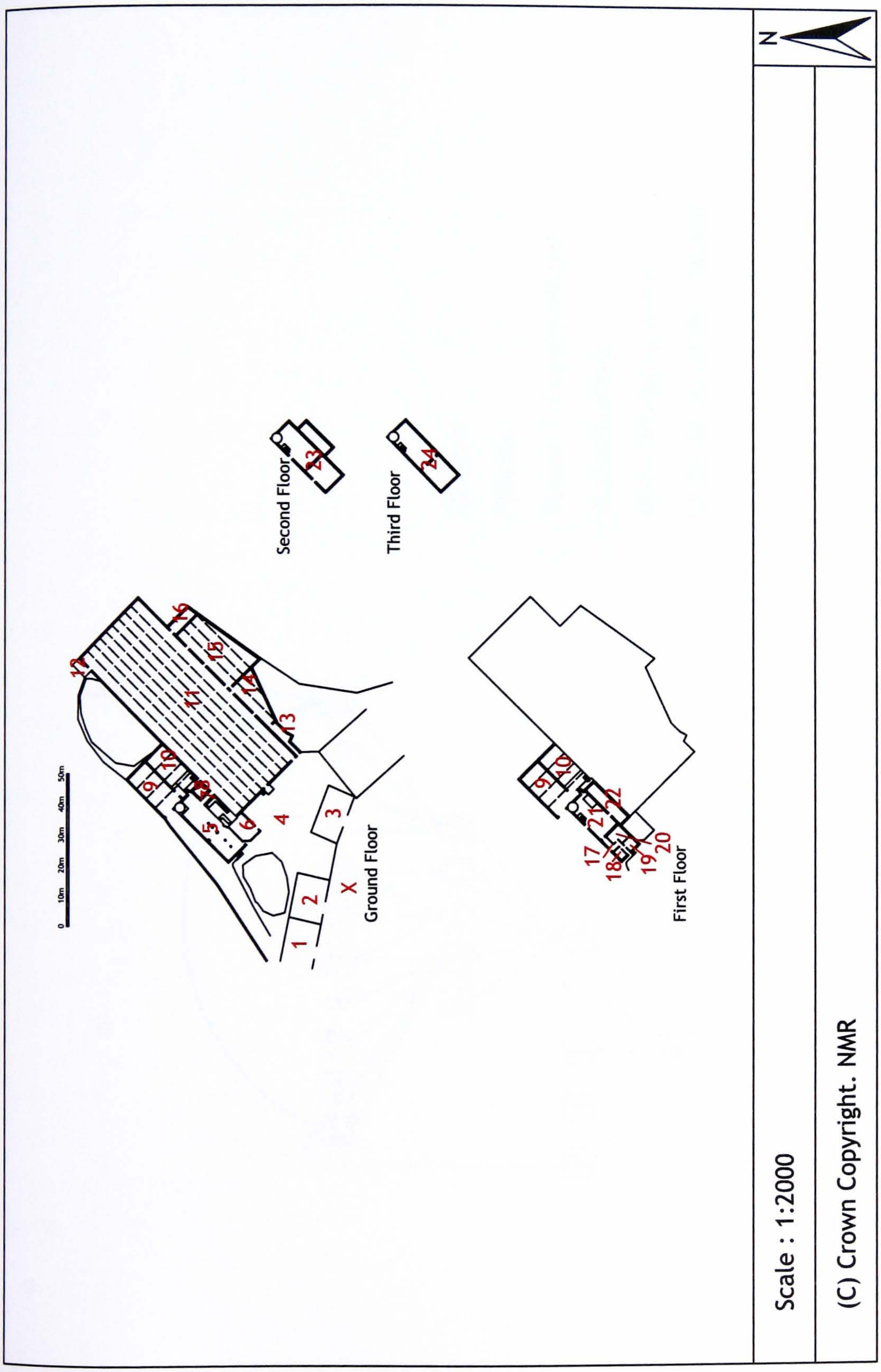


Figure 7.8 *Phase Three: Gamma map of the movement of the workforce*

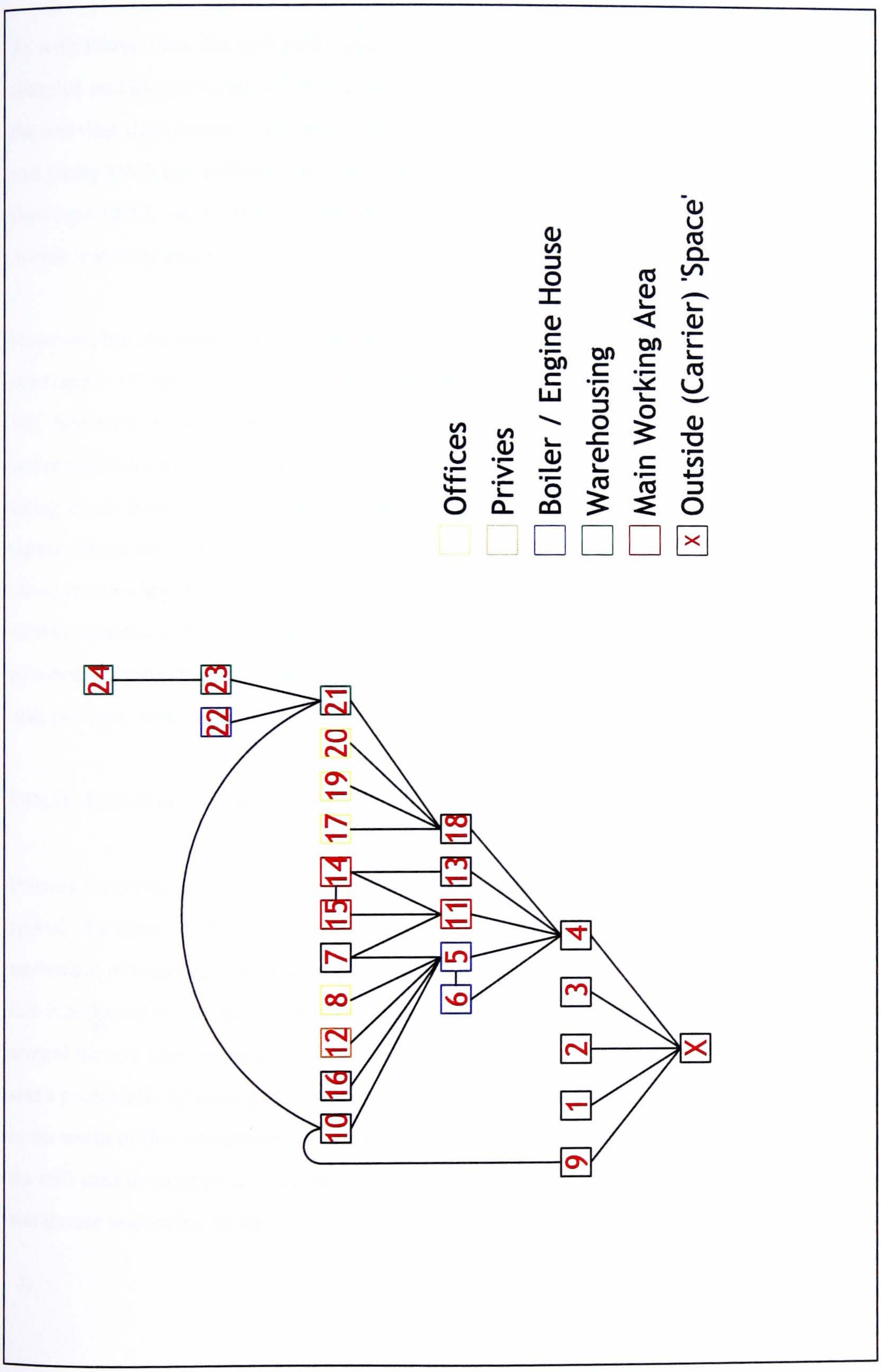


Figure 7.8 cont. *Phase Three: Gamma map of the movement of the workforce*

As with Phase Two, the mill yard (space 4) continues to be the main integrating space in the complex and the provision of the overlooker's office (space 8) and privies (space 12) next to the weaving shed (space 11) remains unaltered. The basic spatial structure of the warehouse and sizing block and offices is also little changed. In addition, the extensions to the weaving shed (spaces 13, 14, 15 and 16) appear as extra spaces in the complex rather than altering its overall syntactic quality.

However, the one significant change occurs in the possible movement between the weaving shed (space 11) and the sizing block and warehouse because of the construction of spaces 9 and 10). Space 10, in particular allows better internal circulation between the two parts of the site and results in a ring. Consequently, workers could access the upper floors of the warehouse and sizing block from within the building removing the need to go outside and use the corridor (space 18) in the office suite. This has two implications. First, it would have allowed the closer monitoring of the movement of workers around the site, particularly as access to space 10 was adjacent to the overlooker's office (space 8). Second, it liberated the office suite from movement around the warehouse and sizing block by workers, making this area more private and, perhaps, better suite to its role as a public interface.

Process Recording and Access Analysis: Discussion

Process recording and access analysis at the site shows the relative stability of the overall spatial character of the site from the mid- to late nineteenth century. In particular, the movement of materials and goods around the site continued to be reliant on the mill yard and this is reflected by the large number of taking-in doors at the site. The movement of workers around the site also remained relatively stable across the period, though in Phase Three there was a potential heightening of control over potential movement about the site when extensions to the north of the warehouse and sizing block removed the need for workers to pass through the mill yard in order to access other spaces, in particular travel between the weaving shed and warehouse and sizing block.

Architectural Summary

The overall architectural character of the site is relatively austere which is typical for sites built around a shed at which there were fewer opportunities for architectural elaboration. However, typically for a middle period site some concession was made to architectural detailing in the form of quoins, arched openings with voussoirs and the inscription over the main loading door in the south wall of the shed. Further attention was paid to the entrance to the offices in the multi-storeyed block emphasising the public nature of this part of the site. Internally, the offices were originally well decorated with panelling and plaster cornices, again emphasising the status of these spaces and, presumably, the fact that they could be viewed by the public. Of particular interest is the marked contrast in the form of the south elevation of the sizing and warehouse block, with rusticated quoins and well-coursed masonry, compared with the north and west elevations of the same building which are multi-phased and of irregular construction. It is therefore apparent that the greatest attention was paid to the most visible elevations at the site.

The treatment of the engine house is typical for Yorkshire textile mills. Externally it has a characteristic tall, narrow round-headed window whilst internally the surviving decorative beam floor supports suggests a decorative scheme typical of beam engine houses. It may have been the case that the interior of the engine house was viewed by visitors to the site and this is further suggested through its close physically proximity to the office suite.

List Of Documents

7.1 'The Pecket Well Shed Weaving Company Ltd, registered 5th April 1858 under theJoint Stock Companies Act, 1857'

WYAS HQ. Deeds. Vol. XK. P32, No. 33, 2nd July 1862

7.2 'Prospectus of the Pecket Well Weaving Shed Company Ltd'

Todmorden and Hebden Bridge Weekly Advertiser, 10th April 1858

7.3 'Draft Indenture, 1858. Pecket Well Weaving Shed Company Ltd, buying land from William and Mary Bancroft of Willcroft, Wadsworth, for £1500'

WYAS Calderdale SU373

7.4 'Destructive fire at Pecket Well, £12,000 damages'

Halifax Courier, 16th August 1873

APPENDIX A
SITE DESCRIPTION : 8

SALTAIRE MILLS

DATABASE ENTRY:	1471
NBR NUMBER:	BFO41553
NGR:	SE 1420 3820
TOWNSHIP:	(Saltaire) Shipley
CIVIL PARISH:	Shipley
DISTRICT:	Bradford
COUNTY:	West Yorkshire
BRANCH:	Worsted (Alpaca)
PERIOD:	Middle

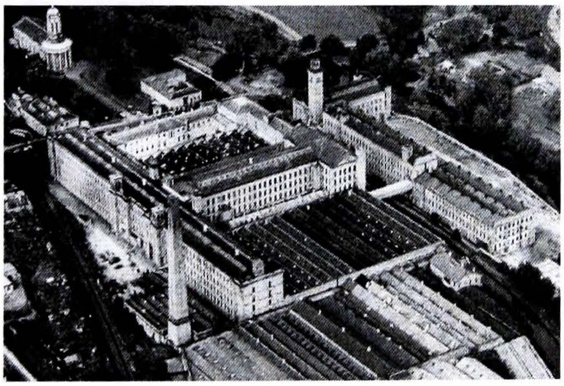
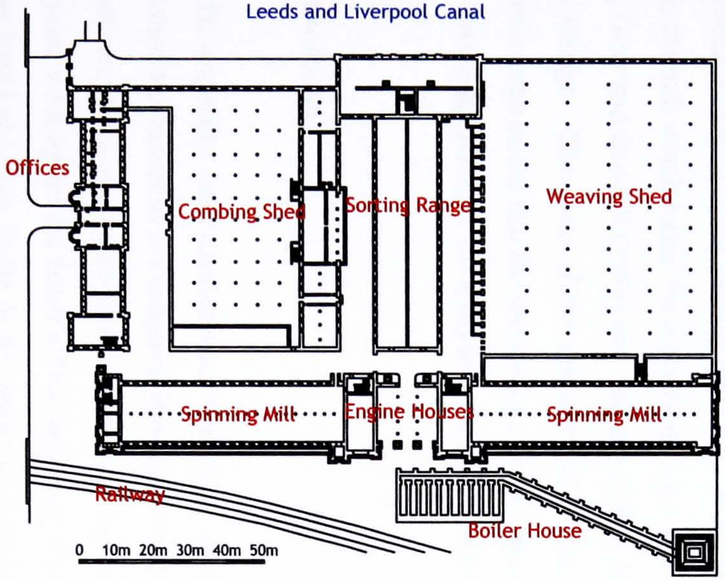
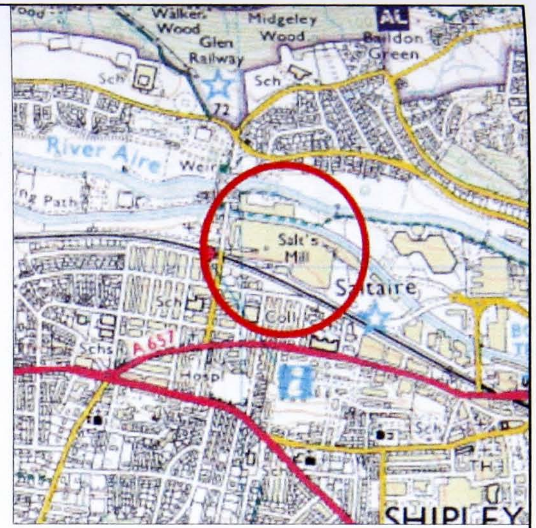


Plate 8.1 *Saltaire Mills, Shipley*

The mills and model settlement at Saltaire, Shipley form perhaps the most famous group of industrial buildings in the West Riding of Yorkshire, notable not only during their heyday as one of the leading worsted producers in the country but also more recently as a symbol of the possibilities for the regeneration and conservation of industrial sites (Plate 8.1; Figure 8.1). The complex is the product of the combined resources of an established textile manufacturer – Titus Salt – with a desire to build a new works and a clear idea of his requirements; the leading millwright of his era – William Fairbairn – bringing a long experience to bear on his crowning achievement; and a distinguished local architectural practice, Lockwood and Mawson (RCHME 1986b, 1). The mills and village were built between 1851 and 1872 in the valley of the River Aire, three miles from the centre of the city of Bradford and

Figure 8.1 *Block Plan, Saltaire Mills, Shipley*





Scale : 1:200

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are an expression of the fully-developed factory system. Saltaire is therefore of great interest to the researcher for it was a statement of the ideal factory and environment for a workforce.

Saltaire Mills is of interest as an example of 'ideal' mill building. The site exhibits many of the features written about by William Fairburn in his treatise on mill work published in 1863 and the architectural style of the site is the epitome of Fairburn's 'polite' mill architecture. Access was granted to much of the site although parts are in private ownership and used for light industrial processes and health and safety reasons prohibited access to them. Much of the original fabric has survived despite the adaptive reuse of the site and existing plans of the site were made available by Salts Estate for the purposes of this research. Although the site underwent subsequent development after the initial phase of building, it is only the mill as originally built that forms the focus of this research for it is this single phase of building activity that represents the 'ideal' worsted mill in the eyes of some of the leaders of the industry in the mid-nineteenth century. Only passing mention will be made to the model settlement of Saltaire as it is the mill which forms the main focus here. The interested reader should see Styles (1990), Giles and Goodall (1992) and Markus (1993) for informative overviews and studies of the village. The scale of the site and difficulties of presenting the data from quantified gamma maps means that the site analysis will adopt a more general perspective and not all of the data gathered from the analysis of the site (such as quantified values) will be presented.

Historical Background

The Salt family, originally from Crofton near Wakefield, settled in Bradford in 1822 and quickly established themselves as woolstaplers (Reynolds 1983, 41-8). Titus was born in 1803 and by 1834 had set up his own worsted manufacturing firm in Bradford, having previously spent several years working for his father's firm supplying wool to Bradford manufacturers. Salt's firm was based at Union Street in the centre of Bradford and by the mid-1840s the business was experiencing great success and Titus had amassed a personal fortune and become one of the town's largest employers. Bradford had experienced substantial expansion in the first half of the nineteenth century as the productive output of the worsted industry underwent a staggering increase as mechanised processes had been introduced. By 1850 Bradford was the world centre of the worsted industry but the town was ill-prepared to receive a steadily increasing workforce and over-crowding, pollution and ill-health were rife in the city by the

1840s. The picture was similar in many other British industrial towns and as a consequence the 1830s and 1840s were a period of social and political upheaval and Bradford became notorious as a centre of political agitation and discontent amongst the working class. However, as Titus Salt's business prospered, so did his reputation and by the 1840s, against a backdrop of dissatisfaction and hatred on the part of workers towards factory owners, he was readily identified as one of the best masters in the town and an example of how factory owners should behave (Styles 1990, 9-13). Perhaps the secret of Salt's popularity was that his personal commitment to his workforce was derived from personal experience of working c lass deprivation (Giles and Goodall 1992, 180).

Much of Titus Salt's business success was due to experiments during the 1830s with the use of alpaca, a long-fibre wool from Peru which, combined with other wools, gave a soft, light shiny material known as lustre cloth (RCHME 1986b, 1) and later, similar experiments with mohair. Both products proved immensely popular and Titus's success and fortune continued to grow. By 1850, he operated six mills in Bradford and in that year served as Lord Mayor of the town (Giles and Goodall 1992, 180). It was at that time that Titus Salt first contemplated investment in a new site and on a massive scale and building work at Saltaire began in 1850-1.

The site selected for Salt's new empire was on the south bank of the River Aire in the township of Shipley, to the north of Bradford. A mill already existed on the site, shown on the mid-century Ordnance Survey map as Dixon Mill (Corn and Fulling) (Sheet 201, surveyed 1847-8, published 1852), and this mill is shown on an early view of the completed mill and was later demolished when the New Mill was built in 1865-8. The site had the advantages of good connections to local transport infrastructure, including the Leeds and Liverpool Canal, rail and road and a good water supply from the River Aire (RCHME 1986b, 2). Salt purchased most of the land fro this new mill and village from W.R. Stansfield, the proprietor of Esholt Hall. At the time of the purchase the site was in open country divided by hills from Bradford; in choosing this site Salt was able to build a mill and settlement that was everything that Bradford was not. It was designed to nurture self-improvement, politeness, orderly behaviour and good-health amongst his workers; to demonstrate Slat's own philosophy that factories, the capitalist free market, and the amassing of great industrial fortunes like his own were compatible with material comfort and moral virtue among the working classes; and to create an overall impression of the site as intimate as well as grand, pastoral as well as industrial (Styles 1990, 5). The aspirations appear to have been successfully executed for the mill itself was revered on many grounds:

> '...the appropriateness of its architecture; the notable excellence and ingenuity of the machinery, and novel contrivances for performing all the processes of the manufacture; the admirable arrangements for ensuring the health and comfort of the workpeople, and preventing accidents from the shafting and gearing, it certainly, as the largest and best contrived of factories, stands supremely at the head of those in the worsted department,... indeed, the whole building is an example, that ornamental and graceful structures are not at all incompatible with the utilitarian purposes of a factory, but that both may be harmoniously combined.' (James 1857, 467-469).

The main mill was opened on Titus Salts' 50th birthday, 20th September 1953 with lavish celebrations including luncheon in the combing shed for 3,200 guests. The model settlement of Saltaire built in the following decades; by 1871, 780 houses had been built and the majority of the amenity buildings erected (RCHME 1986, 2). The main mill, known as Salts Mill or Saltaire Mills, was a celebrated essay in integrated worsted production ad is the perfect illustration of planned integration, comprehending not only the processes within the complex but also the relationship between the mill and its surroundings (Giles and Goodall 1992, 180). The planning allowed a smooth flow of production and minimal handling of the materials and goods within the complex and between the mill and the surrounding transport infrastructure. Only dyeing was omitted from the original design and this omission was rectified with the construction of the New Mill on land to the north of the main mill between the canal and river.

The mills had a legendary productive capacity; by 1857-8 it was claimed that the looms could produce eighteen miles of alpaca cloth everyday and over 5000 miles per year (Fairburn 1857-8, 176; Myall *c.*1866, 22). The popularity in contemporary fashions for alpaca and mohair products secured the success of Salt's enterprise at Saltaire and the firm virtually carved up the entire market in lustre cloths with two other concerns (Fosters of Black Dyke Mills, Northowram, and Fosters of Great Horton) (RCHME 1986, 2). The construction of New Mill to the north of the original mill in 1865-8 increased the capacity of the mills and allowed dyeing to be undertaken at the site, but soon afterwards a shift in ladies' fashions towards softer fabrics using short staple merino wool brought about a serious decline in the lustre cloth trade.

At peak employment, about 3,200 people worked in the mill. Although detailed information about the workforce has not survived it is clear that in its nineteenth-century heyday that a large majority of the workers were either children under the age of sixteen or young adult women. They were mainly employed in the basic, unskilled or semi-skilled production jobs of tending the spinning and weaving machines. Adult men filled the skilled jobs and the positions of authority; the managers, foremen and overlookers were overwhelmingly men, as were the wool sorters, mechanics, finishers, joiners and office staff. A consequence of this was a lack of jobs for unskilled adult amen, a social problem that was common to the worsted industry. Skilled workers could earn as much as 28 shillings per week, whilst warehousemen and male weavers took home a weekly wage of 14 to 16 shillings. Other workers earned less, with female workers, including spinners, weavers and combers, earning about 9 shillings per week; half-time children could expect to earn 2 to 4 shillings (Styles 1990, 19-20). Children started work in the mill at the age of eight, although until the age of thirteen they worked on a half-time basis; the other half of the working day they spent at school. The hours of work at Saltaire Mills began at 6am every weekday and finished twelve hours later at 6pm, with two breaks amounting to an hour and a half for breakfast and lunch. On Saturdays work ended at 2pm. In these rates of pay and hours worked Saltaire was no different to other worsted mills, and despite Salt's apparent paternalistic attitudes he did not offer terms of employment superior to other mills and discipline in the mills was strict at all times. There is little evidence for worker's airing grievances at these conditions at Saltaire, but the fact that most inhabited company houses in the village may have inhibited the voicing of such grievances (Styles 1990, 20).

After the 1870s, Saltaire Mills failed to retain the dominance in the worsted industry that they had once enjoyed and in 1876, just five years after the death of Titus Salt, the firm became a limited liability company. By this time the company was being run by Titus' youngest son, Titus junior and in order to retain a competitive edge in the shifting market the mill began to new, softer fabrics and to diversify into other lines (Styles 1990, 40). In the 1890s a further crisis occurred, blamed on the American tariff, and led to the liquidation of the company and a takeover by a new syndicate, involving the purchase of the mills and village by a consortium of Bradford businessmen. By this time, the Salts connection with the mills was virtually severed; Titus junior had died in 1887 and other siblings and family members had moved away from the area. Trade began to improve in the 1890s and new heights of production were reached in 1895; such was the renewed success of the company that work was undertaken on the mills including the installation of new engines and the development of the New Mill site (RCHME 1986b 2). However, the paternalistic ethos of the mills and village dwindled, and during the economic crisis of the 1930s, many of the houses in the village were sold off to raise capital for new machinery (Styles 1990, 41). In 1958 the company became part of the large Illingworth Morris group; although initially output remained high, activity at the mills soon dwindled, first with the removal of combing and then the running down of spinning and weaving capacity; this progressive decline was entirely reflective of a general decline in the Bradford worsted industry from the 1960s onwards. Total withdrawal from the mills took place in 1986 and the mills lay empty.

The cessation of production at Saltaire Mills presented a problem familiar throughout Britain, what was to be done with those monuments of the industrial age that were now redundant and stood empty. One response was demolition, but Saltaire Mills were spared that indignity and in 1987 most of the complex was acquired from Illingworth Morris by Salts Estates Ltd., a company owned by Jonathan Silver. Salts Estate Ltd., recognised the potential of Saltaire, and other industrial sites, for re-use in imaginative and sympathetic ways without compromising the architectural or historic integrity of the site. Large sections of the mill are now used for commercial use, the largest tenant being Pace Electronics Ltd. Other parts of the building house a public restaurant, art shop and the '1853 Gallery' displaying the works of local artist, David Hockney, and the roof spaces and combing sheds are occasionally used for theatrical productions. The village and area around the mills was designated a Conservation Area in 1971 and most of the buildings, including the mills, had been listed by 1985. Saltaire is now a popular area for commuters and house prices have risen accordingly; this, along with the regeneration of the mills, has in turn prompted many business to return to the area and has brought about the conversion of local mills for new uses. In December 2001 Saltaire was designated a World Heritage Site by UNESCO, recognising its historical significance at an international level.

ARCHITECTURAL DESCRIPTION

The following is a fairly cursory overview of the site which reflects not only the scale of the site but also the variable access to different parts of the factory; the description will therefore be relatively generalising, focussing on the layout of the building and significant alterations rather than the minutiae of the buildings archaeology. The principal focus is the 1853 mill conceived and built during the middle decades of the nineteenth century which was regarded by the owner, Titus Salt, its designers, Willaim Fairbairn and the architects, Lockwood and Mawson, and other contemporaries to have been the ideal integrated worsted factory.

The main mill built by Fairbairn and Lockwood and Mawson survives virtually unaltered, with the majority of later alterations taking the form of internal modernisation so that the external character of the complex has survived. However, internal changes have disguised a substantial part of the power and drive systems and these are now hard to interpret and reconstruct.

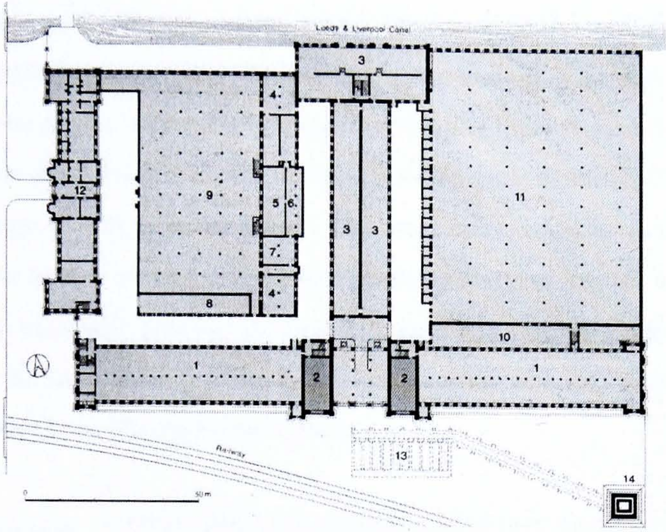


Plate 8.2 *Plan of Saltaire Mills from original plans (Giles and Goodall 1992, 103)*

The advantages of the site have already been noted and were exploited to the full in the layout of the mill. Directly north of the mill was the Leeds and Liverpool canal (opened in the 1770s) and the Leeds and Bradford railway(extended through what was to become Saltaire in 1847) to the south, a purpose built siding serving the site (Plate 8.2; see also Figure 8.1). The site also took advantage of water for processes from the River Aire, to the north of the canal and a growing local road network, including the Keighley to Bradford Turnpike (opened 1825) and the Shipley and Bramley Road (opened 1827). The area between the canal and railway, some six and a half acres, was virtually covered in buildings, each carefully designed and arranged to provide the best accommodation appropriate to each stage of manufacture and the best relationship between the different processes. Importantly, the plan of the mill illustrates how the integrated mill for worsted differed from its counterparts, for it required two blocks of sheds, one for combing, one for weaving, a duplication not necessary for other textiles (Giles and Goodall 1992, 102).

Dominating the site is a multi-storeyed range of buildings on a T-plan, the main east-west range providing spinning on each floors and engine houses; the north-south range providing warehouse accommodation, goods arriving and leaving by the canal to the north. To the west of the warehouse is a combing shed, to the east a larger shed for weaving. An office block lay on the north western edge of the site and, together with the south front of the mill, provides the principal architectural work. In front of the mill, and now demolished, was the boiler house, a subterranean structure into which coal was loaded directly from the railway siding above. At the south-east corner of the site was an imposing chimney. Within the complex, many areas were divided off for particular uses; the combing shed, for instance, is bordered on two sides by storeyed ranges giving rooms of various functions, for example, the washing of wool (RCHME 1986b, 3).

The main mill is designed as a double mill with two central engine houses, a central ground floor opening to the mill yard, two central towers surmounted by Italianate pavilions, main stair cases (with adjacent hoists) behind the engine houses and at the east end, and privies in towers on the south front. The mill therefore provides two large undivided working areas in each half of the mill and at attic level one large, top-lit working space. The main mill communicates directly with the warehouse block at first to attic levels. Lesser planning features include a small room in the western bay of the main mill, possibly an over lookers office, on each floor. Further small rooms are located on the main landing of the main north-western stair may also be over lookers offices or alternatively time offices for each floor.

The south front of the main spinning range of the mill, facing the village of Saltaire, was clearly intended as a show facade (Plate 8.3). Like the rest of the complex, it uses a broadly Italianate style, but here, like on the office block, the architectural detailing is exploited to great effect. Coursed masonry is used throughout and pilasters of various forms, some with mouldings, others rusticated, are found at the corners of the projecting end turrets, pavilion towers and engine houses (Plate 8.4).

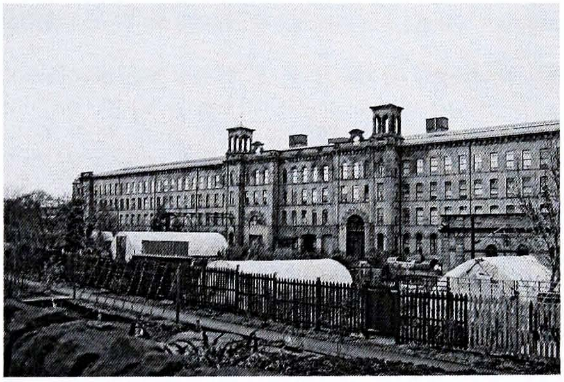


Plate 8.3 *South elevation of the main mill*

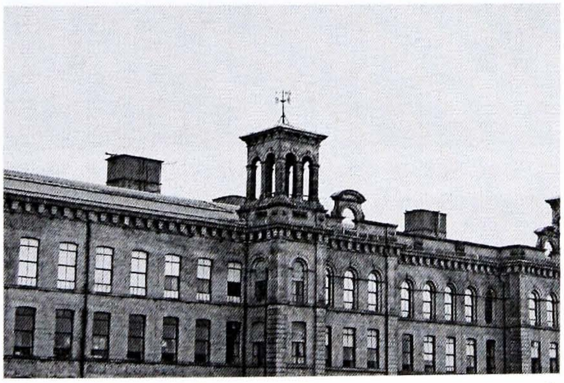


Plate 8.4 *Detail of pavilion towers on south elevation*

The elevation is divided by two plain string courses forming a continuous band at sill level; where the string course crosses the engine houses and pavilion towers, its lower edge is moulded. A heavy, bracketed cornice runs around the mill at eaves level. The fenestration of the south elevation changes throughout the facade. In the main parts of the mill the ground floor windows have round heads with rusticated voussoirs and are linked at impost level (Plate 8.5). On all other floors the windows have segmental heads under single stone lintels. The pattern of fenestration in the area of the projecting end turrets, engine houses, pavilion towers and central section of the mill is different. The windows of the third floor are also round-headed, beneath moulded arches of two orders. The main windows of the engine houses rose through the ground and first floors, were round headed with rusticated voussoirs and employed elaborated timber glazing bars, which only survive in their original form in the eastern engine house. The engine house and projecting end turrets are surmounted by a low parapet and those over the engine houses are punctuated by a centrally located moulded and pierced pediment. The pavilion towers are entirely open, with pairs of round-headed arches on all sides, and are a particularly overt use of the Italianate style.

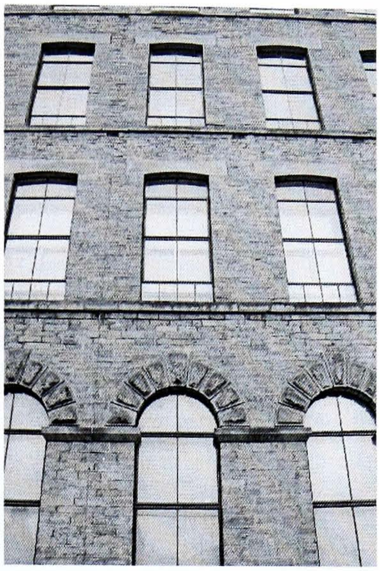


Plate 8.5 *The style of fenestration changes across the south elevation*

The central part of the south elevation was formerly occupied by the two engine houses, between which was an opening allowing the mill yard to pass under the spinning range to the buildings to the north. This area has been much altered in recent times and the once open character of this area is now disguised. Although this was clearly intended to provide an imposing entrance to the mill, workers would have the main staircase was at the western end of the mill, near to a further, smaller entrance from Victoria Road, the main road leading into the village. This entry, via a flight of steps, lead to a gate, beside an gate office controlling access to the yard (Plate 8.6). The narrow mill yard then runs behind the main spinning block of the mill and connecting the main entrance in the central section of the south

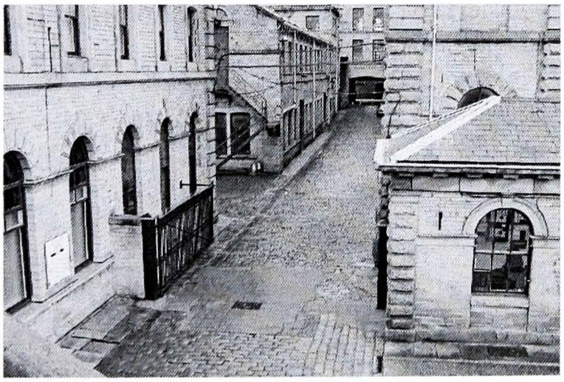


Plate 8.6 *The main approach to the mill by workers from the west through the gate situated next to the time office*

elevation. This western entrance was probably that used by workers on a daily basis and the mill yard also access to the canteen via a tunnel under Victoria Road. That area must therefore be seen as the main thoroughfare, and the southern entrance as a decorative entrance and centre piece to the south elevation.

The east and west elevations of the main mill are stylistically similar to the south elevation though the detail is not quite so profuse (Plate 8.7). A small tower rising from the apex of the gable of the west elevation is a later addition – it is a concrete out-look tower dating from the Second World War. The north elevation of the mill, facing into the complex retains round-headed windows with rusticated stone voussoirs at ground floor, but elsewhere the fenestration is plain, using segmental-headed windows creating a marked contrast to the ornamental southern elevation.

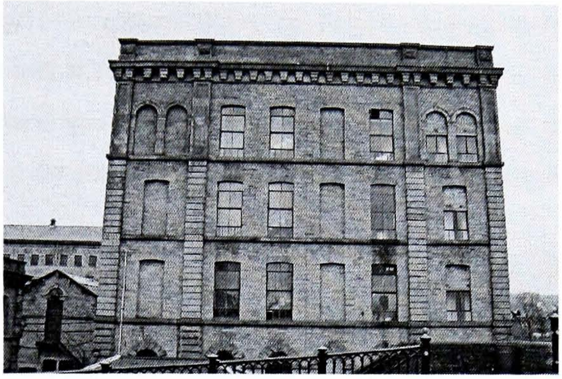


Plate 8.7 *The west elevation of the spinning mill, showing more restrained use of Classical idiom*

A warehouse block forms the spine of the complex. It communicates with the central part of the main mill on all floors except at ground floor level and its design, incorporating a spine wall running the length of the main part of the warehouse, suggests that the east and west halves of the warehouse served the east and west sides of the main mill. The warehouse is of traditional construction, with timber floors and timber king-post roof trusses. There are no columns in the warehouse for the spine walls in both the main part and at the north end split the span of the timber cross beams. Stylistically, the main part of the warehouse leading from the main mill is relatively simple, copying the north elevation of the main mill.

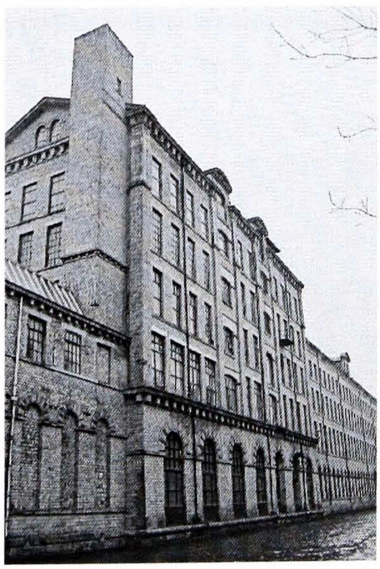


Plate 8.8 *North elevation of warehouse and sorting range*

The northern end of the warehouse is of four storeys over a basement (Plate 8.8). It is Stylistically more detailed than the rest of the warehouse block but is not as ornamental as the south elevation of the main mill or office block. Nevertheless it presents an imposing facade to the canal. It is seven bays long with sets of taking-in doors from ground to attic level flanking the middle bay. The taking in-doors are segmental-headed and have tooled keystones forming a panel above each opening; at attic level the taking-in doors are surmounted by decorative, semi-circular pediments. Otherwise all windows are square-headed with single-piece stone lintels and stone sills that are linked to forma continuous sill band interrupted only by the taking-in doors. Above the basement and at eaves level there is a bracketed cornice, which ties the warehouse stylistically to the main mill. The west and east walls of this part of the warehouse block copy the north wall and the attics are lit in each elevation by a pair of small, round-headed windows.

At ground floor level in the north elevation of the warehouse block are seven large round-headed windows that were originally open to the canal; the date at which they were glazed is unknown (Plate 8.9). These openings opened into the basement of this part of the warehouse block and acted as an open quay off the canal. A large hoist at the west end of the block is a later insertion and originally this end of the warehouse block was serviced by two smaller hoists and a centrally located staircase rising the height of the building.

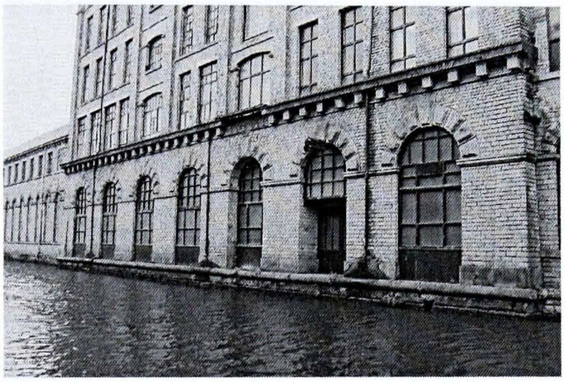


Plate 8.9 *Former arched loading bays at north end of warehouse and sorting block*

The weaving shed to the east of the warehouse block has been severely modernised inside but and only parts of its external walls are now visible because of modern buildings constructed to the east. However, the north wall facing the canal survives relatively unaltered. It is of two-storeys, with the north wall of the basement appearing at ground floor level because of the fall of land across the site.

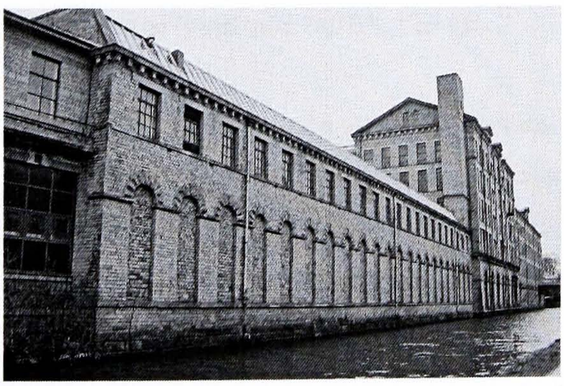


Plate 8.10 *North elevation of weaving shed showing ornamental fenestration*

The basement windows, now blocked, copy the form used on the ground floor of the main mill, with tall, round-headed windows with rusticated voussoirs and a continuous impost band and sting course at sill level (Plate 8.10). Windows lighting the shed itself are square, with stone lintels and sills, the latter being linked to form a continuous stone band. A bracketed cornice runs the length of the elevation, terminating shortly after returning along the east wall. A small hoist tower rises out of the north-west corner of the mill, serving the warehouse block. An area of disturbed masonry at the west end of the weaving shed north wall is evidence for one of three bridges that linked the main mill to the New Mill across the canal. Only one of these bridges now survives, the other two having been removed during the 1980s and 1990s.

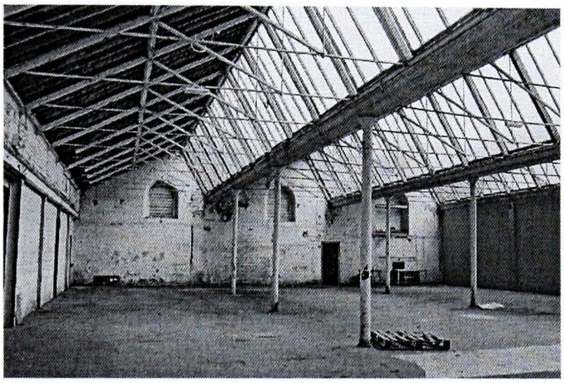


Plate 8.11 *Interior view of the former combing shed*

The combing shed has been subdivided so its former extent is difficult to imagine from the small undivided sections that remain (Plate 8.11). The shed uses cast-iron columns with the same foliage motifs on their capitals as in the main mill and has iron roof trusses forming a north-lit roof; each gable of the roof was original lit by a round-headed window. The walls in the south-east corner of combing shed are built of heavy ashlar blocks, indicating where the underground line shaft from the main mill entered the shed, the strengthened walling giving support to the shaft. A two-storey range, described by Fairbairn as containing a mechanics shed on the ground floor, occupies the south side of the combing shed. Beneath the combing shed, rain water from the roofs of the mill complex was collected in a reservoir and was used for washing the wool (Fairbairn 1857-8, 173-4).

To the east of the combing shed is a three-storey range. On Fairbairn's plan this contained wash houses, a picking room, a drying room and a packing room on the ground floor; it is not known what the upper floors were used for (RCHME 1986b, 4). The seven-bays in the centre of the east front of the range project slightly and have an arcade of segmental arches giving open access to the yard from the east. It is likely that this feature was designed to give easy communication between the shed and the warehouse; it also would have originally opened onto a shallow ramp that descended from the north elevation of the main mill, past this block attached to the combing shed and down into the basement of the warehouse block at its north end, terminating at the open quay beside the canal. The three-storey office block over a basement at the north end of the combing shed is a late nineteenth or early twentieth century addition and has straight joins with the warehouse to the east and the office block to the south and west; it faithfully copies the architecture of the north elevation of the weaving shed and warehouse block. Early views of the mill, prior to the construction of this office block show that the north wall of the combing shed was identical to the north wall of the weaving shed, with tall, round-headed windows at basement level, square-headed windows at ground floor level with a continuous sill band. The north elevation of the three-storey along the east side of the combing shed also fronted the canal, copying the style of the combing sheds north wall. It appears that this area was used as a mooring platform for boats.

Plate 8.12 *West elevation of the office block*

The impressive office block on the western edge of the site, beyond the combing shed was architecturally as detailed as the south front of the mill; it was designed to include counting houses, store rooms and a private suite of rooms with a dining room and bedrooms (Plate 8.12). Salt's office was in the northwest corner at first floor level affording him a view of workers arriving along Victoria Road to the south, below it was the company board room, a room which retains some of its original panelling. Much of the interior of the office block has been modernised and original features lost or obscured, but those areas which survive in their original form, like the Board Room or the main stair case and entrance hall shout opulence.

The exterior treatment is similarly ornate. The central bays of the west elevation, containing the main entrance and main staircase, break forward from the main facade and the wide arched entrance is surmounted by a large decorative pediment and is flanked by a pair of bay windows incorporating round-headed windows and rusticated detailing; heavy quoin stones are used at the corners of these central bays. All ground floor windows have round heads and rusticated voussoirs, similar to those used in the main mill, whilst those at first floor level have uninterrupted stone surrounds and segmental heads. A bracket cornice runs around the building at eaves level and centrally placed above the two main wings of the office block are two small pediments taking the form of an archway. The north and south ends of the office block break forward and like the central bay have quoin stones at their corner. The north and south elevations continue the architectural detailing evident on the west front, but the east facade has a relatively plain appearance and although the decorative treatment used on the west front continues as the facade returns, the elevation soon becomes plain with only the form of the windows reflecting the style used elsewhere in the building (Plate 8.13). This emphasises the use of elaborate detailing in those areas which were highly visible, whilst elsewhere a simpler, cheaper style was adopted.

Plate 8.13 *The east elevation of office block is markedly less ornate that its main facade to the west*

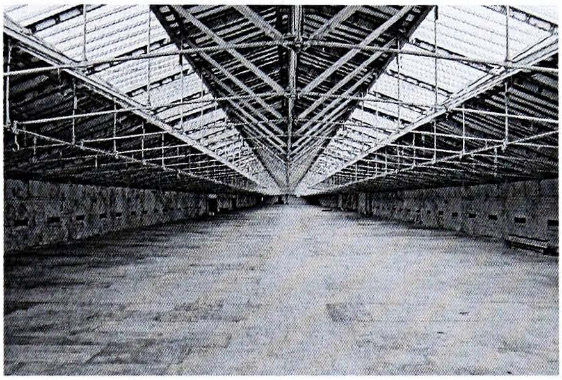


Plate 8.14 *The roof structure of the spinning mill is formed out of thin section iron bars and angle iron*

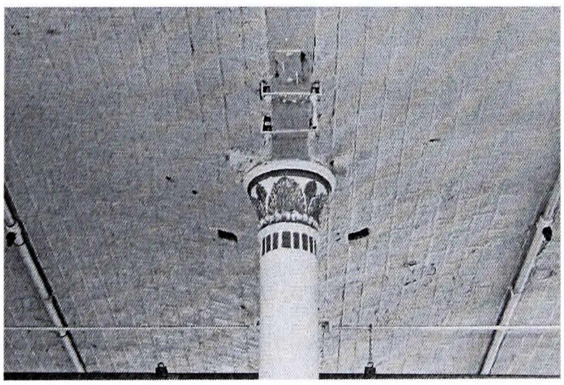


Plate 8.15 *Detail of foliate design at head of columns in spinning mills*

The internal structure of the mill reflects Fairbairn's status as a millwright at the forefront of experimentation with new techniques of construction, although many of his ideas were derived from other men (RCHME 1986b, 4). The structure of the mill is described in detail by Fairbairn himself (see Fairbairn 1857-8, 168-72) and the surviving structure conforms to that description. The main spinning mill employs hollow bricks in shallow vaults, parabolic cast-iron beams and a light roof structure of iron bars and angle iron (Plate 8.14). The warehouse does not have a fireproof structure but instead it has wooden floors and wooden king post roof trusses supported on cast-iron knee braces. The sheds use cast-iron columns and north-lit iron roof trusses. Except those columns in the basement, all other cast-iron columns in the complex have moulded capitals with a foliage motif; they do not have bolting heads and have simply moulded bases (Plate 8.15).

Power and Power Transmission

The entire mill complex was originally powered by two pairs of beam engines located in the engine houses flanking the entrance archways in the central part of the main mill (see Fairbairn 1857-8, 175; 1864, 235-7). The main mill was driven by two upright shafts rising from the cellar to the third floor, each shaft driving line shafts in each half of the mill. An unusual feature of the power transmission within the main mill is the means of driving machinery on the second and attic floors. Fairbairn's drawings show that, instead of having the usual overhead line shaft, these floors were powered by belt from the floor below, through slots provided in the fireproof vaults. The advantage of this system was probably that of reducing the load on the upright shafts by eliminating two sets of gear wheels. The upright shafts were supported in most floors by heavy cast-iron plates fixed to the cross walls (RCHME 1986b, 4).

Shafts leading underground from the engine within the main mill powered the two sheds. A tunnel under the yard from the basement of the western half of the main mill to the corner of the combing shed allowed a shed to be led to the shed, although the apparent necessity of gearing at right angles as many as five points must have reduced the efficiency of the system. Support for the shaft as it entered the shed was given by building the south-east corner in massive ashlar. Countershafts off the main drive shaft ran east to west within the shed, supported on the cast-iron columns; some columns retain the bracket supporting the shaft.

The weaving shed was powered in a more direct manner, with a drive shaft leading from the basement of the eastern half of the mill and turning only a single right angle before running the full east-west length of the shed, not at the level of the main floor but in a vaulted cellar below it. This main shaft was geared to countershafts running north, one within each bay of the cellar, and belt drive through the floor powered the machines in the shed above. This system had the advantages of quietness, safety, and of allowing unobstructed views for the overlooker (Fairbairn 1857-8, 173). The vaulted cellars and basement passages survive but much of the evidence for the shafting has been removed.

The engine houses were powered from a subterranean boiler house the details about which are obscure but it seems that coal was delivered from the adjacent railway and tipped down into the boiler house. An undated picture shows rows of Lancashire boilers in the boiler house with overhead automatic hopper feeds (Plate 8.16). The chimney, with a tapering square-section shaft set on a tapering square plinth with rusticated quoins and a bracketed cornice, originally had a decorative cap, which was removed recently due to fears about its structural integrity (Plate 8.17). Illustrations of the mill show that the cap had oversailing courses and incorporated arch-shaped openings and motifs, complementing the style of the main mill.

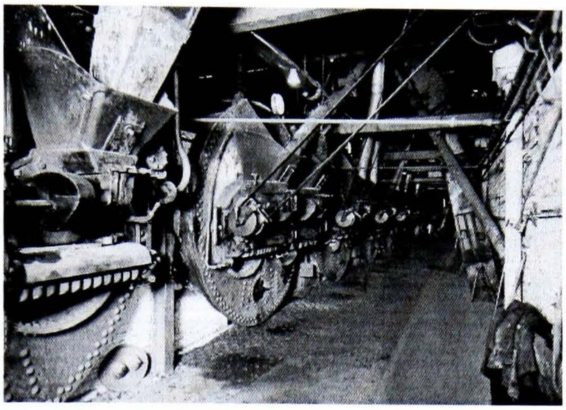


Plate 8.16 *Undated view of interior of the boiler house (Giles and Goodall 1992, 149)*

Later Developments

Following the construction of the main mill in 1853 a number of alterations and additions were made to the site. These included the development of the lower part of the site, between the canal and River Aire, between 1861 and 1865. Here was built the New Mill and a dyehouse. This work involved the demolition of Dixon Mill, an earlier corn and fulling mill on the site. An 1881 plan shows the New Mill, the dyehouse, a sud house and an expanded gas works with two gas holders. The New Mill was independently powered, probably by a horizontal engine in the attached end engine house, although there are records of water turbines being installed at Saltire, probably in the New Mill as it lies over the head and tail races of the earlier Dixon Mill and turbines could therefore be easily accommodated and driven from the River Aire (RCHME 1986b, 5). The New Mill is made particularly distinctive by its Italianate campanile chimney.

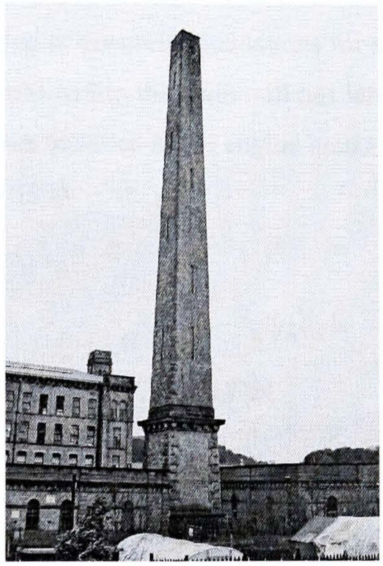


Plate 8.17 *Chimney to the southeast of the spinning mill*

By 1881 the areas to the east of the mills had been partially developed through the construction of a wool shed, and a Yarn Scouring, Drying and Packing Department and Stock Room. Other alterations included the roofing over of the two yards between the warehouse and sheds. The area created next to the weaving shed and dated 1921 was used as a Piece Dyehouse, and that near to the combing shed as a Package Dyehouse. New offices were also built along the north side of the combing shed, in a style sympathetic to the existing structures In the late nineteenth or early twentieth century an engine house was created within the south east corner of the Combing Shed block; the former are of the engine house retains the glazed brick lining to the walls. It is unclear what type of engine was installed, although there is a record of a horizontal engine of 1894 being installed somewhere in the complex and this is the likely site.

The original beam engines in the main mill were compounded by Hick Hargreaves in 1873 and in 1895 were replaced by a new pair of vertical engines and a new rope drive system displaced the original upright shafts in the main mill. This involved changes to the engine beds, with the removal of some of the original ashlar blocks and the insertion of concrete foundations for a new engine or engines, but the insertion of a rope drive system within the main mill has left little trace. The main mill was eventually powered by turbines installed in the engine house; No.1 turbine was started in 1916, No.2 in 1922 and No. 3 in 1934.

PROCESS RECORDING

Because of the scale of Saltaire Mills a schematic representation of the flow of processes at the site has been produced instead of a basic flow chart (Plate 8.18).

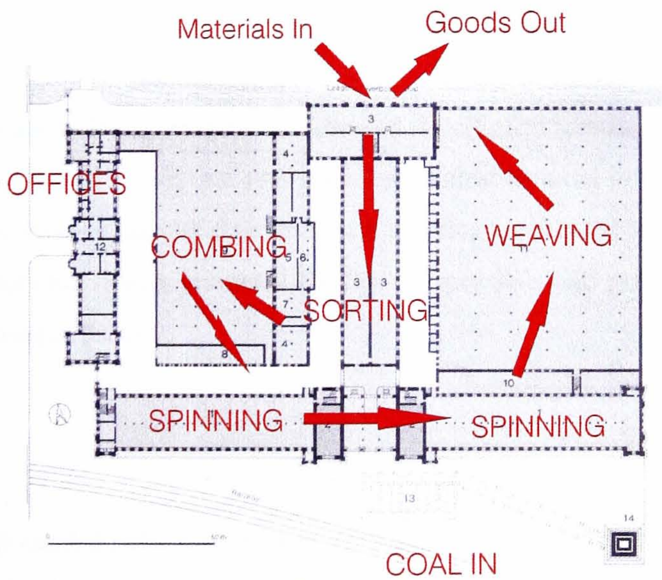


Plate 8.18 *Processes, Saltaire Mills*

With the exception of dyeing and some other finishing processes, Saltaire Mills was essentially an integrated mill and it was designed to produce cloth from raw materials. Raw materials, principally alpaca, entered the warehouse directly from the canal – from the port of entry, Liverpool. The firs major process – combing – was performed in the shed to the west of the warehouse. Machine combing was relatively new to the worsted industry when the mill at Saltaire was built, the patents having been taken out, mainly by Samuel Lister of Manningham, in 1840. Fairbairn's plan shows that the ground floor of the main part of the warehouse was used for the storage of tops, the retained product of the combing process. The tops were then moved to the main mill, where they started on the ground floor to be worked into yarn in different preparatory and spinning stages on this and the upper floors. Between each stage material could be stored in the warehouse, which linked closely with the main mill and which, in its main part, is divided by a spine wall into two separate areas, one serving each half of the mill. The yarn was then stored in a weft room between the mill and the weaving shed. According to Fairbairn's plan, warping was apparently performed in the office block, the one departure from a strict flow of processes (RCHME 1986b, 6), but it is difficult to see where in the office block this process was undertaken since it involved large machines which would not have been easily accommodated in that building which was divided into a series of small rooms. This may therefore be an error on Fairbairn's published plans, and a picture of the warping room in the early twentieth century shows the process housed in saw-tooth roof shed, and it may therefore have been moved into part of the weaving shed in order to maintain the flow of processes (see Styles 1990, 8). The cloth was woven in the weaving shed and, as dyeing and other finishing processes were not provided for in the original design, it is likely that these operations were performed at one of Salt's other mills in Bradford or pout out on a commission basis. Cloth was probably dispatched via the canal (RCHME 1986b, 3).

The high number of taking-in doors and hoists around the site allowed the efficient movement of materials and goods around the site and meant that systems of movement devoted to the handling of materials and goods communicated with all of the main working areas at the site. This high degree of connectivity between spaces promoted the flow of materials and goods between different parts of the production process.

ACCESS ANALYSIS

Access analysis of the site was only carried out at a basic level for reasons of economy but it has allowed the basic pattern of movement at the site to be assessed (Figure 8.2). A number of general observations can be made about the complex. First, it has an inherently tree-like structure which implies social control through the imposition of restrictions on movement about the building. However, the complex also has a large number of rings connecting different parts of the structure allowing workers to follow the flow of production around the building. Although these links may not have been used by all workers they would have been essential to

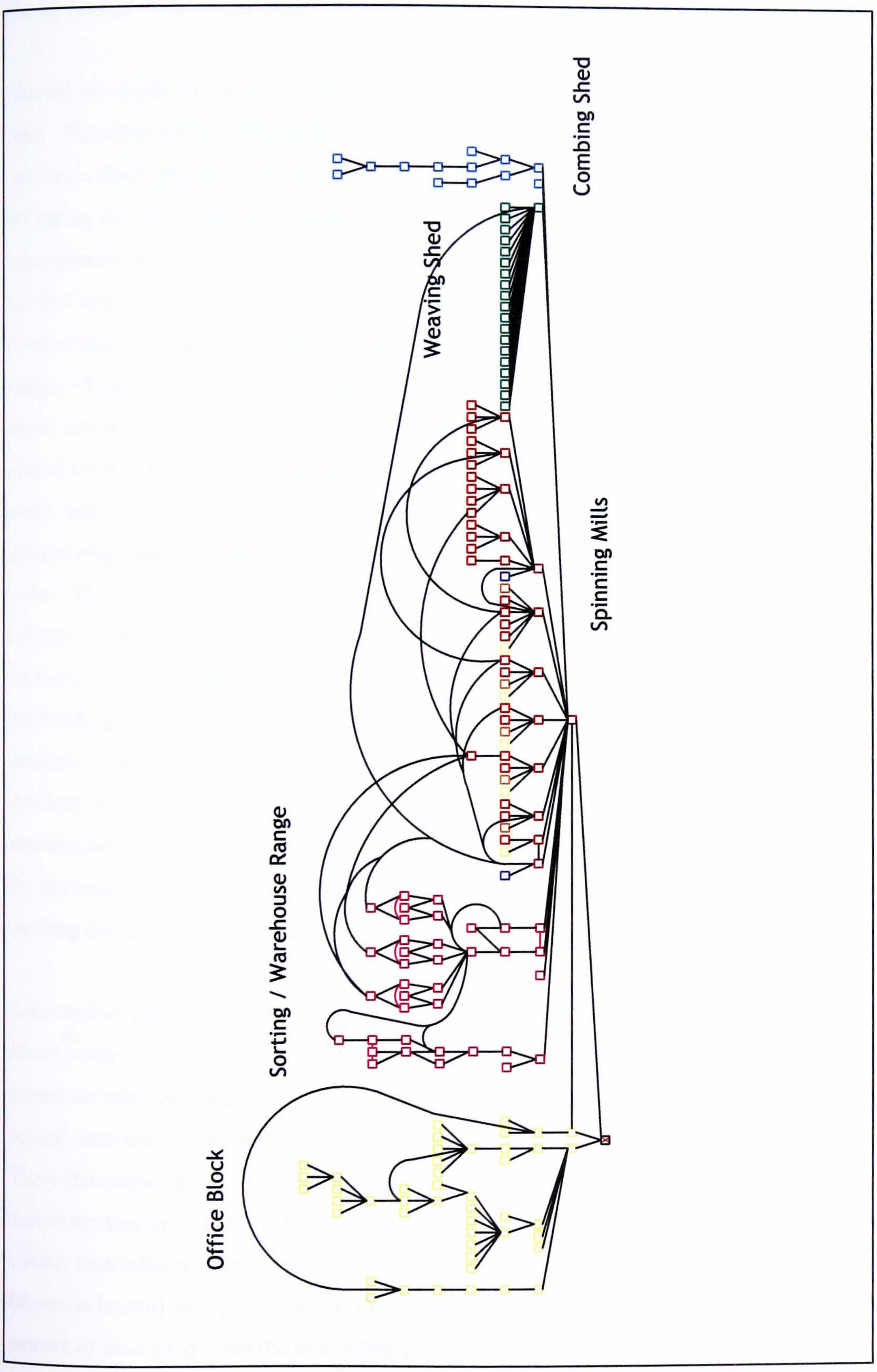


Figure 8.2 *Gamma map of the movement of the workforce, Saltaire Mills*

the movement of those responsible for handling materials and goods around the site.

Second, the spatial character of different parts of the site are immediately clear from the gamma map. The office block, for instance, is not only located away from the main production areas but has a distinctive tree-like structure that reaches into the deepest parts of the complex, reflecting the large number of small offices and suites of rooms for board meetings and management. In contrast, the weaving shed occupies only two levels in the complex, reflecting the fact that it was one large space with a number of storage or holding rooms leading off its western side. The fact that each area of the mill had a distinctive spatial structure implies two things. On the one hand the requirement of space was clearly dependent on the function of that space and thus the spinning mill incorporating the engine houses naturally has a different spatial form to the combing shed where the building was divided in to a smaller number of areas, many of which were used for the storage of freshly sorted wool. On the other hand, this gamma map makes quite clear the level of segregation between workers involved in different tasks. The greatest division is between the office block and the rest of the complex which reflects the fact that administrative staff and management did not readily mix with the other workers. This establishes something of a hierarchy in the workforce that can be mapped on to the building itself. The segregation between workers involved in the production of worsted products is also of interest for, as the gamma map suggests, workers with similar skills and involved in the same part of the production process inhabited the same spaces. This fits microeconomic models of the factory system which suggest that the factory arose because of the advantages of housing workers together and the importance of this commonality for team working and the transfer of skills.

Some further observations can also be made about specific buildings in the complex which allows some analogy with smaller sites. The spinning mills are a good example. Movement around the spinning areas of the site, shown largely in red, was dependent on the existence of several staircase towers in the buildings which provided access to the main working areas. These staircases (shown in purple) thus dictated movement to an from the spinning areas and moved workers directly from the outside of the mill to the place of work, minimising potential contact with other workers or time away from the processes of production. Similarly, privies (shown in brown) were provided next to each of the main working areas, again minimising the amount of time away from the production process and limiting the need for workers to leave the work floor. This system of supervision was bolstered by the presence of overlooker's offices (shown in yellow) at the ends of the main working areas from where workers could be observed at all times. Although located with the spinning mills the engine houses (shown in blue) typically occupy isolated strands in the complex. This not only reflects the fact that they were not directly involved in the production processes, but also the segregation of engine men from other workers.

