



Northamptonshire Archaeology

Archaeological excavation at Bury Ground,
Bury, Greater Manchester
March – April 2010



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OASIS REPORT FORM

PROJECT DETAILS		
Project name	Archaeological excavation at Bury Ground, Bury, Greater Manchester	
Short description	Northamptonshire Archaeology undertook an open area excavation at Bury Ground, Bury, Greater Manchester on behalf of The Property Alliance Group. As a result of the work, elements of the Howarth, Peel and Yates calico-printing works, founded 1773, were revealed together with successive phases of building remains and machine fittings dating through to the mid-20th century. Parts of a contemporary water management system, including a reservoir, a large channel, or goit, and associated leats were also examined.	
Project type	Excavation (BCS10)	
Site status	Brownfield	
Previous work	Evaluation (Mason 2010), Desk-based assessment (AE 2008), building recording (Matrix Archaeology 2007), watching brief (AE 2007)	
Current Land use	Former factory site	
Future work	Further evaluation, possible excavation, reporting	
Monument type/ period	Factory buildings and water management (18th to 20th centuries)	
Significant finds	Pottery, glass bottles, clay pipe	
PROJECT LOCATION		
County	Greater Manchester	
Site address	Bury Ground, Bury	
Study area	c 1565sq m	
OS Easting & Northing	NGR SD 7990 1100	
Height OD	c 80-80.5m OD	
PROJECT CREATORS		
Organisation	Northamptonshire Archaeology	
Project brief originator	Greater Manchester Archaeological Unit	
Project Design originator	Northamptonshire Archaeology	
Director/Supervisor	Paul Mason	
Project Manager	Tony Walsh	
Sponsor or funding body	Property Alliance Group	
PROJECT DATE		
Start date/end date	22nd March – 9th April 2010	
ARCHIVES		
	Location	Content (eg pottery, animal bone etc)
Physical	Northamptonshire Archaeology	Pottery, glass, clay pipe
Paper	Northamptonshire Archaeology	Site records, photographic, drawings
Digital	Northamptonshire Archaeology	Mapinfo GIS data, photographs
BIBLIOGRAPHY		
	Unpublished client report (NA report)	
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**ARCHAEOLOGICAL EXCAVATION AT BURY GROUND, BURY,
GREATER MANCHESTER
MARCH - APRIL 2010**

ABSTRACT

Northamptonshire Archaeology undertook an open area excavation at Bury Ground, Bury, Greater Manchester on behalf of The Property Alliance Group. As a result of the work, elements of the Howarth, Peel and Yates calico-printing works, founded 1773, were revealed together with successive phases of building remains and machine fittings dating through to the mid-20th century. Parts of a contemporary water management system, including a reservoir, a large channel, or goit, and associated leats were also examined.

1 INTRODUCTION

Northamptonshire Archaeology (NA) was commissioned by The Property Alliance Group (PAG), to undertake a series of archaeological investigations focussing on the site of the former Howarth, Peel and Yates calico-printing works, Bury Ground, Bury (centred on SD 7990 1100, Fig 1). The work was undertaken at the request of Greater Manchester Archaeological Unit (GMAU) to mitigate against the impact of commercial development of the site.

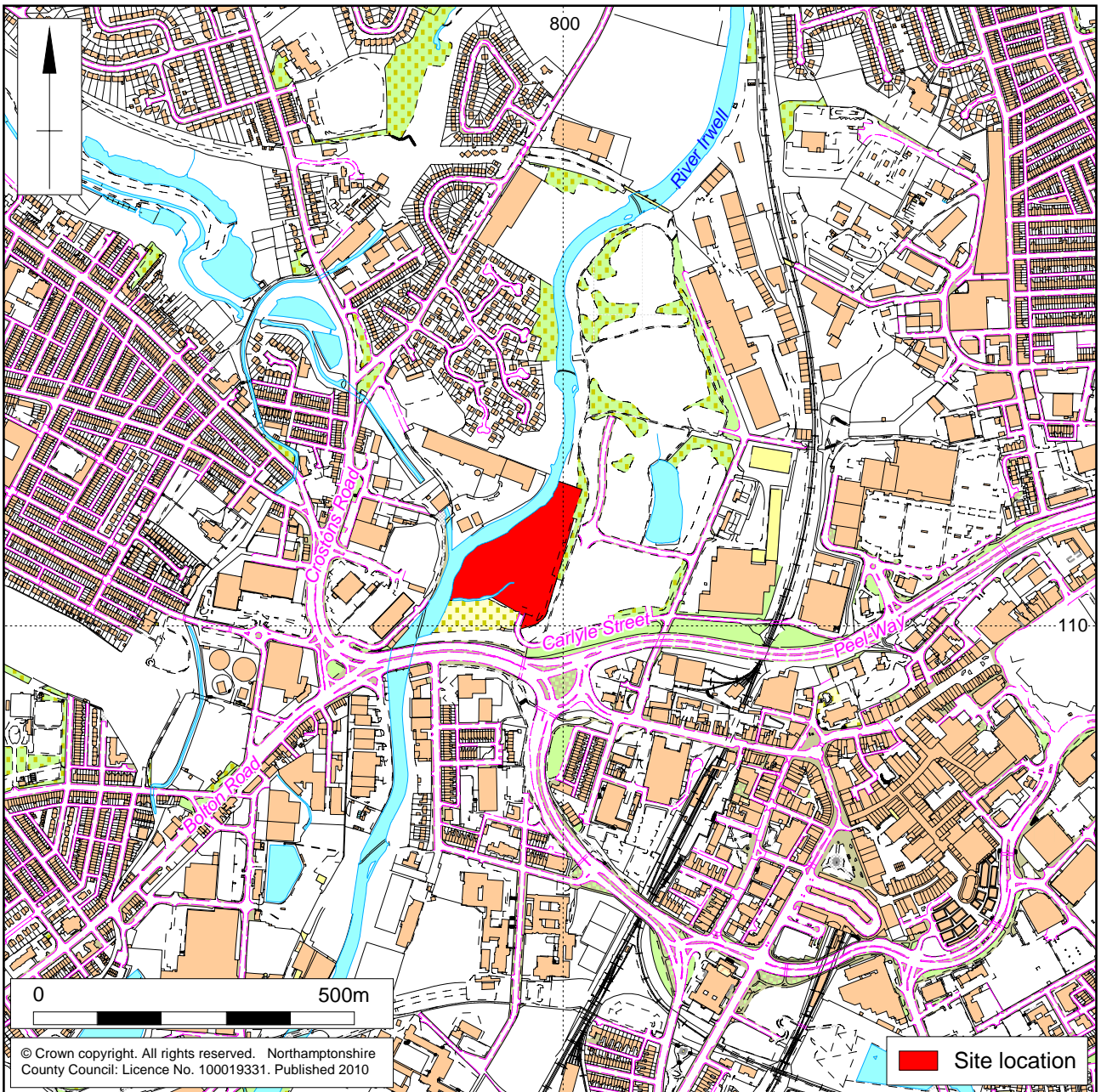
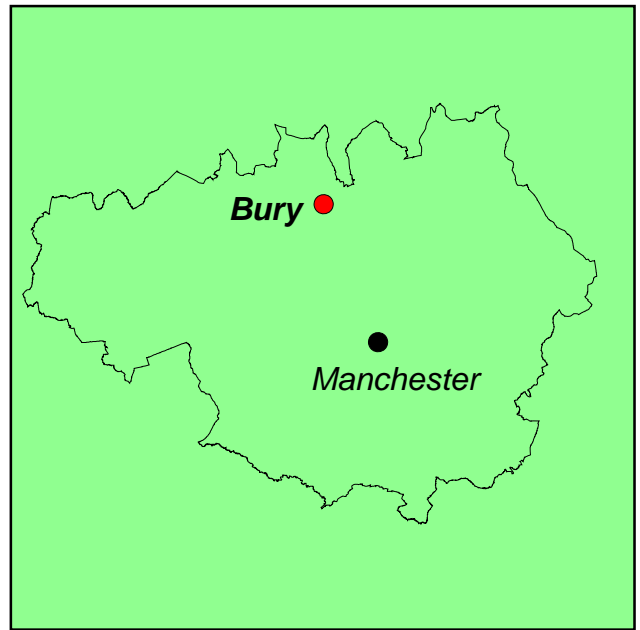
The site had previously been the subject of a desk-based assessment undertaken by Archaeo-Environment Ltd (AE 2008), which identified the potential for survival of significant 18th to 20th-century remains including those of the Howarth, Peel and Yates calico-printing works, whose foundation is considered to have heralded the beginning of the industrial revolution in Bury (Nevell and Redhead 1999, 28).

