

Birmingham University Field Archaeology Unit  
**Report No.310**  
August 1994

**The Old Crown Inn, Deritend, Birmingham:  
An Archaeological Evaluation**

by

Steve Litherland, Catharine Mould  
and  
Stephanie Ratkai

with

Illustrations by  
Mark Breedon

For further information please contact:  
Simon Buteux (Manager), Peter Leach or Iain Ferris (Assistant Directors)  
Birmingham University Field Archaeology Unit  
The University of Birmingham  
Edgbaston  
Birmingham B15 2TT  
Tel: 021 414 5513

**The Old Crown Inn, Deritend, Birmingham:  
An Archaeological Evaluation**

**CONTENTS**

|  | Page |
|--|------|
| 1.0 Introduction .....                     | 1    |
| 2.0 The Site .....                         | 1    |
| 3.0 Objective .....                        | 1    |
| 4.0 Excavation Method .....                | 2    |
| 5.0 Results                                |      |
| 5.1 Trench A .....                         | 2    |
| 5.2 Trench B .....                         | 3    |
| 5.3 Discussion .....                       | 3    |
| 6.0 The Pottery by Stephanie Ratkai .....  | 4    |
| 6.1 Introduction .....                     | 4    |
| 6.2 Jug Forms, Glazes and Decoration ..... | 5    |
| 6.3 Cooking Pots .....                     | 5    |
| 6.4 Bowls .....                            | 6    |
| 6.5 Discussion .....                       | 6    |
| 7.0 The Old Crown in Context .....         | 6    |
| 8.0 Acknowledgements .....                 | 8    |
| 9.0 References .....                       | 9    |

**OLD CROWN INN, DERITEND, BIRMINGHAM**  
**AN ARCHAEOLOGICAL EVALUATION**

by

Steve Litherland, Catharine Mould and Stephanie Ratkai

### **1.0 Introduction**

Following advice from Dr Mike Hodder, Birmingham City Council Planning Archaeologist, Karl Grace Design Associates, on behalf of their client Mr. P. Brennan, commissioned Birmingham University Field Archaeology Unit to conduct an archaeological evaluation of the back-plot curtilage of the Old Crown Inn, Deritend, in advance of proposed development. This report documents the results from a five day archaeological evaluation at the Old Crown Inn, conducted 11th-15th July 1994, and comprises a written descriptive and interpretative report, supplemented by scale plans, sections and level information.

### **2.0 The Site**

The main range of the Old Crown Inn is a Grade II\* listed timber-framed building believed to date from the late 15th century, and is not only the one complete medieval standing building remaining in Birmingham city centre, but is also the city's most intensively documented historic building, thanks to the support and interest of the 19th century historian Toulmin-Smith. A detailed study of the building, which combined structural survey with documentary research, has also recently been undertaken by Stephen Price for Birmingham City Council and English Heritage (Price 1993).

Documentary sources studied by Price indicated a range of ancillary buildings in the back-plot area, including stables, a malthouse and brewhouse in the 18th and 19th centuries. The remains of earlier structures, or typical back-plot features such as rubbish pits or yard surfaces, were also anticipated.

### **3.0 Objective**

The objective of this archaeological evaluation in the back-plot of the Old Crown was to determine the presence or absence of significant archaeological deposits or features which might be affected by the proposed development. At present the redesign is understood to consist of a single-storey building erected against the 19th-century brick structure which is situated on the eastern side of the site, with car parking over the remainder of the back-plot. The nature and extent of any surviving archaeological deposits was also to be examined.

## 4.0 Excavation Method

On-site investigation followed the demolition of out-buildings within the back-plot to ground level, which consisted of concrete slabs of varying thickness. The trial trenches were located to examine the depth of deposits and the nature of deposit survival over the whole area, but with particular emphasis upon the area of the proposed new build.

Two trial trenches were excavated. Trench A was located to provide an east-west transect of the back-plot. The western half of Trench A lay within an area to be least disturbed by the proposed building and services, whilst the eastern half lay within the proposed new build area. Trench B was located to further test the survival of deposits within the proposed new build area - including the possible survival of floor surfaces associated with the partially-demolished section of the eastern timber-range of the Old Crown.

The concrete slabbing was first broken up using a JCB and hydraulic breaker and then mechanically removed along with the modern overburden down to the highest surviving archaeological horizon, which was then cleaned by hand. A comprehensive written, drawn and photographic record was maintained throughout the evaluation and now forms the site archive.

## 5.0 Results

### 5.1 Trench A (Figs 1b and 2)

Trench A measured 4m x 11m and was excavated to a maximum depth of 1.10m below the concrete ground surface (104.34m A.O.D.). The earliest archaeological activity was seen in the southeast corner where the natural sand and gravel (1012 and 1013, top 104.70m A.O.D.) was sealed by a medieval cinder deposit (1036, top 104.90m A.O.D.) which had been truncated by a possible 14th century rubbish pit (F111). This pit had been back-filled with a homogeneous silt-sand matrix containing a vast quantity of broken pottery (1028). Feature F111 was truncated by a brick footing, consisting of a single layer of hand-made (ie pre-19th century) bricks (F109) set into the pit fill (1028) and aligned east-west. Further truncation may have occurred to the east of the feature when a 5 course deep machine-brick wall was laid, seen only in the south half of the west facing section (Fig 2).

A later machine-brick surface (1002) was sealed by the modern concrete ground surface (1000). To the north of F109 the natural sand and gravel (1012) was overlain by redeposited mixed natural (1011) and then by a very clean, compact and level deposit of cinders (1010). A layer of redeposited natural sand and gravel (1007) and one of structural debris (1009) provided a foundation for F100, a four course deep layer of machine bricks which was sealed by the modern concrete surface (1000).

