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Dudley Flint Glassworks

Archaeological Investigations at Stone Street Square, Dudley, West Midlands 2003

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DUDLEY FLINT GLASSWORKS

Archaeological Investigations at Stone Street Square, Dudley, West Midlands

SUMMARY

Stone Street Square, which is situated in the Priory Street Conservation Area on the edge of the planned 12th-century town, was the site of former Dudley Flint Glassworks, constructed around 1770, closed in 1843 and later demolished in 1886. There was also potential for pre-glassworks activity from the medieval period onwards that was once clustered around 'the Horsepool', an open body of water known to have been located here. Archaeological investigation including limited area excavation, trial trenching and a watching brief was carried out by Birmingham Archaeology in 2003 on behalf of Dudley Metropolitan Borough Council at Stone Street Square, Dudley, West Midlands (NGR SO 94377 90377). The Office of the Deputy Prime Minister funded the refurbishment of this public space through the Capital Modernisation Fund.

Preservation of the below-ground elements of a late 18^{th} -century glassworks was very good and included the cone, central furnace, draught 'caves' (a term imported from Lorraine) and other ancillary structures. Earlier evidence found supports the idea that an industrial suburb developed here in the 16^{th} and 17^{th} -centuries, including metal-working and a putative local pottery industry. The Horsepool became progressively silted up prior to the construction of the glassworks. Today, the outline of the cone is represented in the paving of the square and the carefully preserved remains are a nationally important example of this industry (Crossley 1996).

INTRODUCTION

Background to the project (Fig. 1)

This report describes the results of a programme of archaeological work at Stone Street Square, Dudley, West Midlands (NGR SO 94377 90377, see Fig. 1), hereinafter referred to as the site. The work was commissioned by Dudley Borough Council, and undertaken by Birmingham Archaeology during 2003. The site was located within Dudley town centre, on the corner of Stone Street and Priory Street, with the former Town Fire Station to the south and the Citizens Advice Bureau to the east (Fig. 2). Work was carried out in advance of the conversion of a car park into a new public square as part of a council initiative to create a Cultural Quarter adjacent to the civic core of the town using monies received from the Capital Modernisation Fund.

Archaeological and Historical Background

A review of the historical information relating to the site was given in the brief and specification compiled by Dudley M.B.C. (Boland 2002), and much of the specific history of the glassworks has been covered in detail by Charles Hadjamach (1991, 66-71) and Jason Ellis (2002, 267-284). This section of the report provides an outline history only, with more detailed research included in the main body of the report alongside interpretation of the archaeological evidence.

Stone Street Square was the location of Dudley Flint Glassworks, owned by the Hawkes family. Prior to this, the site was called the Horsepool, a name believed to relate to the presence of a watering place for animals, situated on the fringe of the medieval planned town. There is a 15th-century reference to Stone Street, although it may have earlier origins as a route from the High Street to the Horsepool (Hemingway 1996, 1; Appendix 1; Fig. 3). Documentary and archaeological evidence attest to 16th century and later metal working in the vicinity, as do finds of pottery wasters (Boland 1991, 34). Abaither Hawkes, the founder of the glassworks, is first mentioned in a trade directory dating to 1766 (Ellis 2002, 267), although it seems likely that the Dudley Flint Glassworks was built sometime in the early 1770s. The glass cone was first depicted on Snape's canal map of 1785.

Lead or flint glassmaking was developed in London in 1676. The high lead content (commonly up to 15%) gave the product a density that produced a strong and brilliant glass that was ideally suited to cutting. As the level of material culture progressively rose in this country during the 18th century, this glass became a highly sort after but very heavily taxed product. The Hawkes family ran the glassworks, sometimes in partnership with other glassmakers, but it was under Thomas (one of Abaithar's four sons) that the firm became particularly famous for its diamond-cut glass, opal turguoy and gold enamel (Hajdamach 1991, 66). The glassworks buildings are again depicted on Treasure's map of Dudley of 1835 (Fig. 4), and by this time the Hawkes's business was amongst the most heavily taxed in the whole of the Dudley and Stourbridge glass-making area. This burden led to the closure of the works in 1843, only two years before the duty on glass was finally abolished. The abandoned works was recorded in detail by Roper in 1855 (Fig. 5), by which time part of the works had already been developed into housing subsequently sold as a separate lot in 1876 (Fig. 6). After 50 years of standing empty the buildings were briefly utilised by a Mr Rossiter for his hide and skin business. During this use the former glassworks buildings were depicted in detail on the 1:500 Ordnance Survey Map of 1883 (Fig. 7). Part of the cone collapsed in 1886, causing some damage to Rossiter's

property (Ellis 2002, 279) and shortly after this the Town Council, who had bought the site in 1884, demolished the remaining glassworks buildings and laid out the square as a market area (Hadjamach 1991, 70). In the 1890s, the Town Fire Station that still forms the southwestern boundary of the modern square, was also built on part of the glassworks.

While there was no direct archaeological evidence relating to Stone Street Square prior to this programme of work, observations elsewhere in the town have demonstrated the survival of medieval and post-medieval deposits and industrial activity despite intensive modern development. Likewise, other examinations of glass-making sites in the Dudley and Stourbridge area have shown good survival of buried remains (Boland 2002). At Stone Street Square the fact that the site of the glassworks had remained largely undeveloped after demolition suggested that below-ground survival was likely to be high. The potential importance of the glassworks remains was further reinforced by an English Heritage assessment of the glass industry that considered the Dudley Flint Glassworks to be a site of national importance (Crossley 1996). In addition, various local planning policies (32, 32A and 33) in the Unitary Development Plan of Dudley M.B.C. required that, in the event of development proposals, the mechanisms of assessment, evaluation and mitigation be pursued with a particularly strong presumption that archaeological features should be safeguarded.

Aims

The general objectives of the archaeological work were to define the survival, nature, extent and significance of any archaeological deposits surviving on the site. Whilst the main focus of interest was the glassworks, the potential for earlier archaeological remains was also considered, along with environmental information about the Horsepool. Furthermore, it was hoped that any remains of the glassworks could be mapped and incorporated into the design of the new public space.

Specific objectives can be outlined as follows,

- to demonstrate, with the minimum archaeological intervention, the nature and degree of survival of archaeological remains
- to assess the archaeological importance of any remains
- to develop a mitigation strategy for the preservation of significant archaeological remains.

Method (Fig. 8)

Prior to the evaluation, three test pits were hand-excavated under archaeological supervision to establish the depth of modern overburden across the site. Each test pit excavated measured c.1.2 \times 0.6-0.8m and was dug up to 1.2m deep. Test pits 1 and 2 were located along the northeast-facing wall of the old fire station, and test pit 3 against the northern wall of the Citizens Advice Bureau.

The evaluation consisted of four evaluation trenches. Trench 1 (1000- F100-) and Trench 2 (2000- F200-) were located to test survival of the cone and associated features, while Trench 3 (3000- F300) and Trench 4 (4000- F400-) were targeted on ancillary glassworks structures and earlier deposits behind the Priory Street and Stone Street frontages. All the evaluation trenches were machine-excavated, using a JCB, under direct

archaeological supervision to the top of the first significant archaeological deposits. In some instances the length of trenches was changed (in consultation with the Borough Archaeologist), to avoid the live services which run parallel to Stone Street. Trench 1 and Trench 2 were enlarged when significant remains, such as the furnace base, were found. All subsequent cleaning and excavation was by hand.

Recording was by means of pre-printed *pro-formas* for contexts and features, supplemented by plans (at 1:20 and 1:50), sections (at 1:10, 1:20 and 1:50), monochrome and colour print, colour slide and digital photography. Artefacts were collected by context and environmental samples were taken where appropriate. After this phase of excavation was completed a watching brief was then maintained on the preparations for the new paving across the whole site (numbered 6000- F600-). The archive and finds, which are currently held at Birmingham Archaeology, will be deposited with Dudley Metropolitan Borough Museums Service in liaison with the Borough Archaeologist and Senior Museums Keeper.

RESULTS

Pre-Glassworks (Figs 8-11)

Given that the main aim of the project was to assess the survival of the glassworks, the natural underlying subsoil was only exposed in the southwest corner of the Stone Street Square at a level of 197.2m above the Ordnance Survey Datum (A.O.D.). Interpretation of the development of the site prior to the construction of the glassworks was also limited by the requirement to preserve the glassworks remains. Nevertheless, a broad sequence of activity can be proposed, which is outlined below.

Phase 1 (Pre-c.1650; Fig. 8)

The Horsepool

The earliest deposits were found in Trench 3 and provide evidence of the eastern limits of the Horsepool and the environment around it in the early 1600s. The bank of the pool was represented by a compact sandy silt (3037), from which part of the base of a sooty green-glazed whiteware bowl dating to the mid-13th to 14th centuries was recovered. Immediately to the west of 3037, dark waterlogged silt (3038) was formed by the silting of the pool. This deposit contained a mixture of discarded sherds of blackware and red coarseware pottery and a quantity of animal bone that, in the opinion of Stephanie Ratkái, probably dates to the first half of the 17th century (2004; Appendix 2 and Fig. 20). The dark colour of deposit 3038 was due to a significant concentration of coal, wood and charcoal. Organic preservation was good with seeds, insect remains, fly puparia and moss being present (Greig 2004; Appendix 3). Most of the seeds were common weeds that are indicative of open ground, but there were also more permanent species such as nettle, dock, hemlock and elder that prefer enriched ground like that around a pool where animals are watered. A few damp-loving plants such as persicaria and sedge were also present, although these did not feature as largely in the overall faunal assemblage as may have been expected. It is perhaps understandable that a much used, semi-urban and commonly owned watering place would not support as large a selection of water plants as an undisturbed pond.

Mallow, hemp and fig were also present. Mallow is a plant of long grassland and waysides, hemp a crop plant used for fibre, while surprisingly figs were a relatively high-status food that nevertheless contain a number of seeds (Nichol & Ratkái 2004, 110). The archaeological evidence suggests that the Horsepool was at least partially open over a long period but that rubbish was also being dumped into it. Several residual sherds of

15th and 16th-century pottery were also recovered from other episodes of silting to the west of Wall 1, such as 1047 and 2021, at a depth of around 197.5m A.O.D.

A crudely-faced sandstone wall with a rubble core bonded with a yellow sandy-clay (Wall 1) was built into deposit 3038 close to the interface of this deposit with 3037 (Plate 1). Only three courses of this wall survived to a height of 197.7m A.O.D, it measured c.O.6m or 2 feet in width and was aligned perpendicular to Priory Street. Given the chronology of the deposition of both 3037 and 3038, Wall 1 was probably built to define the eastern limit of the Horsepool sometime before the Civil War. However, shortly after this another sandstone wall (Wall 5) was built over it on a slightly different alignment that was perpendicular to Stone Street rather than Priory Street. Only two courses of Wall 5 survived to a height of approximately 0.35m, and a width of 0.5m, but it was associated with a stone surface (F300) that paved the dry ground to the north and east of the Horsepool (Plate 2). Pottery dating from the 17th century had been lodged into the paved surface of F300, which was sealed by a layer (3005) containing late 17th or early 18th-century pottery. This sequence indicates that the stone surface (F 300) and Wall 5 were probably constructed shortly after Wall 1, but had fallen out of use by the first quarter of the 18th century.

Structure 1 (Fig. 9a)

Three other sandstone walls (Wall 2, Wall 3 and Wall 4) of a similar character, width, and general alignment as Wall 1 were observed during the watching brief of the cellar clearance behind the Priory Street frontage (Plate 3). Excavation here was limited, but these walls clearly predated a series of brick walls belonging to the glasshouse that had been built directly over them. A tighter *terminus ante quem* for Walls 2, 3 and 4 was provided by the episode of silting against their south-western faces (6002, see below), which took place in the late 17th or early 18th century. Given their form and location it seems likely that these walls once formed part of the back of a building fronting onto Priory Street (Structure 1).

Interpretation

The archaeological evidence suggests that the Horsepool was a boggy depression on the north-facing slope of a ridge situated close to the medieval centre of Dudley. Here water issued in a north-easterly direction from the sandstone sub-strata and the pool provided an easy place to water animals in the town, so that two market areas, one for sheep and the other for horses, had grown up around it by the late medieval period. The ridge was an important topographic feature that formed a localised watershed. In the fields to the north of the ridge lay the priory next to which was a another pool fed by a stream draining from this side of the ridge. While to the south lay the High Street and the built up area of the medieval town, its boundary following the reversed S-shape of a pre-urban field system now marked by Tower Street. The road now called Priory Street was called Sheep Fair and situated to the west of the Horsepool and Horse Fair to the east and followed the line of the ridge. The road now called Stone Street was originally called Horsepool Lane and gave access between the High Street and the Horsepool (pers. comm. Hemingway). At the junction of Stone Street and Priory Street and adjacent to the Horsepool was an area called Horsepool Green.

While archaeological evidence for medieval activity here is scarce, this is perhaps not too surprising given that the Horsepool was situated at the very edge of the 12th-century planned town (Dudley M.B.C. 2004, 19). Some evidence of 13th and 14th-century occupation was found by excavations carried out just to the east of Stone Street Square, but this area was further away from the Horsepool and activity appeared to have ceased again in the 14th century (Linnane 1996). Two reasons for this apparent lack of evidence may be proposed, with the important proviso that deep excavation was limited. Firstly, most of the lower lying parts of the site were occupied by the Horsepool itself. Secondly, that the ground between the Horsepool and Stone Street may have been occupied by a garden owned by the Trustees of the Free Grammar School described as 'shooting

southwards to the Horsepool adjoining the street called Sheep Fair' in 1649 (Hemingway 1996, 2). In this respect, the description of the plot of land occupied by the later glassworks, when it was sold in 1853, as 'being near a certain place called Horsepool Green belonging to the Trustees of the Free Grammar School' may be significant (Hemingway 1996, 3).

Certainly, the presence of 15th and 16th–century pottery in the silting of the Horsepool provides evidence of general activity around it at this time, which is reinforced by further evidence from Steve Linnane's excavations across the street mentioned earlier. It is interesting to note that the first record of a 'Stoney Street' in the Dudley Borough Accounts dates from 1489/90. The renaming of the street, which was formerly called Horsepool Lane, perhaps implies that at least part of the street was metalled at that time (Hemingway 1996, 2). Furthermore, organic evidence from 3038 indicates that some of the activity taking place by the early 17th century around the Horsepool was industrial. Wall 1 may represent a strategy to formalise the boundary of the Horsepool at this time, possibly shortly before attempts to develop the Horsepool Green (represented by Structure 1) as the area became swallowed up by the expanding early post-medieval suburb (Dudley M.B.C. 2004, 23).

Structure 1 stood at the corner of Priory Street (or Sheep Fair as it was then called) and Stone Street and probably dates from around 1650 or slightly earlier. The construction of this building may have been linked to the realignment of Wall 1 and the laying of the stone yard surface F300. It may even be one of the two cottages noted in an Inquisition of 1638 as being leased by Arthur Dixon from the Dudley Grammar School between the Sheep Fair and the Horse Fair (Hemingway 1996, 2). The sandstone foundations are probably all that remains of a completely stone-built building, a common choice for post-Civil War reconstruction elsewhere in the town. For example, the remains of a row of 17th –century stone cottages have survived within the later brick fabric of the Saracen's Head just across the road (Dudley M.B.C. 2004, 24). It is perhaps less likely that they formed a plinth for a timber-framed superstructure.

Phase 2 (1650 - c.1770; Fig.8)

Dark earth

The thick layers of grey-black organic silt deposited against Walls 1 and 5 (3007) and Wall 3 (6002) at a depth of around 197.8m A.O.D. were also observed in several other parts of the site (1006, 1047, 2021, and 2029). These layers, which accumulated in the late 17^{th} and early 18^{th} centuries, suggest that the Horsepool had substantially silted up by this time, and a soil sample analysed from 2029 contained a high concentration of coal, charcoal and bone fragments, indicating continued and quite intensive industrial and domestic activity here.

Structure 2

To the south of the site, deposits associated with this later phase of silting were cut by a second phase of sandstone walls, drains and associated surfaces that survived to height of 198m A.O.D. This set of sandstone walls (Wall 6, Wall 7 and Wall 8, that were collectively called Structure 2) were associated with a stone floor (F107) and a stone drain (F108; Plate 4) that flowed in a westward direction across the site (F134; Plate 5). Structure 2, like Wall 5 in Trench 3, had an east-west orientation that was set at a right angle to the Stone Street frontage. Both walls and drain were truncated by the construction of the glass cone and furnace and are therefore probably early 18th century in origin (Figs. 10 & 11), akin to layer 3005 that sealed the stone surface (F300) in Trench 3. Here the excavator noted a metallic residue in layer 3005 (pers. comm. Eleanor Ramsey), but no such residues were recovered from the soil sample taken. Therefore, archaeological evidence for the metalworking activity alluded to in the

documentary record (see Appendix 1), must remain open. However, analysis of the pottery (see Appendix 2 and Fig. 20) found a significant quantity of misfired wasters or semi-wasters to be prevalent in late 17th and early 18th-century contexts that may be indicative of pottery production somewhere in the vicinity at this time.