ARCHITECTURAL SUMMARY

The building of Saltaire Mills represented the physical expression of the work of William Fairburn, one of the leading mill engineers of the time. In his treatise on Mill work (1863) Fairburn called for the construction of mills in an 'improved' style, which incorporated Neo-Classical motifs in an Italianate style. These were contrasted with earlier and 'uncouth' mills with only minimal or no architectural detailing. These ideas proved highly influential and few mills, except perhaps those in the most remote settings, were built after either Saltaire Mills or Fairburn's treatise in anything but a Neo-Classical and Italianate style.

The use of Italianate features at Saltaire is especially explicit and conducted on grander and more exaggerated scale than at most sites. Saltaire Mills are therefore best regarded as a showpiece; not only was the accompanying settlement a 'model village' but the site of production was a 'model mill'. The main mill building incorporates pilasters, quoins, a rusticated basement, horizontal and tripartite divisions in its longest elevations, pavilion towers. The later New Mill (not studied here) also adopted the same style and incorporated a campanile-styled chimney. The use of the same motifs across the village of Saltaire creates a sense of architectural unity and firmly situates the mill at the heart of the local community for the scale of the mill gives the sense that other buildings in the area borrow their style from it. An interesting feature of the mill is the use of explicitly ornate detailing on the external elevations whilst internal elevations, not seen by the public, are formally similar but stylistically more restrained. This emphasises the 'public' and 'private' areas of the mill.

APPENDIX A
SITE DESCRIPTION : 9

ARDSLEY MILLS

DATABASE ENTRY:	515
NBR NUMBER:	BFO63623
NGR:	SE 2975 2570
TOWNSHIP:	East Ardsley
CIVIL PARISH:	Morley
DISTRICT:	Leeds
COUNTY:	West Yorkshire
BRANCH:	Worsted
PERIOD:	Late

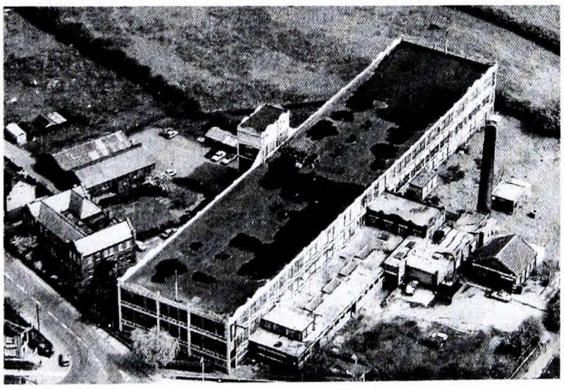


Plate 9.1 *Ardsley Mills, East Ardsley (Giles and Goodall 1992, 121)*

Built on an elevated, flat site beside the main Wakefield-Bradford road (A650) and highly visible in the local landscape, Ardsley Mills comprises a main mill building with attached power plant, a detached office block, canteen, and associated workers housing (RCHME 1987d, 2; Figure 9.1). The mill was built by the company of Thomas Ambler and Sons, worsted spinners, who moved to the site having previously operated from a mill in Bradford. The mill used the latest building technology and was built on the principals of an American model, using the Hennebique system of ferro-concrete construction. This allowed a strong structural frame to enclose a well-lit and large working area and gives the mill a distinctive character.

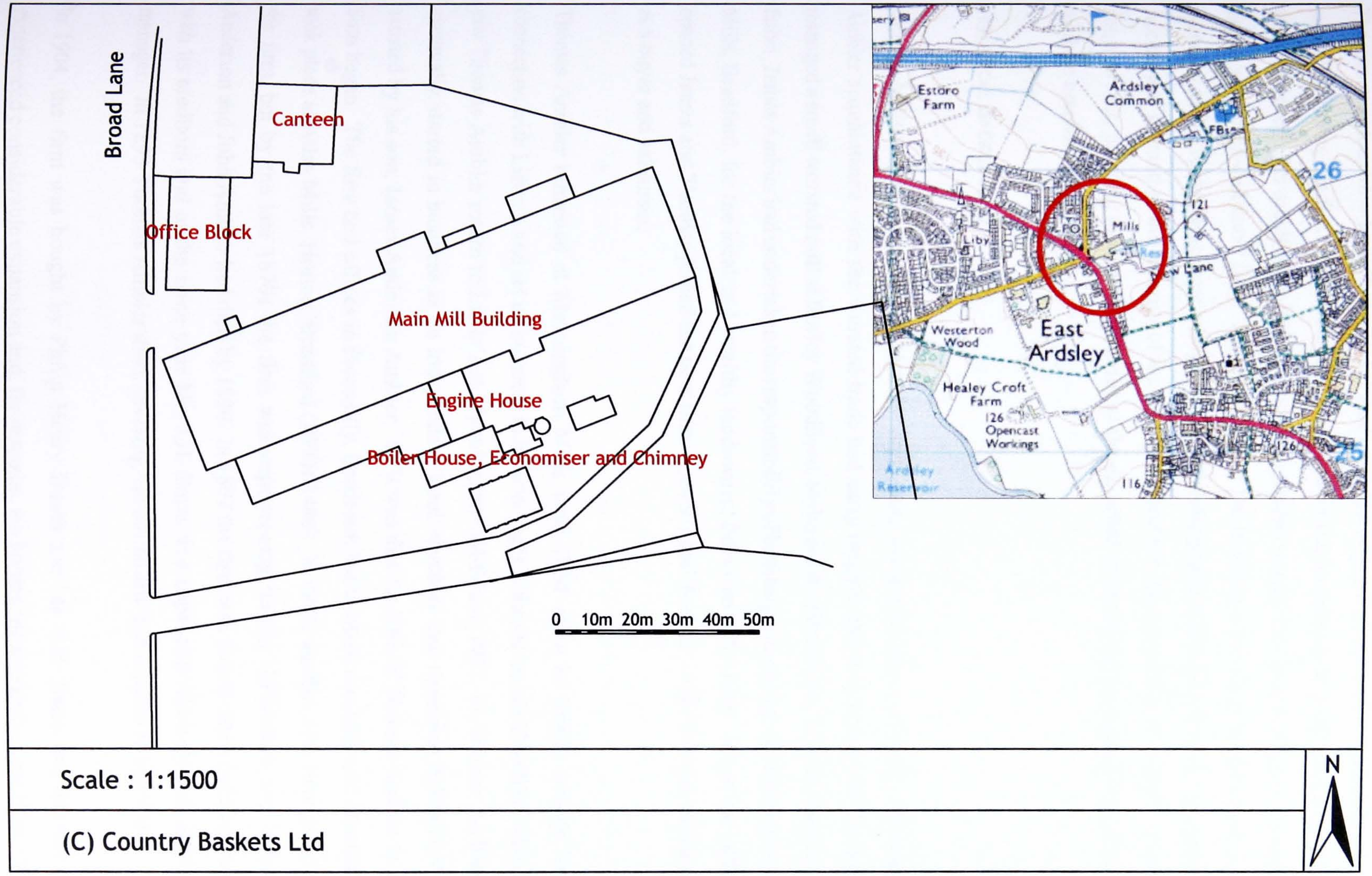


Figure 9.1 *Block Plan, Ardsley Mills, East Ardsley*

The site is susceptible to archaeological study for the original structure has changed little, largely reflecting the fact that the site remained used for the production of textiles until the late 1980s and thereafter much of the building has been used as storage for Country Baskets (Leeds) Ltd, a large cash-and-carry firm. Modern plans of the building were made available for the purposes of this research as were a large number of photographs relating to the life of the mill. Access was granted to the exterior of the whole site and the interior of the 1912 mill. It was not, however, possible to view the interior of the detached office block, canteen or any of the workers houses.

Historical Background

Ardsley Mills was built by Thomas Ambler and Sons, worsted spinners, in 1912. Thomas Ambler acquaintance with the worsted trade had early origins, and as a young man he had managed a small worsted mill at Burley Woodhead, to the north of Bradford. In 1838, Thomas' father, James Ambler had undertaken the responsibility of building and equipping Manningham Mills, Bradford, for the local and wealthy landowner, Ellis Cunliffe Lister. When the mills opened James and Thomas joined the new firm - Lister's and Ambler - with Thomas working as a buyer and salesman.

Thomas Ambler remained at Manningham Mills until 1858 when he finally severed his connection with Lister's and set up business in his own right. Despite an initial setback which saw Thomas Ambler return to Lister's at Manningham (Millmore 1952, 1), Thomas Ambler eventually started in business as an independent wool merchant and topmaker in Bradford, assisted by his son, James Anderson Ambler. So it was that the firm of Thomas Ambler and Sons began. The firm had offices in Piccadilly, Bradford, but worsted combing and spinning took place at Atlas Mills, Horton, Bradford (**BFO62488**). In 1860, another son, John, joined the firm, but by the late 1870s the firm was experiencing trading difficulties and James Anderson and John Ambler had died by 1890. In 1892 the firm was forced into a composition with its creditors and in the same year Mr. J.H. Bates was appointed secretary and under-manager. In 1893 Thomas Ambler died, severing the old family connections to the firm.

In 1904, the firm was bought by Philip Henry Booth and Mr. J.H. Bates and thereafter experienced considerable expansion and, for instance, the number of employees rose from 250 in 1906 to over 450 by 1914. During the early twentieth century the Bradford coalfields was beginning to be exhausted and there was a general shortage of female in the area (Millmore 1952, 2) and it was in response to these difficulties that the decision was taken to move the firm to the Wakefield area where local coal supplies and labour were more plentiful. The site at East Ardsley fulfilled these criteria and the new mill was to be built on previous vacant land (Document 9.1); plans had been drawn up for the new mill by 1912 (Document 9.2).

The model chosen for the new mill was one developed by the Wood Worsted Company in the United States of America, based on a system of reinforced concrete framework which allowed large windows, large working areas and a flat roof (Atkinson 1985, 149). The method by which this model was selected nor the idea for the imitation are known (RCHME 1987d, 1). Although the use of reinforced-concrete structures for industrial buildings was quickly adopted across many industries after its first use in a flour mill in Swansea in 1897-8 (Giles and Goodall 1992, 65; Jones 1985), relatively few textile mills were built in Yorkshire using the new technology. The first such structure was Bridge Street Mill, Slaithwaite (**BFO62993**) in 1903 whilst another notable examples include the New Mill at Brookroyd Mills, Stainland (**BFO62985**) in *c.*1920. However, none employed the style in such an overt way as at Ardsely Mills, where the concrete frame is exposed and an aesthetic feature of the mill. The basic structural framework employs the Hennebique system of ferro-concrete construction, comprising a rigid concrete superstructure with glass and brick in-filling. A novel feature of the mill includes the incorporation off some 100 tons of old railway line alongside more conventional wire reinforcing in the concrete frame! (Millmore 1952, 2). The architect responsible is unknown but it seems likely that the Yorkshire Hennebique Company, Leeds, and L.G. Mouchel and Partners, Civil Engineers, of London, were involved given the novel building technique, but the level of their involvement is unclear (RCHME 1987d, 1).

It is known that the mill and an associated terrace of worker housing is shown on the 1915 OS map (a copy of which it has not been possible to obtain for the purposes of this research (RCHME 1987d, 3; Document 9.3). The construction of the worker housing may been to allow the relocation of workers from the firm's Bradford factory, but Millmore (1952, 2) has suggested that it was always intended to relocate the business to East Ardsley and to employ an entirely new workforce, some of which were presumably to be housed in the new terraces of houses adjacent to the mill site. By 1914, the firm of Thomas Ambler and Sons was operating from both Atlas Mills, Horton, and Ardsley Mills, East Ardsley (Worrall 1913-14), presumably reflecting a period of transition between the two manufacturing concerns but indicating that the new mill was operational by this time. By 1920 the link with Atlas Mills had apparently been severed (RCHME 1987d, 1). The new mill was fitted out with some machinery from Atlas Mills, but also with new machinery based on the latest technology in worsted spinning, including Continental dry spinning methods - the move to the new site was therefore innovative in terms of mill design and construction, and production. The firm maintained a competitive position in the market through the use of the latest spinning machinery and were keen to publicise their innovative approach (Plate 9.2); of particular interest, a hand-written note on the reverse of one photograph read '...these pictures must not appear "dark and satanic"' - it is therefore clear that the firm desired to appear modern manufacturers. It is therefore unsurprising that Thomas Ambler and Sons were one of the first companies in Yorkshire to introduce the 'Burnley System' of a 3½ day working, a measure to ensure the greatest productivity and to appease employees.

Plate 9.2 *Publicity photograph dating from the 1960s showing latest spinning technology in use at Ardsley Mills*

Sometime after 1915 but before *c.* 1920 the detached office block was built to the west of the main mill building at the entrance to the mill yard and a small canteen on the north side of the mill yard (RCHME 1987d, 3). Later still, during the 1960s , an extension was built on the southeast side of the mill. The firm of Thomas Ambler and Sons continued to spin fine worsted yarns until the late 1980s. Since the closure of the firm the site has been occupied by Country Baskets (Leeds) Ltd, a commercial cash-and-carry, as a mixed warehouse and showroom.

ARCHITECTURAL DESCRIPTION

There are two principal phases of structural activity at Ardsley Mills (Figure 9.2): first, the construction of the main mill, office block, workers houses, and canteen *c.*1912 - 1920, which represents the site as initially planned; second a mill extension on the southeast elevation and other smaller additions and alterations built during and after the 1960s whilst the site was still used for the production of textiles but outside of the temporal limits of this research. The

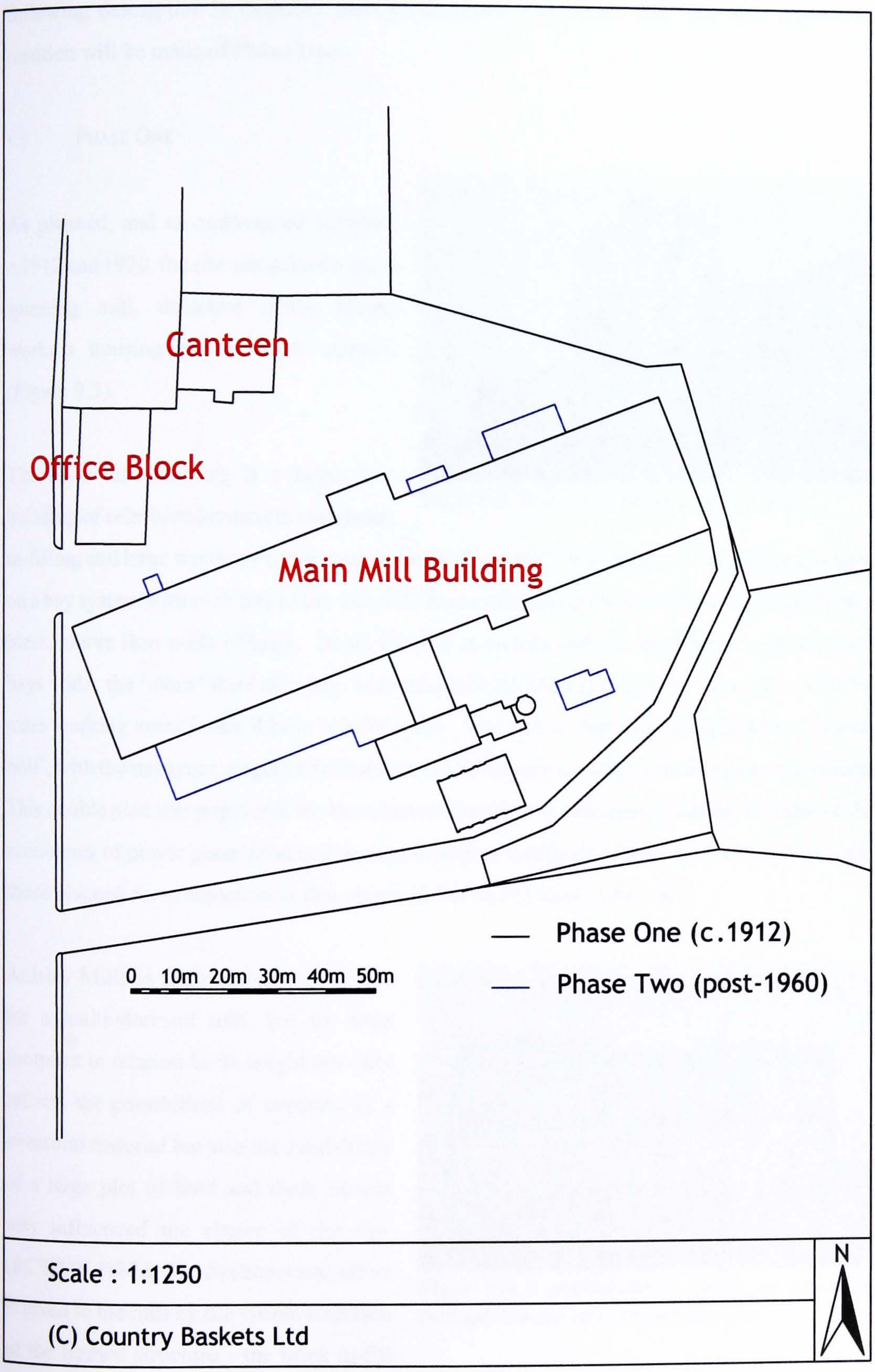


Figure 9.2 *Phased block plan, Ardsley Mills, East Ardsley*

following description is therefore mainly concerned with Phase One and only superficial mention will be made of Phase Two.

- PHASE ONE

As planned, and as constructed between c.1912 and 1920, the site comprised a main spinning mill, detached office block, workers housing and a small canteen (Figure 9.3).

Plate 9.3 *North elevation, Ardsley Mills*

The main mill building is a large, low building of reinforced-concrete with brick in-filling and large windows and is a single build (Plate 9.3). It is three storeys high and is built on a bay system with each bay of the concrete frame containing three windows, divided by thin piers, above skin walls of brick. In all, the mill is sixteen and one third hays long and three bays wide; the 'extra' third of a bay is central located and contained the rope race with the main working areas in the 8 bays to either side. The mill is therefore designed as a 'double mill', with the rope race, engine house and external stair tower all located along its central axis. This double plan was popular in the late nineteenth and early twentieth centuries because of the economies of power generation and transmission that it offered in both mills of one build and those planned for completion in two stages (Giles and Goodall 1992. 38).

Ardsley Mills is uncharacteristically low for a multi-storeyed mill, but its large footprint in relation to its height not only reflects the possibilities of concrete as a structural material but also the availability of a large plot of land and these factors may influenced the choice of the site. (RC'HME I987d, 2). Architectural effect is given to the mill by the visible retention of the framed structure - the brick in-fill panels and large windows contrast with the rendered concrete - whilst extra ornamentation is

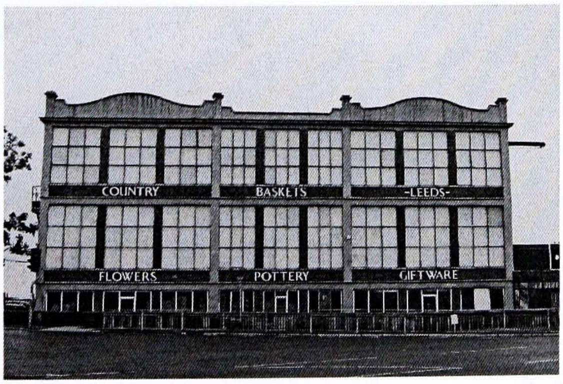


Plate 9.4 *Architectural effect is provided through the use of a curved parapet*

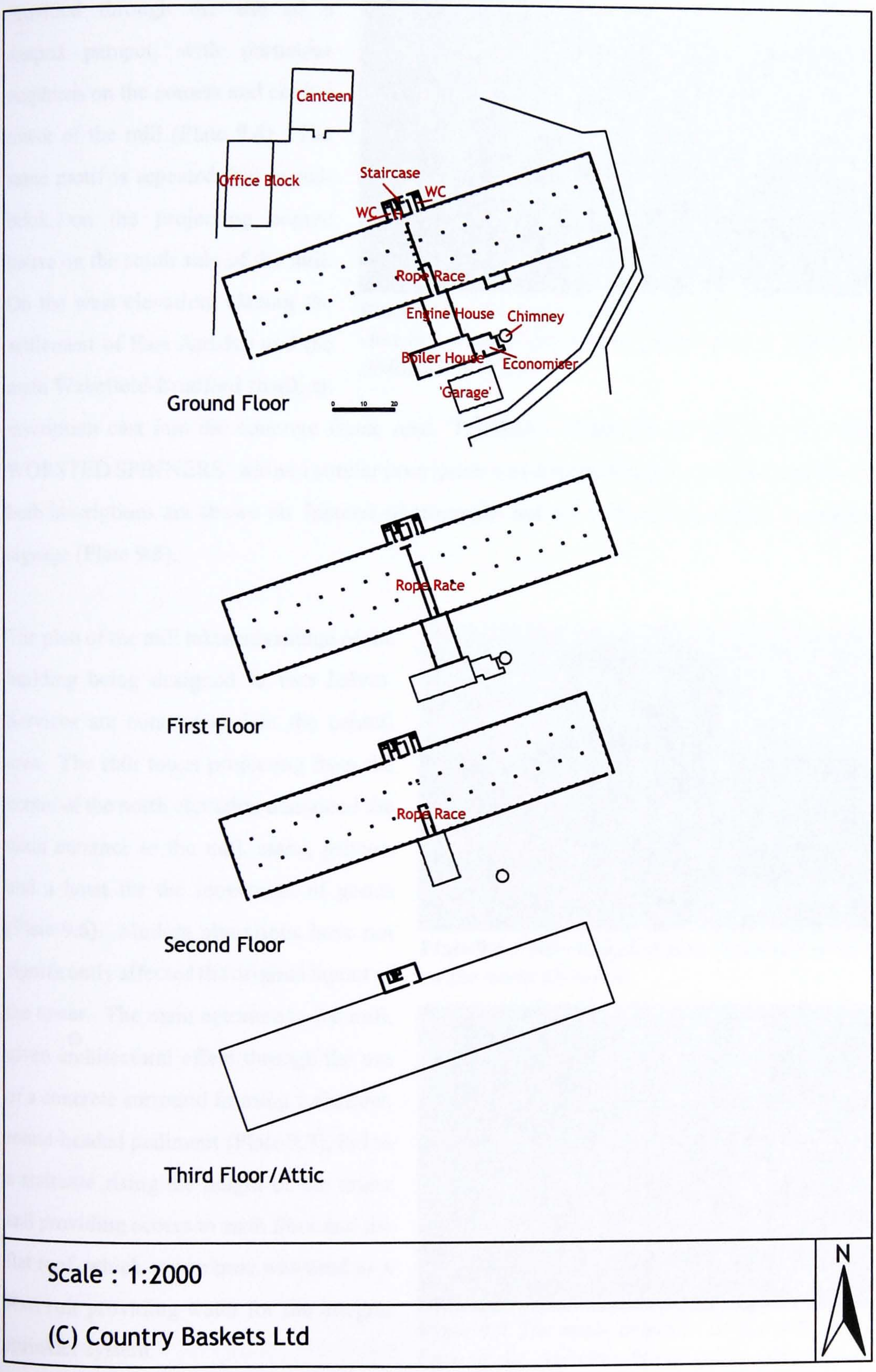


Figure 9.3 *Phase One: Ardsley Mills*

provided through the use of a shaped parapet, with particular emphasis on the comers and central tower of the mill (Plate 9.4). The same motif is repeated, but in red-brick, on the projecting engine house on the south side of the mill. On the west elevation, (facing the settlement of East Ardsley and the main Wakefield-Bradford road), an inscription cast into the concrete frame read 'THOMAS AMBLER & SONS LTD. FINE WORSTED SPINNERS' whilst a similar inscription was displayed at the top of the stair tower: both inscriptions are shown on historic photographs but are both now obscured by modem signage (Plate 9.5).

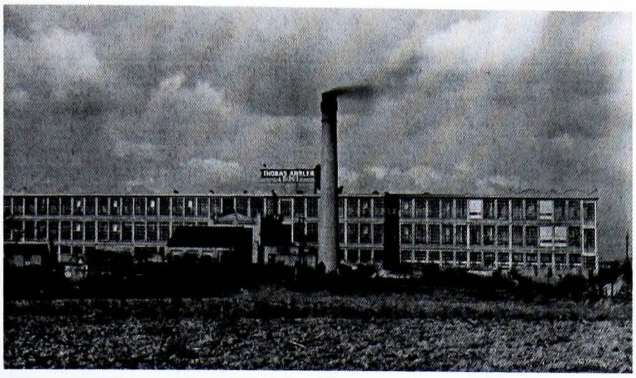


Plate 9.5 *Undated photograph of Ardsley Mills, showing original tower inscription reading 'THOMAS AMBLER & SONS'*

The plan of the mill takes advantage of the building being designed in two halves. Services are concentrated in the central area. The stair tower projecting from the centre of the north elevation contained the main entrance to the mill, stairs, privies, and a hoist for the movement of goods (Plate 9.6). Modem alterations have not significantly affected the original layout of the tower. The main entrance to the mill, given architectural effect through the use of a concrete surround forming a shallow, round-headed pediment (Plate 9.7), led to a staircase rising the height of the tower and providing access to each floor and the flat roof, which at one time was used as a reservoir providing water for the integral sprinkler system.

Plate 9.6 *Projecting stair tower centrally placed on the north elevation*

Plate 9.7 *The main entrance to the mill at the base of the staircase tower with rounded cast-concrete pediment*

Pairs of privies located on the east and west sides of the tower were access from each of the main floors and it seems that these were provided for the workers in each half of the mill rather than by gender as is now the case. A hoist located next to the staircase communicated which each floor of the mill. It has recently been converted for use as a passenger lift, but was originally for the movement of goods only (Steve Wood *pers comm.*). Originally, small offices, probably functioning as time and overlookers offices, were provided on the landing of the staircase agt each floor level and all but the office on the second floor survive. The offices had glazed walls facing onto the landings

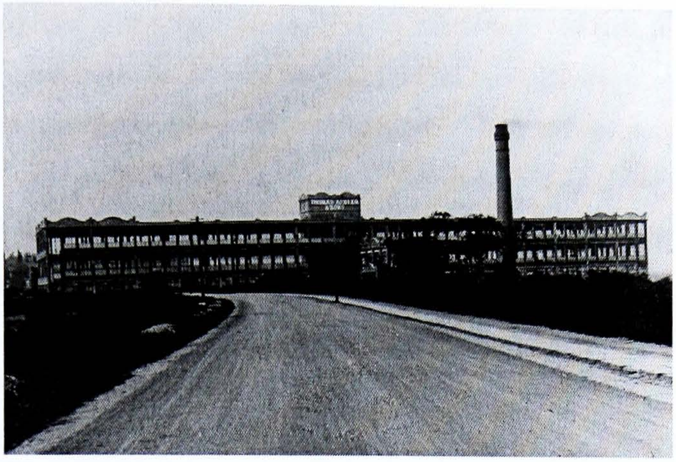


Plate 9.8 *Undated view of Ardsley Mills showing absence of internal walls; the site is clearly newly built but in operation because of smoke from the chimney*

The main working floors of the mill were originally undivided and this is apparent from several historic photographs which clearly show an absence of internal walls except in the area of the centrally located rope race (Plate 9.8). The main feature of the interior is the exposed concrete frame. It is made up of spine beams, supported on two rows of square concrete pillars (which are stop chamfered) and cross-beams, supported by the spine beams and, in the outer thirds, by the concrete piers in the external walls (Plates 9.9 and 9.10). The floors and flat roof are entirely of concrete. A spine wall (part of which formed the

Plate 9.9 *The internal structure of the mill comprises two rows of concrete piers supporting concrete cross- and spine beams*

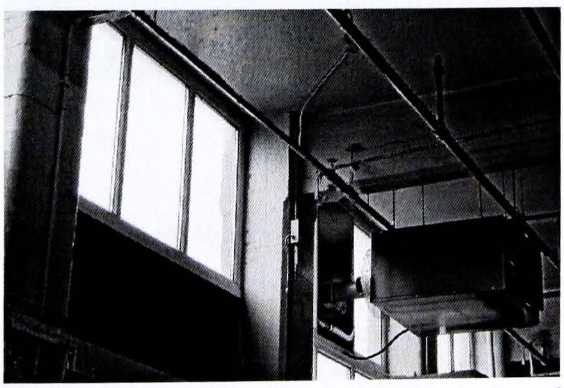


Plate 9.10 *The cross-beams are also supported by concrete piers in the external walls*

central rope race) divided the ground floor with a short passageway at its northern end next to the stair tower. The rope race and spine wall also divided the first floor in a similar way and a sliding fireproof door at the north end gave access between the two. The top floor was apparently undivided apart from a small section of the rope race at the south end. A small, single-storey extension on the northern half of the east elevation is structurally identical to the main mill and is therefore an original feature, perhaps an over-lookers office or additional storage. Within recent memory the ground floor was used partly for spinning, (eastern half) and partly for storage (western half), the first floor for drawing, spinning and warping and winding, and the top floor for spinning and warping. Combing was presumably performed off the premises (RCHME. 1987d. 2).

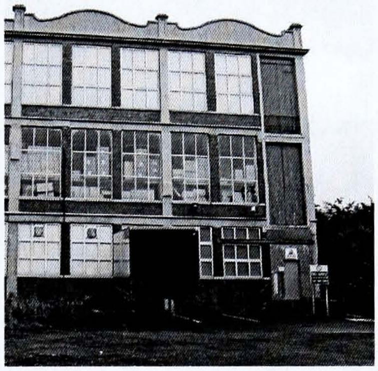


Plate 9.11 *Original taking-in doors at the east end of the south elevation*

At the east and west ends of the south elevation are taking-in doors to each floor (Plate 9.11). Where the original doors survive they are double-wooden doors. There is no evidence for a hoist above these doors, but some form of internal mechanism which could swing out and serve as a hoist must have existed.

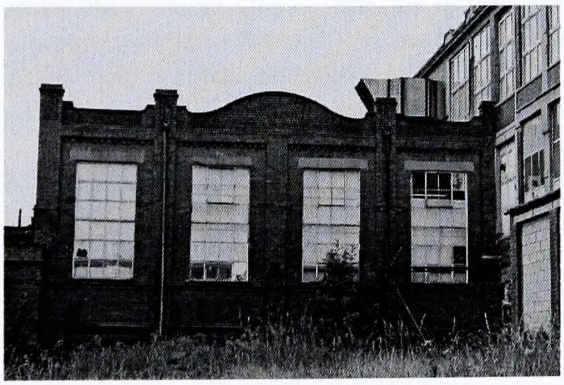


Plate 9.12 *Projecting engine house, east elevation*

Power for the mill was provided by a Hick Hargreaves horizontal steam engine housed in the centrally located engine house projecting from the south elevation. The engine house is of two storeys, four bays in length, and built of red brick but with the same curved parapet seen on the main mill (Plate 9.12). It was lit by four tall windows in the north and south walls. No evidence of the engine survives but the glazed brick walls remain; a modern steel floor has been inserted. The engine drove a large flywheel grooved for 22 ropes which was located in what is currently the internal access from the main mill into the engine house (Plate 9.13). The pulley, in this position, would have prohibited internal access between the engine house and mill and therefore the only access to the engine house was through doorways at its south end. The installation of a steam engine in a mill of this date is not unusual, for despite advances in American factories, most textile mills in Britain did not begin to use electricity until after World War I [1914-1918](Giles and Goodall 1992, 163).

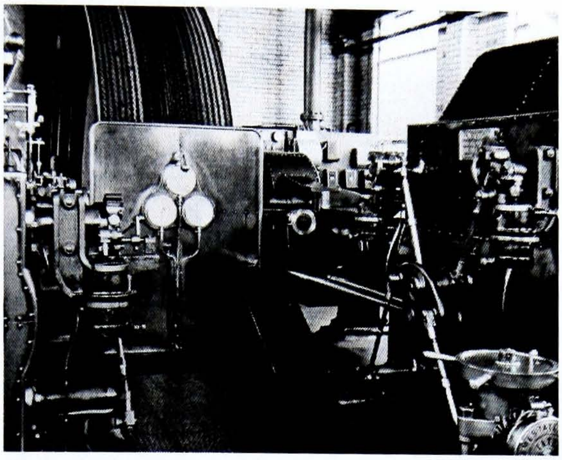


Plate 9.13 *Undated view of interior of engine house showing glazed brick walls and grooved flywheel for rope drive*

The boiler and economiser houses lie to the south of the engine house and are built also built in red brick but stylistically plain (Plate 9.14). The boiler house contained two boilers and ashes were removed by means of low openings in the south wall. Above these openings survive cast-iron hatches bearing the inscription 'THE BOILER & TUBE FLUE CLEANER CO. LTD, GLASGOW' (Plate 9.15). The economiser house is a small, rectangular building and immediately east of it stands the free-standing chimney. It is round in section throughout, built of brick, and missing its decorative cap and cresting. Water for the boilers was drawn from a reservoir which formerly existed in the southeast corner of the site and of which no trace survives (RCHME 1987d, 3). To the south of the boiler house is a large brick structure known as the 'garage'. Whether it was built as such is unclear and it may have originally functioned as a coal store, but it may have been built to house a company lorry. It is built of red brick and has three large openings in its west wall and was lit by windows in its north and south walls.

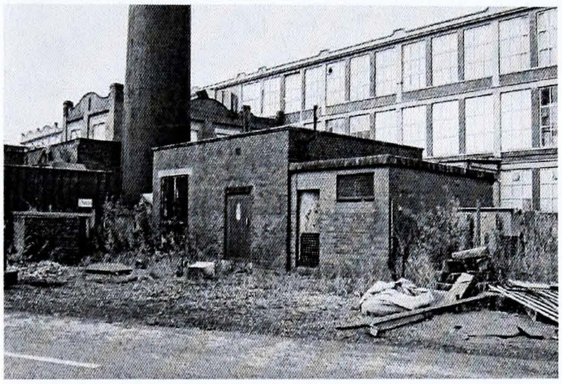


Plate 9.14 *Boiler and economiser houses and chimney from the southeast; the smaller outshut to the right is a later electricity substation*

Plate 9.15 *Inscribed cast-iron boiler and flue cleaning hatches*

Power was transmitted into the rope race occupying the central bay of the mill (Figure 9.3). The rope race was an entirely enclosed structure and rose through the full height of the mill without any internal floors. Doorways at each floor level from the main working areas of the mill must have provided access to the pulleys in the rope race, leading onto small balconies for ease of maintenance. The pulleys were supported on pairs of concrete columns and the seating of the pulleys was provided by the transoms linking these columns (RCHME 1987d, 3). Additional doorways at ground floor level are modern insertions providing access to recently created offices (Steve Wood *pers comm.*).

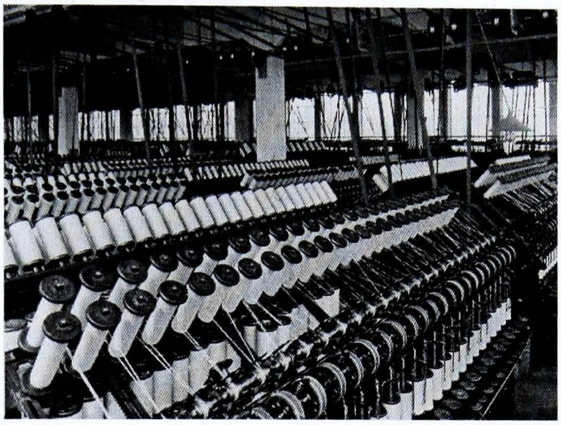


Plate 9.16 *System of line shafting shown on undated view of interior of the mill*

Line shafts connected to the pulleys in the rope race transmitted power into the rest of the mill were supported on the southern row of columns (RCHME 1987d, 3). On the first and second floors there were line shafts to the east and west of the rope race, but on the ground floor only the eastern half of the mill was powered reflecting the use of the western half for storage. The line shafts were supported on cast-iron hangers bolted onto the concrete frame. None survive but they are shown on historic photographs of the mill and the holes for the bolts remain visible in places (Plates 9.16 and 9.17).

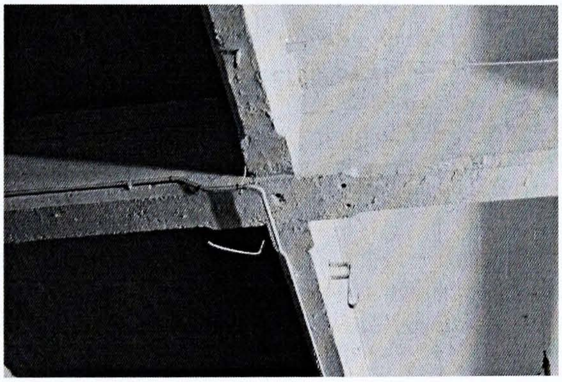


Plate 9.17 *Bolt holes for one of the hangers at first floor level which supported the horizontal line shafts*

Located on the north side of the mill yard is a single-storey, detached brick building which once served as a canteen. The building is stylistically plain and contained a kitchen, serving and seating area. It was not possible to access the interior of the

Plate 9.18 *Undated view of interior of canteen showing kitchen area and serving hatch*

canteen, but a photograph of the interior taken during the 1960s shows the kitchen and serving hatch (Plate 9.18).

To the west of the canteen block, and adjacent to the west end of the main mill stands the detached office block. The physical relationship of the mill and offices creates a narrow entrance to the mill yard and both buildings are accessible only from within the yard. The offices are built of red brick, of two storeys with a main facade facing the main road (Plate 9.19).This facade adopts a mild "Jacobean" style, with two wings surmounted by shaped gables incorporating stone carvings including swags and a cherub holding a shield bearing the monogram 'TAS' (Plate 9.20); a further inscription in a stone plaque in the centre of main range reads 'THOMAS AMBLER & SONS'. A decorative doorway in the south wall accessed from within the mill yard (Plate 9.21) led to a revolving door and onto a central corridor leading off which there were a series of offices, most heated and with fine panelling and plasterwork. There was a fine staircase at the top of which was a detailed stained glass window. It was not possible to inspect the interior of the office block in any detail nor were measured drawings of the building available.

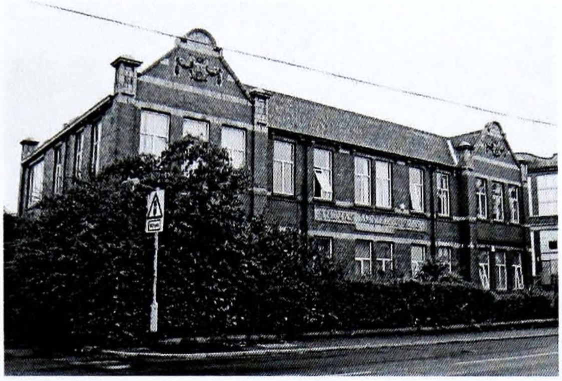


Plate 9.19 *Principal facade of the detached office block*

Plate 9.20 *Carved stone swags and monogram and shaped gables on east elevation of office block*

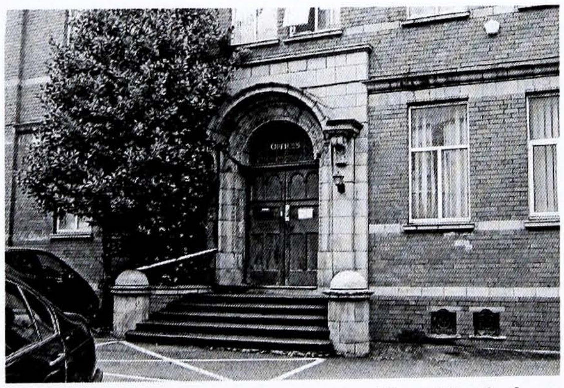


Plate 9.21 *Main entrance to office block from within the mill yard*

The offices were clearly designed as a prestige work intended to impress visitors to the site and its ornamental style contrasts markedly with the more rational style of the mill building. Of interest, the architectural detailing of the office block is reserved only for those elevations visible from outside of the site whilst the north and east elevations are entirely plain.

The site is complemented by two terraces of workers' houses to the north of the mill on Common Lane and are in a vernacular style typical of the area (Plate 9.22). They are constructed of brick with some stone dressings and are of two storeys. The physical proximity of the houses to the mill no doubt reflects that this area of East Ardsley was previously virgin land before the construction of the mill and was therefore suitable for the construction of both the mill and associated houses. Furthermore, the close physical relationship of the houses to the mill and office block is overwhelming.

Plate 9.22 *Workers housing, Common Lane*

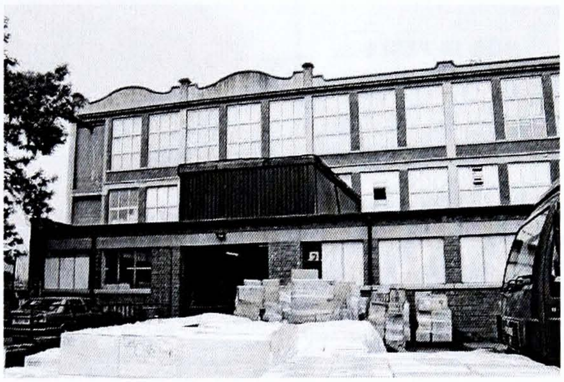


Plate 9.23 *Single-storey extension added in the 1960s at west end of the south elevation*

- PHASE TWO

Phase two is represented by structural alterations to the mill mainly made during the 1960s and later, and are therefore outside of the temporal limits of this research. These alterations included a single-storey range including loading bays at the west end of the south elevation (Plate 9.23), various small additions at the east end of the north elevation housing modern plant associated with the modern heating system, and a free standing brick-built electricity substation to the east of the chimney. A fire escape (Plate 9.24) on the north elevation is also a modern addition and access to it has been provided by two fire doors (one

Plate 9.24 *Modern fire escape on east elevation*

each at first and second floor level) formed out of former windows.

PROCESS RECORDING

Ardsley Mills was built as a worsted spinning mill and remained such until its closure in the late 1980s. However, it is clear that drawing, warping and winding were also carried out at the mill and that storage facilities were provided on the ground floor (Plate 9.25). Raw materials entered the mill from the mill yard via the large loading doors at either end of the south elevation and could be moved internally between the different floors via the hoist located in the staircase tower on the north elevation. Finished yarns would have left the building in the same way. Historic photographs of the site show that early spinning machinery was positioned in lines across the width of the mill, but later, more modern machinery (outside the temporal focus of this research) were apparently arranged on a grid-like pattern throughout the mill. This change in layout largely reflects the changing size of spinning machinery and the liberation of the layout of machinery from the system of power transmission involving line shafts following the conversion to electric power at the site.

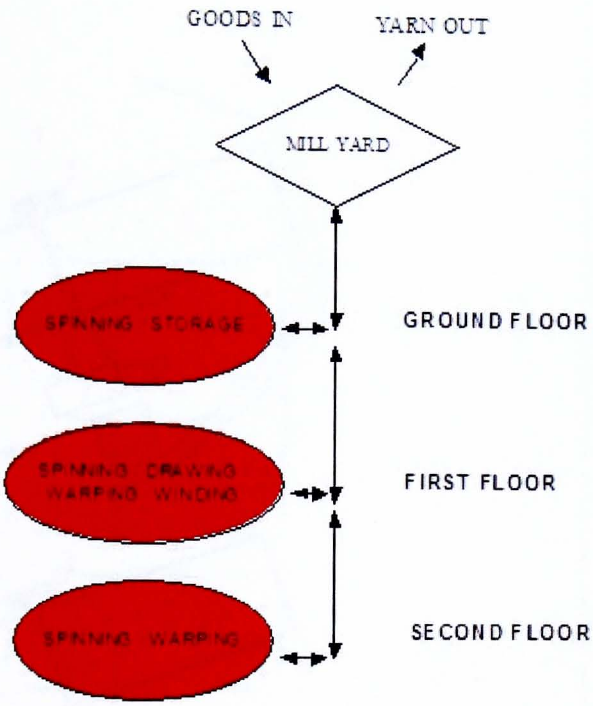


Plate 9.25 *Processes, Phase One, Ardsley Mills*

The movement of goods and materials around the mill was based on an inherently ring spatial structure (Figure 9.4) reflecting the presence of taking-in doors at each floor level and the internal hoist. This inherently ringy structure is also reflected in quantified values for the site (Table 9.1)

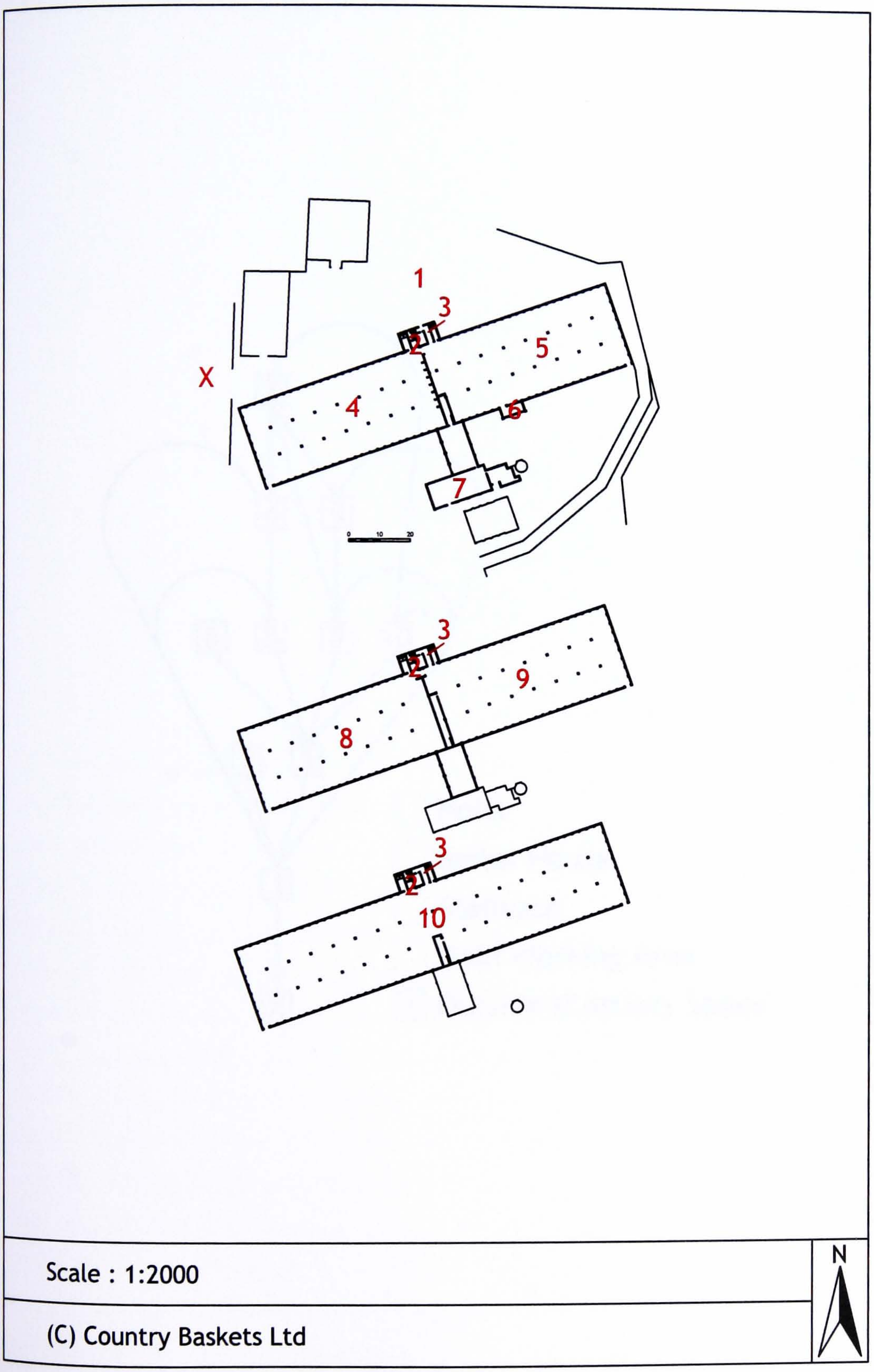


Figure 9.5 *Phase One: Gamma map of the movement of the workforce*

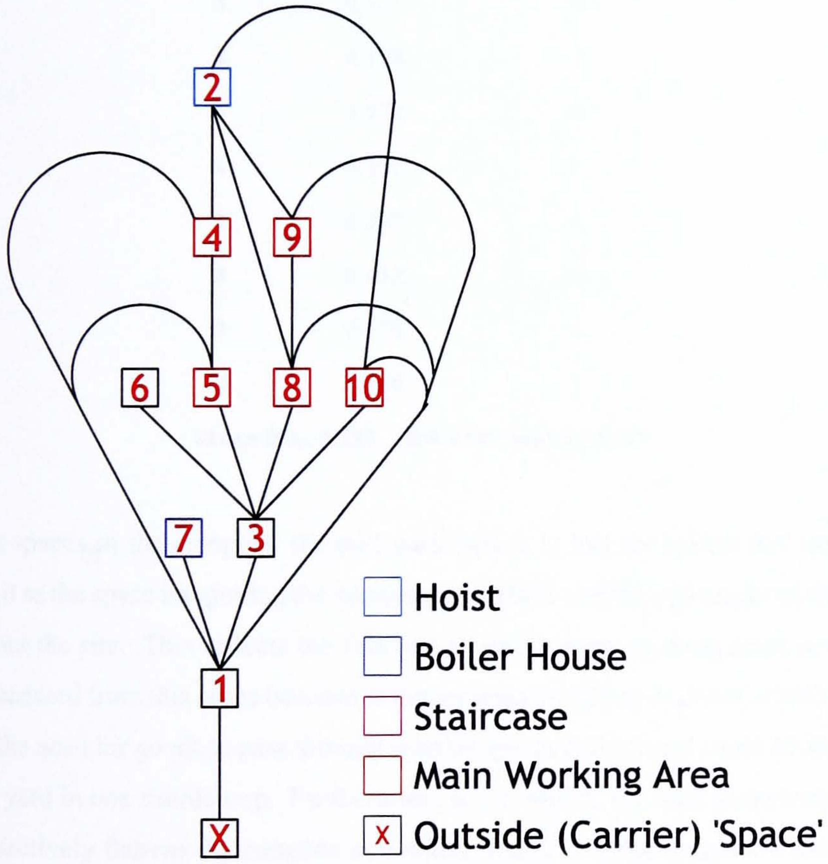


Figure 9.4 cont. *Phase One: Gamma map of the movement of materials/goods*

Table 9.1 *Quantified values for Phase One 'materials/goods' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.244	1
1	0.044	8
2	0.200	4
3	0.111	5
4	0.178	3
5	0.178	3
6	0.311	1
7	0.267	1
8	0.133	3
9	0.178	3
10	0.156	3

Mean RA: 0.182 RR of Complex: 2.417

Of all the spaces in the complex, the mill yard (space 1) has the lowest RA value (0.044) revealing it as the space integrating the complex as a whole and the movement of materials and goods about the site. This reflects the fact that all of the main working areas in the mill are directly accessed from this space because of the presence of taking-in doors at each level. This removed the need for goods to pass through interior spaces and instead could be moved to and from mill yard in one simple step. Furthermore, as a complex, the high proportion of rings to spaces effectively flattens the complex as a whole and few of the spaces are more than two spatial steps away from the mill yard. This is reflected in the high RR of value for the complex (2.417) which means that a high proportion of spaces within the complex provide a means of access to at least one other space and this is also reflected in the fact that only 27% of all the spaces in the complex have only neighbour and these spaces have the highest RA values. Of these, one is the outside carrier space (x), one is the small storage area located off the eastern half of the ground floor (space 6) and the other the boiler house (space 7). These spaces therefore do not play an important role in overall movement of materials and goods around the site which is reflected in their function.

Of interest, the internal hoist (space 2) has one of the higher RA values (0.200) in the complex despite its presence on three rings. This reflects the fact that this space was used only for the movement of materials and goods between floors and as each floor was essentially devoted to spinning, there would have been little need for vertical movement and this hoist was probably mainly used to transport goods to the storage area in the western half of the ground floor with which it communicated directly.

ACCESS ANALYSIS

Access analysis of the site reveals that the spatial structure of the mill concerning the movement of the workforce varied greatly from that relating to the movement of goods and materials (Figure 9.5; Table 9.2).

Table 9.2 Quantified values for Phase One 'workforce' gamma map

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.168	1	**14**	0.231	1
1	0.094	7	**15**	0.168	1
2	0.168	1	**16**	0.256	1
3	0.168	1	**17**	0.137	1
4	0.248	1	**18**	0.188	1
5	0.063	8	**19**	0.188	2
6	0.137	1	**20**	0.182	1
7	0.179	1	**21**	0.114	4
8	0.174	2	**22**	0.199	1
9	0.148	2	**23**	0.137	1
10	0.105	5	**24**	0.194	1
11	0.142	4	**25**	0.125	4
12	0.179	1	**26**	0.166	1
13	0.157	3	**27**	0.137	1

Mean RA: 0.163 RR of Complex: 0.043

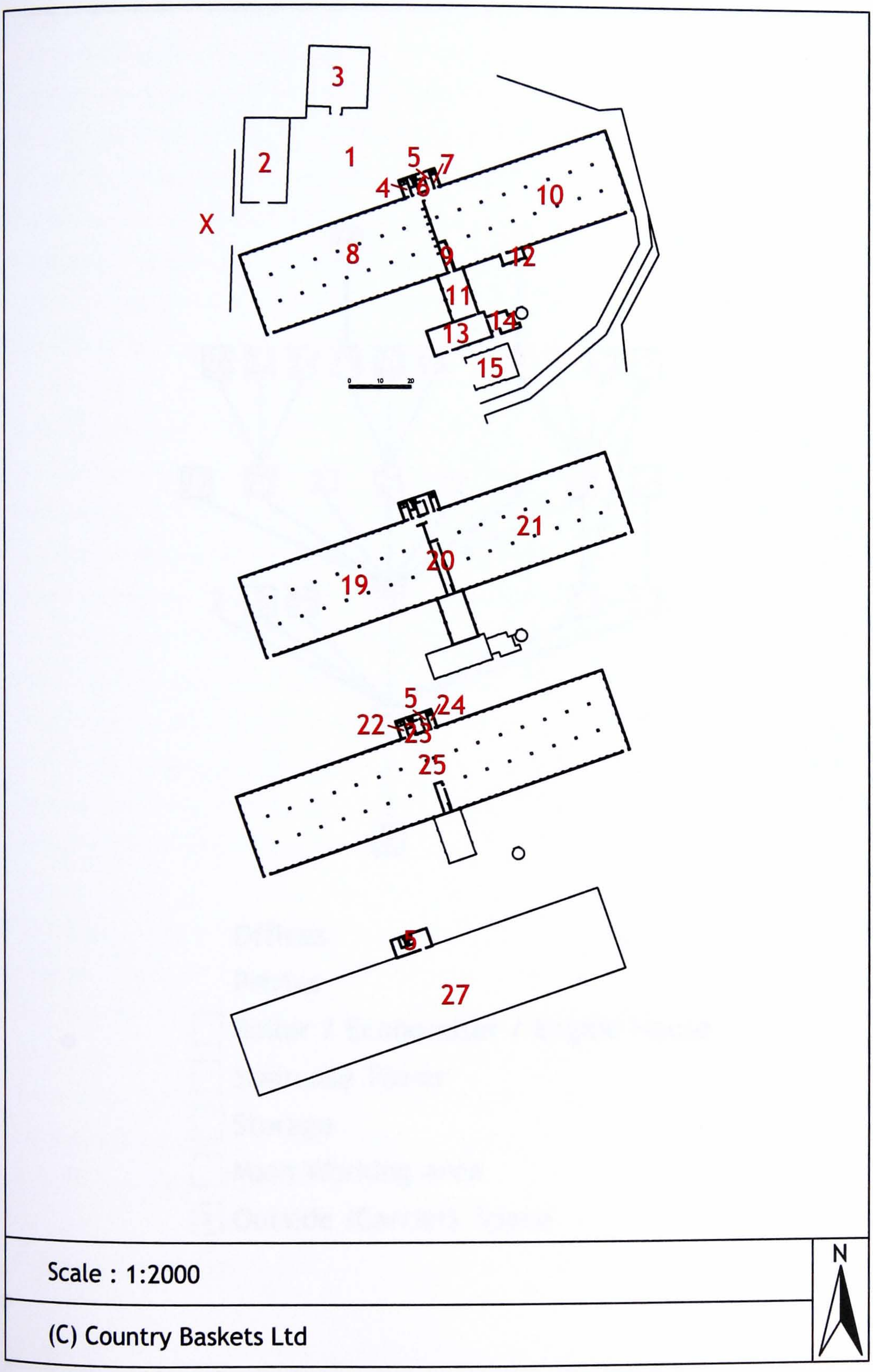


Figure 9.5 *Phase One: Gamma map of the movement of the workforce*

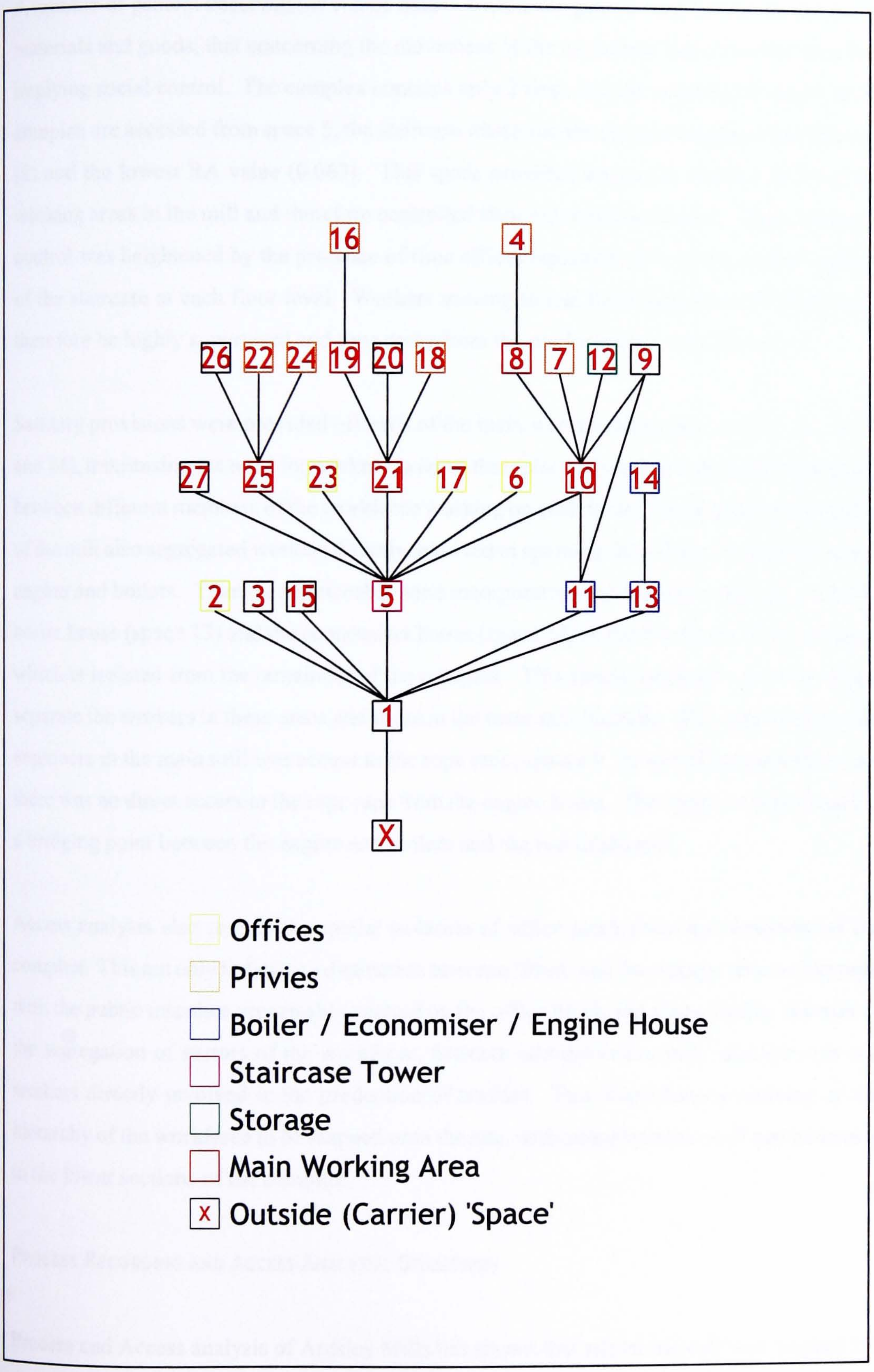


Figure 9.5 cont. *Phase One: Gamma map of the movement of the workforce*

A number of general observations can be made. Unlike the gamma map for the movement of materials and goods, that concerning the movement of the workforce has a tree-like structure implying social control. The complex contains only 2 rings and the majority of spaces in the complex are accessed from space 5, the staircase which has the greatest number of neighbours (8) and the lowest RA value (0.063). This space provided access for workers to all of the working areas in the mill and therefore controlled their potential movement. That element of control was heightened by the presence of time offices (spaces 6, 17 and 23) on the landings of the staircase at each floor level. Workers moving to and from their place of work could therefore be highly supervised and time away from the production process monitored.

Sanitary provisions were provided off each of the main working areas (spaces 4, 5, 16, 18, 22 and 24), minimising the need for workers to leave their place of work and potential interaction between different members of the workforce working on each floor. The spatial configuration of the mill also segregated workers directly involved in spinning from those working the steam engine and boilers. There is a noticeable zone incorporating the engine house (space 11) the boiler house (space 13) and the economiser house (space 14) in the lower part of the complex which is isolated from the remainder of the complex. This spatial isolation would have kept separate the workers in these areas and those in the main mill building. The only interface for engineers in the main mill was access to the rope race (spaces 9, 20 and 26) at each floor, but there was no direct access to the rope race from the engine house. The rope race was therefore a bridging point between the engine and boilers and the rest of the mill.

Access analysis also reveals the spatial isolation of office block from the remainder of the complex. This not only indicates a distinction between 'front' and 'backstage' areas of the mill, with the public interface presumably centred on the office block, but also a further element of the segregation of sectors of the workforce, between administrative staff, management and workers directly involved in the production of textiles. This also allows something of the hierarchy of the workforce to be mapped onto the site, with administrative staff and managers in the lower sections of the complex.

PROCESS RECORDING AND ACCESS ANALYSIS: DISCUSSION

Process and Access analysis of Ardsley Mills has shown that whilst the mill was deigned for the easy movement of materials and goods its spatial configuration also restricted the potential movement of the workforce. This duality was entirely appropriate to the factory environment and accords with technological and organisational accounts of the factory system. With regard to the movement of materials and goods, the mill yard played a central role whilst human movement around the site was centred on the staircase in the projecting tower on the north elevation. The spatial configuration of the site also restricted potential interaction between different sectors of the workforce. This segregation, however, also meant that workers with the same skills occupied the same spaces at all times, and this would have been important to microeconomic considerations like team-working and the transfer of knowledge and skills.