The sequence of archaeological deposition remained equally as clear in the south facing section as far west as the cut for F104, a service pipe. The natural sand and gravel (1012 and 1013) was overlain by redeposited mixed natural (1034, equivalent to 1011 in the west-facing section) which was sealed by a deposit of sand and gravel with some charcoal flecks (1033). These deposits were cut by F114 down to the natural sands and gravels (1012). The process of archaeological deposition resumed within this cut - a cinder layer (1010) was sealed by clean sand and gravel (1007), which was overlain by a more charcoal flecked layer (1029). All three of these deposits were truncated by F102, a service trench with the metal pipe *in situ*. A later cinder layer (1005) sealed the service pipe and was overlain to the east by a thin strip of white ash (1004). The

cinders and ash were truncated to the east by F116 and to the west by F115. The fills of both features provided a foundation for F101, a yard surface of blue machine-bricks (1002) which was overlain in part by orange machine-bricks and the modern concrete ground surface (1000).

The stratigraphy was less comprehensive to the west of F104. A small sondage (Fig.1b) established that the natural sand and gravel (1012) occurred at a depth of 104.58m A.O.D. and was overlain by a thick cinder deposit (1035) into which was set an area of well-preserved cobbles (1015, top 104.88m A.O.D.). The cobbles were sealed by a silty cinder deposit (1014) which continued east to F104. Both the cobbles and cinders were truncated to the east by F117 and to the west by F103. A thick layer of modern structural debris was sealed by the concrete ground surface (1000).

The foundations of a late 19th century building survive towards the western end of Trench A (F106), sealed by the concrete (1000).

## 5.2 Trench (Figs 1b and 3)

Trench B measured 2m x 5m and was excavated to a maximum depth of 0.90m below the concrete ground surface (104.51m A.O.D.). Although major truncation from modern service trenches (F200 and F203) and a modern pit (F201) had occurred, the sequence of stratigraphy was still visible in part.

The natural sand and gravel horizon (2013, top 104.51m A.O.D.) formed a foundation for a cobble surface (2005) which extended over the whole of the trench at a height of 104.82m A.O.D., except where truncated by F200-F203. The cobbles were sealed by a sandy clay deposit (2015 and 2020) which was overlain by a thick cinder layer (2014 and 2019). The cobbles and cinders were truncated to the east by F202, a cut which lowered the ground level for a hand-made brick surface (2004) which occurred at the same height as the cobbled surface to the west (2005). To the west a modern service pipe (F200) caused further truncation. In the south facing section a thick deposit of mixed sandy clay (2016), the cinder deposit (2014) and structural debris (2004) were utilised as a foundation for a blue machine-brick yard surface (2007), the equivalent to 1002 in Trench A. The yard surface was sealed in part by a levelling deposit of orange machine bricks (2008), varying from 1 to 3 bricks in depth, and by the modern concrete ground surface (2000).

A stone-lined well with later brick corbelling was also found partly underneath the foundations of the rear brick service range of the Old Crown (Fig 1b). The well was 4m deep to the top of the latest backfilled deposits. Whilst the potential for the well to contain water-logged deposits is high, safety considerations precluded any further investigation.

## 5.3 Discussion

Despite the limited survival of archaeological deposits as 'islands' across the site between Victorian and later disturbances, a number of tentative conclusions can be drawn about the history of the site from the evaluation.

Whilst only one archaeological feature and two contexts (F111, 1028 and 1036) were datable to the medieval period, the quantity and quality of the pottery recovered from pit F111 is significant, and points to the presence of a medieval pottery production centre nearby. This is discussed in detail by Stephanie Ratkai below, with reference to

evidence from previous excavations in the Deritend area. The probable 14th century date of this pottery dump also gives us clues to the development of the site prior to the building of the Old Crown in the late 15th century.

The absence of the ubiquitous rubbish pit, the characteristic archaeological feature of the medieval urban backyard, is surprising, and when considered with the generally clean nature of the successive yard surfaces would appear to indicate that activity in the backyard of the Old Crown was different to that of a typical medieval domestic tenement. This is consistent with Price's arguments, principally derived from the inspection of the standing building, that the Old Crown was from the beginning a property of considerable status, although unfortunately no archaeological evidence was discovered to shed any light on the early function of the building prior to its later use as an inn (Price 1993,13).

In addition, the evidence from the evaluation was not able either to prove, or disprove, F.W.B.Charles' supposition that the surviving timber-framed frontage of the Old Crown might be the rump of a much larger structure built around a courtyard (Charles 1980), although Price's interpretation of the internal arrangements of the Old Crown and the available cartographic evidence appear to make Charles' contention unlikely.

Of course it is possible that Victorian levelling activity, dated from the Toulmin-Smith restoration of 1861/2, may have scoured away a great deal of archaeological evidence. However, this possibility should be considered against the absence of negative features cut into the natural surface of the sands and gravels of the River Rea terrace (with the important exception of F111 in Trench A), and the proximity of that natural level to the ground-floor of the timber-framed building, which would appear to indicate that the level of man-made deposits in the backyard of the property was never very high.

Several discrete phases of post-medieval activity can be identified from the evaluation, which may be related to the post-medieval phases of building activity identified by Price for the Old Crown (Price 1993,12-17). These are perhaps best illustrated in Trench B where the cobbling (2005) and pre-machine brick surface (F202) were cut or overlain by later features. To the west of Trench A the Victorian walls F105 and F106 continue the story of modern activity through to the engineering-brick yard surface and later concreted surface found today.

