



**ARCHAEOLOGICAL INVESTIGATIONS AT
MEXBOROUGH, SOUTH YORKSHIRE**

ASSESSMENT REPORT

Report Number 2011/39 October 2011



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Non-technical Summary

ArcHeritage were commissioned by Lidl UK GmbH to undertake an archaeological evaluation of the site of the former New Don Glass Works, Mexborough. Four evaluation trenches were excavated, followed by a further contingency trench and a 'strip and record' area to mitigate against the effect of development around the vicinity of Trench 1. The results comprised substantial structural remains pertaining to flue structures in the northeast area of the site, as well as substantial sandstone foundations in the southern area of the site.

Key Project Information

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1 INTRODUCTION

This document summarises the archaeological results of five evaluation trenches excavated in two stages at the former New Don Glassworks, Mexborough. The first three evaluation trenches were excavated between 21.02.11 and 02.03.11, with the excavation of the final evaluation trenches following between 26.04.11 and 20.04.11. This second stage of archaeological investigations also included a 'strip and record' area extending around the location of Trench 1 to mitigate the impact of a sewer main diversion, this 'strip and record' intervention has been denoted Trench 6. The two-stage approach was taken due to original constraints regarding access requirements to a working building immediately adjacent to Trench 4. The aim of this report is to summarize the results of the first phase of the evaluation and discuss the results in conjunction with the results of the second phase of evaluation and the strip and record.

2 LOCATION, GEOLOGY & TOPOGRAPHY

The proposal area contains the site of the former New Don Glassworks. The area (centred on NGR SK 49695 99760) is bounded to the north by Greens Way (A6023), to the south by the Sheffield and South Yorkshire Navigation Canal, to the east by Cliff Street and to the west by Swinton Road (A6022). The location of the site is approximately 8km north-east of Rotherham, 11km south-west of Doncaster and 0.2km south of Mexborough town centre. The geology of the site is Upper Carboniferous Middle Coal Measures with areas of alluvium (Opus/Jones Pike 2010; May 2004). The site is situated at the base of the lower Don Valley, and is overlooked by the raised terrain of Mexborough town centre to the north-east.

3 METHODOLOGY

Preliminary mechanical excavation was undertaken with a wheeled 360° hydraulic excavator. A pneumatic breaker was mounted onto the excavator to break up the reinforced concrete pad overlying the locations of Trenches 1 and 4. All subsequent groundworks were undertaken with the use of a toothless ditching bucket, except in circumstances where the impacted nature of made ground deposits made such a strategy untenable. This was the case in the south end of Trench 4, where a narrow toothed bucket was used to assess the nature and extent of the mixed slag and clinker deposits. In addition, subsequent mechanical excavation was required to remove rubble deposits between fragile fire-brick structures within Trench 6. This was undertaken with a tracked mini-digger fitted with a small toothless bucket.

The excavations were undertaken in accordance with the methodology stipulated in the Written Scheme of Investigation (WSI) for the evaluation and subsequent WSI for excavation associated with the sewer diversion (Appendix 8). These WSIs were prepared in compliance with a brief issued by the South Yorkshire Archaeology Service (SYAS) and in accordance with the principles of the Institute for Archaeology (IfA) Code of Conduct and all relevant standards and guidance. Archaeological structures, deposits and features were recorded in plan at a scale of 1:50, and related sections and profiles were drawn at a scale of 1:20. All contexts were described using pro-forma context sheets, following the procedures laid down in the York Archaeological Trust's fieldwork manual (2009). The photographic record comprised 35mm

colour slide and monochrome film, accompanied by a digital photographic archive. The artefacts and site records are currently stored by ArcHeritage under Project 5445.

4 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

The ArcHeritage desk based assessment (DBA) of the site should be consulted for a more detailed outline of the known historical and archaeological information about the site (ArcHeritage 2010). The primary archaeological interest of the site is the remains pertaining to the New Don Glassworks which occupied much of the eastern part of the site between 1891 and 1955. Documentary evidence indicates that the glass works utilised gas-powered regenerative tank furnaces, the first use of such a technology at a glass furnace in Yorkshire. Cartographic evidence indicates that the proposal area was undeveloped until 1855 when back-to-back terraced houses were constructed on the northern edge of the site, and that by 1874 there was a boatyard with further housing on the west half of the site.

Geotechnical investigations undertaken in February 2006 and March/July 2010 indicated an absence of topsoil and bedrock in any of the 21 window samples excavated. The relevant archaeological deposits encountered during the investigations consisted of ash, clinker, slag, brick and sandstone fragments, ceramic drainpipe, metal pipe and glass. Given the use of gas-powered tank furnaces at the New Don Glass Works, the majority of these finds need not be associated with past industrial practices within the site and instead are likely to have been imported with the dumping material that was used to level the site.

The first phase of evaluation established that well-preserved structures and deposits related to the New Don Glassworks.

5 RESULTS

A total of six trenches were excavated over the course of the evaluation phase of archaeological investigations. They will be discussed in numerical order. The results of Trenches 1-3 (Phase 1 of the evaluation) have also been summarised in a previous interim report (ArcHeritage 2011).

5.1 Trench 1

Trench 1 was located in the northern part of the site approximately 15m from the northern boundary fence to target a group of buildings shown on historic maps (ArcHeritage 2010, site 5). Complex, well-preserved remains of industrial structures were discovered in Trench 1 with at least two phases of yards and buildings including flues constructed from fire brick which are probably related to the furnaces of the New Don Glass Works (Figure 2). Approximately 2m of the trench was not investigated due to the presence of asbestos. In total 25 contexts were recorded in Trench 1. Present ground level was approximately 16.05m above Ordnance Datum (OD) (concrete yard surface).

Two parallel brick flues and two possible outbuildings and yard areas were identified. The flues, which were discovered at the western end of Trench 1 (Figure 7), running east-west along the southern edge of the trench, were typical of the Siemens-type regenerator furnaces (developed in 1857) which were widely adopted in glassmaking from the 1860s (Miller 2007, 28; Willmott 2005, 146). The large quantities of voussoir fire bricks found within the flues

indicate that the flues had vaulted roofs which had been truncated just above the top of the vertical internal side walls. The uppermost part of the northern flue was encountered at 15.88m OD (170mm below present ground level [BPGL]) and parts of the structure had been truncated to a depth of 15.47m OD (580mm BPGL). The internal brick faces within the northernmost flue had been almost entirely heat degraded, those within the southern furnace were heavily encrusted with a green glass-like residue but there were no visible signs of heat degradation. These observations may be significant clues as to the function of the flues.

In the middle of Trench 1 the remains of a small building divided into two rooms was discovered at a depth of 15.92m OD (130mm BPGL). There was no evidence to indicate what function the building had or its relationship to the furnace structures, but it is likely that they formed part of a series of outbuildings. The walls of the building had been built directly on top of a decorative brick floor or yard surface (1004) at a depth of at 15.64m OD (410mm BPGL). The north side of the brick floor had been disturbed. To the east of the brick structures there were two surfaces made from mixed compacted industrial process residues such as clinker and slag (Figure 7). The upper yard surface (1016) was found at 15.77m OD (280mm BPGL), the lower, and therefore earlier yard surface (1017) was identified at 14.65m OD (400mm BPGL). Both of the surfaces abutted the east side of the outbuildings and were probably related to the use of this area as a yard.

5.2 Trench 2

Trench 2 was located centrally at the south of the proposal area near to the northern edge of the canal. The present ground level was 16.02m OD.

Traces of part of a small brick structure were observed in Trench 2 during machining (Figure 3), but the structure could not be recorded due to the rapid ingress of water upon reaching a depth of approximately 15.21m OD (810mm BPGL). A deposit of mid-red-brown sandy silt (2001) was identified at a depth of 15.22m OD (800mm BPGL) aligned north/south running through the trench, covering an area 1.4m x 2m and flanked on its east and west sides by a brick and stone block edging (Figure 7). A number of pottery wasters were recovered from the deposit, which are likely to be related to canal side-paths or yards. The majority of the rest of the trench had to be backfilled due to the rapid ingress of water and deteriorating conditions. The uppermost excavated layer was a homogenous deposit which contained modern plastics, metals and other debris which indicates that the area had been disturbed in recent decades down to a depth of 500mm BPGL. As a result of the limited amount of information obtained from this trench due to poor conditions, a contingency trench (Section 5.5) was included in the next phase of the evaluation.

5.3 Trench 3

Trench 3 was located in the western part of the proposal area, in a yard currently used by Peplow Concrete Products, to target the 19th century buildings and a pond shown on historic maps. The present ground level was 16.76m OD.

The earliest deposits in Trench 3 consisted of dumped industrial process residues within which there was a quantity of pottery wasters. This material seemed to form a consistent layer below 15.51m OD (1.25m BPGL) throughout the trench. It was initially interpreted as the backfill of a pond which is depicted on the 1839 Mexborough Township map. The pottery

wasters are likely to have been originally manufactured at the nearby Mexborough Old Pottery (1795-1844) (ArcHeritage 2010, site 6)

These deposits were overlain by several layers of compacted clay, interpreted as a levelling deposit probably laid down during the construction of terraced houses in the later 19th century (Figure 7). Parts of the foundation walls and drains related to these 19th-century terraced houses were cut into the lower clay deposits (Figure 4). Wall foundations were located at 16.06m (0.7m BPGL) OD and drains at 1m BPGL (15.76m OD).