The results of a trial trench evaluation conducted in February 2010 (Mason 2010) confirmed that such remains were present within the northern area of the site - which would be the focus of the initial phase of development.

The programme of fieldwork complied with a written scheme of investigation prepared by Northamptonshire Archaeology (NA 2010). All procedural documents were approved by GMAU. The site code BCS10 was allocated to the project and the site archive will be held at Northamptonshire Archaeology until a suitable repository is identified.

Acknowledgements

Northamptonshire Archaeology would like to thank The Property Alliance Group for commissioning the fieldwork and Andrew Myers and Norman Redhead of GMAU for monitoring the project and providing background material for this report. Our thanks are also extended to Peter Owen of Gifford for his involvement in the early stages of the project. For Northamptonshire Archaeology, the fieldwork was managed by Tony Walsh, Senior Project Officer and directed by Paul Mason, Project Officer.



Scale 1:10,000

Site Location Fig 1

2 BACKGROUND

2.1 Topography and geology

The Bury Ground site lies c 0.5km north-west of the centre of Bury (NGR SD 7990 1100). It is bounded by parkland to the north, the A58 to the south, a new road to the east and the River Irwell to the west. Prior to excavation the development area (c 2.3ha) was a levelled-off demolition site; most of the existing ground surface comprised of brick rubble (Figs 2 and 3).

The area designated for excavation (c 1564 sq m) lay in the northern part of the site only 25m east of the bank of the River Irwell. The ground surface here lay at c 80.0-80.50m OD.

The geology is recorded as Pennine Lower Coal Measures Formation overlain by River Terrace Deposits (www.bgs.ac.uk/GeolIndex).

2.2 Planning background

In accordance with the archaeological potential of the site identified by the previous archaeological studies, GMAU, as archaeological advisors to Bury Metropolitan Borough Council's Planning Department, required a programme of archaeological works to first assess this potential and then implement fieldwork designed to mitigate against the impact of the development. The current study comprises the first stage of an incremental approach which is likely to involve further trial trench evaluation to the south of the excavated area.

Informed by a desk-based assessment (AE 2008) and by agreement between GMAU and Gifford (acting for The Property Alliance Group) a trial trench evaluation was undertaken in February 2010 (Mason 2010). The results of this evaluation were such that full open-area excavation of the building footprint prior to the start of development was deemed necessary.

The works and the sampling strategies employed throughout were in accordance with a Written Scheme of Investigation submitted by Northamptonshire Archaeology (NA 2010), on behalf of The Property Alliance Group, and subsequently approved by Andrew Myers of GMAU. The document was dated 15th March 2010.

Fieldwork commenced on the 22nd March and was completed on the 9th April 2010.

2.3 Historical and archaeological background

The following summary of the site's archaeological and historical background is largely paraphrased from the desk-based assessment prepared by Archaeo-Environment Ltd (AE 2008).

Earlier prehistoric

There is no recorded prehistoric activity within the site and evidence for prehistoric settlement in and around Bury is sparse.

Iron Age and Romano-British

There is no evidence for Iron Age activity within the site. A 5th-century terracotta cruse of probable Roman or Greek origin was discovered in a clay deposit on the eastern edge of the site (NMR 44378).



Pre-excavation view of site, looking south Fig 2



Pre-excavation view of site, looking north-west Fig 3

Early medieval

There are no finds or activities dating from this period within the site and, in general, material from the early medieval period remains rare across the region.

Later medieval

Bury Ground almost certainly formed part of the manorial lands associated with Bury's 15th-century castle which lay to the south-east and there is documentary evidence for a corn mill that may have occupied the southern part of the site. It is thought that the mill would have been powered by water diverted from the river along a race or *goit*. Such a feature is aligned along the eastern edge of the development area, though it remains unclear as to whether this is medieval in origin (only a short stretch of it was revealed by the excavations). A large mill dam and reservoir were located to the east of the site (part of the latter also fell within the excavated area). References to a corn mill at Bury Ground continue to appear in the historical record until the mid-18th century and it was drawn in c 1870, just prior to demolition.

Post-medieval

In 1773 the Howarth, Peel and Yates Calico Print Works were established on Bury Ground, at the time described as, 'a ruined corn mill, with its adjoining fields' (Samuel Smiles quoted in AE 2008, 18). This foundation, under the auspices of Robert Peel (grandfather of the eponymous prime minister and founder of the first civilian police force), his uncle, Jonathon Howarth and partner William Yates, is widely considered to have triggered the industrial revolution in Bury and, in turn, prompted its rapid growth. An account of 1795 states that the works utilised water from both the river and a reservoir fed by a spring and printed calico, '...in the most improved methods, by both wooden blocks and copper rollers...' (Aitken quoted in AE 2008, 21). Printing was not the only process undertaken at Bury Ground; advanced methods of chemical bleaching and dyeing were also pioneered.

The works continued to expand throughout the late 18th century and first half of the 19th century. In 1866, however, Bury Ground was sold and the site occupied by two cotton-waste bleaching firms, together with a number of smaller industries including firms of hat manufacturers, tanners, wheelwrights and engineers.

The bleach works continued to operate at Bury Ground until the 1960s when Castlecroft Iron Foundry occupied the site. By 1980 the only structure to survive from the original calico works was the Counting House; all of the other extant buildings dated to the 20th century. These were recently demolished when the site was cleared for development.

2.4 Previous archaeological work

Prior to the demolition, a historic building assessment focusing on the Counting House was undertaken by Matrix Archaeology (2007). After the site had been cleared, an intermittent watching brief was undertaken by Archaeo-Environment Ltd while Japanese Knotweed was removed from the south-eastern sector of the site. As a result of this work a number of structural remains representing different phases of development were recorded – some ostensibly relating to the original calico-printing works (AE 2007).

As part of the current phase of development, a desk-based assessment of the site was undertaken by Archaeo-Environment Ltd (AE 2008). Informed by the findings of this report, an evaluation undertaken prior to the current mitigation works comprised two conjoined 15m-long trenches within the footprint of the northernmost building. The trenches revealed well-preserved structural evidence including elements of the water

management system relating to the calico works of the late 18th and 19th centuries, together with remnants of both contemporary and later factory buildings (Mason 2010).

3 AIMS AND OBJECTIVES

The aims and objectives of the excavation were defined in the Written Scheme of Investigation (NA 2010) as follows:

- To excavate and record the archaeological remains identified during the recent evaluation that fall within the building footprint and immediate vicinity of the development
- To clarify the nature of human activity within the development site and the relationship of that activity with the immediate environs in order to further the understanding of the history and development of this part of Bury
- To prepare a report on the archaeological works, which will include a detailed summary of the methodology, site history, archaeological remains identified and an interpretation and assessment of the results.

In addition, the desk-based assessment (AE 2008) identified the following potential avenues for research:

- The cultural transition between the post-medieval and industrial periods
- The impact of humans on the landscape
- The archaeological study of buildings
- The archaeology of the industrial period.

4 DOCUMENTARY AND CARTOGRAPHIC EVIDENCE

4.1 Historic maps

Historic maps spanning the period 1783 to the modern-day enable the industrial development of the site to be examined in some detail (Figs 4-7).

Earl of Derby Estate Map, 1783 (Fig 4a)

The earliest map of the site was commissioned by the Earl of Derby in 1783; some ten years after the Howarth, Peel and Yates Calico Printing Works were established. The goit is aligned north to south towards the eastern edge of the development area and a number of crudely rendered buildings, presumably the early print works, are located between this and the River Irwell. In addition, a number of subsidiary man-made water channels, or leats, are shown suggesting the presence of water-powered machinery.

