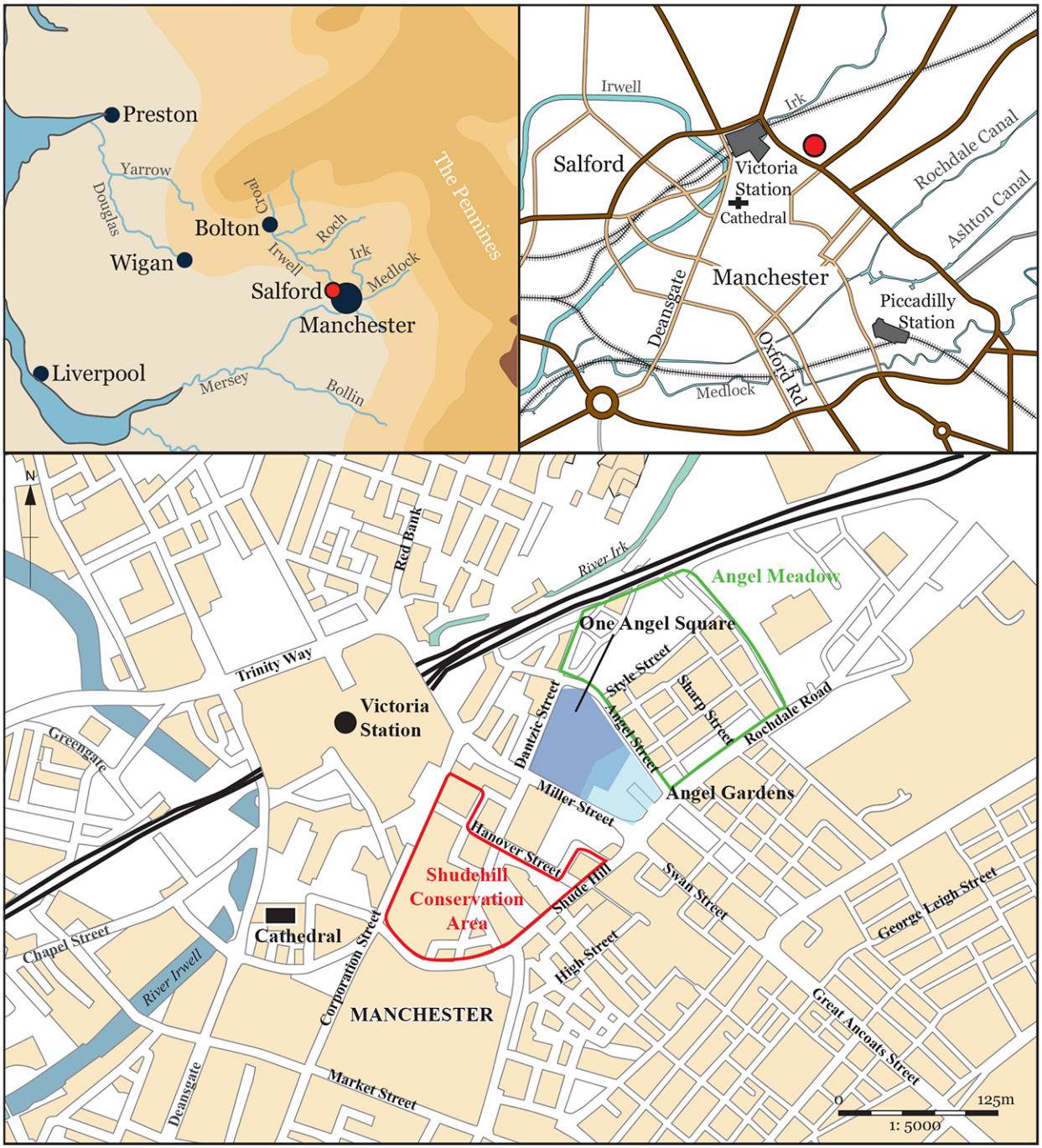
GREATER MANCHESTER'S PAST REVEALED
·14·

'HELL UPON EARTH'

THE ARCHAEOLOGY OF ANGEL MEADOW



Location of Shudehill and Angel Square

FOREWORD

Redevelopment of the car parks off Miller Street has allowed archaeologists to record remains that epitomise the historic development of Manchester. An area that was, in the late eighteenth century, a relatively pleasant edge-of-town environment, with a 'carriage' church, weavers' dwellings and fields, was transformed into a heavily built-up urban landscape crammed with workers' housing, warehouses and factories. The textile industry provided the major stimulus for economic growth. Richard Arkwright's Mill was amongst Manchester's earliest cotton mills, and its archaeological remains encompass key developments in early steam power.

CONTENTS

Manchester's remarkable growth in manufacturing in the first half of the nineteenth century had massive social consequences in terms of living conditions, as families flocked to the town for work. The overcrowded lodgings, back-to-back houses and cellar dwellings were famously described by Engels and other social commentators. The second half of the nineteenth century saw planning reforms and gradual improvements in housing and sanitation. All of this is clearly visible in the archaeological record described in this booklet.

The archaeological investigations and this publication have been secured through the planning system, although the commitment of the developer, The Co-operative Group, and the fieldwork and research of the archaeological contractor, Oxford Archaeology North, have been exemplary. The passion of Mancunians for their heritage was evident at the open day, on a Saturday in October 2009, when over 1000 visitors came to view the excavations.

NORMAN REDHEAD,
Heritage Management Director,
Greater Manchester Archaeological Advisory Service

INTRODUCTION

Situated on the northern edge of the city centre, the area known as Shudehill was at the epicentre of Manchester's phenomenal rise to prominence as a manufacturing centre of international repute in the late eighteenth century. During this period, its semi-rural character was transformed to a densely developed townscape, which was dominated by warehouses, textile mills, and ancillary works that lined the principal thoroughfares of Miller Street, Shude Hill, Swan Street and Hanover Street. Rows of houses were also built for artisan craftsmen and their families in the late eighteenth century, although these were used subsequently as cheap tenements and lodging houses to accommodate the expanding population, creating one of the poorest housing districts in Manchester.

Many of the buildings were dilapidated by the end of the nineteenth century, and several streets in the area were allocated for clearance during the 1930s. However, plans for renewal were halted by the onset of the Second World War, whilst aerial bombing in December 1940 destroyed swathes of buildings in the area.

An aerial view across Shudehill in 1937
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View across Shude Hill from High Street in 1976, featuring the CIS Tower

The Town and Country Planning Act of 1944 permitted Manchester Town Planning Committee to make compulsory purchases of areas it wished to redevelop. One such, allocated for general industrial development, comprised 6.61 acres of land in Shudehill bounded by Miller Street, Rochdale Road, Angel Street, and Dantzic Street. Of this area, however, 4.38 acres were reported to have been cleared in the aftermath of wartime bombing raids.

Post-war redevelopment of Shudehill included the erection of the remarkable CIS Tower on Miller Street in 1962. Designed by Gordon Tait and GS Hay as a prestige headquarters to showcase The Co-operative Movement in Manchester, it rose to a height of 118m, making it the tallest tower block in Britain when built. A large new office block for Baxendale & Co, the leading firm of ironmongers and hardware manufacturers, was also built on the opposite side of Miller Street during this period, although it lacked the architectural merit of the CIS Tower, and was demolished in the later twentieth century. Tracts of land across Shudehill remained undeveloped following wartime clearance, however, and were used until recently for car-parking.

Aerial view across Shudehill in 2005, showing the footprint of One Angel Square. The construction of this iconic building in 2010-12 as part of the NOMA scheme has acted as a catalyst for the regeneration of the area

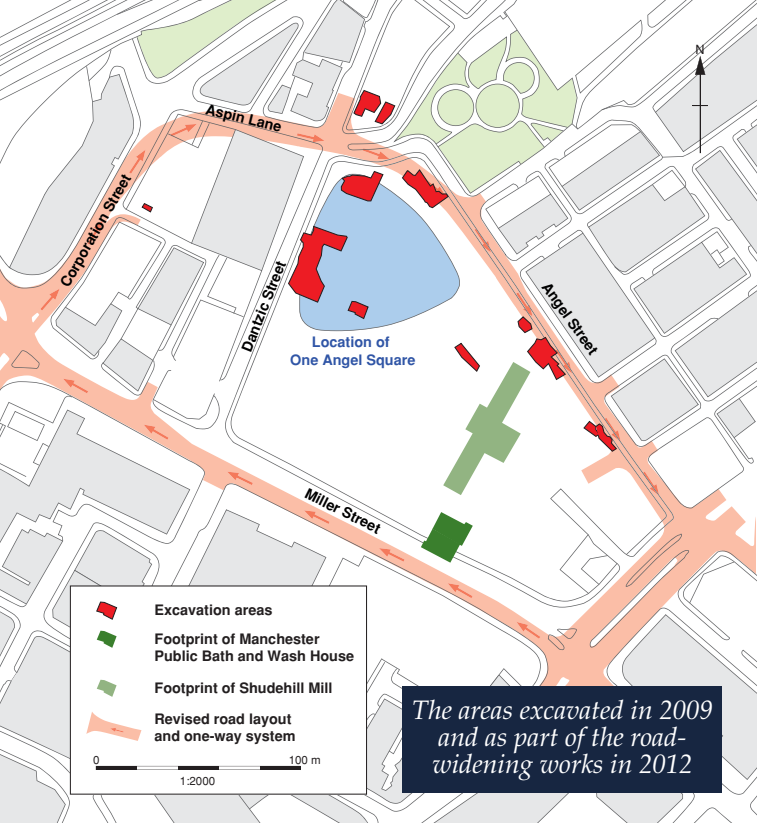
A view from the CIS Tower in 2012, showing One Angel Square during construction (©Co-operative Group)

The twenty-first century has seen considerable investment in Shudehill, leading to its revitalisation as a key locale in central Manchester. This is due primarily to the NOMA project, one of the largest urban regeneration schemes in England, which has been brought forward by The Co-operative Group, with support from Manchester City Council. NOMA aims to rejuvenate 20 acres of land owned by the joint venture partnership of The Co-operative Group and Hermes Investment Management on the northern edge of the city centre, to create a mixed-use neighbourhood of office, residential, retail and leisure space, with four acres of public realm. The first phase of this major scheme involved the construction of the iconic One Angel Square, designed by architects 3DReid as a new head office for The Co-operative Group. Standing to a height of 72.5m, this remarkable new structure was completed in February 2013, and is accredited with being one of the most sustainable large office buildings in the world.

The construction of One Angel Square was preceded by a major archaeological excavation, undertaken by OA North in 2009, which uncovered the buried remains of some 75 dwellings. Several phases of development were recognised, with the earliest structure representing part of a double-pile house. Rows of artisans' dwellings with attic workshops characterised the late eighteenth-century development of the area, whilst evidence for cheaper accommodation was provided by the discovery of two-roomed cellars that had almost certainly been used as dwellings. The excavation also showed that various buildings had been partitioned in the nineteenth century to accommodate the rapidly expanding population, as the area earned notoriety as part of Angel Meadow, one of Manchester's worst Victorian slums.

The atrocious living conditions of Manchester's urban poor, who occupied this type of dwelling, attracted the philanthropic attention of numerous social commentators in the nineteenth century, particularly in the wake of several cholera epidemics, and these created a rich legacy of fascinating contemporary accounts. However, very few provide detailed descriptions of the actual buildings, and the archaeological work carried out on the site of One Angel Square has provided a fresh insight into the development and form of nineteenth-century workers' housing in Manchester.

Revealing the remains of workers' housing on Angel Street in 2009



The areas excavated in 2009 and as part of the road-widening works in 2012

A significant element of the first phase of NOMA was the reconfiguration of the local road system. Until 2012, Miller Street formed an integral component of Manchester's inner ring road, creating a barrier to pedestrian movement between the NOMA estate and the city centre. As part of the regeneration of the area, this road has been transformed into a two-lane boulevard to serve northbound traffic, and Corporation Street, Aspin Lane and Angel Street have been adapted and widened to accommodate southbound traffic. This has effectively altered the perception that Miller Street marks the northern edge of the city centre, and has enabled One Angel Square to be brought into Manchester's central zone.

The road-widening works were preceded by archaeological excavation in 2012, which investigated the sites of more early nineteenth-century workers' housing on Dantzic Street, Aspin Lane and Angel Street. The excavation also provided emphatic evidence for the 'Manchester Blitz' of December 1940, not least through the discovery of an air-raid shelter that had been inserted into the abandoned cellars of eighteenth-century houses.

The remains of early nineteenth-century cellar dwellings revealed beneath the surface of a modern car park on Dantzic Street

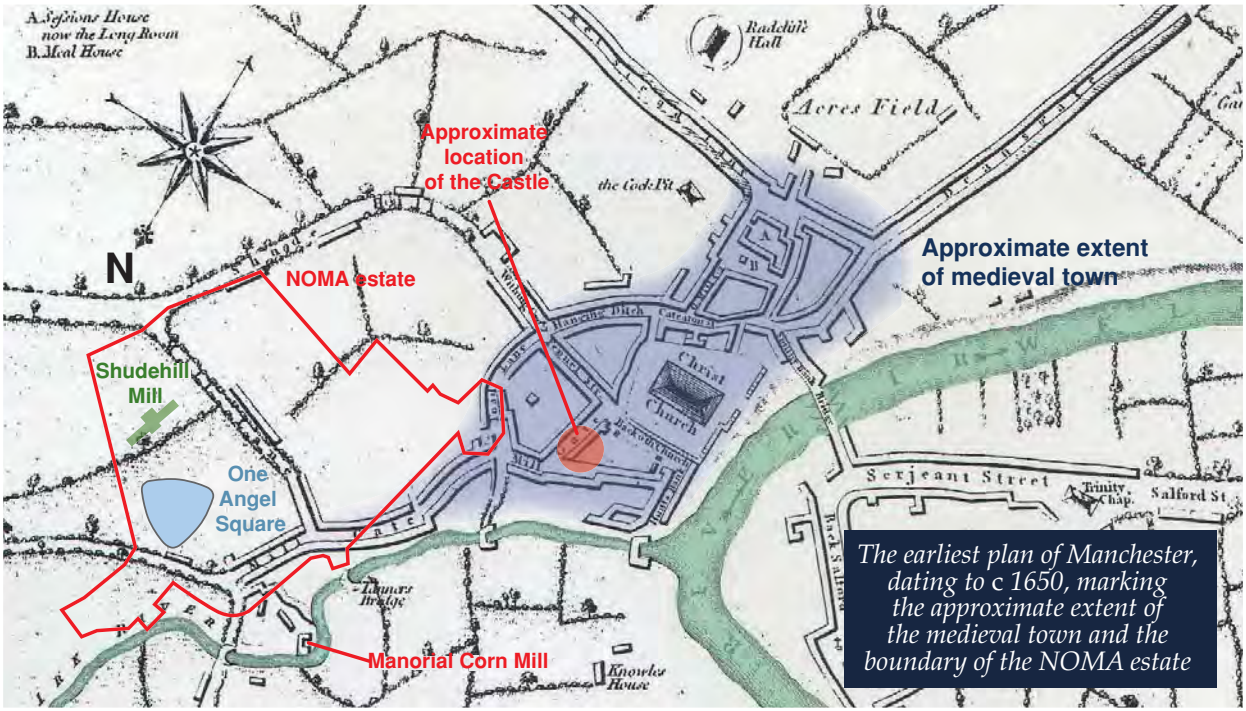
The remains of the engine and boiler houses at Arkwright's Shudehill Mill, revealed during the archaeological excavation

The second phase of NOMA focused on land situated immediately to the south-east of One Angel Square, incorporating the site of Richard Arkwright's Shudehill Mill. This pioneering cotton mill was built in 1780-3, and is considered to have been the first 'modern' textile factory to be established in Manchester, utilising ground-breaking technology that paved the way for the application of steam power to the cotton industry. Archaeological excavation in 2014-15 revealed fascinating evidence for the development of the mill, including hugely significant evidence for the evolution of its power systems.

