



**ARCHAEOLOGICAL ASSESSMENT AT WORTLEY TIN
MILL, WORTLEY, BARNSLEY, SOUTH YORKSHIRE**

ARCHAEOLOGICAL ASSESSMENT REPORT

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NON-TECHNICAL SUMMARY

This report presents the results of an archaeological assessment (run as a community project) at Wortley Tin Mill, Barnsley, South Yorkshire. The mill is known to have been in operation by 1744 and to have fallen into disuse by 1870. The assessment was carried out following previous surveys undertaken at the site which recorded widespread remains associated with the former mill, including limited structural remains, possible wheel pits and several goits. This archaeological assessment involved the excavation of five targeted trenches and involved members of the local community and local school groups. The project was commissioned by Hunshelf Parish Council, with funding from the Heritage Lottery Fund and was designed to provide an opportunity for community participants to take part in an archaeological project.

Whilst limited and actively eroding above-ground structural remains are present at the site, the results of the assessment suggest that the survival of below-ground remains is good. Possible machine bases, walls, floor surfaces, rolling waste and timbers were present in Trench 1, along with an east-west aligned wheel pit and axle base for the wheel itself. The remains of a second, probably later, wheel pit aligned north-south in Trench 4 was also recorded, along with substantial accumulations of made-ground deposits in Trenches 2 and 3 and a wall and brick-lined drain in Trench 5. Ceramic artefacts associated with the structures and deposits from all of the trenches have been dated to the late 18th and 19th centuries, during the time that the mill is known to have been in operation.

The archaeological remains recorded during this assessment are considered to be of local to regional significance.

KEY PROJECT INFORMATION

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1 INTRODUCTION

This report presents the results of an archaeological assessment at the former tin mill at Wortley, Barnsley, South Yorkshire. The Tin Mill is known to have been in operation by 1744 and to have fallen into disuse before 1870. The assessment was carried out following previous surveys undertaken at the site and involved members of the local community. The assessment was undertaken in line with a Written Scheme of Investigation (WSI) (see Appendix 7). ArcHeritage were commissioned by Hunshelf Parish Council to undertake the fieldwork. The purpose of the project was to investigate the site and to provide an opportunity for community members to take part in an archaeological project, and to receive training in a variety of investigative techniques.

2 LOCATION, GEOLOGY AND TOPOGRAPHY

The site is located close to Soughley Bridge on the River Don, south-west of Wortley, in the Parish of Hunshelf, Barnsley, South Yorkshire (NGR: SK 293 988) (Figure 1). The site and surrounding woodland is owned by the Wharnccliffe Estate and the mill dam and reservoir are currently leased from the estate to a private fishing club. The site is not designated, although it is included on the South Yorkshire Sites and Monuments Record (reference PIN 4571). The character of the landscape within the site has been assessed by the South Yorkshire Historic Environment Characterisation Programme (Lines *et al* 2008), which determined that the site has a present character of *Industrial: Water Powered Site 1774-2003* with a previous invisible character of *Enclosed Land: Piecemeal Enclosure 1066-1773*.

The site is located within woodland and has some ground vegetation. The site comprises the remains of former mill buildings and associated water management system (including the former weir, dam and reservoir), with two nearby rows of demolished cottages and other ancillary structures connected to the operation of the mill. Whilst some structural remains are currently present above the ground level, the remains are generally in a poor state of preservation, generally with a maximum of three or four courses of stonework present.

3 METHODOLOGY

3.1 Aims

The aims and objectives of the project were as follows:

- to gather information about the Wortley Tin Mill site, including evidence about former industrial processes, the character and preservation of features, and the possible date of archaeological features and deposits
- to assess the archaeological significance of structures, and identify any current threats or vulnerabilities
- to establish a small-scale community archaeology project
- to provide volunteer and training opportunities on a range of archaeological techniques
- to organise a short public event to explain the results of the work
- to produce material for potential use in display and interpretation

3.2 Methodology

The evaluation was undertaken in line with the methodology outlined in the WSI (see Appendix 8). A total of five trenches were excavated. The trenches are detailed in Table 1, below, and their locations are shown on Figure 2.

Trench	Purpose	Max. size
1	Located near a remaining stone structure in order to expose a supposed east to west aligned wheel pit and the floor of the main working area of the mill	5.85m x 3m
2	To investigate the possibly culverted main tail goit	3m x 1.85m
3	To investigate the possibly culverted main tail goit	2m x 2m
4	To investigate and further expose the visible remains of a large stone built goit and north to south aligned wheel pit	7.40 x 4.90
5	To investigate high responses from a metal detector	1m x 0.75m

Table 1: Trench details

4 PREVIOUS WORK

4.1 South Yorkshire Industrial History Society Survey 1985

The Society's Field Recording Group made a number of recording visits to Wortley Tin Mill between January and July 1985. Basic descriptions of the site and features such as goits, overflows, wheels and working areas were made (Bayliss 2012).

4.2 University of Sheffield Survey 2002-3

A survey of the remains of the mill and the surrounding water management system was undertaken by students and post-graduates of the University of Sheffield (2003). The survey identified elements of standing remains within the area of the mill complex.

4.3 Wessex Archaeology Survey 2013

Wessex Archaeology completed a desk-based assessment and walkover survey of the site in 2013. A number of features were identified, many of which were acknowledged during the previous two surveys, detailed above, comprising elements of retaining walls and water management structures situated around the former mill site. Evidence for three water wheel sites comprising two east-west aligned wheels to the north and south of the mill site and a third (probably later) north-south aligned wheel to the northwest were also identified. Documentary evidence suggests that only two wheels would have been operational at any given time, suggesting a phased construction and abandonment of one of the wheels during the mill's lifetime.

5 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

A comprehensive archaeological and historical background of the site was completed by Wessex Archaeology (2013) as part of a Desk-Based Assessment and walkover survey of the site, the results of which are summarised below:

5.1 Prehistoric

There are no known prehistoric remains within the site, although important evidence of prehistoric occupation has been recovered in the vicinity. Significant Mesolithic remains were excavated in 1962 near Deepcar, around 800m south of the site, comprising more than 23,000 flint artefacts, and evidence of a shelter, possibly a windbreaker, around three hearths (Jones 2000, 17). The flint artefacts included 68 microliths, 102 microburins, 37 scrapers, 8 burins and awls spread over eight sites at Pike Lowe, Mickleden and Deepcar (Radley 1963, 400). The artefacts are mostly of white flint in the Maglemosian tradition with slight variations throughout the assemblage (Radley 1963, 401). The site demonstrates that Maglemosian sites were not confined to lowland areas bordering the North Sea.

A single spot find of a Neolithic polished axe was discovered at Gosling Spring during field walking for the Stocksbridge Bypass in 1986. Similar finds elsewhere in the area include artefacts from Hall Wood and Greno Wood, to the east of Wharnccliffe and also from upon the Chase (Hunter Archaeological Society 1979).

5.2 Iron Age and Romano-British

There is evidence for Romano-British settlement close to the site, including a likely continuation and expansion of earlier prehistoric occupation, with concentrations of enclosures and fieldsystems in Canklow Wood and on the escarpment between Wharnccliffe and Grenoside (Jones 2000, 19). Of particular significance is the quern working site at Warnccliffe which has been found to have been used from the Bronze Age with the main period of use in the Iron Age and Romano-British periods. Several querns of similar date have been found elsewhere within a 1km radius of the site.

To the north and east of the site is a series of dispersed Romano-British settlements, comprising earthwork enclosures with associated field systems on the eastern bank of the River Don. These settlements lie south of Finkle Street, a road of Romano-British origin. Two of these settlements comprised enclosures with evidence of structures dated from a range of ceramics including a Mortaria dated from AD 150-190, Derbyshire ware from the mid-second to early third century AD, Samian ware, Sandy Grey ware and Grey ware. A third settlement was also an enclosure, although not as well defined as the other two settlements, containing a possible cairn and a possible sunken road.

5.3 Saxon and Medieval

Although no evidence dating to the Anglo-Saxon period has been identified within the site or within a radius of the site, both Hunshelf and Wortley appear in the Domesday Survey of 1086 (Open Domesday 2014). Hunshelf at the time of the survey was valued at 3 geld units, although no households were listed. Wortley appears twice in the survey, valued in total at 5 geld units with 6 households (3 villagers and 3 smallholders).

Place name evidence also indicates pre-medieval origins for settlement in the area (Institute for Name Studies 2014). The name Hunshelf derives from the Old English personal name *Hun* and the word *scelf*, meaning a shelving terrain. Wortley derives from the Old English words *wyrt* and *leah* meaning plant/herb and woodland/clearing.

A group of low upstanding banks in a field to the west of Finkle Street Farm are presumed to be of medieval origin, although no dating evidence has been retrieved from these features. There is

evidence of industry in the area from 1379 with four 'smythes' and a 'master' recorded at Wortley (SYTHT 2009, 7). Further suggestive evidence for a mid-13th to mid-16th century bloomery was recovered during excavations in 2009 at Low Forge (Scurfield 2009).

5.4 Post-medieval to Modern

In 1569 the Manor of Hunshelf was sold to the Wortley family, who held the Lordship of Wortley. By this time most of the modern settlements in the area had been established, and the development over the subsequent period expanded from these. Examples of this development within a 1km radius of the site recorded in the SMR include the 17th-century Gosling Moor Farm, the 1782 Forge Bridge, 17th-century outbuildings beside Holly Hall, Well Hill Farmhouse, the 18th-century Ivy Cottage and the 1854 workhouse at Wortley.

In parallel with this growth, a group of interconnected industrial sites developed during the post-medieval period along a 4km stretch of the River Don stretching north from the site within the rural landscape of Penistone, Tankersley and Silkstone parishes. The area was favourable for industrial enterprise as the raw resources for iron working were abundant in the area with the Don possessing the raw power to drive the processes. The works developed in a spread out chain along the river in order for each to pull the maximum possible energy from the 3-4m fall of the river between each site (SYTHT 2009, 5). At the northern end of the chain of industrial sites are two former wire mills, comprising the Old Wire Mill, west of Huthwaite Hall, which was built in 1624 on the site of a bloomery documented in 1567; and the New Wire Mill, or Thurgoland Wire Works, which was established c.1727 to the south of Huthwaite. Downstream of these mills was the site of a tilt mill or slitting mill built c.1624 (SYTHT 2009, 7).

Wortley Top Forge, situated on the flat valley floor of the Upper Don valley between Deepcar and Thurgoland, is the only substantially intact survivor of the group. The first reference to the forge as a finery comes from a lease in 1658 when it was being used for refining pig iron (Crossley 1980, 449). Production at the forge ceased in 1908, but it was used for storage until 1912. It has since been the focus of a programme of conservation works.

Downstream of Top Forge is the site of Wortley Low Forge, sited on a river terrace within a loop of the River Don. Wortley Low Forge includes the standing earthwork and associated buried remains of an iron forge, which operated from the mid-17th century until final closure in 1929. The Top Forge and Low Forge were under common ownership, and were closely linked operationally. For the first half of the 18th century the Wortley Forges were part of a complex of ironworks owned by the Wortley family and operated by the Spencer partnerships from 1658 until the mid-18th century when they became an independent concern operated by the Cockshutt family. The site now lies beside Forge Lane where possible mill goits and culverts survive.

6 WORTLEY TIN MILL

The first clear documentary evidence for the operation of a mill at the site comes from the 1750 valuation of Hunshelf (SA ref: Wh/m/639), which lists John Cockshutt and Joseph Broadbent as tenants of several plots within Hunshelf, including Little Holme and Schole Field. A reference made to the mill in 1753 indicates it had been erected for ten years (Gibbs 1955), giving the likely date of origin for the tin mill as 1743. There is some contention whether actual tin plate was produced at the mill, or, as is perhaps more commonly believed today, the 'tin plate'

produced at the mill were actually thin sheets of carbon steel. Based upon Angerstein's observations in his *Illustrated Travel Diary 1753-55: Industry in England and Wales from a Swedish perspective* (Berg 2001, 219), it is generally believed that there were only four tin mills operating in the British Isles during the 1750's, with Wortley potentially being one of these (Morley nd, 8). A comprehensive study of the history of mill was completed by Wessex Archaeology (2013) as part of a Desk-Based Assessment and walkover survey of the site, the results of which are summarised below:

6.1 Development of the Tin Mill

A significant contemporary description of the mill is provided by R. R. Angerstein in his *Illustrated Travel Diary 1753-55: Industry in England and Wales from a Swedish perspective* (Berg 2001, 219). He describes the Tin Mill as one mile from the Wortley Forges and two miles from Thurgoland Wire Mill, comprising a rolling mill with reheating furnaces, a workshop for annealing and the removal of scale, a workshop for pickling and scouring, and another one with three pots for tinning, polishing and the removal of the thick tin on the lower edge.

Shown on a plan of the Township of Wortley dating to 1796, the mill comprised a single rectangular building labelled 'Tin Mill'. The surrounding fields and dam of the mill are not depicted, and may indicate that the shape of the mill on the plan was intended to be illustrative rather than representative of the actual building at this date. An 1801 plan of the estate in Hunshelf belonging to James Archibald Stuart Wortley illustrates the buildings at Wortley Tin Mill in more detail. By this time the works comprised a group of four buildings, with two rows of terraced cottages shown to the west and northwest. The mill dam is depicted, with the weir to the east and outfall to the southwest, and a tail goit leading out from the buildings to the Don. The numbers on the plan relate to an undated (post 1793) valuation, where the mill, dam and houses, along with surrounding grounds, are shown to have been in the possession of John Cockshutt (SA ref: Wh/M/650).

Around the turn of the 19th century, operations at the mill altered somewhat, with production focusing on rolled bars and plate. Papers at Sheffield Archive (SA ref: Wh M/56/6), dated 1814, include the note '*...and all that Rolling Mill heretofore used as a Tin Mill...*' suggesting that the mill had altered in function sometime before 1814 (Morley nd, 30). There are undated notes on the works in Fairbanks' Fieldbook 174 (SA ref. FB174) listing a Wortley Rolling Mill with two high breast-shot water wheels with float boards. It is likely these notes informed Fairbanks' survey of the mills and other works on the River Don of 1824 (SA ref: MB548), where the mill as described as:

*'Wortley Tin Mill now a Rolling Mill Lord Wharnccliffe Vincent Corbett Esq. 2
Wheels ea. – 2" 3½ wide 4 ft head Aperture about 7 inches lifting shuttle Dam 4 or
5 acres'*

Further details relating to a sale notice in 1824 indicates the two wheels were 17ft 8in and 16ft 6in in diameter, with the presence of two air furnaces, smiths' and carpenters' shops, and eight cottages for workmen (Morley 2002). On 28th March 1847 the Earl of Wharnccliffe's agent Vincent Corbett, who was then tenant of the Wortley forges, wrote suggesting the closure of the former Tin Mill (Morley 2002). The building by this date was evidently in disrepair, and attempts were made to find a new tenant. Although initially rejected by the Sheffield steel firm Newbould & Sons in April 1847 due to expensive essential roof repairs, the works were

eventually taken on by Messrs Andrews Burrows & Co. who repaired the building and continued its operation as a sheet rolling mill. The site as depicted on the first edition Ordnance Survey (OS) map of 1855 during its occupation by Andrews Burrows and Co. shows surprisingly few changes from that depicted in 1801. The principal difference appears to be the rolling mill building in the centre of the site, which comprised in 1855 an 'L' shaped range with a detached structure to the south as opposed to the 'F' shaped structure in 1801. The other buildings, comprising the two rows of cottages at the edge of the Tin Mill Rocher and surrounding three structures appeared to remain the same. The mill was documented as still rolling in November 1879, but had been closed and become derelict by the end of the century (Morley 2002).