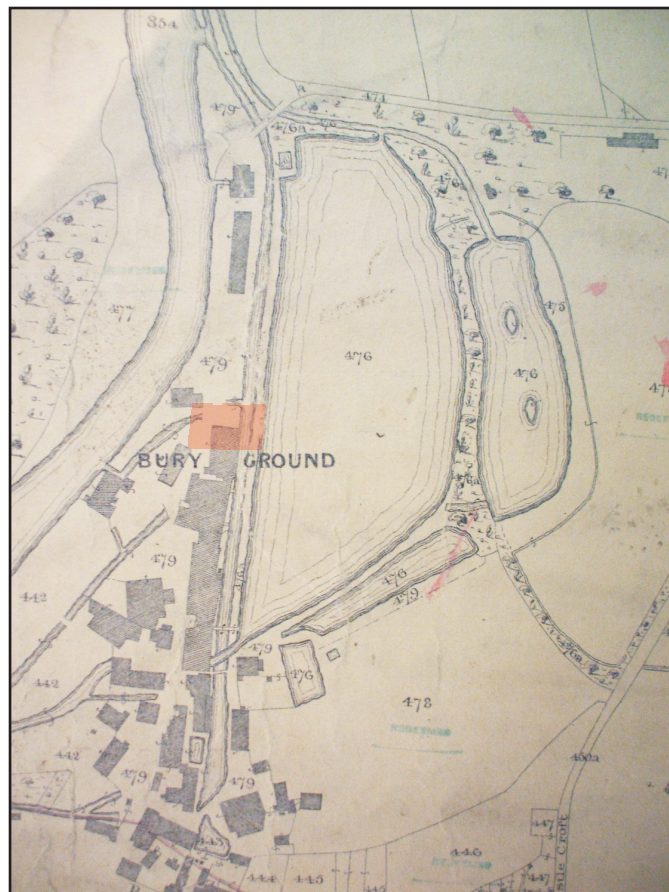
The excavated area lies close to two small buildings, one of which has a distinctive 'dog-leg' shape and shares its alignment with the goit. The other appears more closely aligned with the bank of the Irwell which lies a short distance to the west.

Tithe Map of the Township of Elton, c 1820 (Fig 4b)

The tithe map shows the site in greater detail and it is evident that the works had greatly expanded since 1783. A series of buildings form a long, block aligned north to south to the west of the goit and other structures are spread out between this and the river. To the east of the goit is a large reservoir together with a number of smaller pools and leats. Leats to the south of the excavated area also carry river water eastwards to feed the works



Earl of Derby Estate map, 1783 Fig 4a



Elton township tithe map, c 1820 Fig 4b

The location of the excavated area corresponds with the northernmost element of the elongated block, a rectangular building that has evidently replaced the 'dog-legged' structure depicted on the earlier map. To the north of this are two leats; one adjoins the goit, the other is aligned north-east to south-west to skirt the northern gable of a structure before turning sharply to adjoin the river. Whilst the general alignment of the leats would appear to respect each other, their adjacent terminals are slightly misaligned.

Benson's Map, c 1832 (Fig 5a)

The works have continued to expand. In the vicinity of the excavation a new building added to the northern end of the block overlies the position of the smaller of the two water leats. To both the south-east and north-east of the excavated area buildings depicted on the 1783 map still survive - but have been extended.

1st Edition Ordnance Survey Map, 1847 (Fig 5b)

The first edition Ordnance Survey map of 1847 provides the first detailed evidence for the functions of individual buildings and displays the general annotation 'Bury Ground Print Works'. Individual components of the long, narrow workshop complex - a design typical of textile finishing works - are identified. They include a 'Machine Room' and a 'New Machine Room', both of which, in part, lie within the excavated area; to the south are a dye house and a stoving house. Buildings to the west include the print works themselves, a dye house, a millwrights shop, an office, the 'Roller Place', and a joiners shop. The latter two structures have expanded around building elements identified on the 1783 map. A gasometer lies in the centre of the site suggesting that coal gas was now, at least in part, being utilised as a source of power or light.

The water management system associated with the goit is also shown in greater detail. A wooden conduit runs alongside its eastern edge and others, controlled by sluices, cross it at right angles to feed or be fed by the dye house and new machine room. To the immediate north of the new machine room the goit is spanned by a footbridge.

Ordnance Survey Map, 1891 (Fig 6a)

When this Ordnance Survey map was produced the site was no longer referred to as a print works; it was now a 'Cotton Waste Bleach Works' and many of the earlier buildings had been demolished or converted. A number of small units appear to have been operating alongside the bleach works including firms of hat manufacturers (occupying the former Roller Place), tanners, wheelwrights and engineers.

Those structures whose locations correspond with the excavated area are little changed, although part of the former machine room (lying outside the study area) appears to have been demolished. A new sluice is depicted in the east wall of the goit, a short distance to the south-east of the excavated area.

Ordnance Survey Map, 1910 (Fig 6b)

This map shows a number of alterations to the morphology of the factory buildings in the vicinity of the excavated area. Extensions have been made to all sides of the cotton waste and bleach works, the most significant in an easterly direction where buildings have been carried across the goit.

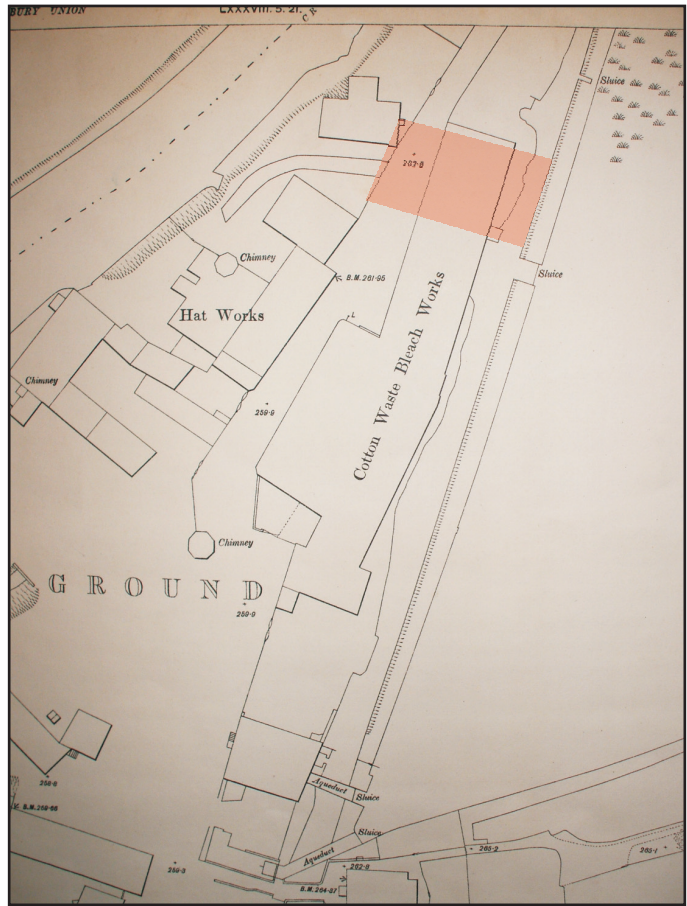
The north-east to south-west leat, first mapped in c 1820, has almost disappeared; only a short section is depicted, lying fully within the excavated area. Elsewhere, the hat works have continued to expand around the former Roller Place premises.