5.4 Trench 4

Trench 4 was located towards the eastern edge of the proposal area, and orientated north/south. The archaeology exposed in the north half of the trench comprised a substantial wall (4003) constructed from rounded sandstone blocks (Figure 5). Although the wall was substantial in width, measuring 0.3m across, excavation showed that only two courses remained *in situ*. The west face of this wall was directly abutted by a red brick wall (4004). This pair of structures were truncated to the south by the later insertion of a concrete block (4005) and to the north by the insertion of a second concrete block (4002). The insertion of the latter block also disrupted the relationship between (4003) and a similar sandstone wall of corresponding alignment (4001). Although the direct physical relationship between (4001) and (4003) has been lost, a continuity between the two sandstone structures may be conjectured due to the presence of a single row of sandstone blocks on an east/west alignment (4006). This structure was found at a comparable depth to the base of walls (4002) and (4003), and would have abutted the walls in the region which has been truncated by the insertion of concrete block (4002). This suggests that the insertion of concrete blocks (4002) and (4005) related to a phase of rebuilding which strengthened the external walls of the building and made the use of load bearing sub-divisions redundant.

In addition to the red brick structure (4004), a second red brick structure (4008) was observed in the east-facing section (Plate 1). Although any direct physical relationship between the two structures would have been truncated by the insertion of concrete block (4005), the shared alignment and similar construction materials would suggest a contemporary relationship. The red brick wall was surmounted by a single sandstone block (4007) with a chamfered edge, which again shared an alignment with red brick wall (4004).

The sandstone block had been neatly dressed and bonded to the underlying red brick wall (4008), which suggests the interpretation that it functioned as a threshold for a doorway. The south end of wall (4008) appeared to have been deliberately truncated. This is consistent with the change in the stratigraphy of the trench in general: from this point to the southern end of the trench the structures are no longer present, and the whole southern half of the trench has been backfilled with compacted slag and other industrial process residues. A mechanical excavator was used to excavate through the slag deposits, which were found to continue down to a depth of 1.5m BPGL before ingress of ground water made further excavation impractical.



Plate 1: Threshold 4007 on top of wall 4008 in east-facing section. 1m scale

5.5 Trench 5

Trench 5 was located near the southern edge of the proposal area, and orientated north/south. The trench was situated in line with the west end of Trench 2 in the hope of providing better conditions for excavation than the preceding adjacent trench. The trench measured 12m in length, and revealed a number of interesting brick and sandstone structures which are interpreted as relating to the square building in the southwest sector of the New Don Glass Works as depicted on the 1903 Ordnance Survey map (Figure 8).

Mechanical excavation removed approximately 0.3m of overburden, suggesting that the structures exposed in Trench 5 had been truncated by demolition and subsequently levelled over with made ground to prepare for the next phase of use. Upon completion of cleaning the presence of a series of inter-related brick and sandstone structures became apparent (Figure 6). The main red brick structures comprised curvilinear walls (5006), (5007) and (5010). Both (5006) and (5007) were parallel to each other, orientated approximately north/south with a slight curve to the west at their north ends. The south ends of these walls were linked by red brick wall (5008). Wall (5010) lay to the west of (5007), and was curvilinear in plan. A direct relationship between (5010) and (5007) was not established, but the spatial arrangement of this set of red brick walls is would strongly suggest the interpretation that they formed part of a flue system contained within the square building depicted on the 1903 Ordnance Survey map (Figure 8). The nature of the backfill context (5005) similarly suggests that the space between the structures was backfilled for structural purposes prior to levelling up for the next phase of site use.

The south end of Trench 5 was notable for the presence of substantial sandstone walls (5013)/(5014) in conjunction with *in situ* heat-affected deposits (5015)/(5016). The presence

of these types of structures and deposits in close proximity is interpreted as evidence for the structural remains of either a kiln or boiler base of some kind. The substantial width of the sandstone walls would suggest a load bearing function, and the discolouration of the *in situ* adjacent deposits and the sandstone structures is suggestive of repeated heating (Plate 2). This set of structures and deposits was neatly demarcated to the north by red brick structure (5012), which was heavily coated in a metallic residue. It is possible that (5012) represents either an internal subdivision within the square building pertaining to the New Don Glass Works, or is the main external wall.



Plate 2: Sandstone walls 5014 and 5013, south end of Trench 5. Viewed facing north, 1m scales.

Although the *in situ* heat affection of deposit (5015) can be explained by close proximity to a heat source such as a boiler or furnace (Plate 3), the abundance of kiln furniture and 'biscuit' wares recovered from excavation of the context cannot be explained by the same mechanism. The location of Trench 5 was too far to the west to have found *in situ* structures relating directly to the Mexborough Old Pottery, but the presence of such comparatively large quantities of part-fired ceramics does raise some interesting taphonomic issues for the results of this trench, and the site as a whole. The Mexborough Old Pottery ceased production in 1844 (ArcHeritage 2010), and construction of the adjacent New Don Glass Works did not begin until 1891. The presence of the pottery waste in deposit (5015) suggests that the deposit was deliberately transported from the adjacent site to fulfil a particular function. It may simply be the case that construction of the wagon wheel works over the former Mexborough Old Pottery generated large amounts of waste that had to be removed, in conjunction with a need on behalf of the New Don Glass Works to level up their ground level to mitigate against the problem of rising ground water. Regardless of the taphonomic pathway, it is important to note

that the best available sample of ceramic from one of the short-lived and elusive potteries of the Lower Don Valley may be obtained from careful excavation of the adjacent site.



Plate 3: East-facing section through deposit 5015. View faces west, 1m scale.

A contemporary document makes reference to the primary structures that comprised the New Don Glass Works (DX/HATT/1/42), listing the structures as glass furnaces, a Bottle House, a yard, a smithy and a fitters' shop. If the distinctive colouration of the deposits at the south end of Trench 5 is indeed due to *in situ* heating, it is appropriate to interpret the structures as remains of a smithy. The heat sources in such a structure would potentially have been more localised than those relating to the flues in Trench 6, where the discolouration of deposits was much more extensive.

5.6 Trench 6

Trench 6 was located to expand upon the results from Trench 1, in order to mitigate against the impact of forthcoming development. The trench was located along the northern site boundary, and orientated east/west. The final excavated extent was 43.5m x 10.5m.

Initial mechanical excavation required use of a machine-mounted breaker to remove the reinforced concrete raft which covered the entire mitigation area. Following this procedure, mechanical excavation removed a relatively limited depth of localised demolition rubble to expose the underlying brick structures and associated deposits (Figure 2).

The structures exposed at the western edge of the trench are interpreted as exterior features relating to the row of domestic housing which bordered the west end of the site. These structures consisted of a series of red brick yard surfaces, (6032) and (6004), bordered to the east by red brick wall (6023). As this is the original boundary wall of the terraced housing block, it represents the division between developed domestic housing and the as-yet unused

land which was to become the site of industrial activity over the course of the next century. The north end of the boundary wall was possibly truncated as a result of construction beginning on the adjacent site, and re-built with an addition of a short section of red brick wall (6022). The structure (6033) at the northwest corner of the trench consisted of an irregular alignment of red bricks. The bricks were placed end-on at an angle of approximately 60°, on an east/west alignment which delineated a rectangular space at the north edge of the terraced housing plot. The rectangular space was filled with deposit (6034), a mid-grey silt. This feature was interpreted as a garden bed pertaining to the domestic housing.

5.6.1 *Phases of construction*

Cartographic evidence of the footprint for the New Don Glass Works is limited to a single phase of the Ordnance Survey published in 1903 (Figure 8); the preceding map, although published in 1892, was evidently surveyed prior to the construction of the Glass Works. The archaeological strip and record was able to identify several phases of construction and re-building of the northwest structure of the New Don Glass Works. These phases are primarily related to the replacement of red brick structures with a more open-plan system of concrete bases, which were presumably inserted to support a system of columns. Perhaps the clearest demonstration of this development is the north wall of the building, (6056), which was the original north wall of the Glass Works building which formed the boundary between the works and the empty space which became Foundry Lane. The 3-course width of this wall suggests it supported a structure at least two stories in height. Extensive second-phase re-modelling of this structure is suggested by the insertion of a series of concrete pads (6035) along the line of wall (6056). The distribution of these concrete pads is not continuous along the entire length of the wall, but several gaps in the structure imply that some of the pads were completely removed during final stages of demolition in the 1950s. The total excavated length of the main north wall was 19.5m, and the southern end of the wall gave way to an extensive concrete pad, which was probably representative of the later concrete hard-standing which was typical of many 20th century industrial areas. The occurrence of the concrete pad would seem to coincide with the return of the main north wall to the north as depicted on the 1903 OS map. This suggests that the concrete pad may originally have been inserted as a floor surface within the building while it was still in use, and became incorporated as a foundation of a more extensive concrete yard which was instated following the demolition of the Glass Works structures.