Excavation of areas immediately adjacent to the mill revealed the remains of other important elements of the nineteenth-century townscape, including the foundations of Manchester's first public baths and wash house, which opened in September 1846. The exciting findings from these various archaeological excavations are presented in this booklet, placed in the context of the historical development of Shudehill.

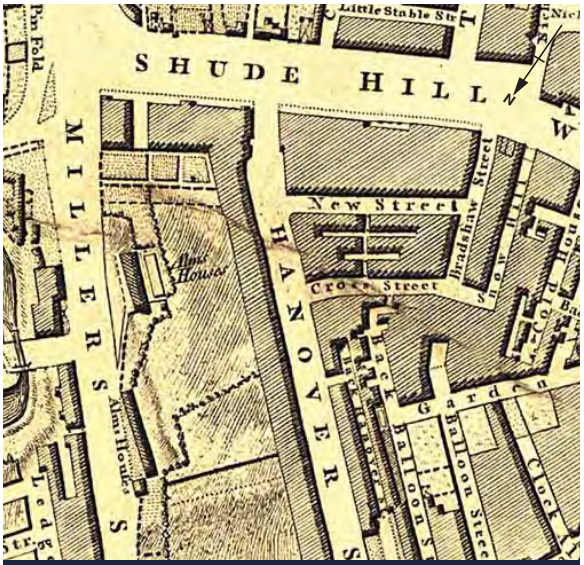
THE EARLY DEVELOPMENT OF SHUDEHILL

Settlement in Manchester following the Norman Conquest of 1066 was focused on the naturally defensible position overlooking the confluence of the rivers Irwell and Irk, where a castle had been built by 1184. The medieval town was established to the south and east of the castle, and was probably bounded by Toad Lane and a modified watercourse known as Hanging Ditch. Long Millgate, the town's longest and most populous street, is documented from the early fourteenth century and extended along the south side of the River Irk to Manchester's manorial corn mill.



The earliest plan of Manchester, dating to c 1650, marking the approximate extent of the medieval town and the boundary of the NOMA estate

The first plan of Manchester, dating to *c* 1650, shows that the town had by then expanded beyond its medieval boundaries, and annotates Shude Hill and Miller's Lane, the forerunner of Miller Street. The earliest reference to Shude Hill occurs in documents dating to 1554, although the thoroughfare is probably older. The origin of the name is uncertain, but perhaps derives from 'Shude', meaning husks of oats. Miller's Lane is documented from the 1580s, and may have originated as a convenient link between the manorial corn mill and the eastern approach to the town via Shude Hill.



The almshouses in the late eighteenth century, as shown on Charles Laurent's map of 1793

In 1635, the trustees of Edward Mayes bought four acres on the south side of Miller's Lane, which were rented out and the profits distributed to the poor. Very little is known about Edward Mayes, other than that he served as an officer of the Court in Manchester and, upon his death in 1621, he bequeathed money to be used for the benefit of the town's poor. The Mayes Charity also established almshouses on Miller's Lane, which they used to provide accommodation for up to 20 families. It is thought that an inscription on the front of these almshouses recorded that they were built in 1680, although some buildings are shown in their position on the plan of *c* 1650.

Another local seventeenth-century citizen noted for his philanthropy was William Hulme, a landowner, lawyer and a Justice of the Peace for Manchester. Hulme owned several significant properties, including Withingreave Hall on Shude Hill. On his death in 1691, he left some of his property in trust, with instructions that the money was to be used to provide funding for poor students. The lands bequeathed by William Hulme are shown on an illustrated survey of the family estates in 1753, which provides a fascinating glimpse of Shudehill prior to the onset of industrialisation. This shows several different types of properties in the area, ranging from merchant's houses to tenements with attic workshops that were probably occupied by artisans.

Extract from the survey of 1753, showing two tenements situated opposite the almshouses on Miller's Lane. The larger properties had formal gardens at the front and an orchard to the rear, bounded by a stream, suggesting that the tenants were reasonably affluent (courtesy of Chetham's Library)

Part of the cellar of the double-pile house

The remains of a double-pile house dating to the seventeenth or early eighteenth century, not shown on the survey of the Hulme estates, were revealed at the corner of Angel Street and Factory Lane during the archaeological excavation on the site of One Angel Square. Whilst much of the building had been remodelled during the later eighteenth century, its original rear cellars were exposed. Their layout was typical for early eighteenth-century town houses, with the main cellar containing a narrow fireplace, suggesting its use as a kitchen. The adjacent cellar was somewhat smaller, perhaps forming a pantry and wine cellar, with access via a short curving stair to a brick-lined well that was discovered in the rear yard.

This form of building remained a popular style for smaller houses until the nineteenth century, and probably typifies the type of dwelling that occupied the urban fringe of pre-industrial Manchester. The use of brick as the principal building material is of note. Whilst timber-framed buildings continued to be erected in Manchester and Salford throughout the post-medieval period, the transition to brick appears to have gained momentum during the seventeenth century. The bricks used in the excavated house are likely to have been made on site, reflecting Shudehill's rich natural resource of clay.

Well and connecting stair into one of the cellars associated with the double-pile house

The survey of the Hulme estates provides useful detail that is not readily evident upon the series of plans of Manchester produced by the cartographers Russel Casson and John Berry between 1741 and 1751. These early plans show the extent of development along the principal streets, and also the almshouses established by the Mayes Charity, together with another building on Miller's Lane that is likely to represent Manchester's first workhouse.

A scheme to provide Manchester with a workhouse was first launched in 1731, and a bill to advance the scheme was submitted to Parliament. Whilst this was aborted initially, the lord of the manor eventually built part of the workhouse on Miller's Lane. The original plan was for a set of buildings arranged around a quadrangle, but only one was actually completed. This was four storeys in height, with a dining hall and offices on the first floor, lodging rooms on the second floor, and Dutch looms for weaving smallwares on the third floor. However, the workhouse was short-lived, and later mapping annotates the building as more almshouses.

It is implicit from the historical mapping that this northern fringe of Manchester had a semi-rural character in the mid-eighteenth century. Houses in Shudehill will have had a very pleasant prospect, with views across the River Irk and Red Bank to the countryside beyond. However, this setting changed dramatically during the following decades.

Plan of Manchester produced by Casson and Berry in 1741, highlighting the footprint of One Angel Square

THE ONSET OF URBANISATION

The onset of rapid industrialisation in the late eighteenth century resulted in a massive expansion of the town's population. The development of Shudehill during this period is captured on detailed maps produced by William Green in 1787-94, and Charles Laurent in 1793. These show that new streets had been laid out, including Blakeley Street and Angel Street, which provided a link between Ashley Lane and Rochdale Road. The streets lay within an area that was known locally as Angel Meadow, which was to become one of the most notorious slums in Manchester.

A drawing of St Michael and All Angels Church in c 1850 by CW Clennell

Extract from William Green's 'Map of Manchester and Salford', begun in 1787 and completed in 1794, showing the boundary of the NOMA estate

Angel Street also gave access to the church of St Michael and All Angels. This was built in 1788, and was associated with a new burial ground, consecrated in 1787. The church was originally planned as a 'carriage church', which wealthy Mancunians could drive to from the town. However, with the purchase of the land to the north-east by the Overseers of the Poor of Manchester in 1786 for a burial ground, and the absorption of this area into the city, the church instead predominantly served the new working-class population in the area.

Many of the houses that were excavated on the site of One Angel Square in 2009 had been constructed during this period, along the two principal thoroughfares of Blakeley Street and Angel Street. When they were first built, these large houses had a pleasant prospect, on the fringe of Manchester, though still close to the commercial district of the expanding town. Initially, they will have provided accommodation for financially comfortable families, which probably included professionals, merchants and artisan craftsmen, such as hand-loom weavers.

Some of the houses were captured on photographs taken in the late nineteenth century, which show long horizontal galleried windows on the upper floors, often referred to as 'weaver's windows'. These demonstrate that these properties were used as 'industrial' cottages, with artisans' workshops on the top floor. In broad terms, the style of these properties reflected the Georgian trend of continuous rows of terraced houses, both in the upper-middle class terraces, typified locally by houses on St John Street off Deansgate, and the short rows of more humble cottages that appeared in many villages at this time.

A photograph taken in the 1890s, showing some of the eighteenth-century houses with top-floor workshops on Blakeley Street (renamed Charter Street in the nineteenth century, and then Dantzic Street)

Excavation in progress along Dantzic Street (originally Blakeley Street)

Excavation along Blakeley Street revealed the remains of eight late eighteenth-century houses, all of which had full-size cellars, a departure from the accepted building tradition of partial basements. All of the cellars had been divided into two rooms, each measuring 15-16ft (4.57-4.88m) wide, with the front room being slightly larger than the rear. All of the rooms contained fireplaces, implying that they had been intended as separate dwellings, rather than being for storage. This suggestion was reinforced by the discovery of stairwells that provided access to the cellars from Blakeley Street, with no evidence for any communication between the cellar and the ground floor of the house.

The front room of the cellar will have been the 'living' room, serving as a parlour and a kitchen area. The rear room will have been used as a dimly lit bedroom, with the inevitable dampness of the underground conditions to some extent being compensated by the inclusion of a second fireplace.

Late eighteenth-century cellars on Blakeley Street

Despite being relatively good-quality houses, the partition walls between these properties were only a single brick-course thick. This type of construction was cited by social commentators such as Friedrich Engels as being an attempt by property speculators to skimp on materials, and erect low-quality accommodation for maximum profit, although it may simply represent a continuation of an established building tradition.

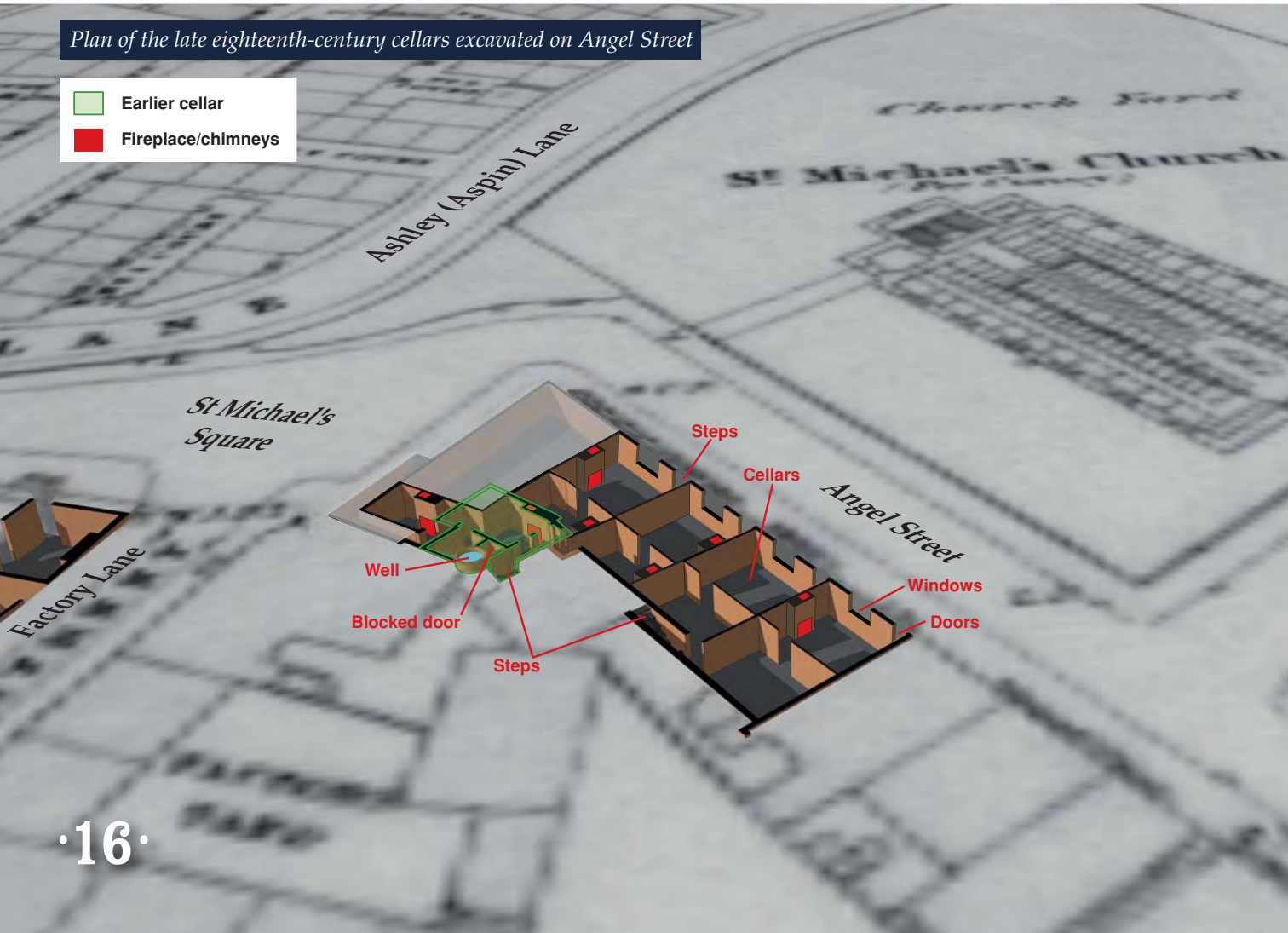
Evidence from the excavation showed that there had been access from the ground floor of each house to a private yard at the rear, each approximately 15ft (4.57m) long. Each of these yards contained an outshut for a privy or ash-closet, affording 'luxuries' that were not present in the dwellings that were built in the area subsequently.

A few houses had been built to the rear of these yards by the end of the eighteenth century, along what became known as Back Blakeley Street. These similarly had private rear yards, although the buildings did not incorporate cellars.

The small yards to the rear of the Blakeley Street houses

The well-preserved remains of cellars and yards belonging to four late eighteenth-century dwellings were excavated along Angel Street, adjacent to the remodelled double-pile house situated on the corner of Angel Street and Factory Lane. In contrast to the houses along Blakeley Street, which had been erected in a single episode of construction, those fronting onto Angel Street all varied slightly in their layout. In particular, there was a much greater variation in room sizes and the positioning of fireplaces, and partition walls varied from a single course of edge-set bricks to a full-brick in thickness. Thus, whilst nineteenth-century plans of the area depict uniform rows of terraced properties, excavation has shown that the buildings were actually constructed in much smaller blocks, presumably by different builders and property speculators.