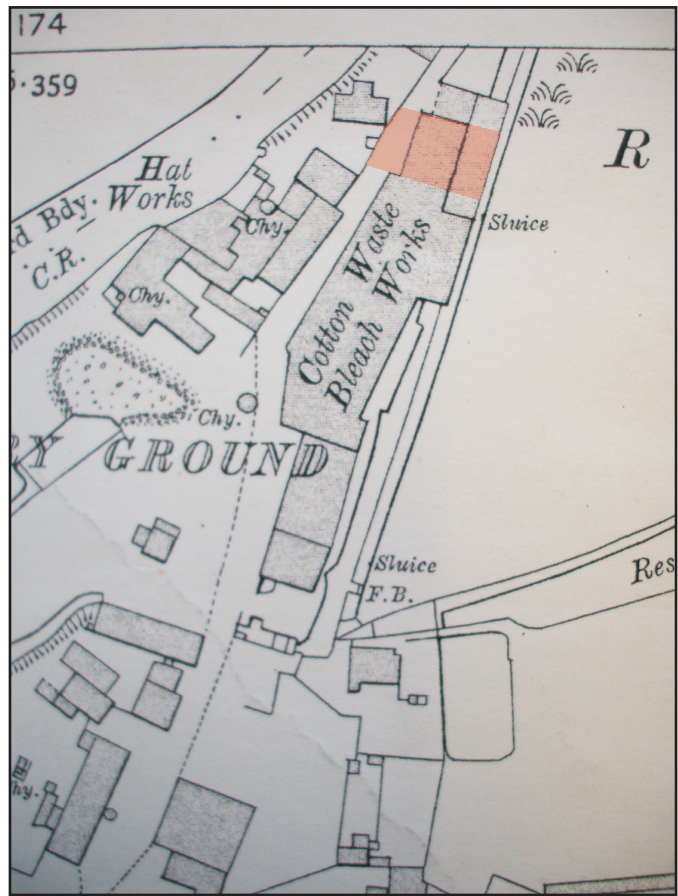
Benson's town map of Bury, 1832 Fig 5a



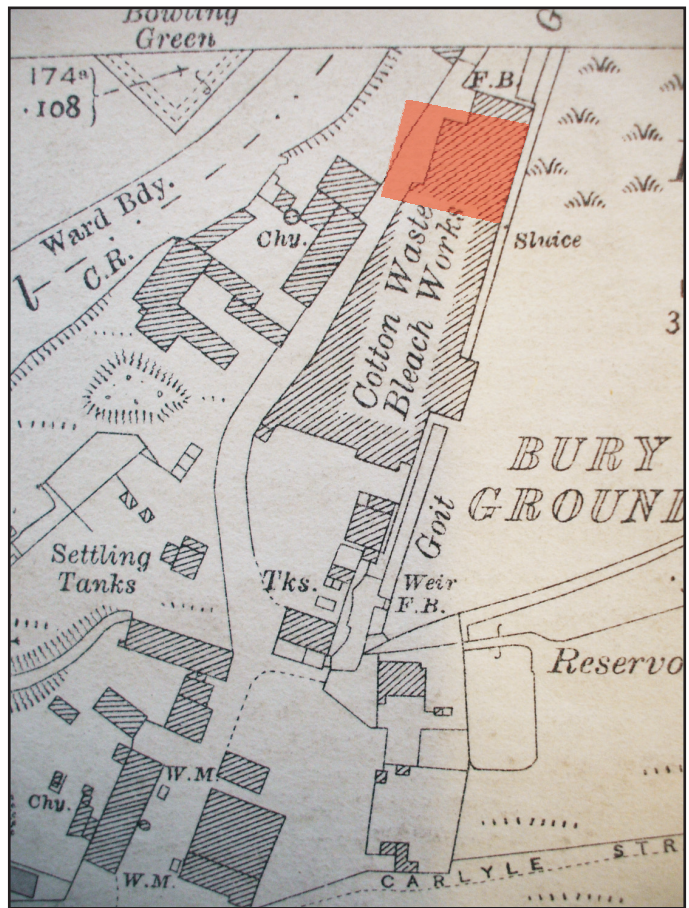
1st Edition Ordnance Survey, 1847 Fig 5b



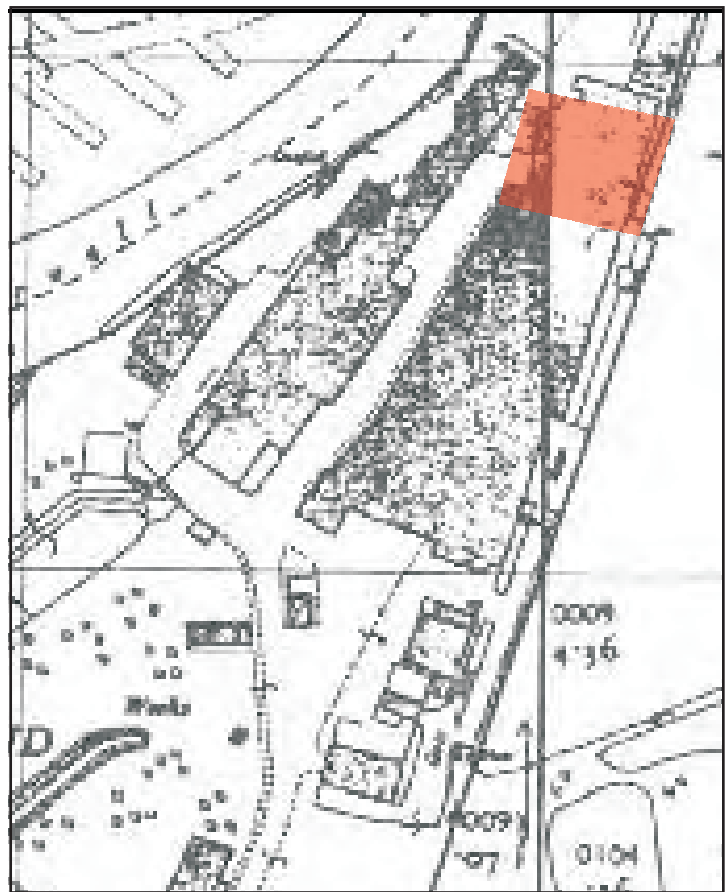
Ordnance Survey, 1891 Fig 6a



Ordnance Survey, 1910 Fig 6b



Ordnance Survey, 1930 Fig 7a



Ordnance Survey, 1958 Fig 7b

Ordnance Survey Map, 1930 (Fig 7a)

Expansion of the factory block over the course of the goit has continued. The structures mapped within the excavated area are similar to those shown on the 1910 map. However, the last vestige of the leat has disappeared and the former joiner's shop, located to the immediate north-west of the site, has been demolished.

Ordnance Survey Map, 1958 (Fig 7b)

By 1958 a large new block had been built to the west of bleach works, replacing all earlier buildings. It is joined to the former 'New Machine Room' by an annex whose location partially falls within the excavated area. A small number of the earlier 19th-century buildings survive in the southern part of the development site. The only building to survive from the original calico-printing works is the Counting House.

4.2 Trade directories

An online search of www.historicaldirectories.org has produced a small body of information pertaining to Bury Ground and the industries that were operating there in the late 19th and early 20th centuries. These are presented in Table 1 below.

Table 1: References to Bury Ground in trade directories

Year	Directory	Description
1891	Cotton Spinners and Manufacturers Directory	Bleachers: 'Rixson Francis (waste), Bury Ground' 'Rixson James (waste), Bury Ground' 'Spencer and Curedale, Ltd. cotton waste bleachers and manufacturers of cleaning waste, sponge cloths, lamp wicks, &c.), Bury Ground Works. Pay days first and third Wednesdays. Telegams, "Bleach Bury." Telephone No., 2. George E. Spencer, manager'
1903	Slater's	Belting Manufacturers: 'David & Co. Bury Ground, Bury: leather strapping and oak bark tanned picking bands' Bleachers: 'Spencer & Curedale, Limited, Bury Ground Works, Bury' Engine Waste Manufacturers: 'Spencer & Curedale, Limited (waste bleachers, engine waste manufacturers, &c. for home and foreign markets), Bury Ground Works – T N (Bury) 2; T A'
1909 and 1911	Slater's	Bleachers: 'Spencer & Curedale, Limited, Bury Ground Works, Bury' Engine Waste Manufacturers: 'Spencer & Curedale, Limited (waste bleachers, engine waste manufacturers, &c. for home and foreign markets), Bury Ground Works – T N (Bury)...'

5 THE EXCAVATED STRUCTURAL EVIDENCE

5.1 Excavation methodology

An 'L'-shaped area corresponding with the location of the building footprint was marked out by the client (c 1565 sq m). The area designated for excavation extended 2m beyond the footprint in every direction (Fig 8) and was divided on a north to south axis by the substantial in-filled leat, or goit. To the west of the goit, the ground surface was comprised mainly of crushed brick deriving from the demolition of the final phase of factory buildings. To the east of the goit the ground surface was largely topsoil overlying the in-filled reservoir depicted on historic mapping (see below).

Following consultation with GMAU, a 25m-long trial trench was excavated to the east of the goit in order to ascertain that the building footprint hereabouts fell wholly within the reservoir fill (Fig 8). When it became apparent that this was the case, this area was written off and subsequent excavations focused on the factory remains and the goit itself (Figs 9 and 10).

This area, measuring c 515sq m, was surveyed using a Leica System 1200 GPS and machine-excavated using a 14-ton tracked excavator, fitted with a toothless ditching bucket, operating under continuous archaeological supervision. Machine excavation ceased at the level of the first significant archaeological remains. The exposed remains were cleaned by hand and the excavation and recording of individual features proceeded in accordance with the Written Scheme of Investigation (NA 2010).