## **6.0 The Pottery by Stephanie Ratkai**

### **6.1 Introduction**

Medieval pottery came from two contexts, 1036 a make-up occupation layer and 1028, the fill of a large pit cutting 1036. Nearly all the sherds came from 1028. Most of the sherds were from jugs decorated with white slip, similar to jugs described by Sherlock as Deritend ware (Sherlock 1955). The remaining sherds were mainly from cooking pots, with a small number which may have come from bowls.

Jug fabrics fell into three groups; a hard sandy oxidised red ware, sometimes with a grey core, a soft sandy red ware and a very hard/overfired ware with mid-grey surfaces and, usually, a grey core, although there were some examples with a red core. The fabric variations were all the result of differing firing conditions, the clay matrix being much the same.

Cooking pot fabrics fell into two distinct groups; a hard red sandy ware similar to the jug fabric and a dark grey ware with a dull brown core. Most of the sherds fell into

the former group. The latter group is a fabric type well represented in Warwickshire (Ratkai 1990 Fabric 121) and named elsewhere Warwickshire Grey/Black Wares (Ratkai forthcoming).

## 6.2 Jug forms, glazes and decoration

There were no very complete profiles. Most of the 40 rim sherds found were from squared 'ledge' rims often associated with a long neck with one or two slight carinations. Some necks were uncarinated, long and cylindrical. Other less common rim types were represented by a simple angled everted rim and by a flat-topped, thickened rim with a marked internal projection. Pouring lips were small and rounded with characteristic circular finger impression on either side of the lip. Base sherds were, with one exception, plain with a slight outward flare. Only one base sherd had long shallow finger impressions. Both rod and strap handles were present. Rod handles were decorated with a line of small deep circular impressions. Whilst the strap handles were most commonly decorated with a central line of roughly 'u' shaped impressions, there were examples of a strap handle with a central line of incisions along the outer edge of the handle. The first type of strap handle has been found elsewhere on 'white-slip decorated ware' vessels, as have the rod handles.

Decoration was usually in white slip, which seems to have been applied with a brush. Sometimes the inner surface of the neck had also been brushed with white slip. Slip patterns on the jugs were varied, and included lattice patterns and curvilinear designs, alternating vertical bands of slip radiating from slipped neck ridge with circular blobs of slip between the bands and vertical bands of slip alternating with applied stamp white slip pellets. Many of the white slip bands had been rouletted with a square notched roller stamp. One particularly elaborate example consisted of a vertical band of slip, then a rouletted band and finally a band of slip with applied 'tear drops' or scales. There appeared to be only one stamp in use which resembled a spoked wheel. Decoration was not restricted to the body of the pot, for there were examples of necks decorated with rouletted zig-zag lines which met with a slipped and rouletted neck ridge. There were two examples of crude applied face pads, with the most cursory rendition of the features of the face. From context 1036 there was a small portion of a rim which may have had a bridge spout. Above the putative spout was an applied ring (an eye?) and to the side of the 'spout' an applied slightly coiled ribbon of clay (part of a rams horn?). If this interpretation is correct then the bridge spout formed part of a zoomorphic motif.

There was one final type of decoration much simpler than above. The body of the vessel is covered with a light horizontal combing, which under a properly fired glaze shows up as a series of darker lines within the glaze.

Glazes varied depending on the firing conditions. Underfired glazes were dull yellowish and opaque. Correctly fired glazes were a glossy olive or a thinner tan-light olive. Overfired glazes were very dark green or black. Some vessels show copper green speckles over the white slip, so presumably the glazes were often slightly coloured with copper.

## 6.3 Cooking pots

The cooking pots formed a fairly consistent group, being fairly globular with an angular squared rim springing from the neck. This rim form is commonly found among the Warwickshire Grey/Black Wares. None of the vessels was sooted.

#### 6.4 Bowls

There were no rims sherds and the presence of bowls is only hinted at by a few base sherds which appear to be glazed internally.

#### 6.5 Discussion

The pottery from the pit fill 1028 and from 1036 is very much the same and there seems to be nothing to distinguish the two contexts chronologically. Apart from the pottery, there is little else present in these contexts apart from burnt daub and two pieces of blackened roof tile. There does not seem to be any residual pottery, apart from, perhaps, the two or three Warwickshire Grey/Black Ware sherds. The relative proportions of vessel type is not usual, nor is the limited range of pottery types. The wide range of firing demonstrated by this group, considered with the lack of sooted sherds, and the absence of animal bone usually found in domestic rubbish pits, suggests that this area is close to the location of a pottery production site. The burnt daub and tile may well have formed part of the kiln superstructure. Waster pits were recorded nearby by Sherlock (1955) although no kilns have been found. The present author was unwilling to accept the presence of a production site at Deritend from the evidence which now survives from Sherlock and Oswald's excavations in Birmingham Museum, particularly as 'white slip decorated wares' have a wide distribution throughout Warwickshire and into Worcestershire and Staffordshire and are even found in the Welsh Marches. However, the evidence from the Old Crown seems unequivocal. There are variations in fabric in the 'white slip decorated wares' and the finer, micaceous fabric found elsewhere in the West Midlands is not represented in this group, so it still seems likely that there is more than one production centre in the West Midlands and that Deritend ware represents a part of the production of a regional type.

The forms and decoration of the pottery from the Old Crown differ in some respects from the pottery excavated by Sherlock and Oswald, and the dating is problematic. The Warwickshire Grey/Black Wares have been dated by the present author to the 13th-early 14th century. There is no way of establishing whether they are residual or contemporary with the rest of the pottery. They are not abraded, which suggests that they were buried shortly after breakage. However, the plain bases and the generally hard fired nature of the pottery tends to suggest a date later than the 13th century. At the same time the highly decorated nature of the pottery makes a late medieval date equally unlikely. It would seem therefore on balance that this pottery group belongs to the 14th century. The very hard fired vessels which would normally be associated with the 15th century can be seen as the result of accidental overfiring.

