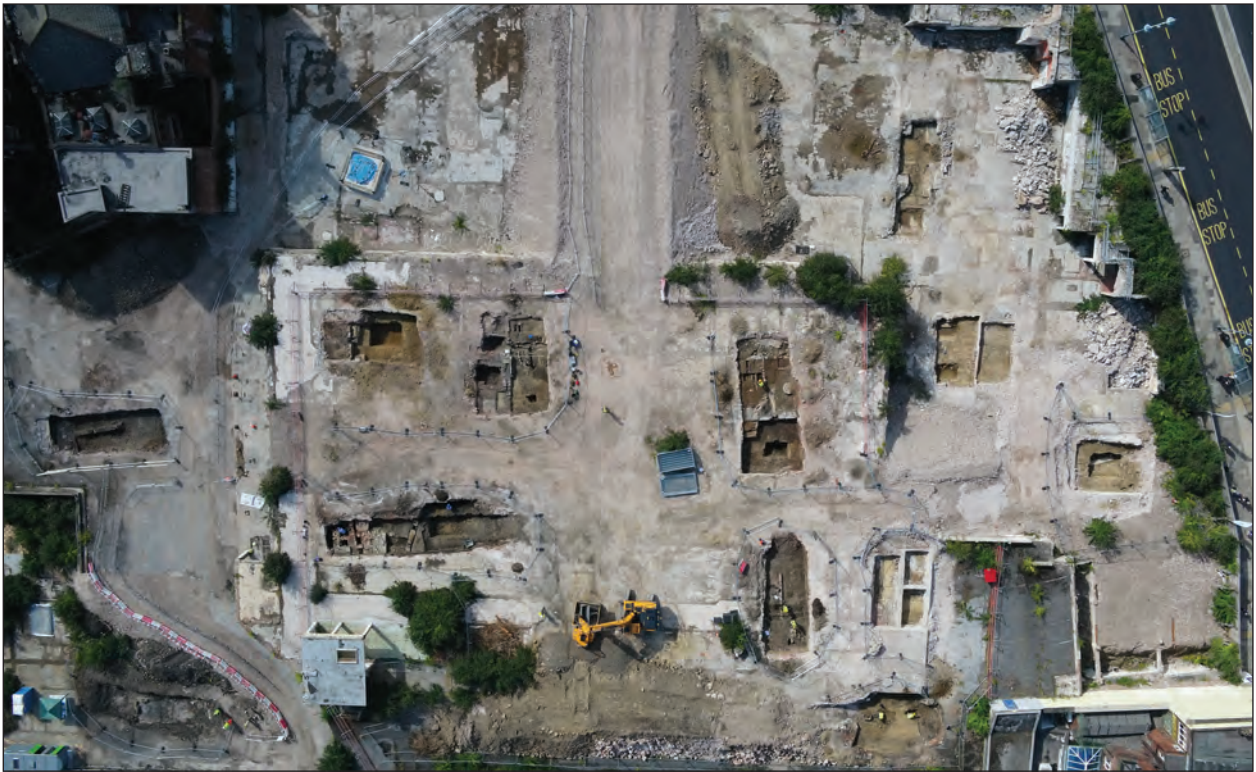




# Sheffield Castle, Sheffield South Yorkshire

Archaeological Evaluation Final Archive Report



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## Summary

Wessex Archaeology was commissioned by Sheffield City Council (SCC) to undertake an archaeological evaluation and borehole survey at the site of Sheffield Castle, Castlegate, Sheffield, centred on NGR 435805, 387684 (**Fig. 1**). The main aim of the project was to provide SCC with information about the archaeological deposits and areas of archaeological potential within the Castle Markets site.

Except in the west of the site, the undisturbed geological substrate was generally not reached. The beginning of the archaeological sequence on the site has not been tested. Trench 11 and much of trench 4 could not be pursued below 18th/19th century strata.

The earliest evidence for occupation of the castle site is a putative entranceway into a timber-built building or enclosure in trench 6 close to the River Don. Radiocarbon dating has indicated a late-11th/12th-century date for these features. A dump of corncockle (*Agrostemma githago*) seeds is indicative of the late stages of cereal crop processing. Four subsequent phases of development in this location gradually raised the ground level, probably spanning the period up until the mid-13th century.

Clean redeposited alluvium in trench 2 is thought to represent a motte. The modern square castle mound is the result of modification by iterative addition and subtraction of deposits in the chronological range from the Norman period to the present day. The extent of the Norman motte is unknown.

Remains from the early 13th century (the 'early castle' phase) were present in trenches 1, 3, 5 and 6 located on the castle mound. These chiefly comprised strata interpreted as levelling layers and made ground. Trenches 1 and 5 contained cobblestone surfaces repaired with stones and with ironworking slag. This slag includes tap slag, providing evidence for 13th-century iron smelting in the general vicinity. An early-13th-century wall foundation was present in trench 3.

Mid-13th century destruction deposits recorded in trench 3 have been identified with the historically attested destruction of the castle in 1266 by John D'Eyvill. A recovered woodcock bone is evidence of status related activity (either hunting or consumption), however environmental information suggests a more modest diet including hazelnuts. Discontinuities in the sequence in trenches 1, 5 and 6 may also be the result of this destructive event.

Analysis of beetle remains from the destruction contexts in trench 3 indicate that the rebuilding effort began rapidly, probably before a licence to crenellate was issued four years later in 1270. Layers and cuts in trench 3 indicate substantial landscaping with an abundant availability of labour. Sandstone structures including retaining walls, a staircase and a passageway were revealed in trench 6. Although their chronology is uncertain, it may be that these structures originate in the 13th/14th century.

The east moat may also have its origins in this period. Although the rock-cut inner side of the moat was known from previous excavation (Davies 2000), an unexpected result was that the outside (east side) of the east moat comprised a clay bank.

A limited investigation of the south moat in trench 9 revealed a 14th-century deposit. Ostracods indicated that this part of the moat was dry at this time.

Borehole investigation of the south moat has defined the location and dimensions of the moat. A scheme of radiocarbon dating has demonstrated that material substantially pre-dating the castle had been reincorporated into the moat fills. The moat sequence is likely to be taphonomically



complex. The results of the borehole survey suggest the south moat was a shallow-water environment with long periods of drying.

Late medieval remains were restricted to a 15th-century or early-16th-century cobblestone surface in trench 1. The lack of remains from the historically-attested zenith of the development of the castle may be due to slighting during the Civil War. In contrast to the results of earlier workers, evidence for Civil War activity was largely restricted to fills within the east moat. These fills comprised unsaleable debris from the demolition of the castle. The site was left in a visibly ruinous state symbolising the end of the power of the castle.

The 18th century saw levelling activity across many parts of the site (trenches 1, 2, 4, 5, 10 and 11). The boundary wall of a bowling green known from historic maps was recorded in trenches 1 and 5. It is probable that some of the ruins of the castle were visible to the bowlers.

At the end of the 18th century a range of slaughterhouses were developed along the Don, as recorded in trench 11. In the 19th century slaughterhouses expanded along the Sheaf (trench 10), and steelworks colonised the castle mound. The poorly-preserved remains of a cementation furnace were recorded in trench 1.

In the 20th century, the site was redeveloped as a Co-operative Store and council market, before the markets expanded and the Co-operative Store was redeveloped and incorporated into the market complex. Across most of castle hill (trenches 1–5 and the north part of 6), and in the east of the site (trenches 10 and 11), the impact of 20th-century development on archaeological remains was generally low and preservation was good. There were some intermittent deeper impacts in these areas (eg stanchions or drains) although these did not impede interpretation. However, in the south of trench 6, late-20th-century redevelopment had removed all archaeological remains to a depth of at least 4 m. Development in the 19th century had also had an impact on medieval remains, for example in trench 3 where a 19th-century weighbridge had impacted 13th-century strata. In the west/south-west of the site, 20th-century development had removed nearly all archaeological remains and truncated the bedrock. However, there is still archaeological potential in this area as demonstrated by the survival of the moat in trench 9.

Artefacts include a medieval pottery assemblage and a copper alloy toilet item. A range of post-medieval artefacts were also recovered.

The environmental assemblages provide evidence for the transport and utilisation of products from a variety of habitat types. Oats, barley, bread/rivet wheat and rye were apparently grown on local acidic, sandy soils. Grassland plants may also have been brought to site as fodder or grazed in situ and deposited in animal dung. Damp soils around nearby watercourses may have been utilised for the collection of plants such as rushes and sedges for use as flooring, roofing or bedding material. Wood from different environments was collected for use as fuel and in construction.

There is also environmental evidence for activities carried out at the castle, and for the environment and living conditions. The castle included damp, muddy, disturbed and nutrient enriched soils, supporting a diverse community of annual weeds, more established perennial vegetation and plants of wet soils. The assemblages also provide evidence for the disposal of waste from various sources, including material from domestic hearths, hazelnut processing and wood working, and possibly cess deposits, animal fodder/dung and/or roofing/flooring material.

The results of this evaluation build upon the results of previous workers including Armstrong (1930), Butcher (working in the 1950s, see Moreland *et al.* in press), Davies (2000) and Davies and Symonds (2002), which are not fully reproduced here.



The results demonstrate excellent preservation of remains of national significance across the majority of the castle site.

The archive is currently held at the offices of Wessex Archaeology in Sheffield, under the project code 201540. In due course, the archive will be deposited with Museums Sheffield under an accession number to be determined. An OASIS form, wessexar1-322479 has been completed for this project and will be finalised at the time of deposition.



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This report was written by Ashley Tuck and edited by Milica Rajic, with specialist contributions from Alex Brown (boreholes), Chris Cumberpatch and Jane Young (pottery), SD White and DA Higgins (clay tobacco pipes), Quita Mould (leather), Roderick Mackenzie (industrial material), Peter Ryder (architectural stone), Phil Andrews (slag overview), Roderick Mackenzie and Michael Charlton (slag microscopy), Lucy Allott and Erica Macey-Bracken (wood), Morgan Windle (animal bone), Alvaro Mora-Ottomano (additional information about CBM), Lorraine Mephram (other finds), Ellen Simmons and Glynis Jones (environmental samples), Liz Chambers (geoarchaeological evidence), Mark Bateman (luminescence dating), Ian Tyers (dendrochronology) and Inés López-Dóriga and Caitlin Buck (statistical analysis). The illustrations are by Ian Atkins and Rob Goller.

The project was managed by Milica Rajic on behalf of Wessex Archaeology.

# Sheffield Castle, Sheffield, South Yorkshire

## Archaeological Evaluation Post-Excavation Assessment Report

### 1 INTRODUCTION

#### 1.1 Project background

1.1.1 Wessex Archaeology was commissioned by Sheffield City Council to undertake evaluation trial trenching and borehole survey on the site of Sheffield Castle (formerly Castle Markets), Sheffield, South Yorkshire, S1 2AF. The site was centred on NGR 435805 387684 (**Fig. 1**).

1.1.2 A written scheme of investigation (WSI) was prepared by Wessex Archaeology (2018) in accordance with industry best practice and guidance (ClfA 2014a–c, Historic England 2015a) and was submitted for approval to Dinah Saich of the South Yorkshire Archaeology Service (SYAS), advisors to Sheffield City Council, prior to the commencement of fieldwork.

1.1.3 Eleven trenches were excavated between 13 August 2018 and 12 October 2018 and were up to 7 m wide and up to 20 m long (**Fig. 2, 3**). A borehole survey was also undertaken between 15 and 19 October 2018.

#### 1.2 Site designations

1.2.1 Three areas of masonry, formerly part of the castle's structure, survive within the former markets complex, and are Listed as Buildings of Special Architectural or Historic Interest (Grade II); under National Heritage List for England nos 1254808, 1254809 and 1254810 and IOE nos 458126, 458127 and 458128.

#### 1.3 Previous reporting

1.3.1 Following the completion of fieldwork, an interim report was produced (Wessex Archaeology 2019a) followed by a Post-Excavation Assessment (Wessex Archaeology 2019b). A separate assessment report was produced for the Borehole Survey (Wessex Archaeology 2019c) which led to a further palaeoenvironmental assessment (Wessex Archaeology 2019d). The results of the evaluation were also outlined in Current Archaeology (Tuck 2019), have been published in a book (Moreland *et al.* in press) and will appear in CBA Forum Yorkshire (Rajic in press).

#### 1.4 Scope of the report

1.4.1 The purpose of this report is to provide a detailed description of the results of the evaluation, to interpret the results within a local, regional or wider archaeological context and assess whether the aims of the evaluation have been met.

1.4.2 The presented results will provide further information on the archaeological resource that may be impacted by the future use of the site and facilitate an informed decision with regard to the requirement for, and methods of, any further archaeological mitigation.



## 1.5 Location, topography and geology

- 1.5.1 The site, covering an area of approximately 1.34 hectares, is in Sheffield City centre, bounded to the north by Castlegate, to the west by Waingate and to the south and south-east by Exchange Street (**Fig. 1**).
- 1.5.2 The site was formerly occupied by the 20th century development of Castle Markets. The majority of buildings relating to the former Castle Markets complex have been demolished to ground level with the exception of a limited number of supporting or retaining walls necessary to preserve the topography of the site. In addition, structures housing two areas of surviving castle-related masonry survive on site. The site is overlaid by concrete slab relating to the recently demolished market.
- 1.5.3 The site lies between 49 m and 56 m above Ordnance Datum (aOD).
- 1.5.4 The underlying geology is mapped as an outcrop of Silkstone Rock, a type of sandstone within the Lower Coal Measures (British Geological Survey online viewer). Superficial alluvial deposits are recorded close to the site, associated with the rivers Don and Sheaf.

## 1.6 Outreach

- 1.6.1 Outreach formed a major part of the evaluation project. Sheffield Castle is prominent in the imagination of the Sheffield public and this enthusiasm was addressed by a raft of community engagements. These included daily volunteer placements, five with the on-site excavation team and five with the finds processing team at Wessex Archaeology's offices in Sheffield. Additional on-site volunteering from local heritage groups and schools was facilitated. Weekend and weekday site tours were provided, both bookable by the public and for schools, youth groups, local history groups and other stakeholders. Public talks were given both during and after the on-site works. Wessex Archaeology sought social media interactions (Twitter, Facebook, Youtube, blog) which, on average, engaged more than 1200 people per week. **Fig. 4** outlines some outreach statistics.

## 2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

### 2.1 Introduction

- 2.1.1 The following section comprises a summary of information as presented in the WSI (Wessex Archaeology 2018a), which was derived from an existing evaluation specification (SYAS 2017). This in turn was an edited version of an earlier specification (Dennison and Richardson 2014), which drew on a desk-based assessment (McCoy and Stenton 2009). Moreland *et al.* 2020 provides a more detailed and critical appraisal of the background of the site.

### 2.2 Previous investigations

#### *Observations (early 20th century)*

- 2.2.1 In the 1920s, the construction of the Brightside and Carbrook Co-operative Society building and of the first Castle Market building was observed by AL Armstrong, JB Himsworth and others for the Hunter Archaeological Society and Society of Antiquities. Himsworth recorded his observations in an unpublished diary, whilst Armstrong published his results in the Hunter Society's *Transactions* (Armstrong 1930). Their work identified remains of the stone-built castle and some evidence of a timber predecessor. Their interpretation of timber remains is questionable (see Moreland *et al.* in press). Some of the remains identified in the 1920s were incorporated into the basements of the buildings

being constructed. Himsworth also mentioned the workers demolishing the remains of a later furnace.

- 2.2.2 Post war reconstruction of the site was observed by Leslie Butcher who expanded the gatehouse results, monitored stanchion pits, identified a section of wall (later Grade II listed) near to the south-west corner of the original market building and the sinking of a shaft through the 'sticky black sludge' of the moat. Moreland *et al.* 2020 attempts to interpret Butcher's beautiful and unusual record drawings, held by Museums Sheffield.

*Survey (1994)*

- 2.2.3 In 1994, the South Yorkshire Archaeology Field and Research Unit surveyed the standing remains of the courtyard building preserved beneath the 1920s market building as part of planned re-consolidation works. This work concluded that the original surviving structure was in good condition (Latham and Atkinson 1994).

*Evaluation trenching (1999 and 2001)*

- 2.2.4 Three trial trenches were opened by Archaeological Research and Consultancy at the University of Sheffield (ARCUS) in 1999 and 2001 (Davies 2000; Davies and Symonds 2002). The trenches uncovered part of the moat and a series of deposits within it dating from the medieval to post-medieval period. Well-preserved structural remains were identified in the north of the site, comprising a probable extension to the 'apartments' preserved in the basement of Castle Market, and a second area in the north-west (which may have been seen by Himsworth, see Moreland *et al.* in press). In addition, a pit containing late-13th-century pottery was excavated.

*Ground radar survey (2013)*

- 2.2.5 In 2013, Met Geo Environmental carried out a geophysical survey as part of works commissioned by Sheffield City Council. The survey identified the two previous ARCUS evaluation trenches along with two anomalies: one perhaps delineating a distinct change in ground composition, and the second to the west, marking a linear area of north-south alignment, possibly caused by a wall or foundation feature.

## **2.3 Archaeological and historical context**

*Prehistoric and Romano-British*

- 2.3.1 Due to the extensive development of the area, evidence of prehistoric and Romano-British activity in the centre of Sheffield is limited to a small number of documented finds which are now presumed lost or destroyed. (Belford 1998; McCoy and Stenton 2009). However, the site of the castle lies between the suggested course of two Roman roads, at Bridgehouses to the north-west and Cricket Inn Road to the north-east.

*Early medieval period (5th to 10th century)*

- 2.3.2 The status and use of the castle site during the early medieval period is speculative. There is no unambiguous evidence to associate the castle site with any named individual and there is similar uncertainty surrounding suggested archaeological evidence for Saxon activity at the castle site.

### *Medieval period (11th to 15th century)*

#### 11th and 12th century

- 2.3.3 Suggested dates for the construction of the first Sheffield castle, which was probably of earth and timber, have typically been given as c.1100 or c.1150 (Davies and Constable 2004–05), although there was no direct evidence to support either date.
- 2.3.4 Sheffield Castle is thought to have been extensively damaged by fire in 1184–85.
- 2.3.5 There is a suggestion that in 1187–98 a professional garrison was present within the castle which would have required quarters within the castle precinct, probably to have been located within the bailey, along with other important ancillary structures such as a chapel and, perhaps, a prison or dungeon. The latter was probably located within one of the castle's towers.
- 2.3.6 From the late-11th to the mid-12th centuries, the focus of a castle's defences was probably a seigneurial dwelling or keep. However, by the second half of the 12th century, stronger perimeter defences, such as a stone curtain wall that enclosed the site, may have become the primary focus of a castle's defence.

#### 13th and 14th century

- 2.3.7 In 1266 John D'Eyvill led rebel forces into South Yorkshire and attacked Sheffield. It is often stated that during the attack the castle was 'burned to the ground', but the extent of the damage incurred is unknown.
- 2.3.8 A royal licence to rebuild the castle in stone was obtained four years later (1270) by Thomas de Furnival. The intention to construct a stone castle may imply that the first Sheffield castle fell due to the firing of its timber structures. However, during this period the symbolic aspects of castles became increasingly prominent and the emphasis on masonry may have included elements of display and defiance.
- 2.3.9 Halls, rather than keeps, were the prevailing form of seigneurial residence within castles of this period, and there are numerous references to a great hall. Documentary sources suggest that a chapel was possibly located either close to the upper end of the hall or between the hall and the gate. A great tower was recorded at the site in 1442 (Thomas 1920, 71) and, while it is possible that this feature was a keep, it may have been merely the largest of the four mural towers which are postulated to have stood along the castle's north wall. Archaeological evidence (Armstrong 1930) has demonstrated that the principal entrance was in the south-eastern part of the site and incorporated a gate and drawbridge, with large circular bastion towers set immediately east and west of the entrance as part of the gatehouse. A large curtain wall appears to have been constructed as part of the castle possibly made of stone derived from quarries at Handsworth. Evidence for ancillary buildings at Sheffield has been recorded through archaeological investigation, and there was also evidence that modifications were made to the defences at the entrance during the 14th century, with a rectangular structure constructed to perhaps protect the drawbridge mechanism and to strengthen the immediate approach to the gate.

#### 15th century

- 2.3.10 Documentary evidence records several structures or features that were present within Sheffield Castle during this period, along with indications of their inter-relationships. These included the great hall, the great tower, the great gate, a bakehouse, a kitchen, a prison and a *hospiteum*, where itinerant workers and less salubrious guests were lodged. The

majority of these structures faced into the castle's inner courtyard, with the subsidiary buildings being arranged around the wall of the inner bailey. Documentary sources also indicate that a stone and cinder path ran from the hall to the gate during the 15th century (Thomas 1920, 71). A 'hedge' (a possible timber palisade) apparently ran from the great tower to the bakehouse and between the castle wall and the river.