5.6.2 *Flue systems*

The flue structures excavated at the west end of the Glass Works building comprised a series of parallel east/west walls. The majority of these were constructed from yellow refractory brick, also known as fire brick, which has the advantage of a higher capacity for resistance to thermal damage caused by the cumulative effect of repeated heating. The main disadvantage of this material is that it tends to have a lower strength in compression than red brick. From north to south, the brick flue structures were ascribed context numbers (6044), (6045), (6046) and (6049) (Plate 4). The north elevation of (6044) was constructed from red brick, while the south elevation was constructed from fire brick. This approach would seem to be intended to maximise the effectiveness of the heat-resistant fire bricks by encasing them in a shell of red brick to provide structural support. This would presumably take some of the structural load off the fire brick structure, therefore increasing the working lifespan of the flue as a whole. The

angles of the remaining upper courses of fire brick on structures (6044) and (6045) would suggest that they originally formed the north and south walls of an east/west flue which was truncated during demolition. The top course of the south elevation of (6045) sloped down to the south, suggesting a similar relationship with (6046) to the south (Figure 7). The slight difference in spatial arrangement gives some caution to this interpretation, as flues are typically constructed to a standardised width.



Plate 4: Flue walls (top to bottom) 6049, 6048, 6046 and 6045. Viewed facing southeast, 1m scales.

As can be seen from the plan (Figure 2), the gap between (6045) and (6046) is 0.5m less than the gap between (6044) and (6045). The pattern of inter-flue relationship would suggest that (6048), the red brick counterpart to (6046), was put in place for reasons of structural support, but the evidence from excavation suggests this is unlikely as (6048) and (6046) do not actually touch each other. It is possible that they were connected at a higher level which was removed by subsequent truncation. The pattern of a red brick casing for a fire brick structure is continued with structure (6049), which comprised a north elevation of red brick and south elevation of fire brick. The structure was presumed to have a symmetrical counterpart to the south, beyond the limit of excavation.

Subsequent excavation between all of these structures, both by hand and with judicious use of a mini-digger, could not establish the presence of any kind of tangible evidence for floor surfaces, either within the flues or in the spaces between (6048) and (6049). This in itself is highly unusual. It cannot be assumed that the flues were constructed without a solid floor, and it seems equally unlikely that the floors of the flues were carefully removed during demolition without any significant damage being sustained to the flue walls. It is possible that the floor surfaces suffered more physical abrasion during the working life of the flues due to regular cleaning processes. This abrasion may then have been exacerbated due to the close proximity

of the water table, leading to a detrimental preservation environment. The internal faces of the flue walls were coated in a thin layer of vitreous slag residues, further evidence of prolonged exposure to high temperature gases (Plate 5).



Plate 5: West end of flue 6045, showing vitrified south elevation. Viewed facing northeast, 1m scales

The total length of the flue system was established as 8m, and the coherent butt-ends of the flue structures strongly suggests that this length was an accurate indication of the original linear extent as constructed. Unfortunately no direct evidence for any connected kiln structure was discovered during the excavation. This can be interpreted as evidence that the original kiln was superseded by an above-ground structure during the working life of the New Don Glass Works. The insertion of two concrete pads to the east of the flue system suggests that localised truncation of kilns connected to the flue system occurred before or during the final demolition of the works.

5.6.3 *Internal sub-divisions and ancillary structures*

The most significant internal sub-division excavated within Trench 6 was the only sub-structure to retain any evidence of an internal floor surface. The structure abutted the south face of the main north wall (6056), and comprised west wall (6051), south wall (6052) and east wall (6053). The floor surface was originally ascribed two context numbers, (6054) and (6055), to denote the division of the floor by wall (6053). Subsequent excavation established that (6053) was a later structure built over the top of (6054)/(6055). Considering the fact that (6052) continued beyond the extent of (6053), as did the associated floor surface (6055), it seems likely that truncation of this subdivision occurred during demolition or re-structuring. Some truncation of the floor surface occurred while the structure still served a useful function. This is demonstrated by the re-construction of wall (6053) after the floor surface had been truncated by the insertion of a drainpipe underneath the floor. Excavation within this area

could not establish a feed into this drain, but it seems likely that the insertion of the drain was an attempt to mitigate against the problems caused by encroaching ground water levels.

The main series of structures within the rest of the trench comprised an arrangement of linear structures constructed from a variety of materials; the lower footings were generally sub-roundered large sandstone blocks, with occasional re-used refractory bricks with a vitreous coating. The use of re-used building materials was a recurrent feature of many of the structures in the east end of Trench 6, and reflects the reconstruction and re-modelling of the structures east end in later phases of the use of the Glass Works. The upper remaining courses were constructed from red brick of varying quality. These structures were orientated east/west, and located on similar alignments to the older flues to the west. It is possible, therefore, that these structures (6068), (6062) and (6065) represent the remains of foundation supports for tank furnaces. This interpretation must however remain tentative due to the fragmented nature of the surviving structural evidence, which was considerably truncated by insertion of later concrete blocks and also by demolition.

Structure (6073) was directly to the east of the structures discussed above, on an alignment between that of (6062) and (6065). The structure was rectangular in plan, and measured 2.4m by 1.2m (Plate 6). While this structure was one of the best-preserved red brick structures excavated in Trench 6, its function still remains unclear.



Plate 6: Structure 6073. Viewed facing east, 1m scales

Although (6073) had two separate courses of arched brickwork connecting the main north and south walls, any direct connection with the flue structures to the west seems unlikely due to the choice of construction materials. Red brick was simply not as effective at withstanding high temperatures, and was therefore not the ideal choice for flue-related structures. However, the sooty residue found on much of the internal surfaces of (6073) suggests the structure was

related to the production of gas which would have been used to provide a heat source for melting glass. This process involved heating coal to evolve a gas which tended to burn with a sooty yellow flame, and was a common solution in areas distant from larger gas works. In the case of the New Don Glass Works the proximity of the site to the canal and railway would have provided access to a plentiful supply of coal for the purposes of on-site gas production. Much of the structures relating to gas production would have been located above ground to allow for ease of access and maintenance, particularly the pipes connecting production areas to storage areas and subsequently to areas of consumption.

5.6.4 External structures

Excavations towards the east end of Trench 6 were unable to determine the precise location of the original east wall of the Glass Works building, although the succession from brick column bases (6070-2) and (6074-7) to sandstone sett surface (6079) suggests that the boundary between internal and external space lay at this point. The excavated extent of yard surface (6079) measured 10.5m north-south by a maximum of 5m wide east-west (Plate 7).



Plate 7: Yard 6079. Viewed facing north, 1m scales

The irregular edge of the surface suggests that considerable truncation of this structure occurred during renovations or demolition. The presence of several sandstone blocks in structures to the west of the yard suggests a possible destination for re-used constituents of the yard surface. The yard surface was also truncated by the insertion of concrete bases (6080) and (6081). The remains of a crude red brick perimeter to (6080) suggest that the concrete served the function of a foundation for a larger structure, most likely a metal column. These structures are therefore interpreted as evidence for the extension of the glassworks building to the east. The shared alignment of these bases with similar structures to the west suggests that the extension of the building probably involved considerable reconstruction of the pre-

existing building. This re-construction would have most likely involved the replacement of brick walls with a load-bearing metal frame, as was typical with many expanding late Victorian industrial works.

The yard surface was coated with a dense layer of fine-grained coal dust, into which several small glass spheres were embedded. Much of the coal dust was impacted into the spaces between constituents of (6079), suggestive of continual deposition and trampling over a period of years. This is perhaps the best available evidence for import of materials into the works; the yard surface may be interpreted as the area where raw materials were brought into the site. The presence of glass spheres within the coal dust deposit does not necessarily mean that these spheres were also imported from off-site; such objects would have readily found their way into such places. They are of an appropriate size for use as stoppers in Codd bottles, which would suggest that their deposition amongst the setts of (6079) represents a casual loss of processed material as it was transported from the place of manufacture to their final inclusion in a finished product. Intriguingly, the spheres are not all identical. Pale green glass of varying degrees of opacity are represented, and a small fraction of the spheres are composed of the cobalt blue glass usually associated with pharmaceutical products.

Structure (6082) was located at the north east corner of Trench 6, and comprised the foundations of two small red brick structures. The associated red brick yard surface to the north suggests that (6082) was an external structure surrounded by a yard of a later phase to (6079). The location of this structure seems to coincide with the location of the small rectangular structure depicted on the (as yet un-sourced) plan from the 1920s.

6 CONCLUSIONS

The results gathered from excavation and mitigation constitute two main phases of construction relating to the New Don Glass Works with regards to the structures excavated in Trench 4 and 6. The changes made around the location of Trench 4 would suggest a radical phase of alterations, reflecting the need for a larger amount of enclosed space. The alterations investigated on Trench 6 suggest that the building footprint remained mostly unchanged, but that the building itself was subject to considerable renovations and refurbishments in response to technological advancements.