The results of the previous evaluation have been incorporated into this excavation report. Context numbers are given in brackets throughout the report.

5.2 General comments

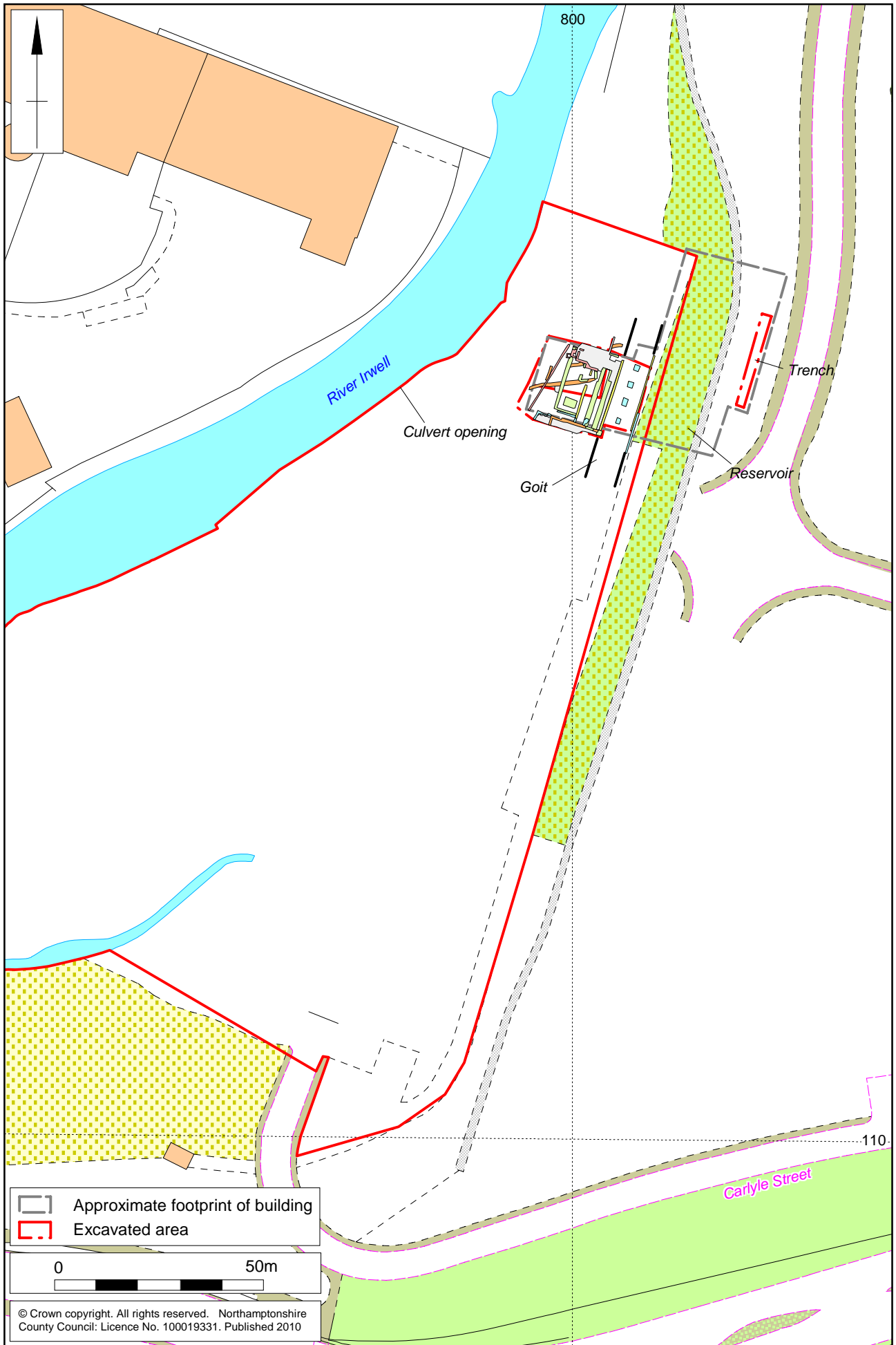
Where exposed, the geology, comprising coarse orange-brown gravel (2010/3008), lay up to 2.45m below the existing ground level at c 77.75-78mOD. It was overlain by a c 0.30m-thick layer of mid-grey alluvium (2025). The nature and depth of overlying deposits and structural elements varied greatly across the site. To the west of the goit all sub-surface features and deposits were overlain by concrete floor surfaces relating to later factory buildings or brick rubble resulting from their demolition. This formed the existing ground surface at 80-80.50mOD.

Prior to the start of the excavation, groundwork contractors had partially excavated the upper fill of the goit, removing a number of timbers and steel joists that probably supported the floor of early 20th-century factory buildings (Fig 11). These structural elements are put into context below.

To the east of the goit, the overburden was characterised by deposits associated with an in-filled reservoir, overlain by topsoil. A number of trees in this vicinity had been felled in anticipation of the development.

5.3 The late 18th-century calico-printing works, reservoir and goit

The fledgling print-works were first mapped in 1783; ten years after Howarth, Peel and Yates founded their factory at Bury Ground (Fig 4a). The goit, which also appears on this map, may have served a mill located to the south of the site and thus probably pre-dates the print-works - as may an associated reservoir located to the east of the goit. The excavations exposed a section of the goit and uncovered heavily truncated remnants of the early works (Fig 9). In addition, a trial trench was excavated through the in-filled reservoir.



Scale 1:1250

General site plan Fig 8



View of excavated features, looking north-west Fig 10



Pre-excavation ground works exposing upper level of goit, looking north Fig 11

The goit

A 20m-long section of the goit was aligned north to south along the eastern edge of the excavated area (Figs 9 and 12). A c 6.75m-wide channel was defined by substantial walls, [3001] and [3002], constructed from roughly-hewn, un-bonded blocks of coarse yellow-brown sandstone. The walls were c 0.50m thick, evenly coursed, and each had an intermittent off-set course, or 'kicker', built into the inner face, nine courses down (c 1.60m) from the top.



View of goit, looking south-east Fig 12

Within the goit, the natural gravels (3008) were exposed at c 77.80m OD in a hand-dug test pit located close to its centre (Fig 13). This was overlain by a 0.55m-thick layer of dark grey silty clay (3010) – an alluvium deposited by the water flowing through the open goit. This was sealed by an imported sand (3004) associated with the eventual in-filling of the channel in the early 20th-century (see below).

The reservoir

To the east of the goit a 25m-long trench was excavated through the in-filled reservoir (Figs 8 and 14). A dark grey silt containing occasional plant fibres and roots (3007) was revealed at a depth of 1.20m below the existing ground level. This represented the upper horizon of *in situ* silting within the reservoir. It was overlain by a 0.80m deep deposit of imported backfill material (3006) comprising dark grey sandy loam with inclusions of fragmented brick, mortar and concrete. This was sealed by 0.30-0.40m of dark grey sandy loam topsoil (3005).

As it had been established that the entire footprint of the new-build in this area lay within the former reservoir no further archaeological work was undertaken east of the goit.



Accumulation of silt in the base of the goit, looking east, showing hand-dug test pit Fig 13



Trial excavation exposing upper level of reservoir silts, looking north Fig 14

The print works

Prior to the construction of the late 18th-century works, alluvial deposits in this part of the site appear to have been consolidated with imported material. Layer (2009), excavated during the evaluation, overlay the alluvium (2025) and contained fragmented sandstone, brick, mortar, lenses of clinker and decaying timber (Fig 15). The same deposit was encountered during the excavation (3070), producing sherds of 18th-century pottery dating through to the period c 1740-1760. This was overlain by a 0.15m-thick layer of gravel which was cut by a wall foundation [2013] – which may relate to the east wall of the dog-legged structure depicted in the Earl of Derby Estate map (Fig 4a).



Made ground overlying alluvium, observed in Trial Trench 2, looking north Fig 15

The wall foundation was constructed from un-bonded slabs of yellow sandstone aligned north to south some 6m west of the goit [3002] (Figs 9 and 16), whose alignment it closely mirrored. At its southern end the remains of an overlying wall [3056] survived to a height of c 0.40m; it was 0.40m wide and constructed from un-coursed, roughly-hewn blocks of yellow sandstone bonded with a loose, charcoal-flecked greyish-white lime mortar (Fig 17). The wall/foundation was truncated at either end by later structural elements (see below).