The pottery from the Old Crown suggests that there are interesting, important and undisturbed archaeological deposits in the area and presumably if further excavation were possible it is not unreasonable to suppose that the kilns themselves would be discovered.

#### 7.0 The Old Crown in Context

The results of the evaluation were interesting in many respects, and have added a great deal to our understanding of the specific development of the Old Crown property. In addition, through comparison with previous excavations, and consideration of the



cartographic, documentary, and standing building evidence our broader understanding of the Deritend area of Birmingham may also be enhanced.

"Every man I meet" wrote Southey, a visitor to the metal-bashing district of Digbeth and Deritend in 1807, "stinks of train oil and emery" (quoted in Thompson 1968,256), and even 400 years before this another traveller to Birmingham chose to highlight the different, more industrial, character of Deritend in comparison to Birmingham centre:

*" I cam through a praty strete or evar I enteryd into Bremis Cham toune. This strete, as I remember, is caulld Dyrtey, in it dwelle smithes and cuttelers, and there is a brooke that devydithe this strete from Bremis Cham. Dyrtey is but a hamlet or membre longynge to (Aston) paroche therby and is clene separated from Bremis Cham paroche".*

(Leland in Toulmin-Smith ed. 1964,96)

While it is probably dangerous to read too much into a urban/suburban divide between Birmingham and Digbeth in the medieval period, it is clear that the split between the east and west sides of the Rea did have some significance to a 16th century observer, at least.

Certainly, artisans such as smiths and cuttlers would have been attracted to the periphery of a town, enjoying the proximity of a market centre, but not the high rents of the commercial centre. In 1381 the Chapel of Ease serving Deritend is described as being newly built, which may reflect a growing population here in the 14th century.

Medieval suburbs have tended to be less studied than urban centres, and the mixture of buildings within them is less understood. For example, Price notes that the frontage of the Old Crown, which is in excess of 70 feet, and the arrangement of the rooms parallel to the street is more characteristic of a suburban than truly urban plan-form. However, he immediately qualifies this argument by stating that the building has an unusual plan-form which might relate to some public function (Price 1993,13). This approach seems valid, for taking all the evidence currently available it seems clear that while there is still a great deal to understand about the Old Crown, we are dealing with an unusual and important building. One way of extending our knowledge of the building may lie in understanding the broader development of the area, and there follows a few preliminary reflections upon this theme, primarily based upon the available cartographic evidence.

Cartographic coverage of Birmingham begins in the 18th century, and reflects the growing importance of the town. Price discusses the cartographic evidence relating to the Old Crown in some detail, so for the purposes of this report comparison will be made between the Hanson Map of 1778 and the Ordnance Survey 1:500 plan of 1889, to place the Old Crown within the development of its immediate setting of Deritend.

Figure 4 shows the Old Crown in 1778, the block plan of the property is similar to that depicted on the Bradford Map of 1750 from which Charles raised the possibility of the larger courtyard building. However, the level of detail depicted by the Hanson map is not sufficient to show the detailed subdivision of the individual building plans, and it would be dangerous to infer too much from such a small scale map. For example, comparison with the larger scale, but later, Ordnance Survey 1:500 plan shows it is possible to reconstruct this distinctive courtyard shape from the buildings surrounding the Old Crown, including the carriage works to the north.

What the Hanson map does show are the various surviving elements of the medieval town in this part of 18th century Birmingham, including the moat to the far left, the main street pattern, St John's Chapel, the Old Crown itself, and the outlines of other medieval burgages arranged radially off Deritend High Street. Coopers Mill Lane (also called Heath Mill Lane) may also be medieval in origin. The first deed which can definitely be equated with the Old Crown, dated 1589, states that it is situated on the corner of that street. While the arrangement of the tail-ends of the property boundaries, which are probably medieval in date, also seems to mirror the angle created by Heath Mill Lane behind the buildings on the north side of Deritend High Street, moving eastwards from the Old Crown.

Both maps show an appreciable widening of Deritend High Street immediately west of the Old Crown where Coopers Mill Lane joins the High Street. This might represent a market area, but, speculation aside, sets the Old Crown in a prominent position with respect to the High Street, a further factor underlining the high status of the property.

Significant later medieval/early post-medieval features are also visible; in particular, the various diversions made to the River Rea to provide water-power for several mills should be noted, many of which powered the burgeoning metal trade of the town. The first reference to the building as a pub is not until 1666. However, it is tempting to think that the craftsmen who produced swords and other equipment for the New Model Army might have quenched their thirst here, despite the vaguely Royalist connotation of the name.

The Ordnance Survey map of 1889 continues the story of the development of the area further towards the present day. Notoriously squalid 'court-type' workers housing can be seen jostling shoulder to shoulder with various metal and carriage works, indicative of an age when tremendous concentrations of people used to crowd the Victorian city, reflected by the high numbers of Inns to be seen on this section of map. The Custard Factory can also be seen to the west of the Old Crown, just as it stands today. It is to be hoped that perhaps the refurbishment and reuse of both these unusual and striking buildings may act as a focus and inspiration for further sympathetic regeneration of this important and fascinating area of Birmingham City Centre which owes so much of its character to the historic legacy reflected in its buildings.