Structure 1 alterations (Fig. 9a)

In the northeast corner of the site a series of brick-lined drains (F611) and a brick-paved surface (F612) abutted the junction between the sandstone walls at the back of the building fronting Priory Street (visible between Wall 2 and Wall 3 of Structure 1 on Plate 3). The drains were exterior to the structure and built upon a silty deposit 6002, but truncated by the backfill (6003) of a barrel-vaulted tank (Tank 1) contemporary with the construction of the glasshouse. Consequently, the drains must date from the early to mid 18th century. Their provision may have been necessitated by the complete silting up of the Horsepool, as suggested by the simultaneous disuse of the stone surface (F300) noted above. Further evidence for this silting may be implied by the construction of a brick-lined well (F605) behind another property fronting Priory Street, as this clearly predated the construction of the brick-lined drain F607 associated with the glassworks. However, more prosaically, these drains may have been built to take away water from guttering to the building fronting Priory Street, as the junction between two roofs is a logical location for a down pipe. Inside the building part of a brick-paved floor (F614) was exposed at a height of 198.15m A.O.D. This floor abutted the sandstone walls (Wall 2 and Wall 3) and it is tempting to interpret it as an improvement to an earlier possibly beaten-earth floor, in common with the provision of the exterior drainage noted above.

Interpretation

During the post-medieval period, the main focus of occupation was probably the Priory Street or Sheep Fair frontage, shifting to the north-western end of Stone Street from the mid-17th century onwards. This was probably linked to the growth of the post-medieval industrial suburb noted above. The relatively ample water supply, readily exploitable by digging wells, would have enabled a continuation of industrial activity. This is supported not only by documentary evidence but also by the presence of iron slag in deposits containing 16th and 17th century pottery, and wasters found during a watching brief over the street at the Saracen's Head (Boland 1991). Certainly, it would appear that by the early part of the 18th century the Horsepool had completely silted up, a process possibly aided by the sheer amount of industrial activity and the fact that it gradually became cut off from public access.

It was at this site near the centre of Dudley where Abaither Hawkes chose to build his flint glassworks, probably around 1770 as has been suggested by Ellis (2002, 268), rather than 1766 which is the local tradition. A later indenture of the sale of glassworks site to Thomas Badger in 1853 noted that it consisted of 40 parts of a 64 part plot, the larger plot probably being the communal area of the Horsepool (Hemingway 1996, 3). This choice of location was not dissimilar to that made by another early pioneer of glass production, Mayer Oppenheim, who sited his glassworks on the edge of Birmingham in Snow Hill in 1757 (Demidowicz and Hodder 1997, 101). In addition to more commonly cited reasons for situating glassworks, such as access to good coal and refractory clay in the Black Country, attractions may also have included available skilled labour, ready consumers and good communications. Such factors must have proved significant in the distribution of glassworks during the early phases of glass production in this country. This might particularly be the case for someone with Hawkes' background. He is first listed as a glassmaker in the High Street Dudley, which suggests that he had a close connection with the finishing and marketing end of the glassmaking industry.

The glassworks phase (c.1770-1886; Figs. 12 & 13)

All of the earlier archaeological features and layers were sealed beneath extensive levelling deposits. The bulk of this material was a typically Black County mixture of burnt soil, ash, building and industrial debris. The ground preparation for the construction of the glassworks was quite extensive and included the reorganisation of drainage, the dismantling of existing buildings to foundation level, and the construction of the foundations of the cone, central furnace and associated flues. The foundations of the primary flue or cave were cut through the upper silted deposits of the Horsepool (2021), the stone drain (F134) and the natural subsoil (2030), which was located at a depth of 197.2m A.O.D (Plate 5).

The glass cone (Figs. 14 & 15)

The cone was the structure of choice for the glass-making industry in this country during the later 17th and 18th centuries, only being superceded by more anonymous buildings around 1830. It resembles hovel kilns used in pottery manufacture with the cone, which could be anything up to 100 feet tall, functioning as a giant chimney. This increased draught made possible the higher burn temperatures required by coal that after certain technical difficulties were resolved also improved the quality of the glass produced. In addition, the cone provided a tolerable covered working environment.

The location of the cone at Stone Street was probably a response to the need to fit a fully functioning manufactory with many different activity areas into a pre-existing urban environment – today we would call it a 'brownfield development'. The cone was located back from the Priory Street frontage, but in a roughly central position relative to the rest of the works which was mainly laid out in front of it. The impact of the glassworks on the surrounding area must have been quite dramatic. It would have been a landmark in the townscape, hence it's prominent position on Treasure's map of 1835 (Fig. 4) and in addition to its sheer bulk, it would have been emitting great clouds of smoke when in operation. It is perhaps worth noting that while a modern regenerative furnace requires about a half-a-metric ton of coal to melt a metric ton of glass, traditional furnaces required something in the region of 18 times more, or roughly 9 metric tons of coal.

The cone was also located within the lowest part of the site where it was easiest to construct the below-ground components of a large and deep structure like a glass cone. It would also not have required as much material to level the rest of the site, particularly as the finished ground-level was partially constrained by the street and building pattern of the surrounding area. The revision of the drainage across the site was also a crucial part of its preparation.

It is difficult to provide a precise measurement for the footprint of the cone because of its shape, but at the original ground-floor level, which was paved in brick and was roughly at a 199m A.O.D., it measured approximately 17m or 56 feet in diameter. This made the cone slightly larger than the average for this period, but then the Hawkes family were consistently amongst the heaviest-taxed glassmakers in Dudley and Stourbridge (Ellis 2002, 274). Even Joseph Richardson of Red House fame recorded that it was a large cone in his notebook (Ellis 2002, 269). The walls of the cone were bonded with white lime mortar and the lower part of the superstructure was generally three bricks, or c.0.7m, wide, although the foundations corbel out to nearly 1.5m or 6 bricks in width (Plate 6). The bricks were traditionally moulded red-fired clay and measured 9 by 4 by $2\frac{1}{2}$ inches, which was the size of brick used in all the original structures associated with the glassworks.

Only limited areas of the cone wall were excavated, so it is not possible to say for certain if the structure was buttressed like another excavated example, the Canalside Cone at

Audnam (Boland and Ellis 1997), although no trace of buttressing was observed in the sections of cone wall exposed. The Audnam Cone also had gaps in the outer wall. These were commonly for pot arches (where the pots were dried before being placed in the furnace) and annealing arches or *lehrs* (where the finished glass was slowly allowed to cool under controlled conditions). It is possible that a secondary flue or 'cave' (Cave 3, below) may have been deliberately routed through an already existing gap in the north side of the cone wall leading to the *lehr*.

The primary cave or flue system (Fig. 10, Plate 7)

An underground flue system, or, to use the local terminology, 'caves', channelled air into the fire-bed of the furnace to help to create the high temperature burn required in a coalfired glassworks. The term 'cave' most likely a French import brought over to the Black Country by glass-making migrants from the Lorraine (Peter Boland, pers. comm.). The primary draught caves, beneath the Dudley Flint Glassworks were aligned southwest northeast. This was a common alignment probably designed to capture the prevailing wind. The southwest cave (Cave 1) was 1.8m, or c.6 feet, wide; while the northeast cave (Cave 2) was slightly wider, measuring just under 2m, or 6 feet 6inches and showed considerably more signs of exposure to heat and exhaust gases. Both caves were deeply founded, being cut through the post-medieval silts of the Horsepool and into the natural subsoil. The cave walls were one-brick thick and were integral with a pair of siege platforms that were c.0.7m, or 3 bricks thick. These formed two rectangular blocks or stacks of deeply-founded brickwork that projected slightly into the main cave to concentrate the air flow to the fire creating a venturi effect that was a common feature in furnaces (Fig. 14 & Plate 8). These stacks would have been augmented by a less deeply founded brick platform or slab which would have acted as the original base of the central furnace. This would have been level with the working floor inside the cone, but all trace of this was subsequently removed. The levelling layers (2017, 2018 and 2019; Fig. 11) were imported to create the working floor inside of the cone.

The main caves were not bottomed, but were commonly 2.5m or 8 feet tall, like the surviving examples at Red House, or the Canalside Cone, Audnam. This was large enough for men to access the grate and rake out the ashes from the furnace, which was an additional function of the cave system. Within the constraints of the excavations it was not possible to fully trace the main cave and establish whether they extended up to or beyond the cone wall. Nor was it possible to define if the cave and the cone wall were contemporary – nevertheless, both are probable. In order to catch sufficient draught Cave 1 must have extended into the yard area to the south west of the cone. In addition, the small open rectangular feature shown abutting the northeastern side of the cone in 1883 (Fig. 13) may represent an outer entrance to Cave 2, as this convention is used elsewhere to denote access to cellars by the Ordnance Survey. No unequivocal evidence of a draught-control mechanism was found, although a short section of wall (F100) at the southeast end of Cave 1 was partially exposed in the baulk of the excavations. However, this was made of 2¾ inch-tall brick and was clearly a later addition (Fig. 10).

The secondary caves

More can be said about later alterations to the main cave system. This mainly involved the addition of another, smaller cave (Cave 3; Plate 9) measuring just over 1.2m (or 4 feet) wide, which ran due north. It was built of $3\frac{1}{4}$ inch-tall bricks that probably date from the era of the brick taxes between 1784 and 1850. It must have been part of a major set of alterations to the glassworks, and only two such changes are documented.

The first change occurred in 1801 when an 11-pot furnace replaced the original 10-pot furnace. These changes coincided with the employment of Joseph Richardson at the Dudley Flint Glassworks (Ellis 2002, 269). A three-flue arrangement is a fairly common

design, and has been found at glass cones elsewhere, for example the Red House (Fig. 16) and the illustration of the 'Verrerie Angloise' in Diderot and D'Alembert's 'Encyclopedia' (Fig 14). However, it has become increasingly apparent as more excavations are conducted that the design of flue structures within glass cones was very idiosyncratic, and that it is difficult to generalise or infer too much from particular examples. What can be said unequivocally is that Cave 3 was cut into the build of Cave 2. This implies that the later alterations incorporated substantial parts of the original 10-pot furnace and cave system. The size of the bricks used in the Cave 3, which were $3\frac{1}{2}$ inches tall, probably means that they were made before 1803. This was when the brick tax was revised to make any brick that was larger than 10 by 5 by 3 inches when it came out of the mould liable to a double duty.

The second documented alteration involved the construction of a 'square glasshouse near the cone' in 1838 (Hajdamach 1991, 70). However, it is difficult to convincingly relate this to any of the buildings depicted on either Roper's plan of 1855 or the First Edition of the Ordnance Survey dated 1883, and so the question of the location of this second putative glass house must remain open. The outline of another four feet-wide cave (Cave 4) aligned perpendicular to Stone Street contained a significant concentration of broken glass in its backfill (Plate 10). This cave was probably the terminus of Cave 2 but was offset with a slight kink to skirt the footprint of the free-standing building situated to the east of the cone on Stone Street. However, it should also be noted that although the construction of the longer section of Cave 4 (that aligned perpendicular to Stone Street), was similar to that of the Cave 2, the width of the cave was smaller and the walls thicker. In addition, the build of the kink (using 9 by 4½ by 2½ inch brick) implied some alteration to the cave, about which we can only speculate.

On balance, the earlier alteration of the 10-pot furnace into the 11-pot one is the best candidate for the construction of Cave 3. However, there is insufficient evidence to say categorically whether this was part of an improvement to the draught of the furnace, or whether it was to provide some sort of ancillary heat source to an annealing oven or *lehr*. It is interesting to note that the sub-divisions within the trapezoidal building adjacent to the northwest side of the cone on Roper's plan of 1855 may denote rooms, and this may support the latter interpretation. In particular, the small room at the northeast corner of the putative *lehr* might have accommodated the Excise Duty Official who oversaw all production (Peter Boland, pers. comm.). Equally, such a cave would have provided the option of 'hiding' pieces from the eyes of the authorities, as there were many industry-wide stories of this type of attempt to circumvent the much-resented tax on glass.

The furnace

The circular furnace was the centrepiece of the cone (Fig. 17). Air was drawn into the firebox via the large underground caves described above and fuel was fed from the working floor inside the cone. The heat passed into the furnace through an eye in the centre of the floor, it was then deflected onto radially-arranged sieges holding the pots that contained the molten glass, before the spent gases were vented into the outer dome and then the chimney. A hollow iron rod was passed into the molten liquid in the pots, and the glass was then withdrawn and worked into the desired shape.

The below-ground components of the furnace were largely intact although all remnants of the floor, superstructure and stoking arrangements had been destroyed. Like the cave system there was further evidence of extensive alterations to the furnace structure that were probably associated with the 1801 rebuild noted above. These alterations involved the construction of two semi-circular siege bases, one on either side of the central fire stacks, but while the main cave system was incorporated into the later furnace, any evidence for the primary furnace arrangement was destroyed. The foundations for the circular furnace were probably cut through the levelling deposits (2017, 2019, Fig. 11)

inside the cone and into the earlier silts (e.g. 2021), as the backfilling of this putative foundation cut (2024 and 2025) contained residual pottery of medieval through to 18thcentury date. These foundations were not as deeply founded as the main caves and oversailed the stone drain (F134), whereas the construction of Cave 2 clearly necessitated the removal of any trace of this drain (Fig. 10 & Plates 5 and 7). The diameter of this later furnace was 5.2m, or 17 feet and so it would have occupied about one tenth of the work space inside the cone. The outer wall of the furnace was one brick thick and the radial siege walls, that supported the weight of the pots at a higher level, were built into this outer wall. Their foundations were deeper than the outer wall (Plate 11). While the spaces between the siege walls were filled with a fired-mixture of mortar and brick rubble that resembled furnace 'cork', an inert material not prone to expansion or contraction under heat, that was used in pottery kilns in Stoke-on-Trent (Sandyman 1901). The remains of eight segmental sieges were visible, arranged in fours on either side of the main cave and presumably more sieges would have been arranged over the caves. The two central stacks of brickwork would have continued to support the central fire-bed of the furnace, but because the working surface inside the kiln had been completely removed no other features including evidence for stoke or glory holes to feed the central fire had survived.

Other features

Various other elements of the 18th-century glassworks were exposed, mainly during the watching brief phase of work. These included parts of buildings fronting onto Priory Street, a series of tanks located immediately behind them, and an oven or small furnace. These features were only parts of what was once a much larger manufactory and their remains present a complicated and incomplete picture. Nevertheless, despite several later alterations, which probably reused materials already to hand, a basic pattern of development may be proposed.

The Stone Street Range

This range mainly fronted onto Stone Street and a sketch of the building 'as it used to appear' was reproduced in Blocksidge's 'Illustrated Dudley Almanac, Diary and Directory' for 1902 (Fig. 18). While the provenance of this illustration is not clear, it is sufficiently detailed to suggest that the artist was at least familiar with the structure. The drawing is also consistent with the excavated and cartographic evidence and there were no contemporary complaints about its accuracy, so it is probably fairly safe to say that it was reliable about the main details of the building at least. The range was a three-storey brick-built structure with large iron-framed windows with segmental-stone heads on the first floor and semi-circular heads on the second floor and the shallow ridge-roof was partially hidden by a brick parapet. Another illustration from Blocksidge's 'Almanac' for 1903 purports to show the southern end of the Dudley Flint Glassworks after the cone had collapsed in December 1885 (Fig. 19). The view is from Tower Street and corresponds closely with the Ordnance Survey mapping of 1883, which was when this part of the site was a hide and skin market. The illustration shows that the freestanding building on the right-hand side was only one-and-a-half stories tall and that there was a cart entrance here, together with pedestrian access. The most interesting feature is inside the yard, where a segmental arched opening is depicted surrounded by rubble. Although the angle is slightly odd, this may be a view of an arched entrance into the cone situated (albeit with a little artist licence) over Cave 2.

A significant proportion of the footprint of the Stone Street Range was swallowed up when Priory Street and Stone Street were widened shortly after Dudley Corporation demolished the old glassworks in 1886. Therefore only the rear walls of this structure were investigated during the watching brief phase of work. These walls were strongly built using $2\frac{1}{2}$ -inch tall, traditionally made brick and were one-and-a-half-bricks (or

c.35cm) thick, and laid in English bond using a white lime mortar. The foundations were generally corbelled in order to spread the load of the tall building. The sandstone foundations of Walls 2, 3 and 4 were incorporated into the structure, which may hint at a certain degree of parsimony. However, this was fairly common building practice and can be seen in many places in the historic centre of Dudley (Dudley M.B.C. 2004, 24).

Excavation did not definitively identify any original internal features due to the building having been demolished beneath the working-floor level to roughly 199m A.O.D., which makes interpretation of the function of the range difficult. However, evidence from the Blocksidge illustration of 1902 suggests that the building was long and thin - measuring roughly 24m by 5m in plan - with a window arrangement of 6 large bays along the length of the building and two shorter bays in the gable end fronting Priory Street. Therefore, given its overall location and aspect and the number and size of windows on the first and second floors, it was quite well lit. If the trapezoid structure to the north of the cone was *lehr*, there is a functional logic for this building, which resembles a 'shopping' or workshop, to have been the finishing area for the glass items produced in the cone. This may have included cutting, enamelling, etching, polishing and packaging, or any permutation of these and, perhaps, other activities.