ARCHITECTURAL SUMMARY

The architecture of Ardsley Mills shows the use of a more rational style into the Yorkshire textile industries. Although the mill incorporates shaped parapets much of the architectural character of the site comes from the exposed concrete frame, presumably to emphasise the modern structure of the building. The architecture of the mill is therefore only mildly classically and this fits a model of late mill architecture as part of the origins of the Modern Movement. However, the same is not true of the detached office block which, in contrast, has a highly ornate front facade in a Jacobean style. The contrast between the two structures is interesting for it suggests that the 'public' and 'front' part of the site, that is the office block, required architectural distinction, whilst the 'backstage' areas directly involved in the production process did not. However, as a note of caution, the very rational style of Ardsley Mills and its innovative structural engineering may have been as visually impressive when first built as the more accepted classically styled mill and the departure from that style at the site may therefore have been deliberate in order to emphasise the modern qualities of the site. The desire to appear 'modern' on the part of Thomas Ambler & Sons is suggested on some of the publicity photographs of the site produced in the 1950s and a hand-written note by the director on one of the photographs read '...these pictures must not appear "dark and satanic"'!. Clearly, the firm relished their modern building and it was no doubt a potent symbol of their success in the industry. In this context, the elaborate office block must be seen as the continuation of a more classical tradition in mill building, perhaps reflecting a desire on the part of Ambler's to be seen innovative but also traditional.

LIST OF DOCUMENTS

9.1 Plan of Site, dated 1911

Private Property of Country Baskets Ltd

9.2 Various building plans including details of the engine and boiler houses, structural details and system of power transmission

Private Property of Country Baskets Ltd

9.3 OS map, 25"; Sheet 233.5; Revised 1915, Published 1922

APPENDIX A
SITE DESCRIPTION : 10

FROSTHOLME MILL

DATABASE ENTRY:	1623
NBR NUMBER:	BFO62166
NGR:	SD 9075 2625
TOWNSHIP:	Todmorden and Walsden
CIVIL PARISH:	Todmorden and Walsden
DISTRICT:	Calderdale
COUNTY:	West Yorkshire
BRANCH:	Cotton
PERIOD:	Late

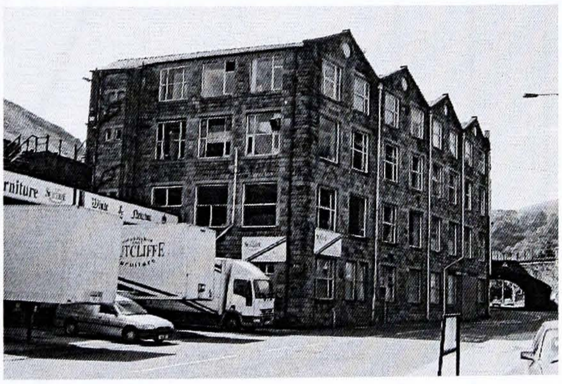


Plate 10.1 *Forstholme Mill, Cornholme*

Frostholme Mill occupies a restricted site in the village of Cornholme, north of Todmorden. The site straddles the River Calder and is bound to the north and northwest by the railway and main road from Todmorden to Burnley (A646) (Plate 10.1; Figure 10.1). To the south there is steeply rising ground to the extent that the southern most parts of the site are terraced into the hillside. Indeed, because of the fall of land across the site from south to north, the weaving sheds are level with the first floor of the multi-storeyed block. The site was first developed in the 1850s by the company of Messrs. Heap, Ashworth and Co., as a cotton weaving mill and thereafter the site gradually developed and expanded until a disastrous fire in 1896. This led to the rebuilding of the multi-storeyed range to the north including the engine and boiler houses and a new central shed, resulting in the site as it appears today. The site

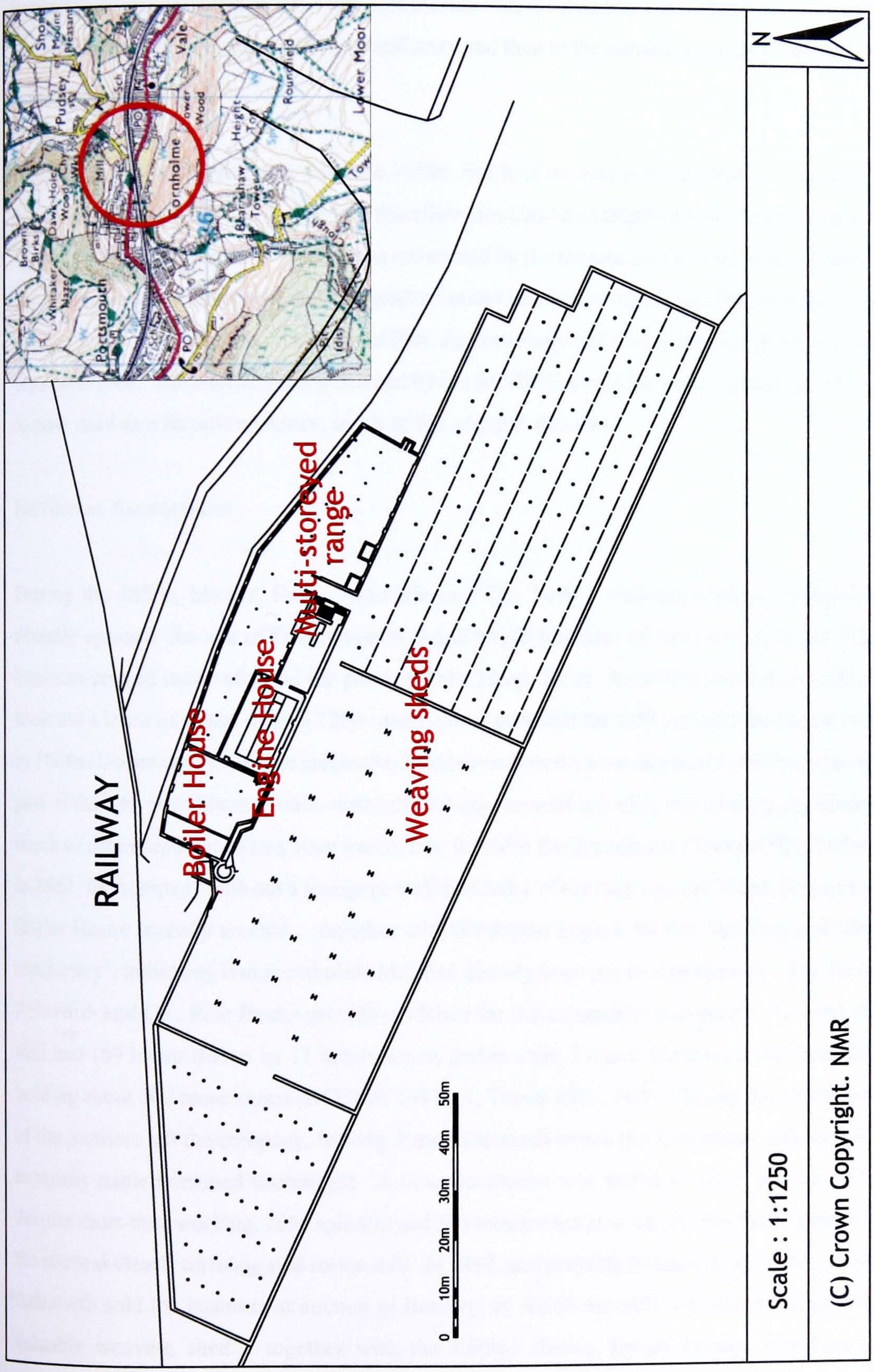


Figure 10.1 *Block Plan (Ground / First Floor), Frostholme Mill, Cornholme*

ceased to produce textiles in 1968 when its closure was recorded by a documentary team from the BBC. The site was sold to the local authority and then to the current occupiers, Sutcliffe's, a furniture manufacturer.

Although parts of the site date from the 1850s, much of the site is the product of rebuilding work between 1896 and 1905. The mill therefore provides an example of a very late nineteenth century cotton weaving mill. Plans of the site owned by the present owner were made available for the purposes of this research along with a limited number of historical photographs of the engine house. Furthermore, a copy of the BBC documentary made when the site closed in 1968 was consulted. Additional plans produced by the RCHME were also used. Although the site is now used as a furniture factory, much of the original survives.

Historical Background

During the 1850s, Messrs. Heap, Ashworth and Co., built a weaving shed at Caldervale, directly opposite the site of Frostholme Mill and began business on their own account. The business proved successful and the partners John Heap, James Ashworth and John Fielding, took out a lease on a plot of land 7200 square yards and built the first part of Frostholme Mill in 1860s (Document 10.1). The earliest buildings comprised a weaving shed for 400 looms and part of the site, possibly in a multi-storeyed building, housed spinning and carding machinery, much of the equipment having been transferred from the Caldervale site (Travis 1901, 103-4). In 1861, the company took out a mortgage on the security of the land and the 'Shed, Engine and Boiler House recently erected... together with the Steam Engine, Boiler, Shafting and other machinery', indicating that Frostholme Mill had quickly been put to manufacture. The Heap, Ashworth and Co., Rate Books provide evidence for the companies occupancy. In 1861 the mill had 169 looms driven by 11 horse power, and in 1866-7 a new loom shed was assessed, holding about 300 more looms (RCHME 1987e, 1; Travis 1901, 104). During the 1860s, two of the partners left the company, leaving James Ashworth to run the firm alone, although the company name remained unchanged. A new warehouse was added in 1871, and by 1879, despite short-time working, 7650 spindles and 305 looms were at work. By this time, therefore, the site was clearly an integrated cotton mill. In 1882, and possibly because of ill health, James Ashworth sold the business at auction in Burnley, at which the mill was described as 'that valuable weaving shed... together with the Engine House, Boiler House, Warehouses, Scutching Room, Mixing Room, Chimney and other buildings' (Document 10.2). The mill was powered by a 50 horse power McNaught engine, two steam boilers of 40 horse power, a Green's economizer, shafting gearing, gas steam and water piping and other features. However, and possibly giving a good indication of the poor trading conditions in the cotton industry at this time, no buyer was found (RCHME 1987e, 1).

In September 1882, Joshua Smith, a cotton manufacturer and merchant finally brought the mill for £3150 from Manchester (Document 10.3). Smith, born 1831, had a long history in the cotton industry, having first assisted his father in cloth manufacture early in his life, and enjoyed the trappings of being a man of substance and experience. Frostholme seems to have been his chief manufacturing centre, though there is evidence for him working other mills in Cornholme and warehouses in Manchester and Bradford. By 1884 plans were drawn up for the expansion of Frostholme Mill, (Document 10.4), with provision made for a new weaving shed for 400 looms, built to the west of the existing sheds and abutting the railway embankment. By 1887, 1050 looms were running full time and it appears that by this time Smith had changed the nature of the mill, the emphasis being on weaving rather than integrated production. At the same time, the numbers employed increased and the rateable value more than trebled between 1885 and 1895. Success and expansion at the site continued. In 1892, a new weaving shed and warehouse were planned, to the designs of John R Blacka of Todmorden. The warehouse may be that five storey building described in 1896, the top floor used for storage, the second floor for taping (for sizing purposes), the third for winding, the fourth for winding, beaming, twisting and part storage, and the fifth for warehousing and offices. In addition there was a cellar, also used for the storage of yarns (Document 10.5). Further developments took place to the east of the site, when a plot of land 2810 square yards was leased with the condition that the lessees built on the land within six months. Construction did take place, the plot of land in question representing the area now covered by the eastern weaving shed.

In 1896, the firm of Joshua Smith Ltd. suffered a great setback when fire destroyed a large part of the works at Frostholme. The major damage was concentrated in the area of the multi-storeyed buildings on the road frontage and necessitated the rebuilding of those buildings 'on the latest principles' (Doc 10.5; RCHME 1987e, 4). The fire did not put the firm out of business, for production continued at the sheds at Pudsey and Lineholme. Plans were soon approved for the rebuilding of the damaged buildings at Frostholme (Document 10.6). The new mill building was similar to the earlier building that it replaced, providing a warehouse and power plant along the road frontage, but the rebuilding replaced a structure that had evolved in several stages with one planned as a whole. The rebuilding program was completed by 1905 and the footprint of the site is shown much as it appears today on the 1905 OS map for the area (Plate 10.2). By 1912 Joshua Smith Ltd. had 1760 looms in operation, doubtless housed in the large sheds at Frostholme. The firm continued production at Frostholme Mill until 1968. At the time of the closure the factory was filmed by the BBC for a documentary *Breakaway – Redundant at the* Carnival, which reveals the devastating effect that the decline of the mill had on the community in Cornholme. Following its closure the mill was sold to the local authority. Three years later it was purchased by the present occupiers and has since been used for the manufacture of furniture.

Plate 10.2 *Extract from 1905 OS map showing footprint of Frostholme Mill*

Architectural Description

There are several phases of structural activity at the site but the rebuilding of much of the site after the fire in 1896 represents a watershed in the development of the site. It is this late phase in the mill's history that is the prime focus here and which will be analysed. The site is therefore best split into two main structural phases (Figure 10.2). Phase One represents the evolution of the site from *c*.1860 to 1896, the surviving evidence for which comprises the weaving sheds to the south of the later multi-storeyed block. Phase Two represents the site as rebuilt after the 1896 at which point it may be considered that the site satisfied the requirements of a late period cotton weaving mill.

- ### Phase One

Phase One is represented by the three weaving sheds to the south of the 1896 block, known as the centre, west and east sheds (Figure 10.2).

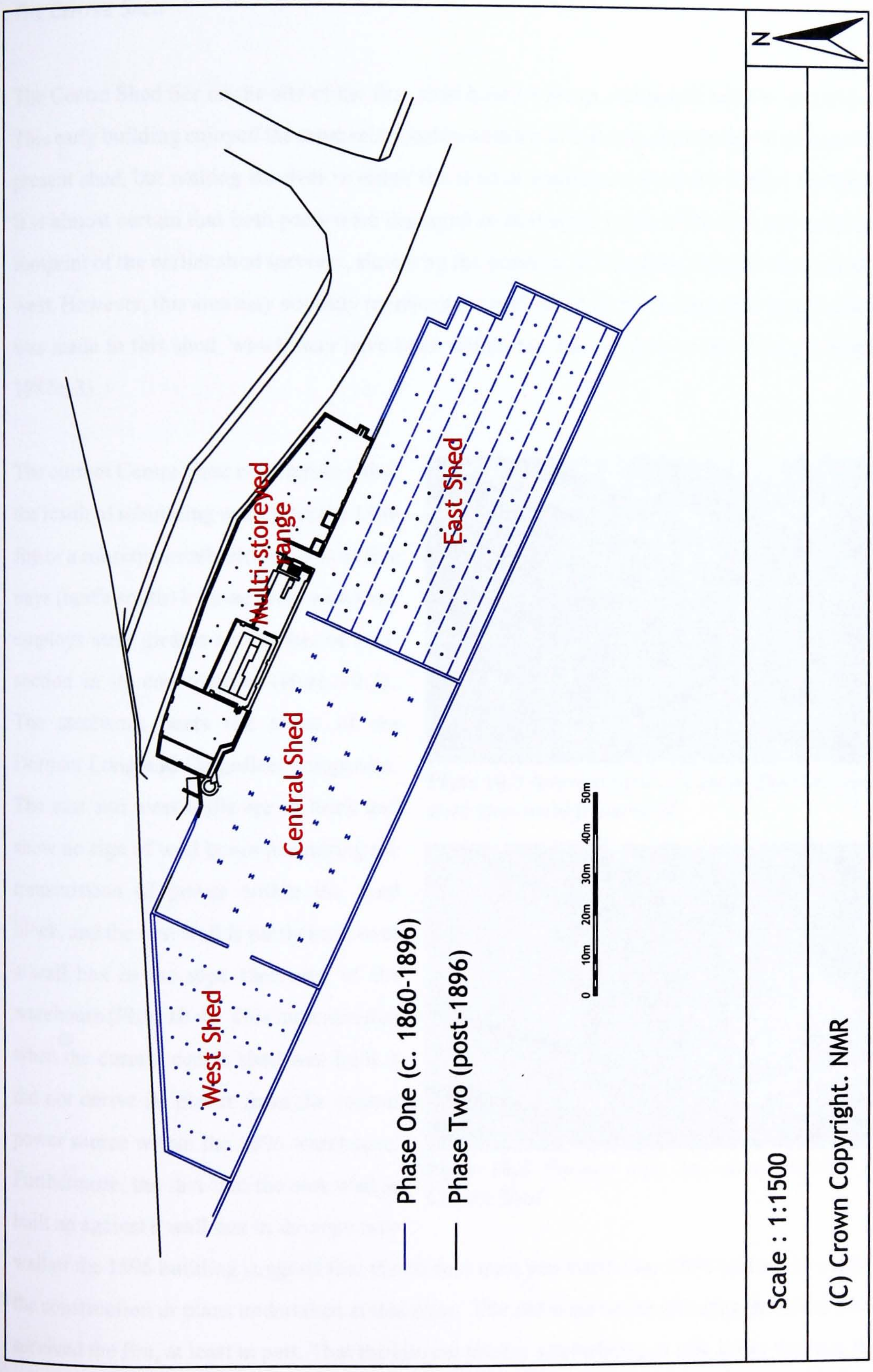


Figure 10.2 *Phased Block Plan, Frostholme Mill, Cornholme*

THE CENTRE SHED

The Centre Shed lies on the site of the first shed built by Heap, Ashworth and Co. in 1860-1. This early building enjoyed the same relationship with a multi-storeyed to the north as does the present shed, but nothing survives in either the shed or warehouse from the 1860-1 building. It is almost certain that both parts were damaged or destroyed in the 1896 fire, and only the footprint of the earlier shed survives, shown by the position of the added sheds to the east and west. However, this area may not truly represent the early shed, as it is known that an extension was made to this shed, which may have been within the current area of the shed (RCHME 1987e, 3).

The current Centre Shed is therefore either the result of rebuilding work after the 1896 fire or a subsequent rebuilding. It is of five bays (north-south) by nine (east west) and employs steel girders and pillars of an I-section in its construction (Plate 10.3).. The steelwork bears the name of the Dorman Long and Cargofleet companies. The east and west walls are of brick and show no sign of wall boxes permitting the transmission of power within the shed block, and the east wall is partly built over a wall box in the rope race area of the warehouse (Plate 10.4). This indicates that when the current centre shed was built it did not derive its power from the central power source within the 1896 warehouse. Furthermore, the fact that the east wall is built up against a wall box in the rope race wall of the 1896 building suggests that the current shed was built after 1896 and not as part of the construction or plans undertaken at that time. The old shed on the site may therefore have survived the fire, at least in part. That the current shed is a rebuilding is also clear because the east wall is partly built over the west wall of the east shed, and is therefore later than its

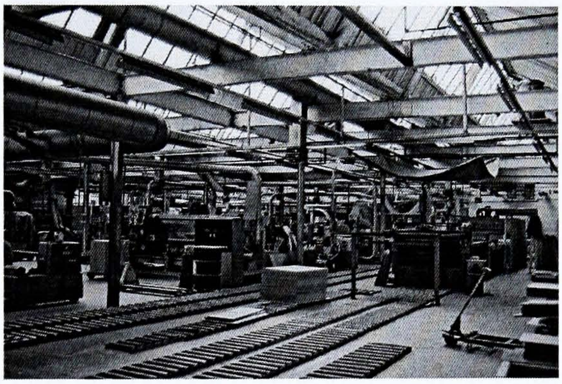


Plate 10.3 *Internal view of Centre Shed showing steel structural framework*

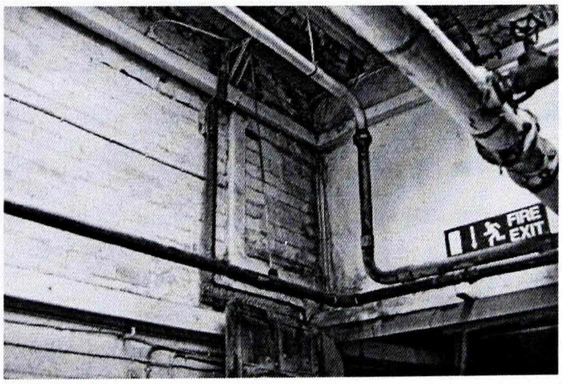


Plate 10.4 *Former wall box in north wall of Centre Shed*

neighbour to the east.

How this shed was powered is therefore not clear, but wall boxes in the north wall and going into the area occupied by the engine house may indicate the point at which line shafts entered the first shed on the site but not the one which survives. Alternatively, the shed as it currently appears may have been powered by electricity thus removing the need for lineshafts.

THE WEST SHED

As built, the West Shed was of thirteen bays (north-south) at the junction with the centre shed and tapering to five bays at the west end, by nine bays (east-west); though the eastern most bay was lost with the building of the centre shed. This shed dates to 1884-5 and its shape indicates that it was built to fit the land available in this irregular plot of land. It employs cast-iron columns at close intervals, resulting in narrow bays to the saw-tooth roof (Plate 10.5). The roof has cast iron mullions, but the rest of the structure is underdrawn (RCHME 1987e, 3). Where not glazed the roof is treated with lath and plaster. Parts of the structure have recently been replaced with steel stanchions, apparently repairing damage caused since the building has been in used for the manufacture of furniture (Mitchell, pers comm.). How the shed was accessed from the original centre shed is not known, however, when the new Centre Shed was built the new brick dividing wall had in it at least one wide opening, supported with steel members similar to those used in the centre sheds structure. More recently, two further openings have been made in the dividing wall, effectively opening the west shed into the Centre Shed.

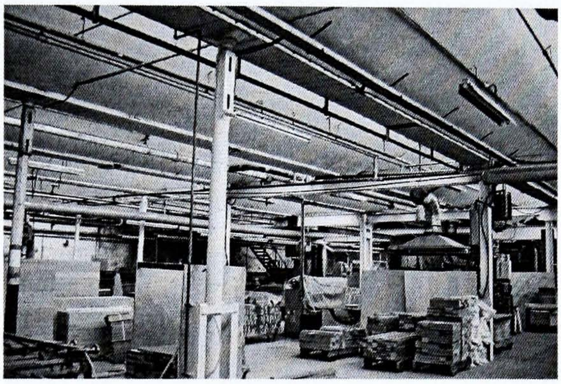


Plate 10.5 *Internal view of West Shed*

The columns in the West Shed have D-section bolting on the head on the north face and in the gutters of the roof there is evidence for brackets to support line shafts. This indicates that this shed was powered by east-west countershafts, which originally extended from the old shed on the site of the Centre Shed. Given the apparent lack of evidence for power transmission in the centre shed it is not known how the west shed was powered after the Centre Shed was rebuilt.

The countershafts may still have operated if the centre shed still contained lineshafts, alternatively the West Shed may have at this time have become powered by electricity.

THE EAST SHED

The East Shed was built in 1893 and relates to the expansion of the firm of Joshua Smith Ltd. on land leased to the east of the existing mill. Although the existing shed does not exactly match plans submitted at the time, it undoubtably belongs to this period of construction; changes to the plan may be ascribed to alterations during or after building. The shed is six and a half bays deep (north-south) by thirteen and a half bays (east-west). It has a saw-tooth roof, with two roof bays to each internal bay structure. Cast-iron is used widely throughout the shed, with columns, tie-beams, valley gutters and mullions all in this material. The tie-beams, aligned north-south on the line of the columns, are perforated with a continuous pattern of circles, making the structure lighter but also decorative; they are cast so that semi-circular ends wrap around each of the column heads (Plate 10.6). All the columns have a bolting head facing north for a mounting to support lineshafts, and in the valley gutters there are castings allowing further supporting brackets for lineshafts (Plate 10.7). The surviving evidence suggests that this shed was, like the west shed, powered by countershafts running east-west, two in each main bay structure, one on the line of the columns and one on the line of the mid-bay valley gutter. The west wall of the shed, a three-brick thick wall, retains a series of wall boxes at bay and mid-bay intervals, and these may show where the countershafts connected to the power system in the original centre shed; much of this evidence is now obscured by modern alterations. In the south-west corner of the east shed, in the second bay north, a large steel bracket is planted in

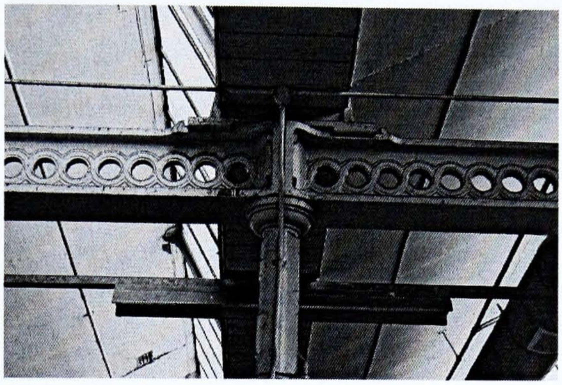


Plate 10.6 *Decorative tie-beams, East Shed*

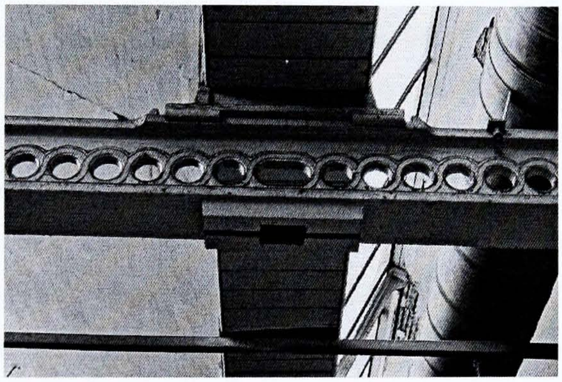


Plate 10.7 *Evidence for hanging brackets supporting lineshafts from beneath tie beams*

the west wall (Plate 10.8). This is unlikely to relate to the early system of lineshafting as it is mounted too low, but it may be evidence for electric group drive motors mounted on the wall and powering overhead lineshafts by belts when the site was converted to electric power during the nineteenth century. Along the inside of the south wall are a series of modern privies and access to modern loading bays – these alterations obscure the original character of the shed in this area.

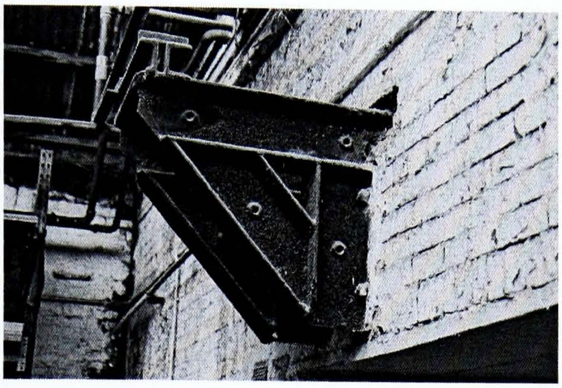


Plate 10.8 *Steel bracket, probably for group drive motor*

- PHASE TWO

Phase Two is represented by the existing mid-nineteenth century weaving sheds and the new multi-storeyed block along the northern boundary of the site rebuilt after the fire in 1896 (Figure 10.3). The new building very clearly shows the requirements of Frostholme Mill at this time with the new block intended to serve much as an adjunct to the weaving sheds to the south (RCHME 1987e, 4). The design of the multi-storeyed block allowed parts of the building to house powered processes, it did not provide sufficient space or power for a spinning plant of a size commensurate with the weaving shed and yarn was probably therefore brought to the site from elsewhere. Frostholme Mill therefore remained a weaving factory and this is evidence of the trend away from integrated spinning and weaving sites, with specialist sites being becoming dominant during the late nineteenth and early twentieth centuries (Giles and Goodall 1992, 120-1). The source of the yarn woven at Frostholme Mill under Joshua Smith is not known; Smith's other mills in Todmorden, Pudsey and Lineholme were apparently weaving mills.

The new range was of four-storeys, irregularly shaped to fit the land between the sheds to the south and the road frontage to the north, and is twenty-three bays long on the north front (Plate 10.9). It is built of stone on the north, east and west walls

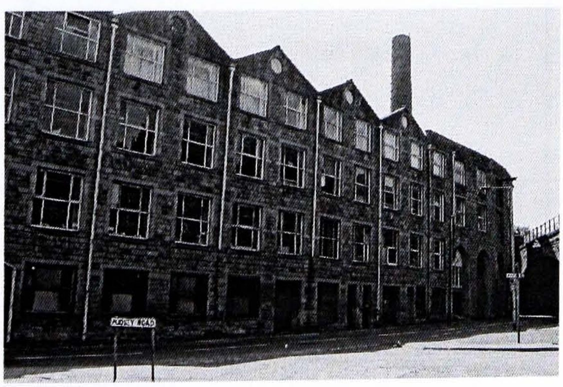


Plate 10.9 *North elevation of multi-storey range*

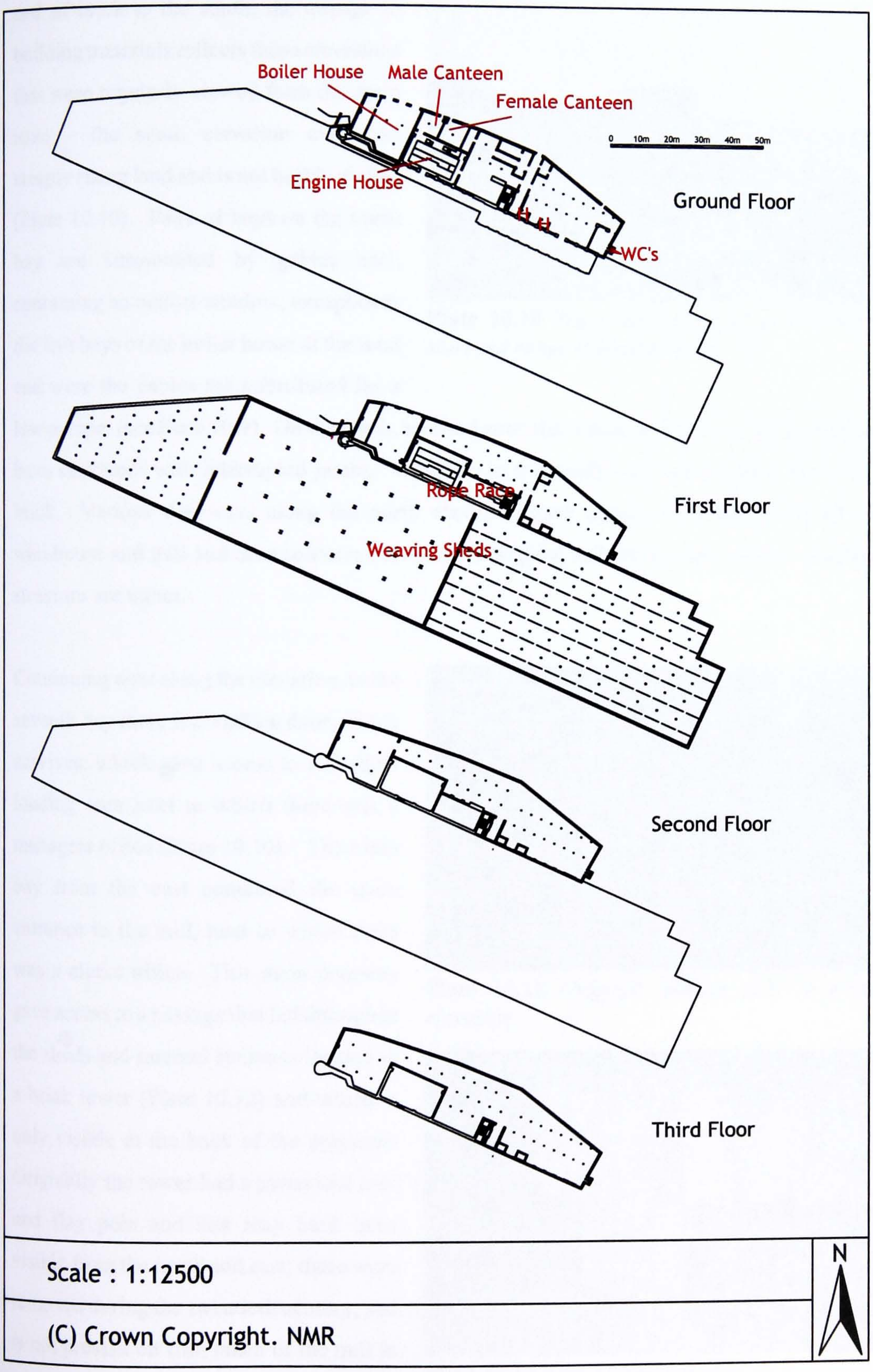


Figure 10.3 *Phase Two, Frostholme Mill*

and of brick to the south; the change in building materials reflects those elevations that were regularly viewed from the main road – the south elevation overlooks steeply rising land and is not highly visible (Plate 10.10). Pairs of bays on the north bay are surmounted by gables each containing an oculus window, except over the five bays of the boiler house at the west end were the gables are substituted for a low parapet (see Plate 10.9). On the north, east and west elevations the windows and doorways have surrounds with interrupted jambs. Windows in the south wall have segmental head of brick. Various doorways along the north elevation gave access to various parts of the warehouse and mill and discrepancies between the original architects plans and the resulting structure are minor.

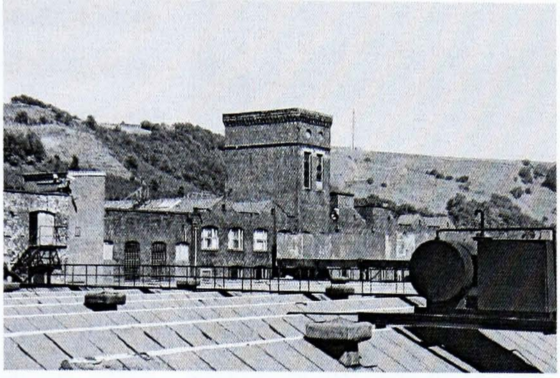


Plate 10.10 *The south elevation of the multi-storeyed range is built of red brick*

Continuing west along the elevation, in the seventh bay there is a loading door, which survives, which gave access to a shallow loading area next to which there was a managers office (Plate 10.10). The ninth bay from the east contained the main entrance to the mill, next to which there was a clerks office. This main doorway gave access to a passage that led through to the sheds and internal staircase located in a brick tower (Plate 10.12) and which is only visible at the back of the premises. Originally the tower had a pyramidal roof and flag pole and this may have been visible from the north and east; these were removed during the twentieth century, and is not present on film taken of the mill in 1968 (BBC 1968). The top of the tower,

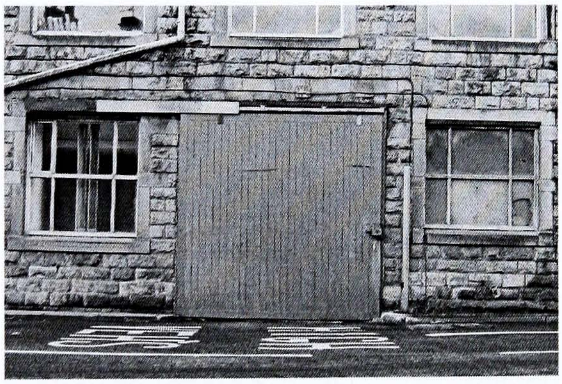


Plate 10.11 *Original loading door in north elevation*

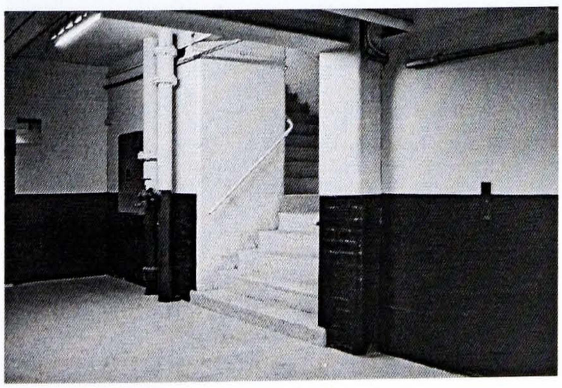


Plate 10.12 *Base of internal stair case*

unusually, has little architectural embellishment, having only pairs of oculus openings on the south and north walls and a bracketed cornice; the lack of decoration undoubtedly reflects the fact that the tower was not visible from the main road to the north. The two bays housing the main entrance and neighbouring clerks office are surmounted by a decorative pediment incorporating a stone plaque inscribed 'FROSTHOLME MILL' (Plate 10.13). Other rooms in this area of the mill included a 'coke room', 'sample room' and a 'private office'. However, modern alterations have removed almost all the evidence for these areas. Two original hoists remain along the south wall, opening into both the shed to the south and the warehouse to the north. A further wide opening, possibly a second loading door survives in the fourteenth bay from the east and as this opening was directly adjacent to the oil store it may have been the means by which oil was unloaded into the mill. Further west two adjacent doorways led into what are named 'female dining room' and 'male dining room'. These rooms were heated and occupied the front half of the warehouse block at this point, the area behind housing the bottom part of the engine house. The openings into these rooms have been altered but fragments of the original lintels and jambs have survived.

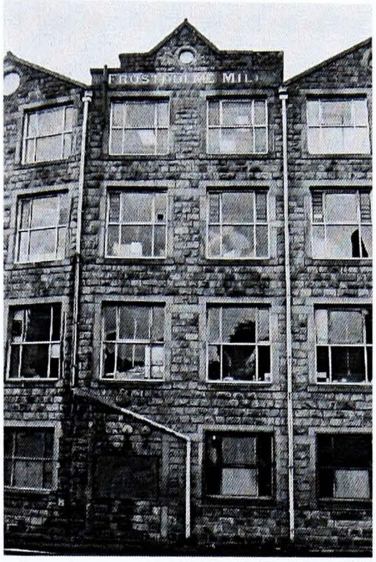


Plate 10.13 *Centrally placed inscribed pediment with original main entrance to mill (blocked) below*

The four western most bays of the multi-storey block housed the boiler house, blacksmiths and mechanics shop. The boiler house rose through two storeys and on the road front the boiler house was entered by three large arched openings which were partly occupied doors an with glazed sections above (Plate 10.14). Above the western most of these arched openings are taking-in doors to the second and third floors but these are not original and have been created out of former window openings. The 1896 plans of the boiler house show that an economiser was sited at the south end of the room, and that a narrow internal staircase linked

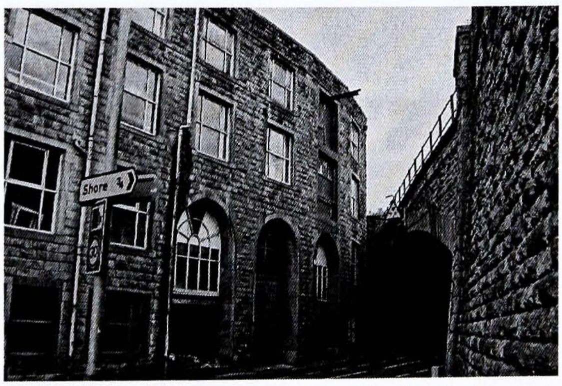


Plate 10.14 *North elevation of boiler house*

boiler and engine houses. At the southwest corner of the mill was the large round chimney, which was once surmounted by a decorative cap which was removed during the twentieth century (Plate 10.15).

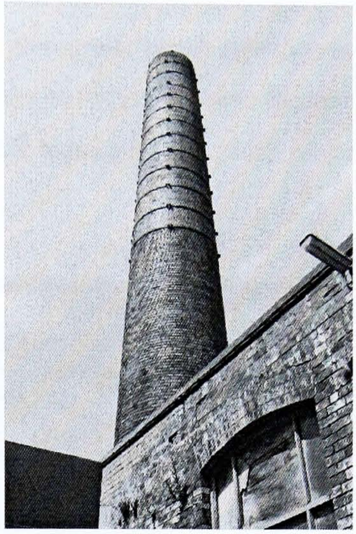


Plate 10.15 *The red brick chimney*

The west elevation is difficult to see for it is built close up against the neighbouring railway embankment. For the most part it has windows similar to those on the north front, lighting the blacksmiths and mechanics shop at ground and first floor level and the second and third floors of the warehouse above. The east elevation is similar in character to the north elevation. At its southern end is a projecting privy tower with pairs of water closets provided at each floor level (Plate 10.16). At ground floor is a modern doorway that leads to a long east-west passage leading to the base of the stair tower. The use of concrete lintels and the disturbed nature of the masonry in this area reveal that this doorway and passage beyond are clearly insertions, employing concrete lintels not used elsewhere. This door was in use by 1968, for workers are shown using it in a BBC documentary of the same date, and it was created as the original entrance in the north elevation led straight onto a busy main road which subject to widening during the mid- twentieth century (Mitchell pers. comm.).

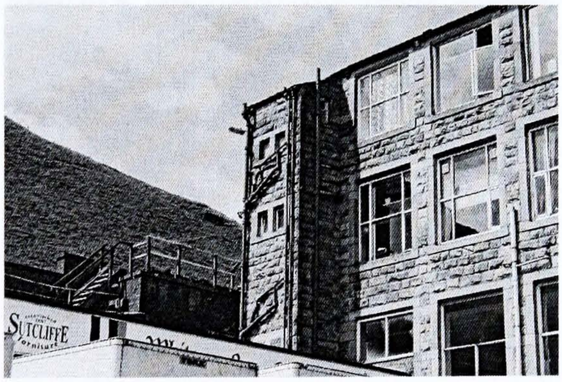


Plate 10.16 *Projecting privy tower on east elevation*

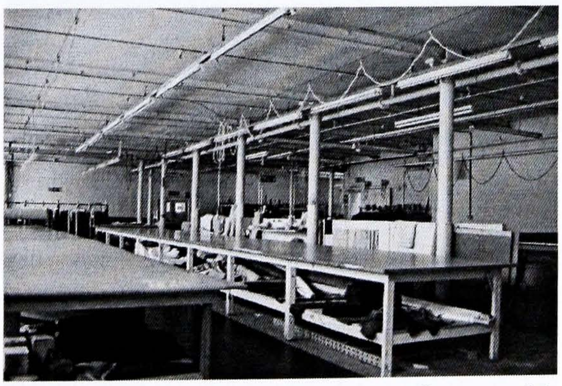


Plate 10.17 *Internal view of first floor, multi-storeyed range, showing cast-iron columns and steel beams*

Structurally the warehouse block uses two forms; over the boiler house and engine houses, fireproof construction with concrete floors supported by steel girders (bearing the name of Dorman Long Company), reflecting the desire to isolate and fireproof those parts of the building with a high risk of fire. Elsewhere in the warehouse there are wooden floors and roof trusses. Each floor has rows of cast-iron, of a simple and undecorated form and no bolting heads, supporting steel girders, the latter with central ribs supporting the joists of the wooden floors (Plate 10.17). Anti-crush boxes transfer the downward thrust of the building around the girders and on to the line of the columns. The roof is of king-post form, is glaze at the apex and uses nine-parallel spans giving a multi-gabled north elevation (RCHME 1987e, 5).

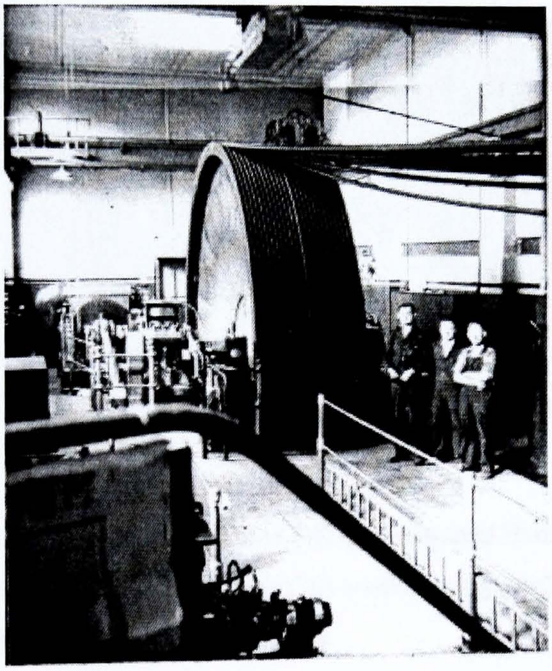


Plate 10.18 *Undated view of interior of engine house showing decorative treatment and flywheel*

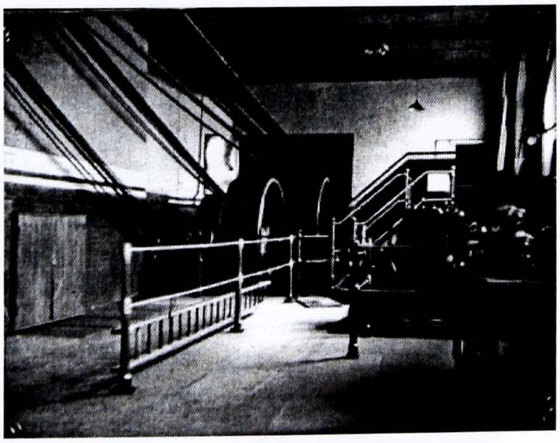


Plate 10.19 *Undated view of interior of rope race*

The engine house, contained within the warehouse, is a six-bay chamber, lit by tall windows in the south wall, which have been altered in modern times. It originally rose through the full height of the building, that is four storeys, but following the removal of the engine in 1959 floors were inserted so that now the engine house is of one storey. There is little left of ornamentation in the engine house and it is currently used as an engineers office, but photographs of the engine house with the engine show that it was once painted with the lower part of the wall in a dark and then above a painted dado with a lighter colour (Plate 10.18). Decorative railings, some of which survive, divided the rope race from the rest of the room. Piers in the north wall probably supported an overhead crane. The engine bed, of brick and stone survives from ground level to the original stone flag floor. The engine was horizontal cross compound engine by William Roberts and Sons, Phoenix Foundry, Lancashire. The piers of the engine bed leave a central space for a large flywheel, positioned to allow rope drive into the adjacent rope race to the east, with the ropes returning under the floor. This evidence is confirmed in surviving pictures of the engine and rope race (Plate 10.19). The rope race, of four bays, was lit from the south, and because it was intended to power the sheds to the south, where the floor level was higher than that in the warehouse, it does not appear at ground floor level in the warehouse block except as a ramped ceiling. The rope race rose through the first and second floors of the warehouse building and was screened of from the rest of the building by brick walls.

The engine primarily powered the sheds to the south and heavy cast-iron wall boxes in the south wall of the warehouse block show where drive was taken from the pulleys in the rope race through to the lineshafts in the shed. However, it is clear that the warehouse itself was used for more than storage for power was transmitted from the rope race to the first and second floors. On the first floor three wall boxes are set into the brick wall screening the rope race from the warehouse and on the second floor a further wall box survives in the same position (Plate 10.20). Whilst the weaving sheds had the heaviest demand on the power supplied the warehouse was undoubtedly used for light powered processes, and it is likely that the 1896 warehouse was designed to include those departments that had been located in its predecessor, listed as taping, winding, beaming and twisting. A further line shaft was taken over the boiler house to power lathes and other machinery in the blacksmiths and mechanics shop (RCHME 1987e, 6).

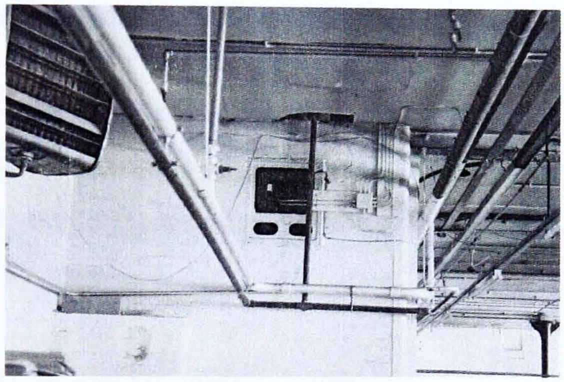


Plate 10.20 *Wall box from rope race into first floor of multi-storeyed block*

PROCESS RECORDING

Although built as a cotton weaving mill, Frostholme Mill as rebuilt after 1896 also provided space for taping, winding, beaming and twisting - all processes associated with the

Plate 10.21 *Processes, Frostholme Mill*

preparation of yarn for weaving on powerlooms. Little is known is about the exact layout of process within the mill, but it seems that the sheds housed rows of power looms orientated east-west, whilst the multi-storeyed range housed the other processes and probable storage space (Plate 10.21). The arrangement of the sheds behind the multi-storeyed range meant that all materials entering and goods leaving the site had to pass through the multi-storeyed range fronting the site. This did not necessarily reduce the logical arrangement of processes at the site for flow production as yarn entering the site would probably have required twisting, taping, winding or beaming prior to being woven and after weaving would probably have been stored prior to delivery. Therefore, the flow of production effectively moved from the front of the site to the rear and back again.

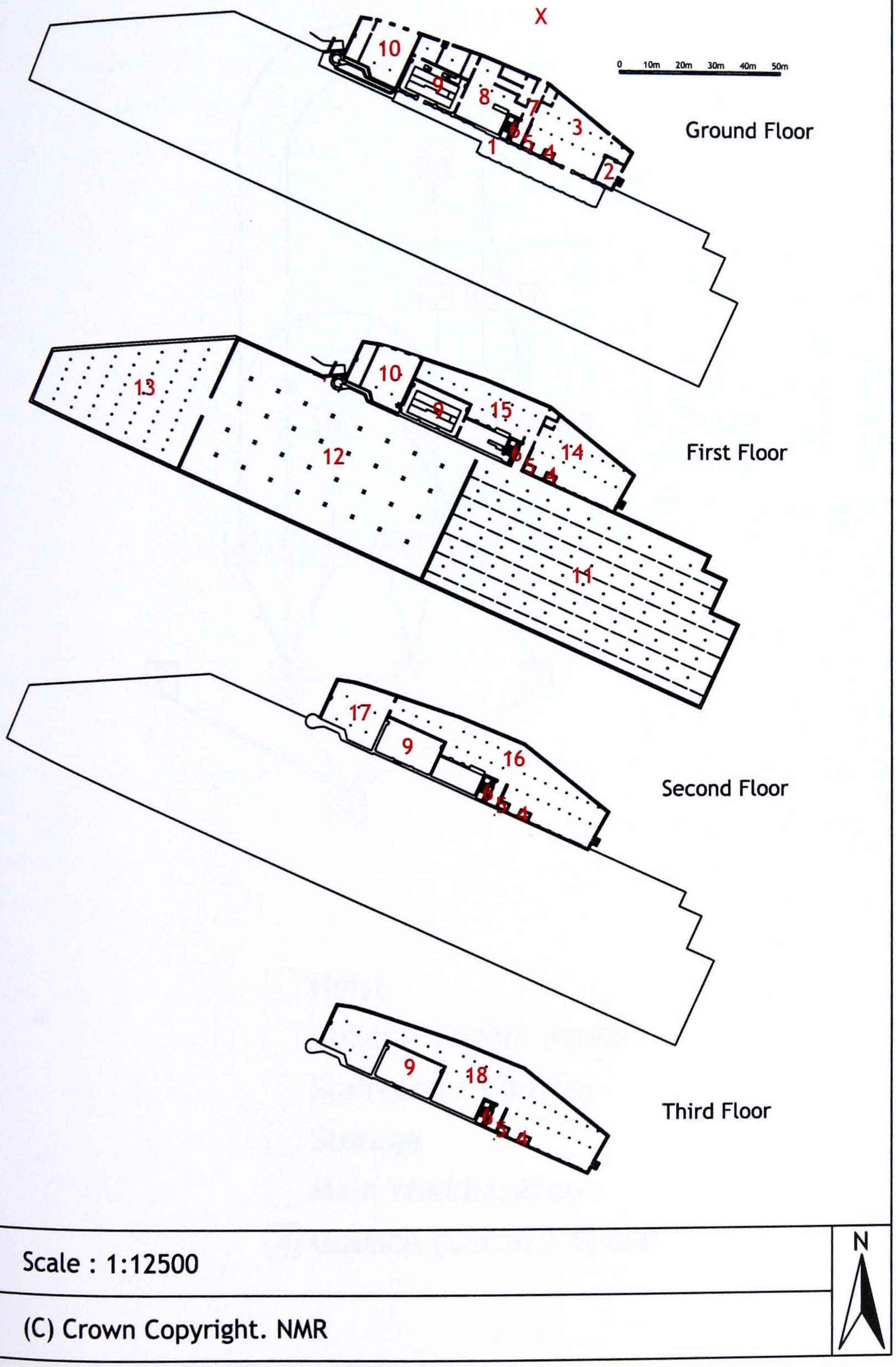
The flow of production in this way is also apparent when the movement of materials and goods around the site is plotted as a gamma map (Figure 10.5) and spaces in that complex quantified (Table 10.1).

Table 10.1 *Quantified values for Phase Two 'materials/goods' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.154	4	**10**	0.265	2
1	0.206	2	**11**	0.157	3
2	0.288	1	**12**	0.279	2
3	0.11	4	**13**	0.308	1
4	0.125	5	**14**	0.199	3
5	0.125	5	**15**	0.228	2
6	0.14	2	**16**	0.169	3
7	0.125	4	**17**	0.279	1
8	0.243	1	**18**	0.184	3
9	0.302	2			

Mean RA: 0.204 RR of Complex: 0.807

The gamma map shows that the main corridor leading through the ground floor of the multi-storeyed range (space 7) and the two internal hoists (spaces 4 and 5) played a key role in the



Scale : 1:12500

Figure 10.4 *Phase Two: Gamma map of the movement of materials/goodsl*

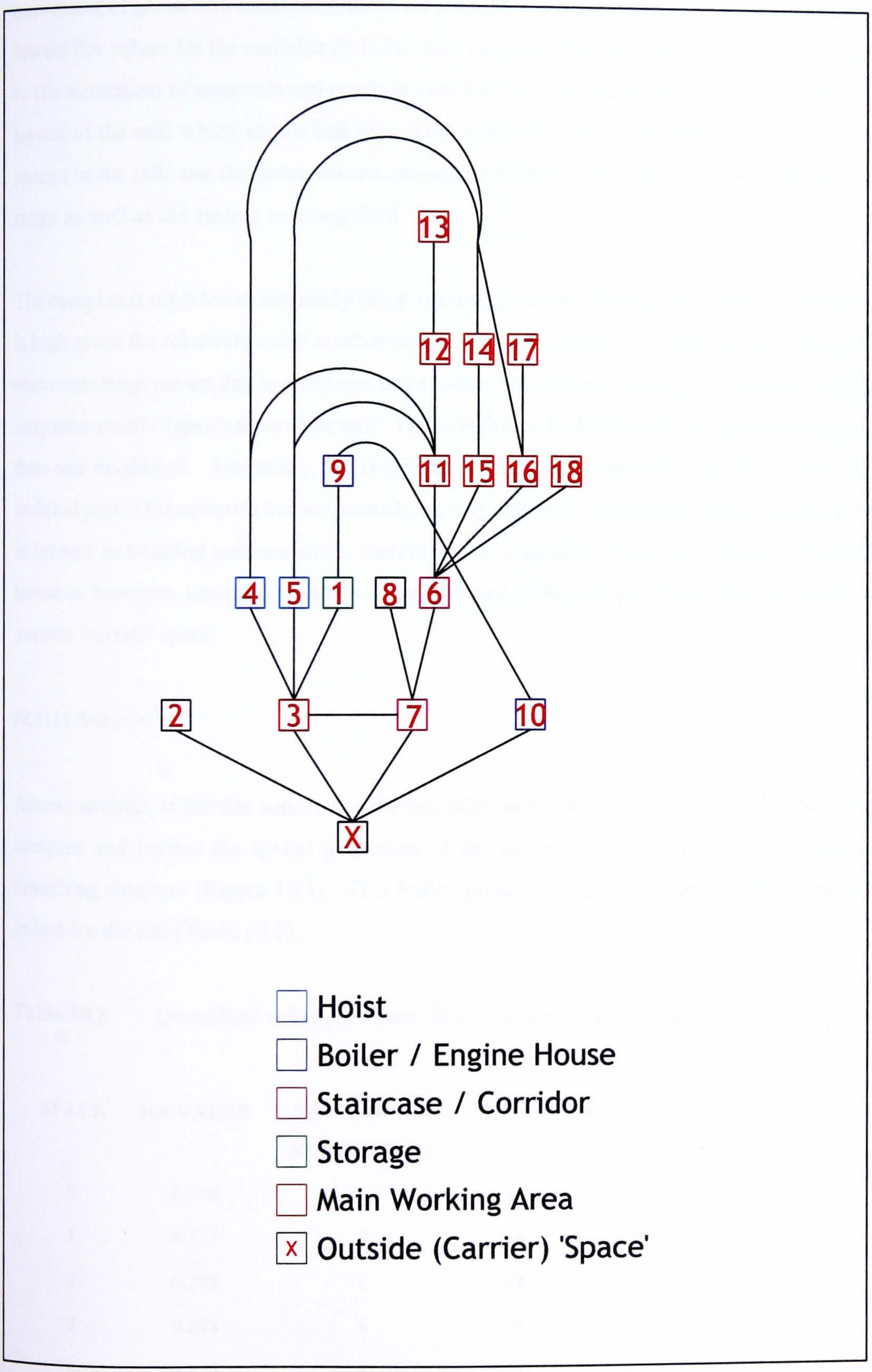


Figure 10.4 cont. *Phase Two: Gamma map of the movement of materials/goods*

movement of goods and materials around the site and this is also reflected in them sharing the lowest RA values for the complex (0.125). This indicates that these three spaces were central to the movement of materials and goods around the mill and this is supported by the physical layout of the mill which shows that the corridor provided an initial point of access to other spaces in the mill and the hoists communicated with each of the floors of the multi-storeyed range as well as the eastern weaving shed.

The complex is revealed as inherently ringy, resulting in an RR of complex value of 0.807 which is high given the relatively small number of spaces in the complex as a whole. The presence of numerous rings means that most spaces had a number of different points of access allowing the easy movement of goods around the mill. This is reflected in the majority of spaces having more than one neighbour. Unusually, the engine and boiler house (spaces 9 and 10) are not in an isolated part of the complex but are located on a ring. This reflects the fact that the engine house is located in a central position and is therefore only accessible from other spaces. The boiler house is, however, typically located in a shallow part of the complex with direct access to the outside 'carrier' space.

ACCESS ANALYSIS

Access analysis of the site concerning the potential movement of workers reveals a less ringy complex and instead the spatial properties of the site are based on a dendritic, inherently branching structure (Figure 10.5). This basic syntactic property is supported by quantified values for the site (Table 10.2).

Table 10.2 *Quantified values for Phase Two 'workforce' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.108	6	**19**	0.2	1
1	0.175	2	**20**	0.111	2
2	0.208	1	**21**	0.159	2
3	0.208	1	**22**	0.213	1
4	0.155	3	**23**	0.211	1

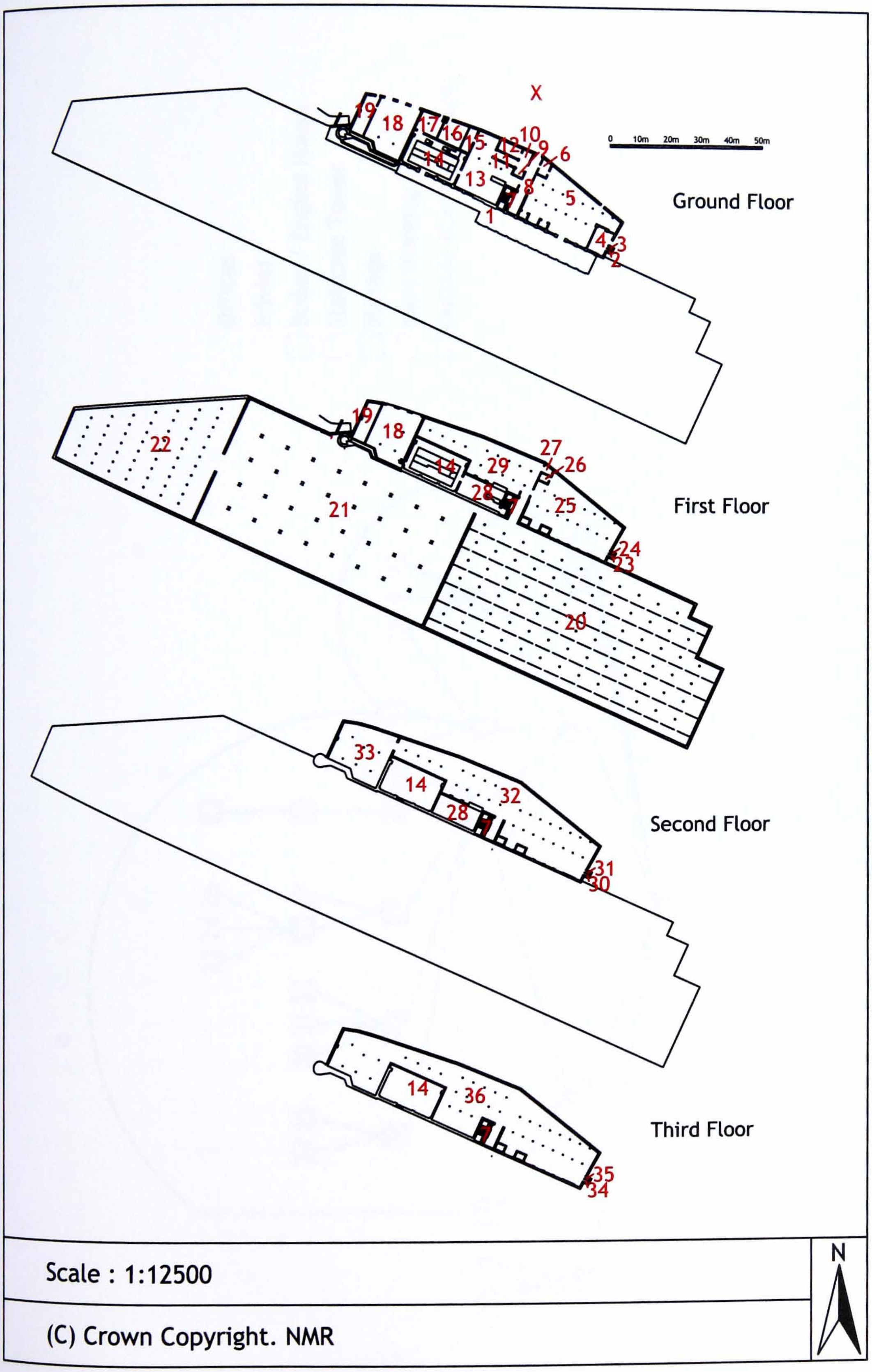


Figure 10.5 *Phase Two: Gamma map of the movement of the workforce*

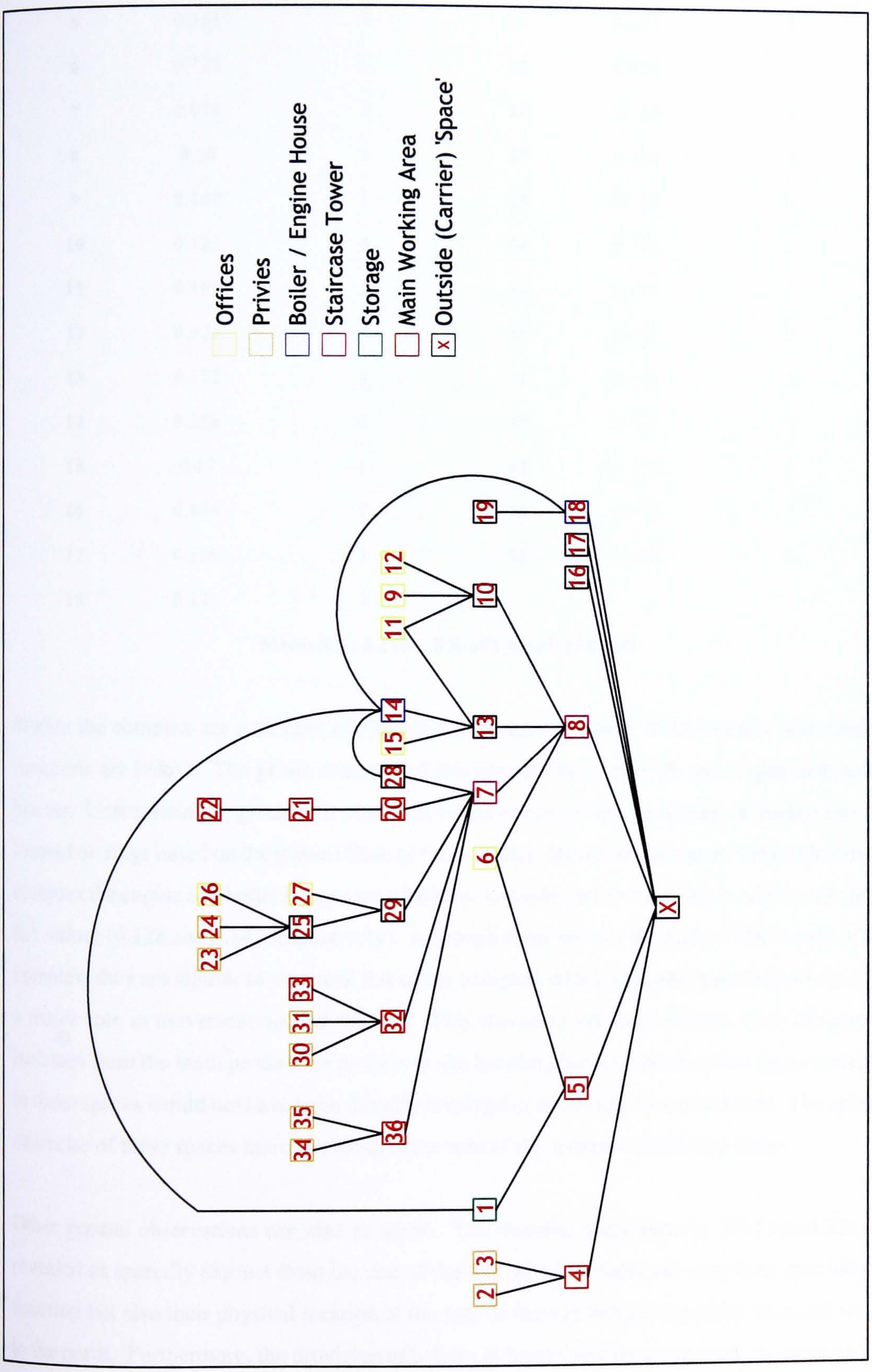


Figure 10.5 cont. *Phase Two: Gamma map of the movement of the workforce*

5	0.151	3	**24**	0.211	1
6	0.128	2	**25**	0.158	4
7	0.078	7	**26**	0.211	1
8	0.08	5	**27**	0.166	1
9	0.169	1	**28**	0.114	2
10	0.125	4	**29**	0.114	3
11	0.164	2	**30**	0.173	1
12	0.123	1	**31**	0.173	1
13	0.122	4	**32**	0.121	4
14	0.128	4	**33**	0.121	1
15	0.17	1	**34**	0.176	1
16	0.159	1	**35**	0.176	1
17	0.159	1	**36**	0.123	3
18	0.147	2			

Mean RA: 0.140 RR of Complex: 0.200

Within the complex are a number of rings but these tend to occur where spaces with similar functions are linked. The prime example of this are spaces 14 and 18, the engine and boiler houses. Unsurprisingly, given their close functional relationship, the spaces are linked and are located on rings based on the ground floor of the building. However, as spaces within the whole complex the engine and boiler houses are relatively spatially isolated and this is reflected in their RA values (0.128 and 0.147 respectively). Although these are not the highest RA values in the complex, they are similar to the mean RA of the complex which indicates that they do not play a major role in movement around the site. This therefore not only reflects their functional isolation from the main production process in the building but also the fact that those working in those spaces would not have been directly involved in the production of textiles. The spatial character of these spaces therefore reflects the role of the workers inhabiting them.