Plan of the late eighteenth-century cellars excavated on Angel Street

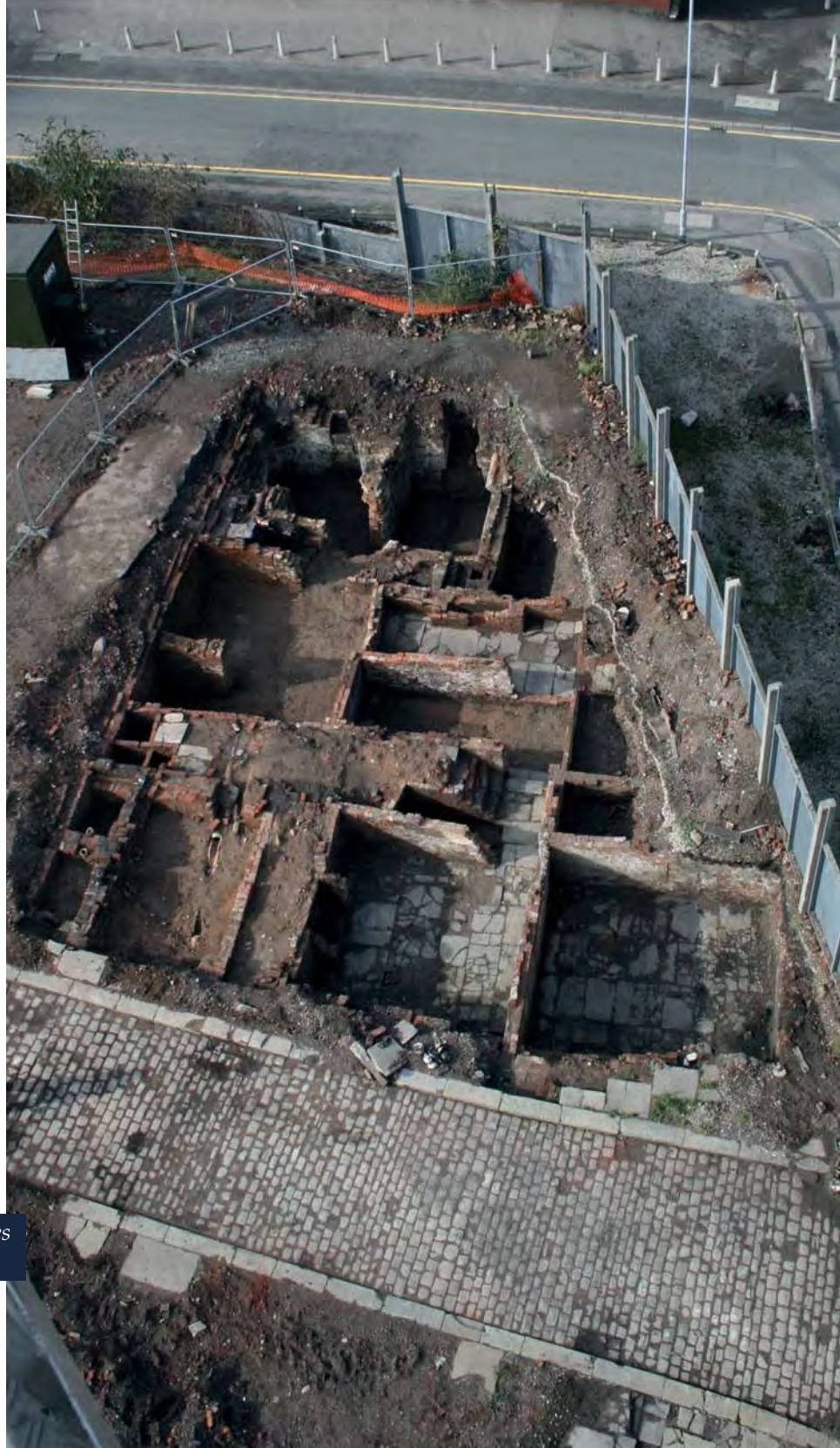


The earliest of these houses had stood at the junction of Angel Street and Factory Lane. The excavated remains indicated that they included the double-pile house, reflecting the latest building fashion, together with a smaller structure on its western side that appeared to have been a small, single-room cottage. The latter incorporated a cellar that was afforded direct access from Angel Street via a narrow passage and steps, suggesting that it may have been a seperate dwelling.

More houses had been built along Angel Street before the end of the eighteenth century, and the remains of four of these were revealed during the archaeological excavation. In many respects, these houses were similar to those on Blakeley Street, all containing cellars that were divided into two rooms, with independent access from the street. Photographs taken in the 1890s depict architectural embellishment around the front doorways, implying that the houses were not intended as low-cost accommodation.

A view of Angel Street taken in the 1890s, showing architectural embellishment around the doorways and 'weaver's windows' on the top floor

A triangular area at the north-western end of Angel Street, at the junction with Ashley Lane and Factory Lane, was named St Michael's Square after the nearby church. Excavation adjacent to the square in 2009 revealed a well-preserved and complex arrangement of cellars, with intervening passageways, comprising several phases of activity. These included two deep cellars, retaining evidence for a barrel-vaulted ceiling, which had almost certainly formed part of a building depicted on William Green's map of 1794, and named St Michael's Tavern on mid-nineteenth-century maps. The adjacent structures appeared to represent the intensification of development in the area during the early nineteenth century, and included several cellars that contained large fireplaces, suggesting that they had been used as dwellings.



The excavated remains of properties fronting St Michael's Square

The site of late eighteenth-century houses on Back Joiner Street, situated behind the main thoroughfares of Blakeley Street and Angel Street, was also subject to archaeological excavation. The foundations of most of these houses had been removed entirely, and none of them contained cellars, although the remains of one small cottage were revealed.

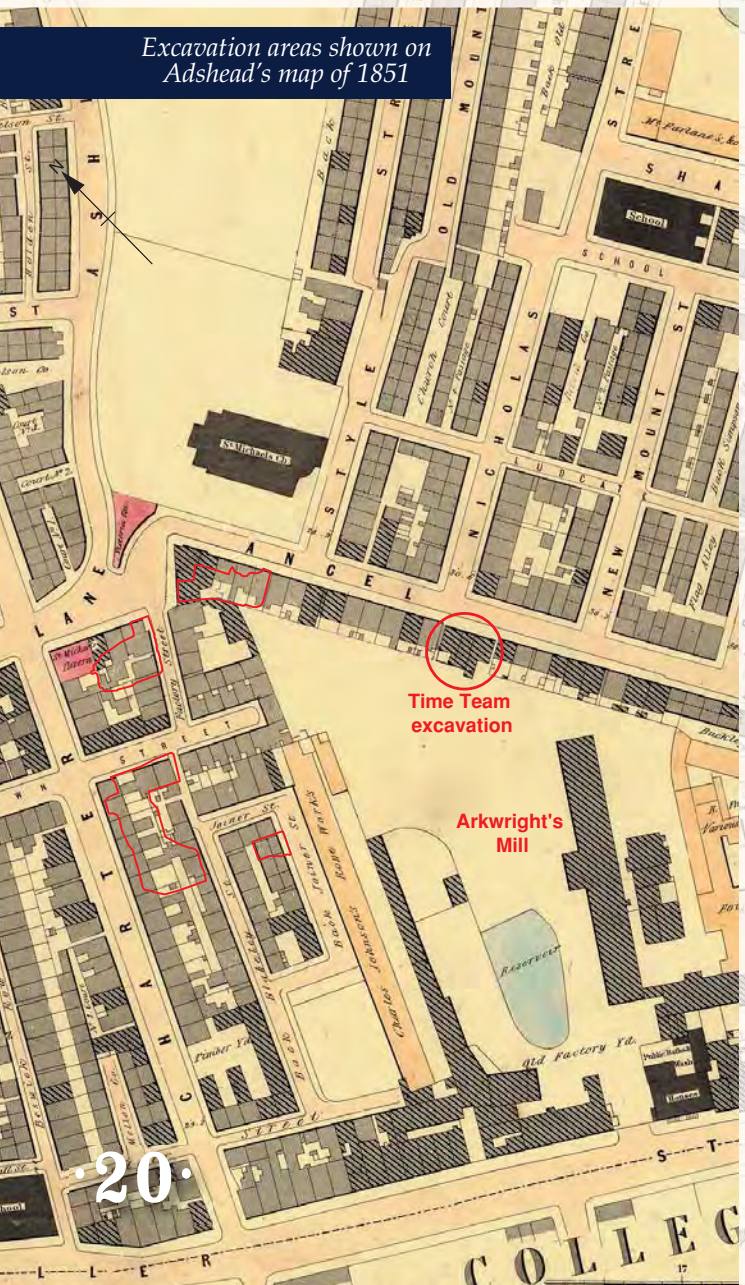
This contained two rooms, each measuring 10ft 2in x 14ft 7in (3.08 x 4.45m), and was thus somewhat smaller than the houses on the main streets. Each room contained a fireplace against the south wall, with a doorway between the two rooms placed near to the north wall. The exterior walls were a full-brick thick, laid on a foundation plinth that was half a brick wider. An entrance in the eastern wall retained a sandstone threshold and pads for door jambs, with a rebate for a timber doorframe. This provided access to the cottage from a 3ft-wide (0.92m) passageway alongside Back Joiner Street.

Excavated areas overlaid on the Ordnance Survey map of 1850, showing the house on Back Joiner Street

Excavated remains of the house on Back Joiner Street

Evidence from the excavation contradicts the detail shown on the Ordnance Survey map of 1850, which depicts a pair of back-to-back houses, with separate entrances from Back Joiner Street and an unnamed courtyard. Whilst this may suggest that the house was sub-divided in the mid-nineteenth century to create two dwellings, there was little evidence for this in the surviving fabric.

The remains of houses situated further to the south-east along Angel Street have also been revealed by archaeological investigations, the first of which was carried out by Channel 4's *Time Team* in 2005. Whilst the primary focus of the televised programme was the site of Richard Arkwright's cotton mill, a short distance to the south, it was hoped that the excavation of a worker's dwelling would provide added interest to a narrative of the early industrial town.



Excavation areas shown on Adshead's map of 1851

The ground floor of the house had been removed completely during demolition, but the cellar survived largely intact. A halfpenny of George III, dated 1775, was discovered encased in mortar within the rubble infill of the cellar, tentatively suggesting the construction date of the house. The cellar originally comprised two rooms, each containing a hearth, although the connecting doorway had been bricked-up in the mid-nineteenth century to provide two single-room dwellings. Access to the rear cellar appeared to have been blocked up subsequently, which probably coincided with it ceasing to be a dwelling in the late nineteenth century.

The remains of a late eighteenth-century cellar excavated by Time Team *in 2005 (GMAU Archive)*

A further opportunity to examine the remains of eighteenth-century dwellings in this part of Angel Street arose from the road widening scheme in 2012. As in the excavations of 2009, the most striking feature of the Angel Street properties was the irregular layout of their plan. The remains of seven properties were revealed, representing four slightly different plan types, with only some containing cellars. All of the excavated houses had two rooms, with each having average dimensions of 11ft 8in x 15ft (3.56 x 4.57m), with a connecting door between the front and rear rooms.

A 3ft-wide (0.91m) side passage leading to a small rear yard was also identified between two of the houses. The yard had contained an outshut, probably containing an ash-closet or privy, similar to those revealed in the rear yards on Blakeley Street. Whilst such extensions became a common feature of terraced housing after the mid-nineteenth century, they have infrequently been recognised in the context of a late eighteenth-century urban terrace.

The remains of one of the eighteenth-century houses excavated on Angel Street in 2012, showing the side passage leading to the rear yard and outshut

RICHARD ARKWRIGHT'S SHUDEHILL MILL

Portrait of Richard Arkwright produced in 1790 by Mather Brown

An immensely significant development that was to have far-reaching implications for the industrial expansion of Manchester and the wider region was a decision by Richard Arkwright to build a textile mill in Shudehill. This was one of a number of pioneering cotton factories in England, but was the first to depend upon a steam engine as a source of motive power. As such, the mill signalled the birth of Manchester as the pre-eminent centre of steam-powered cotton spinning.

Richard Arkwright, the son of a tailor, was born in Preston in 1732, and was the youngest of 13 children. His parents were not wealthy, and Richard never received any formal education. After completing an apprenticeship as a barber, he established a small business on Churchgate in Bolton. He progressed to become an itinerant dealer in hair to serve the local wig-making trade, but soon focused his attention on making a machine that turned raw cotton into thread.

Working together with John Kay, a clockmaker, Arkwright succeeded in producing a machine that was capable of spinning cotton yarn, which he patented in 1769. This became known as the water frame, once Arkwright had adapted the machine to enable it to be powered by a waterwheel. The success of this machine allowed Arkwright to attract the financial backing required to employ the water frame on a commercial basis.

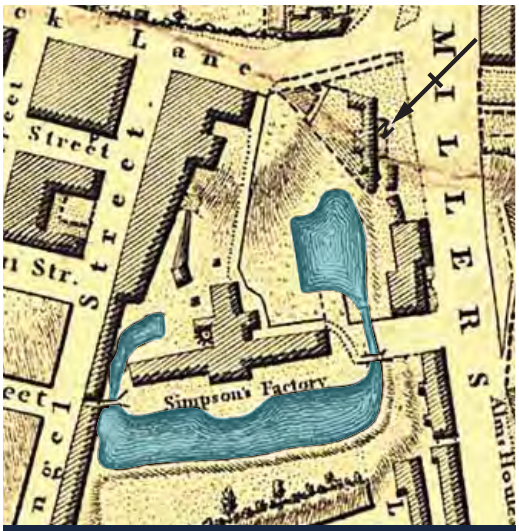
A developed example of Arkwright's patented spinning machine, which became known as the 'water frame', on display at Helmshore Mills Textile Museum in Lancashire

Arkwright's Cromford Mill, depicted on a print of 1836

Following initial experimentation in a horse-powered mill in Nottingham during 1769, Richard Arkwright and his financial partners established a mill at Cromford in Derbyshire in 1771. This five-storey mill, powered by a large waterwheel, became the world's first successful cotton-spinning mill.

Spinning was only one stage in the process of producing cotton yarn, and whilst the water frame allowed this to be mechanised, the preparatory processes were still carried out by hand. In 1775, however, Arkwright secured a patent for his rotary carding machine that transformed raw cotton into a cotton lap that was suitable for spinning. This enabled the entire process of producing spun yarn from raw cotton to be mechanised, signalling the birth of the modern factory system, and led Arkwright to embark on a great burst of mill-building activity. This began at Cromford in 1776, where he erected another huge water-powered mill. In the following year, he established mills at Birkacre near Chorley in Lancashire, at Bakewell in Derbyshire and at Wirksworth, also in Derbyshire.

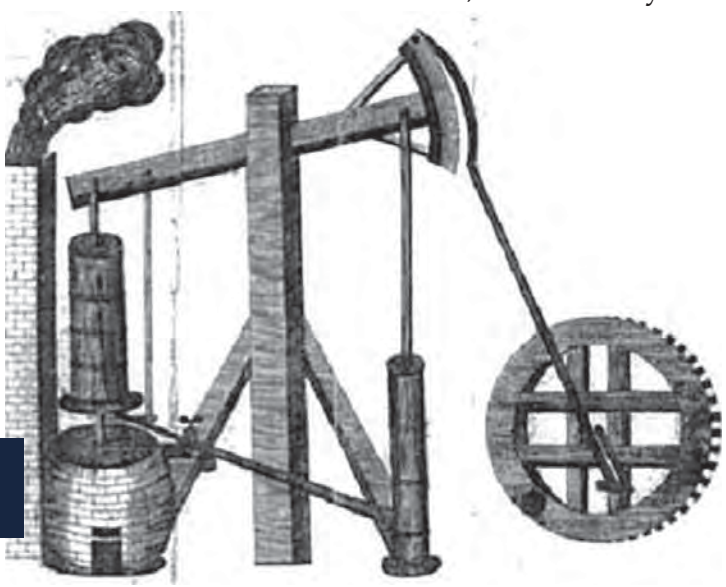
Arkwright's Mills in Cromford. The first mill, reduced in height by two storeys after a fire in 1929, is shown on the right, adjacent to a five-storey block dating to the mid-1780s. Arkwright's second mill of 1776 burnt down in 1890



Richard Arkwright's Shudehill Mill depicted on Laurent's map of 1793, showing the reservoirs that probably originated when the site was used as a brickworks

Arkwright also aspired to have a mill in Manchester, amidst the town's powerful textile merchants. The opportunity arose in 1780, when a plot of land in Shudehill was advertised for let. This had been used until the late 1770s by John Pickford for manufacturing bricks, and was advertised as 'containing upwards of two acres…and plenty of water'. After obtaining the lease for this land, Arkwright, in partnership with two wealthy cotton merchants, William Brocklehurst and John Whittenbury, began to erect his Shudehill Mill in the final months of 1780. At five-storeys high, 30ft (9.14m) wide and an incredible 218ft (66.45m) long, this was by far the largest mill that Arkwright had built, and was perhaps intended to some degree as a symbol of his increasing power and influence.