At the northern end of the Stone Street Range was a section of curved walling (F610; Fig. 9b & Plate 3). The wall was quite roughly built and varied between one and two bricks in thickness. The wall straightened out to the south with no obvious discontinuity in build, but whilst the bricks were similar to those used in the main range, the awkward arrangement of this feature suggested that it was a later addition. We know that there were major alterations to the furnace in the early years of the 19th century and later in 1838, and it is quite feasible that these were accompanied by other changes elsewhere. It is therefore possible to argue that walls F610 and F615 may have been associated with the introduction of steam power, possibly to support a gearing system. Steam power began to be introduced to glass cutting in the early 19th century and the engine house, stack and two-storey cutting shop with gearing for the cutting wheels on the lower floor became a standard feature in Birmingham glass manufactories in this period (Demidowicz and Hodder 1997). In the opinion of Hadjamach, the deep and regular diamond cuts on many of Hawkes' products would have required steam power and that the Pottery Gazette of July 1888 noted that Hawkes was amongst the pioneers of steam power for cutting (1991, 65). A good candidate for an engine house is the trapezoidstructure abutting the southwest end of the three-storey range in 1883 (Fig. 12), which was demonstrably later than that range. The introduction of steam power might have been a last-ditch attempt at investment by the Hawkes family and may even partially account for the financial collapse of the enterprise shortly afterwards in 1843. This was only two years before the glass excise was finally lifted in response to the incursion into the home market of cheaper pressed products from America in particular.

The tanks (Plate 13)

The remains of a series of three brick-built tanks were located close to the rear walls of the range of buildings fronting Priory Street. The barrel-vaulted top of each tank was collapsed and they had been back-filled with demolition rubble. Tank 1 and Tank 2 were designed to operate as a pair with an interconnecting sluice, and were built with one-and-a-half-brick thick walls made of $2\frac{1}{2}$ -inch-tall brick. Tank 3 was smaller and was clearly a later addition.

Tank 1 measured 6.5m by 4m in plan, with a depth of 2.5m from the floor to the springing of the roof (Plate 14). The walls and floor were rendered and the structure looked like it was intended to hold water in which case it would have had a capacity of about 65,000 litres or 14,500 gallons. Tank 2 was about half this capacity, measuring only 4.5m by 3.5m in plan but its walls were not rendered and it was 0.5m deeper. A

small conduit with a wooden sluice enabled water to be drained from Tank 1 into Tank 2. The only visible feed was a surface water drain into Tank 1, whilst the only drain was located in Tank 2.

The structural evidence suggested that both tanks were contemporary with the initial build of the glassworks as they were well constructed, used similar bricks and respected the back walls of the glassworks buildings fronting Priory Street. At the junction of Tank 1 and the sandstone walls (Wall 2 and Wall 3) the brickwork was bonded into both of the sandstone foundations. In addition, the construction cut for the north–east wall of Tank 1 had cut away the drains associated with the pre-glassworks building here (Structure 1). One of the fills of this construction cut (4009) also contained a significant concentration of waste sandstone blocks probably from the partial demolition of Wall 2 and Wall 3.

The function of the tanks is difficult to assess. Expert advice (Michael Cable and David Crossley, University of Sheffield) indicated that although some water was required in the glass-making process (e.g. to clean the sand or flux for the glass mix or prepare the clay for the pots), it would not have been anything in the region of the 65,000 litre capacity of Tank 1. A well, depicted on Roper's plan of Dudley of 1855 (Fig. 5), was the only supply from Tank 1. Therefore, unless there was a pump and piping system all trace of which was subsequently removed, it is difficult to see an industrial function for the tanks. Perhaps the simplest explanation for them is that they drained the surface of the site and collected rainwater from the roofs of buildings set out around the central yard.

Given the fact that there was access into this yard from Priory Street it could be that Abaither Hawkes built these tanks in order to maintain a communal supply of water. Therefore, it is possible to envisage the following sequence of events. The brick-lined well (F605) was originally sunk to provide water for an earlier property on Priory Street during the 17th or 18th century. It then fell into disuse when the glassworks was constructed because it was in the middle of the access point to the manufactory. The brick-lined drain (F607) that was still live and flowed strongly in a northerly direction crossed well F605 (Plate 15), and was probably constructed to divert the water from a spring supplying the Horsepool when the glassworks was built. Tank 3 was then built against the southwest wall of Tank 2 and over drain F607. It was built to supply the property that infilled the former access to the glassworks and could not have had any communal use (see Phase 4, below).

Mixing room, pot arch and clay mixing area

While the evidence for the mixing room and pot room is sketchy, their location here makes sense in terms of the functional arrangement of the glassworks. A two-brick-wide external wall (F205) and a brick-lined internal drain F202 (Fig. 11) may have formed part of the pot room. This would have formed a lean-to structure built against the northwest face of the cone that was about 2.5m or 8 feet wide at its narrowest end. This structure then appears to widen out to c.5m or 16 feet, possibly to provide storage space in which the pots could be slowly dried. The brick base of an oven structure (F201) was built directly against wall F205. This oven, which measured roughly 4m by 2m in plan, contained a large quantity of ash (Plate 16), and may have been a calcar oven where the glass mix was gently heated or 'fritted' to remove impurities. Against this background it may be suggested that the ovaloid feature depicted on Roper's 1855 plan of Dudley (Fig. 5) about 25m to the south west of F201 might be a slip kiln, or a sun pan for preparing the clay or the alkali components of the glass-making process.

Phase 4 Victorian (1843 - 1886)

A final alteration to the Stone Street Range involved the insertion of a brick wall (F600) to create a small chamber, with a secondary brick floor (6001) to the back of the building

immediately adjacent to it on Priory Street (Fig. 9b). This new floor was built over the remains of an earlier one (6005), but was sunk beneath what would have been the ground floor level of the three-storey range. This change was roughly contemporary with the insertion of a brick drain (F608) through the curved wall (F610; Plate 12), and may have connected to a recently built town sewer. The crudeness of these final alterations suggests that they were probably carried out after the glassworks was abandoned, and may have been for the washing or processing of hides. In addition, two parallel brick walls (F200 and F642) were built to the west of the calcar oven (F201) and seem to connect up to the passageway between 23 and 24 Priory Street shown on the sale plan of 1876 (Fig. 6). This, together with their mass-produced brick build, implies that they post-dated the operative phase of the glassworks, as did the construction of Tank 3 to the rear of 23 Priory Street.

CONCLUSIONS

The results of the excavations can be placed into five broad phases of activity on the basis of the development of the properties on the site, the date of the pottery, and the principles of archaeological stratigraphy.

Phase 1: Late medieval - c.1650

Phase 2: Post-medieval c.1650 - 1770

Phase 3: Glassworks c.1770 - 1843

Phase 4: Victorian 1843 - 1886

Phase 5: Post-demolition

This evidence compliments and enhances that derived from other excavations in the vicinity (Dudley M.B.C. 2004). The disposal of broken pottery together with environmental evidence points towards the exploitation of the natural resource of the Horsepool from the medieval period onwards. The north and eastern boundary of this historic feature, which was probably fed by a natural spring, have been identified. The other boundaries of the pool are situated beyond the limits of the current excavations. However, these must lie within the street block defined by Stone Street, Priory Street, Wolverhampton Street and High Street, situated on the northern boundary of the planned medieval town and just to the south of land belonging to the Dudley Priory. Markets for sheep and horses were held near here, and a street called Horsepool Lane, and later from around 1480 Stoney Street, led from the market place to the pool. By the early post-medieval period there is clear evidence that an industrial suburb was developing around the environs of the Horsepool that included metalworking and possibly pottery production.

To what extent the dissolution of the Priory and its estates in the mid-16th century played a role in the development of this industrial suburb is open to speculation, but the 17th century was clearly a period of profound change. This was probably more a product of the general economic development of the town and its hinterland than the direct impact of any civil war action. Although the pottery evidence supports a later 17th-century date for the Phase 2 development of the Stone Street properties, this was probably part of the broader redevelopment of the town in stone that seems to have occurred in the decades after the siege of Dudley Castle was lifted in 1646. Certainly, from the later 1600s onwards the Horsepool became progressively silted up, and by the early 1700s the north side of Priory Street was being developed with prestigious housing such as Dixon's Mansion at 7, Priory Street (Dudley M.B.C. 2004, 29).

The construction of the Dudley Flint Glassworks by Abaither Hawkes probably took place in the 1770s and involved a significant amount of ground preparation that included the draining and total infilling of the Horsepool. The probable footprint of the factory, as indicated by Treasure's map of 1835, is outlined on Figs 4 and 12 and may have been broadly equivalent to the boundary of the Horsepool. The glassworks are likely to have

had a cart entrance off Priory Street. This was subsequently infilled after the glassworks closed. Stylistically the building looks mid-Victorian (note the windows in Fig. 18) and it was probably built between 1843 and 1855. This property, together with 24 – 27 Priory Street, were subsequently sold off as a separate plot and became detached from the later Victorian redevelopment of Stone Street Square. The remains of this part of the glassworks were then encapsulated by the old Town Fire Station that was built in 1893, together with the other buildings immediately to the south and west of Stone Street Square.

The well-preserved remains of the glasshouse, comprising the cone, furnace, caves and ancillary structures, are of national importance providing a relatively rare example of survival from the pre-canal era of glass making in the region. In addition, Hawkes' firm was one of the largest, and most innovative, of the Dudley and Stourbridge glass manufacturers. The broad development of the glassworks has been defined through analysis of a combination of archaeological and historical evidence. Several alterations have also been identified that can be related to the documented expansion of the glassworks in the early 19th century, and an attempt has been made to define the specific activity areas within the glassworks (Fig. 13). While a number of questions remain open, this is largely due to the nature of the unique character of individual glassworks and the aims of the archaeological work which was carried out. The over-riding aim of the excavations was to actively preserve the surviving archaeology rather than dismantle it. Consequently, the opportunity for future work to be undertaken remains and this report should not be seen as the final chapter in the history of the Dudley Flint Glassworks.

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APPENDIX 1: TRADITIONAL ROLE OF HORSE POOL by John Hemingway

Summary

Stone Street Square has been used by the residents of Dudley since at least the 13th century. Its community use has varied in the ensuing years from stock watering, through various types of markets and fairs. For a short time in the 18th-19th centuries a Glass Works occupied half the site but it returned to public use as a bus terminus and is presently used as a car park.

Introduction

The town or borough of Dudley was newly created out of what were pre-existing ploughlands in the mid 12th-century. It probably first consisted of the High Street and Market Place occupying their position between the two churches; St. Edmund and St. Thomas. This road has cut across a much more ancient route; the Wolverhampton-Hall Street ridgeway. Burgage Plots (the townsmen's houses, shops and gardens), lined the High Street and back lanes delimited the plots (Tower and King Street).

A street cut through the plots at an oblique angle - this is Stone Street and appears to lead to the Priory which has a *terminus ante quem* of the 1150's. As this cuts along a furlong, it is later than the ploughlands, but earlier than the burgage plot formation. This may imply that it originated as a route to serve the Priory and suggests the original town evolved, despite its planned appearance, over a period of time.

The Horsepool

To the east of Stone Street, in what is now Stone Street Square, was the Horsepool. A Map by Harry Court c.1785 shows that a brook rose in the area west of the street and flowed into the Priory Ponds, the course of which can be seen today in the depression crossing the road by the museum¹. One assumes that the Pool was where the spring rose that fed the brook. The derivation of the name is most certainly from the habit of watering horses and other stock there. As it appears to have been the only watering place in the early town, it therefore would be of some importance.

Documents are unfortunately rare for the medieval period. Only archaeological information may fill in the details of the history of the site. However brief references do appear. The first mention of the Horsepool is in the Assize Roll of 1274-5 (1022, m25). At an Eyre (king's court) held in Dudley, Adam, son of Ralph of Frankley, was found to have murdered Thomas the Miller at *Horsepol*. In 1348 William son of *Henry atte Pole* is ordained a priest in the Bishop of Worcester's Register, in the Assize Roll of 1377 (n.45) a *William de Horsepol* is recorded as being involved in a lease of land and a *John de Poole* of Dudley was said to have accompanied Sir John Sutton, Baron of Dudley when he became Lord Lieutenant of Ireland in 1429.

There are no references to the surname Horsepool in the 13th century Lay Subsidys so perhaps it was not until the 14th century that settlement began to make its way down Stone Street. The earlier name for Stone Street was Horsepool Lane but presumably, part of it at least, had been metalled by 1489/1490 when the alias Stoney Street was given (Dud.Bor.Accnts).

Most of the land north of the present Priory Street was Priory property. Bt the 15th century the Priory was leasing these lands to Dudley townsmen. At the Dissolution of the Monasteries in 1535, the lord of Dudley acquired the lease of the buildings and lands. A document of 1544 lists the landholders and rents (PRO VO1, 94-107). It shows that a house and half an acre of land called Horsepool (the site of the library, town hall and

¹ That the street curves around the pool would suggest the pool came first. Though whether it was a natural feature or had been man made is difficult to ascertain.

Brooke Robinson buildings), were occupied by the Lee family. Next door and to the west lay *Horsepool Close*, where three quarters of an acre of pasture land was situated, (site of the museum and Planning Department). This was occupied by the Colbarn family. The field names would suggest that the Horsepool had become an area rather than a site by the 16th century.

The continuation of Stone Street to the Priory seems to have become disused after the Dissolution and for the next 300 years it became a cul-de-sac or to be more precise a T-junction with lanes leading west to Wolverhampton Street and east to Limepit Lane, beneath the Castle. A document survives in the Public Record Office of an Inquisition of the Commission for Charitable Uses, dated September 24th 1638. It concerns the lands of the Dudley Grammar School and refers to Arthur Dixon leasing *two cottages....between the horsefaire and the sheepfaire in the towneland.* The Sheepfaire was the west part of Priory Street while the Horsefair was the eastern part. The name *towneland* is the first evidence that the Horsepool was public property.

A deed dated 20th March 1649 of the lands of the Trustees of the Free Grammar School notes as amongst their property "...a garden shooting southwards to the horse-pool....adjoining the street called Sheep Fair."

Unfortunately the 1664 Hearth Tax Returns mentioned only one specific name associated with the Horsepool; John Jewks a nailer. Other evidence suggests John to be a quite important and wealthy man in the town (Roper 1965). A watching brief by Pete Boland at The Saracens Head in 1991 revealed 16th and 17th century pottery and slag waste. It would appear that industrialisation began early in the Horse Pool.

 17^{th} century documents give us the names of the surrounding streets. Tower Street was called Pease Lane. The Sheep Fair has already been mentioned. Stone Street was called Stoney Lane but Smythe Lane, which had an alias in the 16^{th} century, was called Hampton Lane; the forerunner of Wolverhampton Street.

In 1701 there was a survey of all the properties and who held them in the borough of Dudley (Milward Evidences, HWCRO). Although Hampton Lane and Stoney Lane are mentioned there was no reference to the Horse Pool. The Sheep Fair however had 21 properties mentioned and it is probable that it had subsumed Horsefayer Lane by this time. The document mentions James & Thomas Jewkes and Hugh Dixon.

The first cartographic reference is a map of Staffordshire drawn by Shaw in 1775. It shows the street pattern of Dudley an (if it is correct), the Horsepool area would appear to extend halfway along Tower Street. By this date the Horse Pool itself appears to have disappeared and has been built over when Abiather Hawkes founded the first Dudley Glassworks on the site in 1776. Another building that appears to have been erected in the square was The Saracens Head, though a brief look at the gable end displays the fact that a stone structure preceded it.

Harry Court's map in 1785 records the name Horse Pool on the corner of Stoney Lane and Sheep Fair. The brook angles between the properties suggesting that it is a running ditch, probably draining the water directly from the spring. Although they are surrounded by enclosed land the streets widen out at the junctions. This would appear to be a historical pattern, possibly implying a steady encroachment – the open area had been growing smaller! By the 19th century even the name Horse Pool had disappeared.

J. Treasures map of c.1835 also shows the widening corner but by then the street names had again undergone a change: Sheep Lane and Horsefayre had become Priory Street. Stoney Lane was Stone Street and Wolverhampton Street is so named. Hawke's Glassworks ceased business in the 1840's but was not demolished until 1886. The space being used as a marketplace. After its demolition it was called the Fruit Market. In a

document of 1920 it is called the old Fish Market but by then was being used as a Vegetable Market.

An indenture held in the Legal and Property Department of the Borough Council dated 8th August 1853 records the transference of the glassworks site to Thomas Badger. It shows that the property consisted of 40 parts of a 64 part plot. If this was the site of the communal Horsepool then the 64 parts may be the Burgage Holders equal divisions of the land.

Its position was described as being "....near a certain place called Horsepool Green formerly belonging to the Trustees of the Free Grammar School."

A later indenture dated 16th April 1886 describes the sale of the property to The Mayor, Aldermen and Burgesses of Dudley Borough Corporation, who

"...purchased for the purpose of street improvements and works authorised to be made under the Public Health Act 1875"

The growth of the northern edge of the site as an administrative centre began with the creation of St. James Street in the mid 19th century. The building of the Police Station in 1847, was followed by the County Court in 1858, the Museum and Art Gallery in 1883,the Fire Station in 1896, the Library and General Post Office in 1909, the Town Hall in 1928 and the Brooke Robinson complex in 1931.

In the 1920's it was decided to move the Public Weighbridge to the corner of Stone Street and Priory Street. (The Inspector of Weights and Measures was based at 16 Stone Street.) When the trolleybus service from Wolverhampton began in July 1927 the area was adapted to form a turning circle and terminus. The weighbridge use and the trolleybus terminus both ceased in 1967. The Fire Station went out of use about 1959 and was converted to a Paynes Shoe shop.

For the past thirty years the open area has served as a car park.