Correspondence from the last quarter of 1887 relates how the Earl of Wharnccliffe was looking to sell off the machinery at the Tin Mill, with a suggestion that the machinery had been 'blown up' in December of that year, destroying the rolls (Williams 2003). By the production of the 1893 OS map the site was evidently in decline, with one of the workshops north of the rolling mill demolished and the mill dam largely silted up. Interestingly, a well is marked on the spot of the former building, possibly indicating the building had been supplied with water. This decline was evidently complete by 1905 when the majority of works buildings are no longer depicted on the OS map of this date, leaving only the rows of cottages and the southernmost workshop. The cottages remained on the site until the northern cottage was replaced with a smaller structure between 1936 and 1955 and both that and the southern cottage were demolished between 1966 and 1976. An account of the works made in 1950 recalls how plant within the mill had still been *in situ* in the late 19th century (Andrews 1975, 55-56), presumably just prior to its demolition:

The mill was an oblong building and on either side of it was a water-wheel so arranged as to run in opposite directions and fitted with heavy stone segments within the rim to act as flywheels. Between the two water-wheels stood the rolling mill, one wheel driving the top roll, and the other the lower; there was no gearing to couple the rolls. Near the housings were platforms on which two men stood to manipulate the screws which raised and lowered the rolls, these of course being brought gradually nearer together as the sheet passed to and fro. The furnace for heating the blooms was similar to those used in the Sheffield Steel Works, the blooms being of special quality Charcoal Iron.

A great deal of the iron was made into sheets suitable for the shovel trade; an old order book showed that plates could be rolled from half an inch to five-eighths of an inch thick, down to quite thin gauges of sheet iron.

The 2013 survey of the site (Wessex Archaeology 2013) recorded evidence for three water wheel sites, comprising two east-west aligned wheels to the north and south of the mill site and a third north-south aligned wheel to the northwest. Assessment of the remaining structure suggests that the wheels aligned east to west were the earliest, and may have operated simultaneously, with one set of rollers was geared to run counter-clockwise to the other. The north to south aligned wheel appears to have been added at a later date, possibly between 1801 and 1855. In addition, several upstanding walls and the remnants of two buildings were identified outside of the mill area, comprising a possible pig-sty structure on the site of the

site of the former workers' cottages to the west, and an approximately 6 x 11m two-room structure to the east.

7 EXCAVATION RESULTS

Details of the trenches are given in Table 1, above, and the locations are shown on Figure 2. A list of all contexts recorded during the work is given in Appendix 2.

7.1 Trench 1

Trench 1 (Figure 3 and Plates 1 to 10) was located over a postulated east-west aligned wheel pit, determined from the surviving sluice gate and shuttle (Wessex Archaeology 2013, 37, features 108 and 109). The trench measured a maximum of 5.85m in length by 3m in width with a maximum depth of 0.50m and was aligned north-northwest to south-southeast.

The entirety of Trench 1 was covered with upper topsoil comprising loose, dark orange-brown sandy silt (101) with a high organic content including decomposing leaves and moss. Occasional fragmented structural debris was present in the topsoil including bricks and faced stone, some of which appeared to be burnt. This topsoil deposit varied in depth between 0.15m and 0.30m. In the south-west part of the trench, a lower topsoil deposit (102) was present, with a maximum thickness of 0.15m, immediately underlying (101). This lower topsoil (102) comprised loose black-brown sandy silt topsoil with similar inclusions to the upper topsoil. Immediately beneath these deposits was mid-yellow-brown sandy clay-silt with black-grey lenses (103 and 104) and abundant root disturbance. This deposit was noticeably more compact than the two overlying topsoil deposits and overlay all the structural archaeology in the trench. This earlier topsoil was originally assigned two separate numbers for each end of the trench, as it was initially unclear when first excavated whether they were the same deposit; further excavation proved this to be so. Beneath the succession of topsoil deposits in Trench 1, substantial structural remains were uncovered.

In the southern end of the trench a number of large stone slabs (113) were present, some of which contained socket holes, presumably acting as bases for associated machinery. Wall (129) (Plate 3) was identified at the extreme southern end of the trench, aligned east to west with a maximum of three courses visible, although the structure continued beyond the base of the trench. The upper two courses comprised two large, well-dressed stones, whilst the lower course was thinner and less well-dressed. The upper course was slightly off-set from the base, and a gap in the upper course revealed a flat slab with a north to south aligned incised groove. A possible floor surface (136) (Plate 4) associated with the wall was identified in the base of the trench comprising stone slabs that were discontinuous and somewhat uneven. A compact, mid-brown mottled clay-silt surface (135) immediately overlay the stone surface, which may have functioned as the original workshop floor surface, suggesting that the underlying stones (136) may be a foundation/levelling deposit. North to south aligned wooden timbers (124) (Plate 4) were cut into the floor surface (135), possibly the remnants of machine bases that would have provided noise and vibration reduction.

Slab (113) (Plate 5) was observed within the western edge of the trench, measuring 1.28m long by 0.44m wide (not fully exposed in width), with a thickness of 0.18m. Two fragments of heavily corroded iron were adhered to the stone, possibly the remnants of machine fittings, and a small, shallow rectangular socket hole was cut into the surface of the stone. At the northern end

of the slab an insertion had been cut into the corner to allow for the placing of slab (112). Slab (112) (Plates 5, 6 and 7) was a stone set upright within the trench, measuring 0.92m in width, 0.25m wide and protruding 0.33m above the base of the trench. The upper portion of the stone was neatly dressed with clear peck marks, although the lower part of the stone was more roughly dressed. The upper surface of the stone had three rectangular sockets and a smooth scar on the south-facing face. Two wooden timbers (116) (Plates 6 and 7) were placed within the cut [114] for slab (112), both aligned east to west, with one running along the north side of the slab and the other butting against the eastern end. A possible surface (105) (Plates 4 and 5) was identified to both the north and south of slab (112), comprising firm, compact, black and orange gritty clay-silt with frequent flakes of metal scale. Archaeometallurgical assessment (Appendix 6) of this residue confirmed that the metal flakes present in floor surface (105) were made up from flakes of iron oxide. The morphology of the flakes together with their archaeological context strongly indicate that they are scale associated with the rolling of ferrous metals. Further sediment analysis of the sediment that made up deposit (105) (Appendix 7) determined that the deposit contained relatively high concentrations of tin, indicative of manufacturing residue, and in the absence of other sources of contamination, it might be inferred that these concentrations of tin did arise from the tinning process or from other dumped manufacturing residues. Pottery (Appendix 3) recovered from the surface (105) included three pearl sponged fragments, three white earthenware fragments and one English brown stoneware fragment, all of which date to the late 18th and 19th centuries, which fits well with the known lifespan of the mill. Timber structures (116) (Plates 6 and 7) and (120) (Plate 8) appeared to be cut into the surface (105), with (120) possibly representing a wood-lined drain, capped with rubble (117). Pottery (Appendix 3) from within the rubble (117) and associated fill (119) included English brown stoneware, white earthenware, black glaze earthenware, transfer printed blue willow pattern, and further transfer printed fragments, suggesting a date for this feature of late 18th and early 19th century, again corresponding to the time that the mill is known to have been in operation.

The northern end of the trench was characterised by the former wheel pit, which was filled with loose topsoil backfill (106). The southern wall of the wheel pit was aligned east to west and comprised square-cut rectangular ashlar sandstone blocks (130) (Plate 9), of which two were exposed within the trench. This wall (130) was in alignment with the edge of the standing pentrough wall, located 2.22m to the east of the trench. The full depth of the wall was not exposed. The northern wall of the wheel pit was not exposed within the trench, with the pit itself full of rubble comprising ashlar sandstone blocks and other stone rubble, perhaps demolition material from the mill building, used as backfill after its destruction. The wheel pit itself could not be excavated due to the amount of rubble in it. Probing indicated that the base of the pit was 0.36m below the level reached.

At the north end of the north-eastern edge of the trench, a small extension was made in order to fully expose a large stone slab with iron fittings (121) (Plates 10 and 11). The slab was located approximately 0.15m from the outer edge of the southern wall (130) of the wheel pit, measuring 1.54m in length, 0.67m in width, with an exposed thickness of 0.40m, although the true thickness is unknown as it extended beyond the base of the trench. The surface of the slab was pecked with smooth sides, although was visibly less well-dressed than the wheel pit wall (130). Iron fittings were fixed on to the upper surface of this stone (121), set in a trapezoidal

arrangement. The two fittings on the northern end of the stone were placed 1m apart, whilst those on the southern side were placed 0.72m apart. The distance between the two rows measured 0.25m. The presence of these fittings, and their proximity to the wheel pit, suggests that slab (121) and the associated iron fittings formed the base for the mount of the water wheel axle. A possible floor surface (131) was observed to the south of slab (121), abutting it, comprising firm but fairly soft blackish orange-brown greasy silty clay. Frequent inclusions of slag/industrial waste were noted within this deposit, together with flat stones ranging in diameter from between 0.06 to 0.12m. This surface was cut by timber-lined drain (120). A possible I-beam was located in the gap between the wheel pit wall (130) and the slab (121), measuring 0.28m in length, 0.10m in width, with a visible height of 0.25m. An archaeometallurgical sample taken from the I-beam (Appendix 6) confirmed that the beam is constructed from ferrous metal, however there were no obvious indications to suggest whether the metal is wrought iron or mild steel.

Further investigations by the volunteers involved winching a large stone out of the wheel pit associated with Trench 1. This revealed a curved set of stones (Plates 23 and 24), which further volunteer research has established is a crown design by John Smeaton (patented 1794), designed to increase the speed of water onto the wheel (high breast-shot). Current volunteer research is focused on identifying any known links and similarities between this crown design and other mills in South Yorkshire, also believed to have been designed by John Smeaton.

7.2 Trench 2

Trenches 2 and 3 were originally intended to form one 10m by 1m trench, placed to investigate the assumed presence of a subterranean goit. However, due to the location of a footpath within the proposed location of the trench, it was decided to open two smaller trenches to either side of the footpath. Trench 2 (Figure 4 and Plates 11 to 13) originally measured 2m by 2m, however was extended 1m towards the north in an attempt to locate the goit, with the trench ultimately measuring a maximum of 3m in length by 2m in width. The trench achieved a maximum depth of 1m and was aligned north-northwest to south-southeast.

The stratigraphic sequence of Trench 2 comprised very dark brown clay-silt topsoil (201) with abundant root disturbance. The lower boundary of the topsoil was somewhat uneven due to the presence of tree and root disturbance, with the thickness of the deposit ranging between 0.30 – 0.50m. The topsoil was present across the entirety of the trench and contained abundant 18th-to 20th-century material including 158 fragments of pottery, over 100 glass fragments from vessels and windows, slate from roofing, plastic and metal toys figurines and numerous other domestic waste artefacts (Appendix 5).

Underlying the topsoil, a sequence of made-ground/dump deposits was observed. The first of these immediately underlay the topsoil (201) and comprised a thin dump/levelling deposit (202) consisting of fragmented bricks, mortar and stone rubble. Where large enough fragments existed to allow for inspection, most of the bricks were red and appeared hand-made and unfrogged, although occasional brick fragments were pale yellow firebricks. The maximum thickness of this deposit was 0.20m, and appeared to be present throughout the entirety of the trench, although was interrupted by a deep tree throw in the northern end of the trench. A layer of loosely compacted clinker/slag (203) was present underlying (202), present only in the

south end of the trench, possibly representing a dumped layer of waste material from the mill. This deposit had a maximum thickness of 0.20m and contained occasional fragments of pottery and clay pipe stem fragments. Archaeometallurgical assessment (Appendix 6) of deposit (203) proved that the deposit is almost entirely composed of small fragments of coal, coke and associated fuel ash slag. Four clay pipe stem fragments (Appendix 4) were recovered from this deposit, all of which are 19th century in date. Pottery (Appendix 3) fragments recovered from this deposit include English buff stoneware and sponged pearl ware, again indicative of a 19th-century date.

In the southern end of the trench, three thin dump deposits were present. The relationship between these three deposits was unclear, with indistinct boundaries. Deposit (204) comprised a lens of rubble, sand and mortar with a maximum thickness of 0.06m. To the south of this deposit and abutting it, pale yellow soft, sticky clay (207) was present, 0.03m thick and 0.78m wide, before extending beyond the confines of the trench. Deposit (207) overlay a small lens of very dark grey soft silt (208), 0.05m thick and visible for 0.50m in width before extending beyond the confines of the trench. No datable material was recovered from any of these three deposits.

In the centre of the trench, immediately underlying (203) and located to the north of the three dump deposits discussed above, was a small deposit comprised entirely of metallic flakes (205) (Plate 12), measuring approximately 1m by 0.50m, with a thickness of 0.08m. These flakes were directly comparable with the metallic flakes observed in surface (105) in Trench 1, hence it seems highly likely that deposit (205) represents a dump of waste material from the mill.

Underlying the above layers, a layer of thinly laminated deposits (206) was present, comprised of lenses between 5mm and 10mm thick, varying from dark brown to dark grey, all slightly clayey silt. As a whole, the deposit had a maximum thickness of 0.30m. All laminations within the deposit were roughly horizontally-bedded and were present throughout the entirety of the trench. Although different laminations were clearly present, they were often discontinuous and it was not possible to differentiate between the different lenses. Seven clay pipe stem fragments (Appendix 4) were recovered from deposit (206), five of which are formed out of white clay and are 19th century in date, and two pinkish clay stem fragments which are possibly slightly earlier, dating to the later 18th century. Twenty-three sherds of pottery (Appendix 3) were also recovered from this deposit (206), comprising a variety of wares, all of which date to the late 18th and 19th centuries. Underlying (206) was a layer of clinker and slag in a pale red-orange silt matrix (208), with a small amount of crushed brick and mortar fragments. This deposit was present throughout the entirety of the trench, however it was not excavated due to the depth of the trench exceeding 1m at the top of this deposit. One crudely-made 19th-century white clay stem fragment and one slightly earlier pinkish clay pipe stem fragment (Appendix 4) were recovered from this deposit.

No evidence of the subterranean goit was observed in Trench 2. All of the deposits encountered in Trench 2 represent made-ground/dump deposits compiled predominately from industrial waste material, suggesting that this area to the west of the mill was used as a dump for waste materials. The dating evidence from the ceramics (Appendix 3) and clay pipes (Appendix 4) recovered from these deposits indicate a late 18th-to 19th-century date, tallying with the period that the mill was in use. The large amount of 19th- and 20th-century artefacts within the topsoil

deposit in Trench 2 suggests that the area continued to be used as a dump after the mill was demolished, possibly by occupants of the nearby row of cottages.

7.3 Trench 3

Trenches 2 and 3 were originally intended to form one 10m by 1m trench, placed to investigate the assumed presence of a subterranean goit. However, due to the location of a footpath within the proposed location of the trench, it was decided to open two smaller trenches to either side of the footpath. Trench 3 (Figure 5 and Plates 14 to 16) ultimately measured a maximum of 2m in length by 2m in width, reached a maximum depth of 1.10m and was aligned north-northwest to south-southeast.

The stratigraphic sequence of Trench 3 comprised very dark brown silt topsoil (301) with frequent roots and common modern debris including pottery, glass, metal and brick (Appendix 3). The topsoil displayed a fairly uniform thickness across the trench, measuring between 0.26m to 0.34m. Due to time constraints, after removal of the topsoil deposit (301) across the majority of the trench, a sondage measuring 1.10m by 0.85m was dug in the south-eastern corner of the trench to a depth of 1.10m to explore the sequence of underlying deposits.