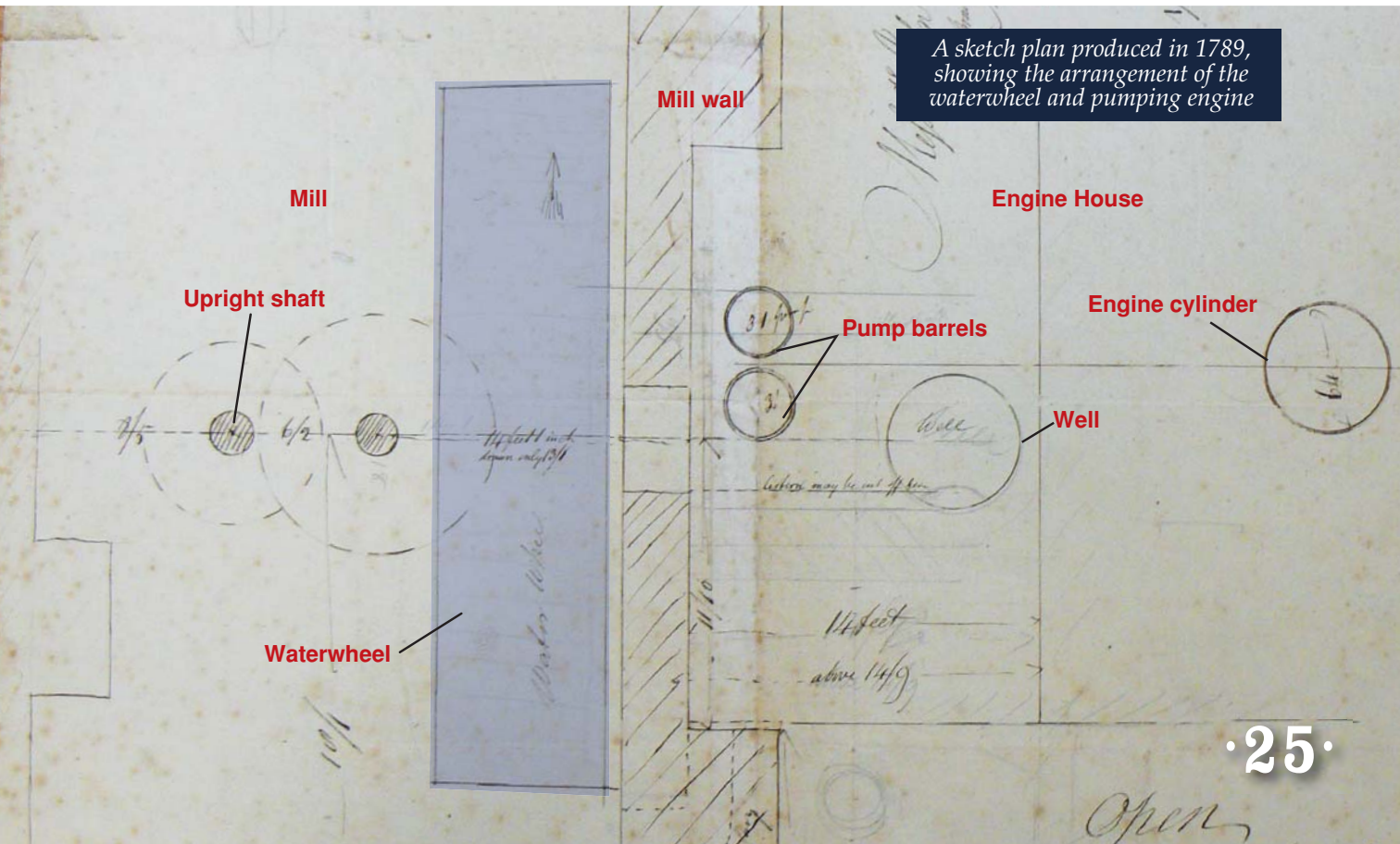
In stark contrast to the sites chosen for all of his earlier mills, Shudehill was not served by a river, and it was thus not Arkwright's intention to depend entirely on flowing water to drive the machinery in the mill. Instead, it appears that Arkwright planned to install a steam-powered pumping engine that would furnish the mill's waterwheel with a regular and constant source of water. However, at an early stage in the project, a London-based engine manufacturer, Thomas Hunt, convinced Arkwright that he was able to supply a Newcomen-type steam engine capable of rotary motion that could drive the mill's machinery directly, without recourse to a waterwheel. Arkwright was evidently persuaded and purchased an engine from Hunt, which he duly installed into his Shudehill Mill in *c* 1781.



Thomas Hunt's drawing of the Newcomen-type steam engine that he supplied to Richard Arkwright

This ground-breaking attempt to power the mill entirely by steam failed to work, however, presumably because Hunt's engine proved to be inadequate. As the local ironmaster James Bateman commented in 1783, 'Mr Arkwright's works to go by fire engine are all to pieces', compelling him to revert to the original plan of using a waterwheel coupled with a steam-powered pumping system. Documentary accounts suggest that the waterwheel was 28ft in diameter (8.53m) and 8ft wide (2.44m), and was supplied with water via two pumps, but very little else is known about this pioneering system.

The archaeological excavation in 2014-15 revealed that the waterwheel had been housed in an 8ft-wide (2.44m) wheelpit, placed against the east wall inside the mill. The pit was of brick construction, with a flagstone floor exposed at a depth of 26ft (7.92m) below the top of the structure. The position of the waterwheel's axle was marked by large housings in opposing elevations of the wheelpit, whilst the distance of the axle from the ends of the wheelpit indicated that the waterwheel had actually been only 26ft in diameter (7.92m).



A sketch plan produced in 1789, showing the arrangement of the waterwheel and pumping engine

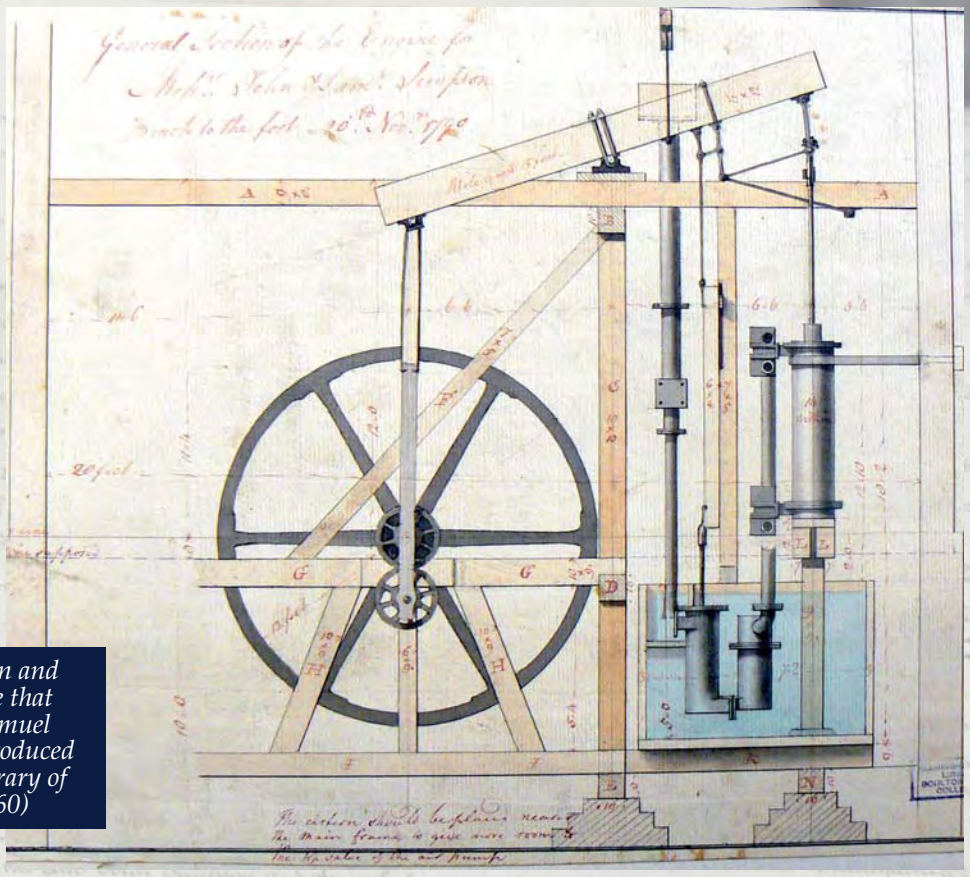
Excavating the bottom of the wheelpit, showing one of the culverts that connected to the large reservoir

It had been widely assumed until recently that the water was pumped from the large lower reservoir to the upper reservoir shown on Laurent's map of 1793, from where it flowed onto the waterwheel. However, excavation demonstrated that the bottom of the wheelpit served as a large cistern, with channels at its base allowing water to be pumped back onto the waterwheel via the engine house. Two culverts on the opposite side of the wheelpit to the engine house provided a connection to the lower reservoir, enabling the water level to be regulated.

Adjacent to the wheelpit was a similar, but smaller, pit that was enclosed by the remains of a semi-circular wall. This pit had probably housed a large spur wheel fitted to the end of the waterwheel axle. Power to each floor of the mill was transmitted via a wooden upright shaft, which will have been turned by bevel gears connected to the spur wheel.

Part of the gearing arrangement is captured on a sketch drawn in 1789, although the pit for the spur wheel is not shown. The sketch also shows where the principal components of the pumping engine were located, including the cast-iron pump barrels that will have lifted some 700 gallons of water from the bottom of the waterwheel pit every minute. The mill's power system was replaced in the early 1790s, however, which removed nearly all the physical evidence for this machinery.

The remains of the wheelpit, and the spur wheel pit, enclosed by a semi-circular wall



Drawing produced by Boulton and Watt of the 6hp steam engine that was installed in John and Samuel Simpson's mill of c 1786 (Reproduced with the permission of the Library of Birmingham, MS 3147/5/60)

In January 1784, Arkwright sold the mill to his son, Richard, who immediately formed a partnership with his brothers-in-law, John and Samuel Simpson. The new owners invested in the site and, by 1786, another spinning block had been added to the mill complex. In the same year, Richard Arkwright Jnr sold his share in the mill for £20,640 15s 4d, leaving Shudehill Mill entirely in the hands of John and Samuel Simpson.

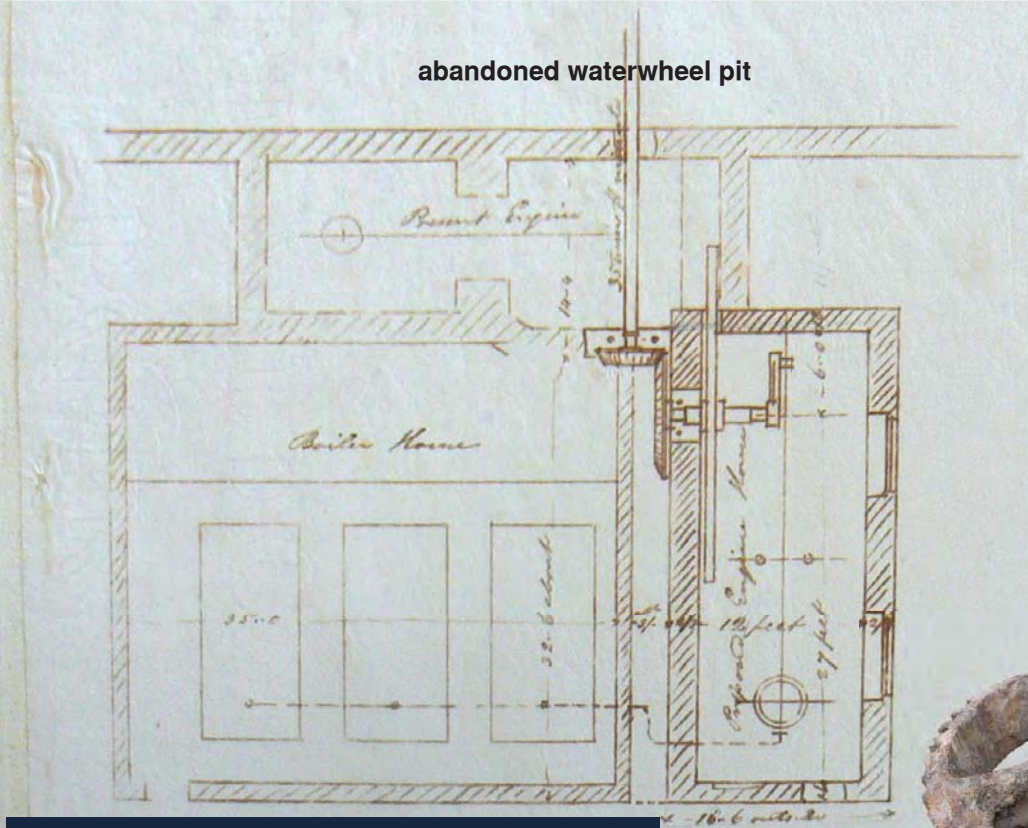
The Simpsons were keen to replace the waterwheel with a steam engine that could power the machinery in the mill directly, a decision taken in the wake of Peter Drinkwater establishing Manchester's first cotton mill to be powered entirely by a steam engine in 1789. The Simpsons entered into discussion with Matthew Boulton and James Watt of Birmingham, the leading steam-engine manufacturers of the time, who had supplied the engine to Peter Drinkwater. This culminated in the placing of an order for a 6hp double-acting 'sun and planet' steam engine in September 1790. The engine was actually installed in the Simpsons' second mill in January 1791, signalling the birth of efficient steam power at Shudehill.

An order for a second steam engine to replace the waterwheel and pumping engine in the original mill followed shortly afterwards. The new power plant was evidently becoming a pressing requirement by that date, as an eyewitness reported that 'the old engine is giving way every day'. The design drawings were produced by one of Boulton and Watt's engineers in February 1792, and show a 40hp engine and two boilers in which to raise the steam. The waterwheel and other original machinery was removed, and the new engine was finally put into production during the summer of 1793.

The archaeological excavation exposed the fascinating and well-preserved remains of the Boulton and Watt steam-power plant. These included the external walls of the boiler house and the foundations for the two wagon boilers that provided the steam for the engine. A series of brick-built flues was also exposed that channelled the exhaust gases from the boilers to a huge chimney to the rear of the mill. In addition, the 'bob wall' for the steam engine was discovered, together with elements of the original brick-built floor in the engine house.