Other general observations can also be made. The weaving sheds (spaces 20, 21 and 22) are revealed as spatially distinct from the rest of the site which reflects not only their specialised function but also their physical location at the rear of the site behind the multi-storeyed range to the north. Furthermore, the provision of privies is from some the main working areas in the multi-storey block (from spaces 4, 25, 32 and 36) and they have some of the highest RA values in the complex (between 0.173 and 0.213). Unlike other sites where privies were provided off each of the main working areas, at Frostholme Mill the provision of privies is random and because of the internal divisions in the multi-storeyed range some spaces in the complex are a considerable distance away from the main working areas at the site. This has an interesting implication as, in the instance of those working in the weaving sheds, some workers would have had to have travelled a considerable distance through other spaces in the mill in order to use the privies. This was not logical in terms of limiting the time workers spent away from machinery during working hours and it did not make for easy supervision of workers as they travelled through the building. It therefore seems likely that there would have been other privies provided at the site for which no evidence has survived. Likely locations would be in the area of the weaving sheds and this would significantly reduce the amount of workers moving around the mill during working hours.

Also noticeable are the number of offices within the mill. Those on the ground floor (including spaces 6, 9, 10, 11, 12 and 15) were probably used by administrative staff and would have been well placed to overseer workers and materials coming and going from the mill. The two small offices on the first floor (spaces 26 and 27) were probably inhabited by overlookers and would have allowed workers in spaces 25 an 26 to be supervised. However, the absence of any offices in the weaving sheds is again puzzling as it would have been in these areas that the majority of the workforce would worked. It therefore seems likely that the evidence for such offices has also been lost either during the rebuilding of the Centre Shed or since the site ceased to be used for the production of textiles.

The male and female canteens are also of particular interest (spaces 16 and 17). Not only do these spaces suggest segregation on the basis of gender, but also provide an indication of other gender divisions within the mill. For instance, the female canteen is only accessible from the exterior of the mill, suggesting that female workers within other parts of the mill had to first come outside before re-entering the canteen. However, male workers in the engine and boiler houses could access the male canteen internally which strongly indicates, as would be expected, that engineers and boiler men were male. Other male workers at the site could access the male canteen from its main entrance in the north elevation.

PROCESS RECORDING AND ACCESS ANALYSIS: DISCUSSION

Analysis of the site reveals the existence of two different spatial structures at Frostholme Mill. Gamma analysis of the movement of goods and materials reveals an inherently ringy complex at the heart of which were two internal hoists which played a central role in the movement of goods around the interior of the site. In contrast, gamma analysis of the movement of the workforce reveals a less ringy complex which is integrated by the centrally placed staircase (space 7). The gamma map charting movement of the workforce also shows a degree of spatial segregation between different areas of the mill (such as the engine and boiler houses and rope race) and the remainder of the site. This emphasises the different functions of spaces in the mill and also the existence of workers with difference skills in specific parts of the building. There are also a number of zones apparent which relate to spaces in the mill not specifically related to the production process, such as the male and female canteens (spaces 16 and 17), which whilst being housed within the main multi-storeyed block were spatially distinct from the rest of the complex. The canteens are also of interest for they indicate segregation on the basis of gender.

However, the analysis of the site also raises a number of questions regarding sanitary provisions and the supervision of the workforce and, unlike many other sites, there is a notable absence of overseers offices and privies, particularly in the area of the weaving sheds. Therefore, whilst access analysis of the site reveals a inherently dendritic spatial structure which implies social control, other evidence which could be used to support this claim is missing. It may be the case that the evidence for these spaces has been lost or that they never existed at all. However, in their absence it is difficult to make any definite statements about the control of labour relations at the site other than the general observations made above.

ARCHITECTURAL SUMMARY

The architectural character of Frostholme Mill is of interest for a number of reasons. In the first place, there is an acute distinction between the 'public' and 'private' facades of the mill. The principal north facade is built of local stone in a mild classical manor with typical Palladian styled pediments, oculus windows and a boiler house frontage treated in an orthodox fashion with rusticated surrounds to large round-headed openings. However, the southern elevation of the multi-storeyed block is built of red brick and is unornamented. Even the windows of the engine house in the south wall are plain, though they are typically tall and narrow. This variety in form emphasises the desire to create an acceptable facade to the wider world.

Second, the architecture of Frostholme Mill is of interest because it has been used to indicate the internal arrangement of the mill. This is, obviously, most noticeable on the north elevation where the section of the mill containing the boiler house is treated in a different fashion to the main part of the building. In particular, it has a square-shaped parapet. Therefore, from the exterior the casual observer could immediately determine that the site was steam powered (not withstanding the presence of the chimney) and the number of three arched openings in the north wall of the boiler house indicated the presence of three boilers. Because the engine house was not visible from the main road the decision to pay special attention to the boiler house is significant.

Third, the internal treatment of the mill is of interest. In the first place, the engine house and rope race were typically ornate with brass fittings and although the windows were not externally ornamental, internally they originally had panelled surrounds. Furthermore, although located in the heart of the mill, the rope race and engine house were easily accessible from the main entrance to the mill, only three spatial steps away from the exterior of the site. Elsewhere, the interior of the mill has limited ornamentation, but the use of decorative tie beams in the East Shed is of interest and may indicate that the interior of this shed was intended to be viewed. This cannot be confirmed, but the beams used at Frostholme Mill in the East Shed are more ornamental than any others observed during the course of this research which would suggest a deliberate choice on the part of the builder to embellish parts of the interior working areas. Moreover, this shed was accessed directly from the main staircase tower and would therefore have been the first part of the working areas of the mill seen by a visitor to the site.

List Of Documents

10.1 'Plan, lease and indenture, Frostholme Mill, 18th July 1860'

Deeds, Rees Edwards Maddox, Solicitors, King Edward House, New Street, Birmingham

10.2 'Sale Notice, 4th September 1882'

Deeds, Rees Edwards Maddox, Solicitors, King Edward House, New Street, Birmingham

10.3 'Draft Conveyance. 18th September 1882. To: Joshua Smith of 12, Marble Street, Manchester, manufacturer. £3150'

Deeds, Rees Edwards Maddox, Solicitors, King Edward House, New Street, Birmingham

10.4 'Various Plans - November 1884'

Calderdale Planning Department. Todmorden Building Plan No. 189 and 211

10.5 'The Great Fire at Cornholme', *Todmorden Advertiser*, 24th January 1896

10.6 'Joshua Smith Ltd. Rebuilding of Frostholme Mill, 1896'

Calderdale Planning Department. Todmorden Building Plan No. 253

APPENDIX A
SITE DESCRIPTION : 11

PARK VIEW MILLS

DATABASE ENTRY:	1341
NBR NUMBER:	BFO62457
NGR:	Se 1445 3005
TOWNSHIP:	(Wibsey) North Bierley
CIVIL PARISH:	North Bierley
DISTRICT:	Bradford
COUNTY:	West Yorkshire
BRANCH:	Worsted
PERIOD:	Late

Built in 1925 by Lee and Foster, worsted manufacturers, Park View Mills is of particular interest as an example of one of the last mills to be built in Yorkshire. Park View Mills is also of considerable interest of interest for the site used electric power from the national grid and the design of the mill is therefore liberated from the need to house a power source or system of power transmission.

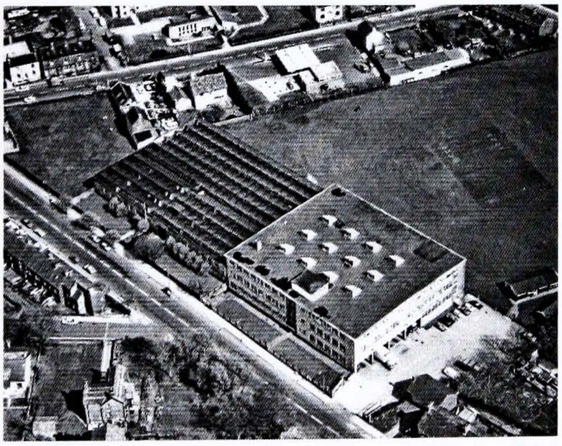


Plate 11.1 *Park View Mills, North Bierley (the original mill buuilding is seen on the left) © Crown Copyright. NMR.*

The site occupies the northeast corner of a large plot of land in the centre of the Bradford township of North Bierley and comprises a single-storey shed over a basement of almost equivalent size (Plate 11.1; Figure 11.1). Typical of its date, the mill had a specialist function and the main working area was dedicated to the

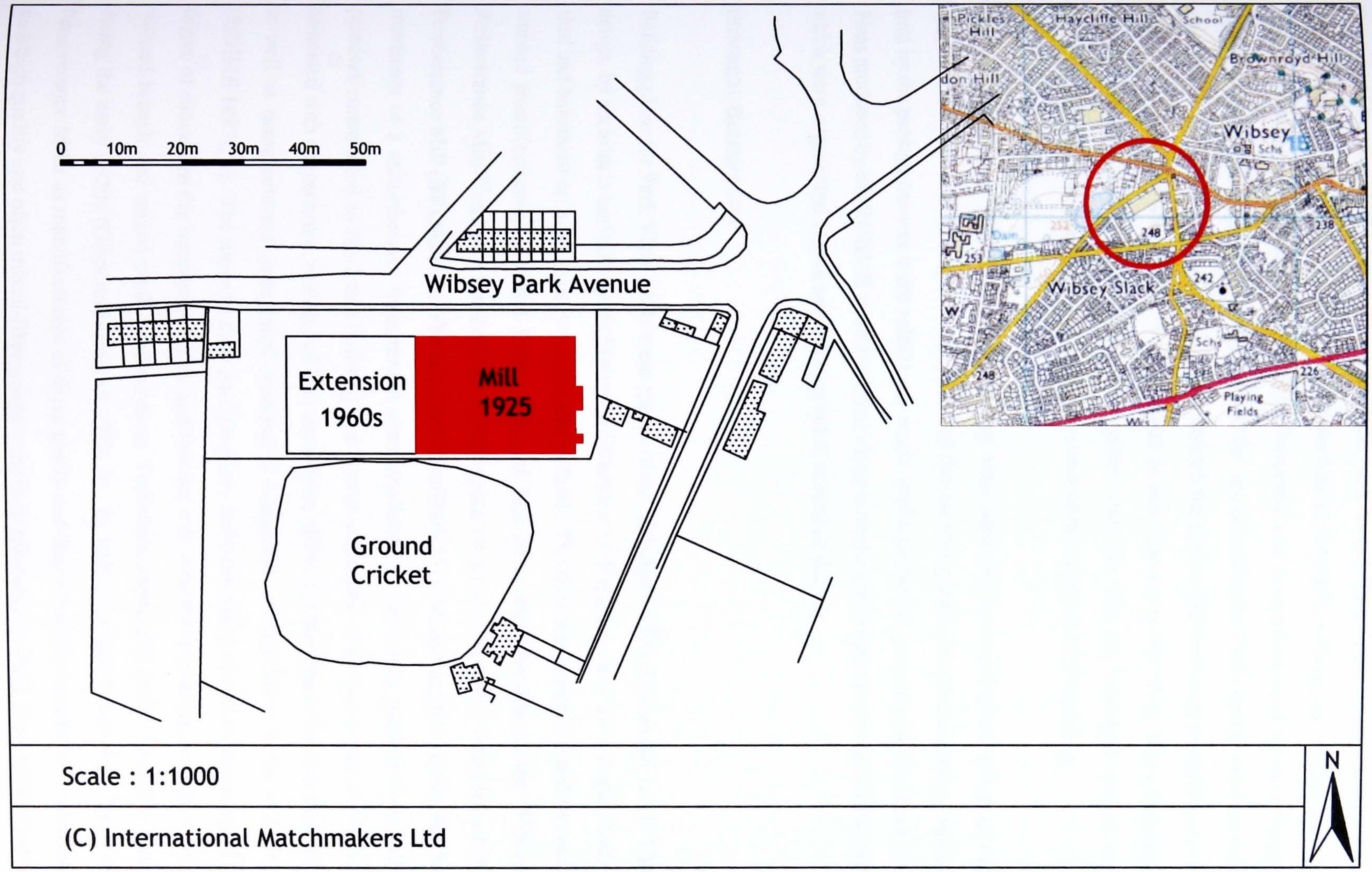


Figure 11.1 *Block Plan, Park View Mills, North Bierley*

weaving of worsted cloths, some of which at least were mixed-fibre clothes using cotton warps, whilst elsewhere provision was made for the storage of materials, offices, an internal loading bay and canteen. It is possible that part of the basement was at one time used for the spinning of worsted yarns. The production of textiles at the site ceased in the 1950s and in 1956 the mill was sold to Grattan Warehouses Ltd. who extended the mill to the west with the addition of a four-storey concrete warehouse. The complex is now known as the 'Park View Business Centre' and is divided in a number of smaller units for let; the principal tenants are Matchmakers International Ltd. who occupies most of the original 1925 building.

Despite many of the interior divisions having been removed in recent times, much of the original evidence survives and architects plans of the site along with other documentary sources held by the present owners were selectively made available for the purposes of this research. Plans produced by the RCHME were also used along with their photographic record of the mill which were augmented with a new photographic record of the site.

HISTORICAL BACKGROUND

Building plans for Park View Mills were approved on 30th April 1924 (Document 11.1). The design, by architects and surveyors Moore and Crabtree of Keighley, was for a single-storey shed and basement on a previously vacant plot of land. The mill was commissioned by local worsted manufacturers, Lee and Foster who, at that time, were tenants of the Wibsey Perseverance Mill Company Limited and rented space on a room-an-power basis in nearby Perseverance Mill (**BFO62456**). The construction of Park View Mills therefore represents the movement of a manufacturer from rented accommodation to their own purpose-built built premises constructed to the latest building and power standards. The move may also have coincided with an intention, not carried into immediate effect, for the firm to become spinners as well as manufacturers (integrated working is suggested at Park View Mills in 1936) (RCHME 1987f, 1). The move to their own premises indicates that Lee and Foster enjoyed a degree of success in the worsted industry and this accords with the increasing strength of the worsted branch and mixed cloth production in Yorkshire, especially in the Bradford area, during the early 1920s (Giles and Goodall 1992, 4). In 1921, Lee and Foster were listed at Perseverance Mills as manufacturers of dress goods and they evidently continued to produce such high quality and often mixed-fibre goods upon their relocation to Park View Mills where, in 1930-31 they were recorded as manufacturers of plain and fancy worsted coatings, venetians, tropical and costume cloths and dress goods (RCHME 1987f, 1).

The original architects plans for Park View Mills (Document 11.1) were for a roughly rectangular shed, lit principally from above, over a basement of almost equivalent size and principally lit from the south. The plans show the shed and basement split into a series of main working areas (Figure 11.2). At ground floor level the southern half of the shed was described as 'weaving shed' whilst the northern half was subdivided into a series of smaller areas, the function of each area being named on the plans. In the north east corner were a series of small offices (including a general office, typists rooms and a waiting room) accessed from a door in the third bay of the north front. A large internal loading bay occupied the centre of the northern half of the ground floor; this feature, designed to accommodate heavy haulage vehicles, is a reflection of the date of the mill and signals the importance of road transport to the textile industries by the twentieth century. Placed around the loading bay were a further small office, small hoist, large hoist and staircase and a chimney from a heating chamber below. To the east of the loading bay was a corridor leading from the front of the building to the main working area to the south; this was the principal means of entry to the mill for use by the workforce. The north west corner of the ground floor was set aside for 'Finished Goods', a 'Grey Room' ('Grey Cloth' refers to the natural colour of cloth as it came of the loom and it is therefore likely that the 'Grey Room' was used for the inspection, burling, mending and storage of newly woven cloth), and a further space for 'Twisting and Drawing' (processes involving the preparation of yarn prior to weaving). Privies, communicating with the weaving shed and a main corridor running east-west through the centre of the mill, were provided along the east elevation.

The basement was similarly arranged with a large undivided working area, function unnamed, to the south and a series of smaller rooms along the north wall. These included a 'cotton cellar', 'worsted cellar' and 'canteen'. In the centre was a small 'heating chamber' and the basement communicated with the ground floor through a centrally placed staircase and hoist. The main working area in the basement was perhaps initially used for weaving or the storage of materials and finished goods but, as by 1936 Lee and Foster are recorded as spinners and manufactures and Park View Mills is given as their only address, the basement may well have been used for spinning. The presence of the cotton and worsted cellars at this level may indicate that the basement was designed for spinning, the newly spun yarn being held in these cellars prior to weaving on the looms housed in the weaving shed above. Alternatively, the

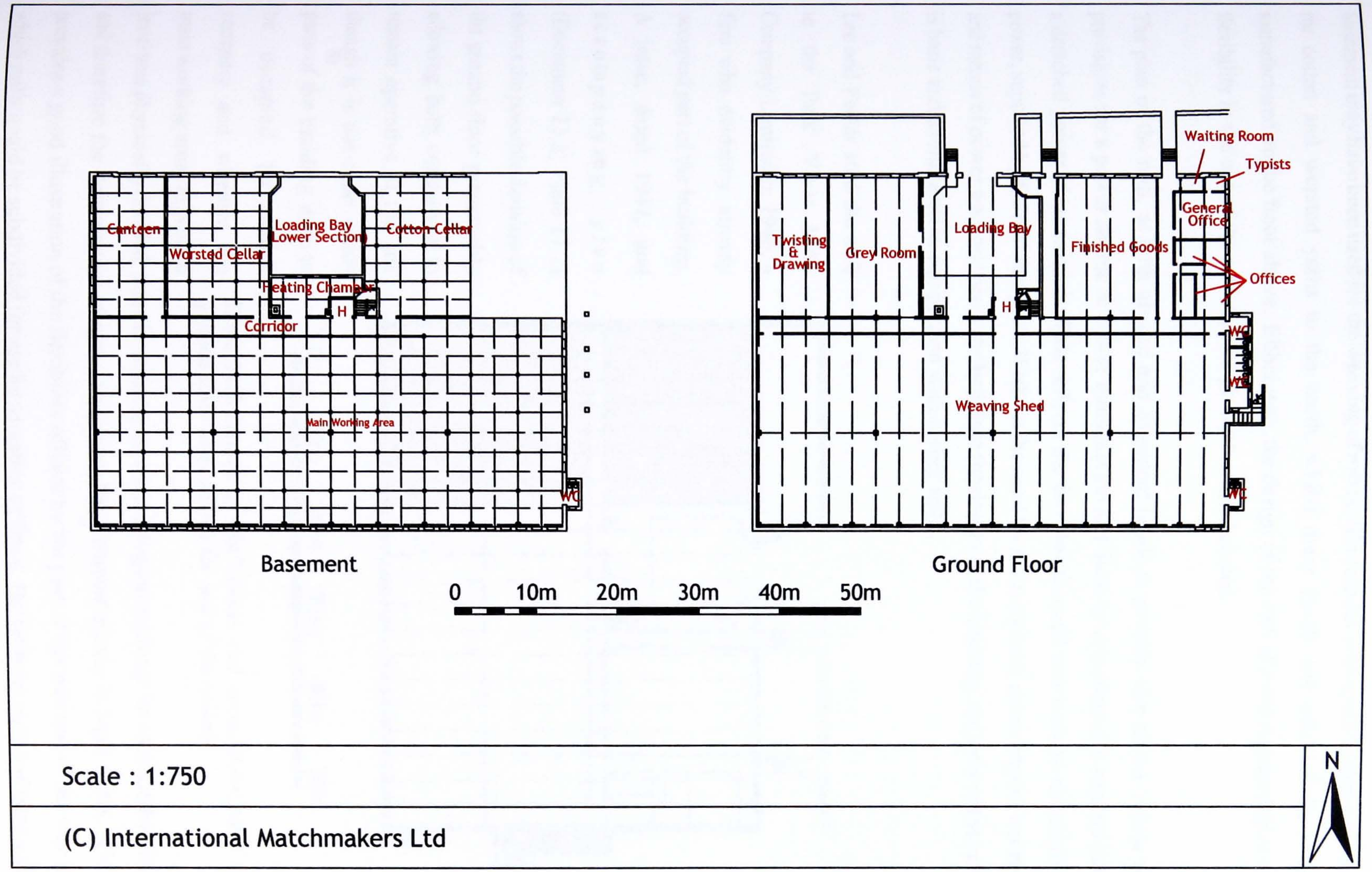


Figure 11.2 *Annotated basement and ground floor plans*

basement may have been used for the weaving of mixed-fibre cloths, with specific storage areas for cotton and worsted yarns to the north, whilst dress goods and other cloths were manufactured on the floor above. Either way, the design of the mill allowed a great degree of flexibility in the use of the mill and the products manufactured.

The plan of the mill, at both ground and basement levels is entirely free of any rooms or provisions for a power source or power transmission and there is no evidence to suggest that a detached power plant existed. This reflects the fact that the mill was built as electrically power, supplied by the national grid. Without the need for a waterwheel, steam engine, boilers and means of power transmission to be built into the design of the building, the form of the mill is basic and uncluttered in comparison with earlier mills.

Lee and Foster sold the mill to the Park View Mills Company Limited in 1946, a firm who evidently already occupied part of the building. A lease, dated 1947, and accompanying plan (Document 11.2; Plate 11.2) shows the possible division of the ground floor presumably allowing both companies to remain operative at the site though it is not clear which parts of the building were to be occupied by which company and whether the main working areas at ground level was physically divided; there is certainly no archaeological evidence for such subdivision and therefore the demarcation of space may have been marked purely in legal terms. This provides a good illustration of the flexibility offered by the plan of the mill and of the way in which mills could be subdivided for use by a number of firms. By 1956 the mills had been sold to Grattan Warehouses Ltd., and textile production at the site ceased. Grattan Warehouses Ltd.

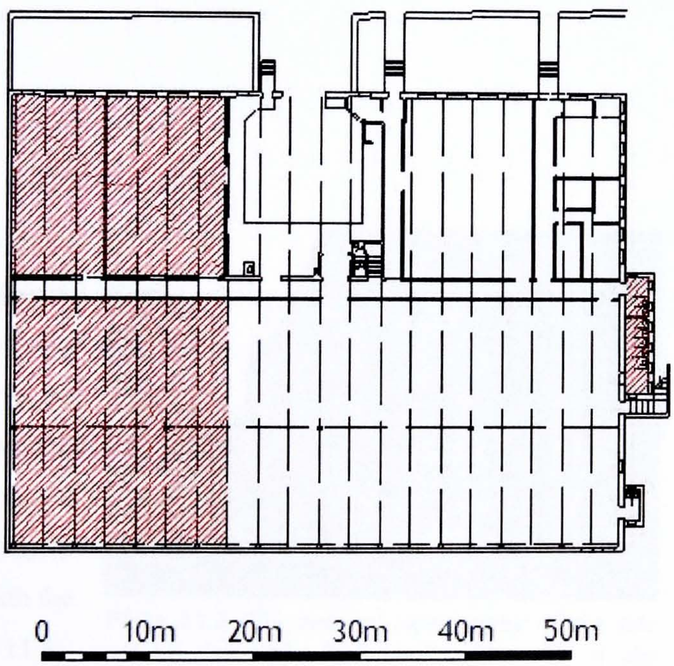


Plate 11.2 *Details of 1947 lease; red areas show parts of ground floor demarcated for one of the tenants*

brought the site and erected four-storey concrete warehouse with offices to the west of the original mill. This involved the removal of part of the west wall of the mill and it was probably also at this time that many of the subdivided spaces in the mill were removed. The site is now in use by a number of light industrial companies and the principal tenant (and occupier of the ground floor of the 1925 mill) is Matchmakers International Ltd., who use the mill for the storage of mail-order goods.

ARCHITECTURAL DESCRIPTION

There are two principal phases of structural activity at Park View Mills but only the first, the mill as built in 1925, is of interest here. Phase Two represents changes made to the site following its use as warehouse adjacent to the new multi-storeyed block to the west built in the 1960s; this phase therefore represents the mill after its use for textile production and outside of the temporal limits of this thesis.

- ### PHASE ONE

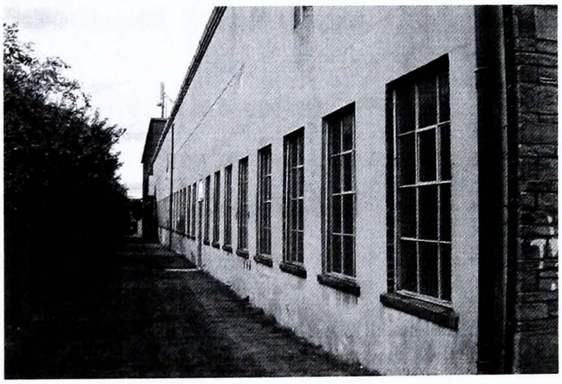


Plate 11.3 *The natural topography of the site means that the south and east walls of the basement are exposed above ground level*

As built in 1925, Park View Mills was a large, rectangular shed over a basement with the main working areas on both floors behind service and storage areas to the north (see Figure 11.2). The fall of land across the site to the south and west means that to the north the basement is largely below ground level whilst to the south the basement is fully-exposed (Plate 11.3). The north and east walls of the mill are of local, coursed stone externally and brick internally. The other elevations are of brick throughout (RCHME 1987f, 2). The use of different materials reflects the provision of expansion to the south and west and this is echoed in the internal steel structure of the mill which is keyed into the north and east walls but is independent of the south and west walls.

The north elevation of the mill was built in a mild classical style and was clearly intended as a display facade (Figure 11.3). Centrally placed is a large loading door that leads directly onto an internal loading bay; the lintel of the loading bay door is of cast-concrete with a cast-in inscription "PARK VIEW MILLS 1925" and is flanked by shallow projecting bays with low pediments (Plate 11.4). A small door immediately west of the loading bay door gave direct access to the raised walkway surrounding the internal loading bay (RCHME 1987f, 2), but this has been blocked in modern times and the short flight of steps or ladder, which must have provided access to the door removed (Plate 11.3). Terminating the ends of the elevation (seven bays to the east of the central loading door and six to the west) are further projecting bays with low pediments. In the centre of each of the pediments the setting masonry on end creates a splayed central motif, similar in appearance to a keystone. Running the length of the elevation, and only interrupted by the shallow projecting bays, is a bracketed cornice; below and above the cornice the effect of repeated triglyths, though set flush to the rest of the facade, is created by setting further masonry on end (Plate 11.5). Above the windows and lintels the elevation breaks forward slightly creating the effect of a continuous frieze. The lintels of the basement window are joined, forming a continuous string coarse At the east of the north elevation this stringcourse is less obvious and appears as a plinth because of the rising ground level in this area.

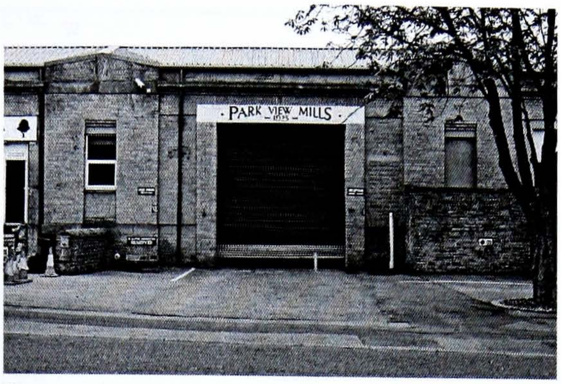


Plate 11.4 *Central entrance to loading bay in north elevation*

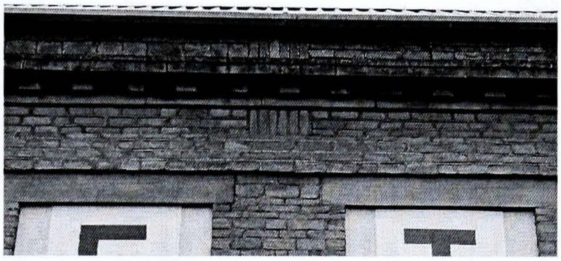


Plate 11.5 *Architectural effect in the bracketed cornice with 'triglyth' design*

There were two principal entrances to the mill, one apparently for use by workers and the other by visitors and clients and both were accessed from the small forecourt which was divided into a number of smaller areas, each associated with the two main entrances and the centrally-placed entrance to the loading bay. Both of the main entrances to the mill were treated in a similar style so that from the exterior, at least, there is no obvious demarcation. The workers' entrance

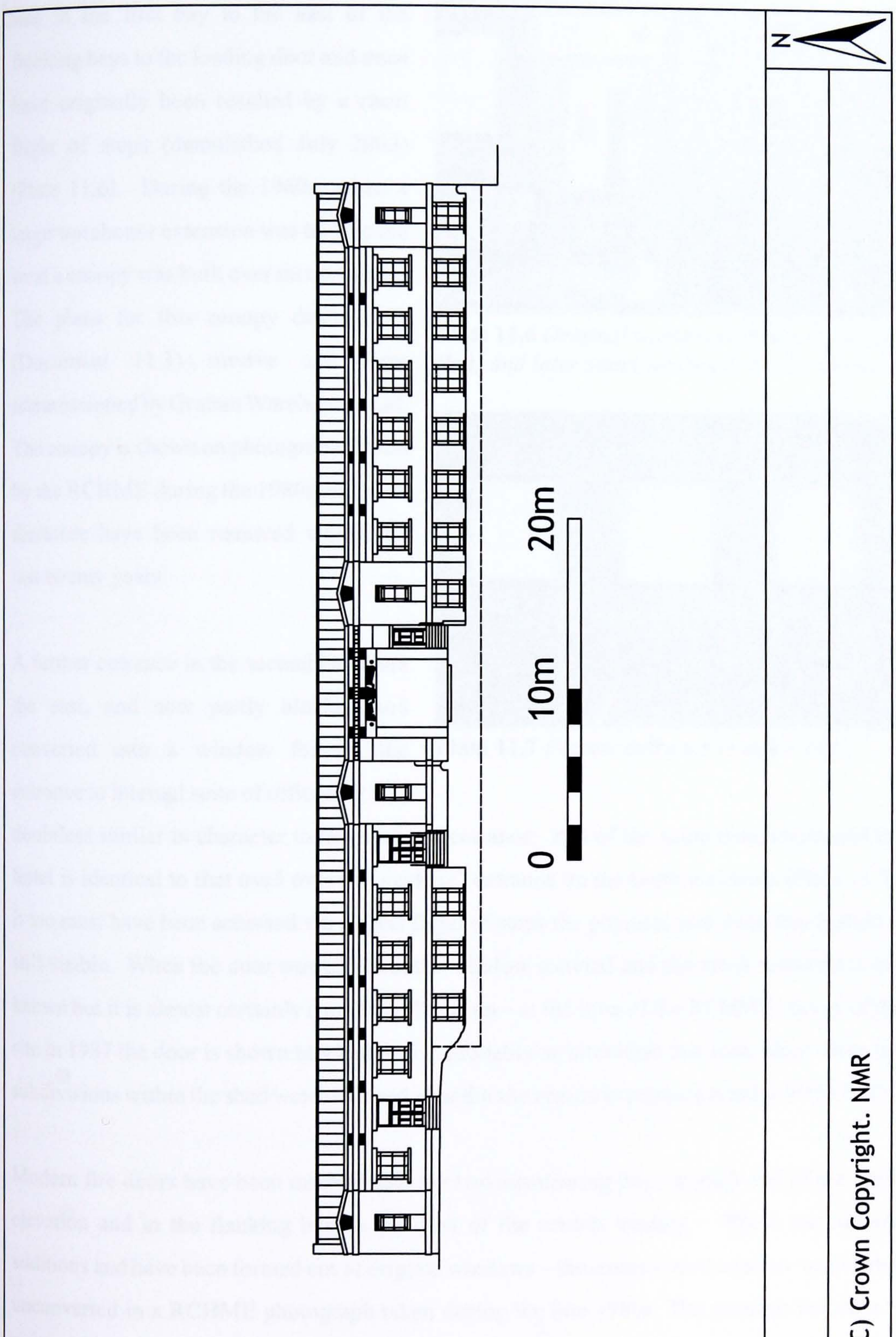


Figure 11.3 *North elebvation, Park View Mills*

was in the first bay to the east of the flanking bays to the loading door and must have originally been reached by a short flight of steps (demolished July 2003) (Plate 11.6). During the 1960s, when a large warehouse extension was built to the west a canopy was built over this doorway. The plans for this canopy dated 1953 (Document 11.3) survive and were commissioned by Grattan Warehouses Ltd. The canopy is shown on photographs taken by the RCHME during the 1980s and must therefore have been removed within the last twenty years.

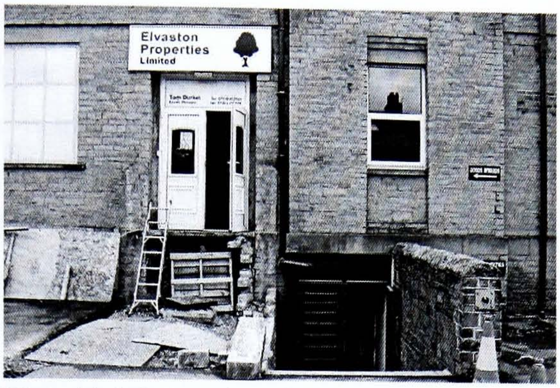


Plate 11.6 *Original workers entrance to the mill (left) and later stairs leading to the basement*

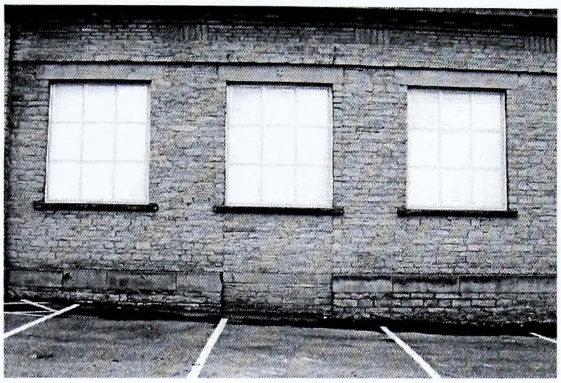


Plate 11.7 *Former entrance to office suite*

A further entrance in the second bay from the east, and now partly blocked and converted into a window formed the entrance to internal suite of offices. It was doubtless similar in character to the workers' entrance: it is of the same dimensions and the lintel is identical to that used over the workers' entrance on the north elevation (Plate 11.7). It too must have been accessed via a short flight of steps the physical scar from this feature is still visible. When the door was blocked, the window inserted and the steps removed is not known but it is almost certainly a modern alteration – at the time of the RCHME survey of the site in 1987 the door is shown blocked so it is probably an alteration that took place when the subdivisions within the shed were removed after the site ceased to produce textiles in the 1960s.

Modern fire doors have been inserted into the two terminating bays at each end of the north elevation and in the flanking bay to the west of the central loading. These are modern additions and have been formed out of original windows – the eastern most window was shown unconverted in a RCHME photograph taken during the late 1980s. The western fire door is accessed by a flight of stone steps. The stone is similar to that used in the original mill building and may therefore have been built using stone from the projecting privy block which was demolished after the RCHME survey (see below p349).

At basement level the north elevation has survived virtually unaltered. The basement windows in the eastern half of the elevation have been shortened due to alterations to the ground level. This represents a modern alteration and the current layout of the yard in front of the mill post-dates the RCHME survey of the site in 1987. In fact, a photograph taken by the RCHME during that survey shows that the eastern most basement windows had been blocked and they have therefore been re-opened since the late 1980s.

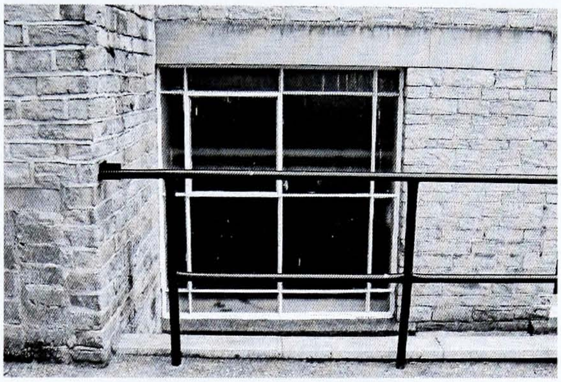


Plate 11.8 *Original window with steel frame surviving in north elevation*

Immediately west of the loading bay door at basement level is the only surviving original window frame in this elevation (Plate 11.8). It is a steel-framed sixteen-light window, with the outer, thinner panes forming a border around four central panes, one of which opened for ventilation. A series of photographs taken by the RCHME in the 1980s show that most of the original windows in the mill, at both ground and basement level, had been replaced but not by the current U-Pvc units – these units are a recent alteration.

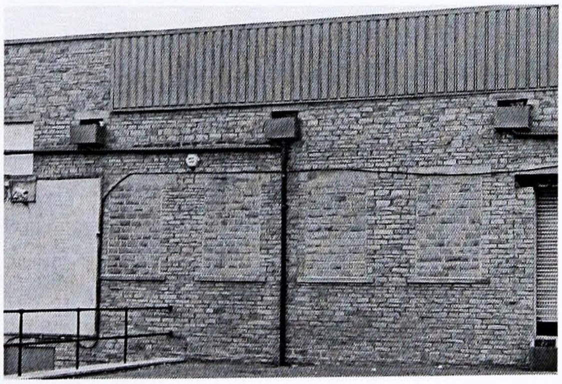


Plate 11.9 *Blocked window openings in east elevation*

The east elevation, in contrast to the north facade, is much plainer in appearance and provides evidence for the provision of ventilation to the main working area of the shed and sanitary facilities for the workforce. The original architects plans show that at the north end of the east elevation there were originally eight windows lighting a series of offices. The four northern most of these windows have been recently created into two large loading doors but their lintels survive above the modern steelwork for these doors. These loading doors are a modern addition as modern health and safety requirements prohibit the use of the original loading door on the north front (Brook, pers comm.). The other four windows have been blocked with modern coursed masonry (Plate 11.9).

Centrally placed on the east elevation was once a long privy block, providing privies at ground floor level. At basement level the privy block was supported on four stone piers and beneath it five windows lit the main working area in the basement. All but one of these windows has now been blocked and the one that remains having been converted into a fire door (Plate 11.10). The privy block was removed sometime after the RCHME survey in 1987 – it is shown on photographs of that date and this, along with the original architects plans for the mill, is the only evidence remaining of this feature. (Plate 11.11). It was split into two unequal parts, the northern most part providing two water closets, and that to the south providing five. On the plans there is no gender ascribed to either part of the block, but it is possible that the northern part was used by staff working in the northern half of the mills, whilst workers in the weaving shed who had direct access to the privies used the larger half. The privy block is now represented by an area of stuccoed wall at ground floor level and it is possible that the stone was re-used to make various modern alterations elsewhere at the site, such as the blocking of windows and constructions of steps on the north front (see above p347.) and would account for the modern stonework being similar in character to the original work.

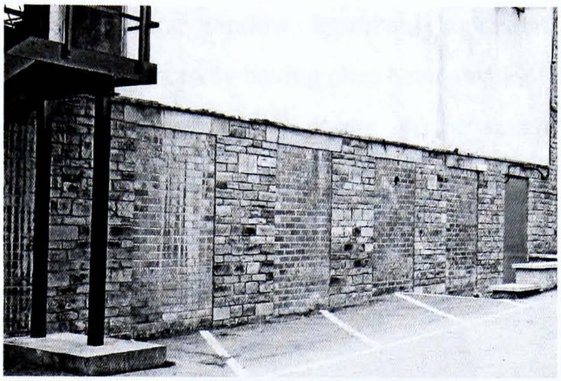


Plate 11.10 *Blocked windows formerly beneath ground floor privy block*

Plate 11.11 *View of privy block on eastern elevation prior to demolition © Crown Copyright. NMR.*

Photographs taken by the RCHME in 1987 show that immediately south of the privy block on the east elevation was a flight of steps leading to a door at ground floor level (Plate 11.11). This feature is not shown on the architect's plans for the building and the door is shown as a window; the steps currently leading to a doorway at ground floor level are a modern steel structure. However, it is likely that the ground floor doorway is original for the lintel of the door matches those used elsewhere at the mill. It may therefore be the case that the door and steps represent an amendment to the original plans undertaken during construction or it is a very early alteration with a door way fashioned of an original window. It probably represents the former as there is no archaeological evidence for the doorway having once been a window – the surrounding masonry is regularly coursed up to the opening at all points. To the west of this doorway are two further windows at ground and basement level, all of which have been blocked with modern materials.

At the south end of east elevation is a further privy block, but here pairs of water closets were provided at both ground and basement level (Plate 11.12). All windows in this privy block have been blocked red brick and at least some of that blocking had been under taken by the late 1980s as they are shown on RCHME photographs of the same date. The provision of a pair of water closet at basement level in this privy block, compared with the nine privies provided at ground floor level gives some indication of the distribution of the workforce throughout the mill. Most of the northern half of the basement was set aside for the storage of worsted and cotton so most of the workforce working on this floor would be engaged in activity in either the canteen or main working area to the south. In contrast, at ground floor level almost the entire floor was in use by members of the workforce and presumably a greater number of people were employed on this level – this is therefore reflected in sanitary provision at the site.

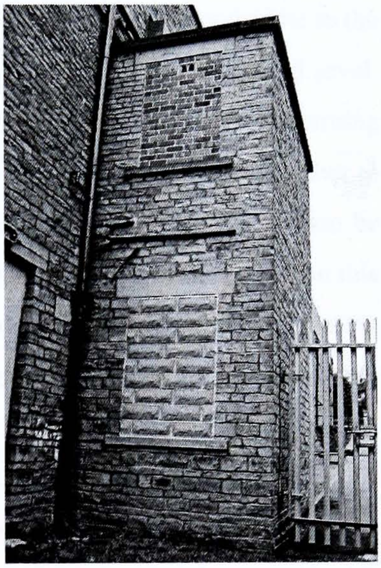


Plate 11.12 *Privy block at south end of east elevation seen from the south*

Within the east elevation are a series of six ventilation grills, built into the parapet and located in the six gables of the north-lit roof over the weaving shed. All six grills are visible, though one is now blocked, and can still be seen internally (Plate 11.13). It is likely that similar grills were located in

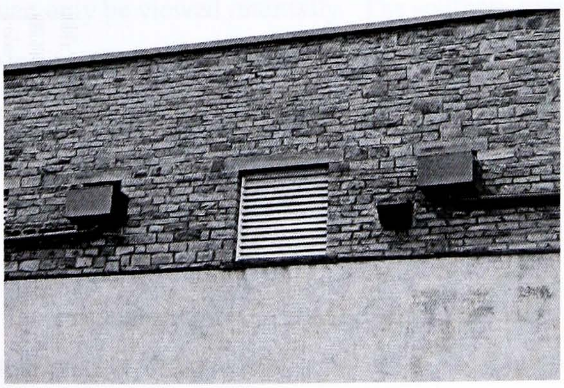


Plate 11.13 *Ventilation grills in east elevation*

the west elevation but they were removed when the southern half of that elevation was removed in the 1960s. The provision of ventilation in this area of the shed indicates that the area to the north was used differently to the weaving shed to the south, which evidently required adequate airing. This further indicates that the northeast corner of the ground floor was built as planned a suite offices, which could be ventilated from windows to the north and south. The east elevation also shows the guttering system for the roof, though altered to accommodate the new loading doors at the northern end. Large gutter boxes collected water from the gutters of the north-lit roof draining through down pipes to ground floor level.

The south elevation of the mill is of two storeys for the fall of the ground across the site to the south means that the south wall of the basement is entirely exposed above ground level. basement is lit from the south by twenty-nine large windows, each with a steel-frame containing twelve lights, with one opening light in each. The form of the frames is similar in character to the surviving original window noted in the north elevation and they may therefore also be considered original. There appear to be few alterations to the basement fenestration on this elevation, but the fact that the elevation has been covered in stucco plaster makes discerning alterations difficult. Certainly, one window has been converted into a modern fire door towards the east end and at the west end of the elevation one window is missing – the original plans for the mill show thirty windows in this elevation. At ground floor level architect's plans for the mill show two small windows at the east end which survive *in situ,* though what they were intended to light is not clear – the weaving shed was lit from above and no smaller rooms in this area which could have been lit by these two windows are shown on original plans for the building or survive archaeologically. Elsewhere the ground floor of the south elevation was blank and it remains so with the exception of a modern fire door inserted in the second bay from the west. This fire door is served by a modern iron fire escape.

The west elevation only partly survives and can only be viewed internally. The southern part of the elevation was removed when an extension was built to the west in the 1960s (Document 11.3). The northern part, shown on plans for that extension of the wall had seven windows at basement level and these survive, but blocked by modern brick. At ground floor level the wall was blank.

Internally, many of the features shown on the original architect's plans for the mill have survived, but much of the evidence for the subdivision of the northeast corner of the ground floor has been lost and the area is now used as two large internal loading bays. Consequently, the evidence for the offices, second entrance to the mill and 'finished goods' room is difficult to reconstruct.

The centrally placed loading bay at ground floor level survives virtually unaltered and it is still possible to see the original loading area and raised walkway (see Plate 11.14). The hoist and stairs communicating with the basement also survive. To the northeast of the loading bay the small office overlooking the loading area remains *in situ* though its window and door to the inside of the mill have been blocked with modern materials and the office is now accessed via a small porch within the original workers' entrance. To the east of this office are the corridor that led past the loading bay to the main weaving shed. The northern part of this corridor has been formed into a porch/office but evidence that it once continued south remains as scars in the surviving fabric. To the west of the loading bay, the 'grey room' and area set aside for 'twisting and drawing' survive, divided from the rest of the mill by original thin brick walls. The east wall of the 'grey room' has been opened out to create a large opening leading directly onto the loading bay and the east wall of the 'twisting and drawing' room likewise opened out so that both areas form one large area. Elsewhere on the ground floor other subdivisions have been removed and little evidence for them survives. However, the fact that the loading bay area, workers entrance and corridor, 'grey room' and 'twisting and drawing' room were built as dictated by the architect's plans, and the fact that a second entrance in the area of the offices was evidently built, suggests that the 'finished goods' area and offices were probably also built as planned.

Plate 11.14 *Former internal loading bay*

At ground floor level, the internal structure of the mill almost entirely clear of structural members and is independent of the steel work in the basement and the

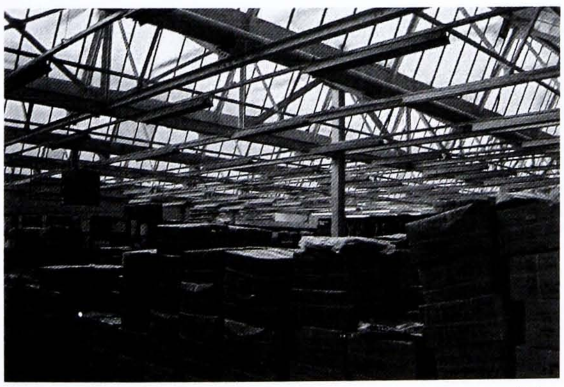


Plate 11.15 *Internal steel-framed structure of the mill*

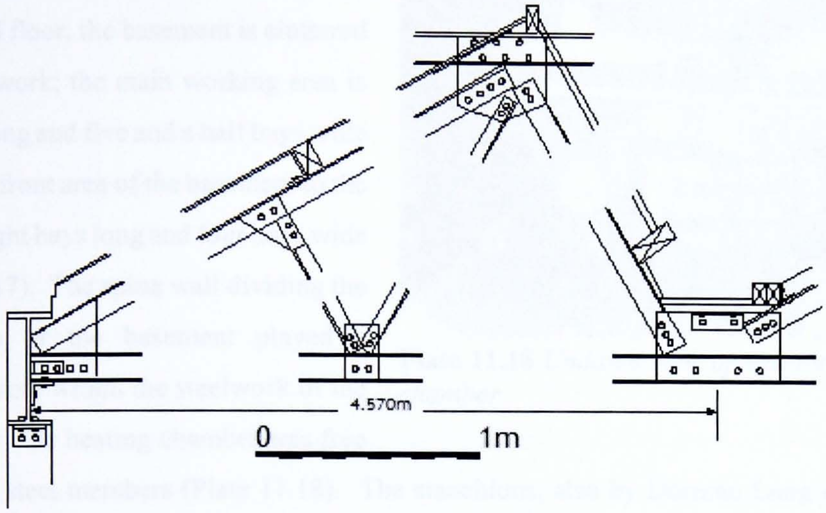


Plate 11.16 *Steel roof truss used at Park View Mills © Crown Copyright. NMR.*

south and west walls, reflecting the provision for expansion. The weaving shed is four bays long and two bays wide and is interrupted only by three upright steel stanchions (Plate 11.15). These upright members, and a fourth one against the original west wall, support a deep I-sectioned steel beam made by Cargo Fleet, England and which runs the full length of the mill (RCHME 19877c, 2). This principal structural member is unrelated to the bay rhythm of the shed roof and supports lesser north-south steel beams which in turn support the valley gutters and six triangulated steel trusses of the north-light saw-tooth roof. The roof trusses have upper ties above the roofs, as well as ties within the shed (Plate 11.16). All the steel work was made by Dorman Long & Co Ltd., Middlesbrough and by Fordingham England. Continuous panels of glass in the north facing sections of the roof lit the shed below. The northern part of the mill, including the loading bay, is uninterrupted by stanchions and its roof is identical and continuous with that over the main weaving area and numbers four north-lit bays.

Plate 11.17 *Internal steel structure at basement level*

The steel work in the basement is physical similar in character to that on the ground floor but forms an independent structure; in fact, the four steel stanchions in the weaving shed at ground floor level pass through the basement and are bedded into the buildings foundations. In contrast to the ground floor, the basement is cluttered with steelwork; the main working area is ten bays long and five and a half bays wide whilst the front area of the basement to the north is eight bays long and four bays wide (Plate 11.17). The spine wall dividing the two areas of the basement played a structural role within the steelwork of the basement. The heating chamber was free of upright steel members (Plate 11.18). The stanchions, also by Dorman Long & Co. Ltd., Middlesbrough, support deeper I-sectioned steel beams running north-south to which others east-west are bolted (RCHME 1987f, 2). These beams were made by Cargo Fleet, England and the joining angle brackets by Skinningrove. This steelwork supports a concrete floor, which is built into the north and east walls, but is free standing to the west and south; this constitutes further structural evidence for anticipated expansion of the mill.

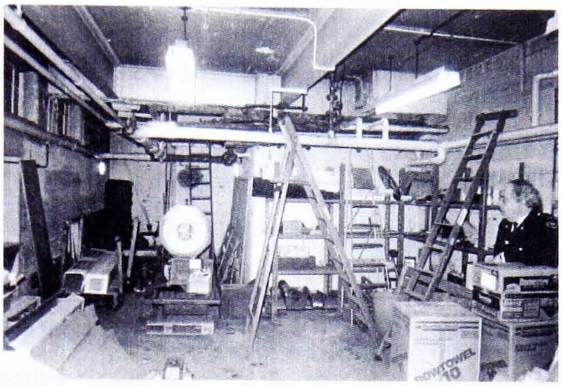


Plate 11.18 *Undated view of interior of heating chamber*

PROCESS RECORDING

Park View Mills was run principally as a worsted-weaving firm, but documentary evidence indicates that shortly after the move to Park View Mills, Foster and Lee were worsted manufacturers, indicating that they were operating an integrated works at the site. It is therefore assumed that the ground floor working area, marked as weaving shed on original plans of the building, housed looms, whilst spinning, possibly only a small scale and supplemented by imported yarn, was undertaken in the basement. This

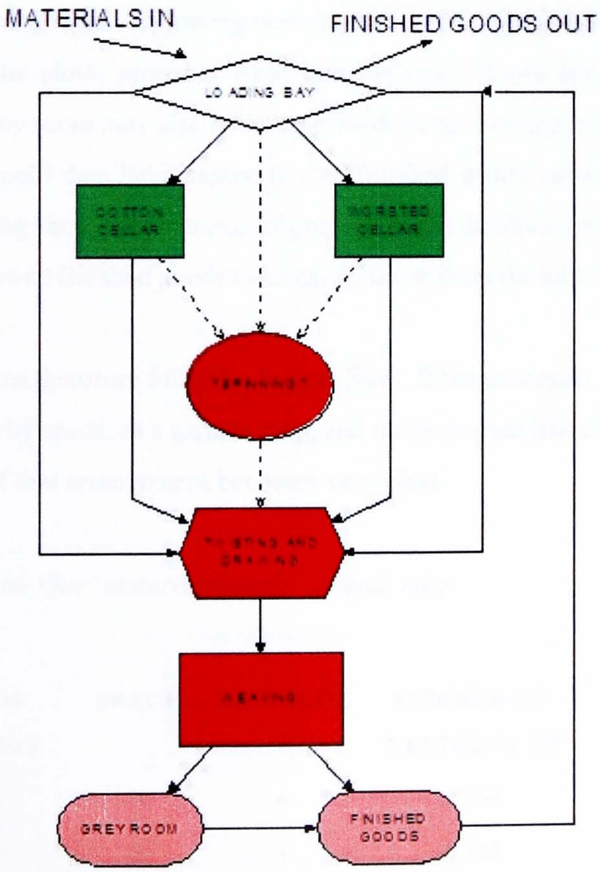


Plate 11.19 *Processes, Park View Mills*

allocation of process may partly account for the very different structural character of the two floors of the mill, with ground floor specifically designed to house large looms (Plate 11.19).

Raw materials and spun yarn from other sites, including the cotton yarn used to produce mixed-fibre cloths, would have been delivered to the mill via the centrally placed loading bay. From the loading bay materials could easily be moved into the basement cellars for storage until use, be moved to the twisting and drawing room if a thicker yarn was required, or moved directly into the weaving shed. Raw worsted, and possibly cotton fibres could also be taken down to the basement and either spun immediately, or stored ahead of processing. Given that there is no provision for the combing of raw fibres at the site it may be assumed that this preparatory process was undertaken at other premises, probably by a specialist firm. Alternatively, the basement area may have been used for the weaving of cloth, in which case it must be assumed that the worsted and cotton cellars were used solely for the storage of ready-spun yarn.

Freshly spun yarn (if spinning was undertaken in the basement), and yarn stored in the worsted and cotton cellars, could be easily moved back to the ground floor using the two hoists. Thereafter it could be moved into the weaving shed. Following weaving the cloth might go to one of two areas. Some, if not all of the cloth, probably went into the Grey Room for inspection, burling, and mending. The grey room may also have been used for the storage of newly woven cloth. Most of the cloth would then have passed to the 'finished goods' area joining other cloth straight from the weaving shed. The location of grey room and the finished goods area adjacent to the loading bay allowed finished goods to be easily taken from the mill.

The allocation of space for certain processes therefore follows a logical flow. If the processes undertaken at Park View Mills are plotted by space, as a gamma map, and likewise quantified (Figure 11.4; Table 11.1) then the logic of that arrangement becomes very clear.

Table 11.1 *Quantified values for Phase One' materials/goods' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.489	1	**7**	6	0.168
1	0.322	1	**8**	1	0.322
2	0.336	1	**9**	1	0.378

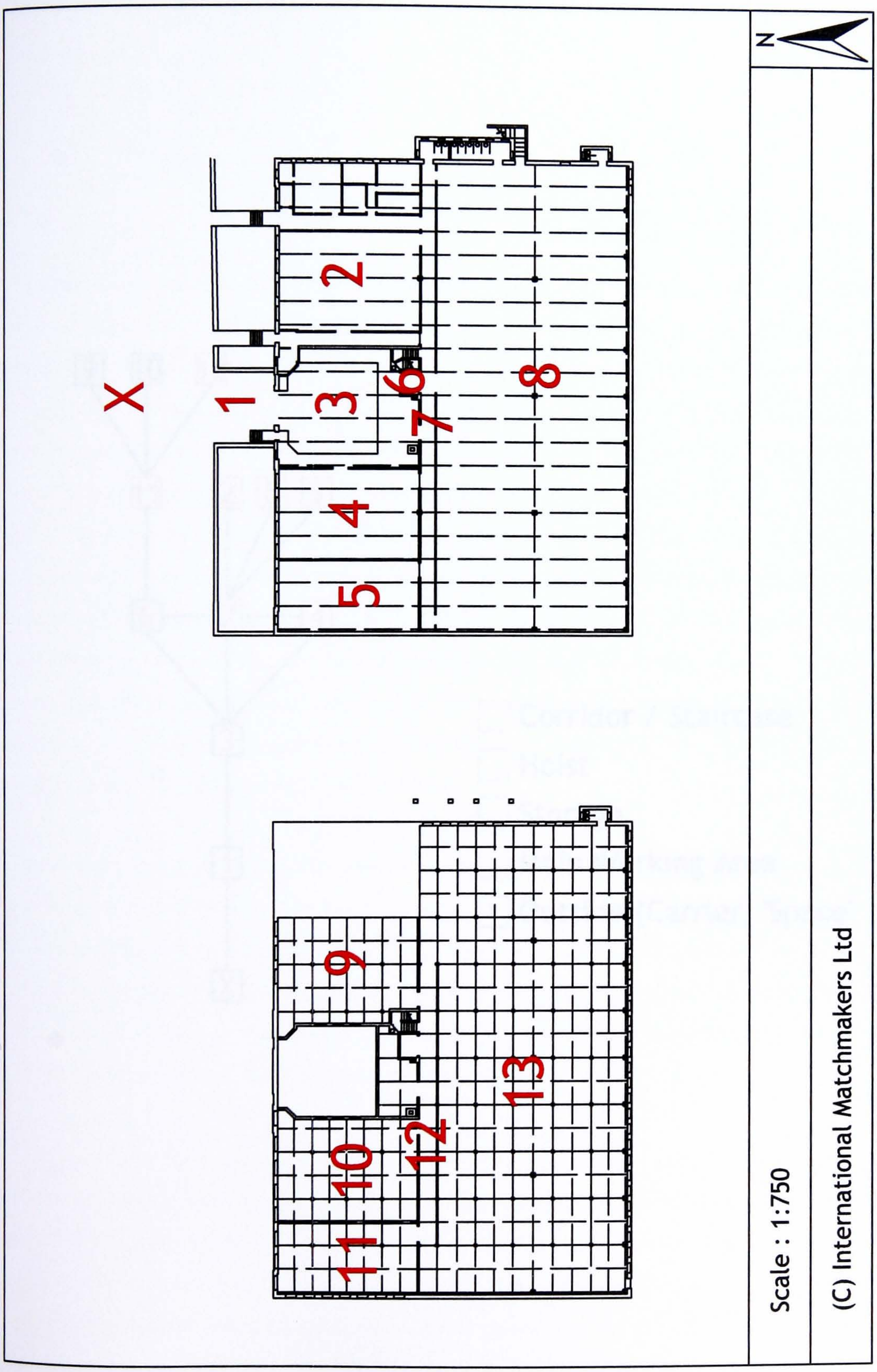


Figure 11.4 *Phase One: Gamma map of movement of materials/goods*

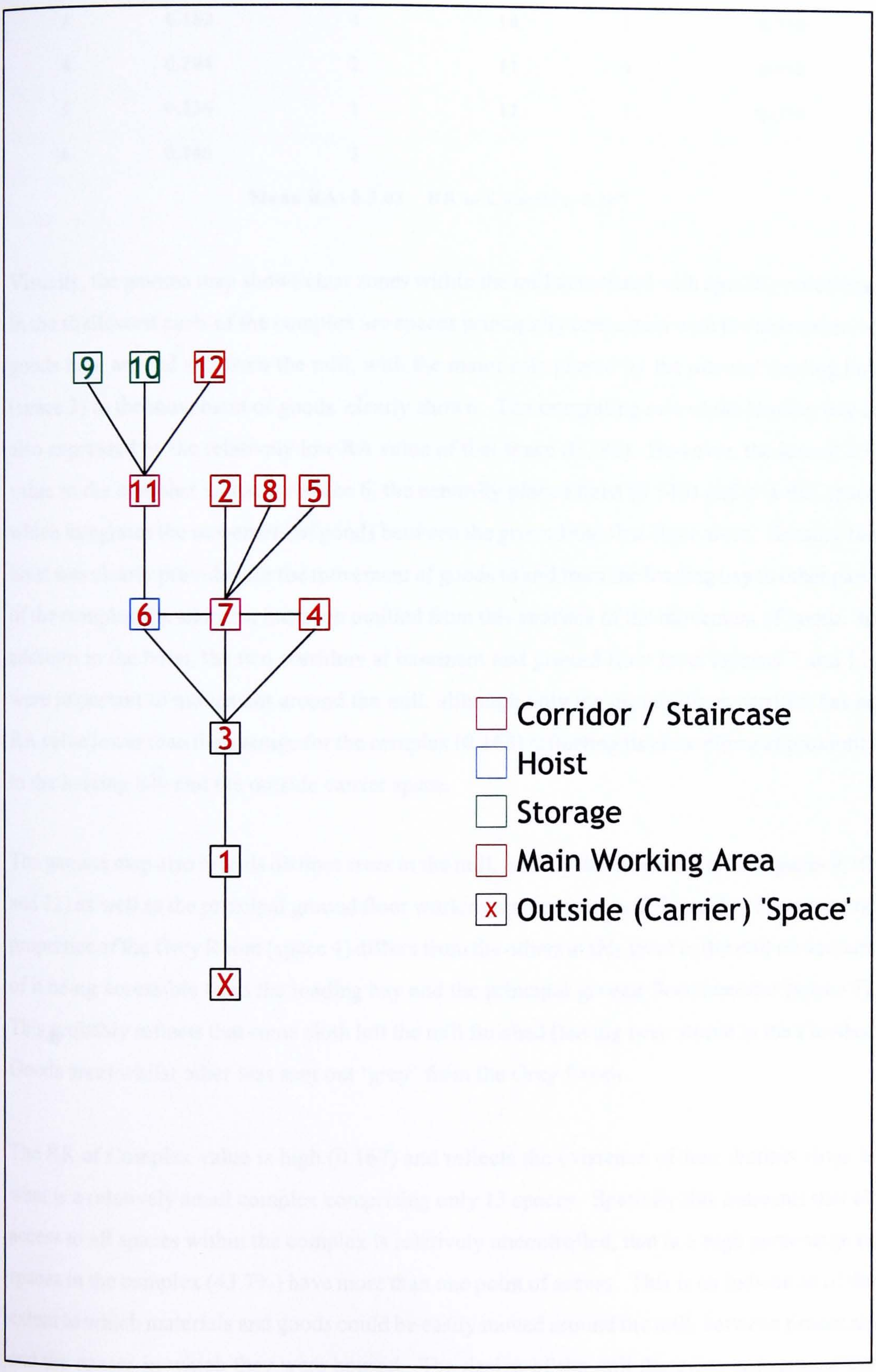


Figure 11.4 cont. *Phase One: Gamma map of the movement of materials/goods*

3	0.182	4	**10**	1	0.378
4	0.294	2	**11**	4	0.210
5	0.336	1	**12**	1	0.378
6	0.140	3			

Mean RA: 0.3.03 RR of Complex: 0.167

Visually, the gamma map shows clear zones within the mill associated with specific processes. In the shallowest parts of the complex are spaces principally concerned with the movement of goods into, around and from the mill, with the major role played by the internal loading bay (space 3) in the movement of goods clearly shown. The integrating role of the loading bay is also expressed by the relatively low RA value of that space (0.182). However, the lowest RA value in the complex is that for space 6, the centrally placed hoist (0.140) and it is this space which integrates the movement of goods between the ground and first floor areas. Because the hoist was clearly provided for the movement of goods to and from the loading bay to other parts of the complex the staircase has been omitted from this analysis of the movement of goods. In addition to the hoist, the two corridors at basement and ground floor level (spaces 7 and 11) were important to movement around the mill, although only the ground floor corridor has an RA value lower than the average for the complex (0.168) reflecting its close physical proximity to the loading bay and the outside carrier space.