- 2.3.11 A further tower was recorded next to the chapel in 1445-46. The stone was sourced from the Roche Abbey quarries indicating that the new tower may have been constructed from limestone.
- 2.3.12 During the 1440s, work was carried out on the gutters and in making a lead pipe to bringing water into the castle. Several structures (the exchequer chamber, stone and timber grange, a cowhouse, stables and a tower) were specifically described as being outside the castle. All these buildings are probably to have been situated within the outer bailey, which stood to the south of the castle's inner court.
- 2.3.13 There was also a chapel associated with the bridge, the 'Chapel of our Blessed Lady on the Bridge', which was probably built at around the same time. It is probable that the chapel did not actually stand on the bridge and it might possibly have occupied a site between the south end of the bridge and the castle's ditch.

#### *Early post-medieval*

- 2.3.14 In 1570, Elizabeth I committed Mary Queen of Scots to the custody of George Talbot, the 6th Earl of Shrewsbury. Mary was held prisoner in Sheffield Castle until 1584. Elizabeth's concerns that Mary might escape were addressed by the earl in a letter written in 1573, in which Talbot said that he had stationed guards permanently 'under her windows and over her chamber'. This suggests something of the layout of the building. In 1571, Talbot stated that Mary was unable to exercise as he was 'loathe to let her out of the gates' of the castle, but that 'I do suffer her to walk upon the kads here in the open air in my large dining chamber and also in this courtyard' (quoted in Hunter 1819, 67). This describes Mary walking on the flat roof (the 'kads') of the earl's dining room, which is probably to have been part of the great hall.
- 2.3.15 In 1575, Talbot wrote to Lord Burghley, revealing that on 24 February Sheffield had been hit by an earthquake which shook the castle walls. In a letter to the Queen, the earl revealed that the shock 'so sunk chiefly her chamber', indicating that Mary's apartments had been the part of the castle most affected by the earthquake. Following her removal to Tutbury (Staffordshire) in 1584, the castle continued in one of its medieval roles as a manorial prison.

#### *Early 17th century*

- 2.3.16 Documentary evidence indicates that development and remedial works were undertaken in the early 17th century. Works included a new building, repairs including glass repairs, plumbing, and the creation of a coachway between Hallam Head and the gatehouse. The principal structure within the site was described as a manor or mansion house and the castle contained a variety of buildings, both official and residential, within the inner bailey, and that the latter was demarcated by a moat. Beyond the moat, the castle had an outer bailey containing an armoury, granary, barns, stables and other buildings. A great stable was also mentioned.

*English Civil War and the later 17th century*

- 2.3.17 During the English Civil War, in 1642, the contents of the castle armoury, including four cannons, had been removed and were in use by the Royalist army elsewhere. The approach of a Royalist army in the following year led the Parliamentarians to retreat which was followed by the re-taking of the castle for the Crown. Eight cannons and two mortars were brought back (McCoy and Stenton 2009).
- 2.3.18 A description of the siege of Sheffield Castle, published anonymously as a pamphlet in 1644, reveals that '[they] found it to be of very considerable strength' in terms of its defensive position and its built defences. During the same siege deep water was found present in the east and west ditches, described as being 'slackered on all sides' which indicates a system of sluice gates. A 'strong fort before the gate pallisado'd' was probably a Civil War defensive feature constructed on the south side of the ditch, protecting the approach to the castle's drawbridge. Bombardment of the castle by cannon was said to have included a direct strike to what is probably to have been the quarters occupied at that time by the castle's governor. Its location within the layout of the castle is unknown.
- 2.3.19 An examination of the castle's defences carried out in 1644 described a little tower that appears to have been a mural tower at the north-east corner of the castle. A further tower on the west side of the castle is said to have partially collapsed following a minor breach of the wall. Archaeological evidence of artillery damage seen at the castle gates may therefore have been sustained at this time.
- 2.3.20 Several resolutions were passed in the House of Commons in order to render Sheffield Castle indefensible, beginning with an order on 30 April 1646 to make the castle untenable with no garrison kept or maintained in it. However, no work was apparently undertaken in response to this decision, and on 13 July 1647 a second resolution was passed ordering the castle and all new works associated with it to be dismantled. A bill sent to Sheffield summarising these orders on 27 February 1648 indicated that the process was being carried out. It is not clear at what date the demolition of the castle commenced. An account of 23 January 1648 suggests that much of the castle was dismantled to allow various materials to be sold off. Slates from the hall were sold, suggesting the seigneurial building was a hall, and indicating the type of roofing material of the castle's principal structure. Further details were revealed by the sale of the roof timber and the pavers and steps of the hall, along with the stone of a square room at the hall end. Named structures were also revealed including Middleton's chamber and Nic. Speedeman's chamber (Hunter 1819, 113–115) a new bakehouse, old kitchen (with lead from the roof), a round tower, a square tower and a sentry house. Timber was removed from the walls of the castle. The lead pipes were also removed. These were probably not the plumbing installed 1633 but may have been lead pipes recorded in 1442. A building of at least two storeys stood at the south end of the castle and parts of the outer bailey were also fortified. Various items held at other locations are often claimed to have come from Sheffield Castle, including boards and plaster taken to Bishop's House and an ornate wooden bed.
- 2.3.21 Work was continuing on the castle in 1649 when the orders to stop the demolition were issued, noting that the remaining part of Sheffield Castle is still standing and was in part tenable (McCoy and Stenton 2009). Nevell highlights that to maximise the symbolic power of slighting it was 'important not just to leave the castle useless as a fortification but to show publicly that it had been done' (2019, 26).
- 2.3.22 Further material was removed from the castle site during the third quarter of the 17th century. The Earls of Arundel retained ownership of the castle site, which was referred to

in a mortgage of 1677. By 1706 Sheffield had passed to the Duke of Norfolk, who began to sell off the land for redevelopment (McCoy and Stenton 2009).

#### *18th century*

- 2.3.23 An reconstruction of the castle in c.1700 made by Thomas Winder in the early 20th century depicts several detached structures set around the former castle courtyard, part of which had been converted into a bowling green. Sections of curtain wall appear to remain extant at the north-east corner. The moat appears to have been filled to level the ground prior to the onset of redevelopment. Several roads around the castle site, (Castle Folds, Waingate and Exchange Street), appear to have developed along the courses of the former castle ditches. Castle Folds seems to have lain within the former outer bailey and may have developed along or immediately adjacent to the south ditch. Waingate appears to follow the line of the castle's western defences. It is unclear what sources Thomas Winder used to compile his reconstruction.
- 2.3.24 Ralph Gosling's 1736 map of Sheffield (which is the earliest known surviving plan of the castle site) depicts general development to the west and south of the castle site, with a large house in the north-west corner. Castle Hill shows a number of sharp right-angled turns along its route, two of which took it along the south and west sides of a large square bowling green. This green lay to the north of centre of the castle site, and there were smaller, rectangular plots or enclosures to the north and east, running to the banks of the Don and Sheaf. A narrow strip of development was indicated on the east frontage of Castle Hill and Castle Fold, again with smaller empty rectangular plots to the rear running as far as the bank of the Sheaf. Their depiction on the map is reminiscent of garden or yard enclosures to the rear of individual properties. Gosling's plan does not depict the outcrop or precipice on the north edge of the castle site which appears on later maps, nor did he indicate any surviving features associated with the castle. Archaeological evidence suggests that the bowling green may have been defined by a series of stone posts connected by iron railings, as a 3 m long iron rail attached to a sandstone pillar was claimed to have been recovered from the site of the green in 1928.
- 2.3.25 In c.1760 (**Fig. 5**), the bowling green was substantially larger in proportion to its surroundings than suggested by Gosling in 1736. Structures were attached to the north-west and south-east corners of the green, with a precipice indicated to the north immediately above the Don. The composite map of c.1760 appears to show two distinct areas to the castle site. The inner area was formed by the bowling green and a narrow strip around the outside with a curvilinear boundary, containing properties, two of which at the south-west corner are joined by a strip marked 'Castle Wall' on a map of 1782. The main access to the inner area was at the south-east corner, along the street Castle Hill marked in 1736. In c.1760 this was flanked by street frontage properties on either side, but it continued along the south and west sides of the bowling green as an unenclosed track. The outer area comprised a wide band between the inner area and Waingate to the west and Castle Folds to the south, which contained a number of sub-divisions that radiate outward from the edge of the inner area probably laid out in advance of actual development. The width of the outer area decreases markedly to the east of the road Castle Hill, and its curve is delineated by a pair of parallel boundaries, apparently a narrow access leading to an enclosure at the confluence of the Don and Sheaf. The building within the outer area at the junction of Waingate and Castle Folds became the Reindeer Inn in 1779, later changing its name to the Royal Exchange. To the south, the area between Castle Folds and Dixon Lane was filled with tenements built during the third quarter of the 18th century.

- 2.3.26 A 1768 Fairbank field book sketch of Castle Hill marks a substantial wall along the north-east boundary of the outcrop. Its scale and location may suggest that a substantial section of the perimeter wall overlooking the river Sheaf remained extant in 1768. Archaeological evidence indicates that several metres of imported material had been brought to the site in order to raise the ground level above the remains of the castle, and in 1764 it was reported that no traces of the castle remained visible. However, a later 1771 Fairbank sketch of the south and west parts of the castle site depicted a section of wall marked 'ruins of the castle.'
- 2.3.27 Industrial premises were also established within the former castle precincts. These included a variety of tool and cutlery workshops, a cementation steel furnace of Thomas Clegg and a cupola furnace of R&J Smith Brothers.
- 2.3.28 Following a 1784 Act of Parliament, calling for general improvements in market accommodation and capacity, much of the property on Castle Hill was demolished. The whole of the bowling green had disappeared (although John Waite's house remained at the south-east corner), and the precipice to the north was now occupied by two parallel lines of slaughterhouses. Most of the buildings formerly to the south of the bowling green had been demolished to create a new right-angled and wide access from Castle Folds, replacing the earlier access along Castle Hill from the south-east although the name was retained for the new alignment. Only the western part of the outer area described above escaped major demolition, with some of the radiating sub-divisions surviving. The narrow curving track noted in c.1760 also partly survived as a boundary, although it had lost its function as a track. **Fig. 6** is a composite map derived from Belford 1998 depicting the castle site in about 1800.

#### *19th and early 20th century*

- 2.3.29 During first half of the 19th century much development occurred on the castle site, with many of the structures that had survived in c.1800 being demolished. Much of this redevelopment was associated with the Sheffield and Tinsley Navigation, which had reached Sheffield in 1819. Nelson and Company also constructed a small steel and tool works within the castle site, which was taken over in the mid-1820s by Furniss, Cutler and Company. By the mid-19th century, John Youle's Phoenix Steel Works was also present on Castle Hill, manufacturing saws, files and other tools. Cementation and crucible furnaces, warehouses, and tool and cutlery workshops were constructed subsequently around the works, on ground around the angled route of Castle Hill laid out in the late 18th century. To the east of Castle Hill, Shambles Lane was created to link the slaughterhouses to Castle Folds.
- 2.3.30 The effects of these early-19th-century changes are clearly visible on the Ordnance Survey map from 1853 (**Fig. 7**). 'Sheffield Castle (Site of)' is marked, with the 'Castle Hill Works (Steel)', the 'Phoenix Works (Steel)' and 'Castle Hill Steel Works' occupying much of the central area of the castle site. Former open areas shown in c.1800 had now been infilled, creating 'Castle Folds' Court' to the east. Only the western edge of the castle site retained anything approaching its pre-late-18th-century plan form, although part of the narrow lane shown in the later 18th century was still visible, branching off Shambles Lane. This may represent a survival of the alignment of the castle's defences.
- 2.3.31 In 1881, the Sheaf was culverted to the south of Exchange Street, while Exchange Street itself was extended west along the southern edge of the castle site, joining the south end of Waingate. By the time that the Ordnance Survey 1892 map was published (**Fig. 8**), Shambles Lane had been re-named 'Castle Folds Lane.' The western edge of the former castle site, and the narrow lane to the east of Castle Folds Lane, remained largely

unchanged in overall plan form. The site was similarly depicted by the Ordnance Survey in 1905.

#### *20th century*

- 2.3.32 An undated detailed plan of the Castle Hill area, almost certainly drawn in the late 1920s (probably c.1927) gives an idea of the layout and shows little had changed from the late 19th century. From north to south, the Bull and Mouth Hotel, the Anvil Inn and the Rose and Crown Inn all fronted onto the east side of Waingate, with enclosed yards to the rear. The Royal Hotel stood at the junction of Waingate and Exchange Street with the New Market Inn flanking the entrance to Castle Hill from Exchange Street and the Rotherham Inn flanking that to Castle Folds Lane. The layout of industrial premises around Castle Hill was also broadly similar to the late 19th century plan, with the narrow unnamed curving lane still visible to the east of Castle Folds Lane, running towards the Sheaf weir. The northern edge and north-east part of the area were still occupied by slaughterhouses.
- 2.3.33 A north to south aligned section across the Castle Hill and its surroundings area drawn in the first half of the 20th century (held by Museums Sheffield) indicated that, prior to redevelopment, the majority of the central part of the Castle Hill area was probably formed by a relatively level plateau. This plateau extended south and south-west towards Exchange Street and Waingate, but it had been radically altered by the construction of slaughterhouses adjacent to the Don.
- 2.3.34 In September 1928 photographs show the nature and the construction of the slaughterhouse buildings (brick buildings with slate roofs), the tall wall fronting the Don acting as a screen wall for the slaughterhouses and raised, beehive-like structures in connection with the caption 'Sewer Manholes for New Road.'
- 2.3.35 The properties on the east side of Waingate reflected the line of the road (ie they were laid out fronting onto the road and then running back from it), which was itself influenced by the line of the western moat. Notes accompanying some of the photographs suggest that some of the modern buildings used walls connected with Sheffield Castle as their foundations; the reliability of these statements is unknown. Photographs also depict a tall, curving rubble structure, containing a possible window, a doorway with quoined jambs and a massive, monolithic lintel as well as several other walls composed of stone, part dressed and part rubble, set in lime mortar.

#### *1927-1929 Co-Operative Society stores*

- 2.3.36 In 1915, the Brightside and Carbrook Co-operative Society purchased a block of land on the corner of Exchange Street and Waingate. On the pre-1915 plan, the area of the Co-operative Stores was delineated in red, demonstrating that both Exchange Street and Waingate were to be widened. The entrance to Castle Folds Lane off Exchange Street remained in approximately the same position but was also moved further north; it was flanked to the east by the Rotherham House public house. The plan of the building included a basement over the whole area with the foundation trenches cut for all four walls, with an extension at the north-west corner linked to either services or drains. Foundation plans show lines of stanchions extending an average of 3 ft 9 ins (1.14 m) below the foundation level.
- 2.3.37 A plan dating from 1958-61 shows that some of the earlier foundations were to be removed to make way for the foundations for a new structure. Shortly before the Second World War, a new rear access (so presumably from the north side) was made to the Co-operative Stores' basement.



- 2.3.38 Above the basement, the Co-operative Stores initially comprised only a single storey building above ground, which in 1936 was raised to three storeys. There were two arcades, each 20 ft (6.09 m) wide, on the ground floor, giving access to the Castle Market to the rear.
- 2.3.39 The store received a direct hit from a bomb on the night of 12/13 December 1940 and was largely destroyed; an adjacent property on Waingate to the south-west was also damaged. Bailey bridges had to be erected to allow the Castle Hill Market to continue trading. The market itself largely escaped damage.

*1928–1930 Castle Hill market*

- 2.3.40 Plans of the Castle Hill market constructed at around the same time as the Co-operative Stores show grids of 4ft (1.22 m) square steel and concrete piles supporting 28 cast-iron columns. Further piles were present along the east external side of the market.
- 2.3.41 The main approach from Castle Hill (off Waingate) had twin vehicle and pedestrian entrances; the vehicle entrance had offices over, and a large plaque reading 'Castle Hill Market.' The Castle Hill entrance was flanked by a heating chamber and fuel store to the north, and more plant rooms to the south, although depths of these structures are unknown. The vehicle entrance snaked around the west and north sides of the market to a loading bay; a manhole/inspection chamber just beyond the vehicle entrance was also marked.
- 2.3.42 Built to be fire-proof with reinforced concrete floor carried on concrete piles (in some places 25ft or 7.62 m deep) and foundations with raised loading platforms, the market was laid out on symmetrical lines with the principal entrance from Castle Hill, the approach being through the two archways, for goods and pedestrians respectively. The outer walls were built in brickwork and lined with plaster and terrazzo slabs. The roof of the market was carried on cast-iron columns which supported the steel roof trusses. The north side of the roof comprised patent glazing and the remainder slated. Flat roofs were positioned over the shops, each having an opening roof light. Portions of excavated walling had been enclosed in a basement under the market hall.

*1929-1930 The construction of Castlegate*

- 2.3.43 A new street (Castlegate) was also constructed between Castle Hill and the Don, linking Waingate and the Blonk Street Bridge. This had a radical and significant effect on the local topography. The eastern return of the steep slope to Castlegate never appears to have been finished off properly. A 1930s aerial photograph shows the area at the base to be roughly fenced off, with rubbish from the market tipped behind. As late as c.1961, photographs show the eastern return to be bricks that may have been a remnant of the north end of Castle Folds Lane.
- 2.3.44 The effects of all this re-development are visible on the 1935 Ordnance Survey 6-inch map and a 1930s aerial photograph. The Castle Hill Market occupied the centre of the Castle Hill area and was located on a level plateau. The north loading dock area is clearly visible, set above a steep slope to Castlegate. To the north-west, the ground level dropped off markedly to properties on Waingate including the Bull and Mouth Inn. To the immediate east of the market building, the ground level also fell away significantly. The area nearest Castlegate had been levelled to form car parking, but to the south, there was a piece of rough ground which sloped up towards the truncated remnant of the alley between the Market Tavern and Mudfords Building. It is not certain if this rough ground was formed by ground untouched by the 1927–30 works, or if in fact it comprised spoil

resulting from these works. Further east, a wide street marked the course of the culverted river Sheaf, and then there was a further small block of buildings at the Exchange Street/Castlegate junction.

*Mid- and late 20th century*

- 2.3.45 The Co-operative Stores were destroyed during an air-raid in December 1940, and lay derelict until 1958 when Sheffield Corporation started the construction of Castle Market.
- 2.3.46 As part of the works, the 1930s Castle Hill Market building was retained, and appears to have been largely unaltered, although comparison between aerial photographs suggests that the southernmost bay of the market (that originally next to the Cooperative Stores) was rebuilt across the entire east-west length of the market.
- 2.3.47 To the immediate south of the existing building, a two storey lower market and upper market (the New Market Block) was built. South of this, there was a five-storey block (the Low Block) with basement and sub-basement, facing onto Exchange Street, on the site of the former Co-operative Stores. The upper floors were occupied by offices, with an arcade and shops to the ground floor. The basement floor level was set at approximately the same level as that of the new building to the north, with the sub-basement comprising a service duct. To the west of the 1930 Castle Hill Market building, an eight-storey block (the High Block) was built, with a concrete tower rising above the southern end.
- 2.3.48 All parts of the re-development are assumed to have been based around reinforced concrete frames, supported by piles or foundations. The foundation plan also has the approximate line of the castle moat depicted on it.
- 2.3.49 Beneath the access passage or subway which runs along the south and west sides of the basement of the New Market Block and Low Block, there was a concrete ventilation/heating duct, with an offshoot running to plant positioned to the south of the subway. This duct takes the form of a concrete tunnel or passage, which was 1.57 m deep and up to around 3 m wide.
- 2.3.50 Within the High Block, there were two north-south aligned lines of foundations, each line being of six pads, and all broadly of the same dimensions (2.44 m square and 0.91 m deep). Along the redevelopment fronting Waingate (presumably within the High Block), column foundations located within the moat were piled and not excavated, and the foundation for the ventilation tower of the High Block was excavated to a depth of 43.89 m. Excavations were also made for supports for inserted beams under the south wall of the original Castle Hill Market and the adjacent 'Styring' property (precise location unknown), for sewers and ventilation ducts, and a large crane on a 'peninsula of unexcavated ground'.
- 2.3.51 As part of the same works, the East Loading Dock was created to the immediate east of the original Castle Hill Market building. Two new service roads were created to access the loading dock, one at the north-west corner and the other at the south-east. Also at the north end, the foundations for the supports of an elevated or spiral ramp were laid, although the ramp itself was not to be built until later. Both the ramp, and the area of the loading dock to the south had piled foundations only; their depths were not recorded.
- 2.3.52 To the immediate east of the spiral ramp, the former Sheffield Transport canteen single storey flat-roofed brick building faced onto the east end of Castlegate.