The evidence from Trench 5 would seem to reflect a greater continuity of use of a single structure until demolition, but has the potential to shed light on the relationship between an adjacent site, that of the Mexborough Old Pottery. The chronological and physical separation of these sites is a historical fact, but the transit of materials from the site of the pottery to the site of the glass works raises interesting issues regarding the redistribution of archaeological artefacts and deposits.

7 RECOMMENDATIONS

The information and finds arising from this has the potential for enhancing the understanding of 19th-century glass production in Mexborough and South Yorkshire. This should include a characterisation of the manufacturing process and the range of material being produced. The information is likely to be of local interest. The pottery wasters recovered during excavation will contribute to the understanding of the range and style of pottery produced at the

Mexborough Old Pottery, this would be of regional interest. Specific recommendations have been made in relation to the pottery assemblage recovered during the works and these are detailed in the pottery assessment report (Appendix 4). This work should be incorporated into the analysis phase for the work subsequently undertaken by Wessex Archaeology (Sheffield). The site archive and finds resulting from the work carried out by ArcHeritage will be transferred to Wessex Archaeology for this purpose.

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9 FIGURES

APPENDIX 1 – Index to Archive

Item	Number of items
Context sheets	109
Context register	4
Photographic register	5
Levels register	6
Drawing register	1
Original drawings	6
B/W photographs (films/contact sheets)	3
Colour slides (films)	2
Digital photographs	106
Written Scheme of Investigation	1
Report	1

Table 1: Index to archive

APPENDIX 2 – Context List

Trench	Context no.	Description
1	1001	Demolition Deposit, moderate brick and cobble inclusions
1	1002	Demolition/levelling deposit, frequent red & yellow brick fragments
1	1003	Probable column base constructed from re-used fire brick
1	1004	Red brick surface, same as 6055
1	1005	Red brick structure, forms east and south perimeter to 1004.
1	1006	Same as 6052 and 6053
1	1007	Same as 6067
1	1008	Brick wall, same as 6044
1	1009	Fire brick structure, same as south elevation of 6044
1	1010	East-west red brick structure, same as 6015, also used for 6017
1	1011	Red brick wall, same as 6018
1	1012	Grey-yellow clay levelling deposit
1	1013	Fire brick flue structure, same as south elevation of 6045
1	1014	Fire brick flue structure, same as north elevation of 6045
1	1015	North-south red brick wall, same as 6014
1	1016	Possible yard surface
1	1017	Possible yard surface below 1016.
1	1018	Demolition backfill deposit above 1019
1	1019	Brick surface, same as 6054
1	1020	Red brick wall, same as 1006/6052
1	1021	Modern concrete yard surface
1	1022	Orange/brown demolition/levelling deposit, frequent brick inclusions
1	1023	Sandy silt demolition/levelling deposit, overlaying remains of flues
1	1024	Loose fire brick structure between flues 1009 and 1014
1	1025	Fire brick structure forming partial arch off 1013
2	2001	Backfill/levelling deposit, occasional inclusions of pottery wasters
2	2002	North-south sandstone structure
2	2003	North-south red brick structure, parallel to 2002
2	2004	Brick structure, possible column base/stanchion
2	2005	Made ground, sealed deposits and structures in trench 2
2	2006	Made ground deposit east of 2002 and west of 2003
3	3001	Fuel/Fuel ash & slag residue dump with pottery
3	3002	Brick wall
3	3003	Demolition/levelling layer
3	3004	Demolition/levelling layer
3	3005	Clay levelling deposit
3	3006	Silty clay levelling deposit
3	3007	Cinder dump/levelling deposit
3	3008	Voided
3	3009	Silty clay levelling deposit
3	3010	Ceramic drain and backfill
3	3011	Cut for 3010
3	3012	Brick wall

Trench	Context no.	Description
3	3013	Pottery/fuel dump
3	3014	Pottery/fuel dump
3	3015	Clay levelling deposit
3	3016	Clay levelling deposit
3	3017	Clay levelling deposit
3	3018	Clay levelling deposit
3	3019	Clay levelling deposit
3	3020	Clay levelling deposit
4	4001	North/south Sandstone structure
4	4002	Concrete block
4	4003	North/south sandstone structure
4	4004	North/south red brick structure
4	4005	Concrete block
4	4006	Foundation remains of east/west sandstone wall
4	4007	Sandstone threshold
4	4008	North/south red brick wall in east-facing section
4	4009	Void
4	4010	Slag and clinker deposit in south end of trench.
5	5001	Rubble and slag deposit at north end of trench
5	5002	Short red brick structure orientated east/west.
5	5003	Red brick structure to south of 5002, orientated northeast/southwest
5	5004	Dark grey silty deposit between 5002 and 5003
5	5005	Rubble deposit, backfill of structures 5006-5007-5008
5	5006	Curvilinear red brick structure, parallel to 5007
5	5007	Curvilinear red brick structure, parallel to 5006
5	5008	Linear red brick structure, orientated east/west, between 5006 and 5007
5	5009	<i>In situ</i> black ash deposit
5	5010	Short curvilinear red brick wall
5	5011	Impacted rubble backfill
5	5012	East/west red brick wall, butted by 5014
5	5013	East/west sandstone wall, butts east face of 5014
5	5014	Substantial north/south sandstone wall, butts south face of 5012
5	5015	<i>In situ</i> oxidised clay deposit with frequent ceramic inclusions
5	5016	Pink clay deposit with grey inclusions
5	5017	Dark grey deposit, overlays 5016
6	6001	Topsoil deposit
6	6002	Structure/concrete floor
6	6003	Cleaning layer
6	6004	Fire brick floor structure
6	6005	Demolition dump deposit
6	6006	Red brick plinth structure
6	6007	L-shaped red brick structure
6	6008	Red brick structure
6	6009	Deposit ?demolished wall
6	6010	Clay deposit
6	6011	Red brick/Fire brick dump deposit

Trench	Context no.	Description
6	6012	Deposit/?demolished L-shaped wall
6	6013	Earth floor deposit
6	6014	North/South linear red brick structure, butts west end of 6015
6	6015	East/West linear red brick structure
6	6016	North/South linear red brick structure, butts north face of 6015
6	6017	North/South linear red brick structure, butts north face of 6015
6	6018	East/West linear red brick structure, butts west face of 6016
6	6019	Pale yellow-grey clay deposit
6	6020	East/West linear red brick structure, north wall of domestic yard
6	6021	Pale yellow-grey clay deposit
6	6022	North/South red brick structure, south end butts north end of 6023
6	6023	North/South linear red brick structure, east wall of domestic yard
6	6024	Partial remains of fire brick floor structure
6	6025	East/West linear red brick structure, between 6014 and 6023
6	6026	East/West linear red brick structure, between 6014 and 6023
6	6027	East/West linear red brick structure, between 6014 and 6023
6	6028	Remains of truncated rectangular red brick structure, butts 6029
6	6029	Sub-rectangular red brick structure, occasional fire brick
6	6030	North/South linear red brick structure between 6031 and 6029
6	6031	East/West linear red brick structure, butts east face of 6030
6	6032	Red brick domestic yard surface
6	6033	Red brick edging of garden feature
6	6034	Mid-grey silt fill of garden feature
6	6035	Sub-rectangular post-pad of re-used brick and poured concrete.
6	6036	Deposit between 6026 and 6027, same as 6019 and 6021
6	6037	Mid yellow-grey sandy-clay deposit below 6019
6	6038	Dump deposit east of 6016, backfill of evaluation trench
6	6039	Mixed clay deposit below 6013, made ground
6	6040	Dark grey gritty silt deposit below 6039
6	6041	Red clay/sand deposit below 6038
6	6042	Clay deposit below 6038
6	6043	Fire brick rubble deposit below 6010, covers surviving flue structures
6	6044	Flue wall structure, north elevation red brick, south elevation fire brick
6	6045	Flue wall structure, fire brick
6	6046	Flue wall structure, fire brick
6	6047	Plinth end structure of 6045
6	6048	Linear red brick structure, parallel to 6046
6	6049	Linear fire brick structure, north elevation butts south elevation of 6059
6	6050	Clay deposit below 6037
6	6051	Red brick structure, internal subdivision
6	6052	Red brick structure, internal subdivision
6	6053	Red brick structure, internal subdivision
6	6054	Red brick floor surface
6	6055	Red brick floor surface, similar to 6054
6	6056	Red brick structure, External wall of works
6	6057	Number voided

Trench	Context no.	Description
6	6058	Discrete block of fire brick, butts east end of 6046
6	6059	Linear red brick structure, south elevation butts north elevation of 6049
6	6060	Red brick structure, butts 6061
6	6061	Red brick/fire brick structure, butts 6062
6	6062	Sandstone wall/foundation, supports 6063
6	6063	Red brick structure, butts 6061
6	6064	Red brick foundation, butts 6065
6	6065	Crude red/fire brick foundation, butted by 6064
6	6066	Linear red brick structure, butts east end of flue 6044
6	6067	Linear red brick structure, in alignment with 6066
6	6068	Square red brick structure, butts east end of 6067
6	6069	Short sandstone structure between 6062 and 6071
6	6070	Isolated square brick structure, probable column base
6	6071	Square brick structure, probable column base. Butted by 6069
6	6072	Square brick structure, probable column base. In alignment with 6070/1
6	6073	Rectangular brick structure with intact arches
6	6074	Brick structure, probable column base
6	6075	Rectangular brick structure, probable column base
6	6076	Rectangular red brick structure, probable column base
6	6077	Square fire brick structure, re-used fire brick. Probable column base.
6	6078	Collective number for 2 concrete column/machine bases
6	6079	Sandstone sett yard surface
6	6080	Crude concrete pad with brick edging, probable column base
6	6081	Crude concrete pad with brick edging, probable column base
6	6082	Self-contained red brick structure with concrete floor, NE corner of trench

Table 2: Context list

APPENDIX 3 – Clay Pipe Report

By Dr S.D. White, University of Liverpool

The clay tobacco pipes discussed in this report were recovered from archaeological work carried out by ArchHeritage, in Mexborough, near Doncaster. The site code used for this work was P:5445. A total of 65 clay tobacco pipe fragments were recovered from the excavations comprising seven bowls, 56 stems and two mouthpieces, from a total of nine contexts and one unstratified groups.