The gamma map also reveals distinct areas in the mill, notably the basement areas (spaces 9,10, and 12) as well as the principal ground floor working spaces (spaces 2, 8 and 5). The syntactic properties of the Grey Room (space 4) differs from the others at this level in the mill on account of it being accessible from the loading bay and the principal ground floor corridor (space 7). This probably reflects that some cloth left the mill finished (having been stored in the Finished Goods area) whilst other was sent out 'grey' from the Grey Room.

The RR of Complex value is high (0.167) and reflects the existence of four distinct rings in what is a relatively small complex comprising only 13 spaces. Spatially this indicates that all access to all spaces within the complex is relatively uncontrolled, that is a high percentage of spaces in the complex (43.7%) have more than one point of access. This is an indication of the extent to which materials and goods could be easily moved around the mill, between processes and the spaces in which they were housed. The design of the mill therefore encouraged the flow of the production process and the movement of materials and goods around the building.

ACCESS ANALYSIS

Access analysis of Park View Mills reveals that the inherent spatial form of the site has a dendritic, tree-like structure (Figure 11.5). The gamma map of the complex reveals that within the complex are three clear zones: the office suite (spaces 2, 3, 11, 12, 13, 14 and 15), the basement (spaces 22, 23 24, 25, 26, 27 and 28) and the ground floor working areas (spaces 5, 9, 10 and 20). These zones are emphasised by similar quantified values for spaces in these areas (Table 11.2).

Table 11.2 Quantified values for Phase One 'workforce' gamma map

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.217	1	**15**	0.167	1
1	0.145	4	**16**	0.108	2
2	0.235	1	**17**	0.074	9
3	0.167	1	**18**	0.145	1
4	0.098	8	**19**	0.196	1
5	0.145	1	**20**	0.124	3
6	0.130	3	**21**	0.196	1
7	0.201	1	**22**	0.219	1
8	0.132	3	**23**	0.219	1
9	0.137	2	**24**	0.219	1
10	0.145	1	**25**	0.219	1
11	0.164	2	**26**	0.148	6
12	0.167	1	**27**	0.140	2
13	0.167	1	**28**	0.286	1
14	0.167	1			

Mean RA: 0.168 RR of Complex: 0.125

The zone occupied by the offices is particularly noticeable and it is obvious that whilst the offices shared a close physical relationship with the rest of the mill, spatially they were relatively isolated with their own entrance and only a single link between them and the rest of

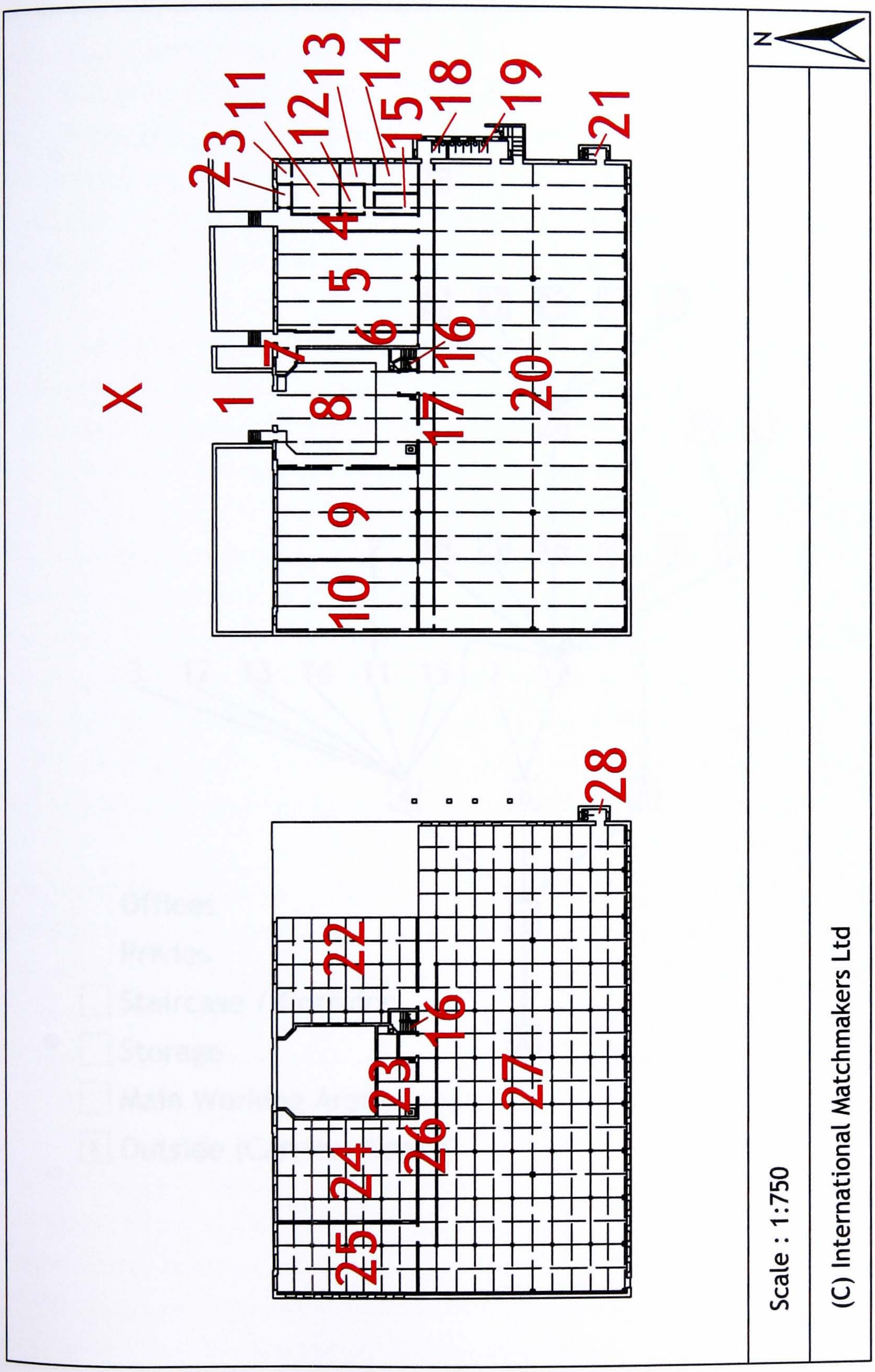


Figure 11.5 *Phase One: Gamma map of movement of the workforce*

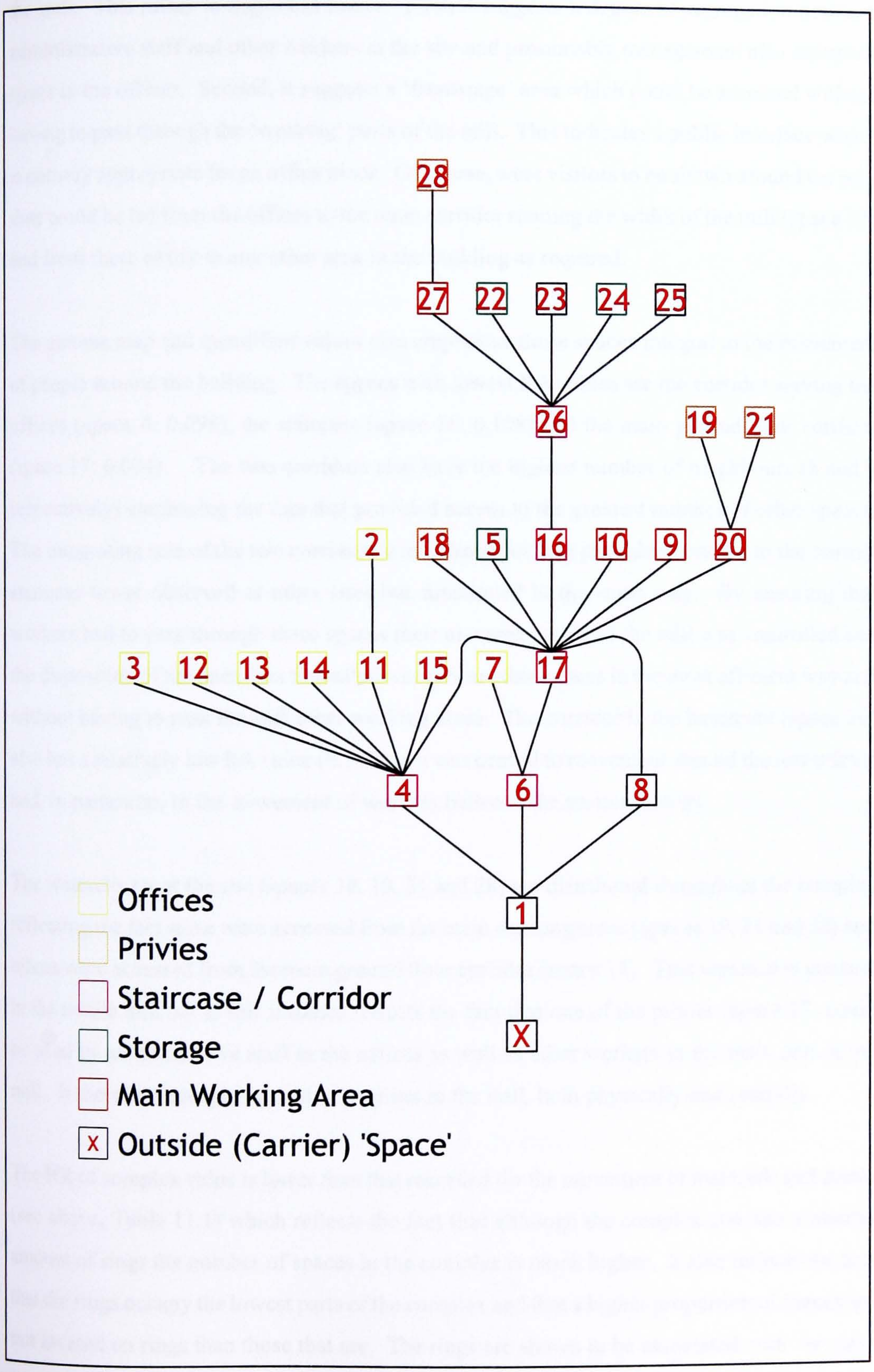


Figure 11.5 cont. *Phase One: Gamma map of the movement of the workforce*

the mill. This raises to important issues. First, it suggests a degree of segregation between administrative staff and other workers at the site and presumably management also occupied space in the offices. Second, it suggests a 'frontstage' area which could be accessed without having to pass through the 'working' parts of the mill. This indicates a public interface which is entirely appropriate for an office block. Of course, were visitors to be shown around the mill they could be led from the offices to the main corridor running the width of the mill (space 17) and from there easily to any other area in the building as required.

The gamma map and quantified values also emphasise those spaces integral to the movement of people around the building. The spaces with lowest RA values are the corridor serving the offices (space 4: 0.098), the staircase (space 16: 0.108) and the main ground floor corridor (space 17: 0.074). The two corridors also have the highest number of neighbours (8 and 9 respectively) emphasing the fact that provided access to the greatest number of other spaces. The integrating role of the two corridors is of interest for they provide a contrast to the normal staircase tower observed at other sites but functioned in the same way. By ensuring that workers had to pass through these spaces their movement around the mill was controlled and the disposition of the corridors funnelled workers to other spaces in the most efficient way and without having to pass through other working areas. The corridor in the basement (space 26) also has a relatively low RA value (0.148) as it was central to movement around the lower level and, in particular, to the movement of workers between the various cellars.

The waterclosets at the site (spaces 18, 19, 21 and 28) are distributed throughout the complex reflecting the fact some were accessed from the main working areas (spaces 19, 21 and 28) and others were accessed from the main ground floor corridor (space 18). This variance is unusual in the textile mill but in this instance reflects the fact that one of the privies (space 17) could be used by administrative staff in the offices as well as other workers in the main part of the mill. It therefore occupied a central position in the mill, both physically and spatially.

The RR of complex value is lower than that recorded for the movement of materials and goods (see above, Table 11.1) which reflects the fact that although the complex contains a similar amount of rings the number of spaces in the complex is much higher. It also reflects the fact that the rings occupy the lowest parts of the complex and that a higher proportion of spaces are not located on rings than those that are. The rings are shown to be associated with the main loading area of the mill and the main ground floor corridor, but in the deeper parts of the complex there are no rings which, in spatial terms, suggests increased social control and supervision of movement.

Process Recording and Access Analysis: Discussion

The analysis of Park View Mills has shown a marked difference between the spatial configuration of the site for the movement of materials and goods and flow production compared with the movement of workers. This is significant for it reveals the very different spatial properties within the same building and therefore the extent to which textile mills were designed for the processes of production as well as organisational factors concerning the workforce.

Park View Mills is also of particular interest for in the configuration of space there are distinct zones. These zones not only relate to 'front' and public areas, such as the office suite, but also the segregation of workers allotted different tasks, in particular those inhabiting the offices and those more directly involved in the production of textiles.

Architectural Summary

The architecture of Park View Mills is of particular interest for although the orthodox view of mill architecture suggests that the last generation of mills were built in a more modest style, the north elevation was clearly intended as a show facade and is architecturally ornate. In the case of sheds, the amount of available space for embellishments was much less than was the case with multi-storeyed mills and the overt use of classical motifs at Park View Mills may therefore represent an attempt to draw attention to the site which otherwise was poorly visible. It may also reflect a deliberate attempt on the part of Lee and Foster to emphasise their success in the industry and their ability to move from rented space into purpose-built, modern facilities. The use of classical motifs on such a modern building is therefore a strong indication of close association between the classical idiom and textile mill architecture.

Furthermore, the use of a show facade emphasises the fact that visitors clearly visited the mill. This is suggested by the office suite with its own entrance and the presence of a waiting room in the northeast corner of the mill. As a consequence, the main approach to the mill was from the north and it was therefore appropriate that this elevation should be ornamented. The north elevation was therefore an integral part of the 'public' areas of the mill despite the fact the parts of it, like the centrally placed entrance to the loading bay and workers entrance, were not associated with the production of textiles and therefore not necessarily 'public' areas. In order to emphasise these distinctions, small walls were built at the front of the mill to distinguish between the different parts of the north elevation.

LIST OF DOCUMENTS

11.1 Architects plans of ground and basement floors of Park View Mills. Drawn 1925 by Moore and Crabtree.

© Matchmakers International Ltd., North Bierley, Bradford.

11.2 Lease, 1947. Park View Mills Company Ltd. (landlords) and Lee and Foster Ltd. (tenants)

© Matchmakers International Ltd., North Bierley, Bradford.

11.3 'Proposed alterations: Park View, Wibsey, for Grattan Warehouses Ltd.' July 1953. P.T. Runton & Co, Bradford

BBP 62908. WYAS Bradford.

APPENDIX A
SITE DESCRIPTION : 12

VICTORIA MILLS

DATABASE ENTRY:	562
NBR NUMBER:	BFO62807
NGR:	SE 0961 2122
TOWNSHIP:	(West Vale) Elland-Cum-Greetland
CIVIL PARISH:	Elland
DISTRICT:	Calderdale
COUNTY:	West Yorkshire
BRANCH:	Cotton
PERIOD:	Late

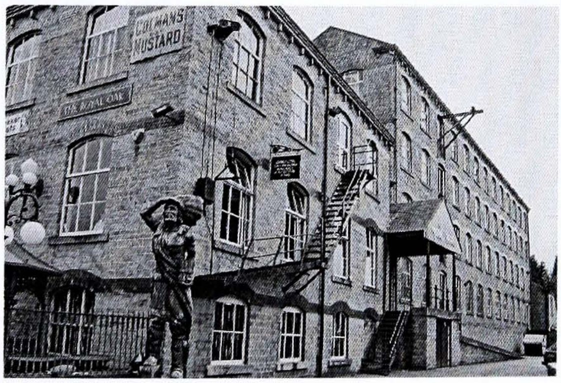


Plate 12.1 *Victoria Mills, West Vale*

Victoria Mills occupies a restricted site on flat ground to the south of the Black Brook and in the angle of a crossroads in the centre of West Vale, Elland (Plate 12.1; Figure 12.1). The current mill buildings were built in the late nineteenth century and comprise a multi-storeyed mill with attached warehouse, engine and boiler houses, and a single-storey mill with attached engineman's cottage to the east. These buildings resulted from a phase of rebuilding after a disastrous fire at the site in 1983, but incorporate the remains of an earlier mill. The site was first developed for the manufacture of textiles in 1854 and cotton spinning and doubling was carried out at the site until the late 1980s. The mills were then purchased and used as a showroom by Andy Thornton Architectural Antiques Ltd., and continue to be so used. Both mill buildings survive virtually unaltered and are therefore a good example of late nineteenth

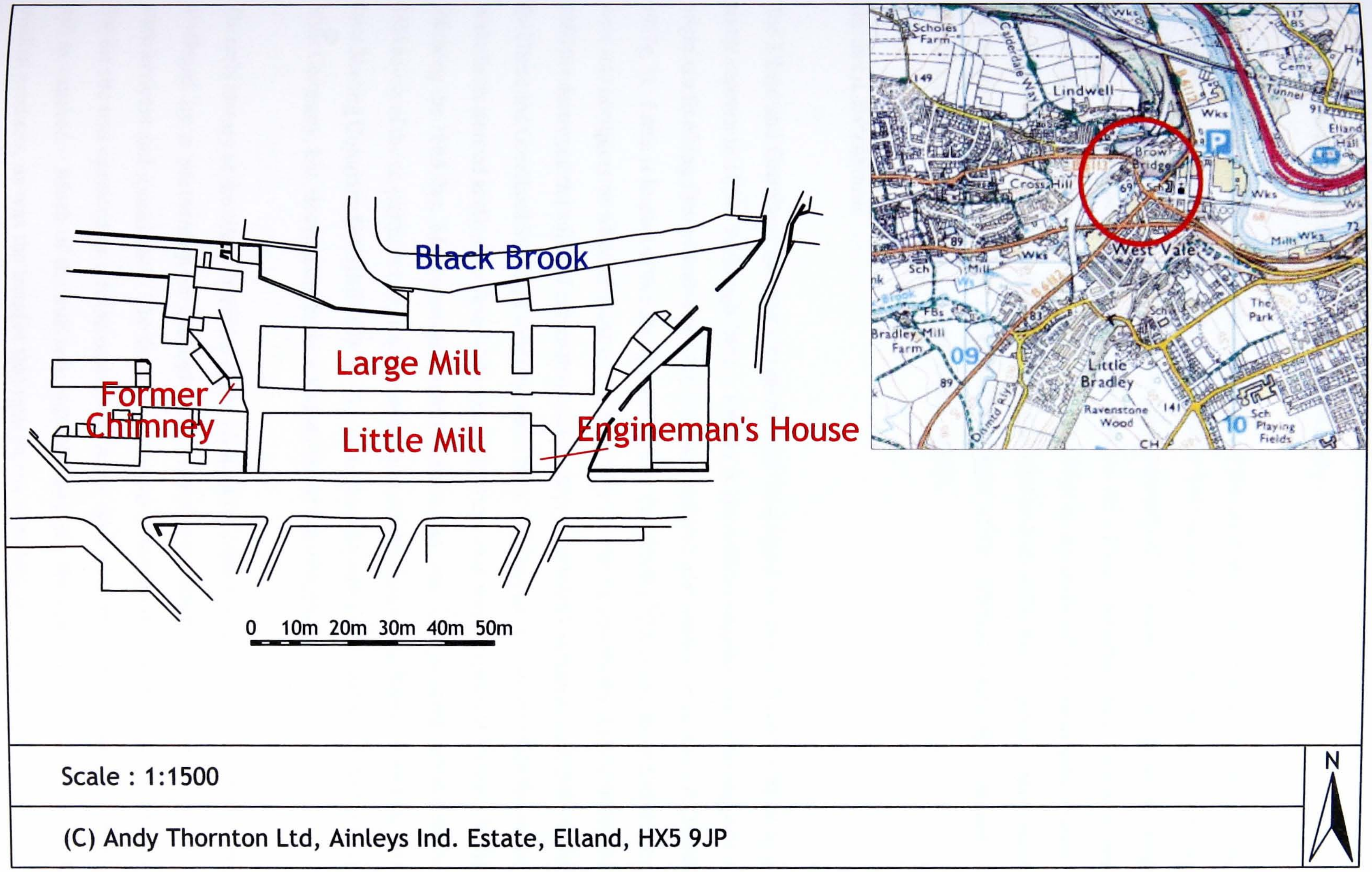


Figure 12.1 *Block Plan, Victoria Mills, West Vale*

century mill building; other buildings and structures, including the chimney, which existed to the east and north of the mills, have been demolished.

Original plans of the site were made accessible for the purposes of this research by the current owners as were RCHME plans of the site. These were augmented with a new photographic record of the site. The site is of interest as a good example of a specialised late cotton spinning mill and although they incorporate elements of an earlier building they represent the requirements of a modest sized cotton spinning firm at the close of the nineteenth century. Since the site ceased to be used for the production of textiles it has been used as a showroom for architectural antiques. As a consequence most of the original fabric survives and is therefore particularly suited to archaeological study.

HISTORICAL BACKGROUND

The Elland and Greetland Stoving Company first developed the site of Victoria Mills as a textile concern in 1854. Although little is known is about this company, its name suggests a origin as a finishing firm probably serving the local woollen and worsted industries (RCHME 1987g, 1). Little is known either about the mill that they built and it is unclear whether they were sole occupiers or whether parts of the mill were let out on a room-and-power basis. In 1866 fire destroyed the mill and although a contemporary account (Document 12.1) fails to list the Elland and Greetland Stoving Company under the active occupiers, they are recorded as one of the firms insured at the site. Seven other insured firms were also recorded at Victoria Mills following the 1866 fire. Most were presumably tenants but one, George Lumb, is recorded in 1884 as one of the co-partners carrying on business under the style of the Elland And Greetland Joint Stoving Company (RCHME 1987g, 1). At the time he was also a partner of the Victoria Mills Company, but, once again, little is known about this company.

The early history of the site is therefore vague. It would therefore seem that Victoria Mills was developed by a partnership or through the co-operative effort of a number of active manufacturers and speculators. The fact that a number of tenants occupied the mills suggests that the site was operated on a room-and-power basis, with each firm taking space within the mill as required. Much of the mill was probably used for the manufacture of worsted and woollen products, as was the trend at that time in the local area (Giles and Goodall 1992, 5), but one tenant, Robert Holt, was apparently recorded as a cotton textiles worker, and this testifies to the rise of cotton manufacture in the region by the mid-nineteenth century.

A contemporary account of the 1866 fire gives some indication of the early buildings at the site. Victoria Mills evidently comprised a six storey mill, a boiler room with drying and working rooms above, a partially detached four storey building and a two storey mill along the road frontage. Power was provided by a steam engine of forty-horse power (Document 12.1). The fire destroyed the larger of the two mills and it was intended to rebuild as soon as possible. A set of plans associated with minor building works in 1879 (Document 12.2) show that the rebuilt mills followed the plan of the pre-fire era with a main mill set behind a second mill on the road frontage. These plans were submitted by the Victoria Mills Company who were the probably successors of the Elland and Greetland Stoving Company and who most likely financed the rebuilding of the mill.

In 1893 the site was once again destroyed by fire, but this time the scale of the devastation was greater – all but small parts of the larger of the two mills, an engineman's house attached to the west side of the smaller mill on the road frontage, and the chimney were destroyed. (Document 12.3). The scale of destruction indicates that despite its date, the mill built following the 1866 fire was not of fireproof construction, despite the fact that between 1825 and 1875 that form of construction was commonly used (Giles and Goodall 1992, 34). At the time of the 1893 fire it was recorded that there were four firms occupying the mill, two cotton spinners and doublers, one manufacturer of warps and one woollen manufacturer. The Victoria Mills Company was not listed as an active concern at the mill at the time of the fire, but were recorded as the owners of the site, indicating that the mill continued to operate on a room-and-power basis.

Rather than financing a second rebuilding of the site, the Victoria Mills Company put the site up for sale in 1894. The sale particulars (Document 12.4) refer to 'buildings and mill chimney' but the accompanying plan makes it clear that both the mills had been destroyed for in each case they are referred to as the 'site of mill'. The site was auctioned in five lots on 20th April 1894 and other buildings mentioned at the site include a two storey winding shed, cottages, warehouse and stables. However, the auctioned proved unsuccessful and no buyer was found for the site. However, in a separate auction some days later, the steam engine, boilers and shafting were sold to brokers (Document 12.5).

The mill was eventually sold to Messrs. James Jnr., Benjamin, Thomas and James Sutcliffe in September 1894, cotton spinners and doublers of West Vale and probably part of, or indeed the same firm that was recorded as a tenant at Victoria Mills in 1881(White 1881, 349). Plans for the rebuilding of the site, prepared by Horsfall and Williams, architects of Halifax, (which were approved prior to the legal transactions for the conveyance of the site taking place) comprised a main mill of five storeys, an attached warehouse of three storeys and basement, and an attached boiler and engine house to the east (Document 12.6). The plans are clearly those for the surviving multi-storey mill, except that both the mill and warehouse were built with one less storey and that the north wall of the warehouse was not built on the angle as the plans show (the 1894 auction plan shows a building in the area of the warehouse, with an angled north wall and it may be that originally the new warehouse was to use the foundations of this earlier building). The mill was probably constructed between 1894 and 1895 for a mortgage agreement dated 11th July 1895 refers to that 'fireproof cotton-spinning mill recently erected...' (Document 12.7).

In 1898, Clement Williams, architects of Halifax, drew up plans for a second mill on the road frontage and butting up to the engineman's cottage to the west (Document 12.8). The plans show a 23 bay building with an end stair tower, a privy tower projecting from the middle of the north elevation and the whole closely following the architectural style established by the 1894 mill to the north. However, only the first floor of this mill was ever built, reduced in length to 19 bays, privies were accommodated within the west end of the mill and the stair tower left unbuilt.

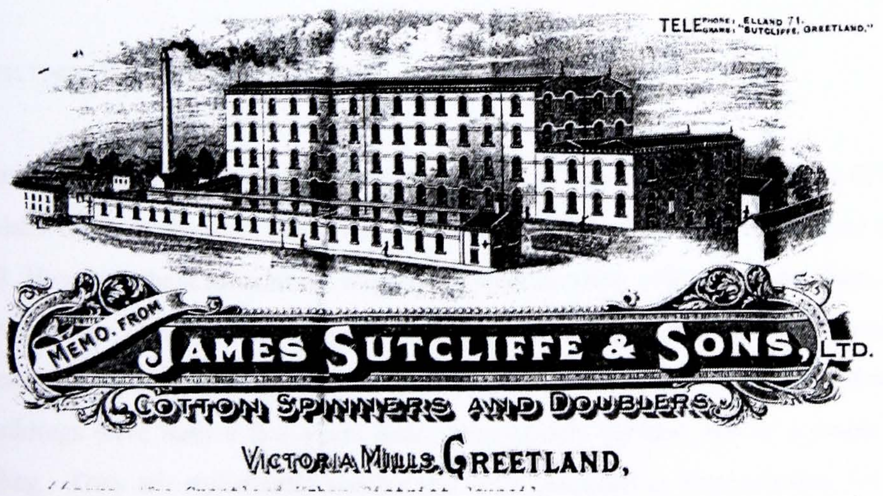


Plate 12.2 *Letterhead showing Victoria Mills as rebuilt after 1893 fire (BIP/G: 1193. WYAS Calderdale*

An illustrated letterhead from the early twentieth century (Plate 12.2; Document 12.9) shows the site as rebuilt and operated by Messrs. Sutcliffe. It clearly shows the smaller mill on the road frontage, indicating that it was only ever constructed to a height of one storey and, apparently, its roof was used as a reservoir. The letterhead also shows the site before the addition of the upper storeys of the stair tower, the plans for which were approved in 1925 (Document 12.10), and also shows the chimney, since demolished, at the eastern end of the site. It also shows other buildings in the complex that either no longer survive or have been subsumed into later development outside the current boundaries of the site. Comparison between the letterhead and the 1894 sales plan indicate that the shed, warehouse and cottages to the east of the main mills, and beyond the chimney, still existed in the early twentieth century. However, their marginal representation on the letterhead may indicate that they were no longer part of the main site, although the steam engine and boilers in the rebuilt mill would have still required the chimney.

Sutcliffes remained the sole occupiers of the mills, operating it as a cotton spinning and doubling factory, until 1933, when for unknown reasons they sold out to Clays of Sowerby Bridge. Clays in turn sold the mills to Joseph Ferguson and Horace Whiteley in 1955, and the Whiteley family continued to operate the site as a cotton spinning and doubling works at the time of the RCHME survey (RCHME 1987g). Since then Victoria Mills has ceased to produced textiles and is now the home of Andy Thornton Architectural Antiques Ltd. and is used as showroom.

ARCHITECTURAL DESCRIPTION

The surviving buildings represent two distinct phases of structural activity (Plate 12.2). Phase One relates to those elements of the site surviving from those buildings destroyed by the fire in 1893. However, these remains are fragmentary and do allow a full-reconstruction of the pre-1893 site. This phase will therefore be discussed but will not analysed. Phase Two is represented by the rebuilt Large Mill of *c.*1894-5 and the Little Mill of 1898. Although these tow buildings were built a few years apart, they clearly formed part of a single phase of rebuilding. They are stylistically similar and were intended as replacements for the mills destroyed in 1893 and were deemed suitable for spinning operations at the site in the late nineteenth century. The delay in rebuilding the Little Mill may have reflected the availability

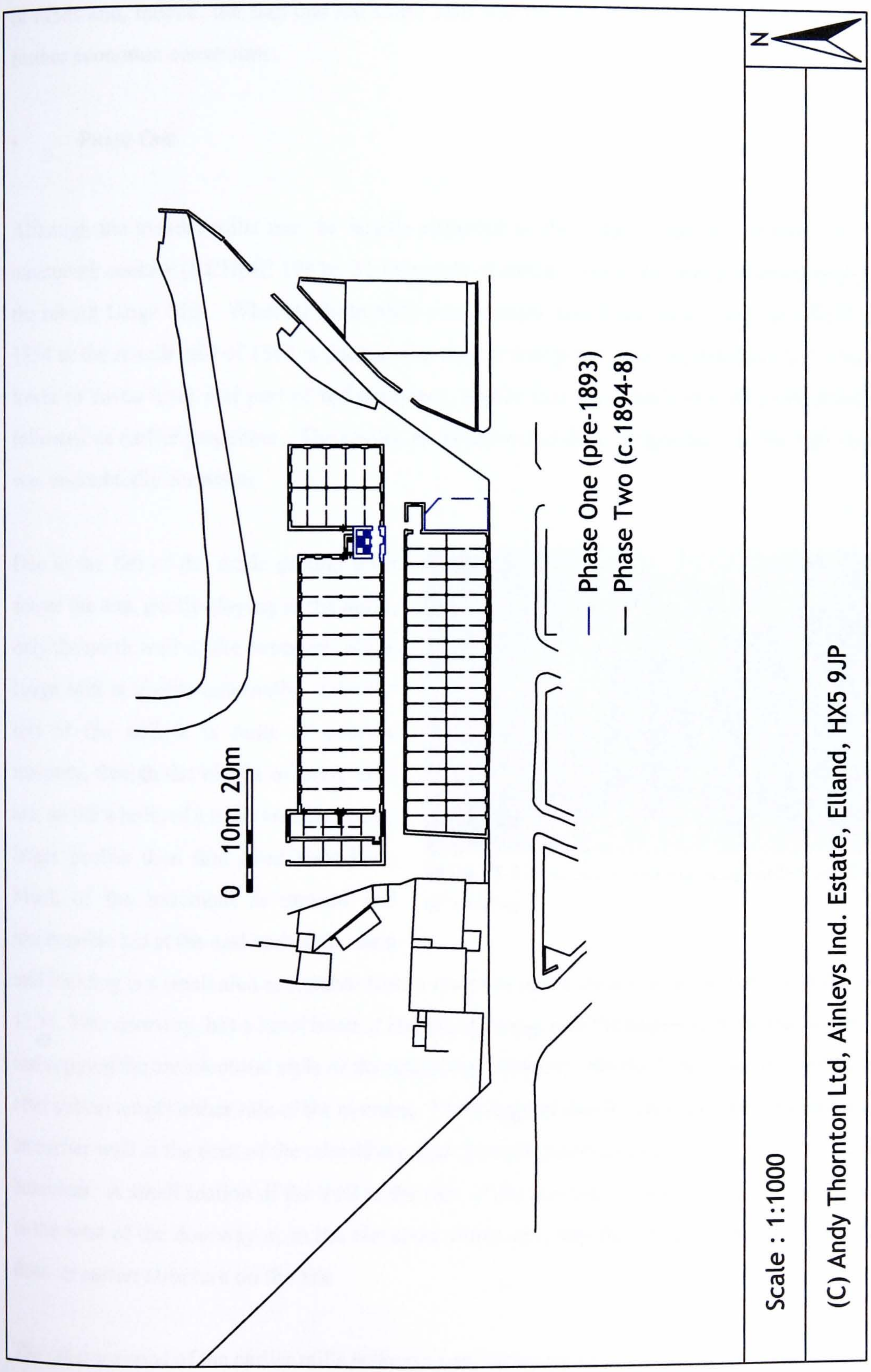


Figure 12.2 *Phased Block Plan, Victoria Mills*

of funds and, indeed, the fact that the Little Mill was only built to one storey may indicate further economic constraints.

- PHASE ONE

Although the present mills may be largely regarded as the work of the last decade of the nineteenth century (RCHME 1987g, 3), elements of earlier structures were incorporated into the rebuilt Large Mill. Whether these early components date from the original mill built in 1854 or the rebuilt mill of 1866 is unclear, but the surviving components, principally the stair tower to eaves level and part of the basement, testify that the rebuilt mill of 1894 closely followed an earlier precedent. The choice to incorporated these fragments into the new mill was undoubtedly economic.

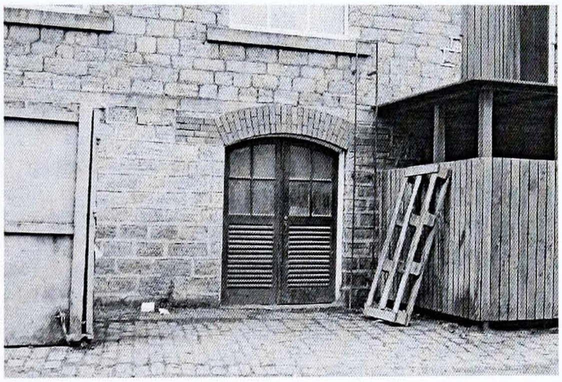


Plate 12.3 *Basement doorway and earlier section of walling*

Due to the fall of the made ground level across the site, gently sloping to the north, only the north wall of the basement of the Large Mill is visible externally. Like the rest of the mill it is built of coursed masonry, though the blocks of stone used are, on the whole, of a more consistent and larger profile than that used elsewhere. Much of the basement is unused and inaccessible but at the east end of the main mill building is a small area accessible from a doorway at the west end of the north wall (Plate 12.3). This doorway, has a lintel band of red-brick, rising over the segmental-head of the door and copying the architectural style of the rest of the 1894 mill, but the lintel band discontinues after a short length either side of the opening. This suggests that the doorway was inserted into an earlier wall at the time of the rebuilding, thus providing access to an area within an earlier basement. A small section of the wall to the east of the doorway is built of larger stones than to the west of the doorway or in the elevation above and may therefore represent a survival from an earlier structure on the site.

The other survival of the earlier mills is the stair and privy tower in the south east corner of the Large Mill. Prior to 1925, when the tower was raised to incorporate a water tank and sprinkler system, the stair and privy tower rose to the height of the eaves and, according to an early twentieth century letterhead (Plate 12.2) was roofed under the main mill roof. However, the stair and privy tower is archaeologically earlier than the rebuilt mill. The masonry used in the tower differs in character from that used in the rest of the 1894 mill, it breaks forward of the south elevation of the Large Mill and all floor levels within the tower are lower than the main floors of the rebuilt mill. Furthermore, the ground floor door entrance leading onto the staircase (and forming the main entrance to the mill) and the window lighting the first floor landing of the stairs have stone lintels rather than the red-brick lintels used throughout the later mill building (Plate 12.4). A small section of the south wall of the mill, at ground floor level immediately west of the main entrance is also different character to the masonry elsewhere in the mill and may therefore be a survival from an earlier structure. Furthermore, addition, openings, now blocked, in the east wall of the stair tower, above the roof of the rebuilt warehouse, show the means of communication between the stair tower and the pre-1893 warehouse (which must have been at least one storey higher than its successor). The stairs descend into the basement of the attached warehouse and in this area are ragged straight joints between the masonry of the stair tower and the basement of the warehouse. The stair and privy tower, or at least its lower section is therefore stratigraphically earlier than the rebuilt Large Mill of *c.*1894-5.

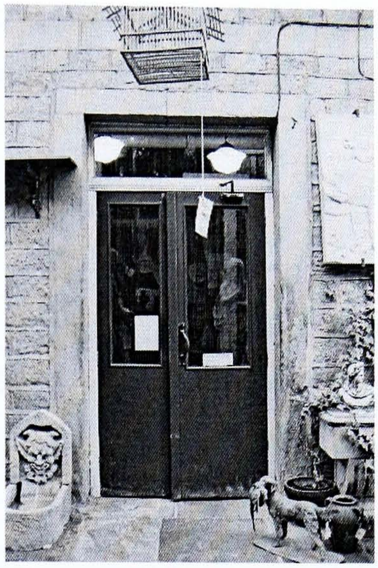


Plate 12.4 *Main entrance to the Large Mill at base of staircase tower; note the stone lintel*

A further survival from the pre-1893 period is the small engineman's cottage at the east end of the Little Mill (Plate 12.5). It is a small, two-storey structure built entirely of stone, with a bracketed cornice under the eaves and a stone slate roof. It is architecturally distinct from the Large and Little Mills, lacking the red brick dressings of those mills. A small section of the east end of the south wall of the earlier mill on

Plate 12.5 *Engineman's cottage at east end of the Little Mill*

the road front has survived and is bonded into the Engineman's cottage. One piece of an early stone string course survives in the wall, beneath which is a ragged straight joint between the earlier fabric and the rebuilt Little Mill.

- PHASE TWO

Phase Two is represented by the Large Mill, built in 1894-5 and the slightly later Little Mill, built in 1898 (Figure 12.3). Although designed by different architects both mills are stylistically similar and both mills occupy a bound site surrounded by a low mill wall with an entrance to the northeast of the warehouse block.

The Large Mill is of four storeys over a basement (of which only a small area at the east end is accessible) and thirteen bays long. There is an attached warehouse at its east end and a combined attached boiler and engine house to the west. With the exception of those earlier sections of fabric described above the mill is of one build. It is constructed of stone, apart from the lintel bands, which are of brick and which rise over the segmental-headed windows (RCHME 1987g). Ventilation slits, with decorative iron grills and wooden shutters to the inside, pierce the piers between the windows, which have wooden frames comprising nine lights, the top three of which opened (Plate 12.6).

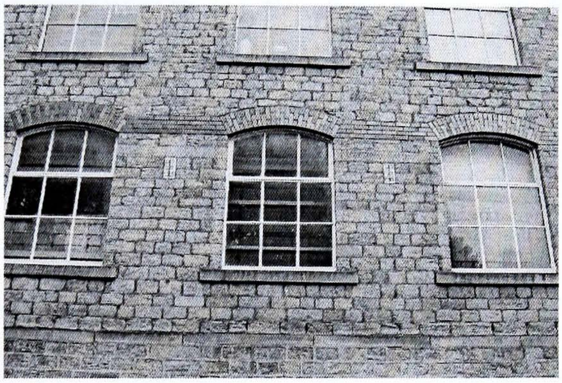


Plate 12.6 *The elevations of the Large Mill have regular window openings with red-brick lintel bands and small iron ventilation grills*

The internal structure of the mill is fireproof. A centrally placed row of cast-iron columns, each with square-section bolting heads at their top, which support I-section cross beams supporting concrete floors (Plate 12.7). The cross beams, bear

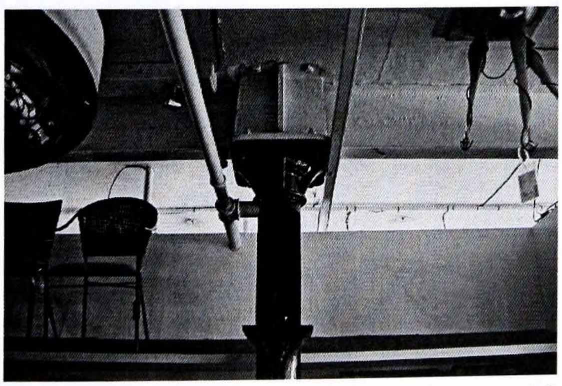


Plate 12.7 *Rows of cast-iron columns with square-section bolting heads support steel girders and concrete floors*

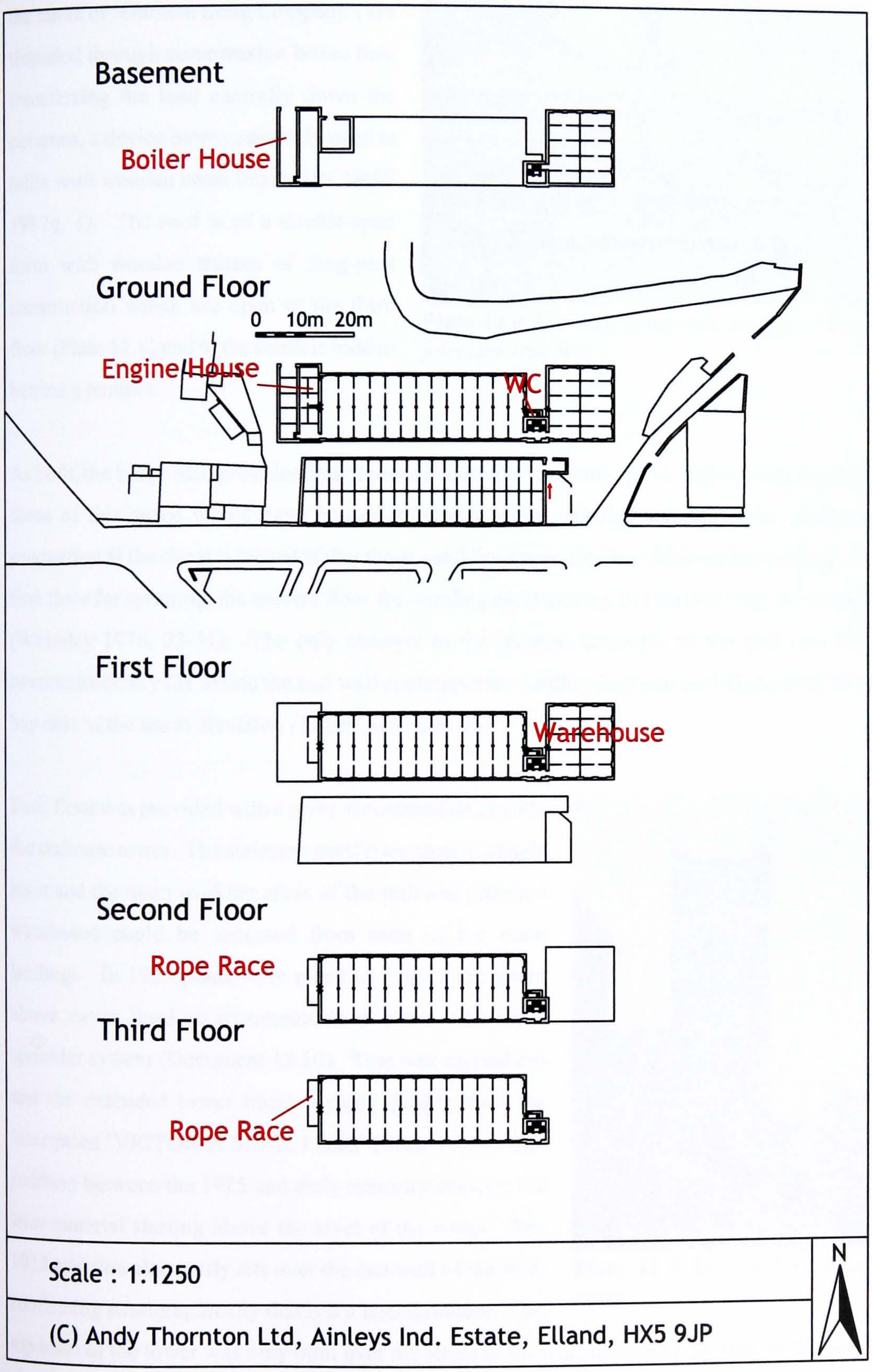


Figure 12.3 *Phase Two, Victoria Mills*

the name of 'Dorman Long Company', are threaded through compression boxes thus transferring the load centrally down the columns, a device more commonly used in mills with wooden cross beams (RCHME 1987g, 3). The roof is of a double-span form with wooden trusses of king-post construction which are open to the third floor (Plate 12.8) and to the south is hidden behind a parapet.

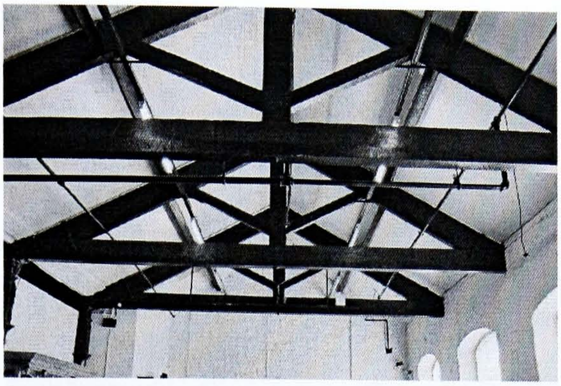


Plate 12.8 *The roof comprises trusses of king-post construction*

As built, the Large Mill provided four floors of undivided working space, and at least originally some of this space would have housed spinning mules. During the last years of textile production at the site it is recorded that the ground floor was used for slubbing and carding, the first floor for spinning, the second floor for winding and twisting and the top floor for storage (Whiteley 1976, 23-31). The only changes to the internal character of the mill is a late-twentieth century lift inside the east wall contemporary loading doors on each floor in the third bay east of the north elevation (Tolley pers. comm.).

Each floor was provided with a privy accommodated inside the staircase tower. The staircase itself rises around a basic hoist and the main working areas of the mill and attached warehouse could be accessed from each of the main landings. In 1925 plans were made to extend the tower above eaves level to accommodate a water tank for a sprinkler system (Document 12.10). This was carried out and the extended tower bears a stone plaque with the inscription 'VICTORIA MILL, J S&S' (Plate 12. 9). The junction between the 1925 and early masonry is clear, the later material starting above the level of the eaves. The 1925 addition also partly sits over the end wall of the mill, confirming stratigraphically that it is a later structure. The top level of the tower was only built over the stairs of the old stair tower, so that on the north face of the tower the earlier privy tower projects and is separately roofed. Later still, a flue was

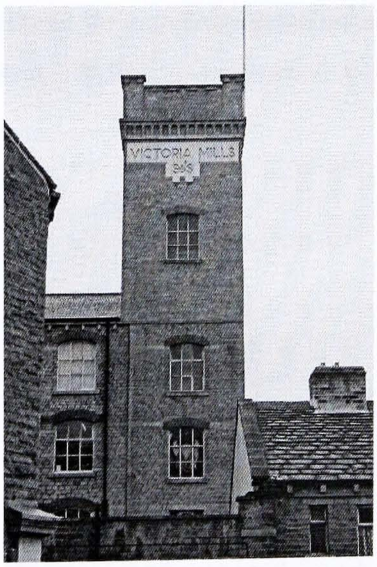


Plate 12.9 *Extended staircase tower*

built against the northern side of the privy tower, and this has straight joints with both the old and new parts of the tower.

To the north of Large Mill lies the contemporary warehouse block, attached to the main part of the mill by the stair tower (Plate 12.10). The gap between the stair tower and between the main mill building and warehouse block to the north has been in-filled with a modern loading bay approached via modern ramp, but originally the visual distinction between mill and warehouse would have been greater. The warehouse is of two storeys with a basement and is of five bays by four; some of the masonry in the south wall of the basement, close to where it is entered from the stair tower is clearly retained from the earlier mill and warehouse. Structurally and architecturally the warehouse is identical to the main mill. Although called a warehouse in early documents the block was used for processing – power was transmitted from the main part of the mill at ground floor level and an early photograph shows reeling machines in use, and a plan dated 1918 suggests that it housed a scotching machine (RCHME 1987g, 4). A door inserted at first floor level in the east wall and the associated stairs are a modern alteration and the door was once a window opening. Before this alteration the warehouse was accessible only from the staircase tower of the main mill at ground and first floor level.

Plate 12.10 *Attached warehouse block*

At the south end of the Large Mill is the combined engine and boiler house. Of one build, they form a low block under a two-stage single-pitch roof, and are slightly wider than the mill, projecting forward to the north (Plate 12.11). The engine house is located next to the mill and was lit by a large window in the south and north walls; the window in the north wall has been blocked and replaced with a small window at first floor level and a wide doorway below. No details of the steam engine survive, but the proportions of the engine house suggest that it was a horizontal steam

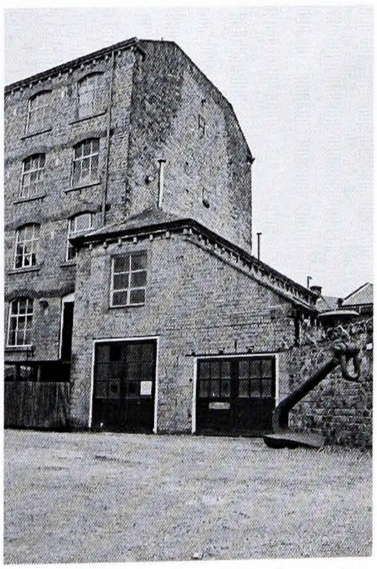


Plate 12.11 *Combined engine and boiler house*

engine. The boiler house has a wide doorway in its north wall suggesting that the firing place lay to the north and that fuel may have been stored on the ground behind the mill (RCHME 1987g, 4).

Internally both rooms are featureless, and both have inserted wooden floors. The roof trusses are of a basic triangulated form, but those over the engine house show evidence for the wooden rope race that rose out of the engine house. Although the rope race no longer exists, its outline is clearly visible on the west wall of the mill (Plate 12.12). Within the area covered by the rope race are two large cast-iron wall boxes and a further one within the engine house. Four conspicuously replaced stones in the west wall, near to the second floor wall box possibly show where supports for the rope race or the pulleys that it house tied into the main structure of the mill. Power was therefore transmitted from a grooved flywheel powered by the engine to pulleys within the rope race and then through the west wall to line shafts powering each floor of the mill and supported on the cast-iron columns. Power was transmitted to the warehouse block to the north by extending the central line shaft on the ground floor of the mill where it passed through a wall box and into the warehouse (RCHME1987g, 4).

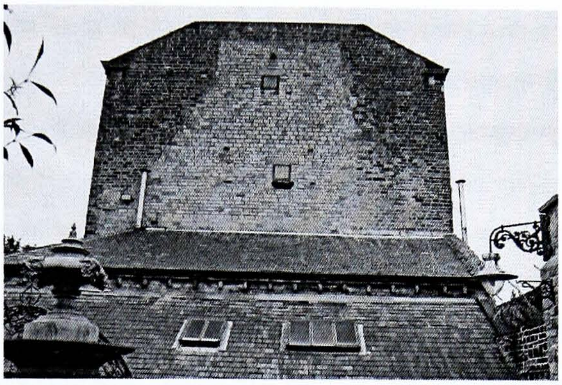


Plate 12.12 *Outline of former timber rope race on west elevation of the Large Mill*

Parallel to the Large Mill, and sited along the road frontage is the Little Mill. The Little Mill is entirely independent of the Large Mill, and the glazed walkway between them is a relatively modern addition and originally the narrow yard between the two mill buildings would have been entirely open. The Little Mill is single-storey and is nineteen bays long and its style closely matches that of the Large Mill (Plate 12.13). Plans for the mill produced in 1898 show that the mill was intended to be four storeys high and 23 bays long. The majority

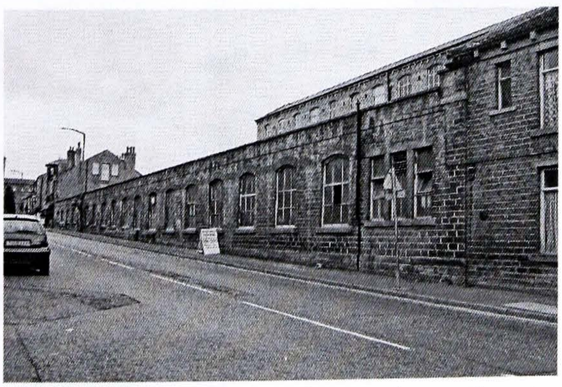


Plate 12.13 *The Little Mill from the southeast*

of the mill was therefore never built. However, space was left for an internal staircase tower in the junction between the mill and the adjacent engineman's cottage, perhaps anticipating later vertical extension. The mill is rectangular on plan and access to it is through a door in the north wall opposite the doorway into the main mill. The windows are large and have segmental-arched heads and an illustrated letterhead dating from the early twentieth century (Plate 12.2) shows the roof used as a reservoir. The building has a fireproof structure with cast-iron columns supporting steel cross-beams. The columns have anti-crush boxes wrapping around the cross-beams, a feature that is best explained either by the need to transfer the weight of the water reservoir away from the beams or by intention to provide upper storeys to the Little Mill should the need for additional working space arise. Power for the Little Mill was borrowed from the main mill, for a wall box, over a window at the south end of the west wall permits a shaft to run from the engine house to the west, across the narrow yard and into the mill (RCHME 1987g, 5). Whiteley (1976, 25) records that in the last decades of textile production at the site the Little Mill was used for beaming and warping.

PROCESS RECORDING

The site of Victoria Mills was built as a cotton spinning mill but provision was also made for other processes related to spinning at the site (Plate 12.14). Thus, it is recorded that at times the ground floor of the Large Mill was used for carding and slubbing (preparatory processes for spinning), the first floor for spinning, the second floor for winding and twisting of yarn and the third floor for storage. There is also evidence to suggest that part of the warehouse block may have been used for preparatory processes. The function of the Little Mill is unknown but as it was a single-storey structure it may would have been suited to heavy

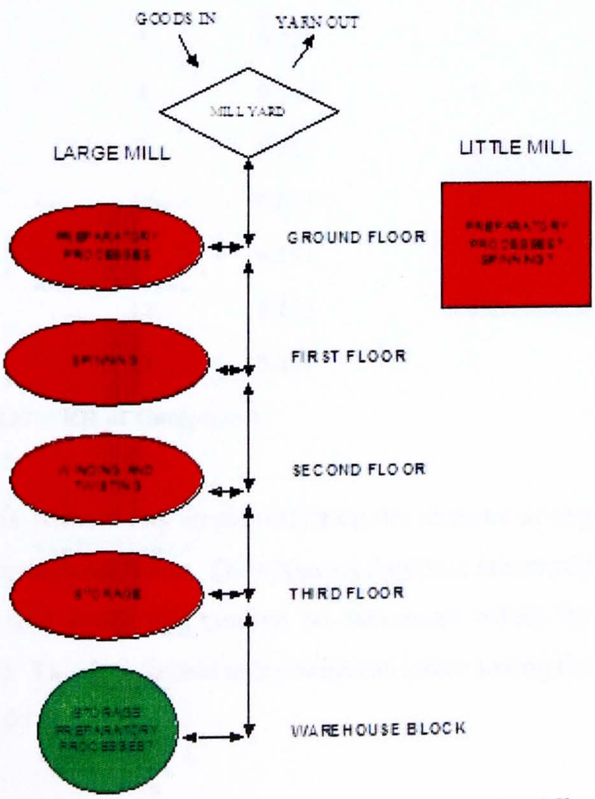


Plate 12.14 *Processes, Phase Two, Victoria Mills*

machinery such as that used in the predatory stages of spinning, like carding engines, and it may have been used for that purpose; weaving was certainly never undertook at the site. Notwithstanding these vagaries, the flow of processes at the site was largely vertical with raw materials entering at ground floor level and finished goods being stored on the third floor and in the warehouse block. In the absence of any original taking-in doors in the mill, the small hoist in the staircase tower must have been the primary means of moving produce materials and goods around the mill and its location opposite the main entrance to the mill was therefore advantageous.

The primary role of the staircase tower and hoist in the movement of materials and goods around the site becomes clearer when plotted as a gamma map and the syntactic property of spaces in the complex quantified (Figure 12.4; Table 12.1).

Table 12.1 *Quantified values for Phase Two 'material/goods' gamma map*

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS
X	0.256	1	**7**	0.231	1
1	0.103	1	**8**	0.385	1
2	0.256	1	**9**	0.231	2
3	0.256	1	**10**	0.231	1
4	0.077	8	**11**	0.231	1
5	0.231	1	**12**	0.231	1
6	0.231	1	**13**	0.231	1

Mean RA: 0.227 RR of Complex: 0

The gamma map reveals a spatial complex without any rings, reflecting the absence of any loading doors and any direct access between internal floors. The system is therefore inherently tree-like and the movement of materials and goods was centred on movement within the staircase tower and internal hoist (space 4). This is reflected in the staircase tower having the lowest RA value of the entire complex (0.077).