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APPENDIX 2: POTTERY REPORT by Stephanie Rátkai

A small assemblage of mainly post-medieval pottery was excavated, most of which was associated with contexts which pre-dated the glassworks. The pottery was divided into post-medieval ware types (e.g. blackware, coarseware, yellow ware, etc), and quantified by sherd count and weight and by minimum rim count. Where possible sherds were assigned to vessel form. The small amount of medieval pottery recovered was examined and also assigned to broad ware groups although details of the fabrics under x 20 magnification were kept in archive. Post-medieval pottery has previously been recovered from Dudley Castle, New Street, Tower Street and Hanson's Brewery and provides comparanda for the Stone Street assemblage.

The Pottery (Fig. 20)

The earliest pottery was a sooted green glazed medieval whiteware bowl base from (3037) dating to the mid 13^{th} to 14^{th} centuries. The lack of other sherds of this date (or earlier) is most likely the result of the project brief, which stopped short of excavating medieval contexts. In nearby Tower Street and New Street, medieval pottery from the 13^{th} to 15^{th} centuries was found. New Street also contained some possible 12^{th} century sherds and two sherds identified as possibly early-middle Saxon in date.

The remaining medieval sherds from (1022), (1015), (1053), (2022) and (2024) were all late oxidised ware sherds, dating to the 15^{th} or 16^{th} centuries. The two cistercian ware sherds from 1022 date to the late 15^{th} -mid 16^{th} centuries and the cistercian/blackware sherd dates to the 16^{th} century. All these 15^{th} - 16^{th} century wares were also paralleled at New Street, Tower Street and Hanson's Brewery and, of course, Dudley Castle.

Most of the pottery dated to the 17^{th} -mid 18^{th} centuries (i.e. before the construction of the glassworks), with the greater part belonging to the late 17^{th} -early 18^{th} centuries.

The pottery from Trenches 1-3 was made up of a similar range of wares. The most important components of the whole assemblage were by sherd count (in descending order) coarseware, blackware, slipware, slip-coated ware, yellow ware and mottled ware. Slipware is generally most common in the late 17^{th} -early 18^{th} centuries, although examples of light-on-dark trailed slipware flange rim bowls are known from Civil War contexts and several examples were found sealed beneath Civil War destruction rubble at Dudley Castle. Slip-coated ware and mottled ware date from the later 17^{th} - early/mid- 18^{th} centuries. Yellow ware is most common in the 17^{th} century but with some examples dating from the late 16^{th} and early 18^{th} centuries. Blackwares are found from the mid- 16^{th} to mid- 18^{th} centuries, and coarsewares are found throughout the post-medieval period up to the early years of the 20th century. However, in the latter two cases, a closer date range can be given to most sherds based on vessel form, fabric and glazing.

The post-medieval pottery can be divided into two main groups; utilitarian wares eg bowls, pancheons (large wide-mouthed bowls) and storage jars, and table wares such as drinking vessels, porringers, posset pots, platters, shallow bowls (often with a flange rim), salts and candlesticks. The relative proportion of these two groups gives some idea of the general status of the site (i.e. the greater the quantity of table wares, particularly slipware vessels, salts and candlesticks, the more prosperous the inhabitants). There is usually a marked difference between urban and rural sites, reflecting the generally more prosperous lifestyle and greater consumer choice in towns. For example, at Bascote, a poor rural settlement in Warwickshire, tablewares were poorly represented. Slipwares constituted just under 8% of the phase group in which coarsewares formed 49%. At Stone Street, the figures were not much different since coarsewares formed just over 40% of the assemblage and slipwares just over 10%. The coarseware figures for New Street were similar but less than one *per cent* of the assemblage was made up of slipware. Slipwares formed an even smaller proportion of the Hanson's Brewery

assemblage. However, the Stone Street assemblage is small and the data may be skewed, especially since all but one of the contexts containing slipware was in Trench 3. In addition there is some evidence to suggest that pottery was made in this area of Stone Street (see below) which may have provided a further imbalance in the types of pottery recovered.

Cistercian Ware and Blackware

Cistercian ware only occurred in (1022) and indeterminate Cistercian/blackware was found in (1022) and (3038) (ill 19 & 15). The sherds were all from cups. Blackwares were much better represented and comprised mainly drinking vessels. The earliest forms were ills 5 (from 3007) and ill 13 (from 3038). The base sherd of ill 13 is a waster since there is a small glaze run across the break and patches of a grey clinkery deposit like that found on vessels from (2024) across the breaks. These cups are unlikely to be later than the 17th century in date. There were several examples of late 17th-mid 18th century cylindrical mugs (or tankards) from (1051), (2007), (2023) and (3005). These are generally much better made than the earlier blackwares and are thin walled and have a fine fabric and glossy black glaze. They are similar in form to Barker 1986, Fig 3.33 (dated to c 1670-720). Similar mugs were also found at Park Street, Birmingham (Rátkai forthcoming). Another late mug form was found in (2021) ill 12.

Further 17th century blackware forms were found in (3013) and (1022). Ill 11 had the trace of a pouring lip and was probably part of a squat or barrel shaped jug, similar to a Cistercian ware vessel illustrated by Barker 1986 fig 1,9. Ill 10 is probably the base of a pedestal salt. The lower portion of the base has a horizontal unglazed scar to which traces of white slip still adhere. There is also a deep oblique crack through the break. It is possible that this sherd is a waster also. The most unusual blackware sherd was a lobed or frilled rim ill 21 from (1022). Since the sherd was so small it is difficult to be certain of the vessels form but a shallow bowl (*pers comm.* D Barker) or salt is a possibility.

Coarseware

Bowl/pancheon forms could be largely paralleled by material of Civil War date from Dudley Castle (Rátkai 19xx fig 5; 17, 22 and fig 6; 27, 28) and ?later 17th-material from Hanson's Brewery (1996, fig 6, 9). However, some forms were unparalleled: ills 8 (3007), 26 (2023) and 31 (3006). Vessel 31 was particularly badly abraded, with very little of the surface remaining. Bowls 29 (2021), 28 (1053) and 30 (4 u/s) are rather later forms with a finer, cleaner harder fired fabric. These types of vessel are likely to date to the 18th or 19th centuries and resemble vessels found at the 19th century kiln site at Lanwills, Brierly Hill. Jar 6 (3007) could be paralleled at Dudley Castle amongst Civil War material (Rátkai 1987 fig 3,2) but ills 7 (2029) and ill 23 could not, although ill 7 was similar to Hansons Brewery fig7: 27

A handled hollow ware ill 21 (1022) was unparalleled at both the castle and brewery sites. Ill 18 (3015) is a rather crude bowl base sherd, again unparalleled. It is very crudely made with an internal and external red slip over a pale orange fabric and spots and splashes of a toffee-coloured glaze on the interior and exterior. This base form was also found in some of the yellow wares eg ill 3, and also on a crude slip-coated ware ill 9 (3004). The external surface of this pot shows evidence of 'blow-out' (portions of the vessel surface have been blown away by the rapid expansion of impurities in the clay during firing). The internal glazed surface is coated with a brown earthy deposit and patches of the internal surface have also flaked away.

Yellow Ware

Both iron poor and iron rich fabrics were present, the latter having a thick white underglaze slip. There were few form sherds. A very crude handled bowl ill 3 from (3004) with a thick white underglaze slip and brick red fabric had a crackled glaze and a flaked

and stained surface. A similar base form and rim in a white fabric yellow ware were found in (3005) and (3003) respectively and another vessel similar to ill 3 in (2024). The latter had badly flaked surfaces and marked cracking at the internal base angle. The former was also very battered with glaze seepage into the clay body, adhesions and discolouration. An equally crude, sloping-sided bowl with a brick red fabric ill 14 was found in 2023. Nearly all the internal glazed surface has flaked away, leaving the white-slipped surface exposed. There is a perforation made before firing, since the interior of it is covered with both slip and glaze. The hole was filled with a greyish clinker-like material. This vessel is also very crude with small patches of surface 'blow-out' on the exterior. A distorted, bowl rim sherd from (1022) ill 18, in a dark red fabric, appears to be a waster. In contrast to these rather crude vessels there was a nicely made candlestick base in a cream fabric ill 6 from (3007). A yellow ware candlestick in a buff fabric but of a different form was found at Hanson's Brewery (Fig 7:26)

Slipware

Four types of slipware were present.; light on dark trailed slipware ill 1 (3004), dark-on-light trailed slipware ill 23 (3006), feathered slipware ill 24 (3006) and three colour slipware ill 2 (3004) and (3007). The light-on-dark slipware sherds were from flange rim bowls, the other slipwares were all from pie-crust edge platters although ill 2 appears to be a sub-rectangular dish. Generally speaking the slipwares are well made and the slip decoration well executed. However, ill 22 has a small patch of blow-out into which glaze has run on the interior surface and a series of small horizontal cracks running also across the interior glazed surface which suggests this sherd may also be a waster or at best a 'second'.

Mottled ware

Most of the sherds are from cylindrical mugs with rather sketchy incised bands above the base ill 27 (3002). One of these vessels from (3005) has a very thick external glaze, largely obscuring the incised bands whereas the interior glaze is very thin, although it is a more normal thickness on the base. These vessels are less well made than those made in the Potteries and it is possible that they are of local manufacture. There was one example of a straight-sided bowl from (2023).

Slip-coated ware

There was one example of a hook-rim bowl ill 15 from (2024). This had a series of fine glaze runs across one of the breaks and some grey clinkery adhesions. This sherd also, therefore, appears to be a waster. A second hook-rim bowl sherd was found in (2023). A cup base was ill 17 was found in (2024) as well. Both these forms date to the late 17^{th} -mid 18^{th} centuries. A crude slip-coated base ill 9 more fully described above was found in (3004). A small rim sherd from a piecrust edge platter (not illustrated) was found in (3015). Generally the slip-coated sherds could not be assigned to any specific forms although most were from hollow wares.

Conclusions

Perhaps the most striking aspect of the post-medieval pottery was the number of misfires, wasters and semi-wasters. These were found in (1022), (2023), (2024), (3004), (3005), (3006), (3013) and (3038). In addition to the possible wasters amongst the illustrated vessels discussed above, there were badly overfired ?slip-coated ware sherds from (2023), (2024) and (3002) and overfired blackware jug body sherds from (3002). A coarseware bowl base sherd (similar in form to ill 9) from (2024) was burnt internally and had clinkery grey adhesions. A second similar base sherd from (2023) had external adhesions and large blobs of glaze on the exterior base. The striking thing about this was that the glaze and adhesions on the base were completely unworn, suggesting that the vessel had never been used. This was in marked contrast to many of the

coarseware base sherds on which areas of wear (particularly at the base edge) were clearly visible.

It can be seen therefore that at best sub-standard and at worst wastered sherds were found in the major ware groups (i.e. coarseware, blackware, yellow ware, slipware, slipcoated ware and mottled ware). These were found in Trenches 1-3 but were particularly in evidence in (2023) and (2024), layers pre-dating the glassworks and cut by cellars to the north of the kiln. The latest sherd from (2023) was an agate ware sherd dating to c 1730-1760. Excavation at neighbouring New Street (Rátkai forthcoming) turned up a handful of possible wasters and a saggar or support. Part of a saggar and two or three possible wasters were also recovered from a small watching brief at the near-by Saracen's Head (personal inspection by the author). This evidence coupled with the Stone Street data suggests the strong possibility of post-medieval pottery production. Dr Plot in his Natural History of Staffordshire records pottery production using "good red earth gotten at (neighbouring) Tipton" in the late 17th century and pottery production within town or village centres is known from elsewhere in Staffordshire eg Wednesbury and Burslem, although in the latter two cases pottery production was an industry of major importance.

Nearly all the pottery pre-dates the glassworks. Exceptions to this were three blue transfer-printed sherds and part of a figurine from (1018). An agate ware sherd from (2023) and two unstratified white salt-glazed stoneware sherds from Trench 2 probably predate the glassworks. A red-brown glazed body sherd from (2029) (see above) may post-date the glassworks. Unstratified blackware sherds from Trench 4 (ill 30) could well post-date the glassworks. A blackware 'semi-waster' from (4027) was found with a creamware sherd. It is most likely that both vessels post-date the glassworks. If so, then pottery production may have continued into the later 18th century. Amongst the unstratified material from Trench 2 were three creamware sherds from a queen-edge ?soup plate and the rim of a pearlware ?tea-bowl with blue painted decoration both probably dating to c 1790.

A silty layer (3038) beneath Wall 1 contained blackware mug sherds including (ills 13) and a fine red coarseware sherd with an internal toffee coloured glaze. A 17th century date seems most likely for this layer. As ill 13 is a waster this indicates that pottery production may have started very soon after the infilling or disuse of the 'horspool' Above (3038) lay (3007), the equivalent of (2021) and (2029) in Trench 2. The presence of slip-coated ware, slipware and mottled ware in (2021) and (3007) suggests that these two layers must post date the later 17th century, although the slipware sherd in (3007) is likely to be intrusive (see below). Layer (2029) contained coarseware and one body sherd, with a white fabric, underglaze red slip and an internal and external red-brown glaze, which must date to the mid 18th century at the earliest. It is therefore possible that this sherd is intrusive or (2021) is not the equivalent of (2029).

The layer (3037) under the stone floor (F300) which lay above (3007) contained only a mid 13th-14th century medieval whiteware sherd. On the floor itself was a 17th century yellow ware rim sherd from a vessel similar to ill 3. Layer (3005) above the floor contained pottery dating from the late 17th century to the early/mid 18th century, including a possibly wastered yellow ware base sherd. The deposition date probably lies in the first quarter of the 18th century. A still later layer (3015) was very little different from (3005) and there need have not have been a long interval between the deposition of the two layers. The fill (3004) of a depression within the stone floor contained a substantial piece of a three-colour trailed slipware sub-rectangular dish ill 2. A small joining rim fragment was found in (3007) where it must be intrusive. The slipware dish is most likely to date to 1700-1750 and probably later in this period rather than earlier. The build-up of detritus over a floor or yard is normally associated with the abandonment/disuse of the area. The ceramic evidence suggests that the stone floor was

constructed at some point in the 17^{th} century, possibly even quite early in that century but was out of use by the early 18^{th} century.

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APPENDIX 3: ASSESSMENT OF WATERLOGGED SEEDS FROM DUDLEY SSD03, WEST MIDLANDS by James Greig

Samples

Two samples were taken from the excavations at Stone St, both from wet silty/organic deposits which were encountered during the excavation, underneath the later glassworks. It was hoped that the samples would enhance understanding of the nature of the horsepool, which had been in that area. The samples came form two different features; 3038 from the West of Wall 1 and 2029 against Wall 3.

Laboratory work

Plant macrofossils

A subsample of each sample was broken down in water, and the lighter, organic, fraction washed over to separate it from the inorganic material, and caught in a 500 μ m sieve. The washover was sorted in water under a x10 stereo microscope and the plant remains identified and checked with the writer's own reference collections. The results are listed in taxonomic order (Kent 1992) in Table 1.

Results

It was soon apparent that the dark colour of the material was due to coal and charcoal in it, rather than to organic content. The sample from F3038 had significant organic content and well preserved remains, while F2029 contained just coal, with some charcoal and bone fragments. The remains identified from 3038 are listed in Table 1.

Most of the remains were from annual weeds of open ground such as *Urtica urens* (annual nettle), *Chenopodium* (fat hen etc), *Atriplex* (orache) and *Stellaria* (chickweed). More permanent weeds were also abundant, such as *Urtica dioica* (common nettle), *Rumex* (docks), *Conium maculatum* (hemlock), while *Sambucus nigra* (elder) is a further sign of enriched ground or wasteland. Weeds generally produce vast numbers of seeds, and so they tend to show up wherever they are present. Other signs of an overgrown place are provided by *Rubus* sp. (bramble) and *Solanum dulcamara* (bittersweet). These plants, because of their very abundant seed production, should perhaps be regarded as having been present in the surroundings rather than dominating them. Unpublished work on the contents of a garden pond showed how the weeds there showed up strongly although they were not very abundant as plants.

A few plants of damp places such as the *Persicaria* (persicaria) and a *Carex* (sedge) are the only sign of wet conditions, but a place used for watering animals might not grow as large selection of water plants as an undisturbed pond would.

The plants that are not weeds are more interesting. There is a record of *Malva* (mallow), a plant of long grassland and waysides, and two cultivated plants, *Cannabis sativa* (hemp) and *Ficus carica* (fig). The first is a crop plant, used for fibre, and not unexpected in such a site, and the second a food which was widely eaten.

Table 1

Plant list, names and order according to Kent (1992); + = present, ++ abundant

sample: 3038		
-		
Cannabis sativa L.	1	hemp
Ficus carica L.	1	fig
Urtica dioica L.	64	common nettle
Urtica urens L.	1	small nettle
Chenopodium album L.	1	fat hen
Atriplex sp.	1	orache
Stellaria media (L.) Villars	1	chickweed
Rumex acetosella L.	1	sheep's sorrel
Rumex sp.	8	dock
<i>Malva</i> sp.	1	mallow
Rubus sect.		
Glandulosus Wimmer & Grab	1	bramble
Potentilla erecta L. (Räusch)	1	tormentil
Conium maculatum L.	1	hemlock
Solanum dulcamara L.	1	bittersweet
Sambucus nigra L.	7	elder
Lapsana communis L.	1	nipplewort
Carex subg Vignea	1	sedge
Carex subg Carex	1	sedge
Poaceae	2	grasses
other remains		
Moss	+	
Coal	++	
Wood	++	
beetle remains	+	
fly puparia	+	

ACKNOWLEDGEMENTS

Thanks to Steve Litherland for the samples and information about the site.