## 8.0 Acknowledgements

Thanks are due to Mr. P. Brennan and Karl Grace Design for sponsoring this project. Dr Mike Hodder of Birmingham City Council provided much invaluable advice and assistance. Dr Nigel Baker and Dr Richard Holt respectively of the Geography and History departments at the University of Birmingham also offered several stimulating ideas concerning the development of the Old Crown and the Deritend area as a whole.

The excavation was carried out for BUFAU by Robert Burrows and Marianne Ridgeway under the supervision of Catharine Mould. Steve Litherland co-ordinated the project and carried out the cartographic and historical research. The illustrations were drawn up by Mark Breedon from site drawings prepared by the excavation team and from maps available from Birmingham Reference Library.

22  
8-2-8

## 9.0 References

Charles, F.W.B. 1980 *The Old Crown Deritend: Preliminary Survey Report* (typescript).

Cracknell, S. 1990 "Bridge End, Warwick: Archaeological Excavation of a Medieval Street Frontage", *TBAS 95 (1987-8)*.

Holt, R. 1985 *The Early History of Birmingham* *Dugdale Society Monograph*. p25 D4 670.W32-30

Oswald, A. 1955 The Clay Pipes, in Sherlock (1955).

Palmer, N. (forthcoming) "Excavations at the Deserted Medieval Settlement of Burton Dassett, Southeast Warwickshire".

Price, S. 1993 *The Old Crown Inn, Deritend Birmingham: A report on its history and development*.

Ratkai, S. 1990 in Cracknell (1990)

Ratkai, S. (forthcoming) The Pottery in Palmer N. (forthcoming)

Sherlock, R.J. 1955 "Excavations at Deritend, Birmingham" *TBAS 73,109-114* p29 2A 670.15

(There are two other short references to excavations near the site of Sherlock's Excavations in Deritend carried out in the early 1980's, in West Midlands Archaeology, Number 26 p89, and Number 27 p56).

Thompson, E.P. 1968 *The Making of the English Working Class*

Toulmin-Smith, L. (ed) 1964 *The Itinerary of John Leland, in or about the years 1535-1543*.

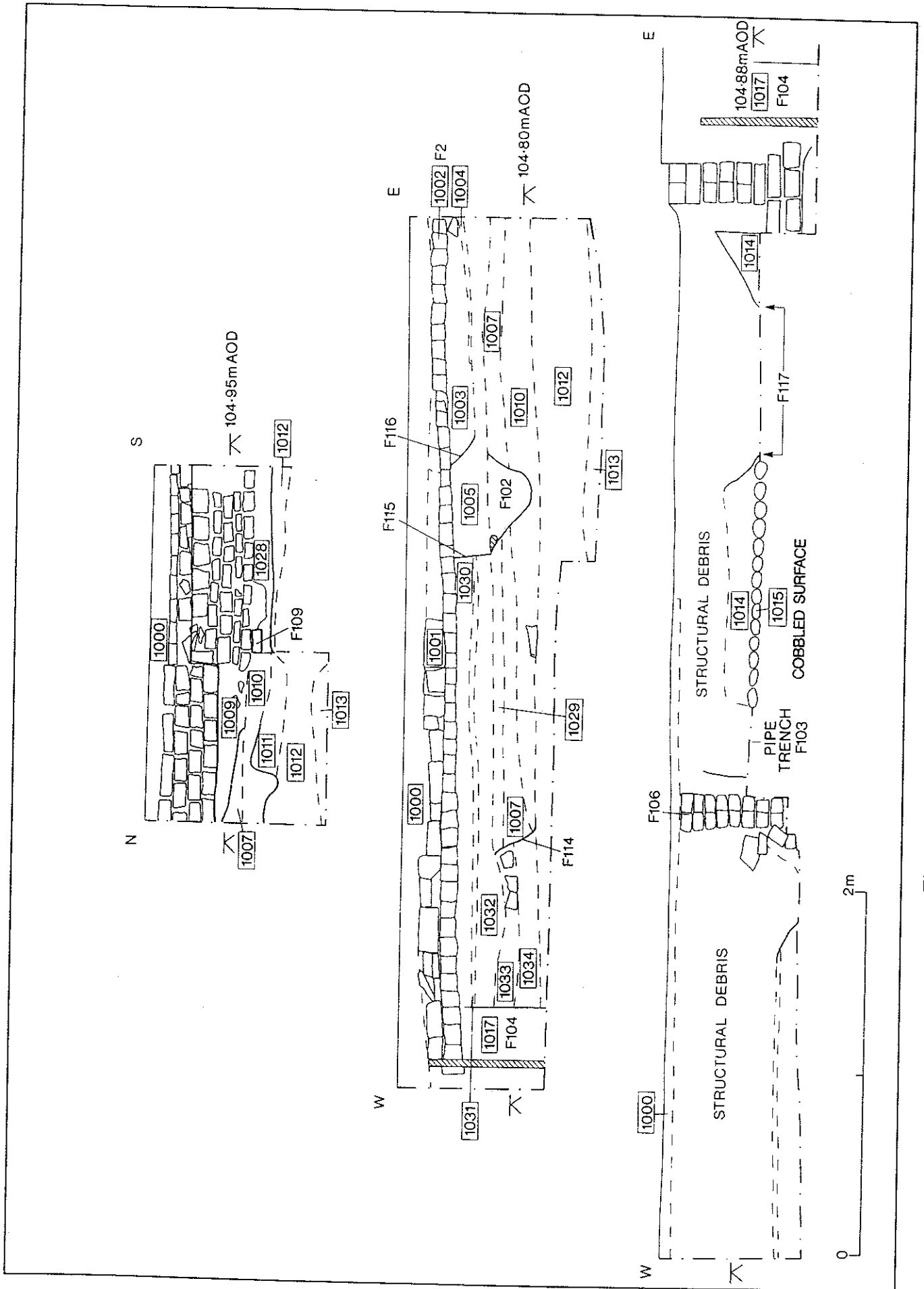


Fig. 2 Trench A. West and South-facing Sections (1:20)