To the north, a shorter section of wall [3026] was exposed in the base of a later culvert (Figs 9 and 18). Although it appeared to be aligned with wall [3056] and was constructed in the same manner, its level was much lower than the remains to the south. It is possible that this wall section instead relates to the curving wall foundation [1011] observed at the northern end of evaluation Trench 1 (Figs 9 and 19) and that they form part of a leat first depicted on the Tithe map of 1820 (Fig 4b), but perhaps more closely contemporary in date with the structures mapped in 1783.



Late 18th-century foundation [2013] for calico-printing works, looking south Fig 16



Truncated wall [3056] of late 18th-century calico-printing works, looking west Fig 17



Late 18th-/early 19th century leat wall [3026] (foreground),
looking south-east Fig 18



Foundation [1011] for late 18th-/early 19th-century leat, observed in Trial Trench 1,
looking south Fig 19

5.4 The 19th-century calico-printing works

Cartographic evidence suggests that the calico-printing works expanded significantly around the turn of the 19th century resulting in the demolition of some of the earlier structures whilst others were incorporated into new factory buildings (Figs 4b, 5a, 5b). Further episodes of structural expansion were witnessed during the first half of the 19th century. The site continued to function as calico-printing works until 1866. The excavation revealed a number of structural remains relating to this period (Figs 9 and 10).

The Machine Room

A 12m-long section of wall [3048] was aligned east to west in the southern part of the excavation (Fig 20). Its location corresponded with the north wall of a 'new' building depicted on the Tithe map of c 1820 (Fig 4b) and later identified as 'Machine Room' on the Ordnance Survey map of 1847 (Fig 5b). In contrast to the earlier wall [3056], which it clearly cut (Fig 17), this wall was constructed using red sandstone ashlar bonded with a medium-hard, off-white lime mortar. It was soundly-built, 0.55m wide, with dressed stonework (typically measuring 0.40m x 0.30m x 0.20m) extending to foundation level. The eastern end of the wall appeared to abut the west wall of the goit [3002] and, to the west, a southerly return [3051] formed the north-west corner of the c 11.30m-wide building. Here, however, much of the original fabric had been robbed away and replaced in brick.

A 1.60m-wide brick-filled aperture in the northern wall of the machine room may indicate the position of a doorway [3049]. The interior of the room was floored in a bluish-grey concrete (3050) – most probably poured over an earlier floor.



North wall [3048] of late 18th-/early 19th-century machine room (foreground), looking north-east Fig 20

Leats

The Tithe map of c 1820 depicts two leats, in close vicinity to the excavated area. One, lying to the immediate north, was fed from the goit and is discussed above. To the west was a slightly later leat which was joined to the river to the south-west. Between these two features the map shows a blank space. However, the investigations have established that the later channel continued eastwards, across the site, in a culvert.

This leat was 3.40m wide with substantial red sandstone walls, [2011] and [3022] (Fig 21). The southern wall [2011], previously exposed in evaluation Trench 1, was built into a foundation trench [3064], which truncated the northern end of wall [2013] (Fig 22). The backfill of this trench (3065) contained sherds of pottery dating to the latter half of the 18th century, suggesting that it was built soon after the original factory buildings.



Late 18th-/early 19th-century leat (to right), looking south-west Fig 21

The point at which the leat entered the culvert was located just within the western part of the excavated area. Here, wall [3032] (Fig 23) was constructed from roughly-hewn yellow sandstone blocks and had a barrel-vaulted opening built into it (later altered when the leat to the west was also culverted -see below). Pottery retrieved from the fills, (3078) and (3081), of the wall's construction trench [3076] again dates to the latter half of the 18th century. To the east of wall [3032] the sandstone-rubble packing over the vault was revealed (3024).

This culvert probably ran into the goit via a modification to the earlier leat, perhaps involving the partial demolition of wall [3026]. Later alterations in the vicinity, however, had removed the evidence for this relationship. Drainage of groundwater into the culvert was evidenced by a small brick soak-away [3092] positioned over the apex of the vault.



Leat construction trench [3065] cutting late 18th-century wall foundation [2013], looking west Fig 22



Culvert wall [3032] and vault [3024], looking south-west Fig 23

The New Machine Room

To the north of the machine room were a series of heavily-truncated walls and surfaces which were clearly the remnants of the building identified as the 'New Machine Room' on the Ordnance Survey map of 1847 (Fig 5b). This structure appears to have been partially constructed using sizeable yellow sandstone ashlar, which could be seen at its south-west corner [3038] (Fig 24) and, in a shorter section, in its west wall [3033]. However, where the west wall crossed the culverted leat, a much lighter construction of lime-mortared sandstone rubble was used [2012]. A doorway was probably present in the southern wall where stonework gave way to later brickwork [3039].



South-west corner of New Machine Room (right foreground), looking north, showing wall [3033] Fig 24

Cartographic evidence suggests that the building's eastern wall, of which nothing remained, was aligned over the west wall of the goit [3002], whilst the north wall, if it survived, lay well outside the excavated area.

A significant proportion of the new building's internal space was occupied by a massive stone-lined trough aligned north to south towards its eastern side (Fig 25). Most of this feature had previously been exposed in evaluation Trench 1. Its edges were defined by huge yellow sandstone blocks, [1001] and [1002], measuring up to 2.0m x 1.2m x 0.50m and defining a 1.0m-wide channel. The southern end of this feature had been inserted into the north wall of the original machine room. Here, a 2m-long block of sandstone [3021] had been drilled with two circular housings (80mm in diameter) set within a sunken rectangular area whose edge was stained with oxidised iron; clearly this was built to house a piece of machinery (Fig 26). Approximately 14m to the north the trough was truncated by a massive concrete tank dating to the mid-20th century and beyond this was its northern end [1007], allowing its total length to be established at c 17m.



Stone-lined trough [1001/1002], looking south, truncated in foreground by later wall [1005] Fig 25



Stone housing [3021], at south end of stone-lined trough,
looking north Fig 26

Slots, housings and iron pegs were set at intervals into both the top and along interior of the trough (Fig 27). In some instances their relative positions were suggestive of housings for the 'feet' of machinery suspended above; others appeared randomly placed.



Example of fittings located in wall faces within stone-lined trough Fig 27

The base of the trough lay 2.45m below its lip, where the natural gravel was exposed in a machine-cut slot. The gravel was overlain by a deposit of homogeneous dark grey clinker and loam (1003) containing occasional blocks of sandstone and bricks – an imported backfill.

Other than this, the evidence for the use of internal space was sparse. Most of the ground was truncated by later phases of construction, possible exceptions being a mortar layer (2004) overlying an 'island' of made-ground covering the culvert (Fig 28) and patches of brickwork to the south (3040), perhaps remnants of the original floor.

Cut through the brick floor, but perhaps loosely contemporary, was a large concrete machine base [3041] measuring c 3m x 2m x 0.8m+ (Fig 29). In each corner was a 40mm-diameter steel bar upon which machinery, or even a steam engine, may have sat.

The new machine room was, in part, separated from the earlier building to the south by a 1.50m-wide passageway which was probably covered as it is not shown on any of the building plans. It is assumed that a doorway must have been located at the head of this passage, giving access to the south-eastern corner of the building, the threshold passing over the denuded remains of the wall relating to the earlier calico-printing works [3056].



Mortar bedding layer (2004) for floor surface of New Machine Room (right foreground), looking north-east Fig 28



Concrete machine base [3041] (centre right) within New Machine Room, looking north-west Fig 29

Modifications to the leats

The new machine room was built over both of the pre-existing leats. Whilst the leat adjoining the goit probably became redundant at this point, the other appears to have been modified to create a 'tank' within the new building. A culvert opening was built into a wall [3023] that spanned the width of the leat in the centre of the new building. It was constructed from yellow-brown sandstone blocks built into the pre-existing red sandstone fabric of the leat (Fig 30). Approximately 5m to the east another sandstone wall - without an arch - was also built [3028] (Fig 18). Its construction trench [3074] cut the lenses of silt (3027) that had accumulated in the base of the leat around wall [3026]. There was no evidence for vaulting between these two inserted walls suggesting that this part of the modified leat was open, or at least accessible, within the new machine room.