View of the excavated remains of the engine and boiler houses, with a series of flues to the rear, leading to a detached chimney

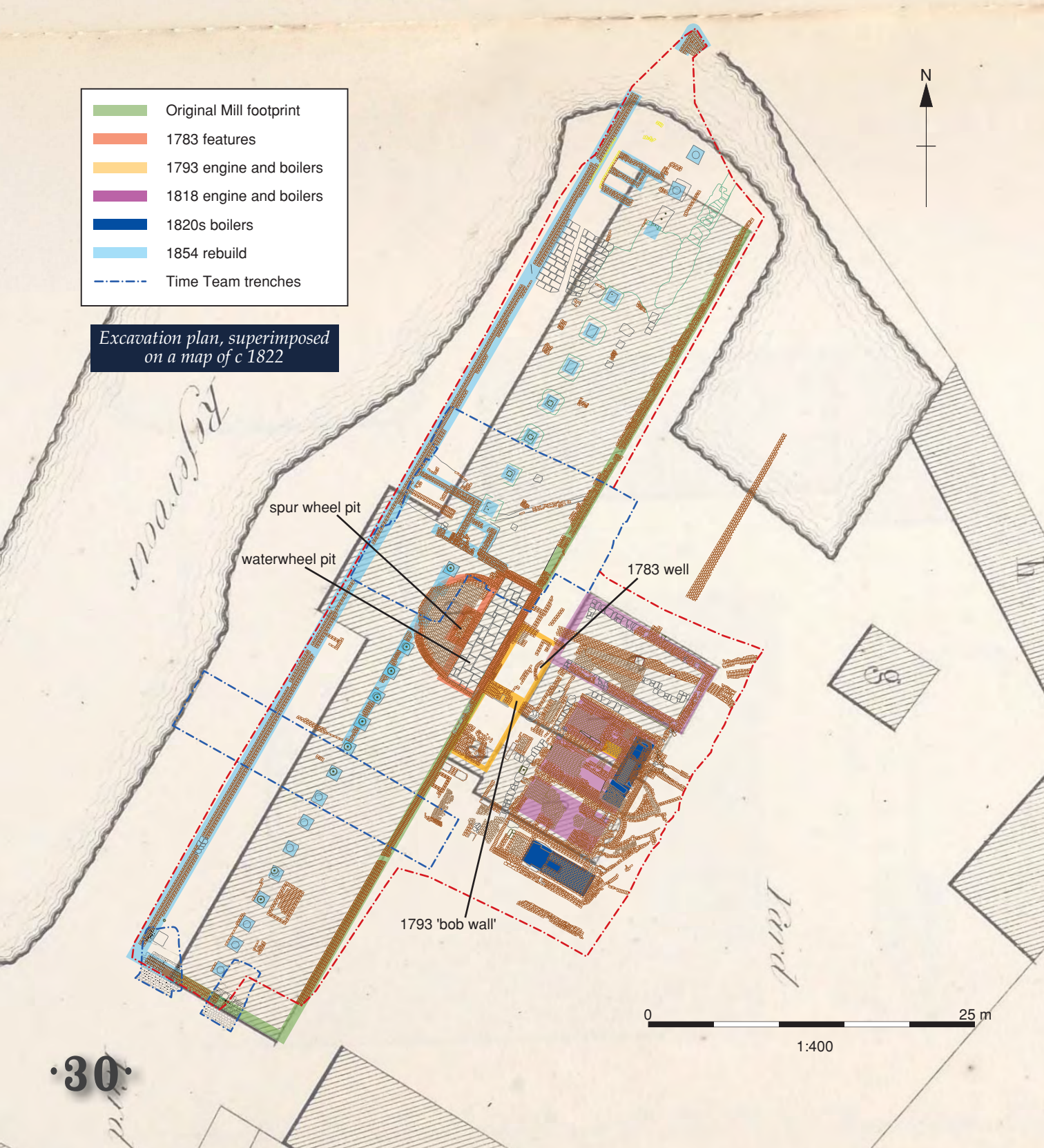
Excavation of the engine house also yielded a large and complete cast-iron bevel gear. This had without doubt formed part of the power-transmission system, and had probably been connected to the upright shaft in the mill, taking power to each floor in the building.



A measured sketch dated 1815, showing the proposed location for the new engine and boilers, and the position of the 1792 engine (Reproduced with the permission of the Library of Birmingham, MS 3147/5/456)

A bevel gear from the 1792-3 power system

The new engine seems to have worked satisfactorily until 1815, when the Simpsons returned to Boulton and Watt to discuss a replacement. A measured sketch of the new machinery shows the position of the existing engine, together with the power-transmission shaft passing through the eastern wall of the mill and across the abandoned waterwheel pit.



Excavation plan, superimposed on a map of c 1822

The excavated remains of the steam-power plant installed in 1818 included a substantial new engine house that was added to the north-eastern end of the existing boiler house, in the position occupied originally by the pumping engine. In contrast to the earlier brick-built buildings, the interior of this new engine house was lined with large blocks of sandstone, providing an impressive finish. Original plans for the engine show an unusual placement of the flywheel, projecting through the north-western wall of the new engine house. This arrangement allowed a bevel gear to be placed in the northern corner of the boiler house, enabling the new power shaft to be connected to the existing shaft.

View across the position of the three new wagon boilers towards the 1818 engine house

The boiler house was also remodelled, and the two wagon boilers that had served the 1793 engine were replaced with a bank of three new boilers, the well-preserved remains of which were uncovered during the excavation. In front of each boiler was a sunken brick floor, which is probably where the boilers were charged with coal.

The foundations of the three wagon boilers installed in 1818

The network of flues to the rear of the boiler house

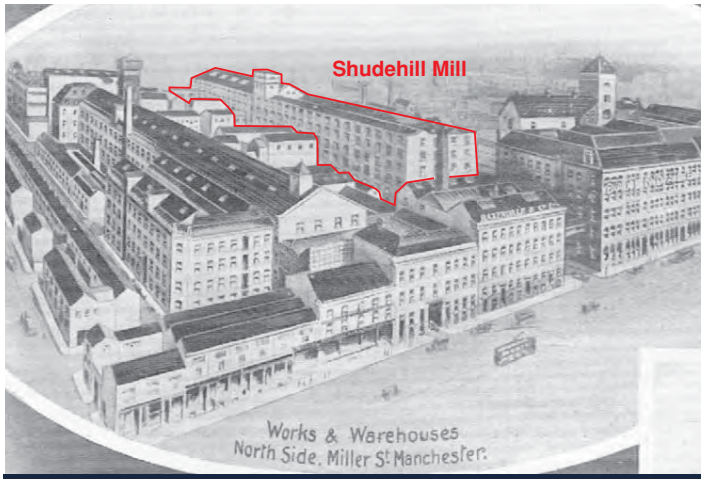
The system of flues to the rear of the boiler house had to be modified to accommodate the alterations. In contrast to the early flues, the later structures were lined with refractory bricks to provide some protection from the corrosive exhaust gases.

A few years after the new engine had been installed, the Simpsons advertised their Shudehill Mill for sale and, by 1824, the site had been taken over by Richard Clogg and Edward Norris. The firm of Clogg & Norris had been involved in the Manchester cotton industry for some years, and also owned a power-loom weaving factory on Hanover Street. This firm may have been responsible for extending the boiler house, and installing an additional boiler. The layout of the surviving foundations suggested that this was an improved form of wagon boiler, although its intended purpose is unclear. It does not appear to have been associated with the mill's engine, and was perhaps installed for heating or to power a hoist.

The foundations for a boiler installed during the 1820s

It seems that Richard Clogg had withdrawn from the manufacturing side of the business by 1830, and Edward Norris had entered into a partnership with Thomas Hodgson. Bancks & Co's map of 1831 annotates Shudehill Mill as 'Norris & Hodgson's Cotton Mill', although this firm was declared bankrupt in March 1831. Shudehill Mill appears to have ceased being used for cotton spinning at this time, and the building was converted for use as a warehouse.

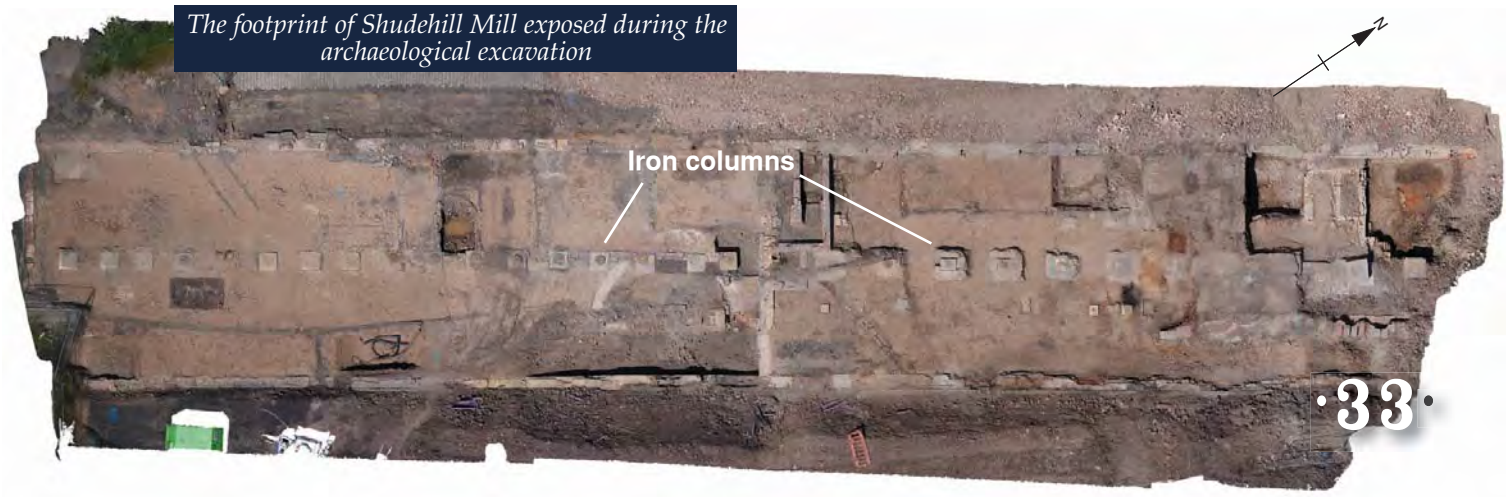
In May 1854, some bags of cotton waste piled up against one of the outer walls of the mill caught fire. These burned rapidly, according to an eyewitness, and the fire spread 'with great vigour', reducing most of the mill to bare walls within three hours. The fire resulted in a major rebuilding, which saw the mill being widened to the west, lengthened on the north and south, and increased in height. The reservoir in front of the mill may also have been filled in at this time, and the engine and boiler houses demolished.



A rare drawing of the Baxendale & Co's Works produced in c 1910, showing the remodelled Shudehill Mill in the centre of the complex

The full footprint of the mill was exposed during the archaeological excavation. This demonstrated that the original western wall of the mill had been demolished and rebuilt in 1854, and a new row of cast-iron columns inserted along the full length of the building. A new block was also added to the northern end of the mill, and there is evidence to suggest that this part of the building was used for a short while for cotton spinning. The excavation unearthed the foundations for another steam engine in this part of the mill, which had probably been installed in the 1880s. However, in 1892, the mill was taken over by Baxendale & Co, a local firm of engineers' and plumbers' merchants, which implemented further alterations to the building. Baxendale & Co retained ownership of the mill, until it was finally destroyed in 1940.

The footprint of Shudehill Mill exposed during the archaeological excavation



NINETEENTH-CENTURY EXPANSION OF ANGEL MEADOW

Manchester's population continued to increase dramatically during the early nineteenth century, as migrants from the surrounding rural districts and farther afield moved to the expanding industrial town in search of new employment opportunities; the population in 1788 was estimated to be 42,821, increasing to 126,066 by 1821 and an incredible 182,016 in 1831. This population shift stimulated further industrial growth, but also outstripped the supply of available accommodation in the town.

During this period, Angel Meadow was transformed into a developed urban district, characterised by a dense mixture of factories, warehouses and tracts of workers' housing. The eighteenth-century houses that were designed to accommodate a single family were used increasingly as tenements, occupied by two or more families, to cater for an expansion of the local population. A proportion was converted into lodging houses, whilst some of the cellars were partitioned into single-room dwellings, providing accommodation for the poorest families. New streets and houses were also built on undeveloped land, such as that to the north of Ashley Lane and to the east of Angel Street, whilst land to the rear of existing properties was infilled with back-to-back and blind-back housing.

Extract from Bancks & Co's Map of Manchester and Salford of 1831, showing the early nineteenth-century expansion of Angel Meadow

There was little legislative control over new dwellings that were built during this period, and most workers' houses were erected without any form of water supply or sanitation; at best, an open drain from a privy might have been installed down the middle of the street or court. A survey of dwellings for the working classes carried out by the Manchester Statistical Society in 1835 recorded that 18,295 people were living in cellars. This equated to approximately 12% of the working-class population in Manchester. These figures are likely to have included some of the cellars that were revealed during the archaeological excavation.

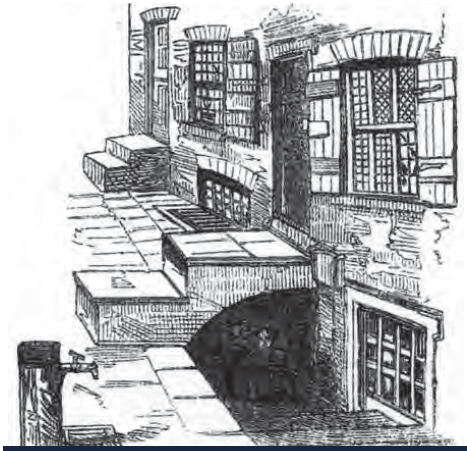
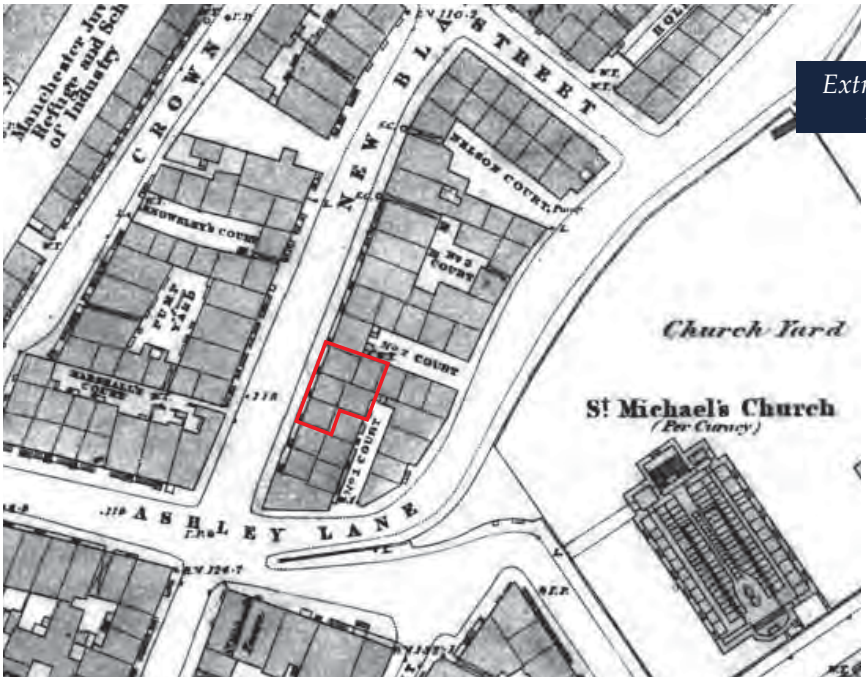


Illustration of Manchester dwellings published in The Builder *in 1862*

Three such cellars had been crammed into the small parcel of land to the rear of St Michael's Square by the early 1830s. The only access to these dwellings was via narrow and enclosed passageways, which will have received very little ventilation and natural light. The sanitation for the entire block of housing appears to have been provided by a single privy and two ash-pits that were placed in the small courtyard adjacent to the cellars.

The remains of nineteenth-century cellars situated to the rear of St Michael's Square

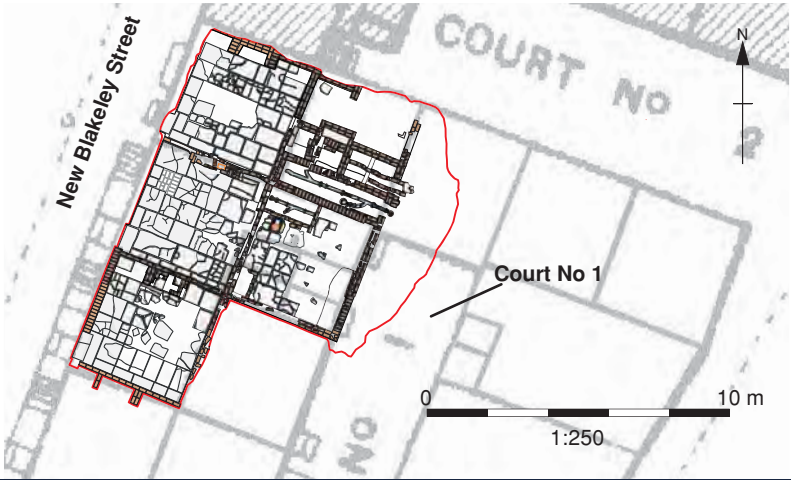


Extract from the Ordnance Survey map of 1850, showing the excavation area

Other examples of workers' housing built in the 1820s were excavated as part of the road-widening works on Aspin Lane in 2012. These houses had formed part of a block of back-to-back dwellings, some of which were accessed from New Blakeley Street, with those to the rear fronting onto a narrow courtyard.