The gamma map also makes clear the extent to which the design of the mill was highly repetitious with most of the main working areas and storage areas occupying the same part of

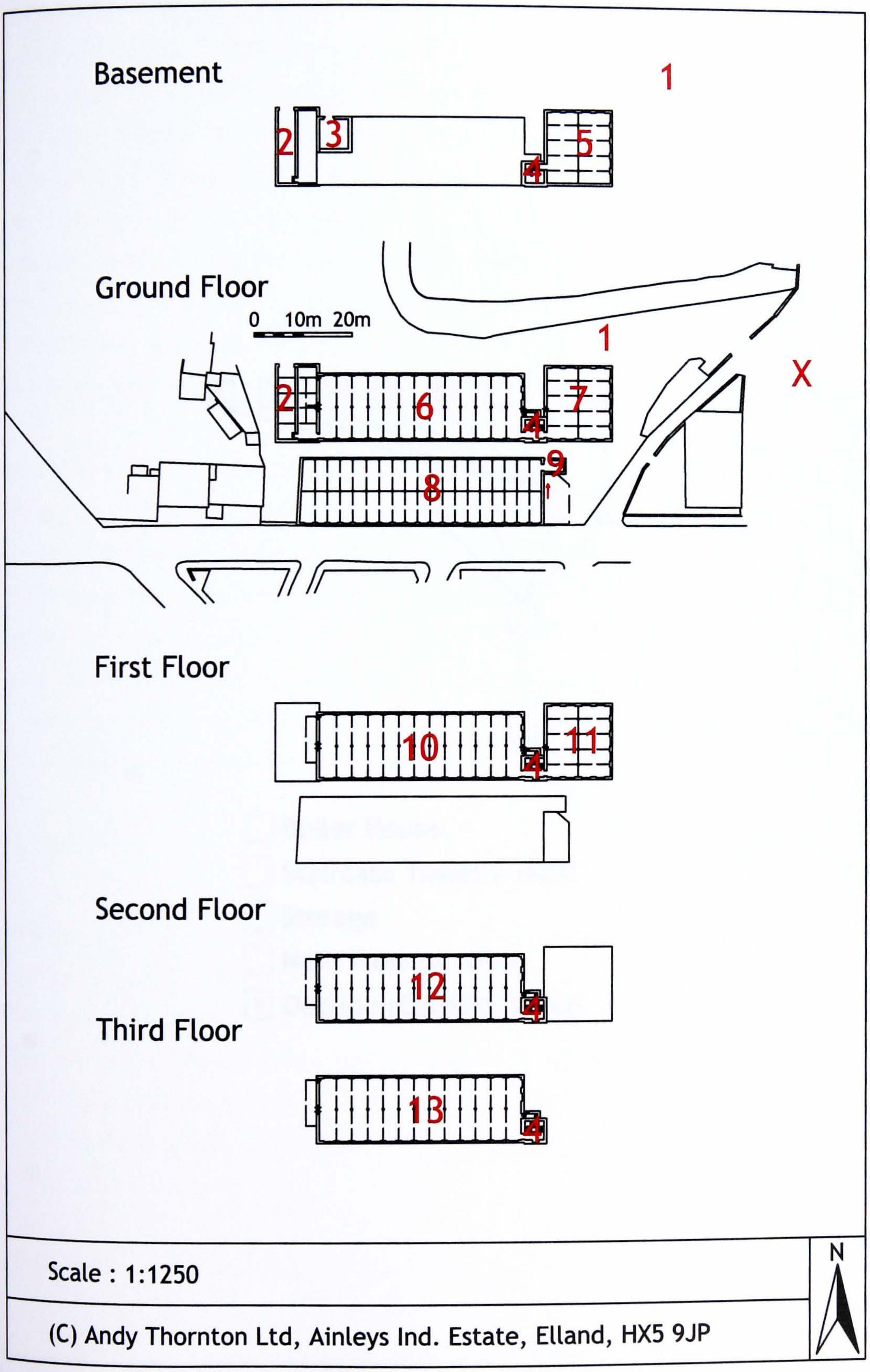


Figure 12.4 *Phase Two: Gamma map of the movement of materials/goods*

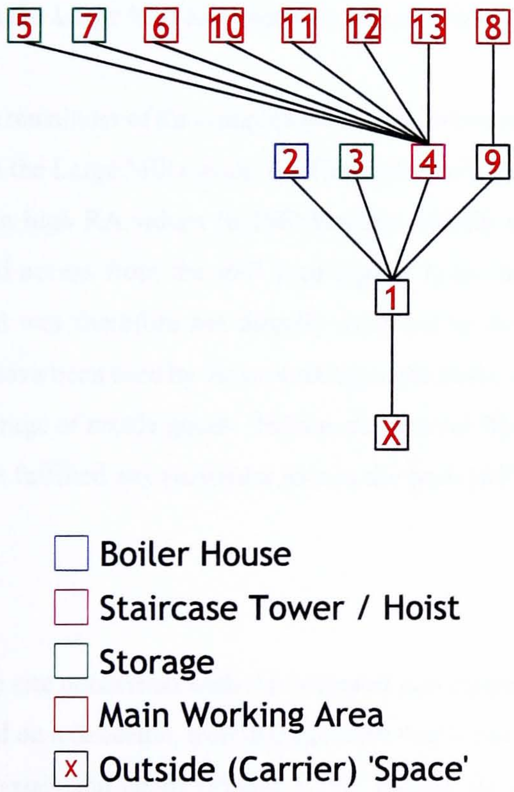


Figure 12.4 cont. *Phase Two: Gamma map of the movement of materials/goods*

the complex and sharing the same RA value (0.231). Accordingly, this meant that regardless of their physical position within the mill, the majority of the main working areas were equally as accessible and meant that materials and goods effectively made the same journey to any part of the mill. Even the main working area (space 8) in the Little Mill, which is located on an isolated strand of the complex reflecting its physical separation from the remainder of spaces located in the Large Mill, was as accessible as all the other spaces. However, in spatial terms this area was isolated from the main system of movement around the site and this is reflected in its high RA value (0.385). In terms of the production process this may have meant that the Little Mill was used for the manufacture of a specific yarn or part or housed a process that was not accommodated in the Large Mill and therefore effectively operated as a separate entity.

Also distinct from the remainder of the complex are the boiler house (space 2) and the basement storage space beneath the Large Mill (space 3). Their relatively isolation from the complex as a whole is reflected in high RA values (0.256) but this entirely reflects their function. The boiler house required access from the mill yard (space 1) for the delivery of coal and the removal of ashes and was therefore not directly involved in the production process. The basement space may have been used by those working in the boiler and engine houses as a store rather than for the storage of textile goods. Indeed, as survivor from an earlier structure at the site it may never have fulfilled any particular role in the post-1893 mills.

ACCESS ANALYSIS

Access analysis at the site concerned with the potential movement of the workforce reveals a spatial structure based on a dendritic, tree-like structure that is not vastly dissimilar to that for the movement of materials and goods (Figure 12.5). Indeed, the only major difference is an increased number of spaces in the complex, principally privies accessed from each of the main working areas in the Large Mill (spaces 8, 14, 17 ad 19). The staircase tower (space 5) is once again the main integrating space in the complex and this is reflected in its low RA value (0.109) (Table 12.2).

Table 12.2 Quantified values for Phase Two 'material/goods' gamma map

SPACE	RA VALUE	NUMBER OF NEIGHBOURS	SPACE	RA VALUE	NUMBER OF NEIGHBOURS

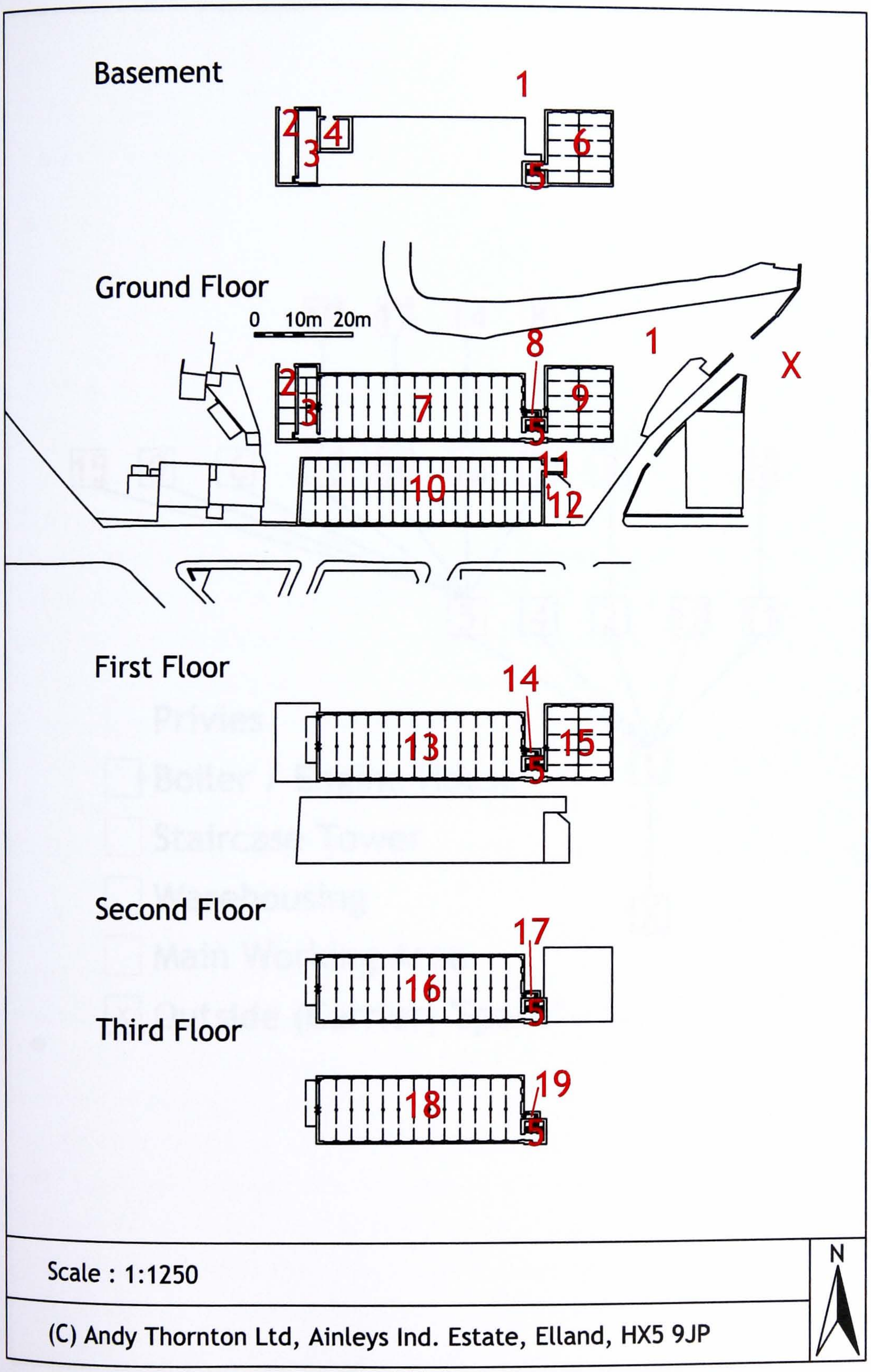


Figure 12.5 *Phase Two: Gamma map of the movement of the workforce*

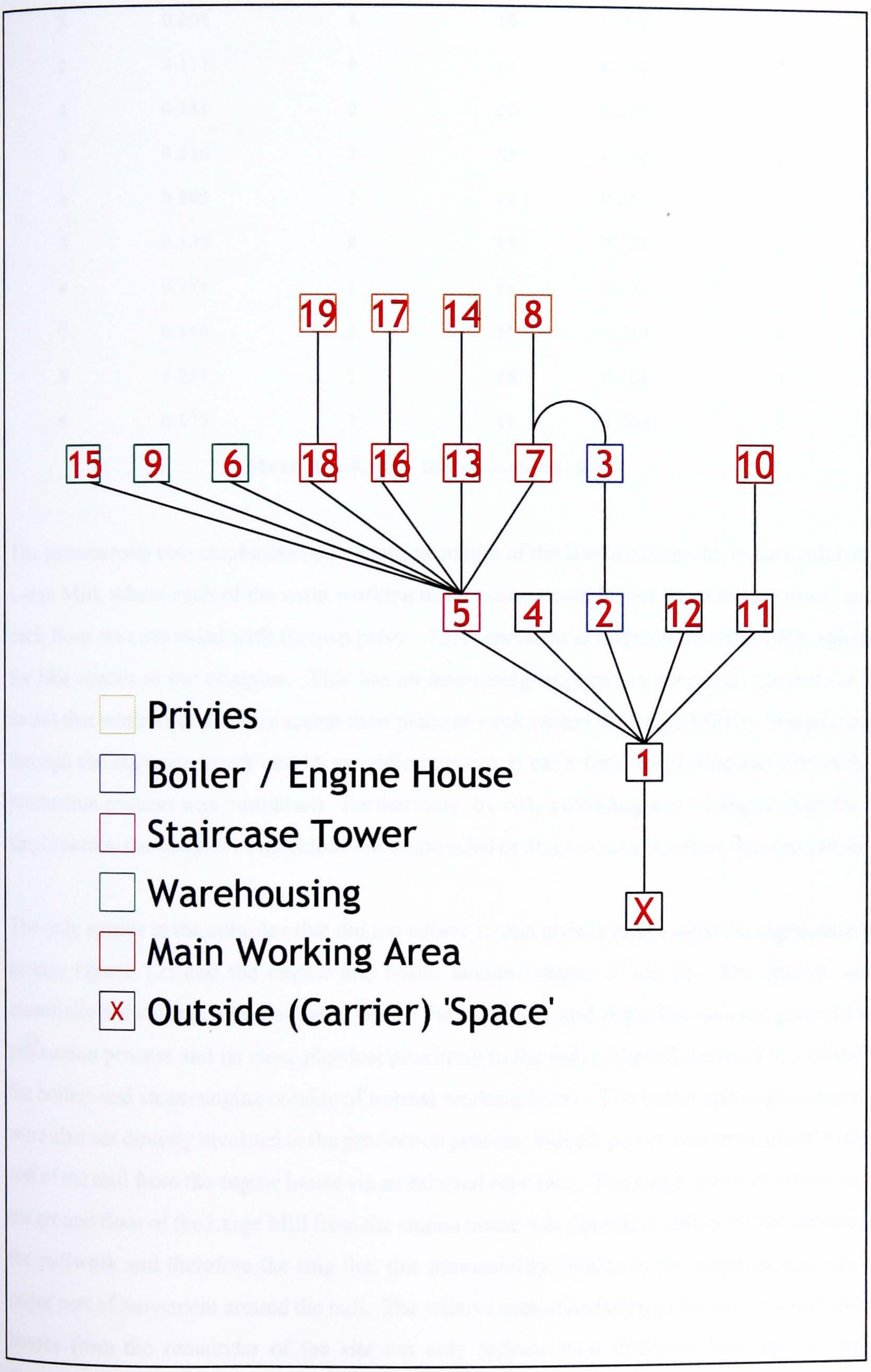


Figure 12.5 cont. *Phase Two: Gamma map of the movement of the workforce*

X	0.205	1	**10**	0.304	1
1	0.117	6	**11**	0.199	2
2	0.181	2	**12**	0.205	1
3	0.216	2	**13**	0.164	2
4	0.205	1	**14**	0.269	1
5	0.109	8	**15**	0.181	2
6	0.181	1	**16**	0.164	1
7	0.146	3	**17**	0.269	2
8	0.251	1	**18**	0.164	1
9	0.175	1	**19**	0.269	1

Mean RA: 0.199 RR of Complex: 0.033

The gamma map also emphasises the repetitive nature of the layout of the site, in particular the Large Mill, where each of the main working areas was accessed from the staircase tower and each floor was provided with its own privy. This repetition is reflected in shared RA values for like spaces in the complex. This has an interesting implication for social control for it meant that workers could only access their place of work within the Large Mill by first passing through the staircase tower and by providing privies at each floor level time away from the production process was minimised. Furthermore, by only providing a privy big enough for a single person the number of machines left unattended or at rest at any one time was minimised.

The only spaces in the complex that did not adhere to this broad pattern were the engineman's cottage (space 12) and the engine and boiler houses (spaces 2 and 3). The former was essentially a dwelling, albeit situated within the mill yard, and therefore was not part of the production process and its close physical proximity to the mill reflected the need to maintain the boilers and steam engine outside of normal working hours. The boiler and engine houses were also not directly involved in the production process; indeed, power was transmitted to the rest of the mill from the engine house via an external rope race. The single point of access into the ground floor of the Large Mill from the engine house was doubtless only used for servicing the millwork and therefore the ring that this permeability creates in the complex was not a major part of movement around the mill. The relative spatial isolation of the boiler and engine houses from the remainder of the site not only reflects their different function but also illustrates the segregation of different skilled parts of the workforce from each other which has important implications for our understanding of microeconomic factors like team-working and the transfer of knowledge and skills between workers.

PROCESS RECORDING AND ACCESS ANALYSIS: DISCUSSION

The analysis of the movement of materials and goods as well as the movement of the workforce is particularly interesting at Victoria Mills but essentially the system of movement around the mill was identical. This results from the staircase tower housing the main means of moving materials and goods around the mill (a hoist) and the staircase used by workers.

Analysis of the site has also revealed that although the mills were built without taking-in doors, the movement of materials and goods was relatively easily and no space in the complex was located more than two spatial steps from the exterior of the mill. In terms of human movement, each working area was similarly only two spatial steps from the exterior and therefore workers could move to their place of work within the mill quickly. Furthermore, as all movement in the Large Mill required passage through the staircase tower potential movement around the site was minimised. Therefore, despite the absence of overlooker's or time offices human movement was controlled and could be supervised from either the main working areas or the exterior of the site.

ARCHITECTURAL SUMMARY

The architecture of Victoria Mills is typical of its date and the use of red brick dressing against the local stone gives the mill a reserved but distinctive quality. This gives the mill a more rational style which is unencumbered with the trappings of a Palladian or classically-styled mill. Furthermore, there is no evidence for the interior of the engine house having been embellished and neither the entrance to the boiler house or the engine house windows are typical of the forms found on earlier mills.

It is unclear whether the Large and Little Mills were direct copies of the mills destroyed in the 1893 fire. Certainly their footprint was similar to the earlier structures on the site and elements of the earlier buildings incorporated into the later mills are not stylistically dissimilar. Whether or not this was a deliberate choice to replicate the earlier form of the mills is not known but it may have been the case that there was a desire to rebuild in a similar style in order to keep an association between the site and the company of Sutcliffe's. Alternatively, the rebuilt mills may have been plainer than their predecessors and certainly the fact that the site was not rebuilt all at once and then the Little Mill was only completed to first floor level perhaps suggests a tight budget following the 1893 fire and this may have resulted in the more rational appearance of the site.

LIST OF DOCUMENTS

12.1 *Halifax Guardian, 25th August 1866*

12.2 ''Victoria Mill Co. Architect submitting plans, 4th August 1879 and 3rd November 1879'

Calderdale Planning Department, Greetland Building Plan, Nos. 167 & 175

12.3 'Fire destroys Mill'

Halifax Guardian, 23rd December 1893

12.4 'Sale of mill site and various surviving buildings after a fire, 20th April 1894'

Deeds, Particulars and Sale Plan, 20th April 1894. WYAS Calderdale

12.5 *Halifax Guardian, 28th April 1894, 6*

12.6 'James Suticliffe. Architect: Horsfall and Williams. Rebuilding Victoria Mill'

Calderdale Planning Department, Greetland Building Plan 423

12.7 'Deeds and mortgage, 11th July 1895'

12.8 J. Sutcliffe & Sons. Victoria Mill extension, 22nd March 1898'

Calderdale Planning Department, Greetland Building Plan 3

12.9 'Letterhead, James Sutcliffe & Sons (March 1933)

BIP/G: 1193. WYAS Calderdale - Reproduced with permission.

12.10 'Building plans: Sprinkler Tower; J. Sutcliffe & Sons Ltd. Approved 25th May 1925'

BIP/g 1028. WYAS Calderdale

APPENDIX B
ORAL HISTORY TRANSCRIPTS

The following comprise a selection of oral history transcripts consulted at Bradford Reference and Study Library, Central Library, Prince's Way, Bradford. The transcripts form part of the Bradford Oral History Series as it existed in January 2005 and were recorded by the Bradford Heritage Recording Unit [BHRU] as a part of the Manpower Services Commission Community Programme Scheme, jointly sponsored by Bradford Libraries and Museums Departments and undertaken since 1983. The transcripts include only those referred to in this thesis and other interviews consulted but not referenced in the main text have not been reproduced below. Furthermore, the transcripts reproduced below only included those passages of particular relevance to this research; complete transcripts are available from the Bradford Reference and Study Library. All of the transcripts are reproduced by permission of Bradford Heritage Recording Unit and Bradford Libraries.

A0001

INTERVIEW NUMBER:	A0001
SEX OF INTERVIEWEE:	Female
DATE OF BIRTH OF INTERVIEWEE:	1912
INTERVIEWER:	O. Howarth
DATE OF INTERVIEW:	15th November 1983
PERIOD DISCUSSED:	Mid - Late Twentieth Century
ABSTRACT:	Working in the textile industry; social and economic conditions; textile strike, 1925

... you were fourteen when you left [school], and you started where then?

Illingworths Morris, up Thornton Road, right, and that's the place I met Doris, which were a life-long friend, and I, I went - I sent her flowers to her funeral, only last year, she died, I'd had a lovely week with her and then she died, but she started school - er, work with me, Doris Delaney.

Did she live round here?

No love, she lived in... er… she lived up by Illingworths somewhere, I never knew much about where they lived, but they went to live in Leeds after that so...

What sort of a job did you do then when you first started?

I were an end doffer when I first started, and it were..

Oh what's that?

Well you used to - you know they get the bobbins, you had to lap the ends in, and then they don't fall about and when they go packing you see they're all right. They know where to get the end out straight away.

Was that in spinning?

That was in the spinning, and I worked in the spinning for four years.

There?

Illingworth Morris, yes, and er, the money wasn't enough, and my mother had no money.

How much about did you get?

Well it were twenty three and a penny, that were exactly the money, I'll never forget getting that twenty three... one pound three and a penny, that were my first wage. Oh and I thought it were, I thought it were lovely, but then somebody started talking about - somebody came to see my mother one night and they said 'Wouldn't you like to try the combing?' I said 'No ta,' I said, 'I don't like leaving where I am because I'd got so used to it'. Anyway I did go work in - at W,H. Greenwoods, so he said 'Would you like to come with me in the morning?' I said 'Ooh, I don't know', I said 'I will do, yes I'll come', and I went with him, and I started straight away you see, but mind you I'd to learn...

Just set you on. Greenwood what?

Greenwood Whitley, up Springmill Street, Springmill Street, and they started me straightaway but I'd to learn of course. I'd to learn.

How long did it take you to learn?

Well, about a month, but they give you a month to learn in, and then I went on every job in the mill. They knew I could do these jobs -I used to watch them.

What sort of jobs?

Well, there was… er... back-washes, strong boxes, the punch.

What was that?

The punch was making the balls that goes into the combs. Yes, that's it. I minded the punch - strong boxes, gill boxes, well they were what we called finishers there, in the, in the drawing it's gill boxes, but it's the same type of work, for it's what they call different things finishers. And I could start at the beginning and do the finished job right to the end.

Not many could do that?

Well, no, that's why you could get a job love. I could get a job anytime, anywhere, and if you've a good character, that makes a lot of difference. We never had owt but we wouldn't take a penny off nobody, them days, I mean today they'd take the eye out of your head wouldn't they? *[laughs]* They would, you know - but, er...

Well how long did you stop there then?

Twenty five years I worked for Greenwoods, and do you know I once left and it were Mr. Whitley himself, I once left - I'd had a few words with the gaffer.

Why?

Well, them days you see, you wasn't supposed to work with your brother, and my brother never left my side, our Dick. No, he never left me, he were always talking to me, but I were doing my job and he were doing his. He was stood while his work were going on, and he said 'I can't do with this here-you lot whispering', so I said 'Leave me alone' I said 'I'll finish, finish tonight'. He said 'You can't do that', I said 'Who can't – I'll show you'. So I left and next morning I went down to... er... 'Ooh' I thought 'I haven't a job. What am I going do, I haven't got a job?' I said to my mother 'I'll have to go get a job', so I went down to Smith Parkinson & Cole, no, not that, that weren't what they called it - wait a minute - Parkinons & Cole. I know it were a combing place but they called it City Combing in other words. So I started there. He set me on three quarters of the way through the morning, 'What can you do' I said, I went in there, did that job, and... er...

One day - you had to have a quarter if you wanted to stop at home, first thing in the morning, if you didn't get there for seven you were 'quartered', so I used - I had a quarter and I couldn't go back. So I thought I'm not going back there, I daredn't, so I went over to Smiths across the road at eight o'clock when I come down the road, and I started there. In the combing… er... in the spinning again, from the combing…

How long was this from?

Oh in a few days, few days. Anyway these is all in my life styles, I mean if you'd a written record you'd know because my names in them all. Anyway, he took a right fancy to me did this gaffer, and there were a lass then and... she wouldn't do nowt...

What did they call him?

Oh, I couldn't tell you, now - ooh no, now that's summat - I didn't work there long enough to know them personally, and he said 'Now then love' he said 'What would you - would you like to take that little lass in hand' he said 'because she won't do no way for me', but believe me in a month she were like - she were just like my daughter. She were only a girl, and I were knocking on then, so he said 'Now then' he said 'you've made a good impression on her', so I said 'Ooh, I've something to tell you'. He said 'What is it?' I said 'I'm going in the combing in the morning'. He said 'Where?' I said 'Over the road', and it were in the same building, same Smiths, Smiths in Preston Street. So I went, and I worked in there for about - I took over there. I did combing there, and I did back washes, the spinning the -oh I did the lot in Smiths, and then who comes into the yard one day, and I were on 'black' of all things, but I'd lovely teeth, we all had right good teeth, and it were...

What do you mean you were on 'black?'

Black - wool.

Oh yes, you were working with black wool.

I were black all over and just white teeth, *[laughs]*. So Gordon Whitley and chauffeur came in the yard, so he said 'I'm sure I've seen Frances walk in that door', so John comes running after me, peak cap and all the lot, 'Frances, it is Frances isn't it?' I said 'Yes. How did you know it were me?' He said 'Mr. Whitley wants you, he's in the car'. I said 'Oh'. I went over, I said 'Now then Mr. Whitley, do you like my face?' He said 'You're going back home', so that meant I were going back to Greenwoods again. All this were in twenty five years you see, but I only did a few weeks in these places.

Had he arranged that?

He didn't. He was the man that owned it, he owned it.

He'd come for you to take you back to... ?

He said 'I want to see you on Monday morning'. I said 'Ooh' I said 'they don't know...' he said 'You're coming back', he said 'you're never dirty like that when you're with me', and I went back, and I finished that twenty five years in that you see. Oh he were lovely, and then he died right sudden with gout. He had bad gout and he died. But anyway I left there - oh, I'd another argument with a fellow that lived up against you not long since, Renny Warrener. Did you know him? He lived up… just up by you.

Fairweather?

Yes. Oak, Oaks Lane, I think it was.

Oaks Lane, on Lower Grange?

Yes, and he were, he were right, oh right clever one day so I said 'Oh, goodbye'. I didn't know what I were going to do for a job, so I went across the road to er...

When was this, when would this be about, when it happened?

Ooh, let's see. When would it be, I'd been twenty five years... and they were always getting redundant then, and it were getting ready for closing down - all redundancies coming in.

It would be about what, nineteen er...?

Four years I did, that were.... I were nineteen when I left the other place wasn't I? Illingworths. I'd be what ooh... twenty-five, thirty-five, forty-four. I'd be forty-four when I started there.

Yes, so that would be nineteen fifty...er?

About nineteen fifty-two was it?

Nineteen fifty five I think.

Fifty-five?

Yes, fifty-four, fifty five. But, here we're rushing on, what about when you were young, when you'd finished in the mill? What did you do, did you help your mam?

Oh yes, we never - we had a good home life. We all used to take our turns what we did you know.

How did you pay her, did you just give her your wages or...?

Oh definitely. Oh yes, you had to give your wages up then, because there were three of us to keep, and John didn't work for three solid years you know with that strike, so he didn't know what work was for a long while.

Why three years?

I don't know, it went on three years did that strike. It was a General Strike, what they called a General Strike. I know he never worked for three years anyway, didn't John.

And how much spending money did you get then?

Oh about half a crown, in old money, half a crown.

You were bringing in how much then?

Twenty three and a penny.

Aye, and half a crown spending money.

That were at Illingworths, Illingworths yes.

BREAK

...You used to do a lot of...didn't you tell me you did three jobs at once in the mill? Where was this?

In the mill, yes, well I had to do. At Greenwoods. I could do any job so they'd put me on one and say 'Now can you manage that while you're at it'. I used to say 'Yes, I can'. I did it for money, and you see with having him I didn't pay a lot of tax, so I were benefited there you know.

You'd no Child Benefit though had you?

No, no, no. I never got anything, I got Richard's money which was in that money seven and six for sixteen year, and missings, and missings.

Didn't you go work up Bowling Old Lane?

Well, that's when I left Greenwoods I went to Bowling Old Lane and I got a job straight away there and I worked there for fifteen years.

Did you like them there then?

Oh yes, lovely. Lovely managers. Oh they were lovely. Now then one - oh one of them, they made him redundant while I were there, Mr, Peel. He was a - he had a shop in Thornton Road when they made him redundant. He was the loveliest man I ever met. Our Richard knew him, he used to go into his shop for papers, and he used to say to him 'Your mother was a good worker', everybody used to say that 'Your mother was a good worker', and he once said to me...

Did they give you any extra for good workers, sort of...?

No, No, but if you were a good worker and you could mind another machine you got that machine, and that were double wages which, to me I could afford to pay, I could afford to buy - I could get him anything he wanted. That were me - I never bought for myself, it were for him.

Sorry - that man said to you what?

One day he said 'Now then' he said 'I'm leaving Frances', and I said 'Oh you're not Mr, Peel', he said 'Oh yes, I've got the push'. And he were a manager, a big manager, one of the best - well they weren't managers then, he were for - there were a firm there before I went there. They didn't call it Douglas Mills - oh and I just can't think what they called it, and them were the people... Laycock Brothers, now they had firms all over had Laycock Brothers, now he worked for Laycocks, the old Laycocks, now these people took over which makes a big difference as you know, when you take over - another takes over and then you've had it haven't you because everything changes. So 'Oh' I said 'I'm so sorry Mr. Peel', so he said 'Come into the office Frances', I said 'Oh yes' and I went in, and he said 'Because I want you to tell the people. I'm not going to tell them'. And I had to tell the mill you know about this here finishing Mr. Peel. He said 'I was going to put it on the notice board' he said 'but I feel so let down', and oh he were a lovely man, and I mean there were managers then walked about in white coats all day long, there were no messing about, no coming and looking at owt. They were managers, you did your job and that were it. Everything were serene, if you could do your job they left you to it. Marvellous person, Mr. Peel, and he said er... I got this here sheet and I went round and I said 'Now then I don't want to alarm you all' I said ' but I've got this job to do and I must tell you all', I was the oldest hand - the youngest oldest hand I should say, there were some old people that worked there, but they were too old to take over responsibility so I did it all. And I said 'I'm sorry but Mr. Peel finishes' I said 'and I'm going to ask you something', I said 'if I come round when it's quiet and there's nobody about at lunch time will you give a donation' I said ' we'll all do something for him finishing'. Oh yes because he was so lovely - he was a spastic, he had a funny hand like that, he was a spastic, and when it came to Friday lunch I thought - they'd all got their wages you see, I said 'How then ' I said 'I'm coming round at lunch'.

I did do, oh and I got a fabulous amount of money for him, in fact it bought him a gold watch which was gold. I took on a lady, an older lady that were over the top of me but she were too old to bother, but she went with me and we got him this watch. So he said what day he was leaving, so he took us all into the place upstairs, and we had a meeting, like a meeting, so he said 'Well I'm going to say goodbye to you all now and slip quietly away'. I said 'Not yet, not yet'. So I said to this old lady 'Now go up', I didn't do it because she were older than me, 'and will you give this to Mr, Peel', and you know what he said to me, he said 'I know whose this, whose idea this is', he said 'and do you know it's something I've never possessed'. All the money they had - he'd three big boys growing up like me you see, which took a lot of money them days. He said 'I've never possessed a watch, never mind a gold one', and oh it were - everybody were crying in the place, and he said 'I'll slip very silently away, nobody will know I've gone' and we never saw him no more until he bought that shop in the bottom of Whetley Lane there where Hopkinsons were the furniture shop, and next door were Mr. Peels'...

A0004

INTERVIEW NUMBER:	A0004
SEX OF INTERVIEWEE:	Male
DATE OF BIRTH OF INTERVIEWEE:	1940
INTERVIEWER:	A. A. Hussein
DATE OF INTERVIEW:	18th November 1983 & 30th November 1983
PERIOD DISCUSSED:	Mid - Late Twentieth Century
ABSTRACT:	Family working in textile industry; apprenticeship at Lister Mills, Bradford; work in a dyehouse; Unionism at Lister Mill; introduction of modern machinery; work patterns; decline in industry

Where did your mother work at the time?

Well she worked in the combing mostly, you know, in the wool textiles, and... mostly mills, she must have worked in ten or twelve different factories you know, but the thing in that period was that if you were dissatisfied with your job at one mill you could go across the road and they'd start you, you know, there and then at that – at any time of the day you know.

Why do you think that was possible?

They wanted workers after the war, and the local Telegraph, some four or five, six pages every day of the week of job vacancies.

You remember that?

Yes, oh yes, you could always – they always used to say if you haven't got a job look in the Telegraph, there's plenty of jobs there, you know. No one need go without a job because...

And that was during the war or...

No that was after the war...

BREAK

Did you go into the mill – was it something that you accepted immediately?

Yes. My friends I used to go out with at the time were mostly in textiles and – you know, it was a matter of how much wage could you get at the period. Your status was measured by how much money you drew at the end of the week, which were only a few pounds. I think my first week's wage was two pounds seventeen shillings, and I was only about six or eight weeks in that particular job, and I got another job then at Listers, four pounds ten shillings a week, which is four pounds fifty. Oh yes, it was a great jump up you know, I'd moved up in the status with, you know, sky high.

How did you come by the apprenticeship when you left?

There was pretty few restrictions, they'd take almost – to be an –if you wanted to be an apprentice joiner you didn't need the qualifications that you do nowadays. Most of the factories, every mechanic in Listers had a young lad with him learning the trade, but you don't see that nowadays. And, you know, as I say if you wanted to be a joiner you just went and applied, and if there were a vacancy you got the job. Nowadays everybody's so cost conscious.

Do you remember the first day of work?

I remember I had to walk across *[inaudible]*... Fields into Thornton Road, and get a bus and take myself into town. I was working at Nelson Street at Kit Wauds, that was the first job I had, and I remember you know, seeming a bit lonely there that particular day. I mean before you've been used to going to school with all your friends, this is the first time you've gone anywhere or ventured out on your own. But I met some chaps, young men there, friends, and it didn't take long, one of the lads there helped, we became firm friends and after I left there, you know as I say I was only there about six or eight weeks, but we were mates then for years afterwards, Donald they call him.

Adam?

Donald. It wasn't the people, it was the job more or less.

And what was the first job?

Woolsorter.

Woolsorter, that's at....?

Kit Wauds up Nelson Street, yes.

When was that? What year?

Fifty-five.

And how was it then?

Well, like I say, you could get an apprenticeship almost, it was and you were just taken on as a 'dogsbody'. You were everybody's 'whipping boy' you know, and this didn't sink in at the time, you don't realise that you've got to do as you're told, or what – even though it's not in line with the job that you think you should be doing. Because I remember my son, who's just started recently, he had the same problem you know, at first when he started work he didn't realise just what his duties should be.

And how were you treated as an apprentice?

Just like I say, as a junior, expected to go out to the shops at lunch times. Stagger up with a box of fish and chips on a Friday, you know, to feed half of, half the mill *[laughs]*.

And were there many young apprentices with you?

Yes, about three or four at that place, at Wauds. But at Listers there was about twenty of us. There was lots of boys, you know, - they used to have a lad, a sort of a spare man on a machine, so that when the chaps wanted to go to the toilet or take his lunch break, there was always a lad available, not necessarily doing anything, but just available, you know. All that's gone by the way, yes.

Were you long there?

In woolsorting no, about six or eight weeks that was all, and I don't know if I'd got my mother's attitude you know, if you don't like the job change it, but I ...

[END OF SIDE ONE OF REEL ONE]

You left and went to Listers after you left Kit Wauds. How did you come to start at Listers?

Well a friend of the family knew I was looking round for a job, and he said he'd ask them if there were a vacancy for me, and I thought I'd give it a try, and I'm still there, thirty years on.

Was it much different from being at Kit Wauds?

Oh yes. The dyehouse, have you ever been in a dyehouse, particularly the older ones, the steam. They use vats of boiling water, and close confines you know, the roof - you know very little ventilation, well not sufficient for the huge dyeing machines. They were real pea soupers,. You couldn't see you know five yards in front of you at any time. Once the steam got up on a morning till say at lunch time, when the jobs used to take up say three or four hours to complete, the steam would die down, and those people you know, washed tubs off, emptied machines and re-filled them, and it would build up again in the afternoon, two pea soupers they were, just there. We don't have that nowadays, do we? A modern dyehouse has a high ceiling and better ventilation. I suppose it's worked out how much ventilation you need for you know, how much area of air it moves, whereas in the old days it...

You didn't have much difficulty in getting to Listers?

No, no, about a quarter of a mile walk, and there wasn't no chance of public transport, it was just across all the streets you know, across Whetley Lane and across Lilycroft Road, so I didn't have to have any expense that way traveling to work.

And what kind of hours did you work at that age?

I think it were a forty five hour week, it were five nines, eight while half past five with a lunch hour you know. It was five thirty, yes it was.

What time did you start?

Eight o'clock until about noon, and then it would be about half past twelve while half past five, yes.

And at that time they - did – they work shift system?

No. At Listers they've always worked overtime to compensate, so that you got a shift system, but they were twelve hour shifts.

Quick turnover?

Yes, do that you know, half past seven while half past seven. The chaps worked that, you see as a young man you only worked -you weren't allowed to work over till you were eighteen, I think it was eighteen then.

And did you have holidays?

Yes. I remember the - starting at Listers at - that were the first opportunity to have a real holiday, you know, a week away at Sunny Blackpool.

Yes, I'll come to that. How did they pay you as an apprentice?

It was about four fifty a week, well four pounds ten shillings, which was quite good, it was... er, all textile work at that period seemed to be well paid. They've slipped behind over the years now. But I always remember I earned more than some of the lads who stayed on full apprenticeships like joiners, bricklayers and engineers, they... about two pounds fifty were the norm for them you know.

And how many apprentices were with you at the time?

Say fifteen to twenty, because there was a huge turnover, labour turnover like because people could do, like I say, walk from one place to another, and get a job, start another job the same day.

Even apprentices did that?

Well you could do, it was possible you know. If you left through some_misdemeanor, you know, like getting up to things, you were obviously going to look for another job that same day *[laughs]*.

And how were you treated I mean at work in terms of rules and...?

Oh quite all right. We worked with an adult, and you fetched and carried for him you know, and you more or less learned the job that way, it was just copying more or less; there was nothing technical, it was just a matter of picking things up as you went along, and it's just experience. You can look back over the years now and draw on things that you did, that you've forgotten all about that seemed irrelevant at the time. You remember processes and one thing and another. It's funny how it always stick doesn't it? Sticks in your mind.

How did the break system work?

The lunch times and periods like that? You always used the canteen at Listers, and good meals - I think they used to start serving about quarter past eleven, lunches, and they went on while half past two. They were continuous. The break times at Listers were just... er, followed on from one department to another sort of, they kept a turnover at the canteen you know, through all the lunchtimes and the office staff were usually the last to go in, because in the dyehouse it's more or less continuous processing they call it, you know; so you can't just stop a machine in the middle of a process. Half of us would go across and then back at twelve o'clock and the other half would go for their lunch.

And you still lived at home then?

Yes.

How was the - did you pay part of your wage to your mother?

Yes. I gave her - all my wage to my mother when I was fifteen, sixteen. I think I was about eighteen before I started keeping myself.

And how did it work out when it came to you wanting to do things of your own?

It didn't go down well at the time, you know, it's like all family things, it brushed aside after a few days. My son now, was straight on to, you know, to looking after himself, and he just pays his mum for his keep, for his food and...

And when did that change?

Oh I was about seventeen or eighteen, before I - you felt a duty to give your wage over to your parents, especially after the war, you know, there'd been some lean years between 1945 and 1960. It wasn't just that there were poor wages, things weren't available, let's see there ration books, I think - I was amazed to learn this, it was about 1961 when, the last - end of rationing in this country from after the war. <u>So long,</u> I mean before everything had been taken off.

Did you think what you were getting was enough, I mean, getting paid?

Yes, like I say it was more than what a lot of my friends were getting. In 1955 the chaps were, on a full wage were earning about twelve pounds a week, which seemed a huge amount then.

Did it go up from four pound?

Yes, it went in six monthly increments until you were twenty one, I believe.

So that by the time you were eighteen it was...?

You were an improver at eighteen, you still weren't on full money. I remember the machines that I'm minding now, I mind two jig machines, but I was only allowed to mind one at that period between eighteen and twenty one, because you know it was an improver's task, one machine. Union rules, you know.

And how did you spend your time outside work?

I was never one for dancing, but I used to like roller skating, a huge Rollerena on Manningham Lane. I spent some happy hours in there on Saturdays, Sundays, and Tuesday evening was a favorite. Tuesday evening it used to be packed solid, everybody used to go, and apart from just the skating they used to play all the latest pop records. I think that I couldn't afford them at the time. I think a single was half a crown then, two and six, you know the old 78's, and you could hear all the latest records there to your heart's content, even if you didn't want to skate.

Did you go there as a group?

Yes, I went with the lads from work and the lads from school, lads that you just – that you met there. Lots of the lads met girlfriends there.

And how about the cinema?

The cinema was popular yes, 'The Gaumont' at the bottom of Thornton Road, and 'The Ritz', they're smaller now, they were large cinemas in those days.

When was this?

In the Fifties.

What kind of other things did you get up to?

I seem to remember mostly playing football in West Park down Girlington, when the weather was fine. In the summer holidays from school I used to spend all day there. I used to get into trouble when I went home because you know I'd gone out at nine in the morning and I hadn't returned while seven or eight in the evening and I'd had nowt to eat, and 'Wherehave you been all day? Why didn't you let us know'. I used to play football, you never got tired. You could play all day.

BREAK

The trips?

What to the seaside? I remember one particular one from Listers, there were a Moonlight Special going to the Illuminations at Morecambe on Friday evening, and that was ten shillings for the rail fare there and back, and it was just packed with teenagers, I don't know if the word got round the town or what, but it just - it left from Forster Square station about six o'clock Friday evening, and I personally came back Saturday morning with about three or four more. We'd missed the train, which didn't leave till about two o'clock'in the morning. I think we'd left Morecambe, and decided to go to Blackpool and then we decided not to *[laughs]*, and then, by the time we got back to Morecambe there were no - the - other train had gone.

So what - that–was your first trip was it?

Yes, well it sticks out in my mind anyway. Obviously there were a lot more went off that I can't tell you about in between getting there and coming back.

So what, I mean how was the work itself?

A bit monotonous to start with. I were on a warp machine, and the warps of cotton were five hundred and sometimes a thousand metres long, and they just threaded through bowls in the machine, and they came into a cart at the back, it was called the box, on wheels and it just stacked the warp neatly so that it didn't snare, because you know, they used to get what they called a 'cod up' and if you've ever had five hundred metres strewn round the dyehouse and everybody trying to untangle it you know, if it had gone in and you weren't paying attention, you know, it would fall over and collapse on itself in the box, and the whole dyehouse used to come to a halt when, er - while they untangled the huge warp. I've seen fellows argue and tempers fly you know.

And what was the attitude of the overlookers?

It's always been good as far as I can recollect but there were one or two chaps, and if one fellow thought you weren't paying attention to what you should be doing he used to stand at the other end of the machine and watch you, he used to throw a 'piggen' which is a four-pint metal container you know for ladling water. He used to throw one of them at you to wake you up. As soon as it hit you it... it don't happen nowadays.

Was he somebody who stood out?

He was just your, you know, your personal 'guider' that's all' You know you could change mates daily you know, 'Go with so-an-so today, he needs a helping hand', - mostly in good spirit you know, there was very little animosity.

Did you have any way in which you could actually you know find out for instance what other people are up to inside the place? I mean the overlookers and so on, were they strict you know in a sense about work or about the apprentices?

No, no, no. As I say it was quite easy going, and there was a - the atmosphere was very good, everyone that works in that dyehouse or ever worked there, I always remember it as one of the best places I've ever worked at, because .they seemed to be a team of people that were thrown together and they just hit it off so well. There was a couple of chaps who were real characters there who you meet now and again, you know. You only want one or two on a shop floor, I mean, it makes the whole day go quickly you know, whatever - the football season, the cricket season, whatever were in off at the time you know, things you used to get - the conversation you know and one thing and another, acting the fool a little bit.

You'd get practical jokes and that?

Yes. Oh aye, where there's hosepipes and water in the dyehouse, particularly in thick fog you know the steams that used to get, you couldn't see who was throwing the water *[laughs]*. You think it's raining in. Suddenly you know there's a fine jet of water coming in over your direction from out of the mist.

What, I mean, just to go back a bit, what was your feeling when you left school now, and this is the first time you've got a pocket with a wage and that? Was the transition very painful?

No it wasn't painful. No I can't remember ever feeling like that because mainly like I say because of the acquaintances if not personal friends that I knew when I went to Listers from there. I seemed to fit in, and it just seemed to be a continuation. I think at the secondary school we were looking forward to making the break because your friends had jobs and they had money, and you couldn't wait for the day when you had money, and a job, a proper job. You felt as if you were grown up when you started work, not like, like today I mean.

What was the - I mean how did you get promotions through, I mean apart from the obviously the regular increments you got in your wage. How did you actually go through the - I mean, you started in the dyehouse, and how...?

There's no promotion on the shop floor itself. It's just a matter of ability, if you can do a particular job you know.

Are there any jobs that are much sought after?

No, no. It's a, what you call it, a chain process, and you know each feed worked from A to B, and it goes from one machine to another and the processing's done in that form.

So, I mean, you stayed there obviously for a long time, I mean if you talking for instance between your apprenticeship up to the Sixties, what kind of changes have you seen in those days - those early days really?

Well, that particular dyehouse that I started working in, there was a fire in about, I think it was about 1970 though, there was a fire, and the whole place was destroyed completely, and this new one was built you know, which is purpose built. The old one just seemed to be bits added on to a good idea that started at the time, everything just seemed to, you know, it didn't fit. The processes you know, they'd take a job from one side of the shop to another to carry another process out, whereas now it goes round in a circle you see. The services and all, the steam and water and electricity all came in through the roof, everything was above ground, and nowadays it's all below ground. It comes up under, you know, through huge grates in the floor, and obviously conditions are much better than they were.

[END OF REEL ONE]

[REEL TWO]

What was the size of the shop, I mean, at that time when you were doing your apprenticeship?

Well the machinery was more varied than it is nowadays. We used to dye a larger range of pile fabrics from toy cloths and fur coats. At one period I worked in the printing department and printed leopard skins for fur coats and slippers, and we had moquettes and quite a wide range of fabrics that were printed at that time; rayon, nylon, draylon. It was antiquated, it was done by <u>hand</u>, and you had a large printing block of wood, a pattern inlaid in copper and felt underneath and a seven pound hammer in your other hand.

This was block printing?

Yes, and the tables were about seven or eight yards long and the piece was thrown underneath the table at one end and pulled taut across to the other, and you used to print down both sides you know, and there was about – what, there - there was about twenty chaps worked in that small department, it was very small at the time, you see it was just an off-shoot of the dyehouse, but as the pieces had to be baked, washed etc., you know it was involved in the dyehouse. I always remember I was there a long period before I realised that there was twice as many men worked there in the printing as there was what you saw, because they worked twelve hours at night, and you never saw them you know, and I used to wonder where all this work were coming from, I used to think 'Bye, they do some work in that printing department.' And when I eventually went in there as a young man about sixteen or seventeen, it was a – each chap had a lad or mate in that department. It was standard procedure, the man did the printing and the boy pasted his pad with colour, you know, it was a felt pad that you dipped the block on to, and that was a, that was hard work, because after about half an hour you didn't lift the block any more, you dragged, you know, you couldn't bend your arm, it wouldn't bend. The use went out of it.

It was heavy was this lifting?

Yes. I've got a wrist now - I can't get a wrist watch on. I think that's with, it must be with that particular job. The strap won't - yes, the strap won't fit round.

How, what's the...?

I don't know, it doesn't look, does it, to you - it doesn't look abnormal does it?

Yes, well I can see that it's a bit overdeveloped just like a tennis player.

It is, that's what I put it down to you know, to that period in the printing, it was about five or six years in there. But you were never a part of the – from the dyehouse, you know, you were always in the dyehouse, sort of thing you know, a dyehouse man, because it was a huge - big family.

Obviously when this was a very old mill, there must have been a lot of old people who worked there for years and years when you were...?

One chap that retired recently, Benny Moorhouse, you won't know him will you? He's from Manningham, quite a character, he lives over there, Heaton Road way, and he started there when he was thirteen and he was sixty three when he retired, and all he had out of that was his war service, about six years, and he - Listers used to produce a magazine every month, in the Thirties and Twenties. It was in hard-back, it was just like a novel, and it cost about a shilling in those days, which might have been quite a lot of money, but it never increased, it was always a shilling as long as they produced it and… I think they subsidised it, you know, it faded out in the Seventies.

Was it produced inside – in the factory?

Yes, and it was donated by people that worked in the factory. Benny was our, Benny Moorhouse being one of the oldest hands, he was our correspondent. He used to report people who retired, you know, and say how they were going on, and people who had emigrated, went abroad etc., or left to go to other jobs, and there were who sung in clubs and all sorts.

And when did that stop?

When this new management took over. It became part of a bigger group, Lister Aked, and they have firms all over have Akeds. I think they bought the name primarily.

When was that?

I aren't quite sure, I think it was in the Seventies, early Seventies.

Did you have any inkling, people who worked in the place, that there was going to be some changes? There was talk about it for a long time wasn't there, before it happened?

It, I would say on the grapevine that somethings going to – but you never find out quite what it is until… I remember when they made the last redundancies, the big change in – what would it be now, about 1978, and we knew there were going to be redundancy, but just how much we didn't know. The shop stewards came back from a meeting with the management, and in the finishing department fifty seven men went, just like that, and we couldn't see how it could operate with fifty seven men less, but it has done.

When was this?

About seventy eight, that would be.

That was quite recently?

Yes, but you see they've reduced the processing of the pieces after they've been dyed by increasing other processing, or you know, better preparation prior to dyeing so that it's all done before it gets to the finishing department. At one period they used to soften the pieces, and you know, and finish them, iron them, you know, there used to be electric irons and all sorts of things, but they've just disappeared. They go through a dryer now, through a card which lifts the pile up, because its laid in one special direction you know for every process, and the pile's lifted back up again, and goes into the warehouse, it's finished.

Just to go back a bit, when you were talking about Benny, I mean did you have much togetherness between the older people and the younger people like yourself?

Yes, there's always been that atmosphere on the shop floor there. Trips we used to have you know, organise shop floor trips to the seaside and to the races, and you know, any things that interested – you know, chaps used to go on fishing parties together, or to football matches particularly, you know, to Manchester and Liverpool, watch the big boys play, you know, and see what we have to put up with in this Third Division stuff.

Who organised them?

We just used to organise themselves you know, more or less, just someone, just off the shop floor, they'd say, put a notice up you know on the notice board, and if they got enough names, say more than twenty, then they'd hire a bus, but there was no... nothing done through the management, as such anyway.

And were there people in the dyehouse like yourself, were they, I mean, consider themselves as a shop separate from the rest of the mill?

From the rest of the mill, yes. It was a - an elite sort of thing to be in the dyehouse, I don't know why, because it was always a dirty job, you know, your clothes were always tattered and that, presumably the chemicals you know, because a pair of trousers now don't last me six months. They just literally, I've some new jeans at work and you can take the bottom, you can pull it off you know, like that, and you've to be careful when you wash them else your legs fall off at the bottom. It's just through you know, carrying buckets of chemicals and that, just rubbing against your trousers all the time, and you can't wear protective clothing because you wear it too long and it really makes you perspire, particularly rubber and what have you, you know. I wear rubber boots which are better than Wellingtons. There's less water now than there used to be on the floor, but it still splashes about you know, you can't work in water and be efficient and not make a mess, you've got to – to move along.

And you were in the – I mean you were in the union, the shop was?

It's a closed shop you know. After I was there about four weeks, I was approached by the shop steward you know. He said 'Do you think you're going to stay? Would you like the job? If so you must join the union', and I've been in ever since.

Throughout that period was there much union activity, I mean in the early days?

No. The only dispute I remember was the one that didn't involve us directly, which was at Denby's if you remember? That was in the early Sixties, and we supported them with their collections, and pickets and one thing and another.

But they didn't win?

No, we lost. We shouldn't have lost. We all know now what should have been done, but of course at the time we marched from Bradford to Shipley, and they'd a meeting in the Town Square, and there was you know, the union officials that were going to tell us what actions to be taken, but the action that needed to be taken was left too long, you know. The only way was an all-out strike, and close all the textile mills, because it was – in the old days they were owned by families were the mills, and the family made a profit and the family were happy, but nowadays they've to account to thousands of small people, investors, and if they aren't doing well, I mean their jobs are at peril. It's –I think it's the beginning of the vicious circle is – profit motive.

I mean you didn't obviously, I mean, there wasn't much union activities in terms of strikes and so on?

No, no.

I mean the union used to represent you in...?

In disputes, yes.

What was the thing that as dyehouse workers, what was the type of dispute that came up on a daily basis?

I remember one particular – a chap had been told to dry some pieces...

[END OF SIDE ONE, CASSETTE TWO]

...dye for some reason doesn't settle in the pieces, it runs off you know and if it's left in the roll or in a cart it'll run straight to the bottom, so you'll get, you know, varying shades. And this chap, you know, normally his job, first thing he went – he had to dry these reds, but he'd been told to dry some other pieces, but he thought 'I'll finish the reds first and then I'll dry the others'. But this foreman you know was adamant and 'Down the street you go' you know, which is –he were doing what he should have done and I remember I think I lost a week's holiday pay through being on strike, and I was on nights, and I finished on the Friday morning, well the Monday night, I broke no time, but I lost a week's holiday pay because they went out on strike on the Friday morning and they returned on the Monday night, well on the Tuesday. But we went to see the stop steward Monday night. He said 'You can return to work, we're starting again in the morning. The dispute is over'. So that was the only period that I've been on strike.

Which was over a weekend?

Yes.

When was that?

About sixty one or two, yes.

And that was over that particular sacking?

Yes. He was re-instated but you know, it was just a moral issue. He'd done what he thought was right, and I think the foreman had got out of the wrong side of the bed that morning, so you know – *[laughs]* – sort of 'Do as you're told', you know. They'd always this attitude of, you know you'd say 'But I thought I should have…', 'You're not paid to think'. *[laughs]* And then they'd say to you 'Don't you think...?', you know you could strangle them sometimes. *[laughs]* 'I'm not paid to think'.

BREAK

I mean, speed ups or…?

It was mainly re-processing you know, where jobs were being re-manned you know, to speed something up, or a new process had been brought in. Those were the main things where the… and particularly if a job wasn't earning much, piece-work, they'd take a man off the job and put him on another job and put a boy on it in his place, so that the boy would be earning the man's wage, but drawing a boy's, and the remainder of that went into the set, and it was sort of distributed then amongst, you know and it lifted everybody's wages accordingly, just a few shillings at the time but it was a, it was rip-off – progress I should say. I remember one particular wage deal, about 1960, and we sacrificed a cost of living index that we were on, a cost of living index where as the cost of living went up, so did our wages, for a three year package deal, and the increase was a day's holiday and seven and six a year extra, over three years, and as I say it was about twenty one shillings and sixpence, which is just over a pound isn't it today, and three days holiday, and that were a three year... Can you imagine them getting away with a three year package deal like that nowadays? A pound spread over three years*[laughs]*?...It doesn't bear thinking about, does it?

I mean apart from – I mean you've obviously spoken about the changes, what kind of changes at the beginning in the processes were taking place?

They're basically the same but the chemical element has changed insomuch as they know more now, you must just imagine, and they seem to go into it in more detail to find out just what effect the chemicals have. You know, that's one of the faults of the shop floor is that the man that's using the chemicals doesn't know just what's, you know, what happens when he puts them into the machine, and if you try to find out you're encroaching on their territory. 'You shouldn't know, it's my territory is this, I'm the brains here and you're the brawn', and it's... it's this dividing line, you see these chaps they're all - same as me and you - they're only working class, and when they put that white coat on, why they have to step across that line heaven only knows. They become 'them' and 'us'. We'd one foreman at work and he goes mates with the lad that minds my machines at night.

He used to work there?

He still works there now, he minds the jigs at night that I mind during the day, and this foreman - and they're best mates, but he says 'You know occasionally when we're out the arguments get a little bit heated, he's at the other side of the fence you know'. And he says you can't understand how I think 'Why don't you and why don't you do this and that', and if there's no - if work isn't involved they get on fine, they're just good mates. They play snooker together.

Was he promoted from...?

No, No. He came as a dyer, and this friend put him wise you know 'They're looking for a dyer at Listers', and they were good mates before he started working there, and you know, they have to be at the other side of the fence…

A0006

Interview Number:	A0006
Sex of Interviewee:	Male
Date of Birth of Interviewee:	1940
Interviewer:	O. Howarth
Date of Interview:	22nd November 1983
Period Discussed:	Mid - Late Twentieth Century
Abstract:	Work at Foster's, Queensbury; currently working as a spinning overlooker; relationships within the mill

...That's where Foster's first started up. Or one of the first-places they started up. Er... then they built Black Dyke Mills.

And your mam worked in the mill a bit?

Weaving.

Was it on and off- part-time?

Part-time, yes. About nine till four.

Yes, yes. Did she have any other interests apart from church, you know - in the community - you know - owt like that?

No.

And did she just work while you were at school, like? She didn't - you didn't stop with anybody- you know, your auntie?

Er... no, we were never farmed out. I can remember odd times being left with a woman for an hour or two if she went shopping or owt like - if the weather was bad...

BREAK

Was it easy to get the apprenticeship?

Er... aye, yes. My uncle applied to the manager, and I were told I'd have to go and do some labouring first, six months labouring, to see what was what, sort of thing, I suppose to suss you out a little bit. They reckoned they didn't start it until you were sixteen, and I were the jobber lad in the reeling department for about six months.

And then when I come sixteen, er... they had me down in the office for an interview and a bit of a mathematic test. Well, I've always been decent at mathematics and stuff like that, well, I passed that test, and they just telled me. They said to me one day, 'Right,' he says. 'You can go with Arthur Oliver now and start serving your time as an apprentice overlooker'.

Oh, that was when you moved to the mill? When you left joinering?

Aye.

How much were you paid there?

I think it were about two pound - two pound odd a week.

This was at Foster's.

Yes. It was less money to be an apprentice than what it was labouring. Your wage dropped, because labourers got a bit more money than the apprentice. It wasn't a lot. I think about two -two or three pound a week.

Did it go up every six months?

Oh, aye, it kept going up, but then when you come twenty-one, like, that's when your wage went up a lot higher than the labourers.

Is that what you wanted, that job?

Well, no, I didn't... No, as I say, I went into it blindly. I just sort of - I just learned the trade. It wasn't a bad job at the time. It's got worse. The pay's eroded. It used to be a well-paid job at one time, as regards other trades, but it's eroded slowly as the years has gone on, because textiles are diminishing.

Which department were you in when you started?

Spinning.

How many people worked in there, in that department?

Er... well, they're all big rooms like. Some of the rooms are as long as a small street. There were two overlookers to a room - they had half each.

Did they each have an apprentice?

No, there would be about two to three apprentices throughout the mill in the spinning department - spinning and drawing together. There were more apprentices then than what there is now. They perhaps… they carry about one now, whereas at one time they used to carry two or three.

Had you further to go to get to Foster's from where you lived than the other job?

Oh, yes. Yes. I'd to catch a bus. I used to go on a bike, but if the weather was bad I used to go on a bus.

How many hours did you work?

Forty-five, standard week.

Did you work over at all? Did they..,?

They wouldn't let you work over when you were an apprentice, unless… something had gone wrong that appertained to that sort of a job, and then they let you work over, which was only occasionally.

But once you were out of your time you could?

Oh, yes. Well, you were more or less expected to.

What - on piece work or hourly or...?

Oh, no, there was no piece rate. It's er… it's all this time work, you know.

We'll leave that one for a minute. Right then. Who was the first overlooker you worked for?

They called him Arthur - Arthur Oliver.

What was he like to work for?

Oh, he was a keen fellow, you know. Strict, but er… he did tricks himself, like. Nobody had to do the same tricks as he did.

Such as?

Well, nobody else had to smoke but he went smoking. And... er, he used to nip off down to the end of the room for a kip, and I'd to bang on the steam pipe with a big key when the gaffer came in. Of course, he was sixty-three. He was nearly ready for retiring like. He was losing interest, only about half of the room running. They were winding it down and putting new machines in, like, so he wasn't right bothered. He was just marking time till his retirement. But he was awkward - an awkward fellow to work with.

Did you learn a lot from him?

No, nowt at all. No, he was - he was more or less - if we weren't doing any work or owt like that, he were more or less 'calling' - or not bothering about owt, really. He was getting to the end of his tether.

And how long were you with him?

About six months. I told the manager, like - I was getting nowhere with him. I realised this. I knew I was getting nowhere with him. I mean I wasn't picking owt up; he wasn't showing me nowt nor nowt. He just showed me how to do the donkey work and then he had me doing that, you see. Well, all the calculations for the wheels on machines and, you know, a bit of commonsense stuff, er… he didn't want to know about, you know. And then I went - after, I finished with him I went with another chap who'd been an apprentice with him and he just said the same as I did, like, and this chap was a lot older than me so he said 'He's always been like that. A bit of a funny sort of a chap'. Then when I got with this other fellow, like, I seemed to go leaps and bounds, because I could talk to him, you see, and he'd talk to me.

Was he nearer your age?

He'd be about fifteen year older than me, at the time. He'd be about thirty when I was fifteen or sixteen, he'd be about... aye. And I used to get on right with him, like, and I got plenty of donkey work off him, but also learned quite a bit, because he was a good man at his job. He just knew every nut and bolt on the machines and all about them, you know.

How long an apprenticeship did you serve?

Till I were twenty-one. I was with him about eighteen month and then I went with another chap who was - everybody in the mill had, was afraid of this fellow. He used to - he used to land out at folk. I've seen him many a time take hold of the jobber-lad and take him into the motor-hole and leather him - with a belt - and deny it when he, he'd done it. Aye, they were all frightened to death of this fellow, he were a tar-tar. I got on all right with him like, he were a very knowledgeable overlooker and nobody daredn't do no bad work under him - they'd have got it stuck down the back of their throat.

And, er… he used to treat you as an apprentice, did this fellow, because if he ever went... if he ever had to go home early, which he used to call at the hospital sometimes, he had a bad back - you were in full authority when he'd gone, and he insisted that you were in full authority and, you know, anything that cropped up, the women had to come and see you. Probably you were only about sixteen or seventeen year-old and you used to have to sort of either say well, wait while tomorrow till he comes... or do this, do that, do the other, and they were more or less told that they had to do it. There were no such thing as saying he's still the apprentice lad, like, we'll muck about while morning till Tom comes.

It would help you then... to manage people?

Oh, aye, you got... you got the sense of authority and that's what the job's all about. I mean, I can suss folk out in two minutes now - their character. I've had some right band-enders over the years. I've had all sorts of…

What did you call them? Band-enders?

Aye, lads out of homes - well, some of the lads out of homes ought to be in them, er... lads that come and done wilful damage. You know, when you interview them you can more or less size them up straight away.

Why - to stop the machines…?

Well, at one time I'd three lads in a room at once, er... one of them come out of Westwood Hospital. Well, he were a good worker, like, but you'd to be you know, he'd no brains, you'd to be behind him all the time, but he did plenty of donkeywork. He was strong in t'back and weak in t'head. And, er... then I've had old pensioners and stuff like that. Some of them's all right, like, just steady as you go sort of thing. Old cocks that's got to the end of their tether, like. I've had some other lads, you know, eighteen or nineteen, been good workers and a bit of brainy - them with the brains you give them hardest… you know, not the hardest job, like, but job with the weighing off and stuff like that.