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APPENDIX 1: TRADITIONAL ROLE OF HORSE POOL BY JOHN HEMINGWAY.

Summary

Stone Street Square has been used by the residents of Dudley since at least the 13th century. It community use has varied in the ensuing years from stock watering, through various types of markets and fairs. For a short time in the 18th-19th centuries a Glass Works occupied half the site but it returned to public use as a bus terminus and is presently used as a car park.

Introduction

The town or borough of Dudley was newly created out of what were pre-existing ploughlands in the mid 12th century. It probably first consisted of the High Street and Market Place occupying their position between the two churches; St. Edmund and St. Thomas. This road has cut across a much more ancient route; the Wolverhampton-Hall Street ridgeway. Burgage Plots (the townsmen's houses, shops and gardens), lined the High Street and back lanes delimited the plots (Tower and King Street).

A street cut through the plots at an oblique angle - this is Stone Street and appears to lead to the Priory which has a *terminus ante quem* of the 1150's. As this cuts along a furlong, it is later than the ploughlands, but earlier than the burgage plot formation. This may imply that it originated as a route to serve the Priory and suggests the original town evolved, despite its planned appearance, over a period of time.

The Horsepool

To the east of Stone Street, in what is now Stone Street Square, was the Horsepool. A Map by Harry Court c.1785 shows that a brook rose in the area west of the street and flowed into the Priory Ponds. (The course of it can be seen today in the depression crossing the road by the museum.) ¹ One assumes that the Pool was where the spring rose that fed the brook. The derivation of the name is most certainly from the habit of watering horses and other stock there. As it appears to have been the only watering place in the early town, it therefore would be of some importance.

Documents are unfortunately rare for the medieval period. Only archaeological information may fill in the details of the history of the site. However brief references do appear. The first mention of the Horsepool is in the Assize Roll of 1274-5 (1022, m25). At an Eyre (king's court) held in Dudley, Adam, son of Ralph of Frankley, was found to have murdered Thomas the Miller at *Horsepol*. In 1348 William son of *Henry atte Pole* is ordained a priest in the Bishop of Worcester's Register, in the Assize Roll of 1377 (n.45) a *William de Horsepol* is recorded as being involved in a lease of land and a *John de Poole* of Dudley was said to have accompanied Sir John Sutton, Baron of Dudley when he became Lord Lieutenant of Ireland in 1429.

There are no references to the surname Horsepool in the 13th century Lay Subsidys so perhaps it was not until the 14th century that settlement began to make its way down Stone Street. The earlier name for Stone Street was Horsepool Lane but presumably,

¹ That the street curves around the pool would suggest the pool came first. Though whether it was a natural feature or had been man made is difficult to ascertain.

part of it at least, had been metalled by 1489/1490 when the alias Stoney Street was given. (Dud.Bor.Accnts)

Most of the land north of the present Priory Street was Priory property. Bt the 15th century the Priory was leasing these lands to Dudley townsmen. At the Dissolution of the Monasteries in 1535, the lord of Dudley acquired the lease of the buildings and lands. A document of 1544 lists the landholders and rents. (PRO VO1, p.94-107). It shows that a house and half an acre of land called Horsepool, (the site of the library, town hall and Brooke Robinson buildings) were occupied by the Lee family. Next door and to the west lay *Horsepool Close*, where three quarters of an acre of pasture land was situated, (site of the museum and Planning Department). This was occupied by the Colbarn family. The field names would suggest that the Horsepool had become an area rather than a site by the 16th century.

The continuation of Stone Street to the Priory seems to have become disused after the Dissolution and for the next 300 years it became a cul-de-sac or to be more precise a T-junction with lanes leading west to Wolverhampton Street and east to Limepit Lane, beneath the Castle. A document survives in the Public Record Office of an Inquisition of the Commission for Charitable Uses, dated September 24th 1638. It concerns the lands of the Dudley Grammar School and refers to Arthur Dixon leasing two cottages....between the horsefaire and the sheepfaire in the towneland. The Sheepfaire was the west part of Priory Street while the Horsefair was the eastern part. The name towneland is the first evidence that the Horsepool was public property.

A deed dated 20^{th} March 1649 of the lands of the Trustees of the Free Grammar School notes as amongst their property

"a garden shooting southwards to the horse-pool....adjoining the street called Sheep Fair."

Unfortunately the 1664 Hearth Tax Returns mentioned only one specific name associated with the Horsepool; John Jewks a nailer. Other evidence suggests John to be a quite important and wealthy man in the town (Roper 1965). A watching brief by Pete Boland at The Saracens Head in 1991 revealed 16th and 17th century pottery and slag waste. It would appear that industrialisation began early in the Horse Pool.

17th century documents give us the names of the surrounding streets. Tower Street was called Pease Lane. The Sheep Fair has already been mentioned. Stone Street was called Stoney Lane but Smythe Lane, which had an alias in the 16th century, was called Hampton Lane; the forerunner of Wolverhampton Street.

In 1701 there was a survey of all the properties and who held them in the borough of Dudley. (Milward Evidences, HWCRO). Although Hampton Lane and Stoney Lane are mentioned there was no reference to the Horse Pool. The Sheep Fair however had 21 properties mentioned and it is probable that it had subsumed Horsefayer Lane by this time. The document mentions James & Thomas Jewkes and Hugh Dixon.

The first cartographic reference is a map of Staffordshire drawn by Shaw in 1775. It shows the street pattern of Dudley an (if it is correct), the Horsepool area would appear to extend halfway along Tower Street. By this date the Horse Pool itself

appears to have disappeared and has been built over when Abiather Hawkes founded the first Dudley Glassworks on the site in 1776. Another building that appears to have been erected in the square was The Saracens Head, though a brief look at the gable end displays the fact that a stone structure preceded it.

Harry Court's map in 1785 records the name Horse Pool on the corner of Stoney Lane and Sheep Fair. The brook angles between the properties suggesting that it is a running ditch, probably draining the water directly from the spring. Although they are surrounded by enclosed land the streets widen out at the junctions. This would appear to be a historical pattern, possibly implying a steady encroachment – the open area had been growing smaller! By the 19th century even the name Horse Pool had disappeared.

J. Treasures map of c.1835 also shows the widening corner but by then the street names had again undergone a change: Sheep Lane and Horsefayre had become Priory Street. Stoney Lane was Stone Street and Wolverhampton Street is so named. Hawke's Glassworks ceased business in the 1840's but was not demolished until 1886. The space being used as a marketplace. After its demolition it was called the Fruit Market. In a document of 1920 it is called the old Fish Market but by then was being used as a Vegetable Market.

An indenture held in the Legal and Property Department of the Borough Council dated 8th August 1853 records the transference of the glassworks site to Thomas Badger. It shows that the property consisted of 40 parts of a 64 part plot. If this was the site of the communal Horsepool then the 64 parts may be the Burgage Holders equal divisions of the land.

Its position was described as being "....near a certain place called Horsepool Green formerly belonging to the Trustees of the Free Grammar School."

A later indenture dated 16th April 1886 describes the sale of the property to The Mayor, Aldermen and Burgesses of Dudley Borough Corporation, who

"...purchased for the purpose of street improvements and works authorised to be made under the Public Health Act 1875"

The growth of the northern edge of the site as an administrative centre began with the creation of St. James Street in the mid 19th century. The building of the Police Station in 1847, was followed by the County Court in 1858, the Museum and Art Gallery in 1883,the Fire Station in 1896, the Library and General Post Office in 1909, the Town Hall in 1928 and the Brooke Robinson complex in 1931.

In the 1920's it was decided to move the Public Weighbridge to the corner of Stone Street and Priory Street. (The Inspector of Weights and Measures was based at 16 Stone Street.) When the trolleybus service from Wolverhampton began in July 1927 the area was adapted to form a turning circle and terminus. The weighbridge use and the trolleybus terminus both ceased in 1967. The Fire Station went out of use about 1959 and was converted to a Paynes Shoe shop.

For the past thirty years the open area has served as a carpark.

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APPENDIX 2: POTTERY REPORT by Stephanie Rátkai

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The Pottery

The earliest pottery was a sooted green glazed medieval whiteware bowl base from (3037) dating to the mid 13th-14th centuries. The lack of other sherds of this date (or earlier) is most likely the result of the project brief which stopped short of excavating medieval contexts. In nearby Tower Street and New Street medieval pottery from the 13th -15th centuries was found. New Street also contained some possible 12th century sherds and two sherds identified as possibly early-middle Saxon in date.

The remaining medieval sherds from (1022), (1015), (1053), (2022) and (2024) were all late oxidised ware sherds, dating to the 15th or 16th centuries. The two cistercian ware sherds from 1022 date to the late 15th-mid 16th centuries and the cistercian/blackware sherd dates to the 16th century. All these 15th-16th century wares were also paralleled at New Street, Tower Street and Hanson's Brewery and, of course, Dudley Castle.

Most of the pottery dated to the 17th-mid 18th centuries (i.e. before the construction of the glassworks), with the greater part belonging to the late 17th-early 18th centuries.

The pottery from Trenches 1-3 was made up of a similar range of wares. The most important components of the whole assemblage were by sherd count (in descending order) coarseware, blackware, slipware, slip-coated ware, yellow ware and mottled ware. Slipware is generally most common in the late 17^{th} -early 18^{th} centuries, although examples of light-on-dark trailed slipware flange rim bowls are known from Civil War contexts and several examples were found sealed beneath Civil War destruction rubble at Dudley Castle. Slip-coated ware and mottled ware date from the later 17^{th} -early/mid 18^{th} centuries. Yellow ware is most common in the 17^{th} century but with some examples dating from the late 16^{th} and early 18^{th} centuries. Blackwares are found from the mid 16^{th} to mid 18^{th} centuries, and coarsewares are found throughout the post-medieval period up to the early years of the 20th century. However, in the latter two cases, a closer date range can be given to most sherds based on vessel form, fabric and glazing.

The post-medieval pottery can be divided into two main groups; utilitarian wares eg bowls, pancheons (large wide-mouthed bowls) and storage jars, and table wares such as drinking vessels, porringers, posset pots, platters, shallow bowls (often with a flange rim), salts and candlesticks. The relative proportion of these two groups gives some idea

of the general status of the site (i.e. the greater the quantity of table wares, particularly slipware vessels, salts and candlesticks, the more prosperous the inhabitants). There is usually a marked difference between urban and rural sites, reflecting the generally more prosperous lifestyle and greater consumer choice in towns. For example at Bascote a poor rural settlement in Warwickshire, table wares were poorly represented. Slipwares constituted just under 8% of the phase group in which coarsewares formed 49%. At Stone Street, the figures were not much different since coarsewares formed just over 40% of the assemblage and slipwares just over 10%. The coarseware figures for New Street were similar but less than one *per cent* of the assemblage was made up of slipware. Slipwares formed an even smaller proportion of the Hanson's Brewery assemblage. However, the Stone Street assemblage is small and the data may be skewed, especially since all but one of the contexts containing slipware was in Trench 3. In addition there is some evidence to suggest that pottery was made in this area of Stone Street (see below) which may have provided a further imbalance in the types of pottery recovered.

Cistercian Ware and Blackware

Cistercian ware only occurred in (1022) and indeterminate Cistercian/blackware was found in (1022) and (3038) **ills 18 and 15.** The sherds were all from cups. Blackwares were much better represented and comprised mainly drinking vessels. The earliest forms were **ills 06** (from 3007), **13 and 14** (from 3038). It is possible that **ill 13 and 14** are part of the same vessel. The base sherd **ill 14** is a waster since there is a small glaze run across the break and patches of a grey clinkery deposit like that found on vessels from (2024) across the breaks. These cups are unlikely to be later than the 17th century in date. There were several examples of late 17th-mid 18th century cylindrical mugs (or tankards) from (1051), (2007), (2023) and (3005). These are generally much better made than the earlier blackwares and are thin walled and have a fine fabric and glossy black glaze. They are similar in form to Barker 1986 Fig 3.33 (dated to c 1670-720). Similar mugs were also found at Park Street, Birmingham (Rátkai forthcoming). Another late mug form was found in (2021) **ill 12**.

Further 17th century blackware forms were found in (3013) and (1022). **III 11**, had the trace of a pouring lip and was probably part of a squat or barrel shaped jug, similar to a Cistercian ware vessel illustrated by Barker 1986 fig 1,9. **III 10** is probably the base of a pedestal salt. The lower portion of the base has a horizontal unglazed scar to which traces of white slip still adhere. There is also a deep oblique crack through the break. It is possible that this sherd is a waster also. The most unusual blackware sherd was a lobed or frilled rim **iII 21** from (1022). Since the sherd was so small it is difficult to be certain of the vessels form but a shallow bowl (*pers comm.* D Barker) or salt is a possibility.

Coarseware

Bowl/pancheon forms could be largely paralleled by material of Civil War date from Dudley Castle (Rátkai 19xx fig 5; 17, 22 and fig 6; 27, 28) and ?later 17th-material from Hanson's Brewery (1996, fig 6, 9). However, some forms were unparalleled **ills 08a** (3007), AA (2023) and AB (3006). Vessel AB was particularly badly abraded, with very little of the surface remaining. Bowls **ills AC (2021)**, AD (1053) and AE (4 u/s) are rather later forms with a finer, cleaner harder fired fabric. These types of vessel are likely

to date to the 18th or 19th centuries and resemble vessels found at the 19th century kiln site at Lanwills, Brierly Hill. Jar (**ill 07**) (3007) could be paralleled at Dudley Castle amongst Civil War material (Rátkai 1987 fig 3,2) but **ills 08 (2029) and ill 24** could not, although **ill08** was similar to Hansons Brewery fig7: 27

A handled hollow ware **ill 20 (1022)** was unparalleled at both the castle and brewery sites. **Ill 17 (3015)** is a rather crude bowl base sherd, again unparalleled. It is very crudely made with an internal and external red slip over a pale orange fabric and spots and splashes of a toffee-coloured glaze on the interior and exterior. This base form was also found in some of the yellow wares eg **ill 03**, and also on a crude slip-coated ware **ill 09** (3004). The external surface of this pot shows evidence of 'blow-out' (portions of the vessel surface have been blown away by the rapid expansion of impurities in the clay during firing). The internal glazed surface is coated with a brown earthy deposit and patches of the internal surface have also flaked away.

Yellow Ware

Both iron poor and iron rich fabrics were present, the latter having a thick white underglaze slip. There were few form sherds. A very crude handled bowl ill 03 from (3004) with a thick white underglaze slip and brick red fabric had a crackled glaze and a flaked and stained surface. A similar base form and rim in a white fabric vellow ware were found in (3005) and (3003) respectively and another vessel similar to ill 03 in (2024). The latter had badly flaked surfaces and marked cracking at the internal base angle. The former was also very battered with glaze seepage into the clay body, adhesions and discolouration. An equally crude, sloping-sided bowl with a brick red fabric ill 14 was found in 2023. Nearly all the internal glazed surface has flaked away, leaving the white-slipped surface exposed. There is a perforation made before firing, since the interior of it is covered with both slip and glaze. The hole was filled with a greyish clinker-like material. This vessel is also very crude with small patches of surface 'blow-out' on the exterior. A distorted, bowl rim sherd from (1022) ill 19, in a dark red fabric, appears to be a waster. In contrast to these rather crude vessels there was a nicely made candlestick base in a cream fabric ill 05 from (3007). A yellow ware candlestick in a buff fabric but of a different form was found at Hanson's Brewery (Fig 7:26)

Slipware

Four types of slipware were present.; light on dark trailed slipware **ill 01** (3004), dark-on-light trailed slipware **ill 22** (3006), feathered slipware **ill 23** (3006) and three colour slipware **ill 02** (3004) and (3007). The light-on-dark slipware sherds were from flange rim bowls, the other slipwares were all from pie-crust edge platters although **ill 02** appears to be a sub-rectangular dish. Generally speaking the slipwares are well made and the slip decoration well-executed. However, **ill 23** has a small patch of blow-out into which glaze has run on the interior surface and a series of small horizontal cracks running also across the interior glazed surface which suggests this sherd may also be a waster or at best a 'second'.

Mottled ware

Most of the sherds are from cylindrical mugs with rather sketchy incised bands above the base **ill AF (3002).** One of these vessels from (3005) has a very thick external glaze, largely obscuring the incised bands whereas the interior glaze is very thin, although it is a more normal thickness on the base. These vessels are less well made than those made in the Potteries and it is possible that they are of local manufacture. There was one example of a straight sided bowl from (2023).

Slip-coated ware

There was one example of a hook-rim bowl **ill 15** from (2024). This had a series of fine glaze runs across one of the breaks and some grey clinkery adhesions. This sherd also, therefore, appears to be a waster. A second hook-rim bowl sherd was found in (2023). A cup base was **ill 16** was found in (2024) as well. Both these forms date to the late 17th-mid 18th centuries. A crude slip-coated base **ill 09** more fully described above was found in (3004). A small rim sherd from a pie-crust edge platter (not illustrated) was found in (3015). Generally the slip-coated sherds could not be assigned to any specific forms although most were from hollow wares.