Collapsed leat vault opening [3024], looking south-west Fig 30

5.5 The late 19th- and 20th-century cotton waste bleach works

After Bury Ground was sold in 1866, the works were split into a number of smaller enterprises. The buildings within the excavated area became the premises of a cotton waste bleach works, which were expanded at the turn of the 20th-century and developed until their closure in the 1960s. A large proportion of the surviving building fabric dated to this period (Fig 9).

The bleach works

Cartographic evidence suggests that the building footprints were not initially altered when the calico-printing industry was replaced by bleach works. Within the excavated area, the structures depicted by the Ordnance Survey map of 1891 are, in essence, the same as those surveyed in 1891 (Fig 6a). By 1910, however, significant changes had occurred (Fig 6b); plentiful evidence for these modifications was revealed during the excavation.

The western side of the original machine room was extended towards the river to respect a distinctive north-east to south-west building line. Within the excavated area, this extension was evidenced by a 0.40m-wide wall [3052] which abutted the original west wall of the block [3051] (Fig 31). It was constructed from large yellow brown sandstone ashlar, presumably salvaged from the pre-existing machine room, incorporated with brickwork and bonded with a grey-hued lime mortar. Aligned east to west for a distance of 2.60m and returning to the south-west at an angle of c 100 degrees, wall [3052] formed the north-west corner of the modified structure. The interior was floored in concrete (3072).



Late 19th-/early 20th-century bleach works extension, wall [3052] (background), looking south Fig 31

The pre-existing buildings were also extended eastwards, over the goit. To achieve this, a series of piers, constructed predominantly in brick, were built along the centre of the channel [3013], [3015], [3017], [3018] (Fig 12). They stood on brick and sandstone foundations [3012], [3014], [3016]. The most northerly of the pier foundations [3012] was constructed over a large timber beam [3011] that had probably been laid across the soft silt to enable access (Fig 32). Subsequently, a 0.80m-deep deposit of yellow sand (3004), lain in a series of lenses, had been used to backfill the goit to just above the level of the pier foundations. Pottery and glass bottles dating to the late 19th and first decade of the 20th century were found in association. The timbers and reinforced steel joists that supported the floor of the works lay over this sand, only one of which [3019] was found *in situ*. The eastern wall of the extended factory [3020] was built in brick over the east wall of the goit.

A number of alterations and additions to the interior of the pre-existing buildings may be contemporary with these extensions – though some could ostensibly relate to slightly later developments. A down-pipe [3047], for drainage inside the building, was inserted into the southern end of the large trough [1002] and connected to a drain

[3062] aligned westwards beneath the passage that divided the original and 'new' machine rooms. A lightly-constructed brick wall [3043] may have been part of this drainage system which, in entering the passage, breached the denuded remains of the original calico-printing works [3056] (Fig 17). The surface of the passage was re-lain in clinker (3088).



Late 19th-/early 20th-century bleach works extension across the goit, showing timber beam [3011] and pier [3012], looking east Fig 32

Further modifications to the leat

Further modifications made in the period 1891-1910 resulted in most of the remaining north-east to south-west leat being culverted. The concrete-lined opening of this culvert can still be seen in the east bank of the Irwell, facing down-stream, to the south-west of the excavated area (Fig 33).

By 1910, only a short section of this leat remained open; it lay within the excavated area, to the west of wall [3032]. By 1930 this too had been covered (Fig 7a), an operation that involved the lowering of the leat's sides, the construction of a sandstone vault [3082] and the partial reconstruction of wall [3032] (Fig 23).

Mid 20th-century development

The mid-20th century saw the construction of a substantial new factory block to the west of the excavated area (Fig 7b). Internal features relating to a smaller structure that joined this to the earlier works were present with the excavated area. These included a concrete base [2020] housing an iron stanchion (Fig 24), brick surfaces (2016) and (3036) and a brick-lined pit [3035]. In the northern part of the excavation a large concrete tank, lined in brick [3030] cut through the leat and the northern end of the stone-lined trough [1001/1002]. The bricks were modern and the structure probably represents an insertion dating to the second half of the 20th century.



Culvert opening on east bank of the River Irwell, looking north-east Fig 33

6 THE FINDS

6.1 Pottery by Iain Soden

A total of 61 sherds of later post-medieval pottery were recovered from nine contexts. They weigh 2.12kg and represent eleven types. The assemblage is comprised as follows:

Table 2: Pottery data (number of sherds/weight (g))

Type/context	3004	3055	3060	3065	3067	3070	3078	3081	3082	Total
Porcelain						3/3g				3/3g
Manganese-glazed ware						4/13g	1/26g			5/39g
Nottingham/ Derbyshire stoneware				2/5g	3/25g	2/14g				7/44g
Creamware				1/8g		9/21g				10/29g
Blue shell- edge pearlware									1/5g	1/5g
Stoneware blacking bottle/ginger beer bottle	1/124g									1/124g
Misc English stoneware	2/167g				1/42g		1/7g			4/216g
Pancheon	7/1101g									7/1101g
Underglaze transfer printed wares	4/218	1/5g								5/223g
Banded slipware	7/175		1/2g							8/177g
Midland/northern Black ware			2/88g		5/33g		2/15	1/25g		10/161g
Total	21/1785g	1/5g	3/90g	3/13g	9/100g	18/51g	4/48g	1/25g	1/5g	61/2122g
Context TPQ/date	c 1910	C19	C18	C18	C18	c 1740-1760	C18	C18	c 1780	

The types are all of the 18th century or later. Pottery from goit fill (3004) is from a dump of material or rubbish, with bigger sherds as late as c 1910.

None of the pottery is present in large enough quantities to make any suggestions as to area usages or any draw any significance as to the site-origin of the wares. In terms of production, where this is clear, they derive from a number of northern and north-midland sources which are well known production centres, such as stonewares from Nottinghamshire and Derbyshire and transfer-printed wares from Staffordshire. The assemblage is primarily useful for dating purposes.

6.2 Clay tobacco pipe by Tim Upson-Smith

Four fragments of clay tobacco pipe were recovered from three different contexts (3055), (3065) and (3078).

The stem fragment from the layer over the leat vault (3055) was dated using the diameter of the bore to the second half of the 19th century. The only bowl was recovered from the backfill of the leat construction trench (3065). It matches the Oswald type series G19, dating to 1710; the stem fragment also from this context dates to the second half of the 18th century. A stem fragment from the backfill (3078) of the construction trench for wall [3032] also dates to the second half of the 18th century.

The pipe bowl from (3065) and the stem from (3055) were both very abraded, as if they had been in water, so are likely to be residual. The other two fragments still had relatively fresh breaks, so can be considered for dating evidence for the features.

6.3 Glass bottles by Tim Upson-Smith

Three complete bottles were recovered from the fill of the goit (3004). Two of the bottles would have been corked, the third had an internal screw. All of the bottles were embossed with the name of the manufacturer.

The first is a pale green/clear cylinder bottle with a rounded base marked William Noble Heywood. From its style it can be suggested that it would have held a fizzy mineral water. The rounded base meant that the bottle could not stand, so the liquid was in contact with the cork to stop it from drying out and the gas escaping. This style of bottle appears in the Barnett and Foster catalogue of 1898.

The second is an imperial half-pint bottle, with cork stopper, in pale green/clear glass. The bottle is typical of the late 19th/early 20th centuries. It is marked J Chandler Botanical Brewer, Bury; the colour of the bottle and the term botanical, would suggest that this bottle was for ginger beer.

The third bottle is in brown glass with an internal screw stopper, the stoppers could be made of Vulcanite or Lignum Vitae. The patent for the internal screw stopper was taken out in 1879. The bottle is marked Bury Brewery Co Ltd, George Street, Bury and would have been for beer.

All three bottles are typical of those being mass produced in the latter half of the 19th century and into the early 20th century and were disposed of in the backfill of the goit, either by those backfilling it, or just as a place to get rid of rubbish.