The houses along New Blakeley Street all had cellars, each 12ft 6in square (3.81m²), which had formed single-room dwellings. The only light to each cellar was provided by a window in the western wall, which looked out onto the stairwell from New Blakeley Street. Each cellar had a flagstone floor and a fireplace against the partition wall, although these hearths had apparently been remodelled in the later nineteenth century, when larger cooking ranges had been installed.

The cellar dwellings fronting New Blakeley Street, during the excavation in 2012



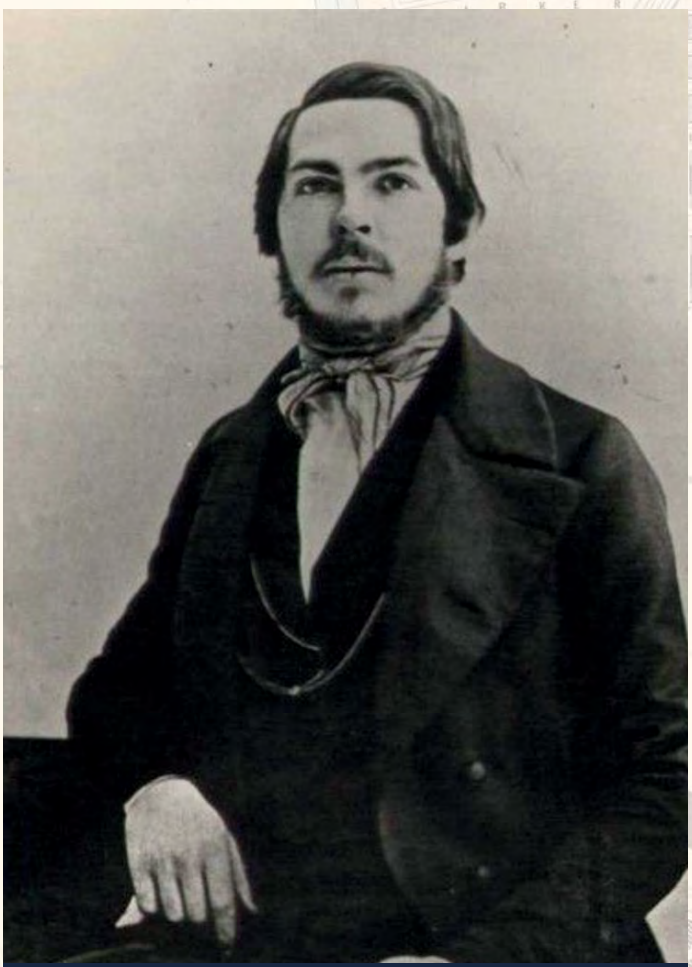
Plan of the excavated houses superimposed on the Ordnance Survey map of 1890

The dwellings on Court Nº 1 were very slightly narrower than those to the west on New Blakeley Street, each room measuring 12ft 6in by 11ft 9in (3.81 x 3.58m). Excavation revealed that these houses had also incorporated cellars that mirrored those on New Blakeley Street, with a fireplace on the north wall and a single cellar-light window set into the external wall.

In contrast to the neighbouring dwellings, excavation of the northern cellars along Court No 1 provided no indication of any external access, implying that this had been placed internally. Evidence for internal access to cellar dwellings has been obtained from archaeological excavations elsewhere in Manchester, where the remains of brick and stone-built staircases have been found keyed into internal cross-walls. The lack of any such features at Court No 1, however, suggests that access was via a timber stair, or perhaps even a ladder.

The cellars on Court No 1 were abandoned and infilled during the later nineteenth century. This may have been associated with improvements to sanitation, which involved converting one of the houses into a block of water closets, and the installation of proper drainage. The link between disease and insanitary conditions had been argued forcibly by Edwin Chadwick in 1842, and published in his *Report into the Sanitary Conditions of the Labouring Population of Great Britain*, although it was several decades before any real improvement to the conditions in Angel Meadow was implemented.

The foundations of the water closets and associated drainage inserted during the late nineteenth century



Friedrich Engels as a young man, when his philosophy was heavily influenced by his study of the living conditions of Manchester's working classes

The atrocious living conditions of Manchester's poor had been recognised as early as 1805, when Dr J Farriar noted in the proceedings of the Board of Health that 'the number of damp and very ill-ventilated cellars inhabited in many parts of the town is a most extensive and prominent evil...'. Perhaps the most famous account of the living conditions in nineteenth-century Manchester, however, is that written by Friedrich Engels in 1844, in which he portrays 'the frightful condition of this Hell upon Earth'.

Engels describes 'old-fashioned houses' in the Shudehill area, 'whose former inhabitants have removed with their descendants into better built districts and have left the houses to a population strongly mixed with Irish blood. Here one is in an almost undisguised working-men's quarter, for even the shops and beer houses hardly take the trouble to exhibit a trifling degree of cleanliness. But all this is nothing in comparison with the courts and lanes which lie behind, to which access can be gained only through covered passages. Everywhere half or wholly ruined buildings, some of them actually uninhabited, which means a great deal here; rarely a wooden or stone floor to be seen in the houses, almost uniformly broken, ill-fitting windows and doors, and a state of filth! Everywhere heaps of debris, refuse, and offal; standing pools for gutters, and a stench which alone would make it impossible for a human being in any degree civilised to live in such a district.'

The Manchester Public Baths and Wash House, as depicted on Adshead's map of 1851

Excavated remains of the Manchester Public Baths and Wash House

In the light of Engels' description, it is unsurprising that the residents of Angel Meadow were vulnerable to outbreaks of disease. The area was particularly badly affected by cholera epidemics in Manchester in 1832, 1849, 1854 and 1866, and an outbreak of tuberculosis and typhus in 1849-51. This led to a wider recognition amongst the middle class of the appalling and filthy living conditions of the working classes, one consequence of which was the launch of an appeal in 1845 to finance a baths for the poor. The funds raised were used to convert a three-storey dwelling for use as an experimental bath-house in Miller Street, which was the first of its kind in Manchester.

Thought to have been designed by the eminent engineer, Edward Taylor Bellhouse, the Manchester Public Baths and Wash House opened in September 1846. It contained 12 bath-tubs for men and six for women, with facilities for washing clothes installed in the cellars. The baths continued in use until about 1876, but the site was in use as a warehouse for Baxendale & Co by 1888. The site of the baths was subject to an archaeological excavation in 2014, which revealed the cellars of the building. However, little evidence for its use as a public baths survived.

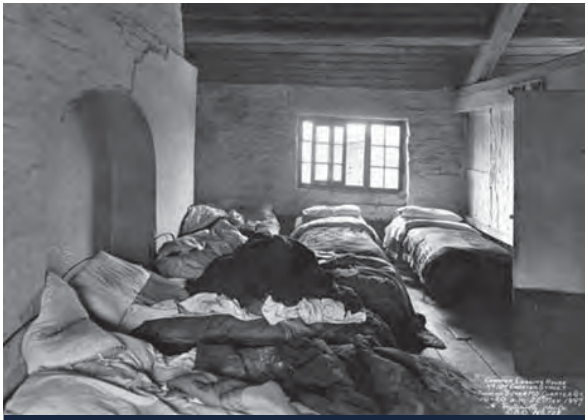
The Baths and Wash House was well used during the 30 years or so that it was open, although it did little to alleviate the atrocious housing conditions and social depravity in Angel Meadow. This was summarised by the journalist Angus Reach in 1849, who considered Angel Meadow to be 'the lowest, most filthy, most unhealthy and most wicked locality in Manchester… full of cellars, and inhabited by prostitutes, their bullies, thieves, cadgers, vagrants, tramps, and, in the very worst sties of filth and darkness, by those unhappy wretches the Low Irish'.

A vivid account is provided by a series of articles printed in the *Manchester Guardian* in 1870-1. These include a description of a small court off Back Joiner Street in Angel Meadow, 'the greater part of which is occupied by a filthy ash pit and privy. Removed from the public gaze, it requires more courage than may be expected from an inspector of nuisances to enter it. The light of a few flickering embers of wood revealed a small room, or rather outhouse, in which there was literally nothing that could be called furniture. On the floor upon a scanty heap of rags and straw, there lay a man with a child at his feet and another at his side...'.

Plan of the country's first public wash house, built in Liverpool in 1842, showing an internal layout that may have been similar to that in the Manchester Baths and Wash House

Illustrations of Manchester cellar dwellings published in the Pictorial Times *in 1847*

The articles also describe Charter Street (formerly Blakeley Street), noting that it was dominated by common lodging houses. On inspecting one of these, it was reported that there were four bedrooms, 'and in these four there are ten beds, each bed to hold two persons....The attic ceiling is black with damp and mould, and the wet drops through on to one of the beds. There is neither gas nor fire here...'. The standard price for this type of accommodation on Charter Street was three pence per night, which paid for a half-share in a bed.



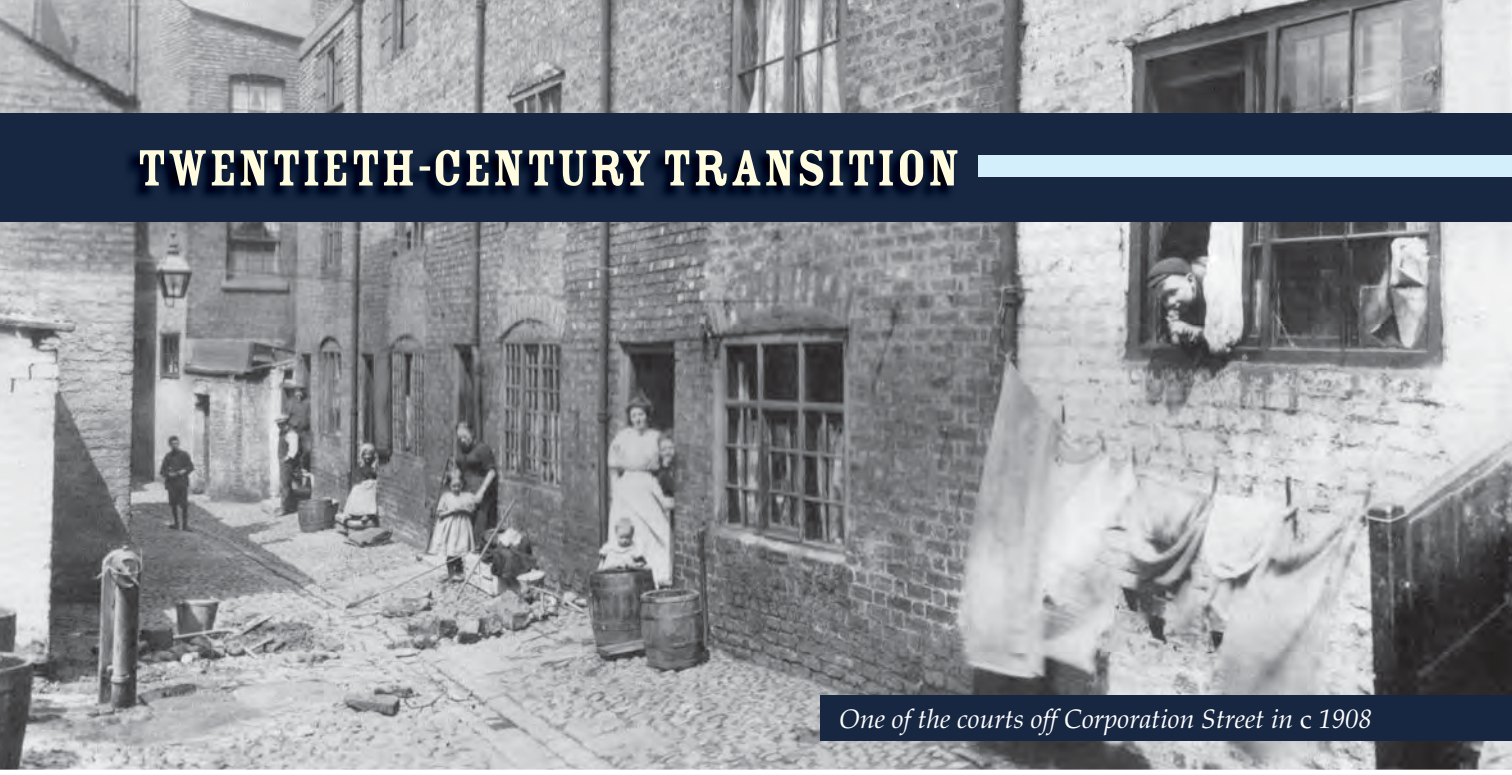
The interior of a lodging house at No 107 Charter Street, taken in 1897

One of the largest of the lodging houses in the area, according to the *Manchester Guardian*, was on the corner of Factory Street and St Michael's Square, the two cellars of which were revealed during the archaeological excavation in 2009. Originally, there had been an internal doorway between the two cellars, although this had been blocked up during the later nineteenth century to create single rooms that could be rented out to families, as opposed to the lodgings for individuals on the floors above. Numerous chamber pots were found amongst the demolition rubble, providing a tangible reminder of the building's use as a lodging house.

The single-room dwellings in the cellars of the lodging house on Factory Street

Chamber pots recovered from the lodging house on Factory Street

TWENTIETH-CENTURY TRANSITION



One of the courts off Corporation Street in c 1908

Significant improvements to workers' housing in Manchester were implemented during the last quarter of the nineteenth century, and a programme of slum clearance gathered momentum across the city. As late as 1897, however, Angel Meadow was described in a report to the Manchester Statistical Society as 'a grievous blot on our municipal policy', despite the creation of an urban park on St Michael's Flags. The numerous lodging houses along Charter Street and Angel Street provided cheap accommodation for a proportion of the local population, and particularly English-born men, whilst the large Irish community occupied the remaining back-to-back houses and court dwellings. Tension existed between the two populations, often culminating in violent exchanges.

The late nineteenth-century tradition of 'scuttling', or gang warfare, is also thought to have started in Angel Meadow, which was the home turf of the notorious 'Meadow Lads'. The fierce pitched street battles between the different gangs of youths caused significant social and political disruption across Manchester, Salford and the surrounding townships during the last 30 years of the nineteenth century, and helped to provide Angel Meadow with one of the most fearful reputations in the city. The rise of Lads' Clubs in Manchester and Salford is credited as having been a significant factor in the demise of scuttling, coupled with the long-awaited improvements to the housing stock.

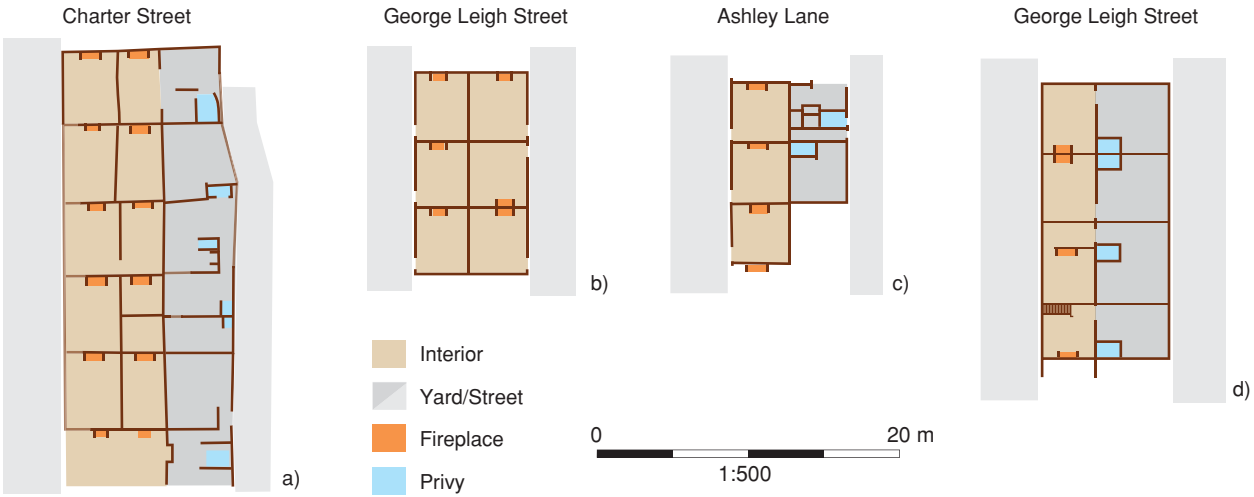
Tommy Cunningham, one of the leaders of the Meadows Lads in the mid-1890s

Legislation intended to address atrocious housing conditions had been introduced in the mid-nineteenth century, including the Manchester Borough Police Act of 1844 that required all new houses to have a properly built privy, and all existing houses to have one installed. Legislation in 1853 sought to address the problems of cellar dwellings, whilst the introduction of the Manchester Waterworks and Improvement Act in 1867 specified the minimum size requirements for rooms and windows in dwellings. Enforcement of these regulations remained an issue until Dr John Leigh was appointed as Manchester's first Medical Officer of Health, as part of the Artisans' and Labourers' Dwellings Act of 1868.