CONCLUSIONS

Perhaps the most striking aspect of the post-medieval pottery was the number of misfires, wasters and semi-wasters. These were found in (1022), (2023), (2024), (3004), (3005), (3006), (3013) and (3038). In addition to the possible wasters amongst the illustrated vessels discussed above, there were badly overfired ?slip-coated ware sherds from (2023), (2024) and (3002) and overfired blackware jug body sherds from (3002). A coarseware bowl base sherd (similar in form to ill 09) from (2024) was burnt internally and had clinkery grey adhesions. A second similar base sherd from (2023) had external adhesions and large blobs of glaze on the exterior base. The striking thing about this was that the glaze and adhesions on the base were completely unworn, suggesting that the vessel had never been used. This was in marked contrast to many of the coarseware base sherds on which areas of wear (particularly at the base edge) were clearly visible.

It can be seen therefore that at best sub-standard and at worst wastered sherds were found in the major ware groups (i.e. coarseware, blackware, yellow ware, slipware, slip-coated ware and mottled ware). These were found in Trenches 1-3 but were particularly in evidence in (2023) and (2024), layers pre-dating the glassworks and cut by cellars to the north of the kiln. The latest sherd from (2023) was an agate ware sherd dating to c 1730-1760. Excavation at neighbouring New Street (Rátkai forthcoming) turned up a handful of possible wasters and a saggar or support. Part of a saggar and two or three possible wasters were also recovered from a small watching brief at the near-by Saracen's Head (personal inspection by the author). This evidence coupled with the Stone Street data suggests the strong possibility of post-medieval pottery production. Dr Plot in his Natural History of Staffordshire records pottery production using "good red earth gotten at (neighbouring) Tipton" in the late 17th century and pottery production within town or village centres is known from elsewhere in Staffordshire eg Wednesbury and Burslem, although in the latter two cases pottery production was an industry of major importance.

Nearly all the pottery pre-dates the glassworks. Exceptions to this were three blue transfer-printed sherds and part of a figurine from (1018). An agate ware sherd from (2023) and two unstratified white salt-glazed stoneware sherds from Trench 2 probably predate the glassworks. A red-brown glazed body sherd from (2029) (see above) may post-date the glassworks. Unstratified blackware sherds from Trench 4 (ill AE) could well post-date the glassworks. A blackware 'semi-waster' from (4027) was found with a creamware sherd. It is most likely that both vessels post-date the glassworks. If so, then pottery production may have continued into the later 18th century. Amongst the unstratified material from Trench 2 were three creamware sherds from a queen-edge ?soup plate and the rim of a pearlware ?tea-bowl with blue painted decoration both probably dating to c 1790.

A silty layer (3038) beneath Wall 1 contained blackware mug sherds including (ills 13, 14) and a fine red coarseware sherd with an internal toffee coloured glaze. A 17th century date seems most likely for this layer. As ill 14 is a waster this indicates that pottery production may have started very soon after the infilling or disuse of the 'horspool' Above (3038) lay (3007), the equivalent of (2021) and (2029) in Trench 2.. The presence of slip-coated ware, slipware and mottled ware in (2021) and (3007) suggests that these two layers must post date the later 17th century, although the slipware sherd in (3007) is likely to be intrusive (see below). Layer (2029) contained coarseware and one body sherd, with a white fabric, underglaze red slip and an internal and external red-brown glaze, which must date to the mid 18th century at the earliest.. It is therefore possible that this sherd is intrusive or (2021) is not the equivalent of (2029).

The layer (3037) under the stone floor (F300) which lay above (3007) contained only a mid 13th-14th century medieval whiteware sherd. On the floor itself was a 17th century yellow ware rim sherd from a vessel similar to **ill 03**. Layer (3005) above the floor contained pottery dating from the late 17th century to the early/mid 18th century, including a possibly wastered yellow ware base sherd. The deposition date probably lies in the first quarter of the 18th century. A still later layer (3015) was very little different from (3005) and there need have not have been a long interval between the deposition of the two layers. The fill (3004) of a depression within the stone floor contained a substantial piece of a three-colour trailed slipware sub-rectangular dish **ill 02**. A small joining rim fragment was found in (3007) where it must be intrusive. The slipware dish is most likely to date to 1700-1750 and probably later in this period rather than earlier. The build-up of detritus over a floor or yard is normally associated with the abandonment/disuse of the area. The ceramic evidence suggests that the stone floor was constructed at some point in the 17th century, possibly even quite early in that century but was out of use by the early 18th century.

Biliography

Ratkai S 1996 The pottery in Mould C Archaeological Excavations at the Former Hanson's Brewery Site, High Street, Dudley

Trans Worcs Archaeol Soc 3rd Ser Vol 15 1996 pp 317-342

APPENDIX 3:

ASSESSMENT OF WATERLOGGED SEEDS FROM DUDLEY SSD03, WEST MIDLANDS BY JAMES GREIG

Summary

One of the two samples contained hemp, fig and a range weeds which show something of the surroundings of the horse pool.

Samples

The two samples were taken from wet silty/organic deposits which were encountered during the excavation, underneath the later glassworks, in case they shed any light on the horsepool which had been in that area. Two features were sampled, 3038 from the West of Wall 1 2029 against Wall 3.

Laboratory work

Plant macrofossils

A subsample of each sample was broken down in water, and the lighter, organic, fraction washed over to separate it from the inorganic material, and caught in a 500 μ m sieve. The washover was sorted in water under a x10 stereo microscope and the plant remains identified and checked with the writer's own reference collections. The results are listed in taxonomic order (Kent 1992) in Table 1.

Results

It was soon apparent that the dark colour of the material was due to coal and charcoal in it, rather than to organic content. The sample from F3038 had significant organic content and well preserved remains, while F2029 contained just coal, with some charcoal and bone fragments. The remains identified from 3038 are listed in Table 1.

Most of the remains were from annual weeds of open ground such as *Urtica urens* (annual nettle), *Chenopodium* (fat hen etc), *Atriplex* (orache) and *Stellaria* (chickweed). More permanent weeds were also abundant, such as *Urtica dioica* (common nettle), *Rumex* (docks), *Conium maculatum* (hemlock), while *Sambucus nigra* (elder) is a further sign of enriched ground or wasteland. Weeds generally produce vast numbers of seeds, and so they tend to show up wherever they are present. Other signs of an overgrown place are provided by *Rubus* sp. (bramble) and *Solanum dulcamara* (bittersweet). These plants, because of their very abundant seed production, should perhaps be regarded as having been present in the surroundings rather than dominating them. Unpublished work on the contents of a garden pond showed how the weeds there showed up strongly although they were not very abundant as plants.

A few plants of damp places such as the *Persicaria* (persicaria) and a *Carex* (sedge) are the only sign of wet conditions, but a place used for watering animals might not grow as large selection of water plants as an undisturbed pond would.

The plants that are not weeds are more interesting. There is a record of *Malva* (mallow), a plant of long grassland and waysides, and two cultivated plants, *Cannabis sativa* (hemp) and *Ficus carica* (fig). The first is a crop plant, used for fibre, and not unexpected in such a site, and the second a food which was widely eaten.

Acknowledgements

Thanks to Steve Litherland for the samples and information about the site.

References

Kent, D.H. (1992) List of vascular plants of the British Isles. Botanical Society of the British Isles, London.

Table 1 Plant list, names and order according to Kent (1992); += present, ++ abundant

sample:	3038	
Cannabis sativa L.	1	hemp
Ficus carica L.	1	fig
<i>Urtica dioica</i> L.	64	common nettle
Urtica urens L.	1	small nettle
Chenopodium album L.	1	fat hen
Atriplex sp.	1	orache
Stellaria media (L.) Villars	1	chickweed
Rumex acetosella L.	1	sheep's sorrel
Rumex sp.	8	dock
Malva sp.	1	mallow
Rubus sect.		
Glandulosus Wimmer & Grab	1	bramble
Potentilla erecta L. (Räusch)	1	tormentil
Conium maculatum L.	1	hemlock
Solanum dulcamara L.	1	bittersweet
Sambucus nigra L.	7	elder
Lapsana communis L.	1	nipplewort
Carex subg Vignea	1	sedge
Carex subg Carex	1	sedge
Poaceae	2	grasses
other remains		
moss	+	
coal	++	
wood	++	
beetle remains	+	
fly puparia	+	