7 DISCUSSION

The excavation, which concludes the first phase of archaeological work at Bury Ground, has provided a body of evidence that elucidates the function, character and development of those elements of the calico-printing and bleach works falling within the footprint of the northernmost building of the development. Furthermore, through investigation of the goit and associated leats, information pertaining to the system of water management and exploitation of the immediate natural landscape has been gathered. Each of these bodies of evidence has the potential to address not only the aims and objectives of the project (AE 2008), but also many of the avenues of research identified in the archaeological research agenda for the region (Newman and McNeil 2007) and local area (Nevell and Redhead 1999). It is anticipated that this will be augmented by the results of forthcoming phases of archaeological work at Bury Ground.

The earliest structural remains relate to the foundation of the Howarth, Peel and Yates calico-printing works in the latter half of the 18th century and described as, 'the first proper industrial factory in this part of the Irwell Valley' (ibid, 28). The goit, however, on the basis of its possible relationship with the documented medieval corn mill, may have earlier origins (AE 2008, 15). Though investigated during the course of the excavation, no dating evidence was discovered to clarify this theory. The earliest building remains

were a section of wall whose location corresponds to one of the structures mapped in 1783, ten years after the calico-printing works were established. Ceramic evidence dated this to same period. It was truncated by later factory elements and no contemporary features were present to enable the function of the building to be established. Its alignment respected that of the nearby goit, which was certainly a contemporary topographical feature.

Cartographic evidence indicates that the works experienced a period of expansion between 1883 and c 1820 when the Elton Tithe map was produced. Survivals from this period included the north wall of the Machine Room (identified as such on the 1847 Ordnance Survey map) present along the southern edge of the excavation. This formed the most northerly building of a long, narrow block typical of bleach, dye and printing works where the cloth was passed through a number of sequential processes (Nevell *et al* 2003, 95). At Bury Ground, a number of different machines would have been used in the printing process; those housed within this particular room were probably used for washing or bleaching the calico, as dyeing and printing workshops are identified elsewhere. Most of the machine room, however, lay outside the excavated area and the exact nature of the process performed within remains speculative.

Other remnants of this early phase of expansion relate to the system of water management, although later alterations hamper their interpretation. Two leats, probably initially conjoined were located; one was connected to the goit, the other, partially culverted, to the river. They may originally have harnessed water power, or alternatively, facilitated the disposal of waste liquids. If power was the principal concern, then the water would have flowed from east to west (or from goit to river), perhaps driving machinery in a building to the south-west, later identified as the millwrights shop.

By c 1832 further expansions had taken place, and it is from this period that many of the excavated features date. By this time a 'New Machine Room' had been added to the north of the original; its south and west walls were located with the excavated area together with internal elements. These included a substantial stone-lined trough which probably housed washing machines – an almost identical example was discovered during excavations at Wallsuches Bleach Works, Horwich (Craig *et al* 2009, 65; fig 34). Originally these machines were probably 'dash-wheels': small water wheels with four internal compartments suspended, and partially immersed over the channel below (Fig 34). Cloth was fed into each of the compartments, which were perforated to allow the circulation of water, and agitated by the motion of the wheel. Although water was originally used to power the dash-wheels, this was eventually replaced by steam, 'in all good bleach and print works' (Ure and Hunt 1867, 354). The large concrete machine base located to the west of the trough could, conceivably, have housed such an engine.

Some of the housings and fittings located along the inside edges and top of the trough are of a configuration in-keeping with the use of dash wheels. Their relative positioning and varied design, however, suggest that dash-wheels were replaced with another type of washing machine, perhaps one utilising a system of rollers linking directly to bleaching 'kiers' (Ure and Hunt 1867, 365; fig 190). The term 'kier' derived from a 17th-century word used to describe generic vats and tubs, but when used in the bleaching trade, it referred to the iron vessels that were used to boil the cloth in a bleaching agent (Ashmore 1969, 60).

Construction of the New Machine Room also necessitated alterations to the system of water management in this part of the works, with the easternmost leat becoming redundant and the westernmost terminating within the new building. These alterations

may reflect the adoption of steam power as water could no longer flow from goit to river as it had previously done.

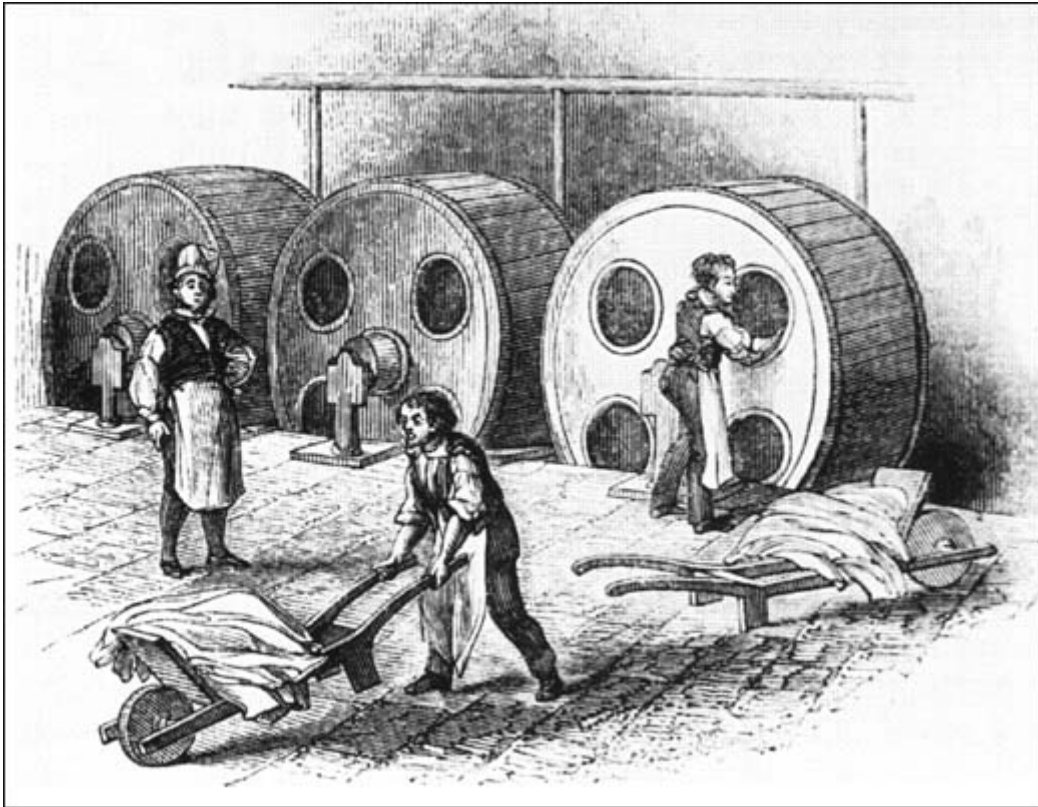


Fig 34: Illustration of dash-wheels (taken from www.spartacus.schoolnet.co.uk)

With this textile finishing infrastructure in place, it is no surprise that when the calico-printing works were divided between a number of smaller firms in 1866, cotton waste bleachers were prominent amongst them. Two firms in particular became synonymous with Bury Ground during the latter part of the 19th century: Spencer and Curedale and Rixon and Sons. The buildings within the excavated area do not appear to have been greatly altered at this time; cartographic sources show little change over the period 1847-1891. However, some of the fittings associated with the stone-lined trough may well have been adapted to house a different type of machinery at this time.

Expansion of the works did, eventually, occur in the final decade of the 19th century and first decade of the 20th. Spencer and Curedale, now the largest of the Bury Ground firms, oversaw the extension of the northern part of the bleach works. This phase of re-development was well represented - most significantly by the row of piers built along the centre of the goit to carry the floor of a new structure. To the west, the old machine room was also extended, using a combination of red sandstone ashlar, presumably salvaged from localised demolition of early structures, and brick.

The 1930s and 1950s saw further episodes of re-development, most notably the full culverting of the remaining leat and, later, the construction of a new factory block to the west of the machine rooms. Remnants of a smaller structure which joined these two blocks together were represented by a concrete stanchion base and patchy areas of brick floor. The large concrete tank which truncated many of the earlier remains in the northern part of the site was clearly the most recently constructed structural element in the site's two hundred year-old history.

This rapid sequence of structural development at Bury Ground has invariably led to a fragmented archaeological record. Within the excavated area, the remnants of each phase of construction were heavily truncated by the superseding ones. Nevertheless, when considered alongside the very comprehensive sequence of historic maps, the archaeology has proven instructive and demonstrates the potential should further phases of work be undertaken at Bury Ground.

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