- 2.3.53 The structure forming the southern rectangle of the canteen is visible on the mid-1960s aerial photograph, and it is assumed that the rest of the building was also there by that date. The ground floor level of the canteen building appears to have been set at the same level as Castlegate, but it is set below the level of the southern part of the area to the east of the East Loading Dock. To the south of the spiral ramp, there was an area of storage for the Sheffield Transport canteen, measuring around 12 m square. The entrance to this storage area was from beneath the south side of the spiral ramp. The base of the storage was set at approximately the same level as Castlegate, with the roof covered over by the area to the east of the East Loading Dock. Outdoor market stalls were located in this area during the 1990s.
- 2.3.54 As a last phase of this re-development, a turf accountant's premises were built adjacent to the Bull and Mouth public house at the west end of Castlegate.
- 2.3.55 An extension to the Castle Market was completed in 1964. The foundations for this extension formed six east to west lines, grouped in three pairs across the north, central and south parts of the building.
- 2.3.56 By 1972, the paving covering the steep north-facing slope to Castlegate which was in a poor condition was replaced by a vertical concrete retaining wall.
- 2.3.57 To the immediate north of the extension to Castle Market, there was another building, formerly a carpet and furniture warehouse (no. 30 Waingate). The building is of 1970s rather than 1960s appearance, and is of a low two storeys in height, probably constructed largely in concrete. It is not known if it has a basement or what form its foundations take. A single storey brick toilet block was also built at the north-west corner of the Castle Hill Market building during the 1980s. Piles were driven into the ground for an unknown depth for this development (this evaluation revealed disturbance to a depth of at least 4 m, see below), and then capped to form a foundation for the horizontal concrete beams supporting the structure's walls.
- 2.3.58 Finally, during the 1990s, a modern concrete floor in the Castle Hill Market building was taken up, revealing the original terrazzo beneath. In a few places, this terrazzo was taken up as well, to reveal intermittent voids up to around 1.50 m deep beneath the floor.

#### *'Tunnels'*

- 2.3.59 In the late 1860s a main sewer was driven through the northern part of Castle Hill, on a line from approximately just above the Sheaf weir towards Bridge Street. This sewer was apparently blasted through solid rock, and so avoided any archaeological deposits above, although two shafts were sunk to aid the work. The shaft encountered what was described as a rock-cut passage, running in an approximate south-westerly direction, and at least 1.20 m in height.
- 2.3.60 This may or may not be part of the same tunnel referred to in 1946 which was discovered during the construction of an air-raid shelter for Sheffield Transport Department in 1939. The tunnel was followed as far as the western boundary of TB and W Cockayne's premises. The function and age of the tunnel is unknown.
- 2.3.61 Met Geo Environmental suggest that one of the tunnels lay close to the north side of the gatehouse fragment chamber, but that the feature had been impacted by the 1958-61 works. The lower part of the tunnel may partly survive beneath this area of the market. It is also possible that either the Co-operative Stores or the Castle Hill Market could have been provided with a tunnel-type air-raid shelter for employees, and this would accord with the

late 1930s date of construction, however there are no known records of such a feature being built.

### 3 AIMS AND OBJECTIVES

#### 3.1 Project aims

3.1.1 The WSI (Wessex Archaeology 2018a) set out the following aims (or purpose) in compliance with the ClfA *Standard and guidance for archaeological field evaluation* (ClfA 2014a):

- *to gather sufficient information to establish the presence/absence, nature, date, quality of survival and importance of any archaeological deposits associated with the former Sheffield Castle and of later industrial, residential and commercial activity within the Castle Markets site;*
- *to determine the profile of the moat;*
- *to characterise the deposits and their sequence within the moat;*
- *to date the deposit sequence;*
- *to evaluate the sedimentary nature of the moat, to evaluate the survival and potential of palaeoenvironmental and waterlogged organic remains; and,*
- *to inform either the scope and nature of any further archaeological work that may be required; or the formation of a mitigation strategy or a management strategy.*

#### 3.2 Project objectives

3.2.1 In order to achieve the above aims, the WSI (Wessex Archaeology 2018a) identified that the general objectives of the work were:

- *to place any identified archaeological remains within a wider historical and archaeological context in order to assess their significance;*
- *to determine the location, extent, date, character, condition, significance and quality of any archaeological remains within the site;*
- *to allow a detailed deposit model for the former Castle Markets site to be developed;*
- *to enhance understanding of construction of the castle's inner court and associated moat;*
- *to enhance understanding of the layout and use of the castle's inner court;*
- *to process and assess any waterlogged organic remains present;*
- *to enhance understanding of phasing of demolition of the castle, post-Civil War;*
- *to enhance understanding of initial post-medieval re-use of the former castle site;*
- *to enhance understanding of post-medieval and modern activities on the former castle site, including steelmaking and other metal trade activities;*
- *to enhance understanding of the impact on earlier deposits of post-medieval and modern demolition and construction phases;*
- *to enhance understanding of the development of the site and its associated buildings;*

- *to assess the artefactual and environmental potential of the archaeological deposits encountered;*
- *to make available information about the archaeological resource within the site by reporting on the results of the evaluation;*
- *to disseminate the results of the work in a manner in keeping with their significance, eg through 'open day' site visits, public talks and publication in a suitable journal;*
- *to deposit the resulting site archive with a suitable museum; and,*
- *to allow for the wider community to play a role in rediscovering the castle's remains.*

3.2.2 The following aims specific to the borehole survey were given:

- *to review any existing geotechnical data, foundation/service plans, etc., to inform the proposed survey and augment it;*
- *to locate two 20 m long transects perpendicular to the recorded course of the moat;*
- *to obtain cores at 2 m intervals along each transect;*
- *to describe the sediment sequence of each core; and,*
- *to sample the two most promising sequences to obtain suitable material for scientific dating and palaeoenvironmental assessment.*

### 3.3 Updated project aims

#### *General aims*

3.3.1 The post-excavation assessment (Wessex Archaeology 2019b) contained an updated project design (UPD) which appraised and updated the aims given above. The updated project aimed:

- *to supplement the full stratigraphic account with additional figures and plates as appropriate, and including a section combining the results of trench 10 with the results of the nearby ARCUS trench;*
- *to analyse all data categories, including finds and environmental, following the recommendations of the assessment report;*
- *to finalise placement of any identified archaeological remains within a wider historical and archaeological context;*
- *to finalise the determination of the location, extent, date, character, condition, significance and quality of the archaeological remains within the site;*
- *to enhance understanding of construction of the castle's inner court and associated moat;*
- *to enhance understanding of the layout and use of the castle's inner court;*
- *to enhance understanding of post-medieval re-use of the former castle site, including steelmaking and other metal trade activities;*
- *to enhance understanding of the development of the site and its associated buildings;*

- *to use scientific dating methods (including AMS dating and luminescence dating) to enhance the chronology of the deposit sequence, particularly in areas where this is poorly understood;*
- *to produce a unified account of the development of the north of the castle site as seen in trenches 1, 5 and 6 and, if possible, also in the 2001 ARCUS trenches and in Armstrong's published results;*
- *to produce a unified account of the development of the castle site in general;*
- *to make available information about the archaeological resource within the site by producing a final grey literature archive report on the results of the evaluation;*
- *to publish the results of the evaluation as a chapter in a book under production by Sheffield University;*
- *to further disseminate the results of the work as appropriate, eg through public talks, and to continue to allow for the wider community to play a role in rediscovering the castle's remains; and,*
- *to deposit the resulting site archive with a suitable museum.*

#### *Research questions*

3.3.2 The following research questions were identified in the UPD (Wessex Archaeology 2019b). These questions form part of the aims of the updated project design.

- *Can the interpretation of probable earthwork defences in trench 2 (and also trench 3 and possibly 4) be refined in light of scientific dating?*
- *Can the interpretation of early cut features in trench 6 be refined in light of scientific dating?*
- *Is the slag contained within medieval strata (chiefly in the early sequences in trenches 1, 5 and 6 identified above) indicative of medieval ironworking inside the courtyard of Sheffield Castle?*
- *What can be said about the layout and development of the castle?*
- *What can the artefactual (particularly faunal) and environmental remains tell us about the lifestyle of the inhabitants of this high status site?*
- *What can the rich environmental samples and wood artefacts derived from destruction layers in trench 3 tell us about slighting of the castle, probably in 1266?*
- *What can be said about the 13th-century transition from the de Lovetot castle to the de Furnival castle in light of the results from trench 3, of the evaluation in general and of Armstrong's work?*
- *Is the industrial archaeology typical for Sheffield? How do the steelworks in particular compare with other sites in the city?*
- *To what extent did the specific character of the killing shambles (slaughterhouse district) influence development in the north and east of the site?*

- *How did the topography, the standing remains of the castle and the status of the castle site influence development in the 18th, 19th and 20th centuries?*

### 3.4 Borehole assessment

3.4.1 The borehole assessment (Wessex Archaeology 2019c) recommended further palaeoenvironmental assessment (Wessex Archaeology 2019d), which aimed:

- *to determine the nature, depositional history and date of the accumulated deposits within boreholes BH11 and BH13;*
- *to determine the preservation potential and concentration of palaeoenvironmental remains within the deposits; and,*
- *to assess the geoarchaeological potential of the deposits.*

## 4 METHODS

### 4.1 Introduction

4.1.1 All works were undertaken in accordance with the detailed methods set out within the WSI (Wessex Archaeology 2018a). This section summarises the methodology presented in the WSI.

4.1.2 All fieldwork conformed to the relevant Chartered Institute for Archaeologists standards and guidance (2014a–c) and Wessex Archaeology’s in-house quality ensured standards.

### 4.2 Setting out and trench location variation from WSI

4.2.1 All trenches and boreholes were set out using GNSS (**Fig. 1–3**). The trenches were laid out as specified in the WSI with variations agreed in advance with SYAS.

4.2.2 Trench 6 partially overlapped with the area of a late-20th century toilet block associated with Castle Market. The steel-reinforced concrete foundations which were used for the toilet block were substantial and were resistant to removal by mechanical excavator and breaker. As a result, trench 6 was split into two parts: trenches 6A and 6B. Trench 6A contained the northern part of Trench 6 and extended further to the east beyond the area specified in the WSI. Trench 6A was successfully excavated and contained archaeological remains as detailed below. Trench 6B occupied the southern part of the proposed trench 6. Excavation in trench 6B revealed 20th century disturbance to a depth of at least 4 m below ground level.

4.2.3 A large drain running across trench 10 had been anticipated, however the strength of flow within the drain was higher than expected. The drain could not be cut and blocked without risk of flooding the trench. This risk did not combine favourably with the risks of deep excavation. Agreement was reached with SYAS and Sheffield City Council to reduce the size of the trench, targeting the eastern part of the original trench. Specialist shoring equipment had to be re-designed to facilitate safe excavation of the new area of the trench.

4.2.4 Excavation of trench 11 was constrained in the east by the presence of asbestos bearing materials (both fragments of cement tile and an asbestos-bearing conduit). In the west, trench 11 was constrained by the presence of a gas pipe. Following determination that the gas pipe was not live, it was agreed with SYAS that the excavated area was sufficient to address the aims of the project.



4.2.5 The location of other trenches underwent minor revision during excavation on the basis of ground conditions, and the safe distance from existing deep drop edges on site.

### 4.3 Excavation methods

4.3.1 Concrete overburden was removed using a mechanical breaker attached to a 360° tracked excavator. After the removal of concrete, the trenches were excavated with the 360° tracked excavator equipped with a toothless bucket. Machine excavation was under the constant supervision and instruction of a suitably experienced archaeologist. Machine excavation proceeded in level spits of approximately 50–200 mm until either a significant archaeological horizon or the natural geology was exposed. Where necessary, the base of the trench/surface of archaeological deposits was cleaned by hand. Machine excavation of trenches was iterative, with several campaigns of machining interrupted by cleaning, recording and hand excavation. The spoil was removed by a dumper and stored on site, in the pre-agreed designated areas.

4.3.2 All archaeological features and deposits identified were hand-excavated sufficient to address the aims of the evaluation. Spoil derived from both machine stripping and hand-excavation was visually scanned for the purposes of finds retrieval, and where appropriate was also metal-detected by trained archaeologists. Artefacts were collected and bagged by context.

### 4.4 Deep excavations

4.4.1 In trenches where deep excavations were required, appropriate stepping and/or shoring was used by suitably qualified operatives as specified in the WSI (Wessex Archaeology 2018a). Excavations were considered deep when there was a risk of collapse; this was typically at depths greater than 1.2 m.

4.4.2 Two methods of shoring were used. In trench 10, sheets and waling were installed under archaeological supervision by a specialist subcontractor (HB Tunnelling). In other areas, proprietary Groundforce shoring boxes were installed by Wessex Archaeology. Main access to deep excavations was by means either of a stepped or sloped ramp or by a steel ladder fitted with a gated entry point and appropriately secured.

### 4.5 Recording

4.5.1 All exposed archaeological deposits and features were recorded using Wessex Archaeology's *pro forma* recording system.

4.5.2 A complete drawn record of excavated archaeological features and deposits was made. This included plans and sections, drawn to appropriate scales (generally 1:20 or 1:50 for plans, 1:10 for sections) and tied to the OS National Grid. The OD heights of all principal features were calculated (as defined by OSGM15 and OSTN15) and the levels added to the drawings.

4.5.3 A full photographic record was made using black and white negative film (supplemented, as appropriate, by 35 mm colour slide film); additional working shots of the site were supplemented by high resolution digital data. The record includes:

- the site prior to commencement of fieldwork;
- the site during work, showing specific stages of fieldwork;
- the layout of archaeological features within each trench;
- individual features and their sections; and,
- groups of features where their relationship is important.



- 4.5.4 Digital photography conformed to Historic England guidance (2015b). Digital images were subject to managed quality control and curation processes to ensure long term accessibility of the image set. Photographs were also taken of all areas, including access routes, to provide a record of conditions prior to and on completion of the evaluation.
- 4.5.5 Unmanned aerial vehicle (drone) footage and videos were also taken by Wessex Archaeology.
- 4.5.6 In addition to the record shots taken by Wessex Archaeology, volunteer Paul Rowland took thousands of digital photographs (<https://photos.app.goo.gl/4YfCidq85tvBuHSn7>) now published as a book (Rowland 2019).

## 4.6 Survey

- 4.6.1 The real time kinematic (RTK) survey of all trenches, boreholes and features was carried out using a Leica GNSS connected to Leica's SmartNet service. All survey data was recorded in OS National Grid coordinates and heights above OD (Newlyn), as defined by OSGM15 and OSTN15, with a three-dimensional accuracy of at least 50 mm.

## 4.7 Finds

- 4.7.1 All archaeological finds from excavated contexts were retained. Any finds requiring conservation or specific storage conditions were dealt with immediately in line with *First Aid for Finds* (Watkinson and Neal 1998).
- 4.7.2 All retained finds have been, as a minimum, washed, weighed, counted, marked and identified. Finds are suitably bagged and boxed in accordance with the guidance given by Museums Sheffield and generally in accordance with the standards of ClfA (2014b).

## 4.8 Environmental samples

- 4.8.1 All bulk and monolith sampling was undertaken by Wessex Archaeology conforming to Wessex Archaeology's in-house guidance, which adheres to the principles outlined in Historic England's guidance (Campbell *et al.* 2011 and Historic England 2015c). The sampling strategy was laid out in the WSI and was agreed with SYAS prior to the on-site works.
- 4.8.2 Bulk environmental soil samples for the recovery of plant macrofossils, wood charcoal, small animal bones and other small artefacts, were taken by Wessex Archaeology following a targeted approach focusing on nature of the feature, its quantity, size, richness, internal variation, ambiguity, etc. The focus of the bulk sampling was on best understood, well-sealed and dateable contexts or features.
- 4.8.3 Environmental samples from the trial trenching were assessed and analysed by The University of Sheffield.
- 4.8.4 Additional palaeoenvironmental work on material derived from the borehole survey was undertaken in-house by Wessex Archaeology.
- 4.8.5 Detailed methodologies for both strands of palaeoenvironmental reporting are given in the appropriate sections below.
- 4.8.6 Samples were also taken by Wessex Archaeology and by Mark Bateman (The University of Sheffield) for luminescence dating using pOSL and OSL techniques.

## 4.9 Geoarchaeological samples

- 4.9.1 Five monolith samples were taken for geoarchaeological assessment from the castle ditch section in trench 10 and from deposits in trench 3. Monolith samples 3010, 3011 and 3012 were taken through a sequence of construction and destruction deposits in trench 3. Monolith sample 10001 was taken through deposits forming the bank and fills of the castle moat, and monolith sample 10002 were taken through post-medieval deposits overlying the moat; both in trench 10.
- 4.9.2 They were described and assessed for microfossil and dating potential. The monolith samples were cleaned prior to recording and standard descriptions were used (following Hodgson 1997 and Troels-Smith 1955), including Munsell colour, texture, structure and nature of boundaries (see **Appendix 10**).

## 4.10 Borehole survey

- 4.10.1 The borehole survey comprised 23 boreholes (BH1–BH23). Boreholes BH1–BH3 were positioned on top of the castle mound with boreholes BH4–BH23 aligned along three transects running across the predicted location of the moat (**Fig. 10–13**; **Appendix 2**).
- 4.10.2 A percussive window sampling rig (Terrier type) was used to extract sleeved cores one metre in length and 100 mm in diameter. The rig was operated by experienced engineers from Ground Technology Services Ltd, under the supervision of a suitably experienced member of the Wessex Archaeology geoarchaeological team.
- 4.10.3 On retrieval the cores were opened, examined and recorded on site. Selected cores were sealed, marked with the site code, borehole number and sample depth, before being returned to the Wessex Archaeology laboratory at Salisbury for further investigation.
- 4.10.4 Cores were split and recorded on site apart from five boreholes retained for later laboratory-based description. The opened cores were described by a suitably experienced geoarchaeologist following Hodgson (1997). Interpretations were made regarding the probable depositional environments and formation processes of the sampled deposits. Boreholes BH4–BH10, BH12 and BH14–BH23 were discarded subsequent to being split and recorded on-site.
- 4.10.5 The five retained boreholes comprised two from the moat transects (BH11 and BH13) that contained possible organic moat fill, and the three boreholes from the castle mound (BH1–BH3).

### *Deposit modelling*

- 4.10.6 All data from the borehole survey was entered into industry standard software (Rockworks™ v17.0). Each lithological description (eg, made ground, clay, sand etc.) was given a separate colour and pattern allowing for the cross correlating and grouping of the different sediment types.
- 4.10.7 Where suitable contexts were present, lithological units representing certain depositional environments were reconstructed. These were then displayed in the form of four linear transects, three through the moat (**Fig. 10–12**) and one across the castle mound (**Fig. 13**).
- 4.10.8 Transect 1 measured approximately 10 m in length, was aligned north to south and contained seven borehole records (BH8–BH12, BH22 and BH23; **Fig. 10**).

- 4.10.9 Transect 2 measured approximately 20 m, was aligned north to south and contained eight borehole records (BH5, BH7, BH13–BH18; **Fig. 11**).
- 4.10.10 Transect 3 measured approximately 3 m, was aligned north-east to south-west and contained three borehole records (BH19–BH21; **Fig. 12**).
- 4.10.11 Transect 4 across the castle mound measure approximately 35 m, was aligned east to west and contained three borehole records (BH1–3; **Fig. 13**).
- 4.10.12 In addition to the above transects, two further transects were produced from the evaluation trenching results to enhance the deposit model produced by borehole survey. Deposits and structures have been grouped into broadly phased units. Data collected by GNSS survey has been used to position these units both horizontally and vertically. These transects are an extrapolation and their detail should not be relied upon, however they are useful as an overview for visualising interpretation of the results. The data used were not obtained from straight line transects (see **Fig. 1**).
- 4.10.13 Transect 5 runs roughly west to east across the castle mound (trenches 1, 5, 6 and 7; **Fig. 37.1**).
- 4.10.14 Transect 6 runs roughly north to south across the castle mound and moat forming an extension of borehole transect 2 (trenches 1 and 2 and BH5, BH7, BH13–BH18; **Fig. 37.2**).

#### 4.11 Radiocarbon dating

- 4.11.1 Suitable material was identified under a binocular microscope, stored in glass tubes, and sent to the <sup>14</sup>CHRONO Centre at Queens University Belfast for dating. Reporting of the radiocarbon dating results follows international conventions (Bayliss and Marshall 2015; Millard 2014). The calibrated age ranges were calculated with OxCal 4.2.3 (Bronk-Ramsey and Lee 2013) using the IntCal13 curve (Reimer *et al.* 2013). All radiocarbon dates are quoted as uncalibrated years before present (BP), followed by the lab code and the calibrated date-range (cal. BP) at the 2 $\sigma$  (95.4%) confidence, with the end points rounded out to the nearest 10 years.