Immediately underlying the topsoil (301) was very compact grey silt (302) with approximately 80% clinker and slag inclusions and frequent inclusions of pottery, clay pipe and glass, all highly fragmented. This deposit displayed a fairly uniform thickness of approximately 0.24m. Thirteen clay pipe stem fragments (Appendix 4) were recovered from deposit (302), five of which were made out of white clay and are likely to be 19th century in date, and six 18th century pink/yellow clay pipe stem fragments. In addition, 30 pottery (Appendix 3) fragments were retrieved from this deposit, including black glaze earthenware, mottled brown glazed English stoneware, sponged scraps, transfer printed scraps, cream bowl fragments, pearl fragments and cream coloured earthenware, collectively dating to the late 18th and 19th centuries. Immediately underlying (302) was a deposit with a maximum thickness of 0.17m, comprising very fine laminations of yellow clay, compact brown clay-silt and blue-black clinker and slag (303). All the laminations were horizontally-bedded, although the intricacy of them meant that it was not possible to differentiate between the different layers. Immediately beneath this deposit was a thin deposit made up entirely of black clinker and slag (304) with a maximum thickness of 0.05m.

Beneath (304), very compact pale yellow clay with frequent horizontally-bedded and cross-bedded thin flat stones (305) was encountered, which upon first consideration was thought to be the natural geology. This was ultimately proved not to be the case. A single pottery fragment (Appendix 3) recovered from (305) comprised a brown streaky glazed manganese dusted mug fragment, dating to the late 18th and 19th centuries. Deposit (305) had a uniform boundary with the above deposit (304), however the lower boundary with deposit (306) was on a steep slant, diving down steeply towards the south-west, measuring 0.07m in thickness at the northern end of the trench and 0.40m in thickness at the southern end. Beneath this, pinkish brown silt with 80% slag and clinker inclusions (306) was encountered. Excavation was terminated at the upper surface of (306) due to the depth of the sondage having reached 1.10m below the ground surface. The nature of deposit (306) was comparable with deposit (208) in Trench 2, and considering that these two deposits exist at a similar level, it may be that they are in fact the same.

No evidence of the subterranean goit was observed in Trench 3. All of the deposits encountered in Trench 3 represent made-ground comprised primarily from industrial waste material, and, as with Trench 2, suggests that this area was used to dump waste material from the mill. The dating evidence from the clay pipe stem fragments (Appendix 4) in deposit (302) indicates an 18th- to 19th-century date, corresponding with the period that the mill was in use. Although some 19th- and 20th-century artefacts were recovered from the topsoil (301), the topsoil in Trench 3 contained markedly fewer artefacts than the topsoil Trench 2.

7.4 Trench 4

Trench 4 (Figure 6 and Plates 17 to 21) was located to investigate the above-ground remains of a former north to south aligned wheel pit, believed to post-date the wheel pit investigated in Trench 1 (Wessex Archaeology 2014, 36, features 105 and 106). The trench measured a maximum of 7.40m in length by 4.90m in width with a maximum depth of 0.60m, and was aligned north-northwest to south-southeast. Substantial structural remains were visible above the ground prior to opening the trench, and much of the work in Trench 4 comprised cleaning and further exposing the visible structures.

In-between the visible stones, the entire area of the trench was covered with dark grey-brown silt topsoil (401) which contained occasional finds of pottery (Appendix 3), glass and fragmented brick. The extent of the topsoil was patchy and discontinuous due to the presence of the upstanding structural remains, and where present the thickness varied between 0.12m and 0.36m. A small sondage was excavated in the north-eastern corner of the trench measuring approximately 0.7m by 0.7m, with a maximum depth of 0.75m. This demonstrated that immediately below the topsoil (401), pale yellow clay with frequent flat, cross-bedded stones (402) existed. Some of the structures at the northern end of the trench appeared to be within or directly upon this deposit. Immediately beneath this deposit was mid-grey clay-silt (403). This deposit was only exposed in the very base of the sondage.

The majority of the structural remains in Trench 4 comprised a well-built stone culvert. As only the upper courses of the structures were exposed and the bases were not reached, the relationship between the structures and underlying deposits was unclear, although it seems likely that the topsoil had built up around the structures, and the structures were likely cut into (402) as observed in the sondage at the northern end of the trench. A large north to south aligned wall (406) (Plate 18) was present in the western side of the trench, exposed for approximately 4.20m and continuing beyond the confines of the northern trench edge. Two courses of the wall were visible, however it extended further below the base of the trench. Each course measured approximately 0.30m in thickness and comprised large, sandstone ashlar blocks. Keyed into this wall, and running off the southern edge of it at a right angle in an eastern direction was wall (410) (Plate 19), again comprising large, sandstone ashlar blocks. One of the large stones at the eastern end of the trench had a small circular notch cut into it. This wall appeared to form an opening into the culvert, where a large, square-cut block of sandstone (409), measuring approximately 1m by 0.8m sat two courses above, acting as the stone capping. This stone sat upon the walls of the culvert (411), which abutted wall (410) (Plate 19). To the north, beyond the single stone capping (409), the culvert (411) was not visible above the ground surface. To the north-west of stone capping (409), and immediately to the east of wall (406) was a series of three well-worn stone flags (407) (Plate 18 and 20), 0.04m thick and in total present in length for 1.10m and 0.60m in width. Two nearby flags were present approximately 0.25m to

the south of this group of three, almost in line with them, however they were very loose and clearly not *in situ*, hence it is unclear whether they belonged to this structure.

A discontinuous north-south aligned wall (408) (Plate 18) was present approximately 0.20m to the west of wall (406), running directly parallel to it. As with wall (406), (408) was constructed from large ashlar blocks, with two courses visible, and each course measuring between 0.35m and 0.40m in thickness. At least one stone appeared to be missing from the wall, which terminated at the southern end but continued to the north beyond the confines of the trench. An east to west aligned wall (415) was present at the southern end of wall (408), running out from the base of it, exposed for approximately 0.10m and continuing to the west beyond the confines of the trench.

The southern end of the trench contained few structural remains in comparison to the northern end. A possible discontinuous wall (412) (Plate 21) was observed abutting wall (410), aligned north-south and comprising roughly cut stones, measuring 1.50m in length. Only one course was visible and it was unclear whether further courses continued beyond the base of the trench. The wall was built on a slope, dropping north to south from wall (410). To the west of the wall, immediately below the topsoil (401), dark brown clay-silt (404) (Plate 21) was present, with frequent inclusions of brick and stone rubble. It seems likely that this deposit represents deliberate backfilling after the construction of the culvert. At the very southern end of the trench, a lower opening for the culvert was evident in partially exposed stone block (413), which was almost identical to (409). A single stone (413), aligned east west and measuring 0.5m by 0.35m was present in-between wall (412) and capping (414); it did not appear to belong to either of these structures and may represent an east to west aligned wall that has been removed.

7.5 Trench 5

Trench 5 was placed over an area of high response from a metal detector, and was located at an outer corner of the former two-roomed structure identified during a previous survey (Wessex Archaeology 2013). The trench measured a maximum of 1m in length by 0.75m in width with a maximum depth of 0.29m.

The stratigraphic sequence of Trench 5 comprised very dark grey brown clay-silt topsoil (501), with frequent root disturbance and a fairly uniform depth of 0.30m. A piece of sheet metal measuring approximately 370mm x 370mm x 4mm was recovered from the topsoil deposit, overlying the structural remains beneath. The surface of the sheet was heavily corroded although a small area of the underlying surface texture of the metal suggests that it may be made from rolled wrought iron. It is possible that it may be a product of the rolling mill, however further analysis would be required in order to determine this (Appendix 6). A sample taken from the topsoil deposit (501) (Appendix 7) contained relatively high concentrations of tin. This may be indicative of manufacturing residues, and in the absence of other sources of contamination, it might be inferred that these concentrations are the result of tinning processes occurring at the site.

Immediately beneath the topsoil, a roughly east to west aligned brick wall was observed (502). The full extent of the wall was not exposed, hence the true dimensions are unknown. Two courses were visible although no mortar or bond was observed. The wall was constructed directly over what appeared to be a small brick-lined drain, slightly offset from the wall, with the

drain aligned roughly northwest to southeast. The brick lining (503) of the drain comprised highly abraded and somewhat fragmented red bricks, possibly re-used, arranged in two parallel rows, measuring a maximum of 0.25m in width, with the gap for the channel measuring 0.12m. The base of the drain was constructed out of roughly squared stone slabs, measuring approximately 0.13m by 0.09m and the smallest observed measuring 0.10m by 0.07m.

8 DISCUSSION

The aims of the evaluation were to determine the extent, condition, character, importance and date of archaeological remains within the site. Further objectives were aimed at identifying the potential for specific remains, including evidence relating to former industrial processes and the life-span of the mill, in addition to identifying any current threats or vulnerabilities. The project also aimed to provide volunteer and training opportunities on a range of archaeological techniques to the general public and local school groups.

The evaluation, in conjunction with the results of the previous surveys at the site (see sections 4 to 6, above), has indicated that archaeological remains do survive within the site, associated with the former mill building and associated structures and processes. The remains in Trench 1 form part of an east to west aligned wheel pit, with a large slab with iron fittings likely to be the remnants of the axle bracket for the wheel itself. At least two floor surfaces (135) and (105) were identified and one of these (105) contained metallic residue, which, following archaeometallurgical assessment (Appendix 6), confirmed that the metal flakes are flakes of iron oxide. The morphology of the flakes together with their archaeological context strongly indicates that they are scale associated with the rolling of ferrous metals. Other remains in Trench 1 include a timber lined, rubble capped drain, a series of stone slabs with insets, presumably for machinery inserts and a substantial east to west aligned wall. The presence of the wheel pit, probable wheel axle and rolling residue in Trench 1 strongly substantiates the supposition that industrial processes in the form of metal rolling was occurring at the site, driven largely by water power. Ceramics associated with the floor surface (105), where the rolling residue was present suggest that this floor was in use during the late 18th and 19th century, which corresponds with the period it is known the mill was in use.

Trenches 2 and 3 were intended to locate a subterranean goit, thought to exist running from the wheel pits investigated in Trenches 1 and 4 to feed water back into the River Don. No evidence of a goit was observed in either trench. The level of the existing visible depression of the goit was recorded as 137.555m AOD; Trenches 2 and 3, approximately 20m to the northeast of this level, achieved minimum elevations of 138.94m AOD 138.62m AOD respectively. Given that there is over 1m discrepancy in the levels of the base of the trenches and the visible depression of the goit 20m away, it seems probable that Trenches 2 and 3 were not deep enough to identify the goit, if it still exists. Both trenches contained successive deposits of made ground, largely made up from industrial waste material including, clinker, coal and fuel ash. Deposit (205) in Trench 2 was comprised entirely of metal flakes, identical to the metal flakes observed within floor surface (105) in Trench 1 which have been identified as rolling residue. As it is almost certain that deposit (205) represents waste material from the mill, it seems likely that the other industrial deposits encountered within Trenches 2 and 3 also originated from the mill, and the area where Trenches 2 and 3 were located was used as a dump for waste materials. The topsoil (201) in Trench 2 contained abundant 18th- to 20th-century artefacts, including pottery,

glass, plastic, bone, metal and building material. Topsoil in nearby Trench 3 contained similar artefacts but with much less frequency, suggesting that the area of Trench 2 in particular was used as a local dump up until fairly recently, possibly by occupants of the nearby now-demolished row of workers' cottages.

The majority of work in Trench 4 comprised the cleaning and exposing of visible above ground structures. A large stone-built goit was exposed, which would have fed water to power a north to south aligned wheel, thought to be later than the remains of the wheel pit recorded in Trench 1.

Trench 5 was excavated due to a high reading on a metal detector; the metal item in question proved to be a piece of sheet metal measuring approximately 370mm x 370mm x 4mm. The surface of the sheet was heavily corroded although a small area of the underlying surface texture of the metal suggested that it may be made from rolled wrought iron. It is possible that it may be a product of the rolling mill, however further analysis would be required in order to determine this (Appendix 6). Further remains in Trench 5 included a brick wall and a brick-lined drain, which may be associated with a poorly-preserved two-roomed structure that was located close to the trench. However, the confines of Trench 5 made it difficult to establish the full character and purpose of the archaeological remains within the trench.

The topsoil across the site was heavily disturbed by roots and the underlying geology was not encountered in any of the trenches. Where archaeological remains were observed, the below-ground remains were observed to be in generally good condition, although those remains that exist above the ground are clearly subject to active erosion.

In total, 20 individuals from the local community volunteered to help with the archaeological assessment of the site, during which time they developed skills such as archaeological excavation, drawing, survey and recording. Staff and pupils from the local Thurgoland Primary School also participated in the excavations and the site has proved to be a valuable community project, forging important links between community groups and teaching useful skills to the wider community.

9 CONCLUSIONS AND RECOMMENDATIONS

The results of the evaluation suggest that the survival of below-ground structural remains of the former mill is good, although remaining above-ground structural remains are subject to active erosion.

Possible machine bases, walls, floor surfaces and timbers were present in Trench 1, along with evidence of a former wheel pit and axel base for the wheel itself. Residues within identified floor surfaces are recognised to be rolling residue and indicate the type of work that was occurring at the mill from the early 1800's, after tin plating at the site had ceased. The remains of a second, probably later, wheel pit and associated goit in Trench 4 were also recorded, along with substantial accumulation of made-ground deposits in Trenches 2 and 3 and a wall and brick-lined drain in Trench 5.

The ceramic evidence (Appendix 3) from secure contexts across the site comprised mostly domestic utilitarian wares, which together with the clay pipe stem fragments (Appendix 4), form an assemblage of artefacts that can be expected to be associated with working industrial

environments of relatively low status. The artefacts recovered from the topsoil deposits cannot be considered to be secure; however, some of the finds associated with the topsoil, particularly those from Trench 2, suggest the area may have been utilised as a domestic dump for a sustained amount of time.

It is generally considered, based upon Angerstein's survey, that there were only four tin mills operating in the British Isles during the 1750's, with Wortley potentially being one of these four (Morely nd, 8). Whether Wortley Tin Mill did in fact manufacture real tin plate has not been confirmed by this assessment, with the majority of artefacts and residues recorded seemingly relating to metal rolling processes rather than the earlier plating processes that are thought to have occurred at the site. Nonetheless, the significance of the tin mill at Wortley should be considered to be at least of local to regional importance, and further excavations at the site will help to advance understanding of the layout of the mill complex, the lifespan of the associated buildings, and may prove to identify remains from the earlier processes occurring at the mill. This, together with further analysis of some of the metal artefacts and samples recovered from this excavation will also serve to better understand the progression of activities that were taking place at the mill. Such work could only be carried out with further funding.

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11 BIBLIOGRAPHY

Publications

Andrews, C. R. 1975. *The Story of Wortley Ironworks*. Mexborough : South Yorkshire Times Printing Company. Third Edition

Bayliss, D. 2012. South Yorkshire Industrial History Society Fieldwork Report on Wortley Tin Mill 1985. Unpublished Report.

Berg, 2001. R. R. Angerstein in his Illustrated Travel Diary 1753-55: Industry in England and Wales from a Swedish perspective.

Gibbs, F.W. 1955, The Rise of the Tinplate Industry. - V. Cockshutt on tinplate manufacture, in *Annals of Science* 11:2, pp. 145-153

Hunter, J. 1831. South Yorkshire: The History and Topography of the Deanery of Doncaster, Volume 2.

Hunter Archaeological Society, 1979. Correspondence.

Jones, M. 2000. *The Making of the South Yorkshire Landscape*, Wharnccliffe Books, Barnsley.

Lines, A., Marchant, J. and Ratcliffe, D. 2008. Unpublished. South Yorkshire Historic Environment Characterisation: South Yorkshire Archaeology Service, Sheffield, English Heritage, London. Database version date 08/02/2013.