When the women were on piece work, a lot of years ago, like, these lads used to weigh off and then it were imperative that the weights were accurate, both for your own production records and for the lasses' wages, you see. They were paid so many - oh, it were a daft way of working out, really. It worked out so many pence per thirty pounds they produced, instead of it being - same as now would be pence per kilo, which is a better way of working, it were so many pence for thirty pounds.

Do they still have piece work?

No, it's all been stopped.

Why was that?

I don't know why. Er... it can create bad work with rushing and pushing and er, skimping things to try and get more weight off. There are no two ways about it, production were higher than what it is today, I do believe, but I don't think the quality was just as good as it is to-day. The quality is a little bit better because they aren't rushing and pushing the same.

Did it cause any jealousy, like, amongst them, one getting more than another?

Well, it did but they could do nowt about it. I mean, if they all got the same sort of stuff, it were up to them. I mean, I've had do's with lasses who's complained about their wage being down and I've had to say 'What do you want us to do then? Give you some brass for nowt, because you don't pull your weight same as the other lasses do?'. Oh, I've had a few do's with a few lasses as has been brought to tears over the years with wage jobs, you know. I aren't getting this and I'm getting t'other, and falling out and stuff, and you'd to crack the whip a bit and bring them into line...

How did you feel... Were you made an overlooker when you were twenty-one?

Yes.

In the spinning?

Yes.

How did you... Can you remember how you felt when you started?

Well, you're a bit... you're buzzing with power. You know, you're only twenty-one, like, and all of a sudden you're gaffer over all these women, and you're dealing with the manager when he comes round and he brings you the orders and stuff like that, and you get while you decide how many machines to put on what order to get so much weight out for a week, and just doing a bit of jiggery-pokery, like, and keeping everything tidy and make sure the work is done right and people keep the machinery clean and you maintain it - or if you don't maintain it you get a mechanic to maintain it if it's a biggish job. Basically, overlooking is fine-tuning machines. If owt breaks big, like, you get a mechanic to see to it. But it doesn't make any… you can't do it, I mean, sometimes you work with the mechanic a bit and do that sort of thing and generally just keeping things…

[SIDE TWO CASSETTE ONE]

...when you're the gaffer over them, like, and if there's any misdemeanors you tend to be a bit harder with them than what you are when you get a bit older, and then when you get a bit older you realise you were a bit hard.

A manager once said to me, he says, 'You can sack them quicker than I can start them,' and I just says 'Well, set some right lasses on that can do the job instead of sending all this crap that you're wheeling in'. I says, 'There's some of these lasses, they'll never make spinners or twisters or winders as long as they live. They haven't got the ability. So I've got to get rid of them and get somebody else that's decent otherwise the place is going to be full of a lot of rough operatives and we're going to get nowhere, you know. We're declining.

Were you prepared to make concessions if you got a good spinner? I mean, to keep them?

Oh, aye, you couldn't give them owt for nowt, but there were times if the job didn't seem so good, if they were working hard and getting nowhere, I mean, you could get studying and have the piece-rate reviewed. And in a lot of cases, like, they'd take notice of you. They might just put it up a few decimal points. Over the week, like, it would give the lass that little bit more brass. Or if it were an exceptionally bad job, well, it were treated as such and then you got a special piece-rate just for that order weight only, if it were a thousand pounds you paid a certain rate for that thousand pounds, irrespective of what else were following it, like, I mean, it might have been another run number that followed it. That other number might have been a lot better job, so you had to go back to your old piece-rate, like, but for that particular job on that particular run number you could get a special piece-rate, so that meant the lass didn't lose out. She were working and she were getting paid.

But it were all... all the piece-rates that they employed, like, were all fair, Er.. providing you kept an eye on things, and if you saw a lass were working really hard and getting nowhere, well, obviously the piece-rate wanted adjusting. And then sometimes I've seen piece-rates come down. They've brought piece-rates down, but not often, but on the other hand, I would say there's more gone up so in all fairness it's a matter of everybody's done about the same amount of work, and if they're doing the same amount of work they get about the same amount of pay irrespective of what they're on, if they're... Then when you come to a really tip-top operative who's what you might call above average, she'll probably take... er, take a bigger overload.

So... did the bosses back you up, like, if there were any bother with piece-rates and all that? Did they...?

Oh, aye, yes. In fact, they weren't really brought into it. You just got onto the work study department, and they sorted it. But the manager always got a copy of what had gone on. You know, he wasn't kept in the dark. I got a copy, they kept a copy, and the manager got a copy of what had been altered. Everything were...

Nobody put any pressure on you or owt? You were just left to manage...?

Yes, yes. Oh, aye. That's one thing good about Foster's, like, I mean, they leave you to do the overlooking. You know what I mean. Basically all you want is the operatives and the orders, and they more or less leave you to do it. Er... you might... you probably have written on the order paper how many... how many, kilos a week they want delivering, and if it's a fair sized order and this, that and the other, or week numbers on, and you just use your commonsense and those that's urgent you get them our first, and er... then occasionally you get one - you get one that's got to be sort of flown round, so you've got to make adjustments and take some of these other orders out and get this one in that's urgent. Some folk can't wait for their stuff.

I believe you were offered promotion, weren't you? A bit since? And you turned it down? Why were that?

Aye, aye. I don't want that job. It's a bloody disease, is that that they have.

What were you offered?

Assistant manager, 1970. But the chap who was there, as I said afore like, I couldn't have worked with him. I couldn't work in close proximity to him. I mean he'd crack me up. He's just too much, you know. Er... he won't let them get on with the job. There's too much faffing about, and... well, this is my opinion, like. Mind you, it's other folks opinion and all like, but this is the way he works, and that's it. He's the gaffer, and that's it. But er… I didn't fancy the job at the time. Too much hassle, and I don't want all that hassle, not for the brass I get, anyway. They don't get enough money for all that hassle.

What about trade unions? Were they... was there any involvement in trade unions?

Oh, aye. Union man has been a time or two, but biggest part of the overlookers weren't in the union. I mean, union were about as strong as that water that comes out of the tap. It'd more or less side with them. Oh, it were a poor do. It were a waste of money paying into it, and I don't think - I don't think there's above two overlookers in that mill paid into it. It's a bit different now. I think there's a little bit better representation now, but even then there's only half of them in it.

Did... what... did you do your own negotiating?

Oh, aye. We've got a spokesman out of us... I've done it three or four times... and go and see the director. And put your cards on the table with him.

And what was his reaction then?

Well, sometimes he'd agree with what we were doing. They were never you'd to fight them tooth and nail for some extra brass like, or to get the rate altered. They once put us on a bonus scheme, and bonus scheme was such that if a lass stopped off, you lost money. Well, you couldn't help them stopping off. I mean, if they were on a doctor's note or badly, they were going to have to be off if they aren't so well like. But it also, there were a clause in it, if -I mean, you could have come home for your dinner, if the time-clock got bust at dinner-time with some lads laiking about on the landing they penalised the overlooker nearest to it. Lost your bonus with the time-clock getting broken off of the landing, and you might have been down home to your dinner. There were a man supposed to walk round at dinner-time seeing that there were no vandalism being done. But we got that stopped. I never thought they'd stop that, but we got that knocked on the head.

In all the time I've worked there, we've only been on strike once. We once walked out at dinnertime. And I went and telled the managing director about eleven o'clock we were going up the yard at dinnertime, and he didn't believe me. But he did when he come back from his dinner, when all the place were standing. But I mean, we'd to really push him to get any sense out of them. They were just not budging at all, I mean to say, when we got this bonus scheme, this bonus scheme were a thorn in everybody's side, because... it was so hard to attain the maximum - and I think it were only fifty bob at the time. It were about fifty bob - mind you, wages will have been in the region of about fourteen or fifteen quid a week. Well, fifty bob like, was a little bit of an incentive, I suppose. It were - you know, it was about a seventh or an eighth of your wage, Er... we once got - we got a service bonus. That started off...one of the Foster's said that anybody who worked there over twenty year - this is overlookers only - could qualify for twenty-five bob, it were twenty-five bob then. Twenty-five bob for twenty years. Which when it came out wasn't so bad. Twenty years hence, it's £1.88 at this particular time. That's how much it's gone up. Now I've calculated out, that if it had have kept pro rata with the wages, it should have been about eleven quid to-day, should the service money, and it stands at £1.88, and it's only gone from £1.25 to £1.88 this last six months because we've been nattering about it.

And they give a... I'm on the maximum with being there a fair while like, but it's one pound - one pound twenty five, I think, aye, one pound twenty-five and they give us a fifty percent increase on one pound twenty-five. And some of the chaps who have been there ten year get 75p. Now that's a bloody insult, isn't it? It's an insult to a tradesman is seventy-five pence. When you've had your stoppages off that it wouldn't buy you a pint of beer.

No, at one time, this overlooker I was with, this old cock, like, he used to work this money out - this service money, and he said it bought him his beer from Monday to Friday, going back so long, you see. He said it were a good thing when it first come out. He said, it bought me my beer, he says, when beer might have been eight-pence a pint in old money. And today, in 1983, two or three pints what? - three pints, it'll buy you three pints, and Fred used to reckon you could have two or three pints every night, Monday to Friday. It were enough to pay for your beer during the week, because you went every night, like. But it's a bloody insult is what we get now. It is, it's an insult. In fact, I shame telling anybody…

A0009

INTERVIEW NUMBER:	A0009
SEX OF INTERVIEWEE:	Male
DATE OF BIRTH OF INTERVIEWEE:	1921
INTERVIEWER:	I. M. Horbury
DATE OF INTERVIEW:	24th November 1983
PERIOD DISCUSSED:	Mid - Late Twentieth Century
ABSTRACT:	Work at Lister's, Bradford, as a reed maker; experiences as an apprentice; wartime service in RAF; relationships's between management and Unions

…So then I thought, well I'll have a walk up to Lister's, and see if they've got anything there, you know. You could walk up to Lister's then any time and get some sort of a job, you know, so I went, anyway, and saw this chap, a Mr. Webster. He were a big, long, gaunt-headed… he were the sort of welfare officer, you know, which they had in those days. And I telled him the tale, and he says 'Well,' he says, 'I've got a nice little job if you fancy it,' he says, 'In the reed-making shop'. Of course, I didn't know what a reed-making or anything about it. So he said, 'It's a good job, you know'. He said, 'It's skilful, a skilled job'. So I said 'Okay, I'll give it a whirl'.

I'll never forget when I went in that place. You can just imagine going in a place - you've never been in a weaving place before. Great big, vast area, big as a football field. Well, two areas as big a football fields, with about six hundred and sixty looms, all batting away, all at the same time. All shuttle looms, which make a lot of row, you know. Deafening! Anyway, this shop that we had was a little bit away from the weaving, sort of on its own, and this old chap come - well, he seemed an old chap, but when I look back, he were only about forty actually, you know, but they seem old when you are young.

Willie Penny. He was just like a second father to me. He was a grand chap. He's long gone now, of course. And he said, 'Now then,' he said, 'You're going to work with me, and I'm going to show you what to do'. He says, 'We'll get two things clear. First of all...'*[telephone rings]*. Sorry about the 'phone call.

Anyway this chap says to me, two things that he didn't want, that was cheek. He said, 'I've got a son and a daughter of my own,' he says, 'and I don't have any cheek off them, so I aren't going to ' have any cheek off you'. I said, 'Fair enough,' like. And the other one was tidy, be tidy. He said, 'Whatever you do be tidy'. He said, 'A tidy workman, a tidy job'. I always remember that, you know. I keep saying to my lad sometimes, 'A tidy workman, a tidy job'. He doesn't take much notice, like, but... So I started with him. There were two or three other fellows as well, you know, but he was sort of my mentor, shall we say. And that was it, we started off from there.

Was it a proper apprenticeship?

Yes, Oh yes. It was in those days. It isn't now, I don't think. It's like a lot more jobs, it's the skill's gone out of it, you know. I mean, then we used to have to start fight from the beginning. We used to have to roll our own wire, do all the workings out, and make them more or less... well, not by hand, but we had a machine that made them, that just... When you come to look at the modern machines now, I mean, they're just ludicrous, you know. We used to go 'Chunk, chunk chunk, ching', like that, ever so slowly, and then you used to have to set up all your own gears and everything, well, now you just work it on a dial and a clock and that's it, you know.

How much did they pay you when you started?

Well, I'd got a rise by this time. It were ten bob a week. Ten bob to start with.

And what hours did you work?

We worked from - er, at that time, quarter to eight, we started, till twelve o'clock, quarter to one to quarter past five. That were five days, and then we worked from Saturday, quarter to eight until twelve o'clock. Half-past eleven they used to knock all the machinery off, and then they all used to be cleaning the machines. Used to all clean their own machines at that time, you know. You'd see all the women there, scratting about with their brushes and such like.

How long was your apprenticeship?

Well, I were just sort of knocking on steadily then by the time I was eighteen - I'd been there about three years, and of course the war came, you know. The second war, not the first. The second war. So off I went and joined up, you see. So that sort of brought my apprenticeship off then.

Can you remember anything that happened to you in the first few weeks you were at Lister's?

Oh, yes, we used to have some great fun. I remember the - er, I don't know whether I ought to say this on this thing, but the toilets in those days were pretty primitive, you know, and they weren't flush toilets as they are today. Sort of all the toilets were in a line and a sort of a channel ran underneath, with the water running through all the time, you know, a continuous flow of water, and when we were kids we used to make paper boats and we used to set them on fire and float them down these channels, you know, and then the feller, he'd be chasing us all over the place.

But there used to be a lot of characters there. You know, there don't seem to be any characters these days. Nobody got much money but I mean there were, you'd a lot of fun, you know, and a lot of girls there and a lot of people worked there then. They seemed to have everything going.

What kind of things did they have going?

Well, they'd dramatic societies, they'd... everything, camera clubs, football teams, cricket teams, ladies' hockey team, you name it, they had it, you know! Somebody were organising it. All in their spare time, of course. I used to play in the football team.

You'd played for Lister's?

Oh, yes. They had a team in the Nig-Nog League. I played while I were about sixteen, and then it went up in - a bit higher up then, and of course when I went in the Air Force, then I had to give it up. I played when we came back.

You enlisted for the Air Force, did you? You weren't conscripted?

No, I volunteered - when was it? - 1940, Yes, about June, 1940, when I went.

What made you do that?

Well, I suppose it... I won't say it's patriotism because that's a load of bunkum but I think it was just because I felt like a change, you know, when you're eighteen you're thinking, Oh, I'll get off and get away from home and such like and so forth. I think that's why, really.

And you wanted the Air Force?

Well, I thought if I'm going to volunteer I might as well volunteer for something that's reasonable, you know. I didn't fancy the army, and navy, you couldn't get in at that particular time. I wouldn't have minded the navy. But you couldn't get in. They'd sort of abandoned the recruiting for it, for the time being, so I went in the Air Force.

What did you do there?

I was a fitter-armourer. Fitter-armourer there. Quite a good job, actually. I mean, they're all in groups, R.A.F, groups, and it were Group One, which was the highest paid, which paid about eleven bob a week at that particular time. That were the highest pay.

That was more than you had been getting at Lister's?

Oh, no, by this time I were I was eighteen. I was getting more than that. I just forget what I was getting. Maybe about thirty-five shillings, or something like that. You know, in proportion to what they are today, it's just ridiculous, isn't it?

BREAK

...And then when they'd got all the string on, they were just sort of loose, there were no body in them at all, then you used to have this big tank of pitch, you know, pitch like they use on the roads, and you used to dip them in, just at the edges where the string was, dip it in, clamp - you'd some clamps to hold them with, dip it in, then you'd turn it over and dip it in the other one, and then leave it to dry. Well, it used to dry solid then, you see, pretty solid. Funnily enough, though, we used to have this tank. People used to come from all over the mill just to sniff it, you know. Like the old tar wagons that they used to have on the road, that they used to hold their babies over when they'd had whooping cough. Maybe you won't remember that.

They thought the fumes from the tar did them good?

The fumes did their chests good, yes. They used to come from all over with bad colds and that.

From all over Lister's mill?

Funnily enough, I can't ever recall having a bad cold there. I don't know whether it were owt to do with it. Or being poorly or anything like that, you know.

What were the conditions like to work in?

Well, compared with now they were terrible, I suppose. I mean, toilets were... no doors on the toilets, not proper doors, just half a door, you know, and if the boss thought you'd been up there too long he used to come on and he could just look over the door and see whatever you were up to, you know.

And then they had some what used to be for the children, children's toilets, you know, when the children worked there. It must have been a long time ago...

Oh, old toilets from..,?

Old toilets that were specifically for the children, you know, and they were right little narrow things. Right peculiar little toilets they were. You know, a fully-built bloke or a big chap he couldn't have hardly got in, you know, only backward, but they were specially built for the children at that time.,.

Were the seats low?

Yes, the seats were low and the cubicles were only very narrow, you know.

Separate cubicles?

Oh, yes, they were separate. No doors on, but they were separate cubicles.

Were there many of those?

There would be about half a dozen where I worked, just about half a dozen. I don't know about the rest of the mill, you know. They were probably all over the mill. Anyway, they did away with those just after the war. But they still had the old toilets, and the dirt… a lot of dirt, you know, a lot of dust flying about.

[SECOND SIDE OF FIRST CASSETTE]

And a lot of noise. I mean, nowadays, you get earplugs to put on and earmuffs, and the toilets are all new. A lot better. I mean, you'd no facilities for washing much. They had a sort of a big, square thing with a sort of a trough with a lot of taps where you could mash your tea or wash your hands either, you know either way. I'll tell you what they used to have that I thought was quite a good idea, they'd two great big ovens, you know, mind you, I'm going back now before the war - two big ovens, and you used to get - maybe take a couple of potatoes and a bit of steak or something, you know, and a tin and give it to this woman, the cook, like, and she used to put it in for you and cook it, you know, for your dinner. No canteen or owt like that, I mean, you just take your meals wherever. We were pretty lucky in this reed shop, because it were on its own, but most of the weavers and such like, they just simply had it where they worked, you know, or they might have a little bit of a makeshift table or something among them.

This was before the 1939 war?

Oh, yes. This was before the war.

But you were saying earlier that they had all these social clubs?

Oh, yes, they still had those, yes.

And no canteen?

No. They had a sort of a place where they used to have dances, and such like, you know, but it wasn't a canteen with a lot of tables where you went and had your meals and anything like that. They used to have dances in... fourpenny hops, we used to call them. It was fourpence to go in. They had a band and everything. I used to right enjoy them, you know.

Who organised all those functions?

The people that worked there. I mean, there wasn't any help from the management or anything like that. All the things that were organised were organised by the people themselves.

And financed by the people themselves?

Oh, yes.

How did they finance them?

Well, with a football club, we used to have a bit of a pay so much a week, you know. About twopence or threepence, It wasn't much. And you used to provide your own shorts and boots and that. I think they provided the shirts, you know. They used to do it all themselves, like the Dramatic Society used to maybe give a play three nights sometime, and what they took in the admissions that, you know, would sort of keep them going. And then every year they used to have a pantomime, and that was the same, you see, it was financed by the people that paid to go in and watch it.

When did they get a canteen?

They built that during the war. It was there when I came back from the war, you know. It was a nice canteen, and you used to be able to get a good meal for… I think it was fourpence then. Twopence for a pudding.

The management subsidised that?

Well, in the war it was subsidised by the Government, wasn't it, for this what-do-they-call-it?… these meals that they used to put on during the war. I've forgotten now what they called them. Oh, it was subsidised, was that. In fact, it always has been subsidised, the canteen. But it was a real good do. And then, this Willie Bennett, this old chap I used to work with, he took a keen interest. He was the secretary of a football club, and he was secretary for this and secretary for the other, and he used to put lunchtime conceits on, you know. And they used to get... all people that worked there that fancied they could sing or whatever, you know, and they used to have these lunchtime concerts about maybe every, other week, you know, and they used to be doing their stuff on the stage. They had a - by this time they had a proper sort of theatre and canteen, you know.

This was after the war?

Oh, this was after the war, yes,

Can you remember anything that the company financed? Any social event?

To be quite honest, I can't, no. They let them have the football ground and the cricket ground and the hockey pitch. They all belonged to Lister's. Well, obviously, they didn't have to pay anything for those, but I can never remember them financing anything.

Did the company make the hockey pitch? Did they pay...?

They didn't actually make it. I mean, it was just a series of fields, you know. Up Scotchman Road. You might have seen them, I don't know. I know the football pitch wasn't too bad, there was a slight slope. The cricket pitch had a slighter slope still and then it dropped down to a hockey pitch. But it were on a slope all the way down, but I don't know how they did it, but the... er, they got the - you know, during the war the football pitch and cricket and that, it all went by the board, you know. There weren't the lads to play, I suppose. And... er, I remember after the war they decided that they'd start another football club. By this time the hockey job had vanished, you know. And I remember us all going up, all those who were interested, and doing the field ourselves, you know. I mean, it had got in a bit of a bad state by that time. It had been neglected for four or five years. Picking all the stones up and cutting the grass, and such like. We did it all ourselves, and I don't ever remember any help at all from the management, you know. None whatsoever. We did it all ourselves.

Same with the cricket club. Well, they did it all. In fact, now it's a beautiful cricket ground, now, but they've done it all themselves, you know. They haven't had much help at all from the managements.

What were the wages like at Lister's?
Well, when Lister's... Lister's was a great place to work - if you could afford to work there! This is what they used to say. I mean wages in... I hope this isn't all going to go down, is it, you know, Is it? Inasmuch as compared with other firms, they were never as good, you know. But as I say it was a good place to work if you could afford to work there, because all in all it were happy times, you know. We used to have a bit of fun.

Well, since this last year or two, all that fun seems to have gone. Now every... you know, especially with this recession and suchlike, everybody's more frightened about their jobs and how much they can get out of it, and whether they are going to get fired or what, whether they are going to be made redundant, you know, and all the fun's gone out of it. There's no characters now. There used to be loads of characters. There used to be one old chap there, he used to sweep up. They used to call them 'muckmen' in them days, with the muckpan. He used to just collect all the muck up. And... er, he was a brilliant violinist, this bloke, and a brilliant poet, as well.

What did they call him?
David... er, in fact in an old magazine there's some of his poems. David Watson, Brilliant violinist. Bachelor. He was an old chap then, you know. Oh, you'd all sorts of characters. One chap there, he come with a baby pig one day, he'd bought somewhere, you know, and it got away in the weaving shed. He were chasing it all over the blinking weaving shed, this little pig. And he were another right character, you know. But there's no characters now. As I say,

everybody's just intent on getting as much out as they can, and that's it. There's no dramatics, there's no nothing now. They have a football team but it's remotely connected with the place now. I don't think any of them work at Lister's actually…

A0035

INTERVIEW NUMBER:	A0035
SEX OF INTERVIEWEE:	Male
DATE OF BIRTH OF INTERVIEWEE:	23rd November 1938
INTERVIEWER:	R. W. Jones
DATE OF INTERVIEW:	19th of January 1984 & 26th January 1984
PERIOD DISCUSSED:	Mid - Late Twentieth Century
ABSTRACT:	Apprentice weaver at Taylor Shackeltons, Bradford; also apprentice finisher at Salts Mill, Saltaire; duties as an overllooker and relationship with weavers; some information on Bradford & District Power Loom Overlookers; work at Keighley Technical College as a weaving technician

Did you have to do evening classes and day release scheme and...?

Yes… for the first two years I went to Shipley Institute of Further Education, which was at the back of the Victoria Hall in Saltaire and one had to go two half days a week and three nights. Now that wasn't too difficult for me because by living up Wrose one could catch a bus into Shipley *[yes]*. It became increasingly difficult, because from there, after the third year we had to go to Keighley Tech., that was partly because at the time, under the old system of education, we lived in the West Riding and therefore we weren't allowed to go to Bradford *[ahem]*. I must admit I did approach the management and ask them if I could go to Bradford, because it was far easier, it was only one bus journey, but because, I suspect, they got grants for allowing their apprentices to go to school, from the various local government agencies, that they insisted I went to Keighley. There was, to some extent, a degree of common sense in that, because the staff that manned the Shipley College, were also part of the textile department at Keighley, so there was that degree of continuity *[ahem]*, but it was very, very difficult for me... er... I had two bus journeys and college started at quarter to seven, I didn't finish work in the evening whilst quarter past five. I had to leave work, go up home to Wrose, it was literally a quarter of an hour in the house to get changed, collect books and have a snack and dash out and catch the bus back into Shipley, to then catch the bus for Keighley to be there for quarter to seven *[yes]*.

Can you briefly describe what you learnt and what were the subjects and so on?

Yea, well there was… because I'd gone to what they termed a technical grammar school, I didn't have to do the preliminary course, a lot of other people had to do the preliminary course, and one went into what was then the O.M.C./ H.N.C. City and Guilds course *[ahem]* and I went... we did textile maths, textile science, cloth designing, fabric design... er... what we call weaving mechanisms, this was study of all the different kinds of looms and the various mechanisms that we used... er... practical designing and a later stage textile... called textile testing *[yes]*.

Was there anything of... to equip you for your supervisory duties?

To some extent, yes, because one had a basic understanding, not only of the looms, which one picked up .in the weaving shed, but other looms that you weren't working on, and there were a vast range of them at that time... one also got a basic understanding of the raw material which one was working with, so that in that sense if there were any problems with the... er... yarns that you were using, you had an understanding of it. But of course the other important thing is that you had... you got a background in cloth design, so therefore you were familiar with some of the faults that could appear in the cloth whilst it was weaving *[yes]*. Now one did get to some extent some training of that back in the mill but not as wide a range of experience and teaching as you got at the college *[yes]*.

Who determined what you learnt, was it the trade unions, or the employer? Or was it a combination?

Well the course were basically prepared by the college to a set syllabus *[yes]*. As far as those days were concerned… er… of people set up with, either the City and Guilds of London Institute... er... and other bodies that were interested in education, I mean there were... Industry Training Board wasn't… in operation at that time... er... and these... these bodies then determined the syllabus over a series of years, the type of course, etc., and then this was implemented in the college. So really it... it... it... I was suspect it was a... partly the employers and partly... the unions, partly education establishment... er... textile education, at that time, had its own H.M.I. in the area *[yes]*.

But if you went to another mill you'd be learning very much the same sort of things would you?

Yes, at the college but when you went to another mill... the.., the course was identical and there were quite a number of us all of a similar age group from various mills in Shipley, Keighley, Bingley, as far away as Yeadon, all went to the college and did the same course [yes].

And did you finish your apprenticeship at Taylor Shackleton's?

No... er... I was very, very fortunate that at Taylor Shackleton's it... Mr. Bertram was a very, very understanding person and having *[sound of something being dropped]* left... having left Shipley and gone to Keighley Tech... er... and finding it difficult I did, half way through the course, ask if I could move on to Bradford, because travelling was a tremendous problem, college finished at quarter past nine, for example, and there was a bus to Leeds at twenty... nineteen minutes past nine, which, if it was on time, caught the bus from Shipley to Wrose, but invariably it missed it because it was late, and it was a quick dash. Now I did go and ask them if I could move... er... and he was very, very understanding, he said that he didn't consider it fair that we were having this problem with meals so I was allowed eventually, to go straight to college from home, without having to call in the mill and on an evening, rather than finish at a quarter past five, I... he did allow me to finish at four o'clock, which enabled me to go... get to college at a reasonable time *[yes]*. And I was always very grateful for that because, in the first year at Keighley Tech., I sat and passed my intermediate exams, because of that he then generously allowed me to go to Bradford and I took my finals there, and he also allowed me to go again to... further during the day and I sat, what they called then the ancillary subjects and got my full tech., that was a college certificate or a diploma and I was the first apprentice to get the full tech, while an apprentice. I all... and again because of that, at the time the union had a prize award scheme... er... the prizes at the end of the academic year were always presented by a local… head of department and at that time it was Professor Happey, and I was in the last batch of national service call-up people, I'd been deferred for a number of years and I was literally in the last call-up session, and because I'd got my City and Guilds Diploma... er... he did say that if Mr. Shackleton would allow me to continue going to day school he could arrange it that I would be able to…

[END OF REEL ONE, SIDE ONE]

So if you could just go over that bit about the deferment of national service again?

Yes, I was deferred... er... up to being about twenty and... er.., having been lucky enough to pass my City and Guilds Final and get the full tech., Diploma... er... I was... it was considered that I could possibly continue at college, and the head of the college at that time, with the union, did suggest to me that... er... if I continued at college he could arrange to have me posted in Bradford and all I would have to do was then report to the local barracks, which I think was Belle Vue in Bradford and morning and evening I could continue my studies at college, and again Mr. Bertram being very, very generous, knowing that I was particularly keen to get into senior management and further... also education... kindly allowed me to do that. It wasn't necessary but he did. Unfortunately half way through the final year at college, Taylor Shackleton's ceased to manufacture, I'm not quite sure of the details but I gather the basic problem was that the lease had run out on the building and I'm told, that because... er... Taylor Shackleton's didn't buy their yarn from C.F. Taylor's... er... and wouldn't agree to a contract to those terms, that C.F. Taylor's refused to renew the licence... er... the lease, sorry, refused to renewed the lease, so Mr. Shackleton closed the manufacturing side down and went into business as a manufacturer without looms. He was very, very generous again, in that he had contacts with the then managing director of Salts at Saltaire, and he did arrange with him for both myself and the apprentice warp twister to have jobs at Saltaire, so I moved around about 1959, December 1959 to Salts at Saltaire. One of the problems there was, at the time, because of the different types of machines at Saltaire to what... to the ones I'd been trained on, I had to extend... they extended my apprenticeship by another twelve months, which, in all fairness, was a good thing from my point of view *[yes]* because they were far more modern machines. The only drawback there was that they weren't as considerate where college was concerned and I was allowed to go to college, to some extent under duress, but if I was needed at the mill it was expected that I would give the mill the first priority.

Have you any idea why Salts were a bit sticky about the training?

Their argument was, as I understand it, that... er... they felt it was unfair that a firm like that should train an apprentice, allow him to gain qualifications, full training in all aspects of weaving in the mill and then move on to another firm, I think to some extent they were under pressure to continue the general concept of training... formal training... academic training for apprentices because they were levied and they did get a grant for every apprentice they allowed to go to college, you know, part-time day release

Was it a common thing for overlookers when they finished their apprenticeship to move on to different firms?

Yes, because, strictly speaking, in those days... er... you weren't... even when you'd finished your apprenticeship, you weren't classed as a qualified overlooker, you had to do a further twelve months as an improver... er... and many of them moved on because they felt they could, and often did, get a higher wage at another firm. I don't think it was <u>over common</u> but it did happen quite regularly *[yes]*.

Perhaps... yes... well... er... that's a good chance to tell me what an improver... what is the... what do you do in the twelve months as an improver?

Well in the twelve months as an improver you're given what is known as a share. Now a share was a set number of looms, depending on the type of loom and you were responsible for that... the production of that unit *[yes]*, the personnel, the maintenance of the machinery, the preparation of the warps into the loom, and the making... ensuring the loom was weaving the correct patterns *[yes]*. That's basically... it's a lot more complicated than that... it gets more technical...

Can I just take you back to Taylor Shackleton's, just for a moment, can you remember how many looms an overlooker would 'be responsible for there?

Yes. Taylor Shackleton's, they were what we call plain dobby looms, plain or Yorkshire tappet looms, circular boxes with dobbies and the occasional dropped box, and they were weaving mainly there, mohair tropical suitings, some coatings and trouserings such as Bedford cords, but another thing they specialised in was a very, very fine, satin backed gaberdine, the type of thing that we don't see about these days, but which was so finely woven that it needn't be waterproof because the water just could not penetrate the fibre and they looked after twenty four looms there.

Was that a... was that a common figure?

Common figure... standard share for that type of loom, yes.

And what would the situation be at Salts?

At Salts it was... the sheds or the weaving machine could be divided, basically, into two types, there was, what we called, the Hattersley Standard loom which was a loom suitable for weaving both fine worsteds and woollens and, it was a rather big cumbersome loom, and there the overlookers looked after sixteen, and I, went I moved to Saltaire, I started work on those, but the other type of looms were known as Northrop Automatic, and they had three different types -there, what they call the four colour loom, which used different shuttle boxes and different colours, the weft mixer and they had the topless loom and…

[END OF CASSETTE ONE, SIDE ONE]

...they then looked after twenty two of those looms *[yes]*. Again the overlookers were payed slightly more proportionally, the automatic overlookers got more, not basically because they were looking after more machines, but because the machines were somewhat more complex *[yes]*.

Can you give us a general idea of what Salts was like at this time, were they making a lot of investment and installing a lot of new looms?

Well, when I first started, at Salts they had three weaving sheds... er... the main big one, I'm not sure of the exact number so I may be slightly off key here, but I think in the main shed when I worked on the standards there were roughly five hundred looms all in one big room, I'm told that that particular shed itself was originally designed by Salt to take over twelve hundred, but these would have been slightly smaller in the days when it was first built. The looms in that were divided up into three sections, there was the main body of Hattersley Standards, there one hundred and thirty two Northrop looms, and at the far side, which I gather is still there, was... there was a row of about fifteen to twenty pattern looms, they were slightly smaller ones, and they were used for developing designs and patterns in the cloth before they actually moved on to the production loom. Then down in what we called the east end, that was again in the old part of the mill at Salts, there was sixty six further Northrop looms, both weft mixers and two colour looms and then down in the new mill, at the far end there were eighty eight topless looms, Horthrops, and these were literally, in those days the most up to date looms that there were about *[yes]*.

I think I'd better ask you what date you started there, I don't think I asked you that?

Er... I started at Salts in December, 1959 or the early part of... yes... Immediately after the Christmas holidays, December, 1959.

Yes . How many years did you work there?

I worked at Salts until...December, 1964 *[yes]* and in that time... er... they also introduced the Sulzer loom, they were one of the first companies to introduce the Sulzer loom and I was there when some of the first Sulzers came in to the Bradford district.

I got a photograph here of Salts just a couple of weeks ago I don't know if you can tell me if it's changed significantly since then?

Yes, that is the old shed I worked in and it has changed considerably since then.

Can you describe the changes, briefly?

Well, I think basically there are two changes, first the number of looms have been reduced considerably with the introduction of the Sulzers, they were, even when I was there, running twenty four hours a day, seven days a week... er... and a lot of the ancillary processes and preparatory processes, which were in separate weaving... separate sheds have been moved into the main weaving shed and it looks as if a lot of the area has been blocked off, to make way for these preparatory processes, such as warping, warp twisting, dressing etc. Now there's the warping, that's in the main shed again *[yes]*, which actually when I was there was in a completely separate shed at the other end of the mill to the weaving.

I think you remember, from one of your visits back to Salts, scenes of incredible dereliction, I don't know if you could describe that for us?

Er... I went back a few months ago... and... er... the then managing director kindly took us round what we termed... what was termed 'The New Mill'... er... there were many, many windows out and there was damp and in the weaving shed where I spent about six weeks, while I was an apprentice, but at the time we were helping to run a night shift, there was nothing all the windows had gone, there were fungi in the wall, there was ferns growing out of the walls, the doors were down and it was completely wet, and the whole of that side of the mill was derelict when I went in. I gather they're now thinking in terms of restoring it and using it for a sheltered housing scheme and a hotel, I don't know whether that's gone through yet?

What did they do with the looms or what are they going to do with the looms?

As far as I know most of them were scrapped *[yes]* yes.

So you finished your apprenticeship at Salts and you...

I finished my apprenticeship at Salts, yes.

And then you did twelve months as an improver?

Well... I didn't really, I was very, very fortunate again... er... near the end of my apprenticeship they had this problem with the night shifts, suddenly they'd lost two... I think it was two, two men and I was asked if I would help them out and it was a really difficult decision, because at the time I was still at college and taking another final exam, but I felt that, to some extent, I owed then for all the help they'd given me so I did say I would help them for six... well for a fortnight initially, for two weeks, while they got somebody, but that two weeks extended into six and I worked thirteen hours a night, four nights a week, Monday to, Monday to the Friday morning and there were two of us. We run a whole shed full of looms... er... paid wages.., when I say paid wages, we worked wages out, we also were responsible for the ancillary winding processes, etc. Having done that, I realised afterwards the extremely good experience and when they managed to find a replacement for the night shift, one of the other chaps in the big weaving shed was being promoted to manager, junior manager if you like, and I was offered his share of looms, so I was very, very fortunate I didn't have to go through the improver-ship process and I got his looms, say a full set of looms, straight away... er... which in many ways was a great compliment to me and... er... and it did at the time cause a lot of problems with some of the overlookers who thought they had been there longer, were older then me and should have had priority... er... managements argument at the time was that I'd helped them out tremendously, the union supported it and that was their way of repaying it.

How many looms were you responsible for?

I was responsible for twenty two looms and all the operative staff as well.

You couldn't briefly describe your duties at... when you started with these twenty two looms?

Well... as I've described before, basically you were responsible for the maintenance of that 'unit *[yes]* production levels, staff controls... er... and the general operation of the unit... er... If there were any minor... any serious technical adjustments to be made to the equipment we were expected to do that ourselves... you were skilled in terms of engineering... what they called tuning the looms *[yes]*. If there were any major breakdowns we had a mechanic or mechanics whose job it was to remove and repair any major parts under our supervision and put them back. It was up to us then to go back and make sure the loom was running properly, producing properly *[yes]*.

What would the most common breakdown problem be, if there was such a thing?

Well not so much a breakdown problem but what was termed 'banging off'. This was the shuttle travelling across the loom and really not getting properly from one side of the loom to the other as it was inserting the weft and there was a safety mechanism on the loom which prevented the loom continuing if this was happening and the safety mechanism consisted of a piece of metal, a pivoted piece of metal but if the shuttle was in the box properly, would be raised and then would clear a stop, but if it didn't clear it properly it hit this stop and, of course, you can imagine the force of the metal tongue hitting the stop with a great big bang and then knock it off, knock the loom off, so this is what we called 'banging off' *[yes]*. There were other problems, you might have a piece of cloth that... in which the yarn was... wasn't to the quality is should have been and it was... ends were coming down even to the point where shuttles flew out. On numerous occasions... er... I've seen people hit and been hit myself with a shuttle flying out.

Did that cause a lot of accidents... injuries and...?

Funnily enough not too many... of course the biggest problem was if they flew out they could split and they would tear all the threads out of the warp *[yes]* they had to be repaired and it could be as long as a days job to repair what they termed a 'trap' and it would just cut out like a pair of scissors across the top of the... top shed of the warp *[yes]*. They could be dangerous... er... on a number occasions I've seen people hit both at Taylor Shacks and Salts. One occasion comes to mind, it seems rather funny now but... er... we were having problems at the time with a guy who would insist on taking his tea break at a different time to everybody else and we tried all ways of stopping this but it didn't work and on this particular occasion a shuttle flew out. Well what we normally did is, if the shuttles started flying out like that you cleared the area of people and put the shuttle back in, 'because one could only... usually find out what causing the shuttle by actually putting it back and set the loom on again and in most instances it was either a small piece of fluff or a knot. On this particular occasion we'd cleared the area and this chap must have seen this happening and decided he'd go back to his looms a different way and drink his tea at the same time. He made what was nearly a fatal mistake, of stopping opposite the row of looms in which the shuttle was flying out, and the shuttle literally flew out, hit the pot in the centre and rather than, get a mouthful of tea he got a mouthful of thin air, and was left holding the handle of the pot. A fraction higher and to the right and he would have lost his eye or even hit him right in the side of the temple *[yes]*.

What happened... were the weavers on piece work by the way?

They were on piece work *[yes]*, they were on piece work both at Taylor Shacks and Salts, but Taylor Shacks had a peculiar way of measuring the piece work, it was measured by how much the manager, one particular point in the week had thought they'd produced on that loom, whereas at Salts they had a more positive way... er... having more up to date machines, and they used what they called a pick clock, a clock at the back of the loom which was connected to the top shaft so every time the shuttle went across the loom it recorded one thread of weft and that's how they were paid, they were paid on piece, yes.

So if the looms weren't working they were losing money?

That's right... er... the firm was losing production and the operative was losing money and it was very, very difficult at times to... er ... balance that out for them... er... not that they weren't prepared to work as effectively as they should and not that the looms weren't running as well as they should mechanically but .. er... different qualities of yarn in the looms and breakages which caused more regular breakages, of course, which stopped the loom... meant that the actual amount they produced was reduced, er...

Were they anxious to get after you to get their loon going as soon as possible?

Oh yea... yea... yea, you got the occasion where they would come and say, 'I think my warp's going to start breaking down', or we had one particular young woman who used to come and, 'I think my looms going to bang off', not that it had, 'I think it's going to bang off , you know.

Were you accused of favouritism... you know favouring certain workers rather than others in getting their looms going?

Sometimes, yes and there again it was very, very difficult. One could put a warp into a loom and it weave out ten cuts which is about eight hundred yards, perfectly without any problem and you could put another warp in more or less identical and you'd have continuous problems throughout that warp and you could put... you could reverse that situation, in fact, you could put one warp in one set of looms for one weaver and put an identical warp in another... er... and one for one weaver'd weave O.K. and for the other no. And you could then put two more warps in again which were identical yet the situation would be reversed and you would get that problem. We also had the problem where people would 'doctor' the clocks.

How did they do that?

Well down at Salts, each week a record was made of the picks on each loom... er... and, of course, these were used to pay the wages but also they were used to calculate the percentage production of that particular set of looms... er... and you then could have... you could chart any production problems by just looking at the basic figures and if you saw the productions were low it would give you an idea of where to look *[yes]*. We had one particular occasion... I think it's worth pointing out that a lot of employees, when I was at Salts were male weavers rather than female, women, and a lot of them were what we called displaced persons *[yes]* and we had one particular chap... er... if my memory serves me correct was an ex-German paratrooper who'd been captured during the war, and he always had a very high percentage, of production level, we always considered that eighty per cent was pretty high, but for a few weeks it went just above eighty and then it started getting up to ninety and again we gave him the benefit of the doubt, and then it got to nearly a hundred on one occasion. The following week on two looms he had, if you can have, a hundred and ten per -cent production, so we became rather suspicious and... er... we came back on the particular Tuesday dinner time, as it was Tuesday afternoon when the picks were recorded, and we came back deliberately early and he was there, he made himself a little crank lever, and he'd disconnected the drive from the loom to the pick clock and he was there winding it round like... nobody's business *[laughs]*.

So what happened to him?

Well nothing at the time... he was told he'd been found out and I think be accepted that, and of course, they were all issued with a warning not to do it but... er... it was just the odd occasion *[yes]*, it wasn't the general pattern.

Was there a temptation amongst some overlookers, for overlookers and, weavers to get together to fix the clocks so that production was, you know...?

If there was, I never came across that, I'm not saying there was, and I'm not saying there wasn't but I never actually came across that, no... er... not that I know of... no *[yes]* no.

I'll just leave it for a moment there.

Aha.

[END OF REEL ONE, SIDE TWO]

Perhaps you could tell me if there were any particular discipline problems with the weavers and how you deal with them?

I don't think there were any discipline problems as such... er

Or staff control problems, as you term them.

Not even staff control problems to that extent where you had to take disciplinary measures... er... there were, for want of a better term, psychological, minor psychological problems... er... if I can give you two instances, we had one overlooker, believe it or not who used to have visions, and he'd come in a morning and say, 'I had a vision last night that I'm going to be ill this afternoon', and he would go home for his lunch and his wife would ring and say he was poorly. Or he would have a vision two or three days before to say… he would say that he was going to have a cold three or four days on. Er... if you had a situation where there was an overlooker off, the general practice was that his share would be shared out amongst the rest of the overlookers and at the time I was working as an apprentice with an overlooker called, a very experienced overlooker called Ben Hodgson and on this particular occasion the other overlooker'd made some comment like, 'I'm going to be off this afternoon, I've had a vision I'm going to be off poorly this afternoon', and sure enough he was away poorly, Ben said to me, 'What's betting Raymond we'll get Meggie, now she was one of these, without sounding rude, old spinster type who was dead keen and she like to natter a little bit, and sure enough, and it was done by purely by chance, by drawing names from a hat, we got Meggie and she came down and she said, to Ben, 'I'm having problems with that loom, all my ends are coming down', so he said to me, 'I'll cure this once and for all', I said, 'What are you going to do', he said, 'Get me a piece of band', and I got him a piece of loom band and he tied two knots in it, about eighteen, inches apart and he went to the loom, to Meggie's loom and he tied the band to one end of the frame, stretched it across the loom, but before he tied the other end he put two washers on the string, tied the other end and then you see he went round to Meggie and said, 'Now then Meggie I want you to keep those washers between those two knots, if you do you'll have no problems', so we went back to do something else and I actually said to old Ben I said, 'She's not going to believe that'. He says, 'Well this is where your psychology comes in', he says 'She won't believe it but you've got to have an answer ready for her', and sure enough you could see the other over... weavers sniggering going round and pushing these washers on, and after a little while she realised what was happening. So she came back and... er... she was really upset and she had a bit of an argument with Benny and he said, when she'd calmed down, 'Let me explain what's happening', he says, 'You see that loom over there', which was somebody else's loom but suitable for example, he says, 'That loom's vibrating, you can see it vibrating can't you', she says, 'Yes' he says, 'Well your loom's doing that but it's doing it slightly worse than the one you're looking at now, and I've put those washers on just to put sufficient weight on the loom frame to stop it vibrating too much to break your ends down' and she was quite happy, she went away and we'd never a minutes bother after that with her.

The other kind of problem, if anything, occurred with the Displaced Persons... er... there was language problems, of course, but we had one particular couple who were, as I recall, Ukrainian and they were man and wife and they had the adjacent pairs of looms, now she always had to walk two steps behind him, wherever she went in the mill, we bad arguments, at one time, because he used to go and collect her wage and the wage clerk would not give him it, he first had to give it to her and he would take it from her, but on this particular occasion they'd suddenly employed a little Indian chap to work as a labourer and one of his jobs was to make sure that the bobbins, used on the different looms, for weft were actually placed in the battery, which is a kind of holder on an automatic loom which contains the weft bobbins and soon as one runs out it mechanically changes it for a full one... and this particular Ukraine was... I suppose one could describe him as very, very racist, he didn't like this little Indian guy and there had been one occasion where a chap had put the wrong colour in, and we knew about that and we'd explained what not to do and he'd accepted it but on the particular occasion I'd watched the Ukrainian and he'd deliberately gone round and changed the colours and... er... I happened to walk into the shed office and just warn a colleague of mine what was happening, because it wasn't on my share of looms and at that particular point this Ukrainian walked in and complained about the poor little Indian fellow and called him a 'bloody foreigner' and they ought to, send him back. So you'd that kind of problem. We'd one particular occasion again where as the Asians were being introduced into the mill, for some reason I just don't know why but there were late in coming in to the weaving section, and we'd got an Asian guy, he was a very nice chap... er... and suddenly one dinner time he went missing and when we came back from lunch his looms were running and there was a total stranger there running the looms, again another Asian chap and we tried to explain to. him that he couldn't just walk in to a mill... 'Well my friend is poorly and I've come to look after his looms so he doesn't lose... *[inaudible]*... we tried to explain to him in a rational way that he couldn't do this so in the end we decided to send, I don't know whether it's for the security people or for the senior manager, but it got the stage where he pulled a knife and it could have been rather nasty. But those were very, very few and far between *[yes]*. Another occasion that comes to mind was... er... we had some Eastern European women doing again general jobs around the mill and there was one particular lady that was of a different religion to the rest, the other three, I'm not quite so sure what the relationship was but they certainly didn't like her and they went to the... it got so nasty that it got to the point where they put.,. they slashed her clothes and her shoes to try and force her into leaving, they were really nasty towards her... er... and that didn't work and we found out afterwards, the police came down, that one weekend they put, I think it was rat poison in her tea, and powdered sugar... powdered glass in her sugar, and when she got home in the evening she was seriously ill, they rushed her into hospital, she didn't die but they put a stomach pump on and it seriously damaged her mouth and things like that. The police came down on the Monday, and we knew who'd done it but we couldn't prove it *[yes]*. Those are exceptions in many ways *[yes]*.

Were most of the weavers immigrants then?

At Taylor Shacks we had one or two... they were a lot of Italians came over at that time and C.F. Taylors in particular had Italian women in hostels and they had one or two there but in the main at Salts they were men and there were quite a number of immigrants, yes. Most of them were in the automatic section were immigrants and certainly all of them on the night shift, when I was working at Salts, were immigrants *[yes]*.

Initially they were displaced persons from the Ukraine...?

From the Ukraine, Hungary, Poland, Czechoslovakia and there were quite a number of white... what they termed, they termed, white Russians, I gathered from them that... er... they were anti-Bolsheviks if they were white, yes.

And then have you any idea, roughly, of when the Asians started in to the weaving shed?

I left Salts in '64 to join the staff at Keighley Tech, and... er... they were just beginning to be introduced into the weaving shed then, by that time we'd got a number of Sulzer looms and replaced the old standards with about half as many less Sulzer looms... er... but they were moving the more skilled weavers from the Northrop looms and the standard looms on to the Sulzers and to some extent that created a gap and that's when the Asians started coming in to the weaving, but I gather they were coming in earlier in the combing and spinning, carding, combing and spinning *[yes]*.

Can I ask you your duties again, can I ask you a general question? It seems as though you obviously picked up a lot of experience in... in your work in Salts and at Taylor Shackletons [aha] how important would you say your training at the technical college was in actually doing the job?

In the mill?

In the mill?

I think it was very, very important... er... again if I can... if I can... er... give you an example of that *[yes]*. We did cloth designing at college, obviously you knew what the basic patterns were in the mill because they were written on the instruction card for the loom, or for that particular warp that was going in the loom, but you didn't go into detail as to how they were all set up and how you could change that pattern, you were presented with the information and you knew what it was, you didn't know whether that information was wrong *[ahm]* as presented to you and on this particular occasion, again at Salts, we'd had a lot of small lots, warps where you only had two... one or even two pieces and they were a kind of cloth known as a double plain, it's a cloth that's woven so that the two faces are interlocked and they change position quite regularly to give a particular thickness of cloth, and we got instructions down about these cloths and on two occasions the instructions were O.K. on the card but when the pattern was cut out and taken over to design for a final check, which was standard practice for every new warp, they would then say that the pattern was wrong and that the colours or the shuttles were in the wrong way round. Well on two occasions we changed these and to their instructions, but strictly speaking, it was wrong according to the instructions on the card *[ahem]* and this caused one or two problems, so on the, I think it was the third or fourth occasion, the instruction came back that we should change these colour round and I refused, because it meant that, you know, we were disobeying... directly disobeying the instructions on the card... er... and it really got up to the board-room in effect... er... and what had happened, is that, when they'd actually been preparing the master set of design patterns for checking production designs, somebody in the design office had stuck the patterns up-side-down, so that when they checked them against the pattern from the loom it was obvious... the pattern from the loom was obviously wrong... er... and we refused after that to actually change them until we got a written card and as I say it got to the board-room and one comment from a member of the design team was, 'Well it doesn't matter, all we'll do if that's the case, we'll weave them reverse and then we'll turn them over and finish them on the correct way', which was all very, very well until I made the point that... er... you can't change name selvedges, you can't turn words inside out just like that, by turning them over. So in that sense one got an idea of what the pattern should be, what it should be producing and if there was a mistake you could pick it up. One of the faults that was very, very difficult to spot was a... what we call a wrong lift in a dobby, a dabby was the computer for lifting a row in the heel shaft to form the pattern, and if you got wrong lift you couldn't always spot it, well knowing a little bit more about design you could pick these faults out and often they weren't picked out until they'd gone through the whole piece, and the whole piece bad gone over to perch for inspection *[yes]*.

You mention the selvedge work there, that required a lot more skill did it?

Not so much more skill, it was just an added mechanism on the loom, it was a separate mechanism that was controlled by, was driven by the loom that was controlled by a separate set of pattern cards and it actually wove the name of the company or the brand name of the product in the selvedge.

You didn't tell us what the 'nifil' attachment was?

Yea that... that... 'nifil' was a... self winding unit which was attached to the loom and given from the loom so rather than having to wind the weft onto packages in a separate department, you put the empty bobbins into the 'nifil' unit, attached the yarn to it and it wound the necessary bobbins for the battery and as soon one was changed by loom, the empty one was cleaned and brought back up and automatically rewound again, so it was a unit that was fitted to the loom.

Were there a lot of new loom modifications which caused you problems as they were introduced?

It wasn't so much the modifications... loom modifications that caused the problems it was the different types of cloth that needed loom modifications that caused the problems. Again one that comes to mind is some cloth that we were weaving for the Hudson Bay and it consisted of two warps, normally you had one but this consisted of two warps, one made out of…

[END OF REEL TWO, SIDE ONE]

…and the length of the fine warp was always... sorry, the length of the thick warp was always a lot longer yet run out quicker than the length of the fine warp because it was making a kind of pile *[ahem]* and to get, for example, the correct tension, so that they were both coming in at the correct tension and producing the correct amount of pile or pattern was a problem but... er... very few mechanical problems in that sense, as I say, it was adjusting the loom to suit the cloth it was weaving *[yes]*.

It's a little bit out of sequence but I should ask you this... going back to immigrants, were there any immigrant overlookers, was there any…?

None while I was there, no, none whatsoever, no, no, not in the weaving, no.

And... er... what were your relationships with management like, I gather that it wasn't as close as it was at Taylor Shackletons?

Our relationship at Salts with... er... executive management was very, very, very, divorced from the shop floor, whereas at Taylor Shacks it was very much a family company and... Sir Harry himself would often come down into the weaving shed and speak to you personally, he'd come down in his... his morning jacket and his pin striped suit and his spats, he would speak to you. Everybody was referred to by the surname *[yes]* yon know, McEugfa, or Hollis or Greenwood... er... but again if there was a problem he would come down on the shop floor and sort it out. At Salts it was, as I say, very much divorced from that, you had... er... I suppose we would have classed it was junior management, then you had shed management... er... divisional management and then executive management *[yes]*. You also had a production management as well at Salts which we didn't have to a great degree at Taylor Shacks it was all done by the shed manager *[yes]*.

Was there pressure on you from, say, production management to increase production or anything of that nature?

It wasn't on us to <u>increase</u> production, no, but there was certainly pressure there when production dropped and often it wasn't either the weaver's fault, the loom's fault or even the overlooker's fault, it may be faulty yarn, a difficult type of cloth to weave *[yes]* and things like this... er... and of course in weaving, production can vary according to the type of cloth you weave, you may have a loose weave where you only put in thirty six ends - picks per inch in, so it weaves pretty quickly, but you get the satin backed gaberdines that we were weaving at Taylor Shacks, for example, and they have a hundred and twenty - a hundred, and forty ends per inch, so the actual length of cloth you wove took a lot longer *[yes]* so in terms of production it was very difficult often to equate the two together in terms of picks put in and actual cloth produced *[yes]*.

Did... er... was there pressure to speed up the limit in any way or...?

No, no, no, *[no]*. Sometimes we did slow them down slightly, again that was mainly because of the type or quality of yarn that we were using *[yes]* but never to speed them up, to make them produce faster. There was an optimum speed at which the looms would run, or that type of loom would run, and it was usually maintained. Sometimes at Taylor Shacks, because of the type if cloth we were weaving, we may change what we called a plain loom, that's where it's only one shuttle, into a box loom and you used to take a major portion of the mechanism out and slot another one in and that could be up to a days job. But again it was determined by the type of cloth that you were wanting to weave, *[yes]*.

Did you say that Sulzers were just beginning to be introduced?
Sulzers were just coming in when I was at Salts, yes, yes.

Did you do any training for them...?
I didn't do any formal training... er... but I was very, very fortunate in the share of looms I had at the time was immediately next to the Sulzer unit, so I did spend quite a lot of time working with people on the Sulzer unit. I would expect if I'd have stayed there longer than I did, I probably would have gone as they did in those days, out to Switzerland for five weeks training, formal training at the Sulzer factory.

Was that looked forward to by the overlookers who had to do that? Trips to Switzerland?
Some of them did but I think after two or three had been they realised it wasn't a holiday. They were working from nine in the morning to nine at night and even Saturdays, so it really wasn't a holiday for them... er... and after the first few trips out there people were less anxious to... to go out to Switzerland *[yes]* on that side.

Was Sulzers significantly more difficult to service?
Well I think one can best make a comparison there by saying that even today Sulzers are referred to as weaving machines and not looms *[yes]* they are very much an extremely sophisticated... er... I would version... not version but certainly on a par with a sewing machine. An extremely sophistocated form of engineering of that nature *[yes]*.

I've heard it said that the overlookers job now has become more of a weaving technician [yes] as a result of the introduction of Sulzers.
Yes there's very much this approach to preventative maintenance and preventative maintenance schemes where, when I was... when I was overlooking if there was a fault on the loom you either, if it was a serious or sophisticated technical fault, you corrected it yourself, if it was a bigger mechanical fault you brought the mechanic in and told him what to do, and it was done there and then on the loom. These days, with the Sulzers... er... if there's a fault on one unit, one part of the machine, that unit is immediately removed and another unit which is known to be in good working condition is bolted on or fixed on... er... and the loom starts up straight

away, so you've a shorter time spent or lost in repairing the loom or the machine and, as I say, they have this preventative maintenance schedule where things are things are being damaged or broken components are being repaired, mechanisms being tuned up so as soon as there's a demand for that it can be bolted straight on and there no... there's the minimum loss of production *[yes]*.

Could I ask you what your wages were when you started at Salts and how they progressed as you progressed in the mill?

To be quite honest I can't recall my wages at Salts... the only thing *[sorry]* sorry, the only thing I can recall is when I left Salts to go to Keighley Tech., in 1964 I took a drop in salary, because it was obvious to me at the time that the trade was in decline. I had a particular interest in further education as well, I wanted to get into further education, I had the qualifications to get in so when I moved... I moved and I did take a drop in salary. I remember, only a few weeks ago, comparing salaries at that time, for some reason, and I dropped from £1,200 a year in 1964 to £900 a year. Well £1,200 in 1964 was quite *[yes]* a considerable salary *[yes]*.

When you finished your apprenticeship did, your wages significantly increase then?

Oh yea, yea I think they more than trebled *[yes]* yea.

And did you get holidays... er....?

We got all the statutory holidays that we get today and two weeks in summer holiday.

Was that the same at Taylor Shackletons?

The same... more or less the same at Taylor Shackletons. I think by the time I'd gone to Salts they reduced the working week from... Taylor Shacks it was fifty when I first started then they reduced very slightly to forty eight. And I think from there it was reduced to forty six before I left Salts, but I'm not dead... I'm not really, positive about that *[yes]*.

I'll leave it there just for the moment.

[END OF REEL TWO, SIDE ONE]

Can I ask you one or two questions about the Bradford and District Power Loom Overlookers?

Mmm.

Er... firstly when you finished your apprenticeship did you get any sort of certificate or was there some sort of union ceremony or anything like that?

No, not that I recall you were just made up to a full member. I think you had to go to a committee meeting and you were made up into a full member where somebody reported on your progress as an apprentice... probably the most significant thing is that your subscriptions increased substantially *[yes]*.

Can you remember what they were?

I can't to be quite honest although I have my old... er...union... back union cards in my office at the moment... *[inaudible]... [yes]*.

How was the union presence felt on the shop floor, were there shop stewards or anything of this nature?

Interestingly enough there weren't shop stewards... they didn't have shop stewards there... each of the bigger firms tried to have a representative on the committee and, if my memory serves me correct, we had twenty eight overlookers or thirty overlookers at Salts and we had one member on the committee. In fact the chap who was made up to manager and I got his share, having finished on the night shift, was the committee member at the time and because he'd been made up into a form of manager, if you like, he had to resign from the committee. He kept his membership but he had to resign from the committee *[yes]*. But we'd certainly no shop stewards *[yes]*.

Would it be true to say that there was close co-operation between the union and management in maintaining discipline in the mill?

If one compares it with the union management situation now, I think <u>yes</u> is a fair answer there *[yes]* yes.

Can you give us an example of that, I think you told me before about a shop official who... [inaudible - crashing noise]?

Yea... there was a particular occasion where one of the representatives on the committee had been... well taken advantage of his position and he would come in a little late and things like that and I know that he'd been spoken to about this aid there was this threat of calling a strike... we were all called to the managing director's room… immediately after one lunch, I'm not quite sure of all the details, but I do recall that within minutes of being in the managing director's room... er... the union secretary came down and... er... from there, everybody was sent back to work by the union secretary and told to leave it alone it wasn't for us and in future they weren't to even consider calling a strike until he'd been consulted. So in that sense there was close co-operation *[yes]* yes. I think although it was a closed shop... er... management realised that it was in their own interest to keep a close liaison with the overlookers because they then could guarantee that they would get the best type of person in the job. You had the problem in the spinning where, as I recall, there were lots of spinning overlookers who were not in the union and therefore hadn't been formally brained and it was less easy to control in the spinning side than it was in the weaving and therefore there was often a great movement of staff.

What would happen if an overlooker was doing something wrong? Would the union... the management automatically go to the union representative [yes] rather than the overlooker directly?

I think it would be... it would be dealt with on a general level, some comment would be made to the overlooker concerned... some views expressed... er... and then it would be up... usually in the case it was up to him to go to the union... er... and then the two would get together, if it was really serious. I don't recall any situation... er... my experience when it got to that stage, other than the one that I've just outlined *[yes]*.

And what would happen if you had a grievance was there an accepted procedure that you'd go through, involving the union representative?

In that sense there was no laid down procedure as we have now. As I recall, again there was only one occasion where I felt I was being treated unfairly and that was at Salts... er... because I'd... er... worked on all... in... on all the .three weaving sheds at Salts, if there were any problems in one they would usually send for me and ask me to go down and help sort the problem out. That would often happen two days or even three days after the problem had occurred. For example you might get an overlooker off and they'd share the looms out and because of... pressure of work, etc., changing warps... there may be a lot of looms felled out, that means to say they'd run out of material .and they had to be changed, other... other overlookers got behind with their work and they used to ask me to go down and sort any problems out and I often did that, what they would do, as far as my share was concerned they would then take one of the older semi-retired overlookers who would just be there as a spare man and help out where necessary, he would look after my share. My problem was that I'd often come back and find it in a... in a worse state than when I left it and I would be left, in turn, to sort my own problems out *[yes]*. And I know on one particular occasion they asked me to go downstairs and I said, 'No, I'm sorry but I'm not coming back to find my own share in a mess, having gone to sort somebody else's problem out'. And I'm afraid the junior manager at the time said, 'Well you'd better go tell the executive manager', I said, 'No, you've brought the question, you take the answer back'. *[yes]*. And the executive manager did come over and say, 'Look, well we helped you out as an apprentice, you should be more committed to us', he completely missed the point that I'd helped them out for six months... six weeks on the night shift when, as an apprentice I could have refused and there was nothing they could have done about it *[aha]* and I'd also helped them out on previous occasions. After a straight discussion he saw the point and there were no problems after that *[yes]*. And I think mainly all the problems were resolved by both parties behaving in a rational, often direct, but rational way *[yes]*.

You've no idea what the relationship between the Bradford and District Power Loom Overlookers and the Managers and Overlookers Society was?