## 5 STRATIGRAPHIC RESULTS

### 5.1 Introduction

#### *Overview*

- 5.1.1 The following section provides an overview of information held in the site archive. It forms a descriptive synthesis of the results presented in the post-excavation assessment (Wessex Archaeology 2019b), the borehole assessment report (Wessex Archaeology 2019c) and enhanced by subsequent analyses commissioned as a result of the recommendations of those reports. For detailed discussion and interpretation, see the discussion section below.

- 5.1.2 A list of context numbers and context descriptions within each trench is contained in **Appendix 1**. Borehole data are summarized in **Appendix 2**.

#### *Methods of stratigraphic assessment and quantity of data*

- 5.1.3 All hand-written and drawn records from the excavation have been collated and checked for consistency and stratigraphic relationships. Key data has been transcribed into an Access database for assessment, which can be updated during any further analysis. The

excavation has been preliminarily phased using stratigraphic relationships and the spot dating from artefacts, particularly pottery.

5.1.4 **Table 1** (below) provides a quantification of the records from the excavation.

**Table 1** Quantification of excavation records

Type	Quantity
Context records	686
Context registers	31
Graphics (A4 and A3)	121
Graphics (A1)	1
Graphics registers	11
Environmental sample registers	8
Other records (brick, timber)	17
Photographic registers	48
Digital photographs	1,538

## 5.2 Borehole survey of moat

### *Introduction*

5.2.1 Twenty boreholes (BH4–BH23) were inserted into the castle moat aligned along three transects (**Fig. 10–12**). The deposits recorded in these boreholes are grouped into four key interpretations, outlined below and described in detail in **Appendix 2**.

5.2.2 The results of the three boreholes inserted on the castle mound (BH1–BH3) are synthesized with the results of evaluation trenches 2–4 below.

### *Made ground*

5.2.3 Made ground primarily comprised mixed grey brown coarse sandy rubble containing large fragments of rock, brick and concrete. This uppermost deposit was relatively modern, present in all boreholes and ranged in thickness from 0.5 m (BH9) to 2.0 m (BH23). Made ground was penetrated in all but two boreholes (BH15 and B21) where large pieces of stone masonry were encountered. The upper elevation of the made ground recorded across the three transects varied between 51.65 m aOD and 51.9 m aOD.

### *Clay and silty clay (moat fill)*

5.2.4 This deposit was firm grey brown clay with no visible structure and occasional small sub-angular stone inclusions. The deposit was present in ten boreholes across the three transects (Transect 1: BH8, BH10–BH12 and BH23; Transect 2: BH7, BH13 and BH14; Transect 3: BH19 and BH20).

5.2.5 The deposit ranged in thickness from 0.34 m to 4 m, with the thickest deposits located within the moat (**Fig. 10–12**). The upper surface of this moat fill ranged from 51.31 m (BH8) to 47.71 m aOD (BH23). Although predominantly mixed structureless clay there was evidence of deposition within a wet environment between 4.5 m (47.25 m aOD) and 5.8 m (45.95 m aOD) in BH11 where the clay was recorded as dark grey with occasional faint darker bands and organic patches. The base of the moat fill, where retrieved in boreholes, ranged from 45.81 m (BH23) to 51.01 m aOD (BH8).

5.2.6 In BH19 there was some evidence for layering within the clay, although this probably reflects dumping of material rather than laminations occurring through natural silting of sediment in the moat.

5.2.7 Occasional fragments of charcoal and brick were recorded in this deposit (BH19), along with occasional organic inclusions (flecks and patches rather than distinct lenses; BH11 and BH12) and iron staining and concretions (BH7, BH8, BH11, BH13).

*Sandstone rubble (demolition layer)*

5.2.8 This layer comprises yellow brown sandy rubble, including large sub-angular fragments of sandstone unrelated to the underlying silkstone sandstone bedrock. The deposit was encountered in eight boreholes (Transect 1: BH9–BH12, BH22; Transect 2: BH13; Transect 3: BH19 and BH20; **Fig. 10–12**).

5.2.9 The deposit ranged in thickness from 0.2 m (BH13) to 2 m (BH23) with the upper surface of this sandstone rubble recorded between 49.96 m aOD (BH20) and 50.42 m aOD (BH9). In three boreholes from transect 1 (**Fig. 10**; BH9, BH10 and BH22) large fragments of stone prevented penetration into the underlying deposits.

*Bedrock*

5.2.10 The bedrock was friable, fine-grained sandstone referred to locally as Silkstone, a regional sandstone which forms part of the coal measures group. The upper surface of the bedrock ranged from 51.24 m aOD to 45.81 m aOD in the base of the moat.

### 5.3 Trench 1

*Rationale*

5.3.1 The WSI (Wessex Archaeology 2018a) stated that trench 1 was intended to test for evidence of:

- a probable cementation furnace shown within the Castle Hill Steelworks on the 1896 Goad Fire Insurance plan;
- the projected line of the eastern range of the inner court, associated with the preserved stonework in the adjacent upper chamber;
- the central yard of the inner court;
- the earlier phases of the castle surviving beneath later deposits/structures; and,
- the extent of disturbance from the 1920s construction of Castle Hill Markets.

5.3.2 The trench was successful in identifying structures and deposits associated with the cementation furnace depicted on the 1896 Goad Fire Insurance Plan, the disturbed central yard of the inner court of the castle, made ground layers and surfaces associated with the earlier phases of the castle, and the extent of disturbance from the 1920s construction of Castle Hill Markets. However, excavation did not reach the projected line of the eastern range of the inner court, which may be situated below the preserved remains of the cementation furnace (protected and backfilled *in situ*) or to the east of the evaluation trench.

*Location*

- 5.3.3 Trench 1 (**Fig. 14**; **PI. 1–12**) was located in the north-east of the raised central area of the site (**Fig. 1**).

*Overview*

- 5.3.4 Excavation halted at 4 m below ground level for safety and methodological reasons. The early castle was evidenced by a series of layers, a stone surface (1075) and a possible metallised surface made of slag (1073). The slag provides evidence for 13th-century iron smelting in the general vicinity. A pit (1052) was medieval but could not be more closely phased. These medieval (and/or early post-medieval) surfaces and strata were directly overlaid by 18th-century made ground layers and a wall associated with a former bowling green. Elsewhere in the trench was a further cobble surface of 15th- to early-16th-century date. In the 19th century, a cementation furnace was constructed. A drain contemporary with the furnace was also recorded. The 19th-century structures were demolished to below the contemporary ground level in the early 20th century for construction of the markets, when the area was levelled and capped with concrete.

*Sondage in west of trench 1*

- 5.3.5 At the west end of trench 1, a sondage was sunk in successive stages to a depth of 4 m below ground level (51.59 m aOD) using box shoring for protection (**PI. 1**). This location was selected for the sondage as it did not contain 18th- to 20th-century structures (other than the concrete slab of the market), having been within the area of the bowling green in the 18th century and forming part of a yard in the 19th century (**Fig. 5–9**).
- 5.3.6 The lowest four strata (1079, 1080, 1077 and 1076; **PI. 1**) comprised layers of grey clay (with green, brown and purple hues) and orange brown sand (1080). Inclusions of sandstone and charcoal flecks were present. The first three layers contained no finds, but the fourth layer (1076) contained a sherd of North Nottinghamshire Quartz & Shell ware dating from the 12th to 13th centuries, and a sherd of Coal Measures Fine ware type pottery dating from the late 13th to 14th centuries. A radiocarbon determination was obtained from material from the fourth layer (1076) indicating a date of cal. AD 1040–1210 (UBA-41313 902±25 BP; see radiocarbon section below for detail, and pottery and discussion sections below for commentary on reconciling pottery and radiocarbon dating of these layers).
- 5.3.7 Layer 1075 comprised abundant sandstone in a matrix of yellow brown silt clay. The stones were disordered with the top of the deposit sloping down from the south to the north (**PI. 1 and 2**). Stone layer 1075 was situated at a depth of 2.5–3.1 m below ground level (52.2–52.8 m aOD). This layer was about a metre lower than a better-preserved stone surface recorded nearby in trench 5 (see below).
- 5.3.8 Two layers (1078 and 1074; **PI. 1**) overlying stone layer 1075 were similar to those found earlier in the sequence. Layers 1078 and 1074 comprised bluish grey clay and orange brown sand respectively. It is possible that these layers represent upcast material associated with whatever works disturbed surface 1075.
- 5.3.9 These layers were overlain by a thin (0.05 m deep) layer of red black slag (1073; **PI. 3**). This slag probably represented a metallised surface and comprised at least some iron smelting tap slag (see slag and discussion sections below).
- 5.3.10 Six subsequent strata (1072, 1064, 1057, 1062, 1048 and 1049; **PI. 3 and 4**) comprised mid-blue brown sand (1072), dark brown silts and clays (1062, 1048, 1057) and mid-grey

yellow silt clay (1049). Layers 1062 and 1064 were rich in charcoal. A radiocarbon date (UBA-41312, 818±28 BP: cal. AD 1170-1260) was obtained for a *Secale* sp. grain from 1057. An assemblage of 21 sherds of pottery was recovered from layer 1048 and a further 14 sherds recovered from 1057. All but one sherd (18th century, intrusive in 1048) can be accommodated by the later six decades of the radiocarbon range (ie a date of 1200–1260).

- 5.3.11 A pit (1052; **PI. 4**) had been cut from around top of the sondage and was seen in both the north and east sections of the sondage. Pit 1052 was 0.65 m deep and had a diameter of around 1.72 m. The fill (1053) comprised 20% sandstone in a matrix of mid-yellow brown silt clay. A further sherd of pottery was recovered from this fill, suggesting that the pit dated to between the 13th and 15th centuries.

#### *Late medieval cobblestone surface 1033*

- 5.3.12 Away from the western sondage, in the south-east corner of trench 1, excavation halted at three strata (1067, 1065 and 1066) forming bedding layers for cobblestone surface 1033. Layers 1067 and 1066 comprised pink and grey yellow silt clays and 1065 comprised black sand silt; layers 1065 and 1066 each contained 5% charcoal flecks.
- 5.3.13 Surface 1033 (**PI. 5**) comprised rounded cobblestones in a matrix of mid-brown sand silt (1042) containing 15th- to early-16th-century pottery. The surface (1033) was situated at 54.54 m aOD, about 1.7 m above the earlier stone layer 1057 seen in the west of the trench.

#### *Bowling green*

- 5.3.14 Medieval pit 1052 at the west end of trench 1 was sealed by layer 1006 (**PI. 4**) comprising yellow grey silt clay with stone, ash and clinker inclusions. A total of 47 sherds of pottery were recovered from this layer, as well as clay tobacco pipe, both chiefly consistent with an 18th century date (although with some intrusive 19th century material; see discussion below).
- 5.3.15 A linear north to south aligned cut (1054) through layer 1006 was 0.93 m wide and 0.26 m deep with straight sides. This cut contained two surviving courses of an unmortared sandstone wall (1055) 0.85 m wide (**PI. 6**). Construction cut 1054 was backfilled with dark grey silt clay (1038). This wall correlates with the wall of the bowling green known from historic maps (**Fig. 5**).

#### *Demolition of bowling green*

- 5.3.16 Disturbed sandstone blocks (1019; **PI. 6 and 7**) derived from wall 1055 survived *in situ* above the surviving part of wall 1055. Demolition material 1019 was overlain by layer 1058. Layer 1056 occupied a similar stratigraphic position overlying deposit 1006 elsewhere in trench 1. Both layers comprised orange or yellow brown sandy silt with inclusions of charcoal and lime mortar.

#### *Layers and structures overlying surface 1033*

- 5.3.17 Overlying cobblestone surface 1033 was a 0.1 m thick layer of light brown silt sand (1043; **PI. 8**) containing pottery with a variety of dates, the latest of which was from the 19th to 20th centuries. A further layer (1044) was also 0.1 m thick and comprised mainly charcoal.
- 5.3.18 Overlying layer 1043 was a 0.15 m thick layer of orange red sand with degraded brick fragments and stone inclusions (1007). An assemblage of pottery had a date range from the 15th to 18th centuries, with no sherd inconsistent with a 17th-century date. The red

colour and sandy composition suggest that it may have been created or transformed by heat, perhaps the result of firing sandstone masonry.

- 5.3.19 A separate sequence (not illustrated, see site archive) recorded layers 1040 and 1041 overlying cobble surface 1033. Layer 1040 comprised over 0.4 m of yellow brown silt clay and contained residual medieval pottery as well as pottery of 18th-century date. Layer 1041 comprised 0.06 m of grey black ash.
- 5.3.20 Structure 1035 (**PI. 8**) had been truncated by a 20th-century drain. Structure 1035 comprised a single course of unbonded sandstone and may represent a fragment of a surface or of a wall. Structure 1035 was stratigraphically later than layer 1043, suggesting a 19th-century date at the earliest for the structure.

#### *Cementation furnace*

- 5.3.21 A large construction cut was variously recorded as 1068, 1070 and 1082 and penetrated through the bedding layers (1066 etc.) of surface 1033 as well as bowling green demolition layers 1056 and 1058. The cut contained a series of structures that occupied the east end of trench 1 (**PI. 9**). The backfill of the construction cuts comprised brown (1069) and reddish purple (1071) sandy silt.
- 5.3.22 Handmade red bricks and lime mortar were used to construct a series of structures in the centre of this complex (**PI. 10**). North to south aligned parallel walls 1022 and 1023 were generally two courses thick, although wall 1022 expanded in the south-west to some 0.94 m in width to fill what would otherwise have been a void in the masonry. The space between walls 1022 and 1023 would have been just large enough for human access. The walls ran from the north limit of excavation to the centre line of the trench where structure 1029 formed a partial blockage or arch constricting access to the south (**PI. 11**). Structure 1029 contained both firebricks and red bricks bonded by lime mortar. Running south from here was a small space delimited in the east by two-skin handmade red brick and lime mortar wall 1047; a matching west wall had probably been truncated by a later concrete base (1028) associated with the 20th-century castle market. This southern space would have been too small for access and may represent the ash pit or fire pit of the cementation furnace. A cementation furnace in this location is depicted on historic maps and photographs (eg **Fig. 9**). Wall 1039 (two skins, handmade brick, lime mortar) also ran 0.9 m to the east from wall 1023, mirroring the widest part of wall 1022 but with more economic use of brick.
- 5.3.23 Sandstone and lime mortar structures from the same phase of construction in places partly overlay the brick structures described in the last paragraph (1022, 1023, 1029, 1039 and 1047). Structure 1031 was not well preserved and was attested by three rough flattish sandstone blocks. Structure 1031 overlay brick wall 1047 forming an upper course or partial capping of the possible cementation furnace ash pit (rear of **PI. 10**). Two substantial sandstone and lime mortar walls (1020 and 1021) were up to 2.3 m thick and had ashlar-faced blocks forming impressive exterior faces (**PI. 10**). Wall 1020 was 'L'-shaped in plan, having originally run north to south across the trench, although the southern portion had been truncated by a drain associated with the 20th-century markets. At the northern limit of excavation, wall 1020 turned to the east, partly overlying brick wall 1022 and ending with respect to the probable access chamber between brick walls 1022 and 1023. On the other side of this chamber, the wall continued as 1021, partly overlying brick wall 1023. A final sandstone structure was wall 1036, 0.6 m wide, which ran south from wall 1021. Wall 1036 was built on layers 1040 and 1041 (see above) overlying late medieval surface 1033 (**PI. 5**).



5.3.24 Iron bars (example retained) had been inserted into brick walls 1022 and 1023 to support a flagstone floor (1024; **PI. 12**). The flagstone floor was also supported on a single skin of each of the brick walls. The flagstones comprising floor 1024 had been reused as evidenced by a groove or rebate carved down one side of some of the stones. The relationship of floor 1024 to the function of the furnace was unclear. It is possible that the floor was a later modification.

#### *Drain and yard*

5.3.25 Ash and clinker layer 1015 had been laid down over 18th-century layer 1006 in the west of trench 1. Maps from the 19th century depict a yard in this area and it is probable that 1015 was a levelling layer for the 19th century yard surface.

5.3.26 A linear cut feature (1008; **PI. 7**) 0.62 m wide and 0.48 m deep ran from north-east to south-west across the centre of trench 1 and cut through layer 1015. Cut 1008 contained a drain comprising handmade brick and lime mortar walls three courses high and one skin thick (1009) capped with sandstone flags (1010). The construction cut for the drain was backfilled with dark brown silt sand (1011) and brick and stone rubble in a matrix of brown grey silt with ash and lime mortar (1016).

5.3.27 The drain itself contained a secondary fill of dark brown silt clay (1018), and probable tertiary fills of mid-white grey ash (1017) and dark grey brown silt with stone and lime mortar (1012).

#### *Demolition of cementation furnace*

5.3.28 The access chamber between walls 1022 and 1023 was backfilled with deposits 1013, 1063 and finally 1005. Deposit 1013 (**PI. 12**) comprised brick rubble in a matrix of purple red sand and ash clearly associated with intensive heat probably associated with the cementation furnace. The deposit (1013) was, however, *ex situ* backfill. A lens of light grey white fine ash (1063) was present within deposit 1013. Layer 1005 comprised yellow brown silt clay with ashy lenses and stone inclusions.

5.3.29 In the east, demolition layer 1026 (sandstone rubble in a matrix of grey brown silt) overlay the remains of wall 1036. Iron plate 1032 (retained) overlay layer 1026 and had sulphurous blisters or drips adhering to it.

5.3.30 Moving west, demolition layers 1025 (sandstone and red brick rubble in a matrix of grey yellow silt) and 1051 (dark yellow clay with ash and rubble inclusions) overlay wall 1020 and other structures.

#### *Markets*

5.3.31 Levelling layers 1030, 1034 and 1081 comprised mainly red and blue to black industrial ashes and clinkers probably imported for levelling. These deposits were probably associated with preparation of the site ahead of the construction of the Castle Hill Market in the 1920s.

5.3.32 A small cut feature (1059) was 0.44 m wide and 0.42 m deep with a fill (1060) comprising chiefly disturbed lime mortar. This was seen in section only and may represent a robber pit or similar feature associated with demolition.

5.3.33 The main construction cut for the markets (1037) truncated structures such as 1020 and demolition deposits such as 1025.

- 5.3.34 Subsequent deposits (a sequence of 1027, 1014, 1004, 1003, 1028, 1045, 1002, 1050, 1001 and 1000) comprised concrete (1000, 1001, 1028), industrial ashes (1002, 1003, 1050), rubble (1002, 1004, 1027, 1045) and orange brown silt clay (1014). Rubble layer 1045 was significant in containing ganister fragments with bonded crozzle (furnace lining) derived from a cementation furnace. It is highly probably that this rubble originated from the demolished cementation furnace.

*Impact of development*

- 5.3.35 The castle market development included a series of drains that had significantly impacted on buried 19th-century structures to a maximum depth of around 1.2 m below the present ground level. However, the drains were an intermittent impact and preservation between them was good. The construction of the markets had not impacted on pre-19th century layers in trench 1. Overall, preservation of remains from all periods was good.

## 5.4 Trench 2 and borehole 1

*Rationale*

- 5.4.1 The WSI (Wessex Archaeology 2018a) stated that trench 2 was intended to test for evidence of:

- the nature of activities within buildings of the Castle Hill Steelworks (shown on the 1850s Ordnance Survey map), later re-used as an iron warehouse (Goad Fire Insurance Plan 1888);
- the structure of the eastern tower of the main gateway;
- the relationship of the gateway with the eastern range of the inner court;
- earlier phases of the castle surviving beneath later deposits/structures; and,
- the extent of disturbance from the 1920s construction of Castle Hill Markets and disturbance caused by linking the 1920s market building to the 1950s extension.

- 5.4.2 The results of trench 2 were generally not compliant with these ambitions, with only the extent of 20th century disturbance addressable. Masonry remains of the castle were not encountered. Preservation of the Castle Hill Steelworks was limited to the foundation of an exterior wall and a drain.

*Borehole*

- 5.4.3 A single borehole (BH1; **Fig. 13–16**) was inserted within trench 2 to test and expand the results of the evaluation trench.

*Location*

- 5.4.4 Trench 2 (**Fig. 15; Pl. 13–**) and borehole 1 were located in the south-east of the raised central area of the site (**Fig. 1**).

*Overview*

- 5.4.5 Borehole 1 reached the bedrock at 51.41 m aOD (4.3 m below ground level). Around 3.3 m of clean clay deposits were present above this, and have been interpreted as the remains of a motte. On top of these deposits were a wall and drain associated with the Castle Hill Steelworks.