Morely, C. nd. Two Early Tin Mills at Wortley and Masborough in South Yorkshire. Unpublished manuscript.

Morley, C. 2002. Forging thro' time: The story of the Wortley Iron Works. Unpublished manuscript.

Mott, R.A. 1970. The Early History of Wortley Forges.

Radley, J. 1963. Yorkshire Archaeological Journal 41, pp.81-97.

Scurfield, C. 2009. *4 Low Forge, Wortley, South Yorkshire: An Archaeological Evaluation*. CS Archaeology. Unpublished client literature report.

South Yorkshire Trades Historical Trust (SYHT) 2009. Forging Ahead: A Conservation Statement for Wortley Top Forge.

University of Sheffield. 2003. *Wortley 18th Century Rolling Tin Mill Survey Project*. Unpublished student report (AAP 367)

Wessex Archaeology. 2013. Wortley Tin Mill, Archaeological Desk-based Assessment and Survey. Unpublished client report. Available online at: http://archaeologydataservice.ac.uk/archiveDS/archiveDownload?t=arch-425-1/dissemination/pdf/wessexar1-150156_1.pdf [Accessed 2nd October 2014].

Williams, M. 2003. *History of Wortley Forges*. Unpublished document provided by B. Tylee of Hunshelf Parish Council.

Online Resources

British Geological Survey. 2012. Geology of Britain Viewer. Available at: <http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html?src=topNav> [Accessed 2nd October 2014].

Open Domesday. 2014. <http://domesdaymap.co.uk/> [Accessed 2nd October 2014].

Institute for Name Studies. 2014. <http://www.nottingham.ac.uk/ins/index.aspx> [Accessed 2nd October 2014].

Sheffield archive sources

Fairbank FB174 Fairbank field book dating to 1825.

Fairbank MB548 List of the Mills and other Works on the River Dun above Sandbed Wheels. Wh/M/D/503 1621 lease of iron smithies in Wortley.

Wh/M/637 The Valuation of the Manor of Wortley, Pilley, Hunshelve and Hoyland Swanne taken by John Craven, April 1737.

Wh/M/639 Wortley, Pilley and Hunshelf's 1750 Survey.

Wh/M/650 Valuation of Pilley and Hunshelf, c. 1800. – numbers on the plan correspond directly to the 1801 Wortley Estate Plan (Pen 12L).

12 FIGURES

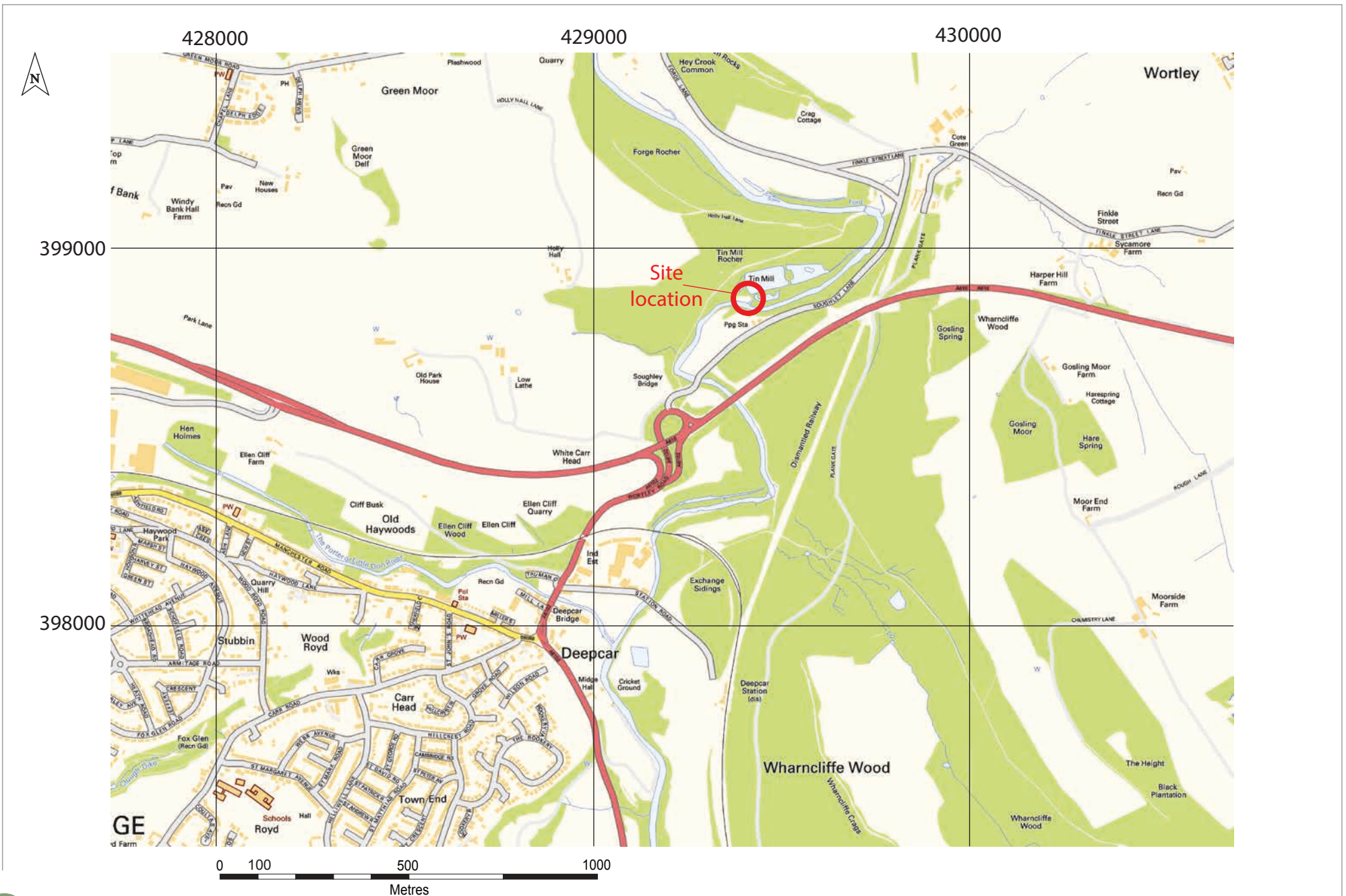


Figure 1: Site location



Figure 2: Trench plan and site survey (incorporating the 2002-3 University of Sheffield survey and the 2013 Wessex Archaeology survey)

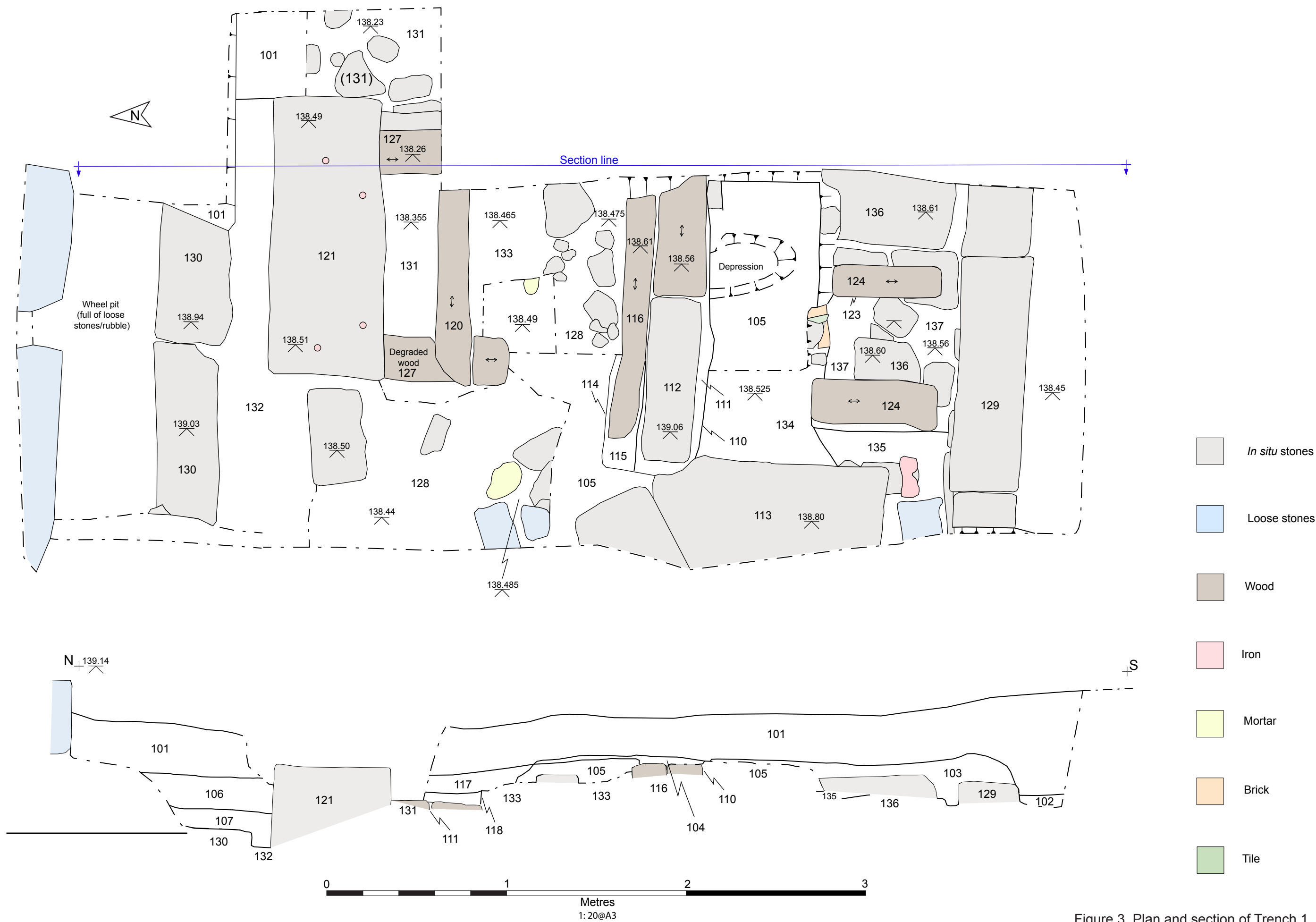


Figure 3. Plan and section of Trench 1

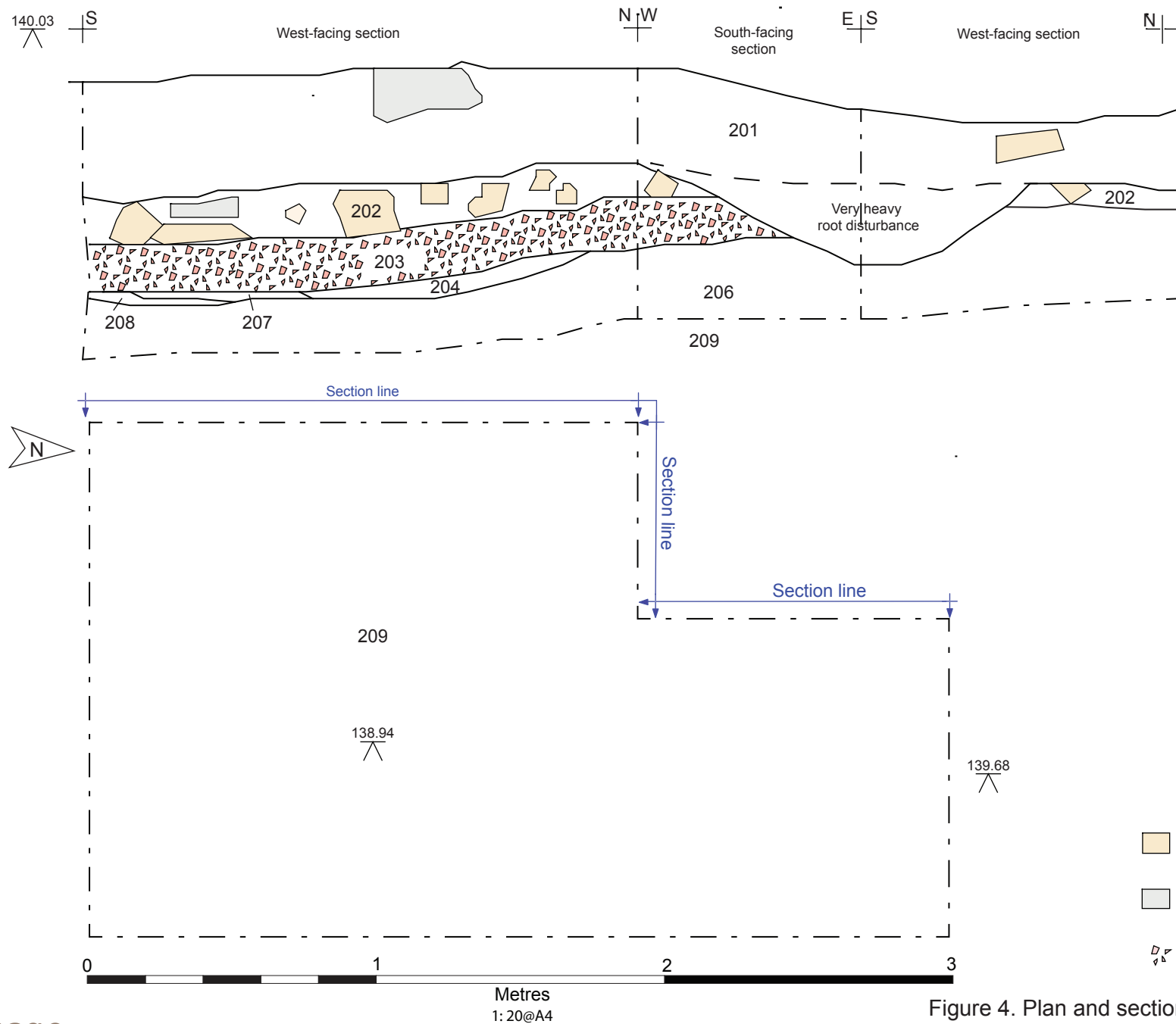
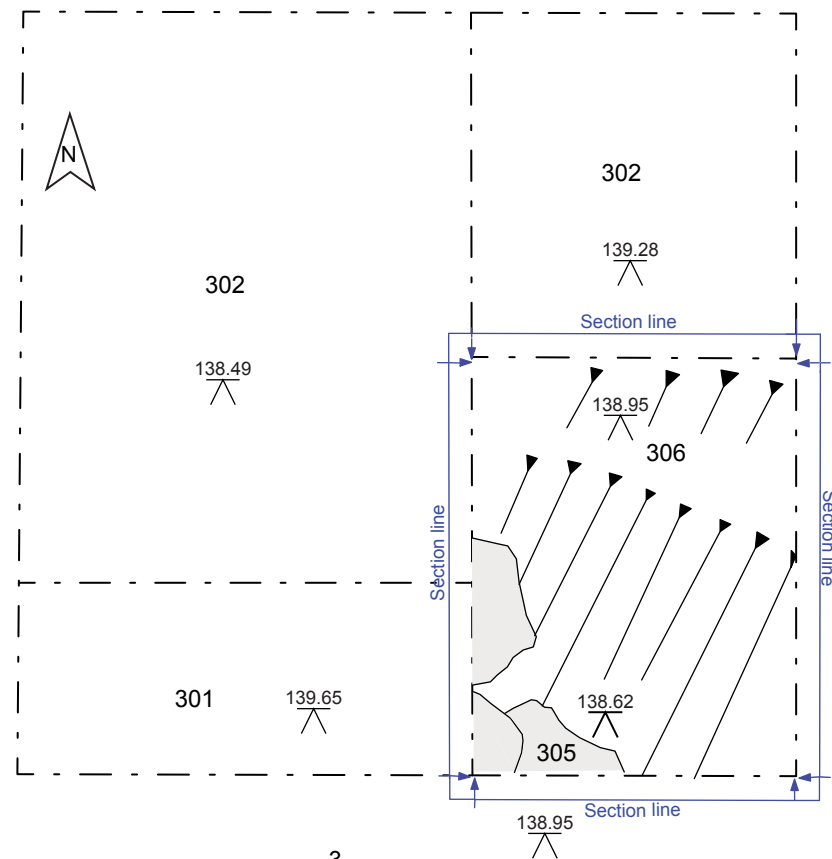
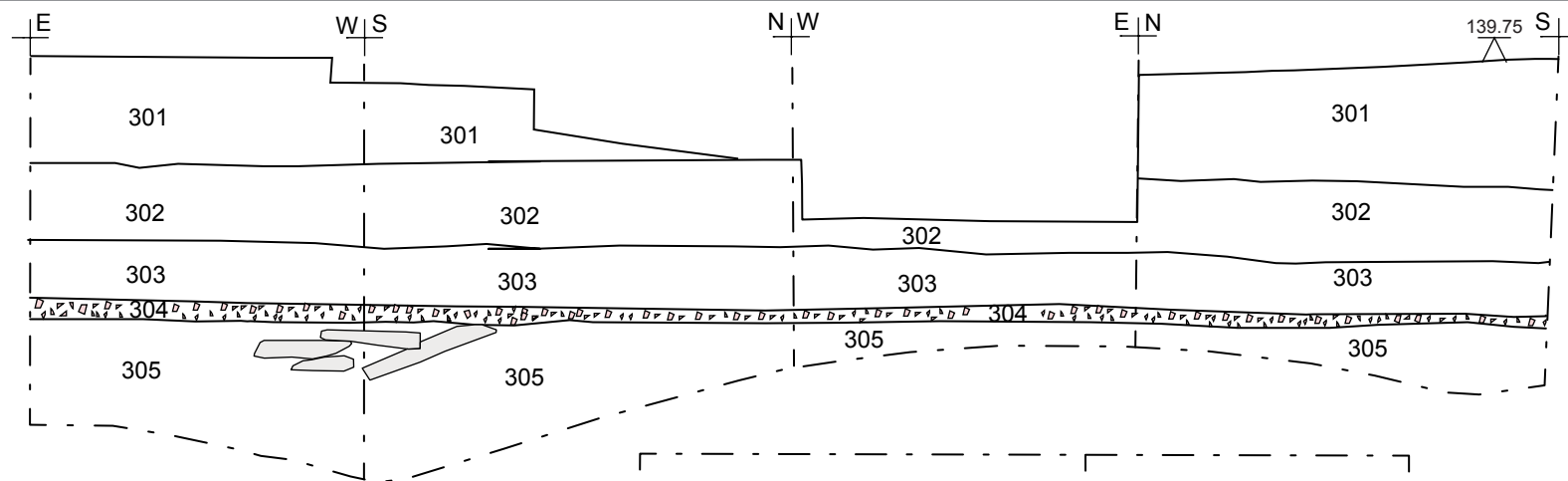