The clay tobacco pipe fragments have been individually examined and details of each logged on an Excel spreadsheet. The layout of the spreadsheet has been based on a draft pipe recording system, which has been developed at the University of Liverpool (Higgins and Davey, 2004). Stem bores of the bowls and the marked stems have been measured to the nearest 64th of an inch using a ruler. In the case of the plain stems, only the surface treatment and a count have been given. When more than one bowl fragment occurs in a context group a letter (A, B, C, etc) has been pencilled onto it so that individual pieces can be linked back to the spreadsheet. Bowl forms have been dated according to local styles of mark and decoration and with references to published typologies. These typologies place the bowls within a 20 to 40-year date range. In the case of marked bowls or stems, where the maker is known from documentary sources, a more accurate date is sometimes possible.

All of the pipes were recorded and dated before any context descriptions or site notes were examined. This methodology avoids any pre-conceptions being formed as to the possible date or nature of the various pipe groups while they are being catalogued. A Context Summary, giving the total count for each context and the overall date range, is given in Table 3 below.

With the exception of Context 3007, described as a fuel waste dump from the glass furnace, all of the groups of pipes from the site produced either a single fragment of pipe or a small group of plain stems. These groups are therefore too small to use to accurately date the deposits in which they occur.

Ctxt	B	S	M	Tot	Range	Deposit	Marks	Dec/Mod	Comments
3005		3		3	1800-1900	1800-1900			Plain stems.
3007	5	37	2	44	1830-1880	1830-1860	Double ring moulded spur mark x1; ring and dot moulded spur mark x1	Flutes and leaf-decorated seams x2; ship/naval figure x1; swan x1; facets x1	Two of the fluted bowl fragments join. The ship/naval figure bowl from the same mould as the bowl fragment from context 6010. Contemporary looking stems; three of which have traces of glaze. Cut mouthpieces with yellow glaze.
6010	1			1	1830-1860	1830-1860	Double ring moulded spur mark x1		Spur fragment with a moulded double ring motif on the sides. Same mould as the Ship/naval figure bowl from 3007
6013		1		1	1800-1900	1800-1900			Plain stem.
6021		4		4	1800-1900	1800-1900			Plain stems; two of which join (fresh break).

Ctxt	B	S	M	Tot	Range	Deposit	Marks	Dec/Mod	Comments
6036		1		1	1800-1900	1800-1900			Plain stem.
6037		3		3	1800-1900	1800-1900			Plain stems.
6039		1		1	1780-1880	1780-1880			Plain stem; burnt with an abraded surface.
6041		4		4	1800-1900	1800-1900			Plain stems; one of which may be burnt.
6043	1			1	1870-1950	1870-1950		THE INNISKILLINGS x1	
U/S		2		2	1840-1900	1840-1900			Plain stems, one of which is likely to have come from a short-stemmed "cutty" pipe.
Totals:	7	56	2	65					

Table 3: Clay pipe catalogue

The table above gives the total number of bowls (B), stems (S) and Mouthpieces (M) in each context. The overall date range is then given based on the earliest and latest fragment in each context group. This is followed by the most likely date of deposition. Details of the marked fragments are then given, followed by decorated or modified pieces (Dec, etc.) and, finally, general comments relating to each context group.

The Clay Tobacco Pipes

Clay tobacco pipes are probably the most useful dating tool for archaeological deposits of Post-Medieval date. They are found almost everywhere, were short-lived and were subject to rapid change in both size and shape. They can often be tied to a specific production site or, at the very least, to a regional centre. Subtle differences in their style and quality enable them to be used as indicators of social status as well as a means by which trade patterns can be studied.

The majority of the pipe bearing contexts from Mexborough only yielded a very small number of fragments and therefore the dating of these individual deposits is difficult to determine from the pipe dates.

One of the stems has traces of moulded decoration in the form of facets that are likely to have extended over the whole of the bowl (Fig. 4). All of the remaining pipe are plain nineteenth-century types.

Context 3007 produced the largest number of pipe fragments comprising five bowls, 37 stems and two mouthpieces, all of which appear to be contemporary and are likely to have been deposited c1830-1860. All five bowl fragments (accounting for four individual bowls) from this particular context are mould-decorated and are discussed below:-

Flutes: Two fluted bowls were recovered from Context 3007. The first (Bowl A, not illustrated) is made up of two joining fragments. The decoration comprises eight crudely executed flutes on each side of the pipe. Both seams are decorated with simple leaves. Around the rim is a band designed to look like a coil of rope. The second (Bowl B, Fig. 1) is a very similar design

although this is much more finely executed with alternate wide and narrow flutes and a much more neatly finished spur. Both pipes are likely to date to c1830-1860.

Fluted pipes were one of the most common forms of decoration on bowls of the late eighteenth and nineteenth century. Broader flutes, or scallops, which were thicker at the top tapering to a pointed tail, were common at the end of the eighteenth century. These were sometimes enclosed with a row of dots or a loop. Narrow flutes tended to become more common in the mid nineteenth century and often in association with other forms of decoration such as leaf-decorated seams.

Ship/Naval Figure: One complete bowl with an image of a ship in full sail on the smokers right, and a naval figure on the smokers left was recovered from Context 3007 (Fig. 2). As well as the central decorative scheme, the bowl has finely executed leaves on both seams. There is also a relief moulded mark in the form of a double ring on the sides of the spur. A spur fragment which is almost certainly another example of this particular design and would have been produced in the same mould, was recovered from Context 6010 (not illustrated). Both pipes are likely to date to c1830-1860.

The closest parallel for this particular pipe is known from excavations in Sheaf Square, Sheffield (White 2005), which produced 29 examples of an almost identical pipe found in association with production waste of c1855 that is attributed to Henry Tunstall of Leeds. The main difference between the Mexborough example and those from Sheaf Square, is that the Sheaf Square examples included the lettering NAPIER below the Naval figure. However, the similarity between the Sheffield and Mexborough examples is such that they almost certainly commemorate the same figure.

The identity of the figure depicted is unclear, but given that it appears in association with a ship in full sail, there is likely to be a naval connection. There are a number of prominent figures by the name of Napier in the early nineteenth century any one of which could be the person commemorated on the pipe. The most likely candidate, however, is Admiral Sir Charles John Napier (1786-1860) (see Plate 8). He was a Scottish Naval officer who spent 60 years in the Royal Navy. During this long career he served in the Napoleonic Wars, the Syrian War, and the Crimean War. He commanded the Portuguese Navy for a period during the Liberal Wars. He was also involved in the development of iron ships and in 1821 financed and participated in the construction of one of the first iron-hulled vessels ever built, and the first designed to venture into open water – the *Aaron Manby*, which could be considered a direct ancestor of the Royal Navy's first iron frigate, HMS *Warrior* built in the year of Napier's death (1860). In 1855 he was elected MP for Southwark and continued to campaign vigorously for the improvement of the way common seamen were treated both during and after service. He died 6 November 1860 and ships of the Portuguese Navy went into eight days of mourning. He was possibly the most widely known naval officer in the early Victorian era.

Swan: A single bowl fragment with traces of a swan design was recovered from Context 3007, Bowl Ref. D) – see Figure 3. The bowl is incomplete but has the swan motif on the smoker's right and leaf decorated seams. It is possible that the swan motif was repeated on the smoker's left, but this is now missing. This particular bowl is most likely to date to the mid nineteenth century (c1830-1860) and is therefore contemporary with the rest of the bowls from this group.

The only other mould-decorated pipe to have been recovered from the excavations in Mexborough, came from Context 6043 (a rubble covering of a flue), and is a highly decorated pipe commemorating the Inniskillings Regiment (Plate 9, top) and dating c1870-1950. A complete example of this pipe, produced from the same mould as the Mexborough example, can be found in the Higgins Collection (Plate 9, bottom). This particular pipe came from a site in Brierley Hill, Dudley in the West Midlands, and was part of a collection of old stock from a tobacconist's warehouse. The Higgins Collection pipe has a meerschaum wash, which does not survive in the ground. It is quite probable that the Mexborough example also had a meerschaum wash originally.