Typical nineteenth-century Manchester pail closet

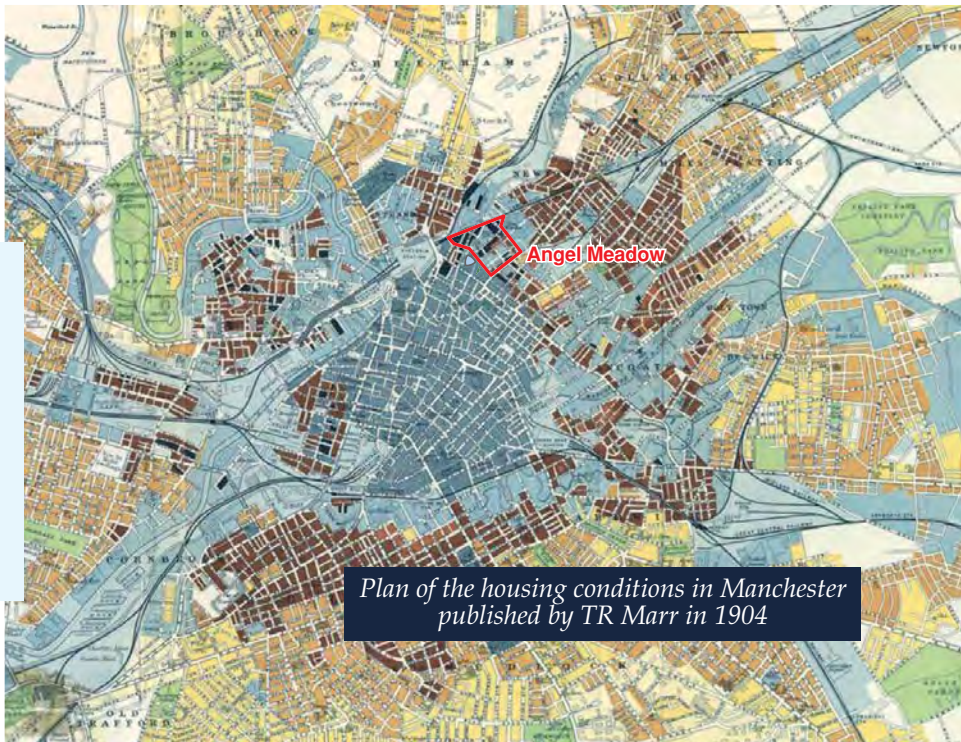
The lack of a water supply and proper drainage was recognised as a key factor in the abnormally high rates of mortality in slum areas. Evidence from the archaeological work in Angel Meadow, however, has shown that the sanitation was eventually improved, and deep ceramic drains and the pedestals of inserted water closets were revealed in almost all of the rear yards of the excavated properties. More drastic measures were taken in other parts of the city, with the large-scale demolition or conversion of sub-standard housing. Compelling evidence for such endeavours was revealed during archaeological excavation on George Leigh Street in Ancoats, a short distance to the south-east of Angel Meadow. By 1815, this site contained three rows of back-to-back houses, separated by narrow courtyards. The central row of houses was demolished in the 1890s and replaced with a wide alleyway, whilst the remaining two rows of back-to-backs were converted into through houses, with yards and privies to the rear.

The excavated remains of remodelled streets and houses on George Leigh Street in Ancoats



Plans of excavated eighteenth-century artisan's houses with yards and privies (a), nineteenth-century back-to-backs (b), and remodelled back-to-backs with selective demolition to create private yards and privies (c and d)

The worst housing in Angel Meadow had been demolished or converted before the outbreak of the First World War. A thematic plan of housing conditions in Manchester published in 1904 shows Angel Meadow as dominated by works and factories, with some surviving back-to-back houses and a few buildings classified as slum property. This plan is unlikely to be completely accurate, however, as many of the notorious common lodging houses on Angel Street continued into the 1930s, and the excavation of houses along Charter Street showed that they had also been occupied into the 1930s.



Plan of the housing conditions in Manchester published by TR Marr in 1904

Artefacts recovered from the excavation on Charter Street provide some insight into domestic life during the early twentieth century, and hinted at slightly more affluent conditions. These included pocket watches, a rosary, and toys such as a porcelain doll, glazed tile 'jacks', and dominoes.

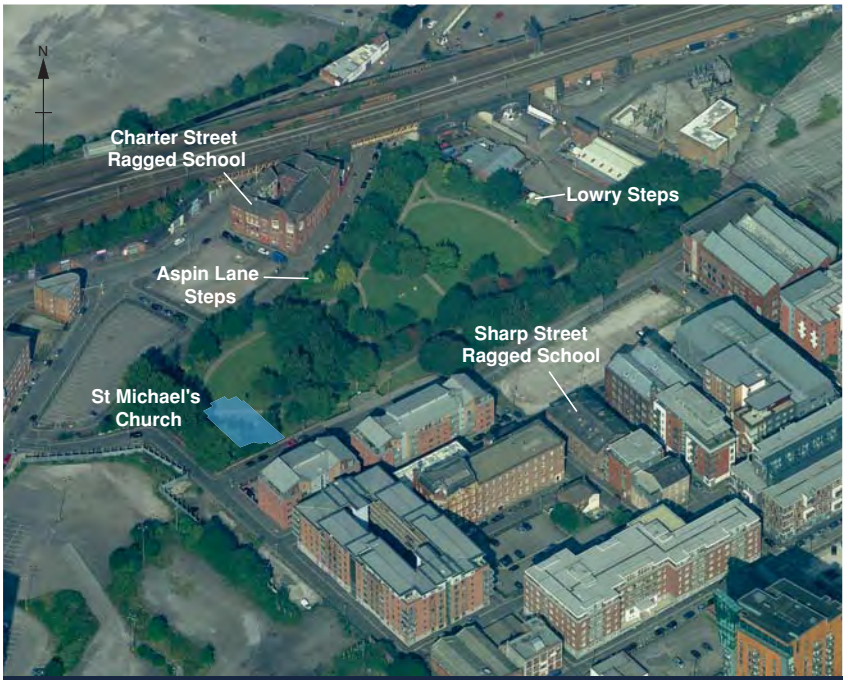
Helmet badge found on Charter Street

Cleaved sheep skull that had probably been the principal ingredient for a sheep-brain stew

Selection of clay pipes, some of which were made in Ireland

Rosary, brooches and watch parts found on Charter Street

ST MICHAEL'S FLAGS AND ANGEL MEADOW PARK



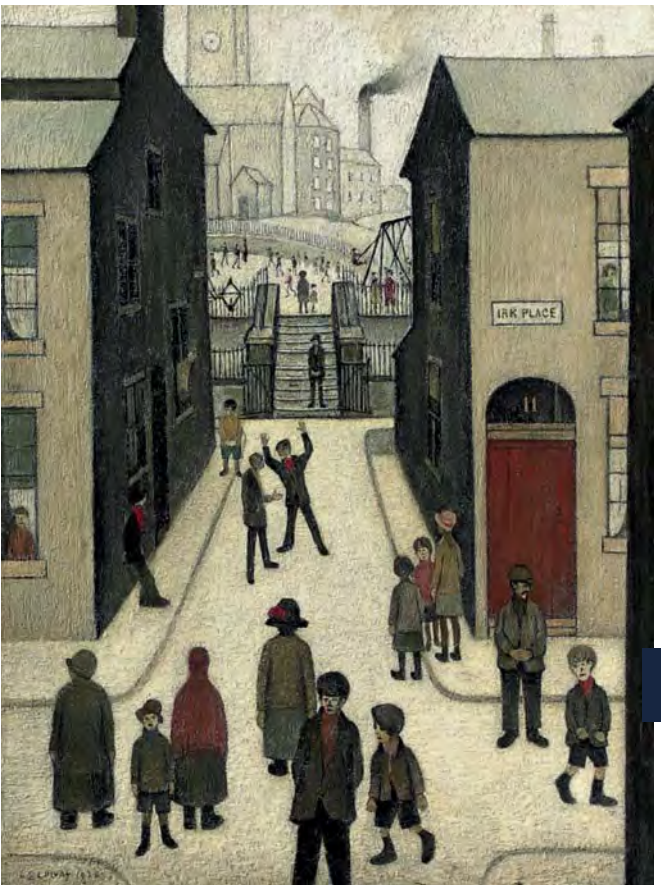
View across St Michael's Flags and Angel Meadow Park

A feature of Angel Meadow in the nineteenth century was the lack of public open space, which was limited to the area immediately to the north-east of St Michael's Church. This land had been purchased by the Overseers of the Poor in Manchester in the late 1780s, and opened as a parish burial ground. Most of the individuals interred in this new cemetery were from poor families, and nearly all were buried in common graves. The parish vestry for the cemetery required that two open graves were maintained at all times, with one for the interment of adults and the other for children. An eyewitness account describes how the open graves were 'packed with coffins piled besides and upon each other' before being backfilled and a new 'cavern of death' opened up.

The cemetery was declared full in 1815, having received more than 30,000 bodies, and was closed to further burials. It rapidly fell into decline thereafter, becoming notorious for activities such as cockfighting and gambling. There were also reports of the illicit excavation of human bones, which were ground into dust and sold as fertiliser. Eventually, in 1867, an Order from the Home Office required that the cemetery should be surfaced and fenced in order to arrest the antisocial behaviour and prevent further illegal excavations. The area was covered with flagstones, and became known subsequently as St Michael's Flags.

The swings on St Michael's Flags in 1917, with the steps leading to Aspin Lane and the Charter Street Ragged School to the rear

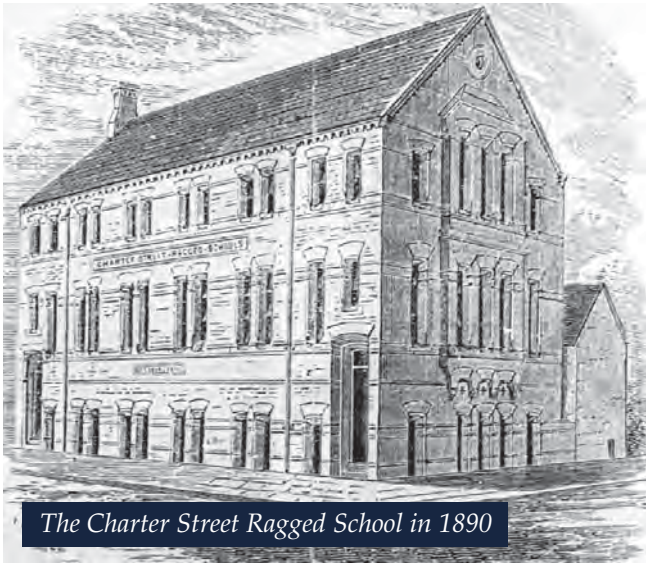
A pressure group supported by the incumbent of St Michael's, the Reverend Mercer, campaigned for improvements to this public space and, in 1887, a local councillor announced a proposal to spend £1500 on creating a children's playground on St Michael's Flags. Manchester Corporation finally secured an agreement to rent the area in 1890, and began to construct the playground. This had been completed by May 1891, when a local newspaper proclaimed that St Michael's Flags had been equipped with 'swings for boys and girls together with the provision of a large double ball court, and a sand bed for children and a drinking fountain'.



Other improvements included the installation of public toilets and a bandstand, which was used regularly for musical entertainment. The playground was extended in 1894, when the back-to-back houses along Style Street were demolished.

Access to the new playground from the low-lying ground in the Irk Valley to the north was provided by stone steps from Aspin Lane and also Irk Street, which featured in a painting by the celebrated artist LS Lowry. The painting also captured a view of St Michael's Church, although this was demolished in 1935 in the wake of continued slum clearance and the resultant depopulation of the local community.

'The Steps' painted by LS Lowry in 1928, with St Michael's Church in the background (Christies/PA Wire)



The Charter Street Ragged School in 1890

The steps on Aspin Lane provided convenient access to St Michael's Flags from the Charter Street Ragged School, and the benefits that the new playground afforded to the pupils was acknowledged in the *Manchester City News* in 1892. This type of institution provided Sunday School teaching, basic education, food and clothing to children who were too 'ragged' to attend normal Sunday Schools and church services. A Sunday breakfast and medical services were also provided for destitute men and women. Occupying the site of the first Industrial School in Manchester, which had opened in January 1847, the existing building was started in 1866 and was extended in 1891 and again in 1900.

Angel Meadow was served by another ragged school, this one on Sharp Street. It was founded in 1853 by evangelical Christians, although the current building dates from 1869. The social conditions were such that a partition was built on the ground floor to separate the reception class of wild street children from those that had been 'subdued'.

The Sharp Street Ragged School

View across Angel Meadow Park, showing the restored steps to Aspin Lane and the Charter Street Ragged School

Whilst the two local ragged schools survived the twentieth century remarkably intact, St Michael's Flags had become abandoned and overgrown by the 1960s, and the stone steps fell into disrepair and were closed to the public. Despite clearance and landscaping works carried out in the early 1980s, the area remained under-used until the Friends of Angel Meadow (FOAM) was formed in 2004 and procured funding for improvement works, including landscaping, new public seating, bins and lighting.

As part of the area's rejuvenation as Angel Meadow Park, Manchester City Council arranged for the stone steps from Aspin Lane to be repaired. This necessitated some limited excavation work, which was monitored by an archaeologist to ensure that any buried remains were recorded. Fragments of human bones were discovered in one of the excavated trenches, consisting of approximately 20 mature adults, one young adult (aged 16-18 years), and three juveniles, some of which had clearly suffered from rickets.

Nearly all of the burials had been disturbed by earlier landscaping schemes, and only a single bone of some individuals was found, although one articulated skeleton survived, partially intact, at depth. All of the human remains revealed during the repair work have been reinterred in Southern Cemetery in Chorlton-cum-Hardy.

The partial remains of a skeleton exposed during repair works to the access steps in Angel Meadow Park

THE CO-OPERATIVE SOCIETY AND SADLER'S YARD

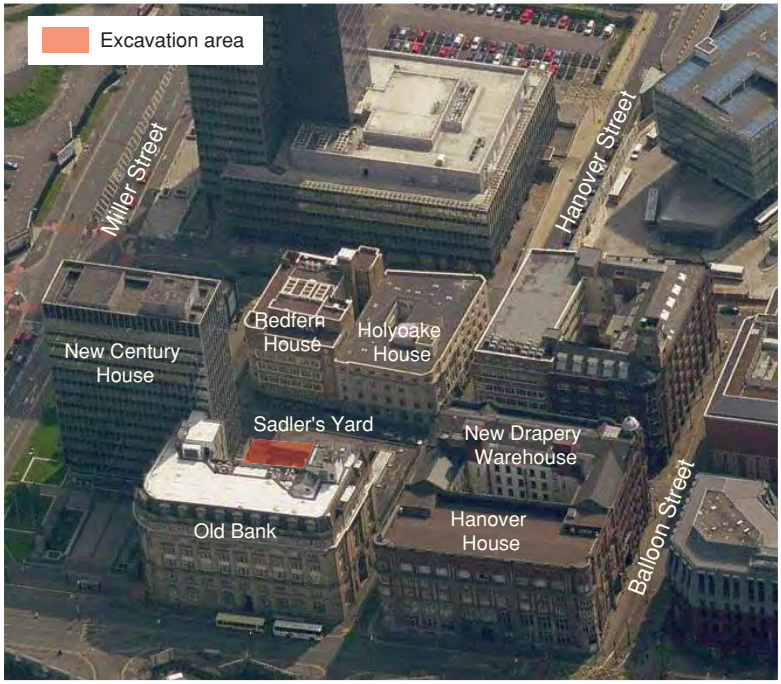
The south-western part of the NOMA estate, centred on Hanover Street, contains several historic commercial buildings that were erected by The Co-operative Wholesale Society (CWS) during the early twentieth century. These represented an expansion of CWS' business, and the redevelopment of the Hanover Street area, which had been occupied mainly by housing since the late eighteenth century.