Figure 4. Plan and section of Trench 2



 Clinker/slag
 Stone

0 1 2 3
Metres
1: 20@A4

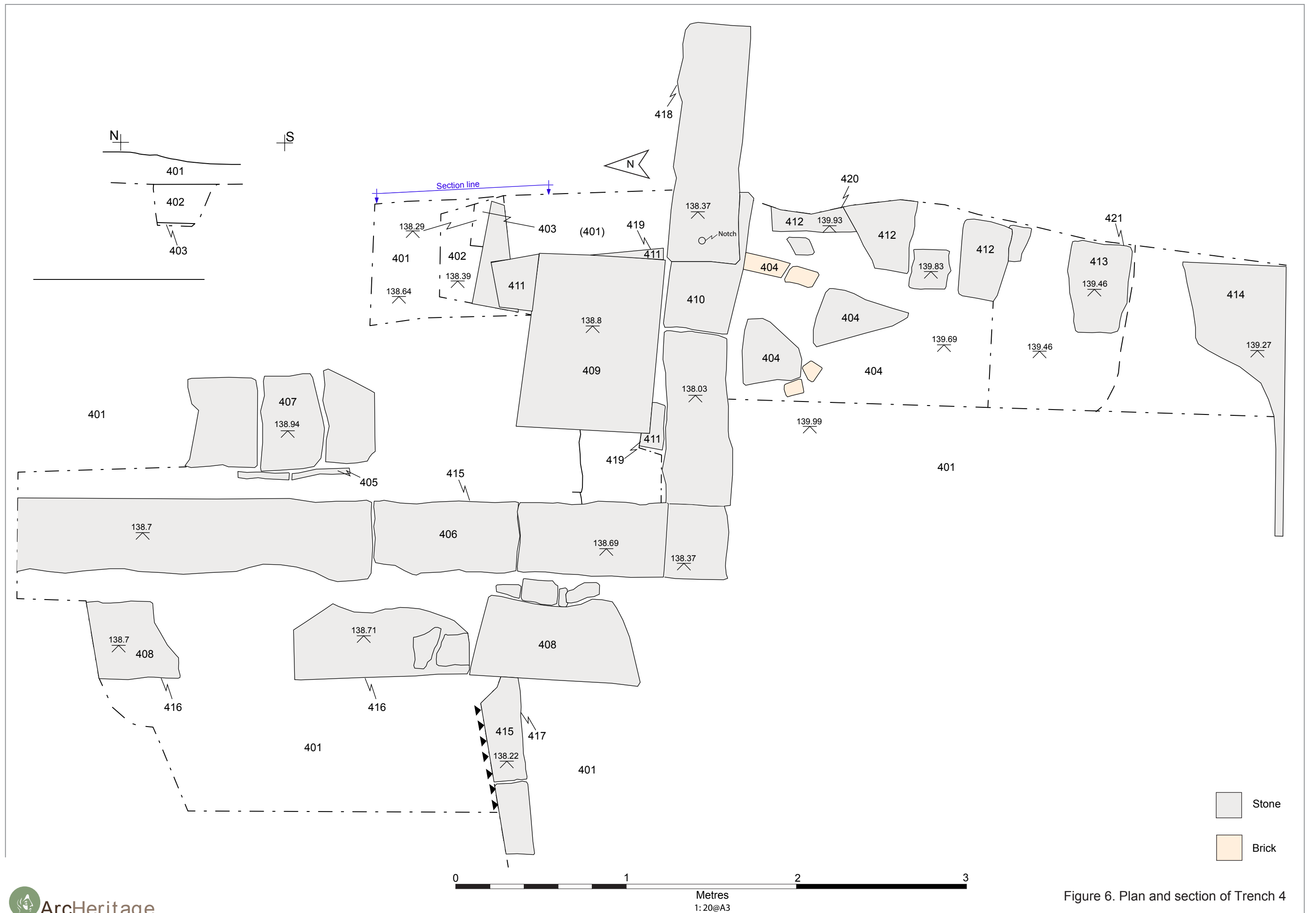
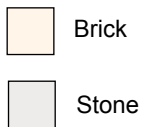
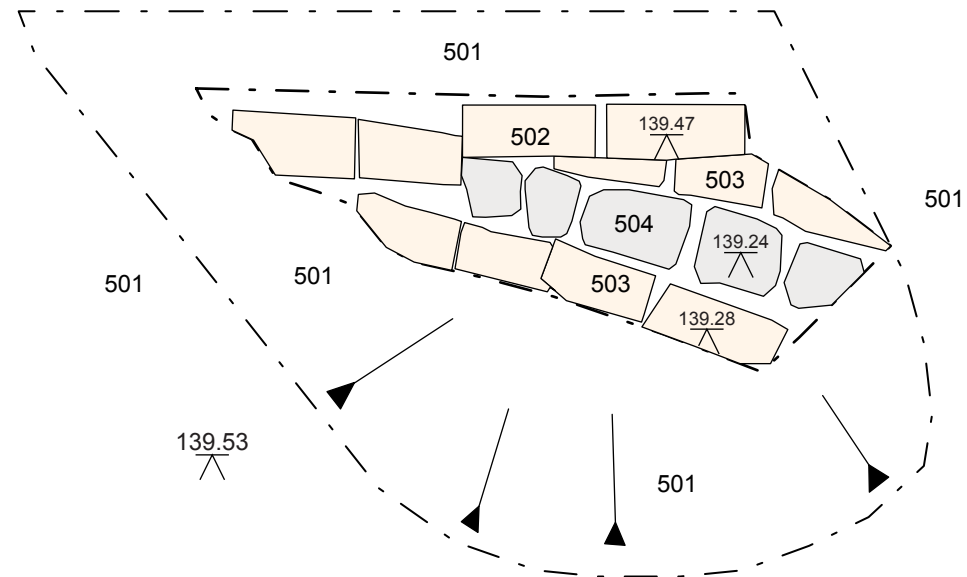


Figure 6. Plan and section of Trench 4



Metres
1: 10@A4



ArchHeritage

Figure 7. Trench 5 plan

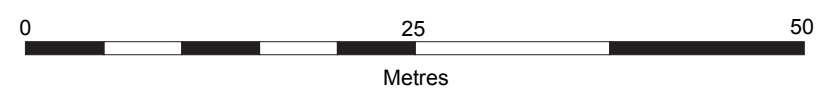
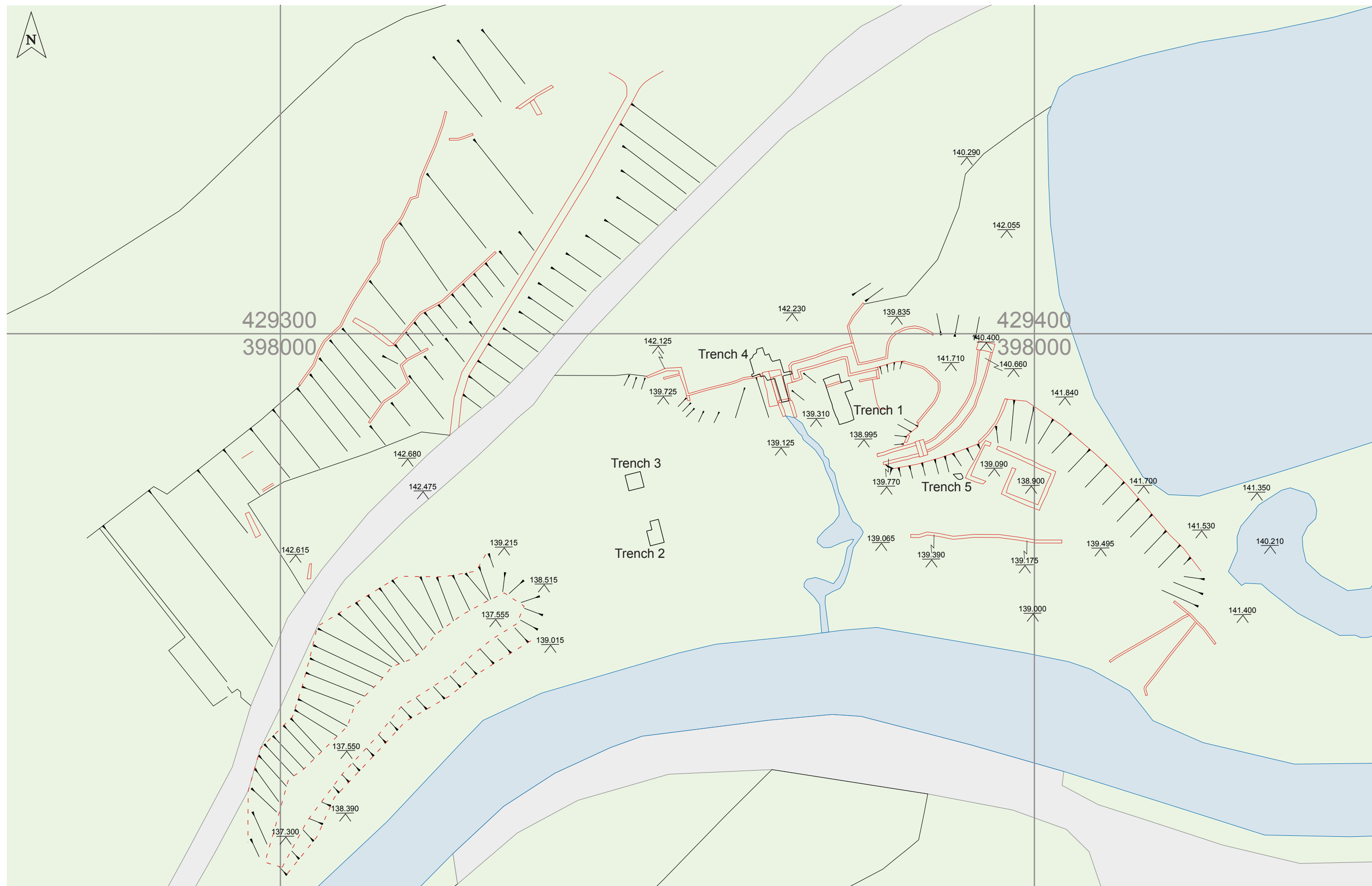


Figure 8: Levels across the site



Figure 9: Photographic location plan

13 PLATES

Plate 1: Trench 1, post-excavation, looking south.



Plate 2: Trench 1, post-excavation, looking south-west. Scale 1m and 0.40m.



Plate 3: Wall (129), Trench 1, looking west. Scale 1m.



Plate 4: Floor surface (105) with timber planks (124) overlying stone foundation layer (136) in the centre, with wall (129) on the left. Trench 1, looking east. Scale 1m.



Plate 5: Southern end of Trench 1, looking north, showing upright slab (112), possible machine base (113) and surface (105). Trench 1. Scale 1m.



Plate 6: Slab (112) showing detail of the sockets on the upright surface and supporting timber (116) to the left. Trench 1. Scale 1m.



Plate 7: Upright slab (112) and abutting timber (116), looking south, Trench 1. Scale 0.40m



Plate 8: Timber-lined and rubble-capped drain [118] and partially exposed wheel base and axle (121), looking west. Trench 1. Scale 1m.



Plate 9. Partially exposed wheel base and axel (121) on the right, and wheel pit wall (130) on the left, looking east. Trench 1. Scales 1m.



Plate 10. Fully exposed wheel axle (121). Trench 1, looking west. Scale 1m.



Plate 11: General view of Trench 2, post excavation, looking south. Scales 1m.



Plate 12: Trench 2, mid-excavation, showing the deposit of metal scale (205) at the base of the trench and twentieth century debris in the topsoil (201) protruding from the section edge on the right hand side. Looking west. Scale 1m.



Plate 13: Trench 2, post-excitation, looking west. Scales 1m.



Plate 14: Trench 3, post excavation, looking south. Scales 1m.



Plate 15: Trench 3, post excavation. Looking east. Scales 2m.



Plate 16: Trench 3, post excavation, detail of sondage in the south-eastern corner. Scale 0.40m.



Plate 17: General view of Trench 4, post-excavation, looking north. Scales 1m.



Plate 18: Wall (406) in the centre, with discontinuous wall (408) to the right and stone flags (407) to the left. The large square capping stone (409) of the culvert can be seen beyond flags (407). Trench 4, looking south. Scale 1m



Plate 19: Capping stone (409) laid upon the walls (411) of the culvert, with lower wall (410) visible at the bottom of the picture. Trench 4, looking north. Scale 1m.



Plate 20: Flags (407) with north-south aligned wall (406) at the bottom of the picture. Trench 4, looking east. Scale 1m.



Plate 21: Wall (412), Trench 4, looking east. Scale 1m.