The Inniskillings design was popular in the late nineteenth century and was produced by many of the major pipe manufacturers of the period including Pollock's of Manchester (pattern no. 188), Joseph Holland, also of Manchester, (pattern no. 47) and the Critchfield's of London.

The example from Mexborough has a hatched shield motif on the sides of the heel, which is a typical mark used by London makers. Neither the Pollock nor Holland examples have shield marks on the heel, which suggests that the Mexborough example may have originated from London. In April 1955 a British Pathé Newsreel film was produced of members of the Critchfield family making pipes. The film includes footage of Inniskilling pipes being made that are almost identical, if not the same, as the Mexborough example (<http://www.britishpathe.com/record.php?id=11736>) [accessed 12 July 2011].

References

Higgins, D. A. and Davey, P. J. 2004. Appendix 4: Draft guidelines for using the clay tobacco pipe record sheets. In S.D. White, *The Dynamics of Regionalisation and Trade: Yorkshire Clay Tobacco Pipes c1600-1800*, *The Archaeology of the Clay Tobacco Pipe, XVIII*, British Archaeological Reports (British Series 374), Oxford, 487-490 (567pp).

White, S.D. 2005. *Clay Tobacco Pipes from Excavations in Sheaf Square, Sheffield*. Unpublished archive report prepared for West Yorkshire Archaeological Services (ASWYAS).

Plates



Plate 1: Spur bowl from Context 3007 with the possible Napier figure on the smoker's left, compared with a contemporary image of Admiral Sir Charles John Napier (1786-1860)

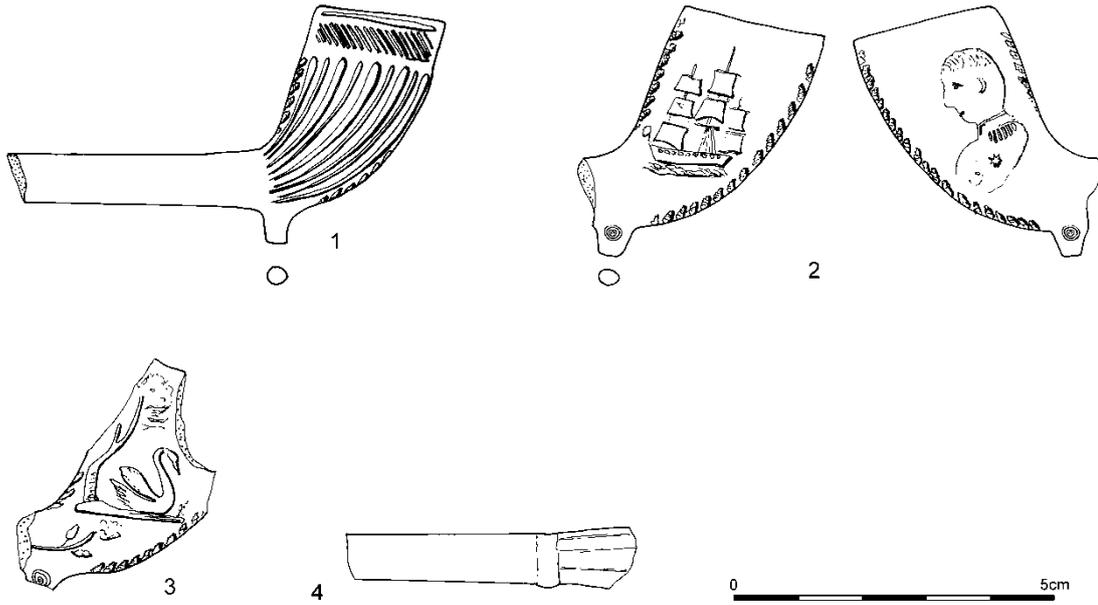


Plate 2: Inniskillings pipe bowl from Mexborough (top); Inniskillings bowl with a meerschaum wash from the Higgins Collection (below). Both pipes produced from the same mould (Photographs by the author)

Figures 1 to 4

The pipe fragments have been illustrated at 1:1 and were prepared by the author.

1. Spur bowl c1830-1860. Not burnished; no internal bowl cross; rim cut but not milled; stem bore $5/64''$. Mould decorated with flutes and leaf decorated seams. (Context 3007; Bowl Ref. B).
2. Spur bowl c1830-1860. Not burnished; no internal bowl cross; rim cut but not milled; stem bore $5/64''$. Mould decorated on one side with a ship in full sail (smoker's right) and a naval figure, most likely Admiral Sir Charles John Napier (smoker's left). Leaf decorated seams with a double ring motif moulded on to the sides of the spur. A spur fragment from a pipe produced in the same mould was recovered from Context 6010. (Context 3007; Bowl Ref. C).
3. Spur bowl c1830-1860. No burnished; no internal bowl cross; rim cut but not milled; stem bore is unmeasurable. Mould decorated on the surviving side (smoker's right) with a swan motif. Leaf decorated seams and a ring a dot motif on what survives of the spur. (Context 3007; Bowl Ref. D).
4. Stem fragment c1830-1880. Not burnished; stem bore $4/64''$. Mould decorated with traces of a faceted design that would originally have extended over the bowl. (Context 3007).



Figures 1 to 4: Pipes from Mexborough (drawn by the author).

APPENDIX 4 – Pottery Report

By Ailsa Mainman, York Archaeological Trust, with contributions from David Barker.

The assemblage comprised approximately 650 sherds of both finished (glazed) and un-finished (biscuit or unglazed) ceramics, in a wide range of different forms. The majority is of white earthenware. While it is possible that the finished items include some domestic debris most appear to be production material which was rejected at different stages of the production process, as the range of forms and patterns closely matches the unfinished material.

The unfinished material was rejected at the biscuit stage, and several pieces have the remains of transfer printing which has not been properly hardened off and is often very unstable and easily removed unless dried with care. Several of the plain sherds might once also have had transfer printing as faint traces still remain on some.

In addition to the unfinished sherds there are crude clay rods c.80mm x 10mm which might have been used in a range of supporting and separating roles both for saggars and wares, as well as a number of more finished smaller rods and triangular spacers which are possibly the remains of 3-arm stilts or bars which slotted into sagger walls for plate glost firings.

There is one clear pottery backstamp (Context 3001) which ties that piece, and almost certainly the majority of the remaining material to the Don Pottery during the Barker period (1839-1893). It is the 'eagle displayed rising from a coronet within a shield' stamp (Griffin 2001, 203. no 3). No other traces of backstamps were noted but there are one or two fragments of text which it might be possible to tie down with further research (see context 2001).

Typical of the material are the transfer-printed wares which occur in a wide range of forms, but are mostly plates. Colours, which appear as black on the unfinished material, include green, pink, blue and black on the finished products. Several of the patterns are identifiable with the products of the Barker period and include willow pattern, GEM (ibid no. 271, p. 205), a floral pattern (ibid. no 276, p. 206), Asiatic pheasant, ibid. no 292 p.210), and KEW (ibid. no. 283 p. 208). The presence of the KEW pattern is of interest in terms of chronology as the pattern (No. 204794) for this was not registered in the Public Record Office until December 1866 (ibid, 208), giving a good *terminus post quem* for the dumping of this material.

In addition there are some patterns which were noted amongst both the finished and unfinished wares but which are not included in Griffin's account of the material excavated at Orchard Street, Mexborough by Doncaster Museum and Art Gallery in 1983 (ibid, 201), nor that collected from the old Swinton Goods Yard (ibid). These would need further study to see if there are extant examples elsewhere. Otherwise the parallels between this assemblage and that published from Swinton Goods Yard and Orchard Street are very strong, and Griffin dates the Orchard street material to the late 1860s or early 1870s which would be the earliest date for this current assemblage given the presence of the KEW pattern.

Other less common types of decoration amongst the whitewares includes sponge-decorated wares, industrial banded slipwares and mocha (ibid. no 300 p. 212) in both finished and biscuit states. These are significantly less common than the transfer printed wares. Less common still are the flow-blue printed wares and those with boldly enamelled decoration (ibid. no.299, p. 2121).

Other types of decoration noted include moulded borders, usually fairly simple grassed edges, often with blue (both in its inky black unglazed form and as intentional black transfers surviving, but one or two examples of more complex moulded border patterns (see 3001 and unstratified). Moulded beaded decoration occurs on other rim edges.

Forms include a wide range: chamber pots (usually plain), plates, platters, saucers, jars, lids, colander/strainer, bowls and teacups. Possible teapots and sauce boats are seen only as rectangular or oval footed bases. There is a wide range of rim and base forms, the latter including footring bases and recessed bases, for which more work would be needed to determine likely forms. There is a large number of sherds currently unassignable to forms although further work might reduce this number.

Other occasional wares include stonewares, coarse earthenwares, pearlwares and translucent one china which might have become incorporated into the deposit from domestic waste.