I'm not quite sure of the actual direct relationship, they were both certainly in the Textile Hall, they had head offices in the Textile Hall... er... the Managers and Overlookers sounds a grandiose title, they were basically the Spinning Overlookers' Union, in that sense they weren't the managers in the executive sense *[yes]*. In terms of the Bradford Power Loom Overlookers there was a kind of federation because there was the Bradford, which was the largest, then there was the Halifax, the Euddersfield, the Dewsbury and Batley, the Keighley, the Leeds and they were all federated together. Now under the general auspices of the *[Yorkshire]* Yorkshire Association of Power Loom Overlookers you have…

That's sort of... like an umbrella organisation?

Yes. Yes,... er... it was always traditional until just recent months that the Bradford Secretary was the Secretary of the Yorkshire Association as well.

Did you ever go to any of the... er... Power Loom Overlookers' Society Festivals, which were held early in the New Year I think?

We never had any festivals as such they were Lodge Night Meetings and then... er... six monthly there was a kind of open meeting, I used to go to one or two of those and they were just like an ordinary general business meeting... you always got one particular person…

BREAK

[May I]. continue by asking you a few more questions about working with the looms and the problems associated with it. Was there a problem with the noise level at all?

I think people walking in and not being used to a shed full of looms, yes there would be. I worked at Salts and I would think there were going on for four hundred looms or more *[yes]* in one shed. We never actually tried to speak over the noise of the looms *[yes]* but you could still have a normal conversation, with somebody fairly close up or even quite a distance away... one adopted... or learnt to use lip reading as means of communication and it's rather embarrassing at times, you can find yourself in a room with people and you suddenly find yourself listening into a conversation at the other side of the room without realising it and simply you've just looked at somebody's face and watched them forming the words with the mouth and your interpreting the conversation *[yes]*.

You didn't see the noise as a problem at work you just took it for granted?

I never... I have never come across anybody that claims they've gone totally deaf with working in a weaving shed... er... that's not to say people's hearing wasn't impaired. I think, if I'm honest mine is to some extent but I think partly because one switched ones self off to the noise, you didn't try to talk over the noise, listen over the noise and therefore you didn't notice it affecting your hearing.

You didn't use any ear protection or anything like that?

No, not when I was in the mill, no, no that hadn't been introduced in those days.

Do you know when it was introduced?

It was certainly... as legislation after 1964 *[yes]*.

Did you see factory inspectors?

Only one... er...and that was when I was at Taylor Shackleton's. I don't recall any factory inspectors at Salts, although I know on one occasion they must have been in, because they criticised a particular part of the loom, the Northrop looms there, and they insisted they were guarded, which led to quite an interesting problem a few weeks later.

The mill mechanic of the time was given the job of coming in on a Saturday to fit the guards they'd made for this particular section and nobody realised that in. fitting them he'd actually altered some part of the loom and they started up on Monday morning for normal production and it wasn't while about Monday lunch time that they realised that quite a number were weaving the wrong design, because he'd adjusted the design pattern on the loom with... and nobody realised this and there were quite a number of faulty pieces went through that week.

Oh dear. The factory inspectors were pretty scarce then?
As I say I only recall two incidents, that was one and the other one was in the mill at Taylor Shackleton's and the problem there was grease on the floor because I quite vividly remember we were all called in the following Saturday morning and given scrapers similar to a garden hoe and big bags of soda appeared that week and mop... mops and buckets and we were given the job of actually washing the floor with soda and scraping all the dirt off it... grease... greasy fly and that, that comes away *[yes]*.

I don't know if you know anything about this but I'll ask you anyway. In the 1930's and 1940's the union was particularly concerned with problems caused by lifting the wool which resulted in hernias and things like this. Do you know anything about that?
I don't... I wouldn't pretend to know anything about that particular inst... that particular case but... or cases like it but... er... it wasn't uncommon, it happened with us that you found the looms were so close together and if you... in some instances, particularly large warps, you could not lift the warp beams and the heald shafts in and out of the loom without actually standing them on end and kind of bouncing them through on the gudgeon end to get them in... the space between them was so tight *[ahem]*. Of course when you've got a warp which weighs anything up to a thousand pounds *[yes]* plus the weight of the beams and the heel shafts *[yes]* it was a particularly difficult exercise to get one warp in, yes.

Did you have lifting gear there?
Well we had <u>carts</u> for wheeling them in... what you called beam carts and you had lifting gear, particularly at Taylor Shacks for lifting them down from the warp twisting which was on the floor above the wearing shed and on to carts in the weaving shed. At Salts also they had large mechanical storage equipment for storing a number of beams. But when it came to actually lifting them into the looms they literally had to be manhandled in *[yes]* yes.

Was lifting gear used at any later date?

In some mills where you had sufficient space between looms they had hydraulic carts which could carry the beam on a kind of mechanical arm similar to those used for lifting jacks for lifting cars up, you could then wheel it in, raise the arm and the beam up to the height and then lever the beat, correct that, lever the beam into the beam stands on the looms but... er... I certainly never worked with a thing like that.

This is all connected up with the problem of spacing of the looms?

Yes, yes, at Salts, I think I mentioned before, that I was told that the... that weaving shed there was designed to take twelve hundred, looms *[yes]*.

Were you ever asked by management to look after more looms for some reason then if so did you have to consult with the union?

We were often asked to look after extra looms if one overlooker was away ill and the usual practice was to divide the looms, in that particular section, between the remaining overlookers *[yes]*. We never had to consult the union because this was standard practice *[yes]* one... *[inaudible]*... got a share of the overlooker's wage or you even got paid for looking after those *[yes]* that section of his looms.

Did you have to do much overtime working?

Er... certainly at Taylor Shacks we worked over occasionally... er... we had a new shed manager come about two years after I started there and he introduced an evening shift *[yes]* for part time weavers and the overlookers were asked to work over there. But down at Salts we worked over quite a lot. On one particular occasion we worked from seven in the morning 'til quarter past seven at night, with only half an hour break for lunch and that went on, as far as I can remember, for nearly eighteen months without a break, except for holidays and weekends. Friday I think we finished at quarter past five rather than quarter past seven.

Any idea when that was?

That was around about 1963, because just after going back on to normal time, which a lot of people, having been used to the continuous overtime seemed to think they were on short time, they did actually introduce short time because of lack of orders *[yes]* and that was introduced on a three day week, we were fortunately allowed to work full time as overlookers and doing routine maintenance and things like this but the weavers were put on short time.

Was it common for production to fluctuate from short time to overtime, or were you mostly on full time?

Ahm... that was the first time I'd come across short time in the mill *[yes]* there always were regular working hours. I think one of the reason for this, particularly at Taylor Shacks was that, believe it or not, for the five years I were there, I think approximately seventy per cent of the operative staff in the weaving were part-timers, they started at nine and finished at four. There were very, very few full timers there in fact I would... I would think about seventy five per cent of them were part-timers.

Do you know why that was?

Mainly because they were women with families... er... you know, they would see their children off to school, arrive at nine o'clock, need to be home for about four - half past, and some finished even earlier than, four o'clock, half past three *[yes]*.

I don't think this would... this affected you again, but do you know what the procedure would be if you were unemployed? I mean would go to the union initially?

Well in our case, yes, yes. If you wanted a change of job... er... you either went to the union who usually found you one or you found yourself a job and told the union. Interestingly enough, because of the close relationship between the union and the manufacturer you usually found that if there was a job advertised in the paper... er... they would -qualify the advert at the end by saying, 'Union Approved', or 'Society Informed', that was to let everybody know that the union... it was acceptable to the union *[yes]*.

Did the union ever ask you to take industrial action of any kind like an overtime ban or anything?

No, I don't remember anything like that yes, no.

Did you ever hear of unofficial strikes in the industry?

I never came across any unofficial strikes, no.

I know you've kept up your membership of the Power Loom Overlookers this seems to be very common in the Society do you know why that would be?

I think if... again if one's honest... er... in many ways possibly as insurance knowing that it would be very, very difficult to get a job in industry doing the job I was trained for without being a member... er... and also... er... really because one didn't pay the full subscription... I still pay what we call an out of trade... I'm still an out of trade member, so therefore you pay considerably reduced subscription so it's really not that... the cost's not that much noticeable *[yes]*.

Is the superannuation benefits an attraction as well?

Well... er... having paid it, for what, nearly twenty years it seems a shame to lose that benefit but it's not as much as one would expect, you know, it's only a small benefit *[yes]* but it's still there *[ahem]*.

At the places you've worked at has absenteeism been a problem?

At Taylor Shacks it could be a problem, singly because of, again, this idea that the woman's place was in the home and so, therefore, her priority was to home and family and you got that, to some extent, as a bit of a problem there *[yes]*. But certainly at Salts it was no considerable problem *[yes]* no.

One last question about the looms, did you develop the knack of anticipating faults on the looms?

Oh yea, yea... er... it's quite surprising now... even now, not having actually worked on them a great length... for a great length of time, not regularly... er... but with this MSC programme that we have downstairs where we're actually getting the looms working with warps in, one still had the knack of telling that that looms not running properly just by listening to it, and you don't realise it's happening until you suddenly... you're stood there and the loom, you're maybe talking and the looms going in the background, and you suddenly... that' s not right by either the sound of the shuttle going across *[yes]* or the way the other mechanisms are working, yes.

Would that facility be impaired if you were told to look after more and more looms?

No. No, because usually... the looms you looked after were all of a similar type... it was very, very rare you looked after a mixed set of looms where the looms were considerably different in the set, you know, for example at Salts you looked after Northrops or Hattersley Standards or Sulzers, they never mixed... you never had a mixed share, it was very, very rare *[yes]*. I won't say it didn't happen... ever happen but it was very unusual *[ahem]*.

Now move on.... in 1965 you got a job at Keighley Technical College [ahem] can you tell us what that job was and how you came to get it?

Well I'd... it sounds rather pompous saying that... but after working all that time on overtime and then finding that not only had we gone to back to normal time, but we were on... we were moving into a short time period, you know, I felt that to acme extent that there would be problems in the textile industry and from my point of view I should consider more security... a job with more security, I also wanted to get into further education, I have a particular interest in that... er... I'd applied for two or three jobs both at Bradford College and Huddersfield Poly and I'd been unsuccessful in those, and then the job I took at Keighley Tech as weaving technician became... was advertised in the paper and I was fortunate enough to get that... Er... that consisted, basically, of looking after the weaving lab there which had quite a large range of looms, from old Hattersley Yorkshire Tappet looms, Hattersleys with jacquards on, old type jacquards, Dracups and Hardacres, Hattersleys with more modern... er... silk loom and jacquards on top, terry towel looms, Northrop looms, quite a large range of looms which we used for -training and teaching on, in the textile department at Keighley Technical College…

A0042

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SEX OF INTERVIEWEE:	Male
DATE OF BIRTH OF INTERVIEWEE:	1934
INTERVIEWER:	R.W. Jones
DATE OF INTERVIEW:	2nd February 1984
PERIOD DISCUSSED:	Mid - Late Twentieth Century
ABSTRACT:	Apprentice drawing overlooker at Benson Turner, Great Horton, Bradford; relationship with management; work's cricket team; mill outings; introduction of new machinery; immigrant workers

… I was Bradford born, 1934. Er... district of Eccleshill, which is the far side of Bradford. We moved just before the just before the war to the south side of Bradford, and I was educated at Great Horton Secondary Modern School, stayed there till I was fifteen. And I used to do a lot of singing in the mixed voice choir during the last two years, and how I got involved with Benson Turner was through a girl in the choir who worked in the mill office. And whereas I didn't have any desires to go in the textiles at that time, it appealed to me the fact that there was probably going to be a vacancy, I applied to Benson Turners and served a four month period assessing as to whether (1) I liked the company and what textiles meant, and (2) whether they thought that I'd the qualifications to be an apprentice, which was a criteria then.

How old were you then?

Fifteen years old. I... I did get signed on as an apprentice and I served a three and half year's apprenticeship, and then I became an improver. But at that time we were working from seven-fifteen in the morning until five-fifteen at night. It was a much longer day then, but we ran a day shift only, and at that time the foreman was boss in his own department, whereas now you've got multi-shift running where you've got three foremen over a twenty-four hour period in the same department. And it's much more difficult now to get the rapport between people as it was then with just one man being in charge, and I can remember the guy who I served my apprenticeship with. He was king in his castle for about forty-odd years before he retired, and he stayed in that room and saw very few changes in machinery. I think he was probably in that room forty-five to fifty years. Certainly forty years anyway, and he did the same thing. Qualities changed, and people changed, but the machinery and the pace of things just went on and on and on.

What sort of hours would you be working at that time?

Well we, we started at seven-fifteen in the morning and if we were a couple of minutes late we got locked out in the 'penny-hole' until quarter-to-eight, so we lost half-an-hour's pay. I think it was seven-fifteen to twelve-fifteen, and then one o'clock to five-fifteen, so it was probably an eignt-and-half, at least an eight-and-half hour day.

There was no shift-working then?

No shift working at that time.

Was there any overtime?

Little on maintenance, usually Saturday morning because the machines built as they were then were the heavy cast-iron type and you know Heath-Robinson type frames that did a job, and they needed very little maintenance other than changing brass bosses. The actual machines didn't wear out, in fact, when they actually changed the scheme of things at Harris Court Mills and at Wyke, they didn't sell the machines, they just broke them up and they were still in perfect running order, but they had to move with the times and change for higher speed machines and more sophisticated types. I mean those machines would probably still run today, with little or no maintenance. We used to oil them regularly and we used to change the belts, but apart from that they went on and on.

You were an apprenticed overlooker?

That's right, yes. With that apprenticeship you had, you worked through the day and you went to evening class three evenings a week on textile courses, spinning courses and the like. That usually lasted about four years.

How many overlookers would there be in the mill at this time?

At that particular time there would have been ten to twelve, but not producing any more than seven or eight, nine thousand kilos I don't think, at that time.

Have you any idea how many apprentices there would be?

There was usually two or three, and that was an ongoing thing for the best part of - up to the middle 'fifties, late 'fifties, and since the early 'sixties we've probably carried one or two. But it was a thing that with, with the economic change and companies wanting to go for survival, they couldn't carry that sort of - it was planning for the future yes, but it was also costly, and so the idea of apprenticeships sort of thinned out.

Could you take me through a typical working day in your early days?

Well, what I can recall about that time of life, we - the first thing we did because it was a 'cold' start, what I mean everything was turned off at five-thirty, five-fifteen, five-thirty and everything had to be started up at the same time, seven-fifteen. And so what we had to do then, er... start from one end of the room and gradually put a machine on at a time, because all that power going on together had an effect back on the main steam engine, as we had then, because everything was driven by the main engine from the boiler house, and belt-driven through subsequent rooms, Er... with putting all the machines on together you tended to exert the power, and this then made certain belts slip which came off the main drive pulley. So the first thing was get as many machines running as you could with as few ends down as possible. Then you had to then make sure that all the belts were up, so you had a great belt-stick, which was like a pole with a, with a cut-out at the top, and you used to run that belt up the face of the pulley. It's quite good, but it's quite, you know er... you felt, you knew you'd done it once you put that on, but you got used to it, I'd an old master, he was good at repairing belts and at sewing and things like that, he was very dexterous in that line. Having got the machines running then, you sorted out the personnel in case there was absenteeisms. You then sorted out any changes for the day from the manager's instruction and got the right amount of material from another department. Being a multi-storey building everything had to come from another department which was usually across the yard where the drawing department - that was the preparation, and the rovings were carted across the yard by the lift-man, and each room was fed with material of a different sort. Now once those materials were secured in position, because you didn't have a lot of room or space in those days, you then had to put the rovings above the machine, so during the course of the day if myself was free of time and the overlooker was free of time, we used to stand on a doffing ledge which was secured to the frame. You were stood on a platform about three foot off the floor and he used to throw you rovings in pairs or threes, and you used to catch them and stack them on a shelf. And if you missed the damn things you got one in the gut, or whatever, and they were pretty heavy, you know, about a pound-and-half weight, something like that. So everything was transported from department to department, and then when you'd made the yarn, that was transported then to another department, and the process was carried on, because in that room the overlooker was a spinning and twisting overlooker and that's all he did, all his life. So we had drawing overlookers, spinning overlookers, winding overlookers and warping overlookers, and each one stuck to his own room and his own situation. Whilst this was going on of course you were given technical training, and it still mystifies me today why we were made to train for three to five years when, when you consider that today that you were only dealing with one or two machines, you should have had this 'buttoned-up' in a year, even with personnel experience, but that's how it was.

The training wasn't a great deal of use for your practical application at work?
Oh yes, it was necessary, but what I'm saying is I never could understand why it took years to train an apprentice when in my opinion it should have been not more than one year. I mean all this business at night school of, of courses, you know, you got side-tracked on to technical courses or chemistry courses which are not a bit of use, and usually most of us were out of our depth anyway, instead of sticking to the principle of spinning. And so really you went to night school to try and pick up something other than your department, and that was the feature that I remember about night school.

What were the main problems as an overlooker in servicing the machines?
None really, because you were king in your own room, you were bossman, you know. People lived in fear and trepidation depending on what sort of person you was, how you applied yourselves to your operatives, I mean there were some overlookers that would literally er... scare the operatives to death and rule by fear, and there were others who knew how to treat people. It was a bit Victorian shall we say and continued so until long after the war.

Was absenteeism a big problem?
No, because they knew darn well that if they were absent, (1) there was no social benefits in those days, and (2) there was usually somebody sat on the doffing bench waiting to take that job. But the company being as it was, was a reasonable company, a reasonable management, and so they viewed illness genuinely, but there weren't that many, there weren't as much by any means because as I say there weren't the social benefits.

Were there any disciplinary, other disciplinary measures besides saying 'You're out the door'?

No, the only discipline - the disciplinary measures were instant. If you didn't do your job and the overlooker didn't like you, you were out the door, and there was no messing. There was no tribunals, or appeals, anything like that. If you were finished, you probably got thumped when you got home anyway for being finished, and then you had to go look somewhere else for a job. But it was - equally it wasn't as difficult to find another job because you could go from the spinning mill in Harris Court across the road to Courtaulds and nearly be guaranteed a job. And in Great Horton there were six or seven mills within a two mile distance, so from Bradford to Queensbury there probably was about ten or fifteen mills.

Were you a member of a trade union?

No, I didn't... I didn't, I was asked to join the Overlookers and Managers, not the Overlookers - it wasn't the Managers - the Overlookers Onion, and there was a questionnaire sent to us, and I didn't approve of some of the questions on it. I thought they were too personal and they wanted to know too much. They certainly wanted to know, em... what my relationship was with the firm in terms of earnings, and I suppose looking back it might have been a fairer question than I thought it was at the time. But I didn't feel the need because I've always been a person from very early on of speaking my mind, sussing the situation out as to whether I had a fair argument, and then no matter who the person was I had to deal with I felt I had the right to deal with that person. And usually being, looking to my superior, whether it was an overlooker or the manager, I felt I had enough confidence to ask the questions. I felt that if I had a grievance I had the right to ask the questions, and I never did join a union, and I've never regretted not joining the union.

Were the other overlookers in - members of the union?

There were a few, yes. It never really carried any weight. Er... there was never any real worth to the overlooker from that union. I found my best method was to negotiate…

BREAK

…I was drawing overlooker. And so when it came in on the Saturday, he hadn't pre-warned me, he brought this machine in and I said 'What are you doing?' and he said 'We're going to put this machine' -mechanics, 'we're going to put this machine in here'. I said 'No you're not, because I'm not a spinning overlooker, I'm a drawing overlooker'. And I had to have words with the manager then and he finished locating that in the spinning where it should have been in the first place, but because he had an older overlooker who would give him aggravation he was going to work it onto young Priestland you see, but it didn't work. And that's the sort of thing, and in the end we talked about it, and he saw my point of view, and we got on famously after that.

Were there opportunities to meet management outside of work, like work's outings?

Yes, more then than there is now, because we always - we had two cricket teams, one at Wyke and one at Harris Court, and we had friendlies between the two, which... We always had a cricket match every week and twice a year we had visitors from Nottingham who - we got an outside ground and played them and had a general 'open day' which was very good. And so there was always chance to - from the cricket point of view, to see people. I mean I can remember at least two directors playing in the cricket team quite regularly and another two probably coming to watch on a number of occasions. And so, you know, you had chance to see things like that. Mill trips were a feature always, but they ceased after about four or five years, (1) because of the numbers and trying to accommodate three branches then, because we had a third branch down Leicester way and so they were becoming very, very expensive and I think probably the companies were feeling a bit of a pinch in the mid-fifties, late fifties, where these luxuries you know could no longer be afforded, but we still ran private trips. You know we had one or two 'fiddles' shall we say like sport's committees and the like, and we used to run raffles, with management blessing of course, and we used to, through the year, accumulate quite a bit of cash to have private trips and so maybe twenty or thirty of us would go on works trips, what we should still call works trips but instead of trains we used to take chara's *[charabancs]*. Fun days.

Perhaps before we go any further you could try and explain to me the division of labour between the different branches of the firm in Harris Court, Wyke and Leicester?

Well, they were made up of the same type of people, but we were so far apart in those days, because you know little did - little or-no occasions did we swap personnel, so the Wyke personnel stayed here, Harris Court stayed there, and Lutterworth stayed at Lutterworth, and they only met on occasions. But the make-up of the operatives was the same. Overlookers, managers, overlookers, warehouse and operatives, male and female, so each was identical.

Were the three all spinning mills?

Yes, basically, drawing and spinning.

Another thing, could you remember what your wages were when you started?

Yes, mmm, in fact, funny thing - er... my wife and I were only talking of - recently about what we are, the situation that we have now in relation to our two sons who, one is married and one's getting married, and just got a second grandchild. And of course Steve who's a printer is on good money, but then he's got all the trappings of 1984, you know. He's got a nice little house, he's got a car, and television, video, and they don't seem to want for anything. And we were relating to the holidays, that's how it came about and what we used to pay for a holiday then in relation to what we now pay for our two selves. Of course the holiday's different but nevertheless in relation to wages. And I think when I was a qualified overlooker I was on thirteen pound... just short of fourteen pound, because I remember getting married, I got married on my twenty-first and I was just out of my time then and I think I was, when I actually got married, I think I was on about fourteen pound fifty, ten bob. And when I came to Wyke and secured the drawing department I think I got a pound rise. In fact I was working over two nights, two evenings then and a Saturday morning and I was earning about seventeen-and-a-half pounds.

Did you get regular wage increases?

Yes, they were annual, but they were about 1% to 2%. I can never remember, in the trade, getting more than 2¼%, I think that was the highest, until I was made manager and then they started moving with the times. And I think in recent years there's been as high as a 10 and 12% in one go, but that was a norm then 1 to 1½%.

Were those wage increase negotiated in some way, or were they in some sense automatic?

Well I assumed they were negotiated by the Feder... I didn't know then, but I assumed then they were the Federation and the union, although the union wasn't active in the mill. They were trying at that time to become more [active]...

A0062

Interview Number:	A0062
Sex of Interviewee:	Male
Date of Birth of Interviewee:	1924
Interviewer:	D. Thomas
Date of Interview:	23rd February 1984
Period Discussed:	Mid - Late Twentieth Century
Abstract:	Work at Courtauds, Bradford as office junior; accountancy work at many other textile firms

Can you remember whether you had any choice of er... you know, sort of staying on at school, or getting a job?

Well I'd no choice. When I left - when the term came up I had to look for work, the idea of going to Cross Lane school, was to go out to work early, and er... I'm afraid that was what er... what I had to do. Although I was very happy starting work, when I wrote my application for a job in Septemeber 30th July 1938 we lived in Hudson Crescent in Great Horton, and I put 'Dear Sir', this was to Courtaulds at Westcroft Mill a new mill that had started, in the, not on the wool side but on the synthetic wool processing, and I applied there for an office position, the common Junior Clerks in those days, and the Junior Clerk had to go and get the er... cigarettes for the office manager and then go and get the sweets for the typist, and then he'd to come back and balance his stamps, books and distribute stationery - go and help to pay the wages, and look after the filing system, and that's how it started. That job, in fact I have a. letter here dated 17th September and it says, 'With reference to your recent application, for a. position in our office, we should be glad if you report about 10a.m. on Monday, your wage will be ten shillings per week, with an increase in January, and if satisfactory a further increase during the year. the usual office hours are 8.15 a.m. to 12.15 p.m. and 1 .45 to 5.30 and you will be engaged as, a Junior Clerk'. Well of course ten shillings was fifty pence, in the present currency and er... and it was, it was good money, and I used to have to go and stay and do the post, and Courtaulds, Westcroft Mill 'till six o'clock at night, before I went to nightschool. But in 1939, June I had an accident, I broke my leg playing football with the - I was keen on football and it was for the works, works team, but in consequence of my absence from the office, I had a letter saying that, this: is from Courtaulds, Westcroft Mill Bradford again, 'In consequence of your absence from the office, we are instructed to reduce your salary to six and threepence per week gross', that's rather strange isn't it gross, 'commencing the 1st June, we trust you will make a speedy recovery and should be glad to know, that you, when you are illegible to return to your duties. On your return to the office, you will of course resume your normal salary', and Mr Horris the accountant at Courtaulds signed that. Well, you can understand that - how I certainly recovered quickly, to be reduced to six and three per week and I went back to work on crutches, to make sure I got back to my ten shillings per week. Er... very happy times really.

Was it difficult to get an office job?

I think so, unless you'd been to the grammar school. As I said earlier, there was, there was various; levels you had a grammar school, at secondary school and a. modern school, and with me been from an ordinary school, I was very fortunate, in, it was pure luck, yes I was very lucky, I was very lucky, competition, in fact I was three or four months waiting, it was with persistence that I eventually got the job really. But er... the, the office job, office work was most enjoyable, I mean I was, there wasn't any bullies, they were very friendly people in those days, and it was a new, a. new kind of fibre that came into it. There was one or two instances, where *[cough]* when the war broke out, the people who had to go and join the forces, had to leave their duties and I had to take over more responsibility, not very heavy responsibility, but I had to do ordering and purchasing and wages and a little bit more important work. Infact I once ordered some toilet rolls for the, for the mill, and I made a mistake and I wanted a gross of toilet rolls, but what I did I wrote on my order a four gross of toilet rolls. So in fact what happened was lots of toilet rolls came through, and my name was absolutely mud, because we, the cartons and cartons of toilet rolls, but I contend that, that saved the Courtaulds, Westcroft Mill from closing in those days, because of me, so much, so, it was a good bulk buying system, mind on another occasion we ran out of coal, and there was Mr Scott and Mr Hodge, who was the engineers, they were short of coal, and we'd, they bought a lot of tyres, and I remember we had to burn tyres for months after month, to keep the mill going, and everybody, all the local people Havelock Street, Great Horton, Southfield Lane they must have a real difficult time, washing and cleaning the 'doorstones' with the, with this burn, burning tyres.

BREAK

... [In your job]...Did you come into contact with any of the mill workers?

Well, yes, that was my particular job, when I was a counter and I was qualified, I had to go round and work out the costing relative to the cost of yarn, whether it was er... *[coughs]* in those days used to work on the er... worsted and cotton counts, and they tried to get it into a standard form, called the 'text system', which never came off really, but the idea was so that you could sell yarn to the, to the knitters and to the weavers, and then either on yardage which wasn't, of course on those days it was pounds weight, and it was, it was yardage, nowadays it's kilogram and it's metres isn't it? So that's all changed, so I had to get in touch with the workers and ask them how, you know, a lot of the questions mainly on the overlooking side, and then eventually I'd go back to the manager and work like that. In fact I worked over at forty mills, in my forty five years *[cough]*.

How did you manage to work in so many mills?

Well, of course I was a cost, I was a cost accountant and when I first started at Andertons, then, this is my first job after Oourtaulds in '52, I went to work at Doncaster, they had a mill at Doncaster George Andertons, and it was there I bought my first car, from the secretary at a thousand pounds, a Morris eight series eight, series eight…

A0085

INTERVIEW NUMBER:	A0085
SEX OF INTERVIEWEE:	Male
DATE OF BIRTH OF INTERVIEWEE:	1907
INTERVIEWER:	O. Howarth
DATE OF INTERVIEW:	6th April 1984
PERIOD DISCUSSED:	Early - Mid Twentieth Century
ABSTRACT:	Life in Ripleyville; work in Rennie's Mill, Stanningley

Did your mother work?

Oh no, she'd.., and my youngest sister was only 18 months old when my father died, so it were nearly impossible for her to work.

Had she worked before they were married?

I presume so, she worked at Kit Waud's in Kelson Street, in a mill there, you know, but she, she'd four children in her married life, up to 1916, when my youngest sister was born and *I* was born in 1907, my other sister was born in 1911 and my brother born in 1904. So, wall, it were, in them days there were pretty big families you see, then that was, I've heard them say in the olden days, stock was as ;good as money, but it wasn't you see, it's proved it's kept them poor, you see.

How did you go on when, when your dad died, did the house belong to, did it, Ripleyville, did it belong to Ripley's Dyeworks?

No, no, you see, Ripley's, it was made like Salt's of Saltaire, but it didn't develop like Salt's. The time they built Ripleyville, which was built for people in the Dyeworks, but it belonged to Sir Edward Ripley, Bart., a different Ripley altogether to Ripley's Dyeworks. But the part of it was built with the assumption that men working in the Dyeworks would have these houses so it was handy to go to their work, but this is why they had to let them off, 'cause at that particular time, the people were finding... they were just starting to buy their own houses, so they had to let them off. But the same person what belonged the estate, belonged all the mills in Upper Castle Street and Spring Mill Street, he belonged the mills, and he belonged, he provided the power, the engines and the boilers and all like that, and the mills was rented off to the people what wanted to use the mills, but as I say...

Was your house rented to your mum and dad?

Yes, that's right, but as I said, my father died in 1918 and I was 11 years of age, and I went to Usher Street all my life, then I went to...

What about your mum, you saying when she was left on her own, you had to apply for Poor Law? [Yes, that's right] Do you remember anything about it?

Oh yes, yes. *[What was it like for her?]* She used to get so much in money and so much in food tickets, and I got free meals at bottom of Barnard Road, in a school what was there for the convenience of that, it was schools attached to Usher Street but it was in the bottom of Barnard Road. And I think at that time, the girls used to go there for cookery lessons and I used to go for my dinner, free meals, and then I'd sort of, many a time I'd have to go on home, get some more. But, I always remember this, during the time my mother was on the Poor Law, they used to be lady visitors, you see, and they'd catch my poor mother at that particular time, because women didn't go out to work as much as what they do, they did, but not as much as they have today. And they'd catch my poor mother making some apple pie, because every day was set aside, Monday was washing day, Tuesday was baking, and so on, so on…

BREAK

…Oh yes, yes, at that particular time, which is changed now, you went to the school nearest to where you lived, and that's why I went to Usher Street. You see, if I'd have lived up here at this particular time, I'd have gone to Lorne Street, you see, and that's how the schools were, you know, dedicated to do that, you see. And then when I left the school I went to Rennie's in Upper Castle Street at 15 years of age.

How did you go on, it must have been very difficult for your mum, how did you go on for clothes, new clothes, buying things, it must have been difficult?

Well, it's hard to say, we were always kept as nice as we could be. I've always said this to my wife, you only get one mother, and my mother, she was marvellous, you see, and I always say that, through my life, you only get one mother, you can get as many fathers as your mother can accommodate but you only get one mother. And the majority of mothers are good people, you know, and loving people, aren't they, you see, and mine was no exception to that.

How did you get the job at Rennie's?

Well, I can't even tell you that, I believe, I believe my mother got me it, you see, but when I did go into Rennie's, the manager, which was only a small mill really, lived in Ripleyville, he lived on Ripley Terrace, I can imagine my mother been to see him to get me a job. 'Cause, with going into the mill at 13, I just forget how much wage I drew, I went, **I** were there right up to going in the mill, going into the railway. But during the time of them mills over there, which was, all belonged to Ripley's Estate, it's, there seemed to be hundreds of people going out of Broomfields, Ripleyville and West Bowling, all in them mills, you know, and it was, that road, Ripley Road, 7 o'clock, 10 to 7, and 5 o'clock at night, it were all crowded with women with shawls on and lads with short trousers like I had and a smock on, you know, and...

What sort of a mill was Rennie's, what did they...?

Well, it was a branch of their big mill at Stanningley, it was.. er..

Spinning?

Spinning, that's right, yes, but the biggest part of the mill was at Stanningley, you see, which this was a subsidiary of Stanningley, but... er...

What time did you start?

7 o'clock, 7 o'clock it was, if you went at five past, you were what they call quartered, you were sent home if you wasn't there when the door was shut, you'd finished until breakfast time, you were what they call quartered.

How did, can you remember how you felt when you started first day, what impression...?

Well, it was either, you see, in the mill, first day in the mill, all the machinery going, which you'd never been accustomed to that, and you couldn't speak to you without shouting, and that's why a lot of the old people today shout, because they were brought up to shout, they were working in what they call the alleys of the mill, and it's mostly like weaving, which they'd more weaving there, 'but that's why the people shouted a lot in them days... er...

How did you go on for your meals, was there a canteen?

No, you had it in what they call in the gate, that was the gate, the spinning, the sides they called them the gates, where the women used to look after the bobbins, and bobbin ligging and things like that.

What was your job?

Well, I was a bobbin ligger, you see, there were lads were bobbin liggers, and there were lads were what they call jobbers. But that were, a jobber were next to an overlooker, you got to be a jobber, but there were no signs of any promotions at Rennie's, because it was only such a small place, you see. But that's how it went from a bobbin ligger to a jobber and to overlooker, if you were lucky enough to stop in the mill all your life.

How did you get on with other people that worked there?

Well, as I say, they were...

Did you know them, did they live locally?

Well, yes, you see, it were more or less, in fact, I'm pleased to say this, I look after the concert, put this concert on for the old people every Tuesday, and I've 'been doing it for *6* years, not only me, some more fellows, people. And there's a lady, not far away, what was a woman, when I started in the mill, and she were never married, they call her Miss Boocock, and she'd say, she'd always say, she says 'It's a while since we were in the mill, isn't it?' And she's in her 80's.

You've kept them as friends then...?

Yes, and she comes in the ambulance now, you see we have an ambulance for them what can't get out, we have ambulance that brings them to the club every Tuesday afternoon, you see.

Which club is that? Straight opposite here. What do they call it?

East Bowling Unity, East Bowling Unity Club, but we go under the name of East Bowling Community Club, and we've been going 6 years and we get, there's a luncheon club, and this concert every Tuesday for old people, and we have ambulance going up there.

Do the East Bowling History Workshop use it...?

No, they don't use it, they use Fairfax.

And I'll get back to the mill, for a bit, how did you get on, with the overlooker, was he strict?

Well, the overlookers, it was the manager's son .was one of them, and the only incident I had in my three years I was there, or two and half years, was, one of the lads put his fist through the overlooker's billycock.

What were a billycock?

Well, it were, overlookers wore billycocks, you know, the trilbys were them, but billycock's like... er…

Rounded? [Yes] A rounded hat?

Yes, black ones, and somebody, one of the lads put his fist through the overlooker's billycock.

While he had it on?

No, so the manager says, well, he says, 'Which one of you's done it'? And nobody would admit it. 'Well', he says, 'I tell you what we're going to do today', he says, 'You can all go home', he says, 'If nobody's done it', he says, 'One of you's got to admit it, otherwise you can all go home'. So I finished up going looking for work in Buttershaw and when I got home, I got home at home time, and mother'd got to know then. She says 'You can go back in the morning at seven o'clock, a lad admitted it'. But I'd been to, I'd daren't go home, I looked for some work, but I didn't get any work.

BREAK

...then the railway sent them wherever they required the suit-lengths, you know, London, where the biggest demands were, you see. railways were very, very busy then the days before the motor industry got going really you see, and railways were the biggest employers of labour in the country, you see. There were more people worked at railways then than anywhere, that was the biggest employers of the country.

I should imagine they'd be the biggest transporters...?

yes, the time when I went to Adolphus Street, there were 4 motors, out of the First World War, there were 200 horses at Adolphus Street alone, so so what there was down at Bridge Street, and at Foster, Valley, I don't know, but that were in Adolphus Street alone.

Were the horses stabled near Adolphus Street?

Oh, they were stabled in Adolphus Street, and there were some in the railway yard and there were some down Adolphus Street where they went upstairs to bed. That were an old saying, it were up a ramp, but they were down some of them, but up this, they used to say, they're going upstairs to bed, but they built a ramp of stone, and it were like two tiers, and there were, as I say, they had their own grooms, they had their own farriers, that were blacksmiths to shoe the horses, and they were *[inaudible]* horse, so...

It was all self-contained then this looking after the horses?

Yes, well, as I say, there were grooms, horse keepers, there were 2 horse keepers at Adolphus Street alone and there were a change of horses for the parcel vans, they changed the horses at dinner-time, these what were going to Heaton, and Horton and the outskirts of Bradford, they used to change them, because they used to be galloping about all day, you know.

How did they go on with steep hills?

Well they had chain horses.

What were they?

Horses, an horse in front of another horse, and then sometimes they'd have two chain horses, they could bring them up Vicar Lane and up Cheapside, you know, all the hills, then they'd take the chains off when they got them at the top of the hill and then they'd get the load off and come back empty. But they were chain horses 'cause, up Cheapside and Vicar Lane, you see, and anywhere else where they were going up hill, I've seen as many as three chain horses, it depends on how much weight they had and till they brought, eventually as time went on, they had what they call a puller and a pusher, a motor, some of the horses got old fashioned and they wouldn't pull at all because they used to think veil our days is numbered and they used to sit in the what they call in the britches, in the harness and they used to have to push horse an all sometimes.

Was the pusher and puller, what did..,? [Well, that were instead horses, you see.] What were that like?

Well, it were a motor you see, where they hooked them on like they did the old chain horse and one that were the puller and then at the front of the motor was a steel plate, and it pushed the front, the one in front, so it was push one and pull one. So hat were doing away with labour all the time, you see, they were doing, this was the days when brains were beating brawn you see, and it's gone on, gone on and galloped on.

Were the horses trimmed up at...?

Oh yes, they used to trim the horses up at May Day.

How did they used to trim them up?

Different colours, ribbons and they used to do this voluntary, did men, you know, get their horses re-groomed and spiced up for May Days' procession, which was not the procession, it was part of their work, you know, one man looked after his horse and majority of them used to do, look after them as if they were their own, you see, they weren't all alike, but majority of them were. And they knew if they looked after the horse, the horse would look after them.

Was there any confusion in the yards with all those horses?

No, well, they had their own horses, you see…

A0184

INTERVIEW NUMBER:	A0184
SEX OF INTERVIEWEE:	Female
DATE OF BIRTH OF INTERVIEWEE:	1915
INTERVIEWER:	L. Reveley
DATE OF INTERVIEW:	29th June 1987
PERIOD DISCUSSED:	Mid - Late Twentieth Century
ABSTRACT:	Work as a winder; work as a weaver at Salts Mill, Saltaire; worked during 1931 strike

...How long did you go to Central Street School, how old were...?

Till fourteen, I left at fourteen years old. And I was all agog to go out to work and get some wage like my sisters. But were were that bit better off, and my mum wanted me at home to help her, after the various operations and troubles she had you see. So I stopped at home till I was fifteen, helping in the house. And then I had a friend lower down Saltaire and she said they were wanting someone where she was, so I begged my mum if I could go. So I went out to work at fifteen.

And where did you go?

To Oddys mill, it was Oddys mill at that time. Well Salts was there but I started out at Oddys.

Was that a separate mill from Salts then?

Oh yes, there were quite a few around the place. In fact I've been at one or two mills. There was Oddys textile where I started, and then C.F. Taylors up to sixteen years old, and then I went to Salts from seventeen years old to twenty. Now when I was at Salts there, seventeen years old, this older sister was away and married and away up Scotland and had her first baby, and when she was three months pregnant, she had to have an operation for appendicitis, and they did it while she was pregnant. But she had to have that little bit more rest and care for recuperating. So I had to stop, I went up there, I went up to Edinburgh for six weeks and lived with her and her husband to make sure she didn't work too hard. And I did all her chores, and ooh, I loved it.

Is that the first time you'd been up to Edinburgh?

It was, at that time, yes. And, er... I was away from work six weeks. Anyway when I came back my job was gone, I couldn't go back just like that you see.

When you went to Oddys when you were fifteen, what did you start as?

A winder. In fact winding really was my job, because when I went to Salts later I did, oh, and Taylors, I went from Oddys to Taylors and then to Salts and I did winding at each place first, but at Salts I got promoted into the weaving. And it was cotton-backed satin, battery, battery bobbins. It had a shuttle but the, the weft that goes across was on what they call a battery. All these spools of weft were on this, clipped in all the different parts like a staircase you know, and as it emptied it dropped the empty one into a bin, clicked a new one out of this battery and carried on weaving, and I minded six of those because they were called automatic with it doing that you see. But there was a lot to watch, and again I was still only tiny for reaching across, fastening ends, tying ends up.

What was it like, just going back to Oddys when you first started, can you remember what it was like going down to work at first?

Yes, it was, it was a fair walk, I had to walk, and it was down Baildon Bridge from up the top road there where I lived, and then up Dockfield Road to Oddys. And Dockfield Road was rather busy then. Everyone was going in, you know.

Busy with people?

Yes, employees, yes. But going down it wasn't very busy really, and the tram, one of the tram routes when down to Baildon Bridge but I could never go on the tram, at least I didn't do, I don't know why. I never went on the tram.

What time would you set off to go to work at Oddys?

Well I started work at half-past-six. It was overtime, and you got extra money, but it only then amounted to about eighteen shillings, or up to twenty-five at the most, you couldn't, you couldn't really raise more than twenty-five shillings in the old money on overtime.

So you worked from half-past-six till when?

Till five o'clock.

And what would... sorry, go on.

The overtime was the morning, you'd to go half-an-hour early you see, and in the week it was built up to two-and-a-half hours overtime. Er... yes, half-an-hour extra on five working mornings onto the ordinary, what time did... yes, seven, the ordinary starting time was seven till five, but we used to go at half-past-six, for this overtime.

What time would you set off walking then?

Oh, six o'clock, because it was quite a walk down. And I took my breakfast with me, a sandwich or whatever, because it was too soon to eat it, six o'clock; and we didn't stop for breakfast, it was just you'd to get it while you could while you were working.

What would your job be like then, as a winder?

It was interesting. We used to mind what we called ten 'ends', and these were the bobbins that we wound the weft on to, to go into the looms eventually, and I liked it very much. Then there was some cheese-winding, and they were big cones like, they called them 'cheeses', big cones of weft, but I didn't like on there. I did go on it once or twice if someone was off, but the ordinary pirn-winding I was.

Why didn't you like the cheese-winding?

It was more complicated. There was a huge drum to every, every cheese. There were about ten in a row, and they, there was a crack in the metal that you'd to put the weft through to tie up to start the cheese. And I was always a bit nervous, it was a bit dangerous really. And, er... I wouldn't, I was always a good worker, but I think I was a little bit slow. But it was thorough, it was, you know, I'd tied the knots where some of the girls used to just slip it round instead of just tying the knot. But what I did was... sincere... *[laughs]*...

Do you think the machines were safe?

Yes.... yes, it, it wasn't, the cogs at the, each end of these silver drums, there was a cog at each... well, a lot of cogs, but they were protected with a, like a canopy metal over them. Yes, I think it was safe enough but it always looked a bit frightening to me. I didn't really like those.

Were there accidents at work, do you remember accidents?

Er... not really, not really. I can't remember one. There have been over the years at different places, but I was never in among anything. I never knew of anything. You did little minor things, this pirn winding I did, the fitment was a steel thing with some wire at each side, so that when you pushed your bobbin on these wires closed in and held it firm. Well one day I pushed a bobbin on and the wire went through into my finger, you know, you got that sort of thing; but they had a First Aid room and of course I went and had it attended to. It was nothing really.

Did they have nurse in the...?

No, it was just the man and he wore a yellow coat, and he bound it for me, you know. It was nothing really, but I was always aware then when I pushed these bobbins on that I got to the end of the bobbon, not near the wire.

Where, was the winding separate from the weaving?

Yes.

Where would you be in relation to...?

Yes, well there were anterooms sort of, the weaving was a huge shed, because the looms are massive. And then of course there would be a little, not a tunnel, but a way through into the winding. And the winding bobbins, there were boys taking them away all the time, into the weaving from the appropriate looms.

Were you paid by how many you did then, on piece rate?

Em... how... yes, each loom had a clock, on, like a meter, and then at Friday the meter, the overlooker came round round and had it... I don't know whether it was every day or just at Friday, but it was checked on in your name, and then you got the appropriate payment for what the meter read.

That was as a weaver?

A Weaver, yes.

And how did you get paid as a winder?

Just so much a week, and so much an hour extra, that was... it was hourly, hourly, we got the extra money for the half-hour extra.

So you said, you worked at Oddys from fifteen?

Yes, yes.

Did you have friends at work?

No, not really. No *I* didn't. No I never... we were always quite happy together but I didn't make any friends. And there we had what we called a 'Christmas Join'. Er... we each paid so much a few weeks before Christmas to one person, and then they bought port wine and meat, little party pies, and things like this, and this 'Christmas Join' was quite an event. I didn't like port, I think it was rather heavy. I wasn't a, you know, I've never really been a drinker as such, but this port to me, I used... I drunk it under sufferance because everyone else was drinking it.

Would you have drunk it at fifteen then?

Yes... yes... *[chuckles]*

How many winders were there then in your anteroom?

Er… about six of us, and each of the six had a frame as they called it with the ten spindles as they called the fitment for the bobbin to go onto. And the weft was in a can in front of each spindle, you know, to provide the weft to go round the bobbin.

What about dinner, what did you do for your dinner?

I took dinner as well. I didn't go home from there. I just took dinner. Sometimes we would go to a little local shop from Oddys. He made beautiful fruit pies and his own meat pies, and very often I got things from there. Then we would have fish and chips, but one boy he went out for all the lot, and if it was nice, a nice morning like this, we would sit outside on the wall in Dockfield Road, eating fish and chips. That was my dinner in those days.

How long would you have for your dinner?

It wasn't long, I think it was half-an-hour there. It wasn't long at all. I think that's why I'd have let that boy go to the fish shop, because it would have taken the queuing time.

Did you have a break in the afternoon, or anything like that?

No, no, no. No there wasn't a break at all.

How did you find it going to work? Did you find it a long day, or did you get tired when you were fifteen?

Well, I was always glad when it was home time, time to do my own thing.

What would you do when you came home?

Well I was in Girl Guiding. I think that was my interest. And swimning, I learned to swim in the... you know, for the first time I could swim was when I was in Girl Guides.

Where did you go swimming?

To the Shipley Baths. But it was an old building at that time they had. They have a new one now, but it was in the old building.

BREAK

...Were you still paid an hourly rate?

Yes, because really they didn't break much, and you could sit down and watch them you see, where down at the bottom you're all the time on your feet tying ends up.

What about supervisors, did you have an overlooker?

No, oh... there was an overlooker for all the lot, the looms and the winding, he used to mooch around you know.

What was he like, the overlooker?

He was an old man to me, you know... *[laughs]*... but the overlooker, that was at C.F. Taylors, you see. The weaving, I went to Salts. This is where the cotton-backed satin was.

[END OF SIDE ONE, REEL TWO]

What was the overlooker... you were telling me what he was like at C.F. Taylors?

Well he was just a grumpy person. He wasn't hard-worked really. He just had to keep an eye on everyone, but he always seemed very grumpy to me. But I didn't, I didn't bother him unduly you know.

What did, what did the winders think about the overlooker, what was the relationship like, you know?

Well none of them really bothered with him much because he was so, well, grumpy... *[laughs]*...

Did some people have...

You see if anything went wrong you had to, with any of the spindles, you had to ask him to come, and he was always 'chuntering' all the time, that's why we didn't like him. You hated it when you had to fetch him to your machine. But that's what he was there for, as well as keeping an eye on everyone, he had to keep up to the machines.

And did, could all the overlookers keep up to the machines?

Oh yes, yes, oh yes, mmm. And at the end of a day we had to dust down and sweep up. And at the end of a week we had to wipe down with an oily rag so that they were all lubricated ready for Monday.

At C.F. Taylors did you do the same as you did at Oddys, did you have a dinner hour?

Yes, it was about the same, it was half-an-hour.

Did you ever go and sit by the canal. You were by the canal there weren't you?

Yes, we were, but we didn't really go out much because there wasn't time, after we'd eaten our sandwiches it was almost time. And they always switched the main belts off, the main engine, and ooh, I remember always this click, click, click, it would start going again. I used to think, 'Ooh, time to start work again', *[chuckles]*... the click of these belts going round again. No, we hadn't time to go anywhere.

Was it noisy in the winding, because they always say how noisy it is?-

Oh it's noisy, even in the winding, but not quite so noisy as weaving. But you got the noise from the shed more or less coming through.

Was there a sort of 'pecking order', did you ever have much to do with the weavers? You know was, what was... between the different jobs when you were a winder and they were a weaver was, was there any...?

Oh no, no. It, a lot of people didn't want to go on to the weaving because it was much harder, more stretching and reaching, and... and more dangerous. Yes, weaving was pretty dangerous, but there again I don't remember anything amiss, you know. Because they had guards over where it was dangerous. And I did a drop-wiring job before I actually went into the weaving, and the roll of warp comes over through to the loom, and then the weft goes across. That's to make the cloth, the warp comes this way, and the weft goes that way with the shuttle. And every thread that came up from warp in the first place, when they fixed it to the loom, you had to have like a hair-pin, we called them drop-wire, and you'd to put one pin on every strand, and it was quite a task. And these drop-wires, they could pick about an inch of width up, and I got right efficient at it, you know dropping them all on. And you sort of, this hand went like that, getting the thread and this hand dropped the drop-wire on. That was one of the jobs before I went on to the looms.

Where, where you were when you did the drop-wire job?

At Salts, yes, sorry, I've moved onto Salts.

You went to Salts when you were twenty?

Yes, yes. And I started there on a sewing machine with a handle underneath the works, and it made numbers, you could write with it. Have you ever seen on cloth, like fine chain-stitching. Well it was this machine that did the numbers, and I had to sew the corner of every piece. This was the finished piece from the loom. I had to sit at this sewing machine and sew the appropriate number in the corner. But there was a man to lift them about, because the piece was very heavy. That was my first job, and then onto the looms itself.

Why did you move to Salts?

Well it was just that it was near home, and all the family were there. He all worked there at one time, even my brother, he was down in the warehouse, and my other, oldest sister was a weaver, and then the next two down were warping, connected to, making the warps, and the next sister to me was a burler and mender. So we all did work there at one time.

What year was it when you went to Salts then?

Ooh, now then....

What year did you say you were born?

Fifteen, 1915. And up to sixteen years I was at Taylors, so it would be thirty-one, thirty-two when I went to Salts, 1932, I would think. Is that what you asked?

Yes.

And, er... and they had a buzzer used to sound all round the town, it, it buzzed at ten-to-seven at morning, to make sure you were ready for going to work, it was time to go. And at... five minutes after he sounded it again, you were supposed to be through the huge gates that were there. There was a gatehouse man and as soon as everybody, as soon as that buzzer had gone at the appropriate time, he shut those gates, and if you weren't through that was it. You had to go back home.

Would they not let you in?

No, no. That's, that's why the buzzer sounded. It was there, you'd got to be ready and then it sounded a second time, you'd got to be through the gates. And there were hundreds of people all going through these gates. And then of course at the home time they opened them back and everybody flooded out. I don't know how to... you know when it shows a marathon on the road, that kind of thing all coming out through these gates. There were hundreds worked there.

Were you ever locked out?

No, no...*[chuckles]*... no.

Was it a bit of a 'poor do' if you got locked out then?

Well you had to lose wage, the day, no, the half day, because it opened again at dinnertime you see. You could go in for the afternoon then. And the, the appropriate buzzers went again…

BREAK

You know when you went to Salts and you went to be a weaver...

Yes.

In... and this overlooker said you'd never make a weaver, did it make you more determined?

Excuse me, there's someone... Yes it did make me more determined. I thought, 'Well I will be a good weaver. I just aren't as tall as our Marian but I'll get there', and I did. Yes, it did make me more determined.

Who taught you to weave?

Well you automatically see it going on like when you're in the room, like on this sewing machine job you see. If I was waiting for some more work to do I'd go watch them or try to help them. I knew how to do it really, by the time I got on. There isn't a lot to it really, weaving, because it's all done by the loom. You just keep up to the appropriate feed of bobbins, weft.

How many machines did you say you watched?

Six, which was big, it was quite a few, when you think of the size of a loom when they show them, I used to mind six of those. But they were, as I said, automatic you see. If anything went wrong it clicked off, it stopped, and you had to go and make the appropriate move and set it on again.

Did... do you think these were regarded as quite advanced machines, or... were they new machines that they were automatic?

Yes at that time they were, and there again I thought it was good because I was on these automatics.

Were all the ones in there...?

But the rest of the shed, the weaving shed, were ordinary, very heavy looms. You could only mind two, so the difference of the automatic was you see, it clicked itself off, where you'd to watch for anything wrong on the bigger ones. I would never have been a weaver on those, I would never have managed those.

Why not?

Because they were massive, they were even bigger than the ones I looked after. I don't think I could have reached.

How many of these automatic ones did they have in the shed?

Er... about twenty, twenty-four, and one girl was particularly good. I thought, 'Oooh, I'll never be like her'. She used to play with the job somehow, but as I said, I was always that bit slower, and Nellie was running round. I think she used to mind more than six.

How did they decide who they'd put on the automatic ones and who on the others?

Well it was just who was available at the time, but I remember this Nellie as I say, her dad was the overlooker on these automatics. He knew the... and he knew what he was about, and he kept hers in top shape you see, she was able to do it easily.

Did, did you think she was a bit of a favourite?

Well he did favour her being his daughter, yes. But he did look after the... he did look after the others, but he was always seeing to Nellie's loom.

Did you not mind?

No, no. Mmm.

Were you paid piece rate then?

No, it was this meter at the end that was totted up for how much you'd turned out. You got paid appropriately to what work you'd done.

And did you have friends, you know, on the...?

Only work friends, you know, didn't come to anything away from the mill.

What about away from the mill, did you have friends?

Oh yes, it was in Girl Guides really, but I kept the three local ones, you know, just for going out and about. Sundays we used to walk through Northcliffe Woods or on to Manningham Park; there were always band concerts. And I stuck to these three. We all used to walk... we walked always from the Ring of Bells end on to Manningham Park.

Did you have outings and things from work?

No, no, there was nothing like that. No...

APPENDIX C
YORKSHIRE TEXTILE MILLS DATABASE

At the end of this volume can be found a digital version of the Yorkshire Mills Database complied and used as part of this research (see Chapter Four). The database has been presented in to formats. First, the raw data is held in three tables as a Microsoft Access © database. Second, the principal data in each table has been presented as a report form for ease of reading and these have been produced in a PDF format.

In order to simplify data entry into the database codes and abbreviations were used. Below are lists of the codes and conventions used in each of the tables of the database:

TABLE ONE: LOCATION DETAILS

FIELD	GENERAL DESCRIPTION
ENTRY	Unique identifying database number assigned to each individual site
NBR NO	Five digit National Monuments Record (Swindon) Building File Number (now prefixed by BFO: *i.e.* BFO*xxxxx*)
SITE NAME	-
TOWNSHIP	-
CIVIL PARISH	-
DISTRICT	-
COUNTY	-
NGR	National Grid Reference (8 digits)
X	6 digit 'Easting' co-ordinate (for use with other applications and programs)
Y	6 digit 'Northing' co-ordinate (for use with other applications and programs)

TABLE TWO: SITE PARTICULARS

FIELD	GENERAL DESCRIPTION	CODES	DESCRIPTION
ENTRY	Unique identifying database number assigned to each individual site	-	-
NBR NO	Five digit National Monuments Record (Swindon) National Building Record Number (now prefixed by BFO: *i.e.* BFO*xxxxx*)	-	-
PRESENT CONDITION	As at time of former RCHME survey (late 1980s) - Updated where possible	**A**	In use
		B	Partly in use
		C	Demolished
		D	Partially demolished
		E	Being demolished
		F	Derelict
		G	Converted for residential use
		H	Partly used for residential use
		I	Used as light industrial units
		J	Only some original buildings surviving
		K	Being restored
		L	Empty
		M	For Sale
		N	Largely rebuilt
		O	Partially rebuilt
		U	Unknown
LISTED?	Statutory protection, if any	-	-

FIELD	GENERAL DESCRIPTION	CODES	DESCRIPTION
NO. OF PRINCIPAL BUILDINGS	Number of principal buildings surviving at the site	-	-
START DATE	Approximate date range during which earliest parts of the site were constructed (ranges are those determined by the former RCHME): Early 18th C = 1700-1733; Mid 18th C = 1734-1766; Late 18th C = 1767-1799; Early 19th C = 1800-1833; Mid 19th C = 1834-1866; Late 19th C = 1867-1899; Early 20th C = 1900-1933; Mid 20th C = 1934-1967; MOD = post-1970	-	-
END DATE	Approximate date range during which latest parts of the site were constructed (ranges are those determined by the former RCHME): Early 18th C = 1700-1733; Mid 18th C = 1734-1766; Late 18th C = 1767-1799; Early 19th C = 1800-1833; Mid 19th C = 1834-1866; Late 19th C = 1867-1899; Early 20th C = 1900-1933; Mid 20th C = 1934-1967; MOD = post	-	-
NO. OF PRINCIPAL PHASES	Number of principal structural phases at the site	-	-
SITUATION	Topographic setting of the site	**BS**	Beck side (on or by)
		CS	Canal side
		FS	Flat site
		HS	Hillside (on slope)
		HT	Hill top
		RDS	Road side
		RS	River side
		RYS	Railway side

FIELD	GENERAL DESCRIPTION	CODES	DESCRIPTION
		T	Town / City (urban setting)
		VB	Valley bottom
		VS	Valley side
POWER TYPE	Source(s) of power	E	Electricity
		G	Gas
		H	Hand-power
		NA	Not applicable
		O	Oil
		S	Steam
		T	Turbine
		W	Water
BUILDING MATERIALS	Principal building materials from basic observation	B	Brick
		C	Concrete
		CB	Concrete & Brick
		J	Jack-arch (fireproof)
		S	Stone
		SB	Stone & Brick
		ST	Steel
		STC	Steel & Concrete
ECONOMIC BRANCH	Branch(es) of the textile industry to which site belonged	BED	Bedding factory
		BLA	Blanket factory
		BOB	Bobbin mill
		BOI	Boiler works
		BRU	Brush works
		BWK	Bleachworks (unknown branch)
		CAB	Cabinet works
		CAR	Card mill
		CAS	Cashmere (Worsted)

FIELD	GENERAL DESCRIPTION	CODES	DESCRIPTION
		CLO	Clothing Factory
		CON	Confectionary works
		COR	Corn
		COT	Cotton
		CPT	Carpet works
		CTH	Cloth factory (unknown branch)
		CWK	Chemical works
		DWK	Dyeworks (unknown branch)
		ELA	Elastic works
		ENG	Engineering works
		FEL	Felt
		FLA	Flax
		FLO	Flock
		FOU	Foundry
		IRO	Iron works
		LAU	Laundry
		LEA	Leather works
		LIN	Linen
		MOH	Mohair (Worsted)
		MOU	Moulding works
		MUN	Mungo
		MWK	Machine works
		PAP	Paper mill
		PLU	Plush works
		PRI	Print works
		RAG	Rag mill
		ROP	Rope
		RUG	Rug
		SAW	Saw mill

FIELD	GENERAL DESCRIPTION	CODES	DESCRIPTION
		SHO	Shoddy
		SHU	Shuttle works
		SIL	Silk
		SOA	Soap works
		SWK	Shoe works
		SYN	Synthetic
		TAN	Tannery
		TEX	Textiles (unknown branch)
		TWI	Twine
		TXB	Textile belting works
		WAD	Wadding factory
		WAS	Waste
		WHO	Warehouse (unknown branch)
		WIR	Wire
		WOO	Woollen
		WOR	Worsted
		YAR	Yarn (unknown branch)
EMBELLISHMENTS?	Presence of any distinctive architectural embellishments	AR	Archway
		BC	Bell cote
		CL	Clock
		CT	Clock tower
		CRE	Crenelation
		CUP	Cupola
		DAR	Decorative archway
		DD	Decorative doorway
		DE	Decorative entry
		DF	Decorative facade
		DG	Decorative gable

FIELD	GENERAL DESCRIPTION	CODES	DESCRIPTION
		DOF	Decoration/embellishments on offices
		DOM	Dome
		DRG	Decorative dressings
		DW	Decorative windows
		GAL	Galleries
		INS	Inscriptions
		PED	Pediment
		PT	Privy tower
		ST	Stair tower
		T	Tower
		VW	Venetian window
		WT	Water tower
		Y	'Yes' - unspecified embellishments
ISF?	Presence of an 'Initial Survey Form' in NMR files	-	-
ARCHIVE TYPE	Level of detail of archive (based on former RCHME survey)	A	Selected for detail report and inclusion in select inventory
		B	Brief record accompanied by limited photography
		C	Records of mills already demolished at time of RCHME initial survey
INVESTIGATOR	Initials of investigator studying each site	-	-
DATE INVESTIGATED	Date investigated during former RCHME survey in the 1980s	-	-

TABLE THREE: BUILDINGS

FIELD	GENERAL DESCRIPTION	CODES	DESCRIPTION
NBR NO	Five digit National Monuments Record (Swindon) Building File Number (now prefixed by BFO: *i.e.* BFO*xxxxx*)	-	-
BUILDING NUMBER	Unique number given to each principal building at each site within the Yorkshire textile industry	-	-
BUILDING FUNCTION	Function of principal buildings; suffixed to differentiate between numerous types of same building at each site: *i.e.* SM1, SM2...	**BH**	Boiler House
		CDH	Conditioning House
		CH	Chimney
		COT	Cottages (associated workers housing)
		DYH	Dyehouse
		EC	Economiser house
		EH	Engine house
		GSI	Gas installation/plant
		LSHP	Loomshop
		MFH	Manufacturers house
		MISC	Other
		OFF	Offices
		RR	Rope race
		SHD	Shed
		SM	Spinning mill
		WCO	Weavers cottages
		WH	Wheelhouse (water wheel)

FIELD	GENERAL DESCRIPTION	CODES	DESCRIPTION
		WHO	Warehouse
		WHSP	Weaving shop/cottage
		WS	Weaving shed
START DATE	Approximate date range during which earliest parts of the site were constructed (ranges are those determined by the former RCHME): Early 18^{th} C = 1700-1733; Mid 18^{th} C = 1734-1766; Late 18^{th} C = 1767-1799; Early 19^{th} C = 1800-1833; Mid 19^{th} C = 1834-1866; Late 19^{th} C = 1867-1899; Early 20^{th} C = 1900-1933; Mid 20^{th} C = 1934-1967; MOD = post-1970	-	-
END DATE	Approximate date range during which latest parts of the site were constructed (ranges are those determined by the former RCHME): Early 18^{th} C = 1700-1733; Mid 18^{th} C = 1734-1766; Late 18^{th} C = 1767-1799; Early 19^{th} C = 1800-1833; Mid 19^{th} C = 1834-1866; Late 19^{th} C = 1867-1899; Early 20^{th} C = 1900-1933; Mid 20^{th} C = 1934-1967; MOD = post	-	-