The CWS was founded in Manchester, but evolved from the Rochdale Society of Equitable Pioneers, which was established in 1844 to operate stores selling essential items such as flour, oatmeal, sugar and candles at reduced prices. Many other co-operatives followed this model, and in 1863 The North of England Co-operative Wholesale Industrial and Provident Society Limited (known subsequently as The Co-operative Wholesale Society) was formed by 300 individual co-operative societies across Yorkshire and Lancashire.

The first CWS building was erected in 1901-4 to house the organisation's expanding drapery business, and remained in use as a warehouse and showroom until the late 1960s. A second building, Hanover House, was constructed adjacent to the drapery warehouse in 1905-9 and provided office accommodation, whilst Holyoake House was built on the north side of Hanover Street in 1911 as a headquarters for The Co-operative Union. Further expansion followed in the 1930s, when the Old Bank was built next to Hanover House, and the Redfern Building adjacent to Holyoake House. All of these are now Grade II listed buildings, although the drapery warehouse has been unoccupied since the 1970s.

Early twentieth-century view of Hanover Street, featuring the New Drapery Warehouse and Hanover House, with its twin building on Balloon Street (right; since demolished)

This important but under-used group of historic buildings is being rejuvenated as part of NOMA, together with the creation of a public space known as Sadler's Yard to the rear of New Century House. The construction of the new square was preceded by a small archaeological excavation, to investigate the workers' housing that had occupied the site by the early nineteenth century.



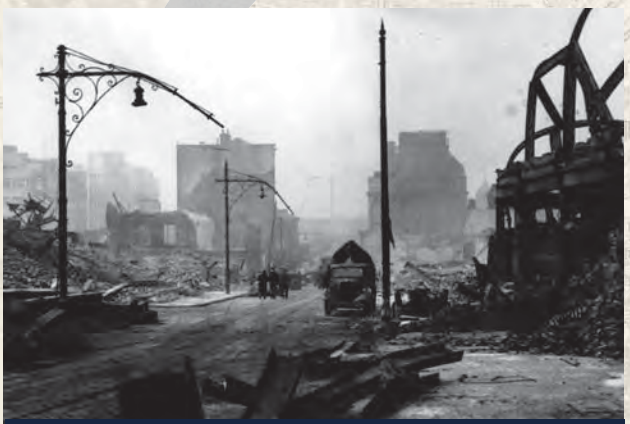
Aerial view across the former CWS estate on Hanover Street

In contrast to the excavations in Angel Meadow, none of these houses had cellars and all traces of their foundations had been removed, probably during the construction of New Century House in 1962. However, excavation revealed buried ploughsoil that had been sealed beneath the floors of the houses. Whilst fragments of pottery recovered from this layer dated to the mid-eighteenth century, it is possible that the buried soil had earlier origins, accumulating over a long period of time.

Excavation on the site of the new public square in 2014

Fragment of an eighteenth-century slip-coated dish

THE MANCHESTER BLITZ

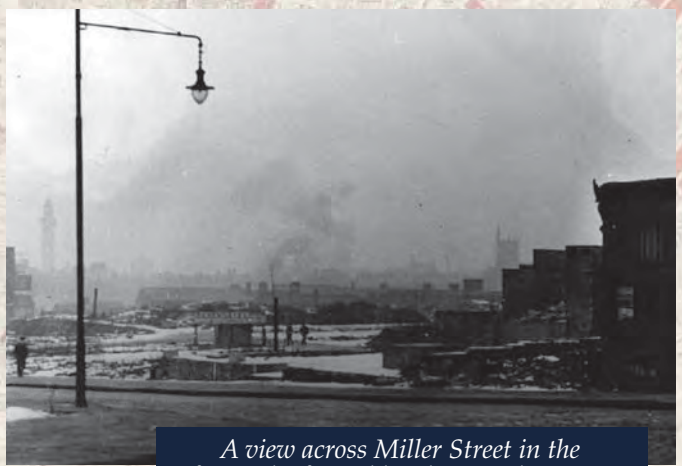


A view down Miller Street in the aftermath of aerial bombing raids in 1940

The heavy aerial bombing of Manchester and Salford by the German Luftwaffe during the Second World War caused widespread destruction. The first air raid was in August 1940, with the Palace Theatre on Oxford Street being bombed during the following month. The heaviest raids, known as the Manchester Blitz, occurred on the nights of 22 and 23 December 1940, when an estimated total of 1925 incendiary devices and 467 tons of high explosive were dropped. Incendiary bombs were designed to start as many fires as possible, with a second wave of aircraft dropping high-explosive bombs into the fires to maximise the devastation.

Manchester Cathedral, Cross Street Chapel, St Anne's Church, the Royal Exchange and the Free Trade Hall were among the large buildings that were severely damaged. Piccadilly Gardens and Shudehill also sustained considerable damage, with Shudehill Mill being one of the buildings that was destroyed entirely, together with properties along Angel Street and Miller Street.

Manchester continued to be bombed occasionally by the Luftwaffe throughout the war, with Old Trafford football stadium receiving a hit on 11 March 1941, and the police headquarters being damaged in June 1941. V-1 flying bombs were launched at Manchester on Christmas Eve 1944, and whilst this attack failed, 27 people in Oldham were killed by a stray missile.



A view across Miller Street in the aftermath of aerial bombing raids in 1940

One of the excavated cellars on Angel Street, showing the heavily burnt walls

Compelling physical reminders of the Manchester Blitz were revealed during the archaeological excavation in 2009, which yielded large quantities of heat-affected debris in places. Most vividly, however, were the damaged walls of two adjoining eighteenth-century cellars on Angel Street, which had clearly been subject to intensive heat, consistent with that from an incendiary bomb.

Further excavation carried out alongside Angel Street in advance of the road-widening works in 2012 exposed part of an air-raid shelter, which had been set into the infilled cellars of the demolished eighteenth-century houses. The basic construction was similar to a large Anderson-type shelter, although it was more substantial, comprising I-section steel bars over which corrugated iron sheets were draped. The steel bars were bolted together, and were braced laterally by L-section bars. The concrete floor had been roughly poured, and lay 2.25m below the ground level.

The remains of the air-raid shelter set into abandoned cellars alongside Angel Street

ARCHAEOLOGY AND DEVELOPMENT

Excavation at One Angel Square in 2009

A requirement to consider the archaeological implications of any new development has been embedded in national planning policy since 1990, and is presently covered by the National Planning Policy Framework (NPPF) that was introduced in 2012. Where known or suspected archaeological sites are threatened by development, the NPPF advises that their importance should be assessed and that the remains should be protected, either through sympathetic planning or, where appropriate, through archaeological excavation and record. When considering an application for a new development, the local planning authorities in Greater Manchester have access to specialist archaeological advisers to help them in assessing development impacts on archaeological sites and historic buildings. This key role is fulfilled by the Greater Manchester Archaeological Advisory Service (GMAAS), which also maintains a database of all known sites of archaeological and historical interest in the county. Known as the Historic Environment Record, this provides the baseline data that enables GMAAS to make archaeological recommendations to local planning authorities.

The potential for a site to contain buried archaeological remains can be established via a desk-based assessment, which is frequently commissioned by a developer as part of the design stage for a new development. An assessment considers all the archival material available, including historical maps, documents and photographs, together with the evidence from any archaeological work that has been carried out in the vicinity. A fundamental stage in this research is consultation with GMAAS and the Historic Environment Record.

A desk-based study was undertaken for The Co-operative Group prior to the regeneration of Angel Meadow, as part of the NOMA project. This highlighted the potential archaeological interest of the site, and led to the excavation of a series of trial trenches across the One Angel Square site in 2009, with additional trenches opened up in 2012 prior to the road-widening works. In both cases, the trial trenches were intended to determine the presence or absence of buried archaeological remains, and whether they warranted more detailed excavation. Well-preserved remains were exposed in several of the trenches, and these areas were subject to some of the excavations that have been summarised in this booklet.

Excavating houses on Angel Street in 2012 in the shadow of One Angel Square

Revealing the remains of Shudehill Mill in 2005 (GMAU Archive)

The site of Richard Arkwright's Shudehill Mill was investigated initially by Channel 4's *Time Team* in 2005. This work comprised the excavation of four trenches, which were intended primarily to locate the position of the original mill and major features such as the waterwheel pit. Extensive structural remains were exposed in the trenches, proving that the foundations of the building had survived the wartime bombing and subsequent clearance of the site. Part of the waterwheel pit was also discovered, and although it was not exposed fully, and its size and precise alignment in the mill remained uncertain, it was abundantly clear that the site was worthy of further excavation ahead of any future redevelopment.

The *Time Team* elicited great interest and local support, and also benefited from the active participation of special interest groups, particularly the Manchester Region Industrial Archaeology Society (MRIAS), whose research on the site enabled the trenches to be placed across parts of the mill that were potentially of the most interest.

Members of MRIAS and other volunteers working alongside professional archaeologists during the Time Team's excavation (GMAU Archive)

The NPPF stresses the importance of engaging local communities in their heritage and archaeology, not least through disseminating the findings of archaeological work at an appropriate level. The value of providing public tours and open days on archaeological sites was confirmed during the excavation at One Angel Square in 2009, where more than 1000 members of the public attended an open day to view the excavated remains. Several visitors took the opportunity to share their memories of the area, and some even recalled ancestors who had lived in the excavated houses.

This oral evidence made an invaluable contribution to a fuller understanding of life in Angel Meadow during the nineteenth and early twentieth centuries. This has added an important element to the archaeological record of the site.

A guided tour of the 2009 excavation site for local councillors, heritage professionals and special interest groups

Visitors at the open day viewing the excavated remains and artefacts from the excavation at One Angel Square

TIMELINE

1780-3	Richard Arkwright established Shudehill Mill.
1785	James Sadler successfully made the first manned balloon flight in Manchester.
1831	Shudehill Mill ceased to spin cotton and became a warehouse.
1832	First major outbreak of cholera in Manchester.
1842	Friedrich Engels arrived in Manchester and researched the living conditions of the working population.
1844	Manchester Borough Police Act stated that all new houses were to be provided with a properly built privy.
1844	The Rochdale Society of Equitable Pioneers established, signalling the foundation of The Co-operative Group.
1846	Manchester's first Public Baths and Wash House opened on Miller Street.
1853	Manchester New Streets Act introduced, to address the problems of cellar dwellings.
1854	Shudehill Mill destroyed by fire, and rebuilt to slightly wider dimensions.
1867	Manchester Waterworks and Improvement Act specified the minimum requirements for room sizes and window areas in dwellings, and also required that every new house had a yard at the rear.
1868	The Artisans' and Labourers' Dwellings Act (The Torrens Act) passed by Parliament, and Dr John Leigh appointed as Manchester's first Medical Officer of Health.
1892	Shudehill Mill taken over by Baxendale & Co.
1936	Housing Act laid down strict regulations on common lodging houses, requiring the registering of lodging house-keepers by the local authority.
1940	Shudehill Mill destroyed completely by aerial bombardment.
1962	CIS Tower completed, becoming the tallest tower block in Britain and signalling the post-war regeneration of Shudehill.
2013	One Angel Square completed, becoming a catalyst for the wider NOMA regeneration.
2015	Sadler's Yard opened as a new public square and event space.

GLOSSARY

ANDERSON SHELTER:	a popular type of air-raid shelter that was designed by Sir John Anderson in 1938
ARTISAN:	a worker in a skilled trade, especially one that involved manufacturing goods by hand
BACK-TO-BACK:	a form of terraced house in which two houses share a rear wall
BOB WALL:	a substantial wall in a beam-engine house that supported the pivot axle of the engine beam
CARDING:	a process that disentangles, cleans and mixes natural cotton or woollen fibres to produce a continuous web suitable for spinning yarn
DOUBLE-PILE HOUSE:	a house having four rooms of equal height on each of two floors
DUTCH LOOMS:	a special type of loom that was used particularly for the weaving of cloth ribbons
JACKS:	a children's game of ancient origin, also known as knucklebones, which involves throwing and catching a group of small objects
LADS' CLUB:	introduced in the mid-nineteenth century, Lads' Clubs were usually established in deprived areas by local philanthropic businessmen, who aimed to engage boys in pursuits such as outdoor games, boxing, gymnastics and billiards, and keep them off the streets
NEWCOMEN ENGINE:	invented by Thomas Newcomen, this machine is generally regarded as the earliest 'modern' steam engine. The first Newcomen engine was put to work in 1712, and they rapidly became widely used for pumping water from coal mines
OUTSHUT:	a single-storey extension to the rear of a building
WATER FRAME:	a water-powered spinning frame developed by Richard Arkwright and patented in 1769, signalling the birth of the factory-based cotton industry

FURTHER READING

- Aspin, C, 2003 *The Water-Spinners*, Helmshore
- Brunskill, RW, 1997 *Houses and Cottages of Britain*, London
- Davies, A, 2008 *The Gangs of Manchester*, Preston
- Engels, F, 1973 *The Condition of the Working Class in England,* London
- Marsden, J, 2014 *Forgotten Fields: Looking for Manchester's Old Burial Grounds*, Manchester
- Miller, I, and Wild, C, 2007 *A & G Murray and the Cotton Mills of Ancoats*, Lancaster Imprints, **13**, Lancaster
- Parkinson-Bailey, JJ, 2000 *Manchester: An Architectural History*, Manchester

All of the historical maps used in this booklet can be found at Manchester Archives and Local History in Manchester Central Library. Historical images can also be viewed at http://images.manchester.gov.uk

Copies of the detailed archaeological reports produced as part of the NOMA scheme have been deposited with the Greater Manchester Historic Environment Record, which is maintained by the Greater Manchester Archaeological Advisory Service (GMAAS).

Other volumes in the *Greater Manchester's Past Revealed* series that focus on industrial heritage include:

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The archaeological work summarised in this booklet would not have been possible without the efforts of many individuals who worked on the various excavations. Grateful thanks are extended to all the staff of OA North engaged in this work, and particularly Graham Mottershead, Lewis Stitt, Phil Cooke, Andrew McGuire and Sarah Mottershead. Thanks are also due to Jamie Quartermaine, who was responsible for the aerial photography taken during the excavation of Shudehill Mill.

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Manchester's phenomenal rise as the world's leading manufacturing centre brought a new industrial townscape that was dominated by steam-powered cotton mills, associated factories, warehouses, and swathes of low-cost housing built for the workers that flocked to the burgeoning town. The rejuvenation of 20 acres of land on the western edge of the city centre as part of the NOMA regeneration project has enabled the evolution of this pioneering industrial townscape to be investigated archaeologically. In particular, excavations carried out by Oxford Archaeology North on behalf of The Co-operative Group have provided a fascinating insight into the development of workers' housing that once formed part of Angel Meadow, together with the remarkable remains of Manchester's earliest steam-powered cotton mill.

Front cover: Exposing the buried remains of workers' housing on Angel Street
Back cover: Excavated remains of Richard Arkwright's Shudehill Mill; (inset) extract from Adshead's Map of 1851

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The co-operative NOMA
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