### *Natural*

- 5.4.6 Borehole 1 encountered the silkstone bedrock at 51.41 m aOD (4.3 m below ground level).
- 5.4.7 A 4 m deep unsupported sondage (**PI. 13**) was sunk in the west end of trench 2 to a depth of 51.68 m aOD, was recorded from the trench edge and then backfilled. The sondage had previously been cleaned and recorded safely to a depth of 2.4 m below ground level as a stepped excavation (**PI. 14**).
- 5.4.8 The lowest deposit reached was 2053, comprising grey yellow clay with rare small sandstone inclusions. This deposit was firm to the machine bucket and, importantly, exhibited pronounced veining, suggesting that it had been undisturbed for some time. The upper interface of deposit 2053 sloped down straight and sharp to the south at approximately 45°. This slope represents either the base of the motte or an interface within the motte. The angle of the upper slope of the motte is unknown.
- 5.4.9 The results of borehole 1 (**Appendix 2**) were not inconsistent with the results of the evaluation trench; however it is not possible to identify deposit 2053 securely with any of the layers recorded by the borehole.

### *Motte*

- 5.4.10 Layers 2051 (yellow brown silt clay), 2049 (red brown clay), 2052 (blue clay), 2050 (orange clay) and 2048 (blue grey clay) overlay cut 2054 in turn. Layer 2051 was over 2.5 m thick, continuing beyond the limit of excavation. The other layers were thinner, typically a maximum of 0.2 m thick each. Each layer contained sandstone inclusions in varying proportions. Iron-panning was present at the interfaces between layers, especially 2049. A dedicated search for anthropogenic material found very rare charcoal flecks (perhaps 1/100th or 1/1000th of 1% of the volume). Two small fragments of woody lignite (coal) were identified in the field consistent with an origin in the underlying coal measures sandstone bedrock. These layers (particularly 2051) were contaminated with hydrocarbons that had probably entered the deposits long after deposition. The hydrocarbon contamination probably relates to 19th-century industrial use of the site. Luminescence samples taken from the motte layers produced unreliable results (see scientific dating section below), however they can be said to indicate that the layers were deposited in historic rather than geological time.

Borehole 1 (**Appendix 2**) recorded similar clay deposits to those recorded in the evaluation trench below 54.71 m aOD. The evaluation trench recorded these deposits from below 54.3 m aOD.

### *Disturbed clays and sandstone*

- 5.4.11 Overlying the clean motte deposits described above were a series of disturbed clay layers (**PI. 16**). Layers 2002 (also recorded as 2019) and 2045 comprised light yellow brown clay with sandstone. Two sherds of 18th- to 19th-century pottery were recovered from 2019. A layer of disturbed sandstone (2055) was present in the south-east of the trench. This sandstone was unworked and had been dumped from the north-west. The results of borehole 1 (**Appendix 2**) supported this result.

### *Steelworks*

- 5.4.12 In the east end of trench 2, a north to south aligned construction cut (2005 and 2006) contained a two-skin handmade brick and lime mortar wall (2003 and 2004; **PI. 16**). The construction cut was backfilled with yellow brown silt clay (2007 and 2008) probably

derived from the arisings of the cut. Wall 2003 = 2004 correlates with the outer wall of the Castle Hill Steel Works as depicted on historic maps (**Fig. 7–9**). The historic maps show the area to the west of this wall as a yard, and the area to the east as the interior of a building.

- 5.4.13 Inside the building, a layer of dark red silt probably derived from crushed bricks (2011 and 2012) had been laid down as bedding material for lime mortared sandstone flag floor 2009 and 2010. A second layer (2028) beneath floor 2009 comprised light yellow brown clay and may represent a later repair.
- 5.4.14 West of wall 2003 = 2004, a layer of crushed brick and redeposited lime mortar (2046) had been laid over disturbed clay deposit 2045. This layer resembled layer 2011 = 2012 on the other side of the wall. It is probable that all three contexts represent imported material. A slightly curvilinear construction cut (2018) cut through layer 2046 from north-west to south-east. Cut 2018 contained a drain (**PI. 16**) comprising three courses of single skin unmortared red brick sides (2021), with some opportunistic re-use of firebrick, and sandstone capping slabs (2016). The fill of the construction cut (2047) and the secondary fill of the drain (2017) both comprised dark brown silt.
- 5.4.15 The area of the drain was then built up with a variety of materials used for levelling. These comprised ash (2020, 2022, 2032, 2033, 2039), redeposited clay (2023, 2031, 2038) and brick crush and fragmentary rubble (2023, 2024, 2029, 2030, 2031). Any surface of the former yard did not survive. Layer 2020 contained an assemblage of pottery primarily of 18th century date but also including 19th century sherds consistent with the 19th-century construction of the steel works. Any of these made ground layers may have been imported, and the 18th century pottery from layer 2020 may relate to some distant source of the levelling material rather than to activity in trench 2.

#### *Markets*

- 5.4.16 A 20th-century large concrete drain (2015; **PI. 16**) ran across the centre of trench 2 in a construction cut (2013) truncating the 19th-century archaeological remains. Two further drains (2027/2025, cut 2026 and 2036/2035, cut 2037) were also seen in section in the west of the trench.
- 5.4.17 Levelling layers 2034 (dark brown gritty sand) and 2040 (brown orange ash) had been deposited prior to construction of the market. A concrete beam connecting two piles (recorded together as 2043) had been inserted in a construction cut (2041) in the north section of the trench. Two layers of concrete (1001 and 1000) formed the slab of the market.

#### *Impact of development*

- 5.4.18 In trench 2, demolition of 19th century structures prior to the construction of the Castle Hill Market was thorough, with only a few courses of an exterior wall and a buried drain surviving. The impact of the construction of castle market itself was moderate and did not hamper interpretation of the remains. The impact of the piles on any deeper remains was not tested, but cannot have been too severe due to their small size. Preservation of pre-19th-century strata was good.

## **5.5 Trench 3 and borehole 2**

### *Rationale*

- 5.5.1 The WSI (Wessex Archaeology 2018a) stated that trench 3 was intended to test for evidence of:

- the nature of activities within buildings of the Castle Hill Steelworks (shown on the 1850s Ordnance Survey map);
- the make-up of Castle Hill, the road constructed c.1800;
- the structure of the western tower of the main gateway, associated with the preserved stonework in the lower chamber;
- the relationship of the gateway with the southern range of the inner court;
- the central yard of the inner court;
- any earlier phases of the castle surviving beneath later deposits/structures; and,
- the extent of disturbance from the 1920s construction of Castle Hill Markets and any disturbance caused by linking the 1920s market building to the 1950s extension.

5.5.2 The trench was largely successful in meeting these objectives, recording walls and a weighbridge from the steelworks and poorly-preserved iterations of the cobblestone surface of Castle Hill road. The earlier phase of the castle was evidenced by a series of deposits and the foundation of a stone wall. The relationship (if any) of this wall with the nearby gatehouse is unknown. The extent of 20th century disturbance in this location was established.

#### *Borehole*

5.5.3 A single borehole (BH2; **Fig. 13**) was inserted within trench 3 to test and expand the results of the evaluation trench.

#### *Location*

5.5.4 Trench 3 (**Fig. 16, 17**; **PI. 17–27**) and borehole 2 were located in the south of the raised central area of the site (**Fig. 1**).

#### *Overview*

5.5.5 A series of anthropogenic charcoal-bearing clay deposits probably represent an earthwork associated with the early castle. These layers both pre- and post-dated a foundation of unmortared unworked stone. Destruction contexts rich in environmental remains may relate to the destruction of the castle during the Second Baron's War in 1266. A 19th-century weighbridge and cellars had a deep impact, but only just reached medieval strata. Further post-medieval remains comprised the walls of the steelworks, a system of culverted drains under the former Castle Hill road, and the surface of the road itself.

#### *Natural*

5.5.6 Borehole 2 recorded the silkstone bedrock at 51.29 m aOD (4.2 m below ground level).

#### *Earthwork and stone foundation*

5.5.7 A hand-dug sondage near the centre of trench 3 (**PI. 17**) extended to a depth of 3.65 m below ground level (52.1 m aOD).

5.5.8 A series of six similar undated charcoal-bearing (less than 1%–5%) clay deposits were recorded, with varying hues: 3063 (orange yellow), 3070 (orange blue), 3075 (grey blue), 3071 (yellow orange), 3072 (blue brown) and 3074 (grey blue). The different colours

indicated the oxidation state of the clay, yellow indicating oxidised and blue reduced. The yellow clays slowly dimmed in hue following exposure over a period of weeks. Layer 3072 contained a proportion of silt (perhaps derived from soil) mixed with the clay, contributing to the blue brown hue of that deposit. The alignment of stone inclusions and the interfaces of the deposits indicated that they had been tipped from north-east to south-west. Luminescence sampling gave unreliable results (see below).

- 5.5.9 An alignment of unmortared unworked stones (3064; **PI. 18–21**) ran from south-south-east to north-north-west. This alignment was 0.52 m wide and was interpreted as a foundation for a wall. A second course of similar stones (3076) overlay 3064 but was located slightly to the north-west. A small fragment of a third possible structure (3077; just visible in bottom right of **PI. 19**) was seen in a small hand-dug intervention to the east of foundation 3064 and comprised a rough collection of sandstone blocks, perhaps no more than rubble.
- 5.5.10 Further clay deposits continued to be deposited after the construction of foundation 3064. It is probable that construction of the foundation and deposition of the clay deposits proceeded contemporaneously, with the clay deposited in stages as the foundation was built up. Layers 3073 (orange yellow), 3058 (bright light blue), 3062 (mixed brownish blue and orange yellow), 3061 (yellow orange) and 3071 (yellow orange) were similar to the earlier clay layers described above (3063 etc.), and the same comments about redoximorphism and tipping from the north-east equally apply to these layers. Importantly, 11 sherds of 13th-century pottery were recovered from layer 3058, providing a *terminus post quem* for the stone foundation.
- 5.5.11 A geoarchaeological monolith sample (sample 3010; **Appendix 10; PI. 20**) was taken through the above deposits (3058, 3074, 3070 and 3063). Borehole 2 (**Appendix 2**) also passed through these deposits. The results of both sampling methods were consistent with the results of the evaluation trench, recording layers of redeposited natural clays. Consistent with the trenching results, the geoarchaeological monolith sample was noted as having traces of charcoal suggestive of human activity. Deposits 3074, 3070 and 3063 were laid down by a higher energy deposition process consistent with an anthropogenic origin.

#### *Destruction*

- 5.5.12 Deposits 3079 and 3057 (**PI. 18–21**) comprised dark brown humic silt clay with common inclusions of charcoal, charred and uncharred wood, hazel nutshell and vivianite. The presence of vivianite suggests the former presence of organic material (providing phosphates and sulphur) and iron-rich sediment. The lower of these deposits (3079) had a bluish hue; the upper (3057) had a reddish hue. Layer 3057 had also been reached at the base of a hand-dug intervention targeting a post-medieval drain: here, layer 3057 was recorded as 3029. A series of three parallel pieces of wood (3078) were present within deposit 3057. It is possible that 3078 represented a structure or surface. A further five pieces of wood were recovered from layer 3057. Of this total of eight pieces of wood, one was alder, one was hazel and the remainder oak (see wood analysis below). This may demonstrate that a range of timbers were exploited in the early castle. One of these pieces of oak from 3057 (not from 3078) was subjected to dendrochronological techniques. Analysis of the results has suggested that the timber was from the 11th century (see scientific dating below). Deposits 3079 and 3057 both contained 13th-century pottery (a total of 12 sherds). A woodcock bone (an indicator of status related activity) was recovered from 3057 (see animal bone below). Analysis of recovered insect assemblages (see environmental analysis below) are indicative of decaying settlement waste including structural timbers. Geoarchaeological monolith samples 3011 and 3012 were taken

through these deposits and the results of the geoarchaeological assessment (**Appendix 10**) have informed the above description.

#### *Aftermath of destruction*

- 5.5.13 Layer 3056 (**PI. 19 and 21**) directly overlay destruction context 3057 and was included within samples 3011 and 3012 subject to geoarchaeological assessment (**Appendix 10**). Layer 3056 comprised orange yellow silt clay with sandstone and charcoal (5%) inclusions and mottles including blue clay suggesting redeposition. Five sherds of pottery fell within a range from the 12th to 14th centuries, with no sherd demanding a date later than the 13th century. Analysis of insect assemblages (see below) obtained from deposits 3057 and 3079 indicate that those deposits were rapidly incorporated into the archaeological sequence rather than being exposed for some time. This is consistent with layer 3056 being laid down rapidly after the destructive event represented by 3079 and 3057.
- 5.5.14 Layer 3056 was then truncated with a wide-ranging landscaping cut (3084 and 3080). The ground was built up again with layer 3067 (**PI. 19**; also recorded as 3028), comprising greyish mid-brown silt. Layer 3055 (**PI. 19**; also recorded as 3027) resembled earlier layer 3057 but did not contain dateable artefacts. Layer 3055 comprised dark brown humic clay with sandstone and charcoal inclusions. Layer 3055 may represent a re-deposition of material derived from layer 3057. Geoarchaeological assessment (**Appendix 10**) noted laminations suggesting that layer 3055 was made up of a series of similar events, perhaps the shovelling and/or barrowing of the layer during redeposition.
- 5.5.15 Layer 3018 (**PI. 19**) comprised 0.8 m of grey yellow silt clay with sandstone inclusions. Dating evidence from trench 3 sequence jumps abruptly from the 13th century to the 19th century and any date in this range is possible for the deposition of layer 3018.

#### *Steelworks*

- 5.5.16 In the east of trench 3, a series of primarily handmade red brick structures were recorded. These structures correlate with a former steelworks depicted on historic maps (**Fig. 7–9**).
- 5.5.17 Layer 3003 (visible below brick structures on **PI. 21**) comprised grey yellow silt clay with crushed brick, sandstone and lime mortar inclusions and probably represented a pre-construction levelling layer.
- 5.5.18 The western exterior wall of the steelworks was defined by three-skin handmade brick and lime mortar walls 3025 and 3026 (**PI. 22**). This wall probably pre-dated the rest of the surviving remains from the steelworks in trench 3. Later repairs to this wall (eg 3024) are detailed below.
- 5.5.19 Two walls extended east from wall 3025/3026 forming interior divisions of the steelworks (**PI. 22**). In the south, wall 3038 comprised two skins of handmade brick bonded with black ash mortar. Moving north, wall 3040 was of similar construction although the structure also contained a single frogged machine brick. Wall 3040 also contained an iron door lintel carrying handmade bricks and black ash mortar (3042; **PI. 23**). The door was at cellar-level and communicated between the base of a weighbridge to the north (**PI. 24**) and a room to the south; the door therefore probably represented service access to the weighbridge.
- 5.5.20 The weighbridge (recorded on an historic map as 'W.M.', a 'weighing machine', **Fig. 8**) extended to a depth of around 1.2–1.3 m below ground level (**PI. 25**). The weighbridge was built in a construction cut (3065, 3081) backfilled with grey sand silt (3066) and it comprised a chamber delineated by two- and three-skin handmade red brick and ash

mortar walls (3036, 3046 and 3047). The east end of the weighbridge lay beyond the limit of excavation. Three sandstone and ash mortar foundations were recorded, two in the west corners of the weighing machine (3049 and 3085) and one opposite door 3042 (foundation 3048). By comparison with another example of a late-19th-century weighbridge recently excavated at Grunwergs, Sheffield (Wessex Archaeology in prep.), it is probable that foundation 3048 represents the fulcrum of the bridge with further fittings present beyond the limit of excavation to the east. These walls and foundations were supported by handmade brick and ash mortar foundation 3044 and sandstone and ash mortar foundations 3053 and 3054. There was no continuous floor at the base of the weighbridge, but three structures were present at the bottom of each of the walls. Western wall 3036 was accompanied by a sandstone and ash mortar floor-level 'lip' and the north and south walls had short sections of single-skin handmade brick and ash mortar added (3052 and 3051 respectively). A further single skin frogged brick and ash mortar structure (3045) ran across the base of the weighbridge and was probably a later addition.

- 5.5.21 At the west end of the north side of the weigh bridge, wall 3047 expanded to a full width of eight skins and contained a reused sandstone block (3050; left site of **PI. 21**). Sandstone block 3050 had a well-carved chamfer suggesting it may have been re-used from the fabric of the castle. Block 3050 was securely located within 19th-century contexts and has been buried *in situ*.

#### *Drains*

- 5.5.22 In the west of trench 3, in the area of the former Castle Hill road, a 'Y'-shaped construction cut 0.82 m wide (3004; **PI. 26**) cut through layer 3018. The base of the 'Y' dipped sharply to the north-west, and the two arms of the 'Y' rose in level, turning towards the south. One of these arms continued beyond truncation by a later drain (3014) as construction cut 3030. The other arm petered out due to rising more sharply. Each arm of the cut contained a culverted drain comprising a sandstone flag base (3007, 3011, 3037), either up to five courses of single-skin handmade brick and black ash mortar sides (3006, 3013) or similar sandstone sides (3010, 3031), and sandstone capping (3008, 3032). An assemblage of 19th-century pottery was recovered from among capping stones 3008. The backfill of the construction cuts comprised grey brown silty clay with ash and rubble inclusions (3005, 3035). A secondary fill had formed within the culverts comprising dark brown and yellow brown silt clay (3009, 3033 and 3034).
- 5.5.23 A second similar cut (3020; 0.6 m wide; **PI. 27**) running north to south in the north-west of trench 3 was deeper (1.7 m) and did not contain a culverted drain. Cut 3020 terminated in the south and was deep enough to impact on medieval deposits such as 3057 = 3059. The fills of cut 3020 comprised redeposited yellow clay (3021; perhaps the arisings from digging through layer 3018) and dark grey brown silt (3022). It is possible that cut 3020 was intended as an abortive element of the drain network, ie that it was initially excavated for the installation of a drain but then backfilled prior to the construction of any drain within it.

#### *Steelworks repairs*

- 5.5.24 As mentioned above, an additional structure (3045) was added to the base of the weighbridge at a later date.
- 5.5.25 Perhaps at the same time, alterations were made to the west exterior wall of the steelworks (**PI. 22**). Part of the wall (3024) was entirely rebuilt using black ash mortar, and the southern part of the wall (3025) was repointed. A fragment of a sandstone flag surface overlay rebuild 3024 and wall 3026, and may have represented a threshold or part of a wider surface, perhaps associated with the weighbridge.



5.5.26 Additionally, a line of bituminous cobblestones (3019; **PI. 26**) was preserved along the west side of walls 3026 and 3024. These cobblestones represented a remnant of a removed surface of Castle Hill road. They may have been preserved by being buried below a removed surface (the continuation of 3023) allowing access to the weighbridge.

*Demolition and re-construction of Castle Hill road*

5.5.27 Little evidence survived for the demolition of the steelworks beyond the absence of the structures above ground level. The weighbridge was backfilled with dark grey brown ashy silt gravel with rubble inclusions (3039). Geoarchaeological assessment (samples 3011 and 3012; **Appendix 10**) of this deposit noted laminations suggesting that it was formed during a series of similar events, perhaps shovelling or barrowing. The cellars of the steelworks were backfilled with redeposited alluvial yellow brown silt clay with sandstone inclusions (3033), perhaps derived from earlier deposits on the site.

5.5.28 It is probable that the surface of Castle Hill road (the continuation of 3019) was removed at the same time the steelworks was demolished.

5.5.29 A layer of dark grey silt ash (3002), probably a post-demolition levelling layer, extended over both the area of the steelworks and of the former road. In the north section of the trench, a series of sandstone setts (3083; **PI. 27**) were seen in the area of the road. These probably represent a remnant of a late re-build of Castle Hill road. The setts were bedded in a matrix of deposit 3002. The resurfacing of the road was therefore roughly contemporary with the demolition of the steelworks. The latest pottery contained within layer 3002 was of broad 19th–20th century date.

*Markets*

5.5.30 A major east to west aligned concrete drain (3017; **PI. 26**) ran across trench 3 in a 0.62 m wide construction cut (3014). This is the same drain recorded as 2015 in trench 2. Pottery recovered from the backfill of the drain cut included residual 19th century and medieval material.

5.5.31 The concrete slab of the markets (3000) was bedded on a layer of red brick crush (3001) overlying earlier archaeological strata and structures.

*Impact of development*

5.5.32 In general, the development of the markets did not have much impact upon archaeological remains in this area. Drain 3017 was an exception to this and impacted deeply on 19th-century deposits, although it did not penetrate far enough to reach medieval strata. Demolition of 19th-century structures in advance of construction of the markets proceeded only as far as ground level. Preservation of 19th-century and earlier remains was good. The construction of the 19th-century weighbridge and cellars had impacted upon medieval strata, however the depth of this impact will be unusual across the site as a whole.

## 5.6 Trench 4 and borehole 3

*Rationale*

5.6.1 The WSI (Wessex Archaeology 2018a) stated that trench 4 was intended to test for evidence of:

- the nature of activities within buildings of the Castle Hill steelworks (shown on the 1850s OS map), later re-used as part of wholesale tea dealers (Goad Fire Insurance Plan, 1896);

- the nature of activities in the buildings around a courtyard to the rear of properties fronting Waingate (shown on the 1850s OS map and earlier historic plans);
- any structural remains of buildings associated with the castle's inner court;
- the central yard of the inner court;
- any earlier phases of the castle surviving beneath later deposits/structures; and,
- the extent of disturbance from the 1920s construction of Castle Hill Markets and any disturbance caused by linking the 1920s market building to the 1950s extension.