Significance of the assemblage.

This is an important collection of material. It has the potential to build upon and augment Griffin's published account of the later, Samuel Barker, phase of the Don Pottery which was producing '...all the usual varieties of the commoner classes of earthenware...' (Jewitt's Ceramic Art. Vol I, p.525 1878 as quoted in Griffin 2001) which were supplying an increasing regional population; examples have found their way onto the current excavations at Hungate, York, and must have been widely distributed through the region.

Griffin remarks that there is a paucity of specimens which can be tied to the Barker period at the Don Pottery (2001, 200). He goes on to say that 'So few examples of shapes are known from this period that it is not possible to pronounce that any particular shape is peculiar to the Don Pottery. Until more pieces have been collected and studied it is much safer to rely only on marked specimens...' (ibid 202). This assemblage, because of the large number of biscuit-fired examples (matched by more finished examples) offers the opportunity to study both the forms and the wealth of decoration which almost certainly derive from the pottery in its last twenty or thirty years of production, before it closed in 1893.

The following approach to this assemblage is recommended:

- A full study and discussion of the ceramic assemblage is required, comprising identification of the ware types, vessel forms and types of decoration used. This should be based upon appropriate, up-to-date terminology. This should be accompanied by a full catalogue of the assemblage.
- Identification of the manufacturing processes used for all vessels and compare and contrast this with processes used in other major manufacturing centres, especially Stoke on Trent.
- Identification of the types of kiln furniture recovered and determination of the manner of their use. Relate this to pottery vessels and wares types recovered, where possible.
- Attempt to identify firing faults which might be suggested by the sherds themselves, and identification of the possible causes for the failure of these sherds.
- Publication of the assemblage, with illustrations to include photographs (certainly) and drawings (possibly). This should be offered to an appropriate regional journal, with a

shorter note for *Post-Medieval Archaeology*, and a note for one of the Northern Ceramic Society publications (Journal or Newsletter~), depending upon the significance of the assemblage determined during analysis.

Catalogue of the assemblage

Context	Description
1000	5 sherds transfer-printed ware, willow pattern, bowl and plate 100g 2 pale transfer-printed ware sherds 21g 1 green transfer-printed ware 10g 1 sponge ware (blue) sherd 10g
1001	2 sherds spongeware (blue) 16g 4 sherds transfer-printed ware 18g 1 pale blue transfer-printed ware 6g 1 biscuit sherd 8g
1002	2 sherds transfer-printed ware willow pattern 26g 1 brown glazed stoneware 20g
1016	1 white earthenware utility jar base 120mm diam. 30% 24g 1 pearlware with bunched blue incised lines 8g 1 white translucent bone china 6g
1017	2 white earthenware including handle 10g
1018	4 white earthenware base 80mm diameter 14g 1 sponge ware (blue) sherd 6g 1 pale transfer-printed ware ? plate 7g 1 green/blue handpainted plate (unmeasurable) 6g 1 blue banded earthenware 7g 1 black transfer-printed ware 7g 2 biscuit plate included grassed edge 200mm diam 5% 7g, 1 biscuit with remains of transfer – foliage on rim edge, 200mm diam 6% 8g
1023	1 flow blue rim 140mm 10% 8g 1 transfer-printed ware 180mm 8g 1 transfer-printed ware bowl (unmeasurable) 22g 1 blue banded sherd 10g
2001	1 brown glazed red-bodied earth 400mm diam. 8% 48g 2 sherds of brown transfer-printed ware, saucer/bowl (unmeasurable) 14g 1 green transfer-printed ware 80mm diam 5% 3g (NB pattern also seen in biscuit wasters) 1 mocha (mug) with applied stamp.shield 'W... IMP...' 15g 2 white earthenware 10g 1 scrap spongeware 12 spacers/testers 66g 33 smaller square rods, triangular supports 90g
2001	Biscuit sherds: Forms include: bowls, plates (large and small), sauce boat, lids, saucers, footed bases Decoration includes: polychrome banded slipware/mocha Green transfer-printed ware Blue transfer-printed ware – willow, floral, geometric Grassed edges, moulded Quantities: 18 sherd decorated (140g) 40 sherds of plain/transfer lost 300g.

Context	Description
3001	<p>Undecorated biscuit sherds:</p> <p>1900 gms of undiagnostic unglazed sherds</p> <p>10 handles including chamber pots, teacups 250g</p> <p>5 sherds from ribbed jars 58g max 80mm diam</p> <p>16 (plate?) bases with small footrings 302gms 80-120mm diam.</p> <p>26 bases (bowls? chamber pots?) with deeper footrings 1300gms. 40-120mm diam</p> <p>5 spacers/testers 62 gms</p> <p>5 large concave bases (bowls?) 488gms 120mm</p> <p>5 open bowls forms with flared rims 340mm max 150 gms</p> <p>10 beaded rims 230 mm 180 gms</p> <p>20 closed forms 160-200 mm diam 396 gms</p> <p>53 plate/platter/saucer rims included moulded grassed edges and moulded spiral decoration largest is 160mm - 240mm diam 1200 gms</p> <p>9 squared bases (sauce boats/sugars) 179 gms</p>
3001	<p>Decorated biscuit sherds:</p> <p>11 banded slipware (Blues/browns/tans). Forms include bowls with footring 40mm, rims 140mm 126g</p> <p>25 sherds of transfer-printed patterns including willow, floral, geometric and scenic. One with pot stamps S.B & S. 'Eagle displayed Rising from a coronet within a shield' (Griffin 2001 p. 203 no.3). Includes bowls and plates</p>
3005	1 sponge ware chamber pot 260mm flanged rim 40gms
3007	<p>3 biscuit sherds 18 gms</p> <p>6 sponge (blue) chamber pot 140mm 96 gms</p> <p>3 earthenware – yellow/black internal glaze, red body 228 gms</p> <p>3 banded slipware bowl 92 gms 12 mm rim</p> <p>3 opaque glass ware with moulded decoration 20 gms. Plate</p> <p>1 chamber pot handle white earthenware 56 gms</p> <p>1 black transfer-printed ware</p> <p>3 transfer printed-ware including lid</p> <p>5 white earthenware base with footring/pedestal 66 gms</p> <p>2 stoneware bottle 90mm base 100gms</p> <p>3 brown stoneware, included sherd with moulded design, line and shield</p> <p>1 brown stoneware stew pot lid 156gms</p> <p>1 spacer</p>
6010	<p>1 red earthenware with yellow internal glaze 24 g</p> <p>4 transfer-printed ware willow 54g</p> <p>1 plain? jug 50 g</p> <p>2 sponge ware plates (220mm diam 10% 20 g</p> <p>1 pink transfer-printed floral 200mm 16g</p> <p>1 banded slipware sherd 13g</p> <p>1 knob 10g</p> <p>1 black transfer-printed ware open form 26g 230mm plate (GEM no. 271 Griffin p.205)</p> <p>1 flow blue plate 240mm 12 g</p> <p>5 misc scraps</p> <p>1 biscuit pedestal base 15g 30mm</p>
6013	<p>1 spacer</p> <p>4 transfer-printed ware sherds blue and brown 16g</p>
6019	<p>4 biscuit sherds undiagnostic 70g</p> <p>2 stoneware 48 g</p> <p>1 white earthenware 14 g</p> <p>2 transfer-printed ware blue 24g</p>

Context	Description
6021	<p>3 biscuit sherds inc. plate, handle, footring base 8g 3 spacers 1 stoneware utility jar frag 3 transfer-printed ware 36g 1 banded slipware brown/grey 8g 1 pearl recessed base 120mm 32g</p>
6036	<p>2 biscuit (plate and base) 32g 1 flow blue plate 240mm 72 g (Griffin 2001 no. 299 p.212) 1 pink transfer-printed ware plate 220mm 24g (Griffin 2001 no. 276. p. 206) 1 grey blue plate 240mm 81g (Griffin 2001 no. 271. p205) 6 sponge ware including teacup 1 frag of GEM pattern in black 10g 1 blue transfer-printed ware colander 1 sherd Gem pattern on inner border and letters ...D GE... 18g 1 blue banded slipware 10g 3 pale blue rim edge plate 10g 3 earthenware 100 g</p>
6037	<p>2 biscuit – footring base 140mm 20% 68g 4 spacers 4 joining sherds of block cut spongeware plate 260mm 40% 60g 1 blue grassed edge moulded 220mm 50% 17g 2 transfer-printed ware 15g 1 moulded rim 100m jar/jug 12g 1 lid/pedestal 24 g 3 brown glaze earthenware jar base 160mm 122g</p>
6039	<p>2 flow blue 4g 2 spacers 3 blue sherds GEM pattern 3 black sherds GEM pattern 1 sponge ware 10g 1 pink transfer-printed ware 12 g 3 pearl ware 30g 3 scrap 15g 1 beaded green rim 2 sherds of plate comparable to Griffin 2001 no.299 p.212 ('boldly enamelled decoration') 13g</p>
6040	<p>1 brown glaze earthenware 1 yellow earthenware 2 white earthenwares Total 52g</p>
6041	<p>Biscuit sherds with decoration: 4 banded slipwares 22g 5 transfer-printed ware willow pattern 30g 4 floral (Griffin 2001 No. 276) 72 sherds of misc forms (including plates, chamber pots, sauce boats, teapots, moulded rims and beaded rims) 890g</p>