# OLD CROWN, DERITEND JULY 1994.

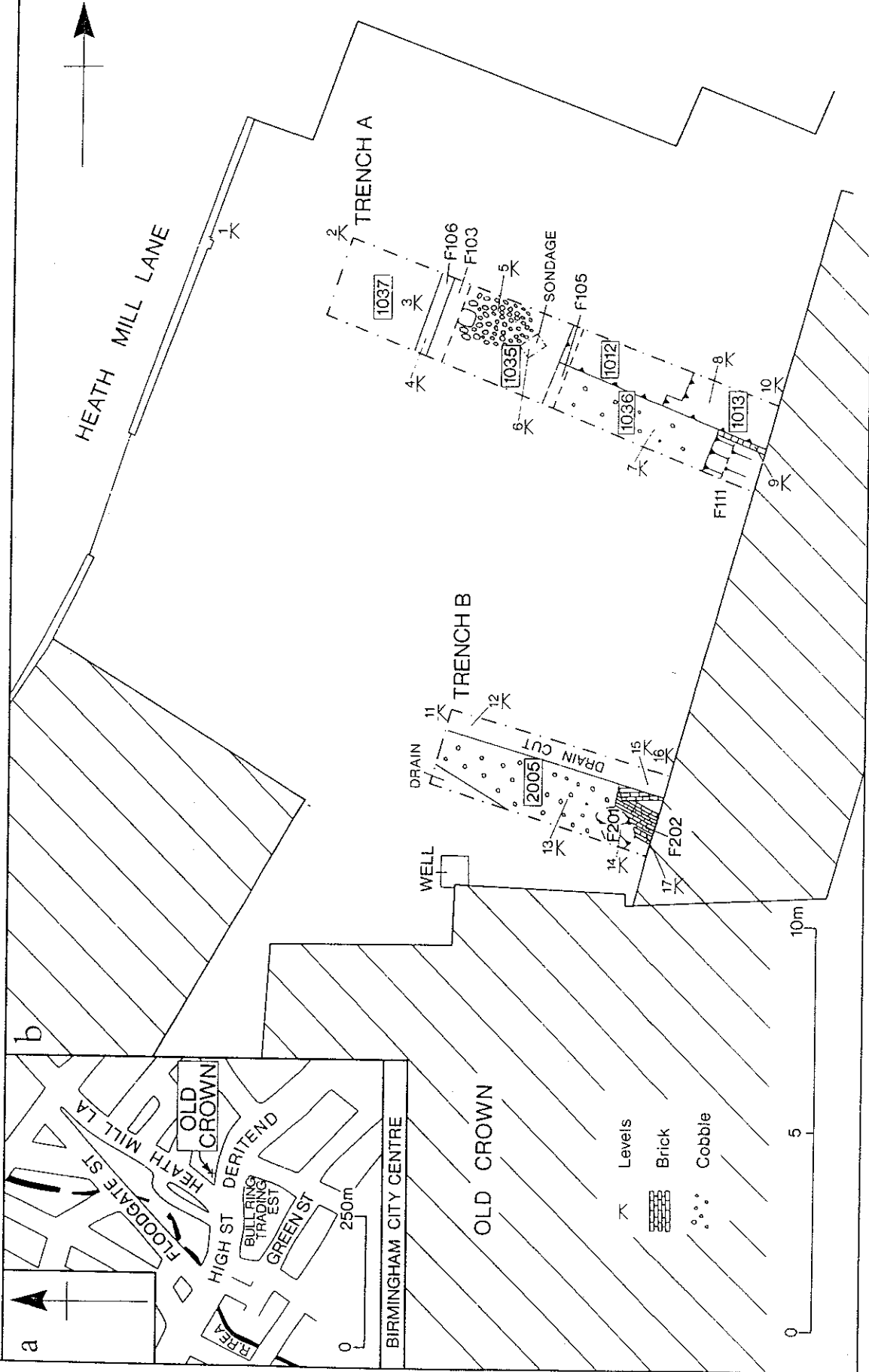


Fig. 1 a. Site Location b. Trench Location (1:100)