5.6.2 The trench was successful in finding evidence for the 19th-century steelworks and buildings. However, the trench did not reach any remains associated with the castle. The extent of disturbance from the markets was established.

#### *Borehole*

5.6.3 A single borehole (BH3; **Fig. 13**) was inserted within trench 4 to test and expand the results of the evaluation trench.

#### *Location*

5.6.4 Trench 4 (**Fig. 18–19; Pl. 28–36**) and borehole 3 were located in the south-west of the raised central area of the site (**Fig. 1**).

#### *Overview*

5.6.5 Trench 4 contained the highest number of contexts of any trench. A sondage in the north end contained an undated clean clay deposit comprising clean, redeposited alluvium.

5.6.6 The residuality of pottery in later contexts in trench 4 complicates phasing. The cause of this is probably that existing medieval deposits on castle hill (or elsewhere) were used as the source for 18th- and 19th-century levelling layers.

5.6.7 Historic maps attest to steelworks in the area of trench 4 in 1853 (**Fig. 7**), in 1892 (**Fig. 8**) and also in 1808 (not illustrated, see Clarke 2019, 41, who also identifies the trench 4 steelworks with the firm of Weldon and Furniss). Prior to this, most of trench 4 was depicted as undeveloped on a composite map c.1800 (**Fig. 6**), and by 1896 (**Fig. 9**) the area had been taken over by a tea wholesaler. The archaeological results do not contradict this map regression.

5.6.8 Several phases of development of two broadly contemporary ranges of 19th-century buildings were identified, including limited evidence (power transmission conduits and a machine base) for processes taking place within the steelworks.

#### *Natural*

5.6.9 Borehole 3 reached the silkstone bedrock at 50.85 m aOD (4.8 m below ground level).

#### *Motte?*

5.6.10 A machine sondage was sunk to a depth of 4 m below ground level (51.7 m aOD) in the north end of trench 4. This location was chosen due to the lack of 19th-century structural remains.

5.6.11 The lowest 1.6 m of this sondage was dug through a homogenous deposit of sterile yellow clay with sandstone inclusions (4113; **PI. 28**). The arisings were carefully scanned for finds and inclusions with a negative result. An environmental sample (sample 4003, see below) was taken from the arisings which contained only wind-blown wild seeds that were probably intrusive. Borehole 3 confirmed this result, recording layers interpreted as 'redeposited natural' below 54.38 m aOD (1.27 m below ground level).

5.6.12 It was notable that a medieval surface recorded at a depth of 53.09 m aOD a few metres away in trench 5 (see below) was not present in this sondage. The make-up of the castle mound appears to be complex with a variety of local sequences.

#### *Disturbed clay*

5.6.13 An additional 0.45 m of brownish dirty clay with stone inclusions (4114) overlay clean clay 4113. No dateable artefacts were recovered, but deposit 4114 had been disturbed, probably *in situ*, by some anthropogenic process.

5.6.14 A further layer (4082 = 4094 = 4095) comprised grey or yellow brown clay and silt with sandstone, slate and 19th-century pottery. This layer was probably derived in part from disturbance *in situ* of layers 4113 and 4114 and immediately preceded construction of flue 4091 (described below).

#### *Green grey clay 4106*

5.6.15 Hand excavation in the south of the trench halted at layer 4106 for safety reasons. Layer 4106 comprised green grey clay with sandstone inclusions. Layer 4106 contained late-18th- to early-19th-century pottery and mid-18th-century clay tobacco pipe.

5.6.16 Layer 4106 was dissimilar to later yellow brown sand and sand clay deposits (described below) and so has been described separately here. It is probable that green grey clay layer 4106 represents a 19th-century levelling layer (made ground), probably associated with construction of the steelworks.

#### *Yellow brown sand and sand clay deposits*

5.6.17 Overlying layer 4106 was a layer of yellow brown sand clay (4104). Nearby, the yellow brown sand clay was seen again in a different intervention (4118). In the west centre of trench 4, at the base of a machine sondage to a depth of 2.4 m below ground level (54.42 m aOD) were a series of four similar deposits (4087, 4103, 4100 and 4086; **PI. 29**, also **PI. 35**). Elsewhere in the trench, near stone base 4011 (see below), hand excavation proceeded until layers 4111, 4109, 4107 and 4117 were reached. Excavation halted for safety reasons. Each deposit comprised yellow brown sand or sand clay with sandstone and natural coal inclusions. These yellow brown deposits contained a mixture of medieval and post-medieval artefacts (see discussion below).

#### *Flue 4091 and associated contexts in northern sondage*

5.6.18 Returning to the northern 4 m-deep sondage, layer 4082 = 4094 = 4095 was truncated by a construction cut (4096) containing a flue (4091; **PI. 30**). Flue 4091 comprised an unmortared red brick base with unmortared firebrick sides. The interior of the flue was sooty indicating that it carried exhaust gases. Flue 4091 was deeper than other structures seen in trench 4 at 53.42 m aOD (2.4 m below ground level). Construction cut 4096 was backfilled with dark brown silt clay with rubble inclusions (4112). The flue contained a fill of red purple fine sand (4092) which may have had a refractory purpose protecting the non-refractory bricks of the base of the flue. The colour of deposit 4092 was probably due to exposure to intense heat.

5.6.19 A series of levelling layers survived to the north of flue 4091 (**PI. 31**). These stratigraphically early layers built up the ground almost to the present level (at 0.3 m BGL, 55.5 m aOD). These layers comprised dark grey clay and silt with 19th-century pottery (4077 = 4081 = 4093), brown yellow clay with rubble (4050), grey yellow ash with rubble (4051), and brown grey redeposited lime mortar with rubble, and pottery and clay pipe suggesting a 19th-century date (4052). These deposits may have represented imported material and are not necessarily indicative of demolition in the area of trench 4.

*Line shafting 4020, 4021 and 4022*

5.6.20 A series of probable power transmission conduits located towards the south-east of trench 4 could have been contemporary with flue 4091. These features may represent channels through which leather belts ran to transmit power, or may represent channels for line shafts, ie wooden axles. The processes supplied with power are unknown other than that historic maps record the premises as a steelworks (eg **Fig. 7**). Alternatively, the structures may have been drains.

5.6.21 Yellow brown sand clay deposits 4111, 4109, 4107 and 4117 (described above) were overlaid by layer 4065 comprising grey brown silt clay with mortar inclusions and containing both 19th-century and residual 13th- to 15th-century pottery.

5.6.22 Layer 4065 formed a bed for north to south aligned structures 4019, 4020, 4021 and 4022. These structures comprised single-skin walls of handmade bricks and lime mortar. Structures 4020 and 4022 formed a pair (**PI. 32**); structure 4021 was presumably paired with another structure located outside the area of excavation. Structure 4019 comprised a single brick bonded to structure 4022 forming a return to the east.

*Decommissioning of power conduits 4020, 4021 and 4022*

5.6.23 Conduit 4020/4022 was backfilled with orange brown silt containing a single sherd of 18th-century pottery. Conduit 4021 was backfilled with brown silt clay with a sherd of 19th-century pottery (4064), black silt (4063), and rubble in a light grey brown silt matrix with 18th/19th-century pottery (4039).

5.6.24 Nearby was a further deposit (4108) comprising dark brown sand clay with ash, 18th- to early-19th century pottery, 19th century clay pipe and residual 12th/13th-century pottery. Backfill deposit 4040 overlay both line shafts (4020, 4021 and 4022) as well as deposit 4108. Backfill 4040 comprised orange brown sand with rubble and 32 sherds of pottery and also clay tobacco pipe, including 19th-century material alongside earlier residual finds.

5.6.25 The power conduits (4020, 4021 and 4022) were truncated along with their decommissioning deposits (4040 etc.) by cut 4061 for the installation of sandstone base 4011 (see below), and were also truncated by cut 4098 associated with a 20th-century drain.

*Demolition cut 4078, fills and associated walls (4060, 4028 etc.)*

5.6.26 Returning to the northern sondage, a large demolition cut (4078; **PI. 31**) truncated layers 4052, 4092 etc. (described above) and removed all but the lower six courses of flue 4091 (**PI. 30**). Demolition cut 4078 contained almost all of the structures and deposits recorded in trench 4, and probably served as the construction cut for the second phase of the steelworks in addition to its function as a demolition event. Demolition cut 4078 may be conceptualised as a terrace cut into the edge of the castle mound.

- 5.6.27 Decommissioned flue 4091 was backfilled with dark brown sand silt with rubble containing a residual sherd of late medieval pottery (4097). The flue was then buried by a substantial (0.66 m deep) deposit of dark ash with rubble (4142; **PI. 30**).
- 5.6.28 A two-skin handmade brick and black ash mortar wall (4033; **PI. 30**) was constructed bedded on layer 4142. Three courses of wall 4033 survived. Wall 4033 was constructed against the limit of demolition cut 4078; it may be that the wall was intended as a temporary retaining structure during construction works.
- 5.6.29 Following removal of all but three courses of wall 4033, demolition cut 4078 continued to be backfilled with rubble (4043) and ash (4058 and 4057).
- 5.6.30 A construction cut (4102; **PI. 29**; not drawn) through yellow brown clay sand layer 4086 (described above) contained a major east to west aligned sandstone and lime mortar foundation (4060). Construction cut 4102 was visible on the south side of foundation 4060. To the north, demolition cut 4078 (described above) probably served dual purpose and formed the construction cut for this wall. Foundation 4060 (**PI. 33**) carried a two-skin handmade red brick and lime mortar wall (4017 and 4018). This wall formed the north exterior wall of a building associated with the steelworks as depicted on historic maps (**Fig. 7–9**).
- 5.6.31 North of foundation 4060, a series of further fills of cut 4078 post-dated the construction of the foundation. Layer 4036 = 4044 comprised ash with rubble inclusions and 24 sherds of pottery including 19th-century material. Layer 4038 comprised fairly clean yellow grey clay.
- 5.6.32 A small construction cut in the east of the trench (4067) contained two single-skin handmade brick walls bonded with pink sandy lime mortar (4027 and 4028; **PI. 34**). Walls 4027 and 4028 extended for 1.35 m from the eastern limit of excavation. They were in line with earlier flue 4091, although the features were separated by level and stratigraphy. Both sets of structures may have related to something (perhaps a chimney) situated outside the area of excavation. The walls were shallow (4028 was no more than three courses high) and there was no surviving surface between the walls. The area between walls 4027 and 4028 was filled with brown yellow clay (4030).
- 5.6.33 A later single-skin handmade brick and black ash mortar wall 4026 ran roughly north from wall 4018 to the west end of wall 4027. Some of the bricks in wall 4026 carried traces of lime mortar indicating re-use.
- 5.6.34 Walls 4027, 4028 and 4026 may have been temporary structures associated with a yard shown on historic maps (**Fig. 7–9**).
- 5.6.35 In the west of the trench, the upper fills of large demolition cut 4078 comprised rubble (4056) and ash (4055).
- Deposits and structures south of foundation 4060 including walls 4031 and 4035*
- 5.6.36 South of foundation 4060, a series of fills and levelling layers were built up mirroring the fills of large cut 4078 to the north.
- 5.6.37 The fill of construction cut 4102 (**PI. 29**) comprised dark yellow brown sandy clay (4090), perhaps derived from the arisings of the cut. Cut 4102 was sealed by a thin (0.1 m deep) layer of lime mortar (4089), perhaps surplus or spilt material dumped during the construction of foundation 4060 and wall 4017/4018. A layer of sandy clay in a mixture of

hues contained rubble, ash and 19th-century clay pipe and pottery (4088). Layer 4101 comprised dark grey silt sand with coal and rubble (all **PI. 29**).

- 5.6.38 In the west section of trench 4 (east-facing), the stratigraphic sequence was different (**Fig. 19**; **PI. 35**). Construction cut 4102 was not identified in this location. Yellow brown sand clay deposit 4086 (described above) was overlain by brown grey clay and rubble with 19th-century clay pipe and pottery (4024). Earlier residual sherds of medieval and post-medieval date were also present. A large (1.1 m diameter) grindstone (4023) overlay layer 4024. Layer 4076 overlay grindstone 4023 and comprised orange grey sand silt. A cut feature of unknown purpose (4072) truncated layers 4076 and 4024. Cut 4072 was just over 1 m wide and 0.4 m deep and extended up to wall 4017 but was not the construction cut for that wall. Cut 4072 was backfilled with 4074, comprising dark grey sand silt with stones.
- 5.6.39 Wall 4085 (rear of **PI. 32**) also overlaid layer 4024. Wall 4085 ran east to west and formed an internal division of the steelworks parallel to wall 4060/4017/4018 to the north. Wall 4085 was two skins wide and comprised handmade red bricks and lime mortar. In the west, wall 4085 was truncated by later drain cut 4098. Wall 4085 terminated in the east, perhaps with an entranceway between this and wall 4031. Levelling layer 4009 filled this possible entranceway below the former ground level and also extended to the south of wall 4085. Layer 4009 comprised orange brown sand with a variety of artefacts including 19th-century pottery and clay pipe.
- 5.6.40 A bed of black ash mortar (4032) overlay deposit 4101. Mortar bed 4032 did not carry a wall in the vicinity of deposit 4101, however it continued further to the south where it formed the bed for wall 4031 (under scale in **PI. 32**). Wall 4031 had been damaged by demolition but was originally two skins thick and was constructed of handmade brick and black ash mortar. It probably formed an internal division in the steelworks.

*South walls of steelworks (4034, 4035 etc.)*

- 5.6.41 Yellow brown sand clay deposit 4118 (described above) was overlain by red brick rubble in a matrix of dark brown silt sand with plaster, 19th-century pottery and clay pipe, and residual medieval and 18th-century pottery (4115). Again, this material may have been imported in whole or in part. A series of walls were bedded on layer 4115.
- 5.6.42 Foundation 4034 (also recorded as 4110) comprised sandstone and lime mortar and ran from east to west forming the base of the south wall of the steelworks as depicted on historic maps (**Fig. 7–9**). Foundation 4034 carried the poorly-preserved remains of a three-skin handmade red brick and lime mortar wall (4035; running away from camera on **PI. 32**). Both 4034 and 4035 had been disturbed by demolition and by cut 4105 (described below) and as a result the remains of the structures were jumbled, with most of the bricks and sandstone blocks misaligned. Four sherds of pottery were recovered from within wall 4034, consistent with a 19th-century date.

*North-east to south-west range of buildings*

- 5.6.43 In the south of trench 4 were a second range of structures on a different alignment (north-east to south-west) to the rest of the structures in the trench (north to south and east to west). The structures in the south of trench 4 (on left of **PI. 32**; **PI. 36**) correlate with the rear of a range of buildings depicted on historic maps (**Fig. 7–9**) aligned with the frontage of Waingate to the south-west. The relationship between these buildings and the steelworks had been damaged both by cut 4105 (described below) and by disturbance during demolition and it was not possible to establish the relative chronologies of the two ranges.

- 5.6.44 Wall 4006 (**PI. 36**, also visible on left of **PI. 32**) ran from north-east to south-west and probably formed the south-east wall of the range of buildings fronting Waingate. Wall 4006 was three skins wide and comprised handmade red brick and lime mortar. To the north-east of wall 4006 (ie inside the building), was a levelling layer of dark grey ash containing post-medieval artefacts including 19th-century pottery (4008). An interior kerb comprising sandstone kerbstones in a dark matrix (4047) was bedded on layer 4008 and ran parallel to wall 4006. Between kerb 4047 and wall 4006 was a surface of sandstone slabs or setts (4046) and cobbles (4045) in the same dark matrix. A different flagstone surface (4005, 4003) was present to the north-west of kerbstones 4047. Each of these surfaces (4003, 4005, 4045, 4046 and 4047) had the same black silt matrix.
- 5.6.45 A linear cut, variously recorded as 4105, 4059 and 4048, ran from east to west across the interface between the two ranges of buildings (**PI. 32 and 36**). Cut 4105 was over a metre wide and had disturbed structures 4003, 4005, 4006, 4034, 4035, 4045, 4046 and 4047. It is possible that this feature was a robber trench, perhaps removing some unknown pipe or other valuable commodity. Cut 4105 was filled with yellow brown clay with rubble and 19th-century pottery (4007) and dark grey sand silt (4071).
- 5.6.46 A later drain (4004, described below) had truncated surface 4003 and 4005.

#### *Sandstone base 4011*

- 5.6.47 Towards the south-east of trench 4, line shafts 4020, 4021 and 4022 (described above) were truncated by a large cut (4061). Cut 4061 extended up to walls 4031 and 4035, indicating that it was intended to modify but not replace the existing steelworks structures. Cut 4061 was 1.75 m from north to south, and over 2 m from east to west, continuing beyond the limit of excavation to the east.
- 5.6.48 Cut 4061 was made for the installation of a pair of large (0.9 m by 0.4 m by 0.3 m) sandstone blocks forming a base (4011; **PI. 32**). The under side of the sandstone blocks contained fittings indicating that they had previously been used as a machine base elsewhere in an inverted position. The size and geology of the blocks was consistent with the fabric of the castle; it is possible that they were sourced from the ruins of the castle. The top of base 4011 did not contain any fittings and was situated at 55.39 m aOD.
- 5.6.49 Cut 4061 was backfilled with grey/orange brown silt with redeposited lime mortar, 19th-century pottery and residual 18th-century and medieval material (4042 = 4062), and rubble in a matrix of redeposited lime mortar and 19th-century pottery (4010).

#### *Markets*

- 5.6.50 A series of drains associated with the 20th-century markets truncated 19th-century remains in trench 4.
- 5.6.51 In the far north of trench 4, a linear east- to west-aligned cut (4025) truncated layers 4050, 4051 and 4052. This cut (4025) contained a concrete drain (4080, 4084) bedded on reused bricks (4079). Cut 4025 was backfilled with ash and rubble (4037 = 4049, 4066 = 4083 and 4053).
- 5.6.52 Concrete drain 4013 passed through wall 4017/4018, dividing wall 4017/4018 into two contexts. Drain 4013 was removed during initial machining.
- 5.6.53 Drain 4013 intersected with concrete and ceramic pipe drain 4012. Drain 4012 was contained within a north-east to south-west aligned linear service cut (4098), which truncated walls 4018, 4031, 4085 as well as many other contexts in the centre of trench 4.

Cut 4098 was backfilled with ash (4041) and orange brown sand clay with rubble and residual 18th-century pottery (4099). The area between drain 4012 and walls 4026 and 4027 was filled with similar brown orange sand (4029) which was probably a fill of cut 4098. These fills were then cut (4015) for installation of a poured concrete and metal stanchion (4014). The stanchion was close to drain 4012 but did not truncate it. Cut 4015 was backfilled with a small amount of ash containing 27 sherds of mainly residual 18th-century pottery (4016).

- 5.6.54 Sandstone base 4011 (described above) was covered by a localised levelling layer (4002) probably associated with construction of the markets. Layer 4002 comprised ash with a variety of redeposited pottery and clay pipe.
- 5.6.55 Concrete and ceramic pipe drain 4004 truncated and divided surfaces 4003/4005 in the south-west of trench 4.
- 5.6.56 All of the above contexts of trench 4 except stanchion 4014 were sealed by levelling layer 4054 comprising yellow brown clay with rubble, layer 4070 comprising dark grey silt sand with gravel, layer 4069 comprising brown orange sand clay, and layer 4068 comprising yellow brown clay. The concrete slab of the market (4000) was bedded on red crushed brick (4001).

#### *Impact of development*

- 5.6.57 Although 20th-century drains were common in trench 4 and had impacted upon 19th-century remains, the depth of impact was generally shallow and the truncation did not hamper interpretation. Any medieval layers or structures that might exist at lower levels will generally not have been impacted by 20th-century development, although the depth of stanchion 4014 is unknown and this may have had a discrete but deep impact. In general, preservation was good.

## **5.7 Trench 5**

### *Rationale*

- 5.7.1 The WSI (Wessex Archaeology 2018a) stated that trench 5 was intended to test for evidence of:
- the nature of activities within buildings of the Phoenix (steel) Works (shown on the 1850s Ordnance Survey map), later re-used as a wheelwrights/carriage repository (Goat Fire Insurance Plan, 1896);
  - the make-up of Castle Hill, the road constructed c.1800;
  - the projected line of the northern range of the inner court;
  - the central yard of the inner court;
  - earlier phases of the castle surviving beneath later deposits/structures; and,
  - the extent of disturbance from the 1920s construction of Castle Hill Markets.
- 5.7.2 Limited evidence for the steelworks was identified comprising walls and traces of surfaces. No evidence for the Castle Hill road was contained within trench 5 (although see trench 3). The surface of the central yard of the early castle was identified, however no



further remains of the castle were uncovered. The extent of 20th-century disturbance was established.