Context	Description
6041	Finished products: 3 Griffin 2001 no.299 p.212 ('boldly enamelled decoration' 1 mocha Griffin 2001 no.300 p. 212 3 floral (green and blue) Griffin 2001 no 276 p. 206 58g 9 flow blue 63 g (plate with spacer intact 240mm diam) 3 banded slipwares 8g 38 spacers and supports 158g 1 transfer-printed ware willow 30g 5 transfer-printed ware geometric 30g 2 platter blue transfer-printed ware Griffin 2001 no.292 p.210 Asiatic pheasant 102g 4 brown glaze 1 'KEW Griffin no. 283/284 no. 204794 16g 1 grassed edge 2 green and blue foliage banded decoration seen in biscuit but not illustrated in Griffin 2001 3 transfer-printed ware designs not seen in Griffin 2001 1 ?teapot handle with paired/slash decoration 10g 8 misc plain and burned sherds 120g 1 knob
6043	3 sponge ware 40g 5 plain white earthenware 50g 2 willow transfer-printed ware 17 1 spacer 2 scraps
6050	3 biscuit 192g 2 brown glazed earthenware 92g 1 blue banded slipware 5g 1 block sponge ware 7g 1 Asiatic pheasant 7g 2 white earthenware plates 15g 1 ribbed white utility jar 21g
Unstratified	More of the same including lots of GEM pattern and some more KEW pattern. Also sherds of moulded painted plate similar to earlier muffin plates.

Table 4: Pottery catalogue

References

Griffin J.D. 2001. *The Don Pottery 1801-1893*. Doncaster Museum Service.

Acknowledgement:

I am very grateful to David Barker for reading and commenting on this assessment report, and for his help in formulating the recommendations. The report incorporates his comments, but any errors remain the author's. He agrees that the group is potentially of considerable importance with potential to better understand Mexborough's (and other contemporary factories') products, to chart developments in style, taste and processes, and understand their place in the wider market.

APPENDIX 5: Metalworking Debris Report

By R.S. Cubitt, York Archaeological Trust

The small quantity of debris recovered from excavations at Mexborough is detailed in Table 5. All items were subjected to visual assessment and are discussed briefly below.

Roughly 2kg of ironworking debris were recovered. The material from context 1016 is likely to be smelting slag. Two of the lumps contain highly magnetic blue/grey areas which are reminiscent of the iron bloom produced during smelting. The ironworking slag from context 3001 is not visually diagnostic. Loose soil in the same finds bag included smelting evidence, in the form of a tiny chipping of possible blast furnace slag, and a fragment of spheroidal hammerscale formed during smithing. The discovery of clinker (76g) also points to ironworking as it is produced when coal is used in a smelting furnace. There was also a small quantity of coal (44g).

In conclusion, the majority of the debris relates to ironworking. There are residues that indicate smelting and probably also smithing activity.

Context	SF no	Slag type	Weight (g)	Comment
1016	3	Probable iron-smelting slag	1909	Two of the lumps are possibly bloom having areas that are highly magnetic and of a blue/grey colour. Shaley inclusions. A third lump is angular-possibly incorporating part of the furnace structure or was formed in the corner of the furnace.
3001	23	Non-diagnostic ironworking slag	3	Spheroidal hammerscale
3001	23	Clinker	76	
3001	23	Coal	44	
3001	23	Over-fired clay	4	
3001	23	?Blast-furnace slag	<1	Tiny green chipping

Table 5: Summary of the metalworking debris

APPENDIX 6 – Glass Report

By Dr Hugh Willmott, University of Sheffield

A small assemblage of glass and glassmaking debris was recovered from the excavations at the New Don Works, Mexborough (summarised by context in Table 6 below). Although some of the material is probably unrelated to the actual manufacturing processes taking place on site, most appears to derive from the works and is entirely consistent with what would be expected from a bottle works of the second half of the 19th century. All the glass is stable and requires no further cleaning or conservation.

The glass can be divided into three broad categories; finished vessels, working waste and raw glass. All the identifiable vessels present are portions of press-moulded bottles and their stoppers. Working waste takes the form of either overblows (off-cuts from the mechanised inflation process) or other types of manipulated glass debris. Finally there is a small quantity of raw lump glass that had yet to be worked.

As well as glass, other elements of the manufacturing process are present. There is a small quantity of glassmaking slag or gall and a single crucible sherd. Also present are a few small pieces for furnace structure, as well as some vitreous deposit from the flue.

Significance and recommendations

Unfortunately the assemblage is too small for it to have any great archaeological potential, especially when compared with excavated groups from other contemporaneous works. Nonetheless, it provides a small insight into the nature of operations on the site and the first indication of the range of items produced. Therefore, two recommendations are made:

- A characterisation of the manufacturing process be undertaken based upon the available evidence;
- An identification and discussion of the range of products be made.

Summary of the material

Context	SF no	Description
1000		Vessel, finished
1001	22	Lump glass
1016		Vessel, finished
1013	18	Working waste
1013	17	Vessel, finished
1017	16	Slag/gall
1018		Vessel, finished
1023		Lump glass
1023		Vessel, finished
3007		Vessel, finished
T6 U/S	10	Crucible fragment
T6 U/S	13	Vessel, finished
T6 U/S		Working waste
6010	19	Overblow
6010		Furnace structure
6013		Vessel, finished
6021	8	Working waste
6036	21	Working waste
6037	20	Working waste

Context	SF no	Description
6039	4	Blowing waste
6039	5	Slag gall
6039		Blowing waste
6039		Vessel, finished
6040		Vessel, finished
6041	6	Working waste
6041	11	Lump glass
6041	12	Vessel, finished
6041	15	Furnace lining
6041		Blowing waste
6041		Vessel, waster
6041		Vessel, finished
6044	SA1	Flue lining

Table 6: Summary of glass artefacts

Material not related to glassmaking

[3000] <7> 2 pottery saggar fragments

APPENDIX 7 – CERAMIC BUILDING MATERIAL

by J. M. McComish, York Archaeological Trust

Thirty-three fragments of ceramic building material (CBM) were examined, weighing a total of 63850g; all the material examined was of modern date. The material was recorded to a standard YAT methodology. The material is summarised in Table 7.

The overwhelming bulk of the CBM comprised machine made bricks (49600g in total) dating to the mid nineteenth century or later. Five of these were fragments of firebricks, one of which had a rectangular frog on one bed, two were plain rectangular bricks, one was stamped HX and one was stamped HXLL; three of these firebricks were covered in thick dark green glass residue resultant from industrial use. There were also three voussoir bricks made in firebrick clay, one of which was not stamped while the remaining two were stamped P&H and P&S respectively. The two stamped examples were both covered with thick dark green glass resultant from industrial use. A search of the Scottish fireclay manufacturers listed in Douglas and Oglethorpe (1993) and of British manufacturers listed on <http://www.penmorfa.com/bricks/index.html> could not find a match for these stamps, so their precise place of manufacture is unclear, though is most likely to have been in England or Wales.

The remaining bricks were all machine made, four were plain rectangular bricks, one of which was badly cracked and one of which had kiln scars showing the way it had been stacked in the kiln. Two of the bricks had a single rectangular frog while and one brick had elongated oval frogs on both beds of the brick. Three fragments had become totally vitrified and fused together, presumably resulting from use in an industrial context. One of the bricks had a rectangular frog on one bed and an elongated oval on the opposing bed with the stamp MEXBORO, a further two bricks had a rectangular frog on one bed stamped MEXBORO, both these bricks were from the Mexborough brickworks matching examples seen on <http://www.penmorfa.com/bricks/england4.html>. One brick had rectangular frogs on opposing beds one of which was stamped MANVE which is part of the stamp Manvers; this brickworks was attached to Manvers colliery which was in operation from the 1880's to 1988 <http://www.penmorfa.com/bricks/england4.html> and http://en.wikipedia.org/wiki/Manvers_Main_Colliery (accessed on 27.6.2011). The bricks with glass residues were present in context 1013 (five examples), while firebricks were present in contexts 1006, 1008 and 1013. The bricks which had vitrified were in context 2001.

In addition to the bricks there were four fragments of machine made drains dating to the 19th century or later, one fragment of pan tile dating to the 17th century or later and two fragments of ridge tile which could be of any date from post-medieval onwards.

Context	Date	Keywords
1004	1850+	Brick
1006	1850+	Brick
1006	1850+	Brick
1008	1850+	Brick
1010	1850+	Brick
1011	1850+	Brick
1012	1850+	Brick
1013	1850+	Brick
1017	1850+	Brick
2000	1850+	Brick
2001	1850+	Brick
6041	1850+	Slate, Brick, Drain, Ridge, Pan

Table 7: Summary of CBM

APPENDIX 8 – WRITTEN SCHEME OF INVESTIGATION