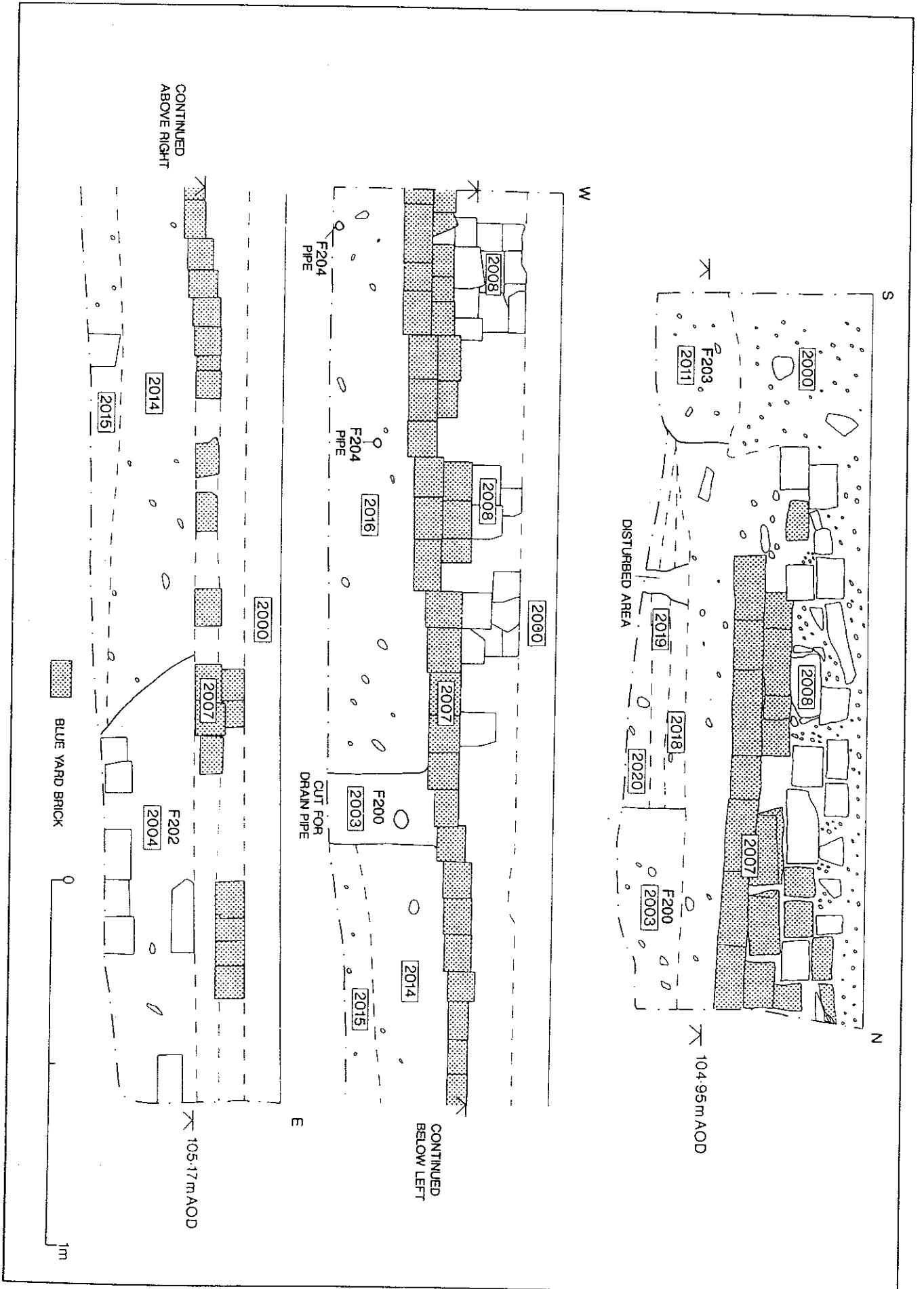


Fig. 3 Trench B. East and South-facing Sections (1:10)

Levels on Fig. 1b  
(Above Ordnance Datum)

Trench A

|    |         |
|----|---------|
| 1  | 105.25m |
| 2  | 105.27m |
| 3  | 104.44m |
| 4  | 104.78m |
| 5  | 104.88m |
| 6  | 104.58m |
| 7  | 104.90m |
| 8  | 104.34m |
| 9  | 104.80m |
| 10 | 105.43m |

Trench B

|    |         |
|----|---------|
| 11 | 105.38m |
| 12 | 104.74m |
| 13 | 104.82m |
| 14 | 104.51m |
| 15 | 104.99m |
| 16 | 105.39m |
| 17 | 104.82m |