#### *Location*

- 5.7.3 Trench 5 (**Fig. 20**; **PI. 37–42**) was located in the north of the raised central area of the site (**Fig. 1**).

#### *Overview*

- 5.7.4 A cobblestone surface interpreted as that of the courtyard of the castle was reached. This courtyard was probably part of the early castle, and may have remained open to the sky until the 18th century. A series of 18th-century levelling layers were associated with construction of a bowling green known from historic maps. The boundary wall of the bowling green was also recorded. Subsequent layers and walls evidenced a former steelworks. The depth of 20th-century deposits was greater than in other locations.

#### *Cobblestone surface*

- 5.7.5 Excavation of a sondage in the centre of trench 5 halted upon discovery of a stone surface at a depth of 2.6 m below ground level (53.09 m aOD). Box shoring was used to facilitate access. The surface comprised three elements (5042, 5043 and 5044) and was accompanied by deposits 5041, 5045 and 5040 (**PI. 4**).
- 5.7.6 Bedding layer 5041 (**PI. 38**) comprised blue grey silt and contained three sherds of 13th-century pottery. A radiocarbon determination (UBA-41314) on a *Triticum* sp. grain returned a date of 823±22 BP: cal. AD 1170-1260. The combination of this evidence suggests that construction of the surface was initially undertaken in the period 1200–1260, during the early castle phase.
- 5.7.7 In the south, part of the surface (5044) comprised a single layer of rough uneven cobblestones around 0.2 m in diameter. Surface 5044 sloped down slightly to the west. In the north, a second patch of the surface (5042) was isolated from surface 5044 due to the loss of stones. Surface 5042 resembled surface 5044 and was probably a continuation of the same structure.
- 5.7.8 A bedding layer of yellow brown silt sand with charcoal flecks contained a sherd of 13th century pottery and was laid down prior to the construction of a second layer of rough cobblestones (5043). This second layer (5043) comprised slightly larger rough cobblestones (0.3 m diameter). The second layer (5043) was constructed as a renovation of the first (5042, 5044), however it is unclear if this was a localised patch, perhaps filling a hollow, or if it formed a widespread structure substantially covering the earlier iteration of the surface.
- 5.7.9 In the north-east, a small deposit of dark red silt clay (5040) contained a copper toilet item perhaps from the 14th century (**PI. 39**). This layer may represent an occupation layer; ie material built up through use of the surface.
- 5.7.10 In the north-west (top right of **PI. 37**), some of the cobblestone surface had been dislodged (cut number 5046) and the surface repaired with ironworking slag 5039. The red black ironworking slag (5039) closely resembled medieval slag deposit 1073 seen in trench 1.

### *Bowling green*

- 5.7.11 Examination of the layers overlying surface 5042/5043/5044 was restricted by the box shoring used to support the deep excavation (**PI. 40**). The following layers (5038, 5037 and 5036) were not cleaned by hand and were recorded at a distance. A layer of dirty yellow clay with stones (5038) overlay surfaces 5042, 5043 and 5044. A mixture of pottery types was assigned to this layer (see discussion below). Further layers of yellow brown silt clay (5037) and orange brown clay (5036 = 5025) followed.
- 5.7.12 Moving beyond the machine sondage, three courses of a 0.6 m wide unmortared sandstone wall (5010; **PI. 41**) was preserved for a length of around 2 m in the north-west of the trench. This wall correlates with the boundary of a bowling green depicted on 18th-century historic maps (**Fig. 5**). It is probable that layers 5038, 5037 and 5036 described above represent levelling layers deposited during construction of the bowling green.
- 5.7.13 A bedding layer of black silt (5009; **PI. 41**) was present on both sides of wall 5010 and had the appearance of formerly carrying a flagstone surface. One stone of this surface survived *in situ* (5031; **PI. 41**) as it contained a circular iron drain grate, perhaps making it unattractive for re-use. Layer 5009 contained 10 sherds of 18th-century pottery (and one sherd of residual 15th- to 16th-century pottery) suggesting that it was associated with development of the bowling green.

### *Steelworks*

- 5.7.14 A layer of dark yellowish-brown silt clay with rubble inclusions (5005) was seen across trench 5 and formed a levelling layer (ie made ground) deposited prior to construction of a steelworks known from historic maps (**Fig. 7–9**). Layer 5005 contained 58 sherds of pottery indicating a late-19th century date for the layer, although with some residual older material (eg 18th century) and a single intrusive sherd of 20th-century pottery. Layer 5005 may have been *in situ* demolition material or may have represented imported material.
- 5.7.15 A 4.8 m-long fragment of a three-skin handmade brick and lime mortar wall survived running north to south in the centre of trench 5 (5007; **PI. 42**). Two small buttresses were present on the east side of the wall (5030). A second fragment of a similar wall (5008) ran east to west. These structures correlated with part of a steelworks known from historic maps (**Fig. 7–9**). Each structure was built in a construction cut (5026, 5028) backfilled with dark brown clay (5027 = 5023 = 5024, 5029). Backfill 5029 and 5024 contained 19th-century clay tobacco pipe alongside residual earlier clay pipe and pottery.

### *Demolition of steelworks*

- 5.7.16 Other than the absence of the continuation of structures (both vertically and horizontally), there was little evidence for the demolition of the steelworks. Rubble from the demolition had been removed from the immediate environs, perhaps used elsewhere on the site or removed to some distant depot.

### *Markets*

- 5.7.17 A construction cut (5032) ran east to west across the centre of trench 5, impacting to a depth of around 1.75 m below ground level (53.9 m aOD). The cut contained a primary fill of brick rubble (5035) carrying a concrete drain (5033). The cut was backfilled with dark brown silt and rubble (5034) from which 143 sherds of 19th/20th century pottery were recovered.
- 5.7.18 Layer 5002 comprised yellow brown silt clay with some rubble and 19th- to 20th-century pottery. Layer 5003 comprised dark grey ash and clinker. Overlying drain 5032 and layer

5003 were 5015 (fine black ash), 5014 (yellow brown clay with rubble), 5019 (dark brown ash with rubble), 5013 (dark grey silt with rubble), 5016 (dark yellow brown clay with rubble) and 5018 (dark grey silt with stone and concrete inclusions). These represent possibly imported levelling materials associated with the construction of the markets.

- 5.7.19 In the north-east, a construction cut (5011) 0.75 m by 1.85 m in plan truncated layers 5002 and 5013. Concrete 5006 containing somewhat coursed red brick rubble was poured into cut 5011 to form a drain. The cut was backfilled with stone and brick rubble (5004, 5012).
- 5.7.20 A bedding layer of brick crush (5001) for the final concrete slab (5000) was spread over the area. However, a further concrete drain (5017) was cut (5020) through layer 5001 at a late stage in construction immediately prior to the slab of the markets being poured (5000).

#### *Impact of development*

- 5.7.21 In general, the development of the market in this area was not sufficiently deep to impact archaeological remains. In fact, the ground level was built up in area 5 to facilitate the construction of the markets. However, demolition of 19th-century structures was quite thorough in this locality. Additionally, drain 5032 was unusually deep (around 1.75 m) and had impacted on post-medieval archaeological remains. Preservation of 18th-century and medieval remains was good.

## **5.8 Trench 6**

### *Rationale*

- 5.8.1 The WSI (Wessex Archaeology 2018a) stated that trench 6 was intended to test for evidence of:
- the nature of activities within buildings of the Phoenix (steel) Works (shown on the 1850s Ordnance Survey map), later re-used as a wheelwrights/carriage repository (Goad Fire Insurance Plan, 1896);
  - the projected lines of the northern and western ranges of the inner court, and the relationship between the two;
  - the nature of the curvilinear feature and possible floor identified by Leslie Butcher;
  - any earlier phases of the castle surviving beneath later deposits/structures; and,
  - the extent of disturbance from the 1920s construction of Castle Hill Market and later works associated with the 1970s construction of a toilet block.
- 5.8.2 The results of trench 6 largely did not relate to these objectives. The south and centre of the trench had been subject to a high level of disturbance in the 20th century. It is probable that no evidence of the steelworks/wheelwrights was contained within trench 6, although the interpretation of some structures is cannot be finalised. It is more probable that these structures instead represent elements of the ranges of the inner court of the castle. The curvilinear feature identified by Leslie Butcher lay outside the area of trench 6 and has probably removed by 20th-century development (a plan showing this feature was supplied to Wessex Archaeology by SYAS). Five sub-phases of early activity were identified, spanning the period from the 11th century probably until the early 13th. The

extent of the disturbance from the 1920s and late-20th-century development was established.

#### *Overview*

- 5.8.3 A palimpsest of cut features were identified towards the base of excavation in the north-east of the trench from around 51.50 m to 50.40 m aOD (maximum 4 m below ground level). The earliest sub-phases of these features have been radiocarbon dated to the 11th to 13th centuries (UBA-41315 and UBA-41316, see below for detail).
- 5.8.4 Substantial sandstone structures were recorded. Through analogy with a previously excavated evaluation trench (Davies and Symonds 2002) it is probable that these structures represent a survival of part of the castle. A single sherd of 18th-century pottery and part of a brick suggest that the structures continued to be used and maintained for some time after the Civil War slighting of the castle.
- 5.8.5 Later contexts represented services and made ground. In the south of the trench ('trench 6B') late-20th century development had impacted to a depth of over 4 m below ground level.

#### *Location*

- 5.8.6 Trench 6 (**Fig. 21–23; Pl. 43–52**) was located in the north-west of the raised central area of the site (**Fig. 1**).

#### *Earliest cut features*

- 5.8.7 A machine sondage was excavated in stages to a depth of 4 m below ground level in the north-east of trench 6 and protected with box shoring (**Pl. 43**). At the base of the sondage, layer 6066 was revealed, comprising green grey sand clay with stones. Four shallow (0.1 m deep) cut features were cut through layer 6066, including two gully terminals or beam slots (6063, 6067) with a central gap, possibly forming an entranceway. Feature 6063 was 0.38 m wide; feature 6067 was 1.95 m wide. There was a small pit or posthole (6059, 6061) flanking the possible entranceway adjacent to each terminal. Pit 6059 (**Pl. 44**) was sub-circular, 0.6 m in diameter, whereas pit 6061 was sub-square and 0.36 m in diameter. A radiocarbon determination on a waterlogged hazel nutshell (UBA-41316) from the fill of 6059 returned a result of 916±32 BP: cal. AD 1030-1200, ie 11th to 12th century. Features 6063 and 6067 continued beyond the area of the sondage. Analysis of insect remains from the fill of 6067 (see below) indicate an environment including settlement waste and structural timbers. Insect remains also indicate that pit 6067 was probably rapidly sealed. It is possible that these features represent the entrance to a structure or enclosure.

#### *Second sub-phase of cut features*

- 5.8.8 A layer of dark brown silt clay (6055) sealed features 6059, 6061, 6063 and 6067. Analysis of dendrochronology on a small timber from 6055 suggested a post-conquest, 11th or early-12th century date. Analysis of insect assemblages (see below) indicated the presence of synanthropic species, indicating intensive human activity.
- 5.8.9 Two pits (6073 and 6075; **Pl. 45**) were cut through layer 6055. Pit 6073 had a wide 'V'-shaped profile 0.97 m wide and 0.49 m deep with a light-coloured fill (6074, green yellow silt clay with charcoal), and contained a stone post pad (6071) and an *in situ* wooden post base (6070, retained; **Pl. 46**). The post was not situated centrally within the large cut. Pit 6075 was 0.44 m wide and 0.47 m deep and contained three layers of alternating dark

and light fills (6076, dark brown silt clay with stones and wood; 6077, grey green silt clay with charcoal and wood; and 6079, dark brown silt loam).

*Third sub-phase of cut features*

- 5.8.10 Two small pits (6080 and 6082, both with light-coloured brown yellow clay fills; **PI. 45**) truncated earlier pits 6073 and 6075. Pit 6080 was 0.31 m wide and 0.17 m deep; pit 6082 was only partially within the area of excavation.

*Fourth sub-phase of cut features*

- 5.8.11 A layer of yellow grey silt clay (6053 = 6065) sealed pits 6080 and 6082.
- 5.8.12 The following sequence was recorded in two separate parallel machined sections as well as two earlier hand-dug sondages located around 2–3 m to the west of the machined sections.
- 5.8.13 Layer 6052 (recorded in both machined sections) comprised dark blue ashy clay. This was probably the same layer recorded in the base of two hand dug sondages: 6047 (dark brown ashy clay) and 6048 (dark brown clay). Similarly, the next layer seen in the machined sections (6051), comprising greenish grey silt clay, was probably the same as layers 6043 (grey yellow silt clay) and 6044 (grey brown silt clay) from the hand-dug sondages. A charred hazel nutshell from layer 6044 was radiocarbon dated to the early to mid-13th century (UBA-41315, 785±22 BP: cal. AD 1220-1270).
- 5.8.14 In the earliest machined section only (**PI. 47**), a shallow (0.3 m deep), broad (over 0.7 m wide) cut feature (6057) truncated layer 6051 and contained a primary trample fill (6050) of red black slaggy ash containing a single sherd of pottery that was medieval in date but could not be more closely dated. The main fill of feature 6057 comprised grey yellow silt clay (6058).

*Fifth sub-phase of cut features*

- 5.8.15 Stone rubble layer 6054 sealed pit 6057 and was recorded in the earlier machined section only.
- 5.8.16 Pit 6078 was recorded in both machined sections (**PI. 45 and 47**) and probably cut through layer 6054, although the upper boundaries of the pit were hard to identify, both where it cut through layer 6054 and also where it cut through lower layer 6051. The pit (6078) was 0.3 m wide and at least 0.7 m deep. The fill (6084) comprised dirty yellow clay with stone and ash and contained a large block of dolomite (magnesian limestone).
- 5.8.17 In one of the hand-dug sondages, an additional layer (6045) of grey yellow silt clay with stones was recorded.

*Layers 6039, 6049, 6046 and 6042*

- 5.8.18 Layers 6045, 6043 and pit 6078 were sealed by layer 6039, comprising grey yellow silt clay. Six sherds of pottery were recovered suggesting a 12th-century date for deposition. Layer 6039 also contained a small lens of charcoal and ash (6049).
- 5.8.19 Layer 6038 comprised dark brown ash; layer 6046 was grey brown silt and layer 6042 comprised grey yellow silt with sandstone rubble.

### *Sandstone structures*

- 5.8.20 A series of visually impressive sandstone and lime mortar structures (**PI. 48–51**) were excavated in the north centre of trench 6. Existing deposits were truncated by a construction cut (6085) prior to construction of the structures.
- 5.8.21 Wall 6029 ran north to south and was 0.8 m wide. The wall comprised a well-made west face and a rubble core backing onto deposits 6046 and 6042, acting as a retaining wall for these earlier deposits (**PI. 48**). A single handmade brick (retained; see artefactual evidence below) was contained within the sandstone rubble core of wall 6029. The north end of wall 6029 turned 90° to the east before turning again 45° to the north-east. This wall (6031) was much less robust (0.4 m wide max.) but continued the pattern of a well-finished face exposed to the north-east and an unfinished rubble rear built to retain older deposits.
- 5.8.22 A staircase (6032) ran up from north to south adjacent to the west face of wall 6029. The stairs included flagstone treads and a rendered keeping hole with iron stains (**PI. 49**).
- 5.8.23 Piled against staircase 6032 was deposit 6041 comprising dark brown clay silt and containing a large sherd of 18th century pottery sealed below flagstone surface 6037.
- 5.8.24 North of the stairs and partially overlying deposit 6041 were flagstone surfaces (6037 and 6036) forming a passageway running from west to east before turning to the north-east following the alignment of wall 6031 (**PI. 50**). An incised mortise revealed the position of a door jamb in line with wall 6029. The north side of the flagstone surfaces was enclosed by a further wall (6035).
- 5.8.25 The structures were truncated in the north by a drain cut (6014) and in the south by the cut for late-20th century redevelopment of the market (6005).

### *Demolition of sandstone structures*

- 5.8.26 A layer recorded variously as 6026, 6030 and 6033 comprised grey or orange brown silt with sandstone fragments, plaster, clay pipe and 66 sherds of pottery. The pottery dated from the 15th century to the 20th century, with only three intrusive sherds demanding a date later than the 18th century. The clay pipe assemblage contained 17th- and 18th-century pipes. This material appeared to represent the decayed remainder of the demolished structures after the useable stone etc. had been removed.

### *Markets*

- 5.8.27 A layer of dark orange brown sand clay with sandstone and slate inclusions (6023) overlay demolition deposits 6026, 6030 and 6033. Layer 6022 comprised dark brown sand with sandstone, natural coal and mortar inclusions. Layer 6004 comprised clean yellow brown clay with natural sandstone inclusions. These three layers (6023, 6022 and 6004) probably represent levelling layers deposited prior to construction of the market (**PI. 51**).
- 5.8.28 A complex series of early 20th-century drainage structures in the north-west of trench 6 included frogged brick and cement inspection chambers (6017, 6021) and a cast iron pipe (6019). These drainage structures were constructed in a series of service cuts (6005, 6008, 6014, 6015, 6018 and 6024) excavated through levelling layers 6026, 6030 and 6033 (**PI. 51**). Cut 6014 extended east to west across the north of trench 6 and was not bottomed after 1.2 m of hand excavation. Backfill of these service cuts comprised general demolition rubble, typically in a matrix of grey brown silt (6006, 6007, 6009, 6013, 6016, 6020, 6025, 6040).

### *Market renovation*

- 5.8.29 In the centre of trench 6, a large concrete foundation approximately 3 m by 3.2 m in plan contained inspection chamber shafts several metres deep (6000). Foundation 6000 was constructed within construction cut 6005 which was seen in the north of trench 6 in association with modern drains (described above).
- 5.8.30 To the south of foundation 6000 ('trench 6B'), a north to south aligned frogged machine brick and cement wall (6503) ran down the east side of the trench and was seen in an unsupported machine sondage to be over 4 m deep. A concrete inspection chamber (6504) was adjacent to wall 6503. Layers were piled against wall 6503 and inspection chamber 6504, comprising yellow brown and yellow clay silts and clays with rubble (6506, 6507, 6508). The clay components of these deposits may have been derived from the arisings from excavating through deposits similar to 4113 seen in trench 4, or other alluvial or earthwork deposits formerly in this locale.
- 5.8.31 A cut (6509) truncated the west side of deposits 6506, 6507 and 6508 and contained a concrete inspection chamber (6505) and a concrete pile-like foundation (6502). Cut 6509 was backfilled with two deposits of stoney sand hardcore of differing hues (6510 and 6511).
- 5.8.32 Elsewhere in the south of trench 6 ('trench 6B') a deposit of yellow brown clay with sandstone was reached at a depth of 1.27 m below ground level (55.26 m aOD).
- 5.8.33 Deposit 6512 was cut by a 0.65 m-wide east to west aligned linear feature (6513) filled with stoney sand hardcore (6514). Cut 6513 was not excavated but was assumed to be a service cut.
- 5.8.34 Finally, in the south-west corner of trench 6, a concrete surface (6515) partially survived at a depth of 1.3 m below ground level. Surface 6515 was overlaid with grey brown grit sand with rubble (6516).
- 5.8.35 Across the south of trench 6 ('trench 6B'; **PI. 53**) A layer of foam insulation (6501) had been installed below a series of concrete foundation beams (6000) running between a series of piles (eg 6502). The foundation beams (6000) contained substantial steel reinforcement and could not be removed with the equipment available during evaluation.
- 5.8.36 The north of trench 6 ('trench 6A') was sealed by a surface comprising a layer of roughly coursed brick rubble (6003; **PI. 52**) overlaid with grey brown grit hardcore (6002) bedding a layer of tarmac (6001).

### *Borehole*

- 5.8.37 Sometime prior to the commencement of archaeological works, a modern borehole (6068) had been drilled from the tarmac surface and was backfilled in parts with pea gravel. The borehole was seen throughout the various stages of excavation, including in plan accompanying the earliest cut features at the base of the trench.

### *Impact of development*

- 5.8.38 The impact of the development of the markets on 19th-century structures was severe across most of trench 6. However, the north of trench 6 also contained a small area of excellent preservation. It is probable that nothing survived of the 19th-century structures known from historic maps (**Fig. 7–9**), although interpretation of sandstone structures 6029 etc. cannot be finalised. Drains associated with the markets had had a substantial impact upon earlier remains. The drain cuts extended below 1.2 m BGL and were not excavated

to their bases. The chief impact of 20th-century activity was the late-20th-century renovations in the south of trench 6 ('trench 6B'). In the area of these renovations, archaeological remains had been completely removed to a depth of over 4 m below ground level (below 51.66 m aOD). Taken as a whole, preservation in trench 6 was poor. However, trench 6 also contained some of the most significant remains encountered during the evaluation, underlining the importance of archaeological works even in areas of lower potential.