Plate 22: Trench 5, showing detail of brick wall (502) and brick lined drain (503). Scale 0.40m



Plate 23: Curved stones within the wheel pit associated with Trench 1



Plate 24: Curved stones within the wheel pit associated with Trench 1

APPENDIX 1: INDEX TO ARCHIVE

Item	Number of items
Context register	5
Context sheets	50
Levels register	4
Photographic register	3
Drawing register	1
Original drawings	11
B/W photographs (films/contact sheets/CD-ROMs)	2 discs/2 negative sheets
Colour slides (films/contact sheets/CD-ROMs)	1 disc/1 negative sheet
Digital photographs	118
Finds register	1
Pottery archive	1
Sample register	1
Sample sheets	11
Written Scheme of Investigation	1
Report	1

Table 2: Index to archive

APPENDIX 2: CONTENTS REGISTER

Trench no	Context no	Description
1	101	Topsoil (upper)
1	102	Topsoil (lower)
1	103	Compact earthy deposit in southern end
1	104	Compact earthy deposit in northern end
1	105	Possible metalworking debris in southern end - surface
1	106	Loose topsoil fill of wheelpit
1	107	Reddish loose stony fill of wheelpit
1	108	Black silty fill of [109]
1	109	Cut into (105) filled by (108)
1	110	Cut into (105) for upright slab
1	111	Fill of cut [110]
1	112	Upright slab with machine slots for fittings
1	113	Horizontal slab adjacent to (112)
1	114	Cut into (105)for wooden structure (116)
1	115	Fill of cut [114]
1	116	Wooden structure in cut [114]
1	117	Stony deposit over (105) and cut/drain [118]
1	118	Cut of linear conduit/drain
1	119	Fill of cut [118]
1	120	Wooden structure within cut [118]
1	121	Big stone slab with metal fittings
1	122	Blackish silty fill of wheelpit
1	123	Cut for wooden structure (124)
1	124	Wooden structure in cut [123]
1	125	Fill of cut [123]
1	126	Blackish silty fill of area between (123) and (127)
1	127	Wooden structure in eastern section edge
1	128	Compact deposit under (117)
1	129	Wall at southern end
1	130	Wheelpit wall
1	131	Compact deposit south of (121) and cut by[118]
1	132	Deposit to the south of wall (130)
1	133	Compact deposit under (128)
1	134	Compact deposit under (105)
1	135	Compact deposit cut by (123)
2	201	Topsoil
2	202	Brick rubble
2	203	Clinker
2	204	Brick rubble and crushed sand/mortar
2	205	Dump of metallic flakes/scale
2	206	Compact surface

Trench no	Context no	Description
2	207	Pale yellow lens
2	208	Very dark brown/black lens
2	209	Pale pink clinker/slag layer
3	301	Topsoil
3	302	Very compact deposit
3	303	Series of finely laminated deposits
3	304	Thin slag/clinker deposit
3	305	Very compact pale yellow clay and sub-angular boulders
3	306	Pinkish-brown slag/clinker
4	401	Topsoil
4	402	Pale yellow clay
4	403	Grey silt
4	404	Rubble infill
4	405	Upright slabs abutting flags 407
4	406	Substantial north to south aligned ashlar wall
4	407	Row of three flags sitting upon topsoil 401
4	408	Discontinuous north to south aligned wall parallel to 406
4	409	Square stone capping for northern opening of goit
4	410	Substantial ashlar east to west aligned wall, keyed into 406
4	411	Walls of goit, supporting capping stone 409
4	412	Discontinuous north to south aligned wall
4	413	Possible robbed-out east to west wall
4	414	Partially exposed stone capping for southern opening of goit
4	415	Cut for 406
4	416	Cut for 408
4	417	Cut for 415
4	418	Cut for 410
4	419	Cut for 411
4	420	Cut for 412
4	421	Cut for 413
5	501	Topsoil
5	502	E/W aligned bricks
5	503	Brick edge of drain
5	504	Stone base of drain

Table 3: Context register

APPENDIX 3: POTTERY ASSESSMENT

Anne Jenner

Six contexts produced forty two sherds of domestic pottery which is mostly late 18th/19th century in date (Table 4, below). The sherds are mainly small and many have spalled surfaces, which may suggest that they are not all from primary contexts. The wares can be divided into post-medieval earthenwares, stonewares and fine wares.

The earthenwares include black glazed open forms, possibly from pancheons or bowls, for food preparation and storage, and manganese and mottled brown wares, possibly for drinking.

The finewares include pearl, cream, sponged and transfer-printed ware dishes, plates and cups for tea drinking and eating. None of the decorative schemas suggest any great level of wealth. Sponged wares and transfer printed wares were mass produced in the 19th century and were not expensive to buy. However, one complete profile of a cream china dish has a handpainted over glaze # mark under the base. The fact that this piece is marked suggests that it was a more valued item for use at table.

The stonewares are all English in origin and possibly made locally in Yorkshire and Derbyshire. Forms include shiny brown bowls decorated with incised decoration and perhaps used for storing food. The simple incised decoration might suggest that they were used on the table. Stoneware bottles may have been used for blacking, or to contain ale. One buff stoneware mixing bowl rim also points to food preparation such as home baking.

Recommendations for further work

The sherds are mostly too small to devote any further time to analysis of form and function. Despite this, it might be of interest to identify the mark under the fine vessel mentioned above as this may shed light on its origin and perhaps say something of the connections that the owners/users had at the time.

Context	Quantity	Dating	Details
105	7	late 18th/19th century	3 pearl sponged, small; 3 white earthenware, small; 1 English brown stoneware, small/medium
117	4	late 18th/19th century	1 English brown stoneware ?bottle, Nottingham type with shiny glaze, large; 1 English brown stoneware, Nottingham type bowl with incised decoration, large; 1 white earthenware, medium; 1 post medieval earthenware, open form with black glaze, small
119	2	19th century	1 transfer printed dish rim blue ?willow pattern, small/medium; 1 transfer printed with thin blue band inside rim, small
203	6	19th century	3 English buff stoneware small to large; 1 shale or burnt organic, small; 2 sponged pearl ware cup rim body handle with moulded trefoil terminal, small/medium
206	23	late 18th/19th century	2 banded slip closed form yellow ground, very small; 1 flow blue scrap; 1 English buff stone ware pudding bowl rim, large; 1 white earthenware with blue stripe, closed form, small; 1 cream china dish profile with hand painted over glaze # mark under base, large; 3 banded slip closed form plain yellow ground, small; 1 white earthenware jar body with light brown under white glaze, inside unglazed out, medium; 1 fine stoneware jar base, white glaze inside, lustrous spot under base, small; 1 English brown stoneware scrap; 5 white earthenware, very small; 2 cream jar base; 1 Cistercian type, small; 2 mottled brown glazed, very small; 1 white earthenware with white glaze inside and yellow out, small
302	30	late 18th/19th century	1 post medieval earthenware with black glaze rim, open form, small; 1 mottled brown glazed, very small; 8 English brown stoneware including one with incised decoration, very small; 8 sponged scraps; 3 transfer printed scraps; 2 cream bowl rim joining sherds with beaded rim, small; 1 pearl, small; 6 cream coloured earthenware, very small
305	1	late 18th/19th century	1 brown streaky glazed manganese dusted ?mug, very small

Table 4: Pottery assessment from secure contexts

APPENDIX 4: CLAY PIPE ASSESSMENT

Five contexts produced 27 clay pipe fragments deemed suitable for assessment, which are all late 18th/19th century in date (Table 5, below). The assemblage is fragmented and abraded, with no wholly complete bowls and only relatively small stem fragments.

It is not recommended that the clay pipe assemblage be retained, as its value for further study is highly limited.

Context	Context description	Material description	Date	Description
106	Trench wheel pit backfill	Clay pipe bowl x1	19th century	1 19th century bowl with 'Prince of Wales Feathers' and bird on a branch designs. Milling marks around bowl. Such milling marks were a sign of quality on earlier 17th/18th century bowls, and this pattern may have been copied from such earlier designs. Many pipes were bought from public houses. The Prince of Wales feather motif was very common and may represent the name of the pub it was bought from, or to show loyalty to the Prince of Wales. The bird may be a dove, but is too abraded to be certain.
203	Trench 2 made ground	Clay pipe stems x 4	19th century	4 19th century white clay stem fragments
206	Trench 2 made ground	Clay pipe stems x 7	19th century	5 19th century white clay and 2 pinkish clay stem fragments which are possibly dating slightly earlier to the later 18th century
209	Trench 2 made ground	Clay pipe stems x 2	19th century	1 19th century white clay stem fragment (crudely made) and 1 slightly earlier pinkish clay fragment
302	Trench 3 made ground	Clay pipe stems x 13	18th/19th century	5 19th century white clay and 6 18th century pink/yellow clay fragments

Table 5: Clay pipe assessment

APPENDIX 5: BULK FINDS QUANTIFICATION

A basic description and quantification of the remainder of artefacts recovered across the site is detailed in Table 6, below. Generally the finds represent domestic activities and are typical 18th-, 19th- and 20th-century artefacts of relatively low wealth and social status. The majority of finds were recovered from the topsoil deposit in Trench 2. It is not recommended that the artefacts from any of the topsoil deposits be retained (101, 201, 301, 401, 501) as they are contextually insecure.

Context	Context description	Material type	Material description	No of items
101	Trench 1 topsoil	Ceramic	Ceramic	9
101	Trench 1 topsoil	Charcoal	Charcoal	2
101	Trench 1 topsoil	Fe	Metal objects	17
101	Trench 1 topsoil	Glass	Glass	2
101	Trench 1 topsoil	Stone	Stone	8
103	Trench 1 lower topsoil	CBM	CBM	3
103	Trench 1 lower topsoil southern end	Ceramic	Ceramic	2
104	Trench 1 lower topsoil northern end	CBM	CBM	16
104	Trench 1 lower topsoil northern end	Ceramic	Ceramic	13
104	Trench 1 lower topsoil northern end	Glass	Glass	1
104	Trench 1 lower topsoil northern end	Slag	Slag	1
105	Trench 1 metalworking surface	CBM	CBM shards	4
105	Trench 1 metalworking surface	Slag	Slag	1
105	Trench 1 metalworking surface	Stone	Stone	5
105	Trench 1 metalworking surface	Wood	Wood	16
106	Trench 1 topsoil backfill of wheelpit	CBM	CBM	8
106	Trench 1 topsoil backfill of wheelpit	Ceramic	Ceramic	3
106	Trench 1 topsoil backfill of wheelpit	Glass	Glass	2
106	Trench 1 topsoil backfill of wheelpit	Slag	Slag	1
106	Trench 1 topsoil backfill of wheelpit	Stone	Stone	4
107	Trench 1 topsoil backfill of wheelpit	Ceramic	Ceramic	7
107	Trench 1 topsoil backfill of wheelpit	Fe	Iron	1
107	Trench 1 topsoil backfill of wheelpit	Slag	Slag	3
108	Trench 1 topsoil backfill of wheelpit	CBM	CBM	7
108	Trench 1 topsoil backfill of wheelpit	Glass	Glass	5
108	Trench 1 black silty fill of wheelpit	Wood	Wood	1
115	Trench 1 fill of cut for wooden timber (116)	Glass	Glass fragment	1
117	Trench 1 stony deposit over (105) and cut/drain [118]	CBM	Brick fragment	1
117	Trench 1 stony deposit over (105) and cut/drain [118]	Fe	Metal pieces	3
119	Trench 1 fill of cut [118] of drain	CBM	CBM	3
119	Trench 1 fill of cut [118] of drain	Wood	Wood	5
124	Trench 1 timber in cut [123]	Wood	Wood fragments	2
201	Trench 2 topsoil	Brick	Brick fragments	6
201	Trench 2 topsoil	Ceramic	Ceramic shards	12
201	Trench 2 topsoil	Ceramic	Ceramic Tile	34
201	Trench 2 topsoil	Ceramic	Ceramic	156
201	Trench 2 topsoil	Ceramic	Clay Pipe stems	3

Context	Context description	Material type	Material description	No of items
201	Trench 2 topsoil	Fe	Compact/mirror	1
201	Trench 2 topsoil	Fe	Metal objects	26
201	Trench 2 topsoil	Fe	Iron tongs	1
201	Trench 2 topsoil	Fe	1 toy tractor + 3 pieces toy car	4
201	Trench 2 topsoil	Fe	Metal machine pieces	4
201	Trench 2 topsoil	Fe	Toy	1
201	Trench 2 topsoil	Glass	Glass fragments	160
201	Trench 2 topsoil	Glass	Lenses (Glasses)	2
201	Trench 2 topsoil	Glass	Glass bottles	4
201	Trench 2 topsoil	Glass	Glass bead	1
201	Trench 2 topsoil	Non Fe	Metal doorknob	1
201	Trench 2 topsoil	Non Fe	Batteries	2
201	Trench 2 topsoil	Non Fe	Tin lids	4
201	Trench 2 topsoil	Plastic	Toy figure	1
201	Trench 2 topsoil	Plastic	Plastic glasses frame + tube	2
201	Trench 2 topsoil	Shell	Shell	2
201	Trench 2 topsoil	Shell	Shell	12
201	Trench 2 topsoil	Stone	Stone	6
206	Trench 2 compact make-up layer	Slag	Slag	3
206	Trench 2 compact make-up layer	CBM	CBM	4
206	Trench 2 compact make-up layer	Charcoal	Charcoal	2
206	Trench 2 compact make-up layer	Glass	Glass	3
209	Trench 2 clinker/slag layer	Charcoal	Charcoal	1
209	Trench 2 clinker/slag layer	Slag	Slag	1
301	Trench 3 topsoil	CBM	Brick	1
301	Trench 3 topsoil	Ceramic	Ceramic	2
301	Trench 3 topsoil	Ceramic	Bead	1
301	Trench 3 topsoil	Ceramic	Ceramic	33
301	Trench 3 topsoil	Clay Pipe	Clay Pipe	5
301	Trench 3 topsoil	Fe	Metal debris	4
301	Trench 3 topsoil	Glass	Glass	4
301	Trench 3 topsoil	Glass	Glass	26
301	Trench 3 topsoil	Leather	Leather	2
301	Trench 3 topsoil	Leather	Leather fragments	3
301	Trench 3 topsoil	Non Fe	Transformers	3
301	Trench 3 topsoil	Stone	Stone	8
302	Trench 3 compact deposit	Charcoal	Charcoal	7
302	Trench 3 compact deposit	Non Fe	Lead whorl	1
302	Trench 3 compact deposit	Slag	Slag	1
305	Trench 3 pale yellow clay and boulders	Ceramic	Ceramic	1
305	Trench 3 pale yellow clay and boulders	Slag	Slag	1
306	Trench 3 pink-brown slag/clinker	CBM	CBM	4
401	Trench 4 topsoil	Brick	Brick fragment	1

Context	Context description	Material type	Material description	No of items
401	Trench 4 topsoil	CBM	CBM	4
401	Trench 4 topsoil	Ceramic	Ceramic	12
401	Trench 4 topsoil	Glass	Glass	1
401	Trench 4 topsoil	Glass	Glass	4
401	Trench 4 topsoil	Glass	Glass	5
401	Trench 4 topsoil	Pottery	Ceramic	4
501	Trench 5 topsoil	Metal	Metal x 3	1
501	Trench 5 topsoil	CBM	Brick x 5	1
Surface Finds		Glass	Glass	3
Surface finds	Trench 4	Metal (lead alloy?)	Machine component?	2

Table 6: Quantification of bulk finds

APPENDIX 6: SAMPLE ASSESSMENT

Dr R. Mackenzie

The following report is an archaeometallurgical assessment of the small assemblage of metallurgical samples and residues that were recovered during archaeological excavations at Wortley Tin Mill. The aims of this report are to provide a brief description of the materials recovered and assess whether further analysis of the material is likely to provide additional information about the site, or activities carried out there.