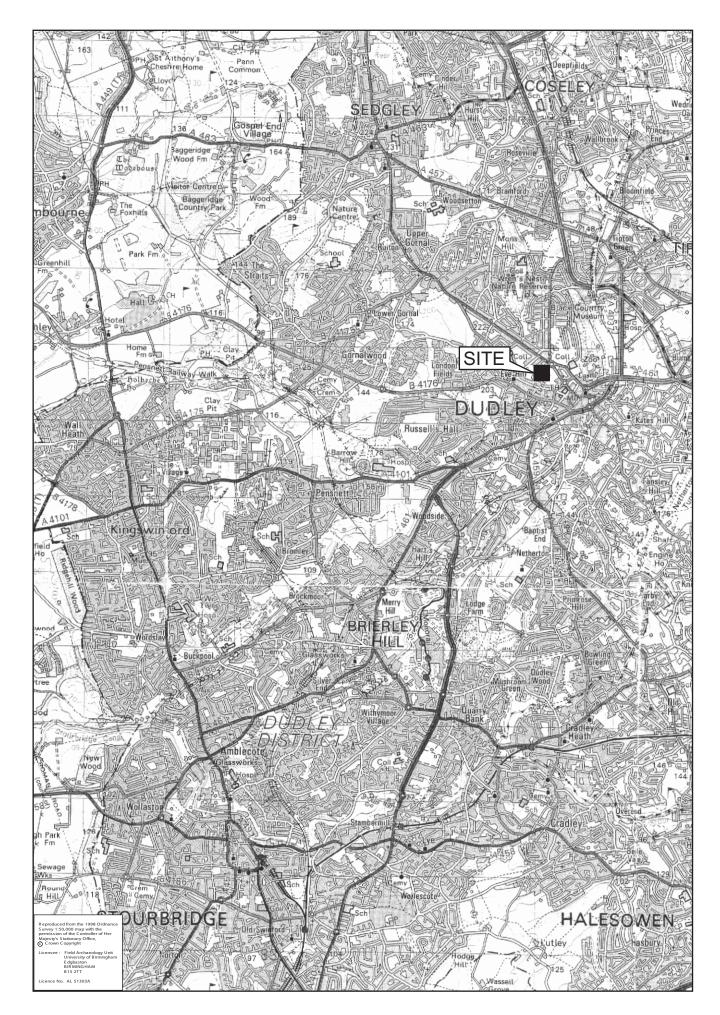


Fig.1

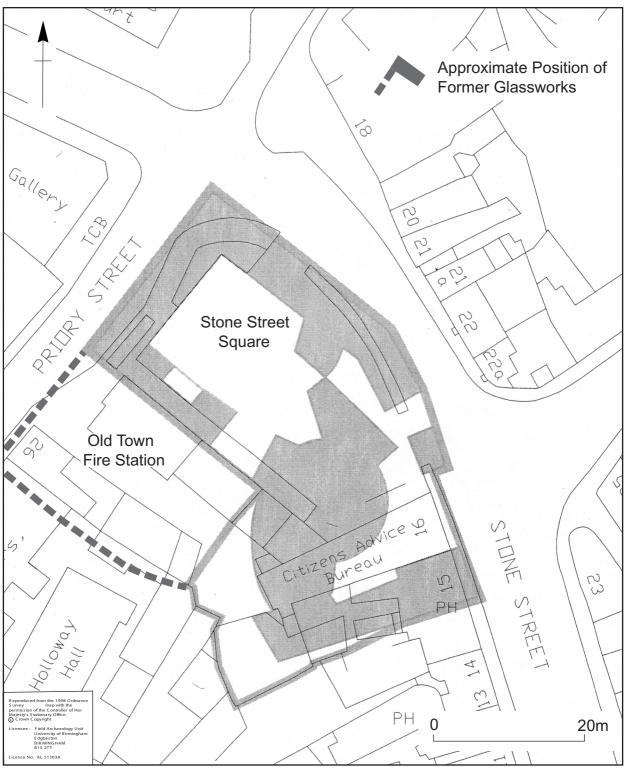


Fig.2

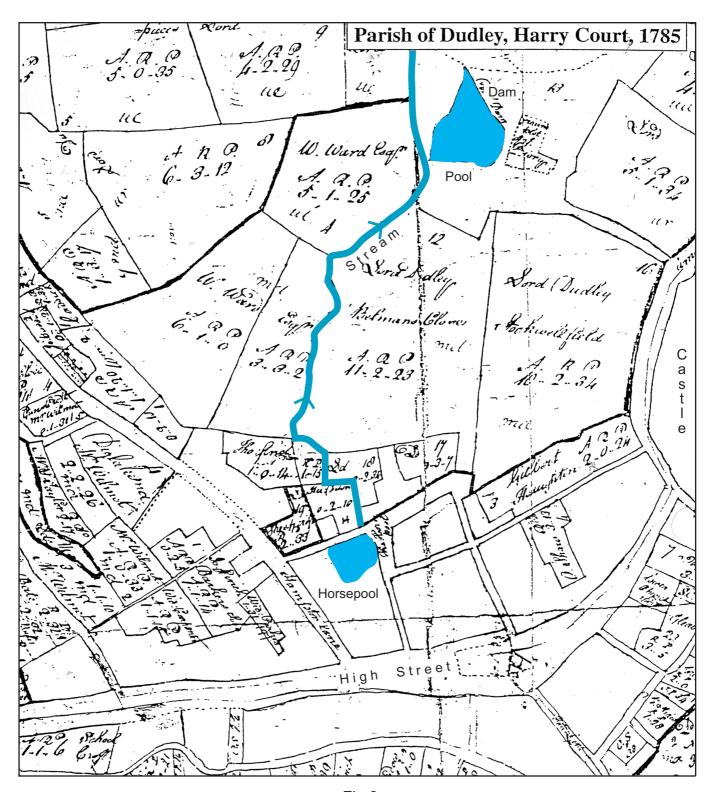


Fig.3

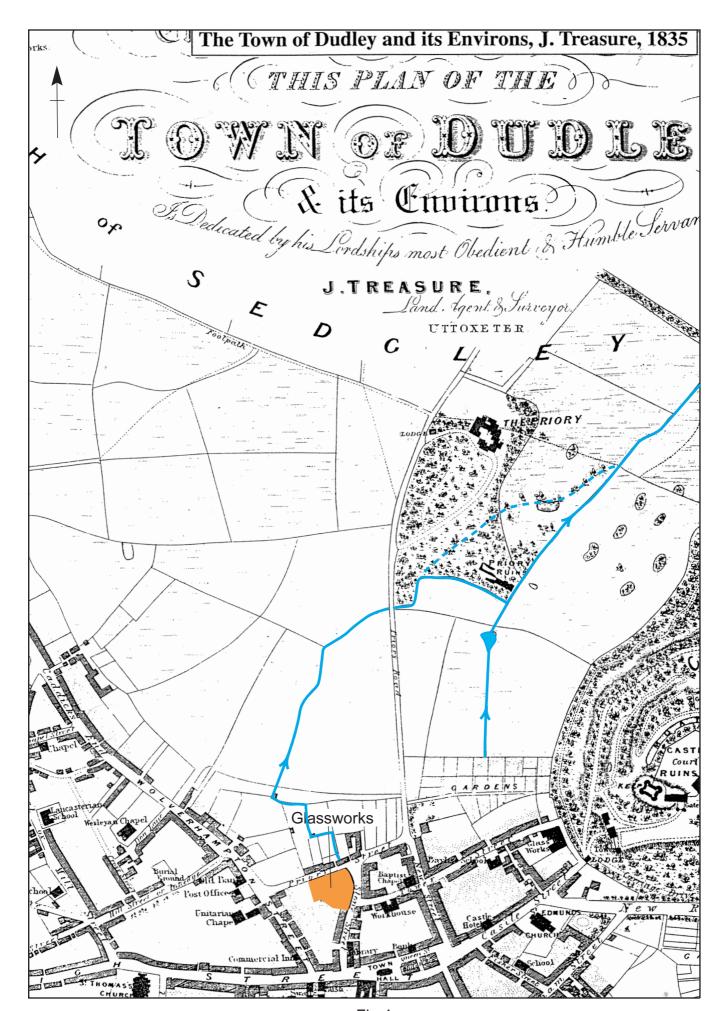


Fig.4

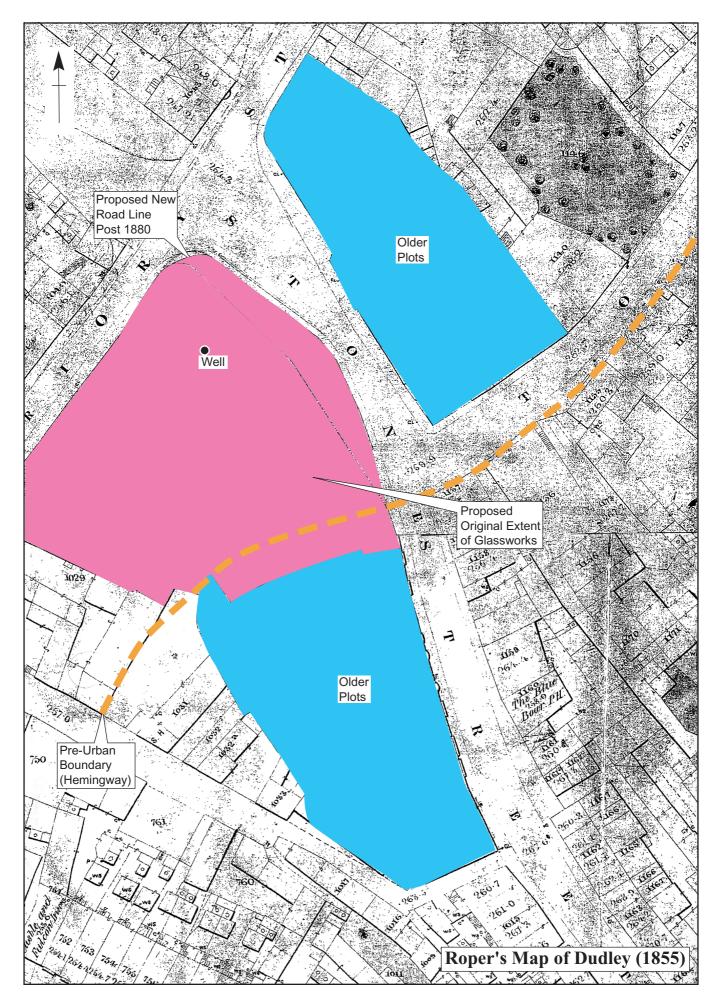


Fig.5

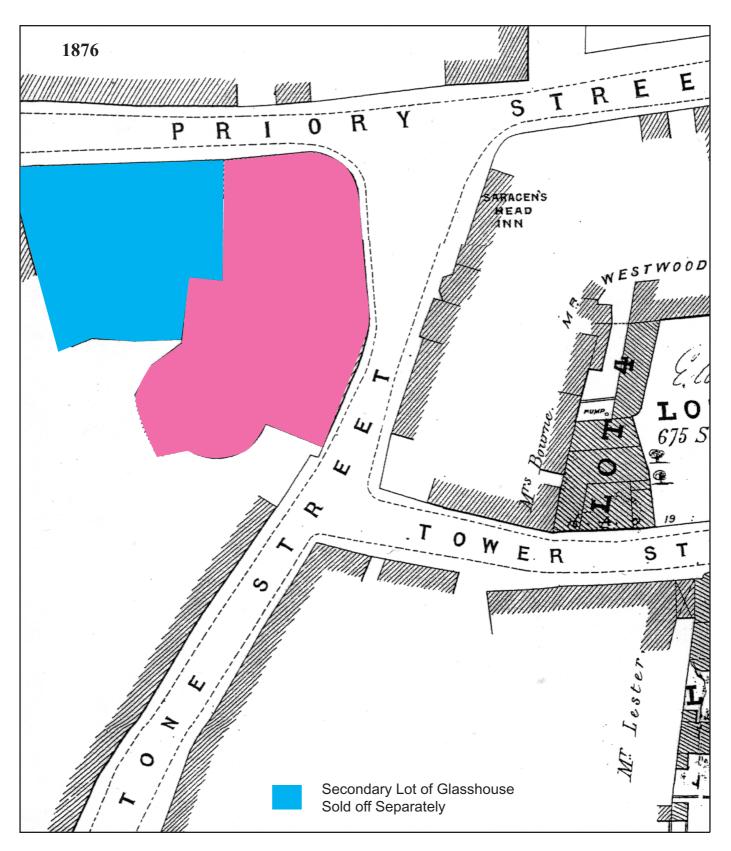


Fig.6

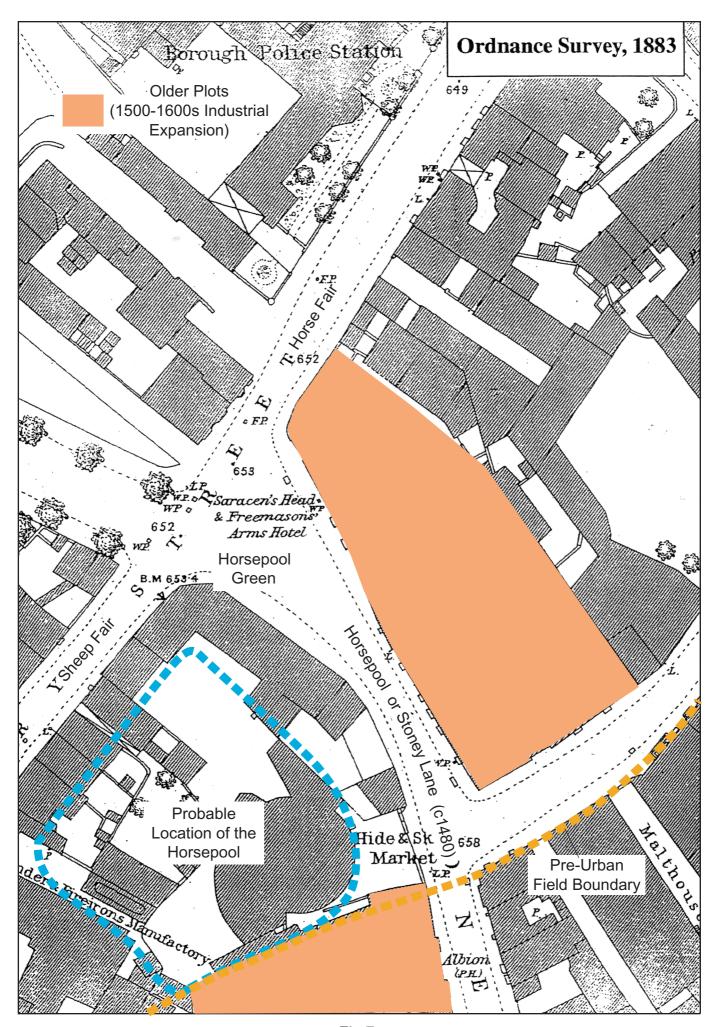


Fig.7

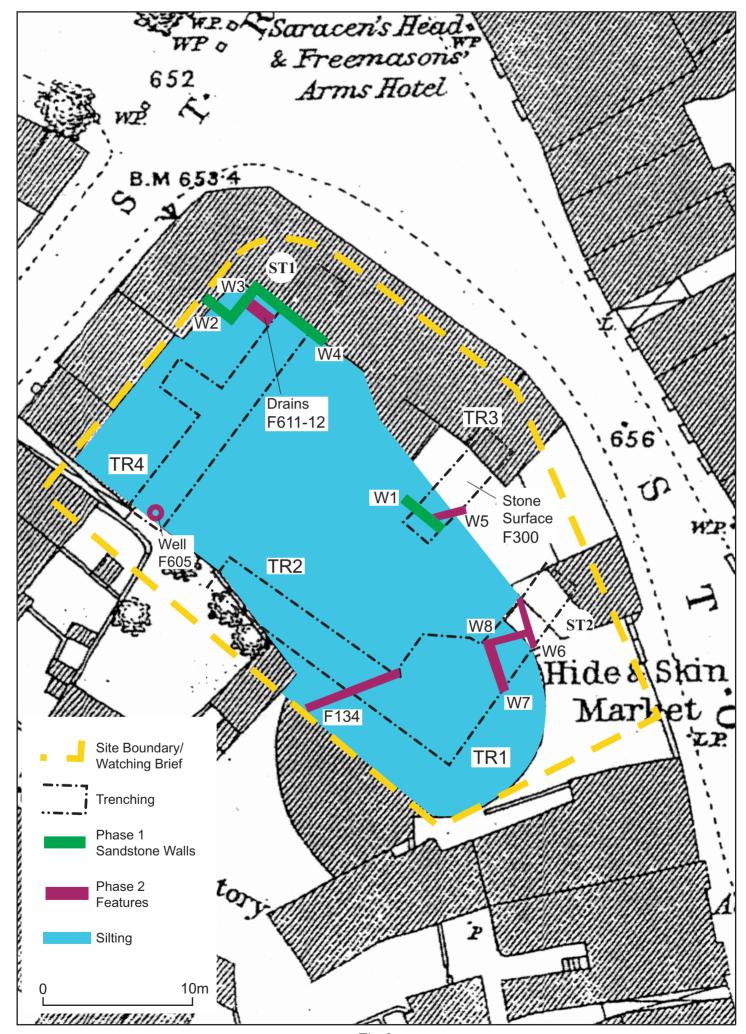


Fig.8

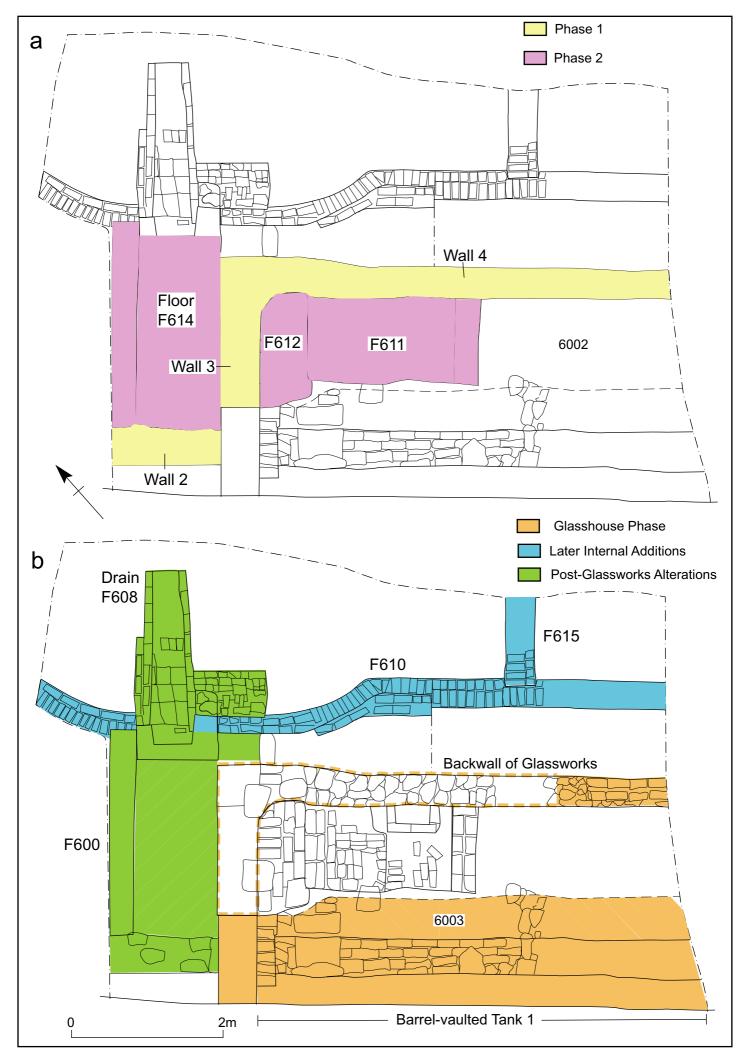


Fig.9

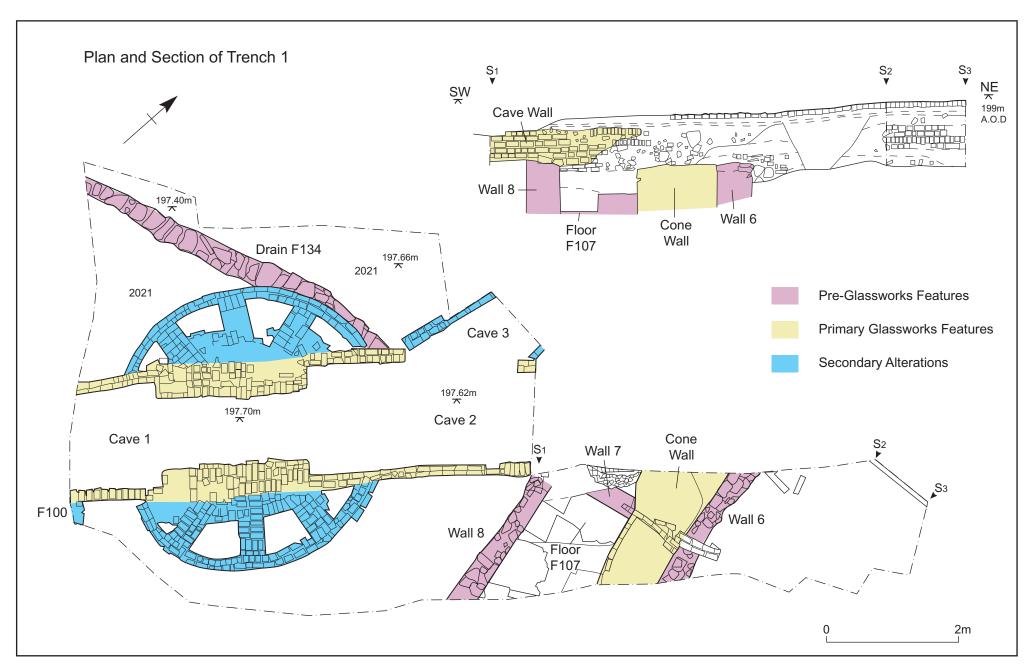


Fig.10

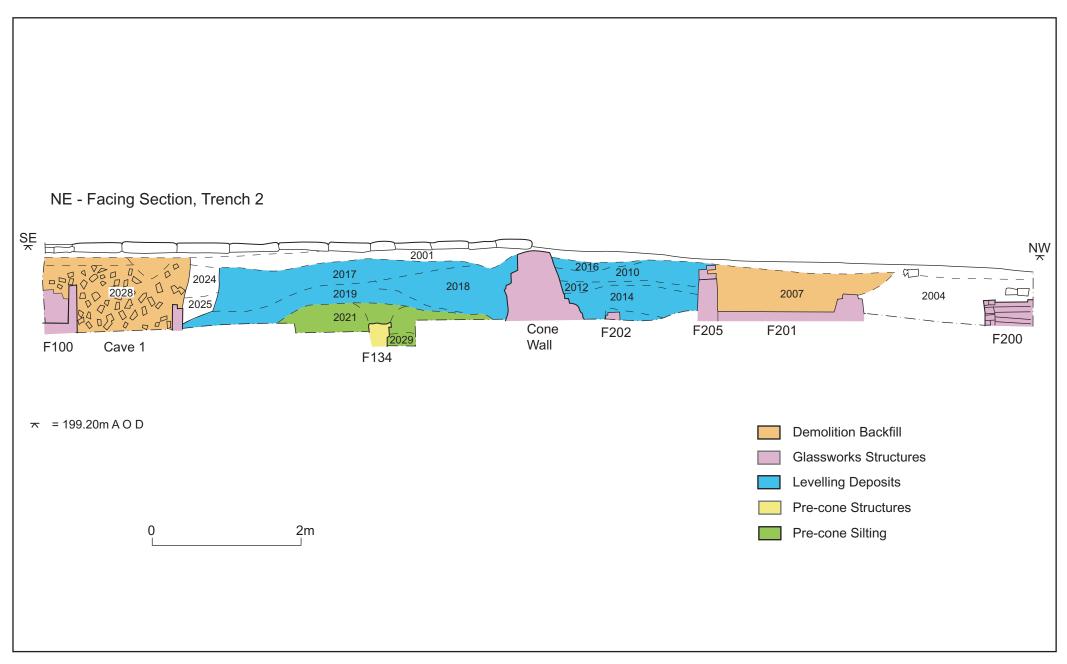


Fig.11

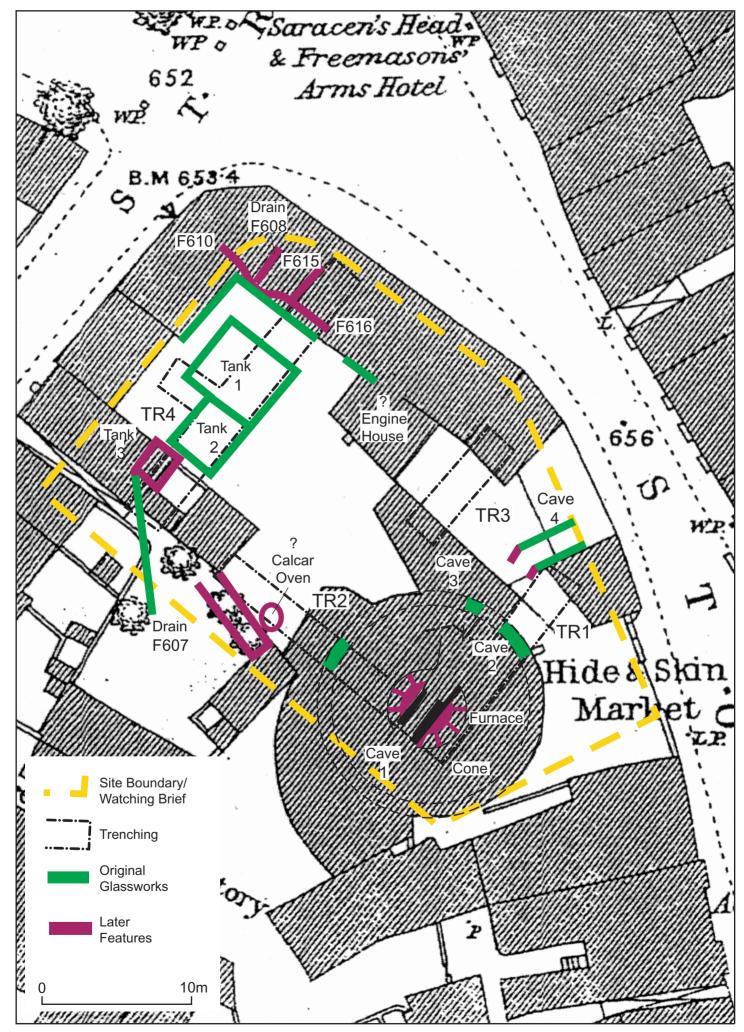


Fig.12

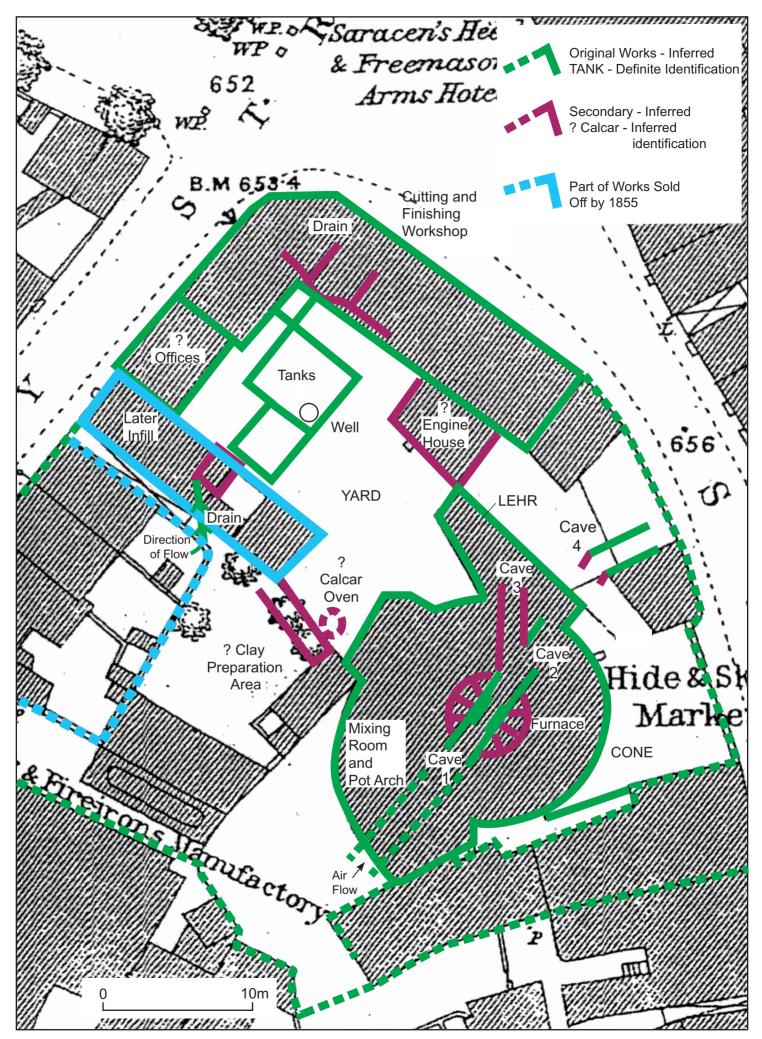
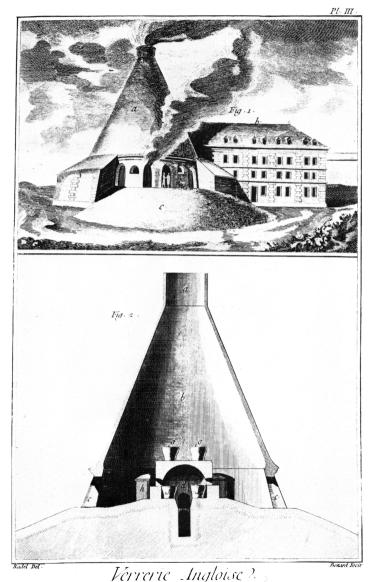
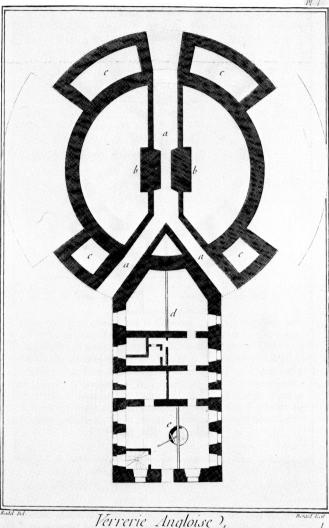


Fig.13



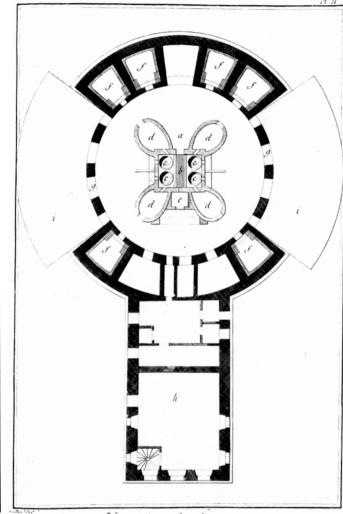
VOTTOTIC -IMJUNICA - 5 - Tue extérieure de la Vérrerie , et Coupe sur la lappeur .

Exterior view and section of a 'verrerie Angloise' – an English-style cone glasshouse – from Diderot and D'Alembert's encyclopaedia. a, b = interior 'chimney' of cone building; f = crucibles on sieges; g = crucibles drying off on roof of furnace; h = annealing arches.



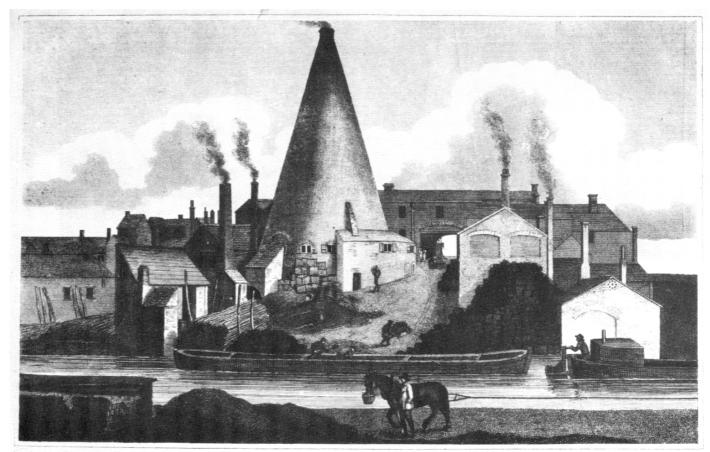
Plan des Fondations d'une Halk avec son Four et le Baliment de service .

Plan of the foundations of an English cone glasshouse, showing the three large flues (a) which feed air from the outside to the central coal-fired furnace. (b) indicates the siege foundations, and (c) the annealing furnace foundations. From Diderot and D'Alembert's encyclopaedia.