DERITEND IN 1778

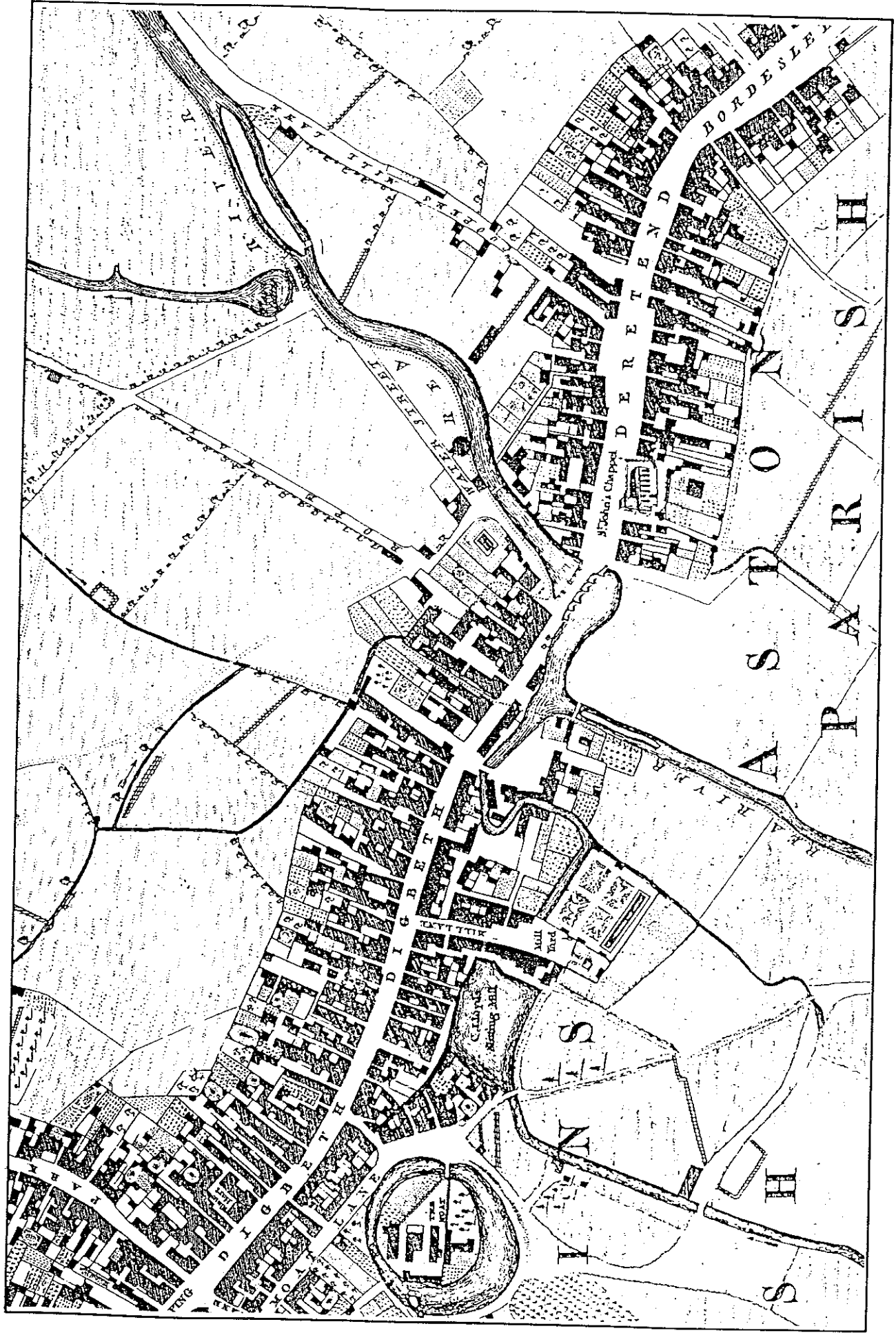


Fig. 4



DERITEND IN 1889

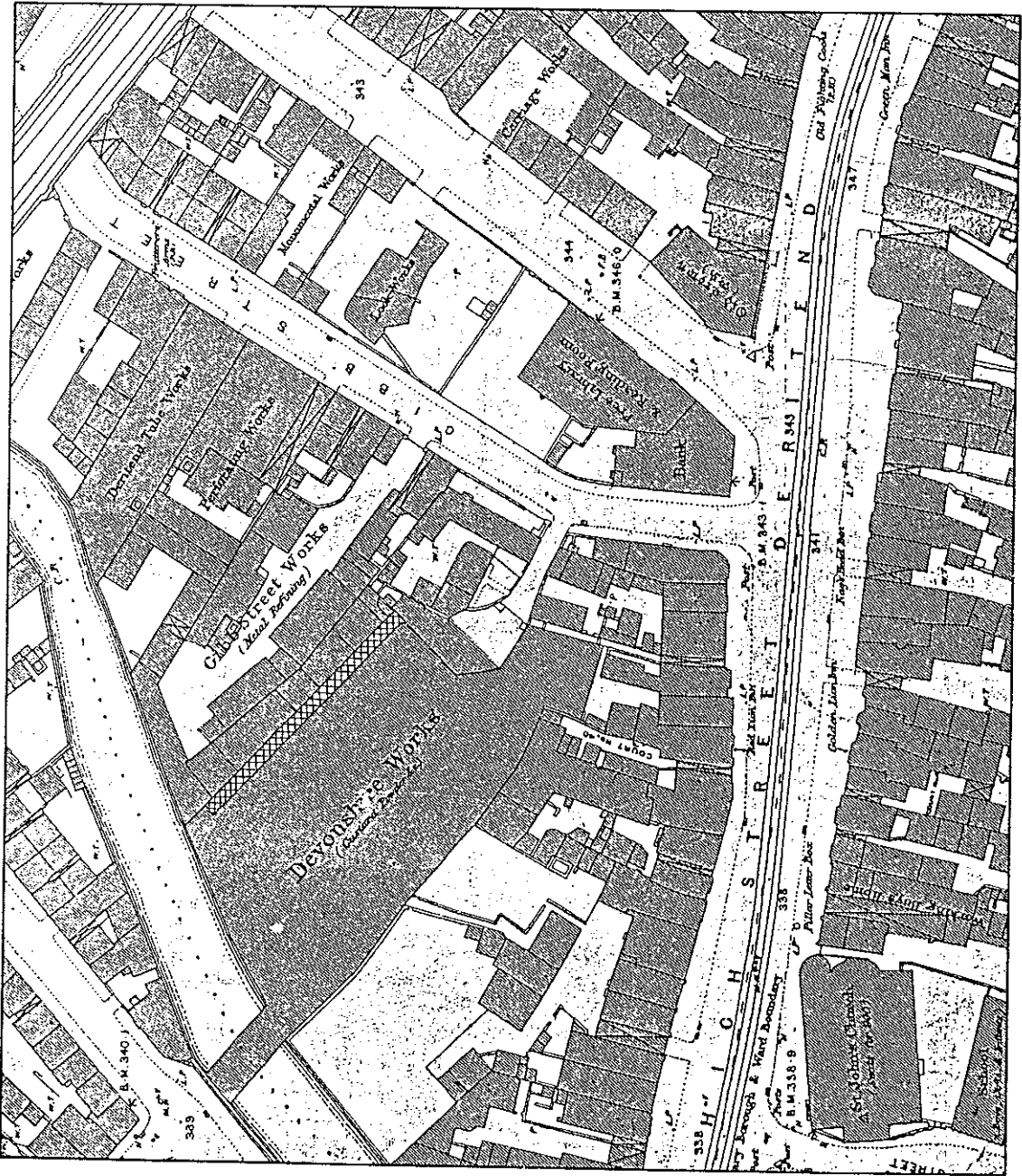


Fig. 5