The assemblage has been visually examined and the results of the assessment are described below.

Results of assessment

The assemblage consists of three bulk environmental type samples, each approximately 5 litres in volume; 6 small samples of metal from a structural beam and one rectangular sheet of ferrous metal.

The two bulk samples (sample numbers 4 & 5) recovered from context 105 are predominantly composed of sandy soil with a moderate abundance of flakes of iron oxide. The flakes vary in size from around 3mm to 10mm across, and <0.5mm to around 2mm in thickness; some flakes appear to be more corroded on one side than the other. Both samples also contain fragments of friable iron rich concretions.

The bulk sample from context 203 (sample 1) is predominantly composed of fragments of fuel ash slag together with small fragments of coal and coke.

The small samples of metal (sample 12) are from the *in situ* I-beam associated with 132. The samples are ferrous metal, but there are no obvious visual clues to suggest whether the metal is wrought iron or mild steel.

The piece of sheet metal (sample 13) was recovered from topsoil within Trench 5. The piece of metal measures approximately 370mm x 370mm x 4mm (14½" x 14½" x ⅛") and its surface is heavily corroded. A small area of the underlying surface texture of the metal suggests that it may be made from rolled wrought iron.

Discussion and interpretation of results

The most diagnostic material contained in Samples 4 and 5 are the flakes of iron oxide. The morphology of the flakes and their archaeological context confirms that they are scale associated with the rolling of ferrous metals at the site. The reason why some flakes are corroded on one side is not known; although it is likely that the corrosion was influenced by the conditions in which the scale was deposited and its post depositional environment. It would be possible to investigate the chemistry of the surfaces of the partially corroded flakes using X-ray Fluorescence (XRF), but this technique can give very misleading results when used on corroded surfaces of archaeological metals.

Given what is already known about the site, it is unlikely that further analysis of the rolling scale will add significantly to the history of the site.

Sample 1 is almost entirely composed of small fragments of coal and coke and associated fuel ash slag; this type of material is a very common component of made ground on post-medieval to early 20th century industrial sites, and as such, its research potential is very limited.

The samples of metal from the I-beam may be of potential interest. If the I-beam was found in-situ, metallographic analysis of the metal could provide a terminus post quem for the beam.

The ferrous metal plate is potentially of research interest, as it may be a product of the rolling mill. Metallographic analysis would be able to determine what sort of metal the sheet is made from and whether it may relate to tin plating activities at the site.

Recommendations

Further analysis of bulk samples 1, 4 and 5 is not recommended, but a small representative sample of the hammerscale should be kept for the site archive.

Metallographic analysis of two samples of metal from the I-beam (sample 12) and one sample from the sheet metal (sample 13) is recommended.

It is recommended that a written report with an interpretation of the bulk samples and metallographic analysis is commissioned.

APPENDIX 7: ANALYSIS OF SOIL SAMPLES FOR TIN

Barry Tylee BSc DipSH FRMS CCP (for Hunshelf Parish Council). January 2015

Introduction

A community excavation was carried out at the site of an old mill in Tin Mill wood, in the parish of Hunshelf, Barnsley, during October 2014, led by ArchHeritage, with the purpose of determining whether the site did manufacture tinned iron products during its operation in the 18th century. Soil residue samples from a number of places around the site were taken with a view to determining the concentration of tin in them. It was not expected that any significant concentrations would be found, as it is at least 232 years since tinning was carried out at this site, and it would be likely that any tin in the soil would be washed out since then. Also, no artefacts were found that might be characteristic of the tinned products manufactured on the site, possibly because there were not any, or because they had decayed.

Sampling Positions

Samples were taken at the positions shown on the attached map (Plate 23). These were:

1. At the bottom of Trench 1 on the working floor surface (105), where the main mill building was located, where numerous pieces of rolling scale could be seen.
2. Topsoil very close to Trench 5 (although not within the trench itself), where a strong signal was obtained from a metal detector, indicating a non-ferrous artefact (this was later dug up and found to be a large piece of lead).
3. At a position near to 2 above, within Trench 5, where a strong metal detector signal was obtained, indicating a ferrous artefact (which turned out to be a large iron plate). The sample was taken at the bottom of the trench.
4. At the bottom of an excavation above the main trench, where the remains of a large stone building were found.

Sample Preparation

The samples were dried to constant weight, and then sieved through a 125 micron mesh sieve. There was not enough material from Sample 4 after sieving, and this analysis was discontinued.

Standard and Blank Preparation

It was originally thought that there were not suitable matrix- matched standards for the analysis, so one accurate standard (target about 5,000 ppm) was prepared to enable the existing calibration for the machine (a portable x-ray fluorescence machine) to be scaled. As in all analyses, it is important that a suitable blank is used in the analysis. This sample was taken from a location about 1 km from the site. This location had similar underlying sandstone bedrock (lower Carboniferous beds), was near another of Cockshutt's mills, Low Mill, and did have discrete amounts of ferrous slag, but as far as was known, no association with the Tin Mill. This soil was dried and sieved as for the samples.

The standard was prepared by dissolving a known mass of stannous chloride into dilute hydrochloric acid and evaporating this onto a known mass of the dried and sieved blank soil. This gave the standard a calculated concentration of 4,000 ppm. The concentration of tin in sandstone soils in areas where there are no tin deposits normally varies between 0 – 1 ppm (Geological Survey of Finland).

Analysis

The analysis was carried out on a Nitron 700 portable x-ray fluorescence machine in a static laboratory (Simpson *et al* 2006). This machine has been used extensively for soil analysis and is calibrated for soil with a particle size of 125 micron or less. The closer that the standards can be matched to the samples, the more accurate the results could be, as this machine is, at best, only capable of a semi-quantitative answer. Previous work (Simpson *et al* 2006) have established that the limit of detection is very dependent on the element being measured and is between 8 – 140 ppm, although another study (Environmental Technology Verification Report 1998) suggests 130 ppm for any element.

Discussion of Results

The results are given in Table 7, with the tin concentration in the samples measured by both the general soil standard and the specially prepared one. The prepared standard, using a similar soil matrix to the samples, is likely to be a better match to the samples than the general one, as it would have a similar mineral and silica content, as well as probably a large concentration of iron. As has been seen from the archaeometallurgical assessment of the samples from the trenches (Mackenzie 2014) the samples contained fuel ash slag, clinker, fragments of coal and coke and iron oxides.

The true concentration of tin in the samples is likely to be within the two figures given in Table 7. The three samples contained surprisingly high concentrations of tin, in addition to large amounts of iron and contamination with lead, manganese, arsenic and copper. The samples are typical of manufacturing residues, and in the absence of other sources of contamination, it might be inferred that these concentrations did arise from the tinning process or from other dumped manufacturing residues.

Sample I.D	Sn (using general std.)	Sn (using soil standard)	Fe	Mn	Pb	As	Cu
Blank	<LOD	<LOD					
Sample 1	454	577	10%	1192	381	63	320
Sample 2	1131	1436	20%	1487	391	72	643
Sample 3	233	296	60%	6070	677	118	1419

Table 7. Levels in ppm except Fe

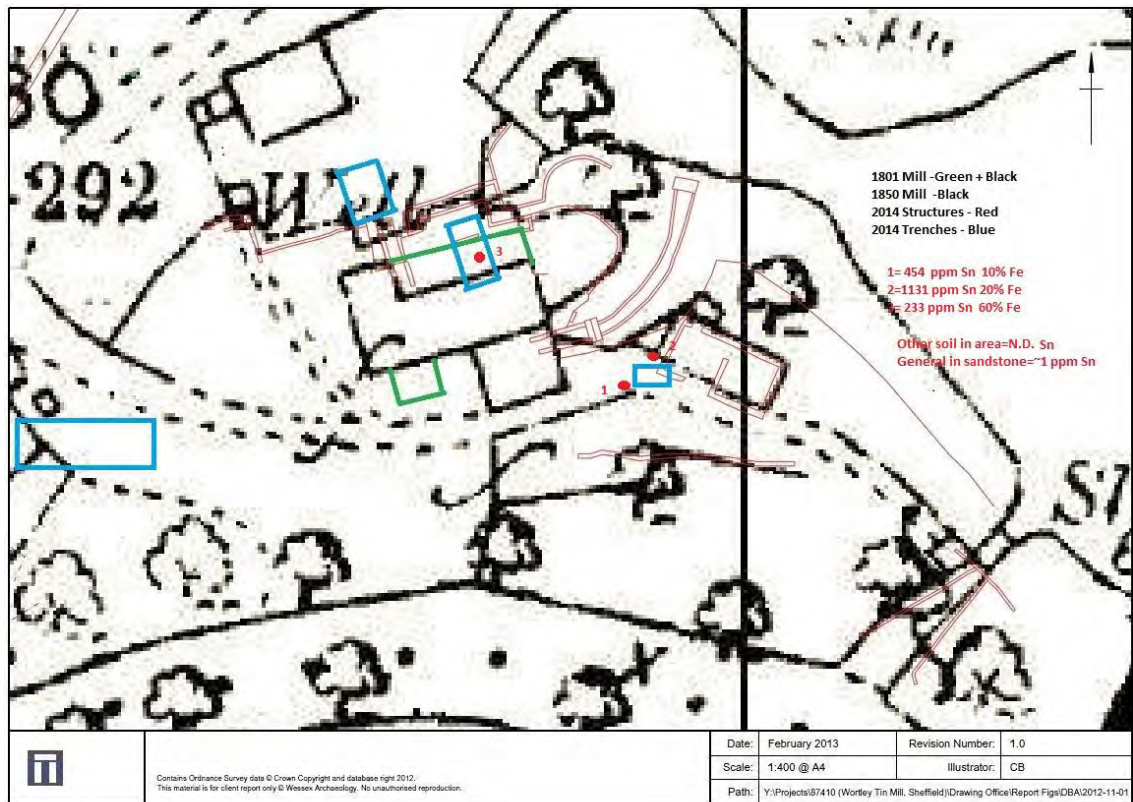
References

Environmental Technology Verification Report. 1998. *Field Portable X-ray Fluorescence Analyzer - Nitron XL Spectrum Analyzer* EPA/600/R-97/150 March 1998.

Geological Survey of Finland. weppi.gtk.fi/pub/foregsatlas/text/Sn.

Mackenzie, R. 2014. *Post-excavation assessment of archaeometallurgical samples recovered from the site of Wortley Tin Mill, South Yorkshire*. Analysis report to ArchHeritage.

Simpson, P., Crook, V., Rawson, B. and Wake, D. 2006. *Investigation of PXRF procedures for measuring contaminated land*. HSL Internal Report 2006/102.



Detail of Tin Mill survey overlain onto 1893 OS map

Figure 10

Plate 25: Sample locations



Plate 26: Sample cup components



Plate 27: Nitron pXRF

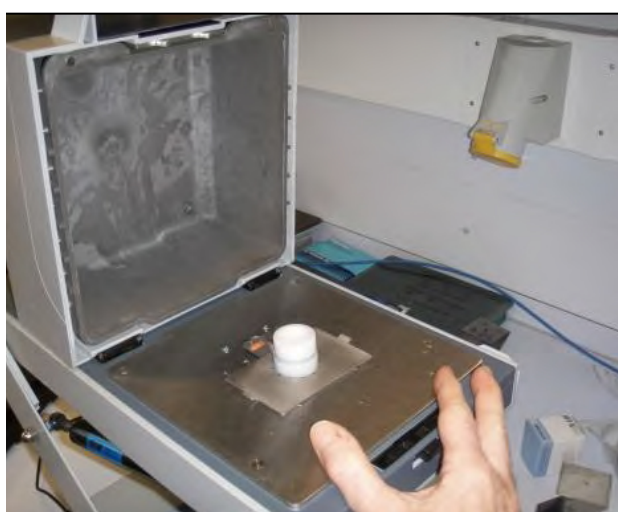


Plate 28: Presentation of sample to p XRF

APPENDIX 8: WRITTEN SCHEME OF INVESTIGATION

SPECIFICATION FOR AN ARCHAEOLOGICAL ASSESMENT INVOLVING A COMMUNITY EXCAVATION OF THE FORMER TIN MILL AT WORTLEY, HUNSHelf PARISH.

Brief provided by the client.

1 Summary

- 1.1 Wortley Tin Mill, Wortley (Hunshelf Parish), Barnsley (grid reference SK 293 988) is the site of a former water-powered rolling and plating mill on the River Don, close to the Wortley Top and Low Forges (both scheduled ancient monuments).
- 1.2 Documentary records suggest that the mill was in operation by 1744, becoming disused some time before 1870. The working of the mill was described by contemporary Swedish industrialist R. R. Angerstein, who visited the site in the 1750s. His account describes the making of tinned products at the site, with the tinning-process itself described in detail. However, later historians have argued that the 'tin-plate' produced at the mill is more likely to have been thin plates of soft carbon steel. This query is currently unresolved, however if shown to have been using tin the site would be the most northerly known tin mill in Great Britain.
- 1.3 The former mill buildings are thought to have been demolished during the late 19th and early 20th centuries, however the site has never been redeveloped and a number of visible features remain including stub walls, water management features and traces of other structures thought to be connected to the operation of the mill.
- 1.4 Hunshelf Parish Council has had an initial assessment carried out and is proposing to develop a community archaeology project to further investigate the Tin Mill site, with the permission of the site owners Wharncliffe Estate.
- 1.5 This project will build on the work carried out previously. A number of limited surveys were carried out by students from Sheffield University Archaeology Department. Also in 2012/13 a desk-based assessment and earthwork survey was carried out by Wessex Archaeology. This project will expand upon these initial surveys, to provide historical context, produce an interpretative plan of the site, and assess the archaeological significance of the structures and any current vulnerabilities.
- 1.6 Hunshelf Parish Council will form a Steering Group and appoint a project manager. The Steering Group will include members of Hunshelf Parish Council, South Yorkshire Industrial History Society and members from other local historical societies. The successful contractor should also liaise with other local stakeholders (including the fishing club who currently lease the mill pond and dam) throughout the project to keep them updated as work progresses.

Hunshelf Parish Council is currently bidding for funding for this project from the Heritage Lottery Fund's 'Your Heritage (<£10k)' programme and is seeking competitive tenders for this work in the form of a costed project design, with an itemised quotation based on the requirements set out in this specification.

2 Site location and description

- 2.1 The site is located close to Soughley Bridge on the River Don, south-west of Wortley, in the Parish of Hunshelf, Barnsley, South Yorkshire, centred on grid reference: SK 293 988. The site and surrounding woodland is owned by the Wharnccliffe Estate. The mill dam and reservoir are currently leased from the estate to a private fishing club.
- 2.2 The site is located within woodland and is currently overgrown. The survey area comprises the remains of the former mill building(s), two rows of cottages, associated water management system (including the former weir, dam and reservoir) and other ancillary structures connected to the operation of the mill (see attached photographs).
- 2.3 The site has vehicular access along a private track from Wortley Road/Soughley Lane, and pedestrian access from a public footpath over a footbridge from Cherry Tree cottages.
- 2.4 The site is not designated, although it is included on the South Yorkshire Sites and Monuments Record (reference PIN 4571).