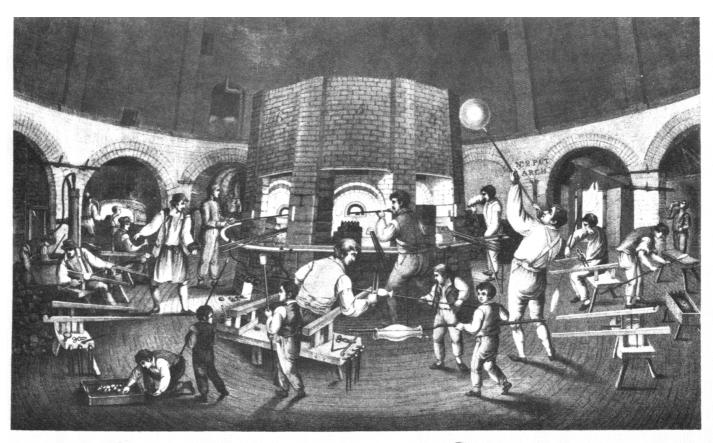


Plan du premier étage d'une Halle avec son Teur et le Batiment de service

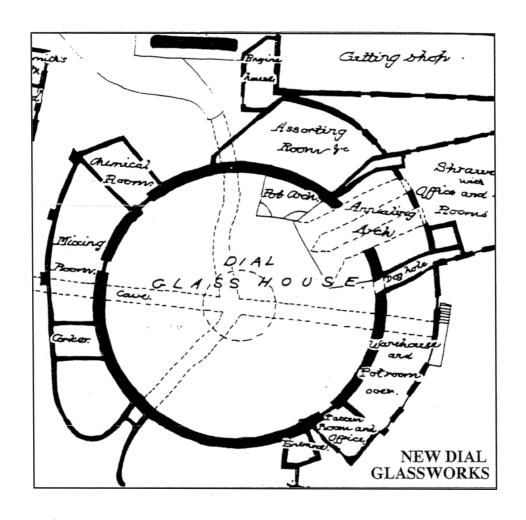
Plan of the ground floor of an English cone glasshouse showing the central four-pot furnace with an iron grill (b) for burning coal fuel between the sieges. (c) indicates the crucibles, and (d) the pot-arches. Four wing furnaces were used for firing pots before they were placed in the main furnace, and a small fritting oven (e) is also attached to the main furnace. Six annealing furnaces (f) flank the walls of the cone. Also visible are the linnet holes for conducting heat from the main to the wing furnaces. From Diderot and D'Alembert's encyclopaedia.

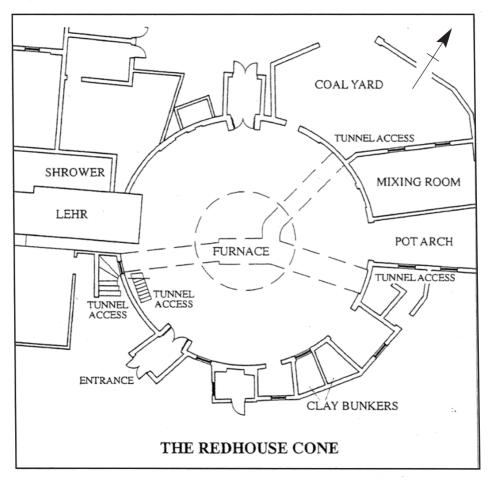


Tiens of Aston Flint Blass Works belonging to B. W. Bibling, Diemingham



Carerier View of Aston Flint Glass Horks belonging to Co. H. Biblins, Girmingham.





Comparative Ground Plans of the Red House and New Dial Glasshouses.

Fig.16

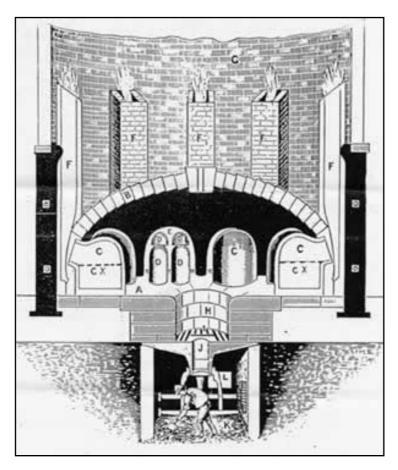
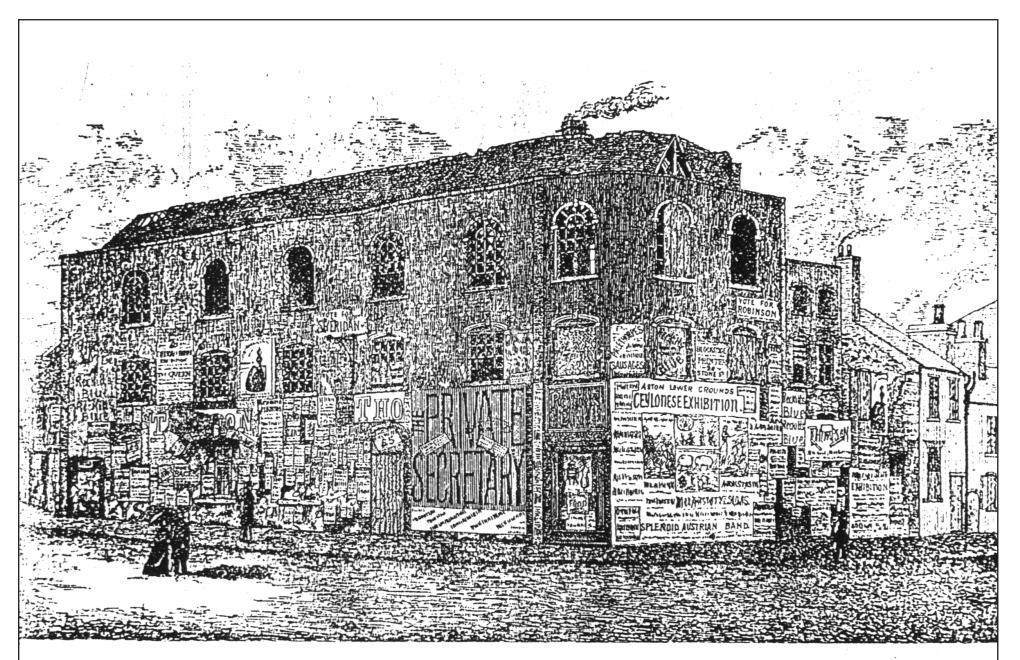


Fig.17



THE OLD GLASSHOUSE, STONE STREET, DUDLEY.

Purchased by the Corporation; and pulled down in 1886.

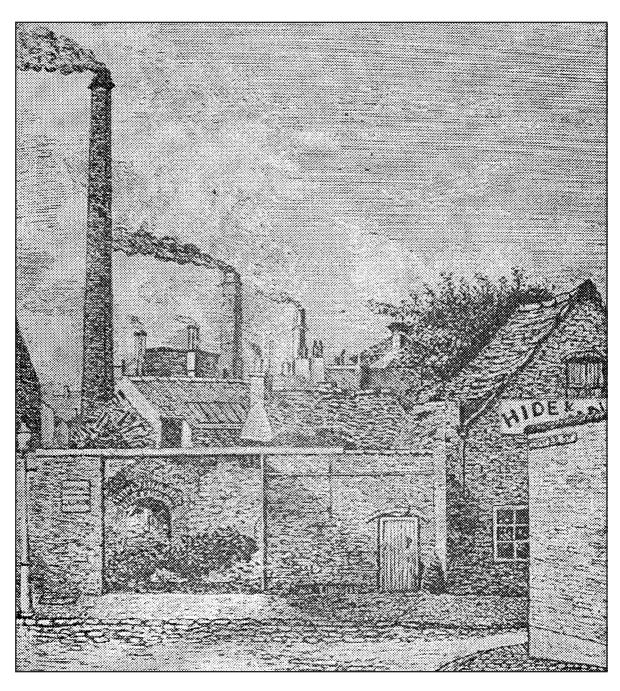


Fig.19

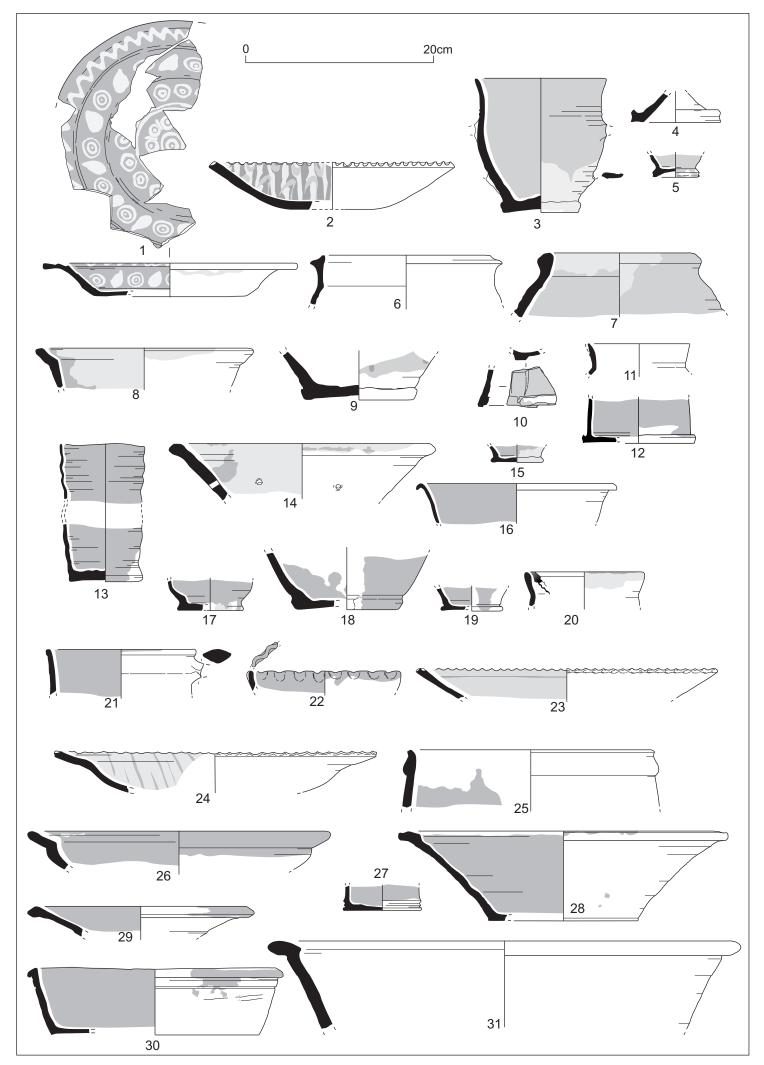


Fig.20



Plate 1



Plate 3



Plate 2



Plate 4





Plate 6







Plate 7 Plate 8



Plate 9 Plate 10





Plate 11



Plate 12

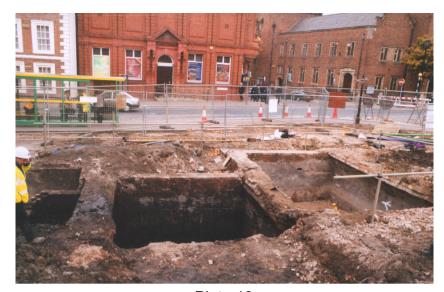


Plate 13



Plate 15



Plate 14



Plate 16