3 Aims and Objectives of the Project

- 3.1 The aim of the project is to gather sufficient information to establish the site's layout and operation of the former industrial processes at the site, and the presence/absence, character, extent, state of preservation and date of any archaeological and historic features and deposits within the survey area (as far as possible within the limits of this specification).
- 3.2 Specific objectives of the survey are to:
 - **Establish a small-scale community project** working with the Steering Group, local societies and schools to excavate and put in trial trenches at target areas within the site, to determine the extent, condition and character of any archaeological remains present. The project will enable local people to learn more about the heritage of this site, and may involve the successful contractor outling the finds to local people and schoolchildren.
 - **Provide volunteer and training opportunities** for no less than 15 volunteers from Hunshelf Parish Council and other local interest groups, including training in a range of archaeological techniques
 - **Organise a short public event** (in collaboration with the Hunshelf Parish Council to explain the results of the excavations to volunteers and members of the public on the last day of site work, before the trenches are backfilled.
 - **Produce material for potential use in interpretation and display** including photographs and drawings of finds and uncovered archaeological deposits 3.3 This work should be treated as an evaluation, and every effort should be taken to destroy as little of the underlying archaeological deposits as possible.
- 3.4 Some of the trial trenches may be situated near a public footpath and fishermen's paths, and the successful contractor should therefore expect members of the public to visit on an ad hoc basis throughout the period. In addition it is likely that local schools may be interested in this activity and would visit under supervision.
- 3.5 It is anticipated that the site work will be completed over a couple of weeks (to include at least one weekend) during spring 2014, although specific project dates should be agreed by the successful contractor in consultation with Hunshelf Parish Council.

4 General Guidelines

- 4.1 It is not known how deep the excavation may be; the object will be to enable an understanding of the water courses and mill processes to be made, including finding the working floor area. Although it is likely that any archaeological deposits will be close to the surface, it is not known if there were, for instance cellars. Therefore provision should be made for excavations of suitable depth and for the movement of large stones.
- 4.2 Trenches are to be recorded according to the normal principles of stratigraphic excavation.
- 4.3 The stratigraphy of each trial trench is to be recorded, even where no archaeological deposits have been identified. No archaeological deposit should be entirely removed unless this is unavoidable.
- 4.4 Human burials are not anticipated, however should any human remains be encountered they must initially be left *in situ* and, if removal is necessary, this must comply with the relevant Ministry of Justice, Diocesan and other regulations, as appropriate.
- 4.5 All finds that are 'treasure' (in terms of the Treasure Act 1997) will be reported to the Coroner and appropriate procedures then followed.
- 4.6 All finds are to be treated in accordance with the EH guidance document *A Strategy for the Care and Investigation of Finds* (1995) and the UKIC's document *Guidelines for the Preparation of Excavation Archives for Long Term Storage*. In particular, all ferrous objects and a selection of non-ferrous objects (including all coins), will be x-radiographed and costs for this should be included in the tender. In addition it might be necessary to carry out a metal analysis of some of the finds, to determine whether tin is present.
- 4.7 All finds will remain the property of the landowner(s) unless otherwise agreed. All finds should be recorded and analysed at the end of the project, and then deposited with Barnsley Museums for long-term storage. The options for finds deposition should be agreed with the landowner(s) before the project begins.
- 4.8 The actual areas of trenching and any archaeological features noted within the trenches, must be accurately located on a site plan and recorded by photographs, summary scale drawings, and written descriptions by the contractor.
- 4.9 All trenches will be planned at 1:20. One representative long section of each trench will be produced, at an appropriate scale. Sections and/or profiles of each feature will be drawn at 1:10 or 1:20, depending on the size of the feature. All plans, sections and profiles will be related to Ordnance Datum, in metres.
- 4.10 It is not anticipated that there will be any service pipes or cables etc. crossing the site, however the archaeological contractors will be responsible for locating any which cross any of the trench lines, and for taking the necessary measures to avoid disturbing such services.
- 4.11 Contingency provision should be made for additional specialist advice, e.g. for finds analysis and conservation.

5 Trial Trenches

- 5.1 It is hoped that a number of trenches could be excavated, but would depend on the complexity, depth, and the resources available including the number of suitable volunteers. The initial archaeological assessment has shown a number of areas, which are listed in order of priority below:

- 5.2 The first target area will be located near the remaining stone structure (called wheel 2). This should enable the floor of the main working area of the mill, the wheel pit and direction of water courses, to be established. This trench could then be developed south towards wheel 1 (see photographs 1 and 2).
- 5.3 The next target area is the two roomed building, south east of wheel 1. This may be contemporaneous with the main mill building, or of later construction.
- 5.4 Another target area would be the site of Wheelpit 3 and any tail goit remains, which appears of later construction.
- 5.5 The final target area could be the possibly calverted main tail goit.
- 5.6 The successful contractor will organize the necessary digging equipment and supervise the excavation of the test pits across the target area by volunteers.
- 5.7 The trenches will be filled in on completion of the site work, and the area made safe.

6 Photography

- 6.1 Record photographs should be taken of all features, as well as general shots of both trenches at different stages during the excavation (as a minimum this should include before excavation, mid excavation and after excavation before and after the trench is back filled).
- 6.2 Record photographs should be taken using film or slide film. The medium used for photography and photographic prints should be of archive quality and the consultant should provide details of the selected format and materials, and obtain confirmation that the method and materials from the project manager.
- 6.3 Photographs must be accompanied by a plan(s) showing the position from which the photographs were taken and the approximate axis of each shot.
- 6.4 Photographs must also be accompanied by a register detailing the subject, the date taken and the name of the photographer.
- 6.5 Prints should be at least 6" x 4" and should be labelled on the reverse either in HB pencil (taking care not to damage the print) or using printed self-adhesive labels. Labelling must include the site name and national grid reference, date recorded, photographer's name.
- 6.6 Prints and negatives should be presented in archivally stable envelopes and negative sleeves, such as Kenro display pockets. PVC holders must **not** be used. Negatives should be presented in strips, and in no circumstances should be cut into individual frames. The prints and negatives should be accompanied by the plan referred to above, with sufficient documentation to leave no doubt as to the subject of each photograph; photographic prints should be labelled and cross-referenced to the negative.

7 Reporting

- 7.1 At the end of the excavation a written report should be produced including background information, methods, detailed results, grid references, conclusion and discussion.
- 7.2 As a minimum the report should include (as illustrations):
- a detailed location map
 - a detailed site plan showing all trenches
 - all trench plans and sections and detailed plans and sections of features,

- selected artefact illustrations
 - a selection of photographs
 - an overall site plan showing all (phased) archaeological features recorded (including reference to previous project features and reports as appropriate)
- 7.3 The report should consider the results in their local and regional context. Where possible the report should also relate the results of this project to the findings of the 2013 Survey Report (Wessex Archaeology 2013) and to other related sites, if appropriate.

7.4 The report must include a detailed context index and an index to the archive.

8 Report Deposition

8.1 Within 1 month (or such other period as may be mutually agreed) of completion of the excavation a draft report should be produced and copies supplied to Hunshelf Parish Council, South Yorkshire Archaeological Service and English Heritage.

8.2 Within 3 months (or such other period as may be mutually agreed) of completion of the fieldwork a full report should be provided to Hunshelf Parish Council (taking into account any comments or amendments required by Hunshelf Parish Council, SYAS and English Heritage).

8.3 It is required that 7 copies of the report should be given to Hunshelf Parish Council and members of the Steering Group in a bound A4 printed format and a full digital copy of the report in both word and PDF format. English Heritage will require 3 copies of the final report in bound format and digital copy. One additional A4 bound copy of the report and a digital copy in PDF format must be submitted to both the South Yorkshire Archaeology Service and to Barnsley Archives & Local Studies library on completion of the project

8.4 A database of records must be submitted with the final report to the local SMR (held by the South Yorkshire Archaeology Service). The Database format should be compatible with MIDAS xml, which forms the industry standard. The data structure of the records should be created according to the latest version of MIDAS, which is MIDAS Heritage available at <http://www.english-heritage.org.uk/publications/midas-heritage/>. This should also include metadata so that they have the background information e.g. scale of data capture. Acceptable formats for digital survey information are:

- MAPINFO Interchange format (*.MIF)
- CAD (*.DXF)

8.5 Upon completion of the work, the archaeological contractor should make their work accessible to the wider research community by submitting digital data and copies of reports online to OASIS (the Online Access to Index of Archaeological Investigations (OASIS) Project using the online form available at <http://ads.ahds.ac.uk/project/oasis/>. The overall aim of the OASIS project is to provide an online index to the mass of archaeological grey literature that has been produced as a result of the advent of large scale developer funded fieldwork.

8.6 A summary report of an appropriate length, accompanied by illustrations, should also be prepared and submitted in digital format to the SYAS, for publication in the appropriate volume of *Archaeology in South Yorkshire*.

8.7 The contractor should also make arrangements for the work to be publicised through a talk at the relevant South Yorkshire Archaeology Day.

9 Site Archive

- 9.1 Within 6 months of completion of the fieldwork a full site archive comprising the original paper records and plans, photographs, negatives etc, should be offered for deposition with Barnsley Archives, who should be contacted to discuss archiving arrangements at the outset of the project (telephone: 01226 773950).
- 9.2 Any archaeological finds collected by the project should be offered, after agreement with Wharncliffe Estates, to the new Barnsley Museum for long-term storage. Costs for archive deposition should be included in the tender.
- 9.3 A copy of the archive index should also be deposited with the South Yorkshire Sites and Monuments Record, together with a selection of images for display or educational purposes.
- 9.4 The contractor will either arrange for copyright on the deposited material to be assigned to the archive repository, or will arrange to licence the archive repository to use the material, in perpetuity; this licence would allow the archive repository to reproduce material, including for use by third parties, with the copyright owner and author(s) suitably acknowledged.

10 Copyright

The author of the material should give permission for the material presented within any reports, and other documents produced as part of this project, to be used by the client Hunshelf Parish Council and English Heritage, in perpetuity, although the author of the material retains the right to be identified as the author of all project documentation and reports as specified in the *Copyright, Designs and Patents Act 1988* (chapter IV, section 79). The permission will also allow the South Yorkshire Archaeology Service to reproduce material, including for non-commercial use by third parties, with the copyright owner suitably acknowledged.

11 General considerations

- 11.1 The project will be overseen by the project manager and the Steering Group.
- 11.2 The contractor will ensure that arrangements are made for monitoring visits and meetings before, during and after the archaeological site work, as appropriate.
- 11.3 Monitoring meetings will typically involve an initial site visit, a further visit(s) to review findings during or near completion of fieldwork, and a final discussion when the report reaches an advanced draft. Time must be allowed for all staff involved in the fieldwork/report to discuss progress with the project manager.
- 11.4 The archaeological contractor will report any significant or unexpected discoveries immediately to the project monitors.

12 Authorised alterations to Specification by consultant

- 12.1 Archaeological consultants submitting tenders should carry out an inspection of the site prior to submission.
- 12.2 If, on visiting the site or at any time during the course of the excavation, it appears in the archaeologist's professional judgement that:

- a part or the whole of the site is not amenable to evaluation as detailed above, and/or
- an alternative approach may be more appropriate or likely to produce more informative results,

it is expected that the archaeologist will contact Hunshelf Parish Council as a matter of urgency.

13 Unauthorised alterations to Specification by consultant

It is the archaeological consultant's responsibility to ensure that they have obtained the consent of Hunshelf Parish Council in writing to any variation of the specification prior to the commencement of on-site work or (where applicable) prior to the finalisation of the tender. Unauthorised variations will be solely at the risk of the consultant and may result in non-payment if subsequent work is deemed unsatisfactory.

14 Technical Queries

Any technical queries arising from the specification detailed above should be addressed to the project manager without delay.

15 Valid Period of Specification

This specification is valid for a period of one year from date of issue.

16 Health and Safety

Contractors are expected to abide by the *1974 Health and Safety Act* and its subsequent amendments as stated in the *Construction and Design Management Regulations 1994*. Appropriate provision of first aid, telephone and safety clothing as described in the *SCAUM* manual on archaeological health and safety must be followed. The project must have a nominated safety officer.

- Health and safety will take priority over archaeological matters. All those undertaking fieldwork must comply with all Health and Safety Legislation; this includes the preparation of a Risk Assessment.
- Necessary precautions should be taken over underground services and overhead lines.
- The archaeologist or archaeological organisation undertaking fieldwork should ensure that they, or any proposed sub-contractors, are appropriately qualified to undertake such projects.
- The archaeologist or archaeological organisation undertaking the survey should ensure that they are adequately insured, to cover all eventualities, including risks to third parties.

17 Submitting a Proposal

17.1 A detailed project design for the work outlined above should be formulated by potential contractors and submitted to Hunshelf Parish Council for consideration (in consultation with SYAS and English Heritage). The proposal should include:

- A description of the proposed fieldwork/trenches etc. and methods to be used.

- Details of the volunteer and training opportunities that will be offered.
- A projected timetable for work on the site.
- Details of the arrangements made for deposition of the site archive
- A breakdown of costs for the proposed work (including, as a minimum, the desk based assessment, survey work, volunteer training, reporting and archiving costs)

- 17.2 The work shall be carried out by appropriately qualified and experienced staff; details of staff numbers and their relative experience should be included, plus their responsibilities in carrying out the work. Staff CVs should be included as supporting documents with the application (unless already supplied to SYAS and/or English Heritage in previous project specifications).
- 17.3 At least three tenders will be sought. All responses will be assessed in terms of cost, quality of project design and timescale. The final decision on the consultant employed will rest with Hunshelf Parish Council .
- 17.4 The successful contractor will be required to enter into a contract with Hunshelf Parish Council for the delivery of the work in accordance with this brief and the tender documents submitted.
- 17.5 Once a project design has been agreed, any changes to the project design must be discussed and agreed with Hunshelf Parish Council before implementation
- 17.6 Applicants should submit a written copy of their tender, along with the requested project plan and supporting documents no later than **1st March 2014**
- 17.7 The work must be completed and the final report submitted in draft form no later than 3 months after the excavation work has been carried out.

18 Contact Details

Please submit a written copy of your tender along with any supporting documents to:

Barry Tylee, 1 Ivy Cottages, Well Hill, Green Moor, Sheffield, S35 7DP

Please mark the envelope 'tender submission'. If you have any queries about this document please contact Barry Tylee. (barrytylee@btinternet.com or 0114 2830056)

19 Bibliography

Wessex Archaeology 2013. Wortley Tin Mill – Archaeological Desk-based Assessment and Survey.

A List of References

(Many of these documents are published by English Heritage, Swindon, and can be downloaded from the English Heritage website)

English Heritage 2002, *With Alidade and Tape: graphical and plane table survey of archaeological earthworks*). English Heritage 2003, *Where on Earth Are We? The Global Positioning System (GPS) in archaeological field survey*.

English Heritage 2006, *Management of Research Projects in the Historic Environment: the MoRPHE Project Managers' Guide*.

English Heritage 2007, *Understanding the Archaeology of Landscapes: a guide to good recording practice*.

English Heritage 2008a, *SHAPE: A Strategic Framework of Historic Environment Activities and Programmes in English Heritage*.

Forum for Information Standards in Heritage (FISH) 2007, *MIDAS Heritage – a data standard for the historic environment* <http://www.english-heritage.org.uk/publications/midas-heritage/>

HMSO 1974 *Health and Safety at Work Act*
http://www.opsi.gov.uk/RevisedStatutes/Acts/ukpga/1974/cukpga_19740037_en_1

HMSO 1988 *Copyright, Designs and Patents Act*
http://www.opsi.gov.uk/acts/acts1988/ukpga_19880048_en_1.htm

HMSO 1994 *Construction (Design and Management) Regulations*
http://www.opsi.gov.uk/si/si1994/uksi_19943140_en_1.htm

Institute of Field Archaeologists, 1994, revised September 1999 . *IFA Standard and Guidance for the archaeological investigation and recording of standing buildings or structures*.
<http://www.archaeologists.net/modules/icontent/inPages/docs/codes/build2.pdf>

RCHME 1999. *Recording Archaeological Field Monuments a descriptive specification*. RCHME. Swindon

SCAUM 2006 *Health and Safety in Field Archaeology Manual* <http://www.famearchaeology.co.uk/>



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