## 5.9 Trench 7

### *Rationale*

5.9.1 The WSI (Wessex Archaeology 2018a) stated that trench 7 was intended to test for evidence of:

- the location of a sample of driven piles—to be assessed in a separately commissioned condition survey;
- the nature of activities within buildings shown on 19th century maps (marked as 'clothier' on the Goad Fire Insurance plan, 1896—part in a basement);
- the make-up of Castle Hill, the road constructed c.1800 and the original vehicular access to the 1920s Castle Hill Markets;
- the western arm of the moat, as it reaches Waingate; and,
- the extent of disturbance from the extension of the market in the 1960.

5.9.2 Driven piles were identified to facilitate a separate condition survey. No remains relating to the clothiers, to the Castle Hill road or to the moat were identified. The extent of disturbance in the area was determined.

### *Location*

5.9.3 Trench 7 (**Fig. 24**; **PI. 54, 55**) was located in the north-west of the site close to the road Waingate (**Fig. 1**).

### *Overview*

5.9.4 A series of modern drains and concrete structures impacted directly on truncated natural bedrock. A small fragment of wall in frogged machine brick and cement may pre-date the mid-20th century expansion of the market but is probably not older than the early 20th century. No archaeological remains pre-dating the 20th century were identified.

### *Natural*

5.9.5 The undisturbed natural geological substrate (7000) was quickly reached and comprised light brown yellow coal measures sandstone bedrock (**PI. 54**). The bedrock was unweathered indicating that the upper horizons had previously been removed.

### *Frogged brick and cement wall*

5.9.6 In the north-west of the trench, a frogged machine brick and cement wall (7023; **PI. 55**) ran roughly west-south-west to east-north-east approximately along the north side of the former Castle Hill road. Wall 7023 was only partially within the area of excavation and the exposed portion was 1.1 m long, 0.3 m wide and 0.5 m deep. Based on the materials used, the wall is probably 20th century in date. The wall was constructed in a cut (7024)



made through bedrock 7000 and backfilled with rubble (7025). It is possible that this wall was associated with the Co-operative Store that occupied this part of the site prior to the Second World War.

#### *Drains*

- 5.9.7 Major drain cut 7001 ran approximately east to west across the centre of trench 7 and contained iron drain 7003 set on a bed of concrete (7002) as well as ceramic drain 7004 (**Pl. 54**). Cut 7001 widened in the east of the trench due to the differing alignment of the two drains. Cut 7001 was backfilled with yellow brown clay (7006) and rubble (7011).
- 5.9.8 Service cut 7026 ran from south-west to north-east and carried iron drain 7005. Frogged machine brick and cement inspection chamber 7012 (**Pl. 54**) was also contained in cut 7026 and was situated at the intersection of drains 7003, 7004 and 7005. Cut 7026 was backfilled with dark rubble deposits (7007, 7008, 7017), dark brown silt (7009) and dirty yellow clay (7010).
- 5.9.9 Service cut 7020 ran from north-north-west to south-south-east in the south of trench 7. Cut 7020 carried ceramic drain 7021 and was backfilled with dark brown sand silt with slates (7022).
- 5.9.10 These drains were associated with 20th-century development, probably with the expansion of the markets in the mid-20th century.

#### *Markets*

- 5.9.11 A series of concrete piles and horizontal beams connecting the piles formed the mid-20th-century foundation of the expanded area of the markets. A construction cut (7013) was associated with installation of the piles. Cut 7013 had partially exposed a vertical iron pipe (7014) and was backfilled with crushed and uncrushed rubble (7016).
- 5.9.12 Inspection chamber 7012 was backfilled with light grey dry silt and rubble (7018).
- 5.9.13 The area was capped with a complex concrete surface (7019) shaped to accommodate a former vehicle entrance ramp.

#### *Impact of development*

- 5.9.14 Development has had a significant impact upon archaeological remains in trench 7. Truncation has extended to the removal of the upper horizons of bedrock, probably including removal of overlying alluvial deposits. Any archaeological remains from all periods have been removed by development, however there is still archaeological potential in the general area as demonstrated by the survival of the moat in trench 9 (see below).

## **5.10 Trench 8**

### *Rationale*

- 5.10.1 The WSI (Wessex Archaeology 2018a) stated that trench 8 was intended to test for evidence of:
- the location of a sample of driven piles—to be assessed in a separately commissioned condition survey;

- the nature of activities in the buildings around a courtyard to the rear of properties fronting Waingate (shown on the 1850s Ordnance Survey map and earlier historic plans);
- the projected line of the western range of the inner court;
- any earlier phases of the castle surviving beneath later deposits/structures; and,
- the extent of disturbance from the 1920s construction of Castle Hill Market and the extension of the market in the 1960s.

5.10.2 Driven piles were identified to facilitate a separate condition survey. No remains relating to either the properties fronting Waingate, or to the castle were identified. The extent of disturbance in the area was determined.

*Location*

5.10.3 Trench 8 (**Fig. 25**; **PI. 56**) was located in the west of the site (**Fig. 1**).

*Overview*

5.10.4 A series of 20th-century foundations and services were cut into the truncated bedrock.

*Natural*

5.10.5 As in trench 7, the undisturbed natural geological substrate (8008) comprised orange yellow coal measures sandstone bedrock (**PI. 56**). The bedrock was unweathered indicating that the upper horizons of bedrock had been removed.

*Markets*

5.10.6 In the south-east of trench 8, two-skin frogged machine brick and cement wall 8007 ran roughly north to south at the limit of excavation. Construction cut 8014 adjacent to wall 8007 contained pile 8006.

5.10.7 In the north-east of trench 8, construction cut 8018 contained pile 8005.

5.10.8 In the west and centre of trench 8, construction cut 8002 had a complex shape (**Fig. 25**) to accommodate a series of concrete walls or foundations (8001). Cut 8002 also contained an iron pipe (8004) and was backfilled with yellow brown stoney sand (8003).

5.10.9 Linear feature 8010 ran from the west of trench 8 to wall 8001 in the centre of the trench, cutting fill 8003. Linear feature 8010 was 1.62 m wide and was filled with brown yellow stoney sand (8012). The feature (8010) was not excavated but was assumed to be a service cut.

*Impact of development*

5.10.10 Development has had a significant impact upon archaeological remains in trench 8. Truncation has extended to the removal of the upper horizons of bedrock. Any archaeological remains from all periods have been removed by development, however there is still archaeological potential in the general area as demonstrated by the survival of the moat in trench 9 (see below).

## 5.11 Trench 9

### *Rationale*

5.11.1 The WSI (Wessex Archaeology 2018a) stated that trench 9 was intended to test for evidence of:

- the location of a sample of foundations from the 1950s high office block—to be assessed in a separately commissioned condition survey;
- the location and character of a sample of foundations from the 1920s Co-op store and the impact of these foundations on archaeological deposits; and,
- the extent of disturbance from the 1920s construction of the Co-op building and the 1950s extension of the markets.

5.11.2 Foundations were identified to facilitate a separate condition survey. The extent of disturbance in the area was determined.

### *Location*

5.11.3 Trench 9 (**Fig. 26; Pl. 57, 58**) was located in the south-west of the site (**Fig. 1**).

### *Overview*

5.11.4 The cut of the moat of Sheffield Castle was identified in the south of trench 9 and the fills investigated. Foundations and services of 20th-century date were identified.

### *Natural*

5.11.5 As in trenches 7 and 8, the undisturbed natural geological substrate (9001; **Pl. 57**) comprised brown orange coal measures sandstone bedrock. The bedrock was unweathered indicating that the upper horizons of bedrock had been removed.

### *Moat*

5.11.6 The north side of the cut of the moat (9007; **Pl. 57 and 58; Fig. 26**) ran from north-west to south-east across the south end of trench 9, in agreement with unpublished plans of previous excavations held by Museums Sheffield (see Moreland *et al.* in press). Cut 9007 was steep and made directly into the sandstone bedrock. An intervention was excavated into the fill of the moat (9011) and was halted at a depth of 1.2 m below ground level (49.89 m aOD) for safety reasons (the top of the surviving moat cut was at 51.12 m aOD). The fill (9011) comprised homogeneous brown sand clay, although the upper 0.15 m contained intrusive modern brick rubble that had been pressed into the deposit from above. Seven sherds of pottery were recovered suggesting a 14th-century date for deposition of 9011. A second fill (9016) was identical save for a bluish hue, and was contaminated by intrusive modern brick rubble pushed into the deposit.

### *Markets*

5.11.7 The fills of the moat were truncated by two concrete piles (9009 and 9010; **Pl. 57 and 58**).

5.11.8 Two further similar piles (9008 and 9013) were located slightly to the north, cutting through the sandstone bedrock.

5.11.9 The service cut (9005) for an electric cable ran north to south across trench 9 (**Pl. 57**), partially truncating moat fill 9011 and was backfilled with orange brown silty sand with rubble (9006).

5.11.10 The north end of service cut 9005 was truncated by an east to west aligned service cut (9002) containing an iron drain (9003) and backfilled with red brown sand and rubble (9004). Cable cut 9005 did not continue north of drain cut 9002. In the east, drain 9003 ran into concrete inspection chamber 9015.

5.11.11 Levelling deposit 9014 comprised dark brown gritty sand with rubble and was overlain by the concrete slab of the markets (9000)

#### *Impact of development*

5.11.12 Development has had a significant impact upon archaeological remains in trench 9. Truncation has extended to the removal of the upper horizons of bedrock, probably including removal of overlying alluvial deposits. Archaeological remains from all periods have been significantly impacted by development.

5.11.13 However, the survival of the moat in trench 9 demonstrates the potential for deep archaeology across the western area of the site.

## **5.12 Trench 10**

### *Rationale*

5.12.1 The WSI (Wessex Archaeology 2018a) stated that trench 10 was intended to test for evidence of:

- a full profile of the eastern arm of the moat;
- samples suitable for palaeoenvironmental assessment, analysis and scientific dating;
- a detailed understanding of the character, condition, date and palaeoenvironmental potential of deposits within the eastern arm of the moat; and,
- the extent of disturbance from the 1920s construction of Castle Hill Market and later construction particularly that associated with changes to vehicular access to the markets in the 1960s.

5.12.2 During excavation, the scope of trench 10 was reduced due to the presence of a drain containing a strong flow of water. Only the eastern part of the trench as originally designed was excavated.

5.12.3 Part of the profile of the moat was recorded. Despite the 6 m depth of excavation, the greatest part of the trench was occupied by 18th- and 19th-century levelling layers. The encountered deposits were not well-suited for palaeoenvironmental techniques and the results of sampling were of little value. The character, condition and date of the moat fills was established. The extent of 20th-century disturbance was established.

### *Location*

5.12.4 Trench 10 (**Fig. 27**; **Pl. 58–66**) was located in the south-east of the site (**Fig. 1**).

### *Overview*

5.12.5 Deposits forming the bank of the moat were identified, along with two undated fills. Demolition deposits relating to the 17th-century Civil War slighting of the castle partly filled the moat. The largest part of the stratigraphic sequence was occupied by 18th- and 19th-century made ground layers forming two major phases of activity, the latter associated

with construction of a range of 19th-century slaughterhouses. Drains and surfaces associated with 20th-century development completed the sequence. The results accorded with and expanded upon the results of an earlier evaluation trench (Davies 2000).

#### *Moat bank*

- 5.12.6 Excavation of trench 10 extended in stages to a depth of 6 m below ground level and was protected by shoring installed by a specialist contractor (**PI. 59**).
- 5.12.7 A deposit of blue yellow clay with sandstone and charcoal inclusions (10072) had a sharply-sloping upper interface. A second deposit of orange yellow clay with similar inclusions (10073) probably overlay deposit 10072 although this was not demonstrated. Augering of deposit 10073 revealed that it extended to at least 6.6 m below ground level (44.53 m aOD). The upper interface of 10073 was shallower than that of 10072. A third deposit (10071) comprised grey yellow clay containing a dog or fox tibia, six horse teeth and two sherds of 13th- to 15th-century pottery. Deposit 10071 overlay both deposits 10072 and 10073; the upper interface of deposit 10071 continued the gradient established by 10073.

#### *Moat fills*

- 5.12.8 The base of the moat was not reached in trench 10. This was primarily due to the positioning of the re-designed trench on the shoulder of the moat. The base of the moat must lie at over 6.6 m below ground level, perhaps at around 7 m below ground level, and is probably located in the area of the modern drain that limited the size of trench 10 (ie west of trench 10 as dug).
- 5.12.9 An orange blue silt clay deposit with charcoal inclusions (10078) was the deepest moat fill reached and was overlain by 10076, grey blue silt clay with charcoal inclusions (**PI. 60**). These two deposits were undated (but see discussion below for comparison with Davies 2000).

#### *Slighting deposits*

- 5.12.10 A series of jumbled deposits were suggestive of sudden dramatic infilling (**PI. 61**). Their jumbled arrangement (**Fig. 27**) suggests they were related and broadly contemporary.
- 5.12.11 Light grey silt clay with stones (10077) was deposited away from the bank of the moat in the west of the trench. Grey brown silt clay with few inclusions (10067) filled some of the gap between 10077 and the bank and extended up the bank of the moat. A single sherd of 14th-century pottery was recovered from deposit 10067, although this was probably residual. A deposit of dark brown silt clay with few inclusions (10075) filled the rest of the gap between 10077 and the bank.
- 5.12.12 Two large pieces of masonry tumble (10064 and 10063; **PI. 61**) comprised rough sandstone blocks bonded with lime mortar and had been derived from the core of large walls or similar structures.
- 5.12.13 Deposit 10066 comprised blue grey silt clay with sandstone and 'early' handmade brick fragment inclusions (not retained) and may have been deposited either before or after tumble 10064. Deposit 10066 contained three sherds of pottery, two dating to the 17th century (contemporary with the slighting of the castle at the end of the Civil War), and the other slightly earlier. A similar deposit of grey brown silt clay with fragments of sandstone and 'early' handmade brick and lime mortar (10074) was present on the west side of tumble 10064, post-dated tumble 10064, and was probably contemporary with deposit 10066.

### *Redevelopment*

- 5.12.14 At the beginning of the 18th century, the moat probably appeared as an area of uneven topography at around 4 m below the present ground level (47.23 m aOD), with lumps of masonry tumble (10064 etc.) protruding some 0.6–0.7 m above this level.
- 5.12.15 A thin (0.2 m) deposit of brown yellow clay with sandstone (10070) formed a bedding layer for wall 10060 (**PI. 62**). Wall 10060 comprised unworked, unmortared sandstone blocks and was 0.9 m wide. The upper part of wall 10060 was bonded with lime mortar and was recorded as context 10051.
- 5.12.16 Levelling layers (made ground) were built up west of wall 10060/10051 comprising dark yellow grey clay silt with stone (10056; **PI. 62**), a thin lens of sandstone rubble (10054), dark brown grey clay silt with ash and slag (10049), brown clay with fragments of red brick (10050), dark blue silt clay with brick fragments and ash (10048), and brown orange clay with sandstone (10046). Geoarchaeological assessment (Sample 10001; **Appendix 10**) suggests that layers 10050 and 10048 were derived from alluvial deposits and had been redeposited by a high-energy process such as human activity. These deposits frequently contained large blocks of predominantly unworked masonry probably derived from continued demolition of castle structures or redeposition of existing demolition layers.
- 5.12.17 A cut (10068) truncated the exposed top of the moat bank (10071 and 10072) and contained a primary fill of ash (10069) upon which a ceramic drain was bedded (**PI. 62**). The cut was backfilled with deposit 10055 comprising brown yellow clay with stones. Deposit 10055 acted both as a fill of the drain cut and as a general levelling layer in the area. Deposit 10055 contained clay tobacco pipe with a date of 1800–1850.
- 5.12.18 Overlying drain cut 10068 was a thin (0.05 m) layer of blue grey silt clay and ash (10058) forming a bedding layer for a flagstone surface (10059; **PI. 63**) at 3.15 m below ground level (48 m aOD).
- 5.12.19 In the north of the trench, a cobblestone surface (10013; **PI. 66**) was bedded on a layer of ash (10041) containing nine sherds of 18th-century pottery.

### *Slaughterhouses*

- 5.12.20 Historic maps show that a slaughterhouse district at the confluence of the rivers Don and Sheaf had expanded to the area of trench 10 by the 19th century (**Fig. 8–9**).
- 5.12.21 A major levelling or landscaping cut (10028) truncated the entire area of trench 10 (including wall 10060/10051) to a level of 1.6–2.35 m below ground level (48.78–49.53 m aOD). The cut (10028) contained a thin (0.1 m thick) primary fill of black ash trample (10045).
- 5.12.22 Wall 10060/10051 was rebuilt as 10038 (**PI. 64, 65**), comprising sandstone and black ash mortar. The wall was rebuilt in the original style and was distinguished only by the change in mortar; the mortar change was at the same level in the wall as adjacent landscaping cut 10028. Wall 10038 was capped with sandstone flags (10006). A similar wall (10035, also recorded as 10029; **PI. 65**) was constructed running from east to west but without the benefit of the substantial foundation offered by wall 10060/10051. In the east, wall 10035 had been truncated by a previous archaeological intervention, which recorded the wall as 0010 (Davies 2000). Wall 10035 was capped by sandstone flags (10007) which supported a three-skin handmade brick and ash mortar wall (10008 and 10009). Deposits of brown grey ash (10017 and 10018) were laid down on either side of the wall (10035/10007/10008/10009) as levelling layers. Layer 10017 contained 12 sherds of

pottery with a variety of dates, the latest of which was 19th century. Earlier sherds were residual and probably derived from whatever source was used for the levelling material before it was redeposited.

- 5.12.23 A posthole (10014) containing an *in situ* wooden post (10015) and a fill of black ash (10016) cut layer 10017 as well as earlier surface 10013.
- 5.12.24 In the north-east of trench 10, brick structures (10019 and 10020; **PI. 66**) were of unknown function but correlate with detail shown on the 1892 Ordnance Survey map (**Fig. 8**). Walls 10019 and 10020 comprised a variety of re-used brick types, most frequently bull-nosed machine bricks, all bonded with ash mortar. Structures 10019 and 10020 formed an 'F'-shape in plan, with each element comprising two or three skins.
- 5.12.25 In the south of trench 10 was a small complex area of surfaces and kerbs (**PI. 66**). Minor sandstone foundation 10042 carried a two-skin handmade red brick and yellow brown sandy mortar wall 10011. Made ground layers 10047 (dark grey ash), 10044 (dark blue grey clay with gravel and lime mortar) and 10043 (black ash) surrounded wall 10011 and bedded structures 10010, 10012 and 10021. Structure 10010 was an unmortared two-skin handmade red brick kerb imitating a single course of wall 10011. Surfaces 10012 (cobble) and 10021 (setts) filled the space between wall 10011 and kerb 10010.
- 5.12.26 Apart from this small surface (10012, 10021 etc.), the floor of the slaughterhouses did not survive. Although at a similar level, surface 10013 (described above) was stratigraphically associated with 18th-century development and not with the 19th-century slaughterhouses.

#### *Demolition*

- 5.12.27 Demolition of the slaughterhouses in trench 10 extended to a maximum depth of 4.1 m below ground level (47.03 m aOD), reaching even the 13th- to 15th-century moat bank deposits (10071). This deepest extent of the demolition was a robber trench (10057; **PI. 63**) extending below lane surface 10059. Deposit 10052 both filled robber trench 10057 and buried lane surface 10059 and comprised black ash containing frequent frogged machine bricks including a toppled wall directly overlying surface 10059 (**PI. 63**).
- 5.12.28 A deposit of brown yellow clay (10033) had been mostly removed by later development but survived bonded to the east face of wall 10038. Deposit 10033 was probably broadly contemporary with deposit 10052.
- 5.12.29 The typical depth of demolition in trench 10 was 0.9 m below ground level (50.23 m aOD). A series of black ash and dirty clay levelling layers (made ground) buried the remains of the slaughterhouses (10025, 10024 and 10023). Thirty sherds of 18th- and 19th-century pottery were recovered from layer 10025.

#### *Markets*

- 5.12.30 East of wall 10060/10051/10038/10006, a construction cut (10034 = 10053) truncated deposits to a depth of 2.25 m below ground level (48.88 m aOD). Cut 10034 = 10053 contained a frogged machine brick and cement wall (10005). Wall 10005 was used during excavation to define the east end of trench 10. The construction cut was backfilled with black ash (10004) containing eight sherds of primarily residual 18th-century pottery, but also including a single 19th/20th-century sherd.
- 5.12.31 A construction cut (10027) had removed the red brick wall which probably formerly sat on wall 10006. Cut 10027 contained concrete drain 10026 and was backfilled with black ash (10030).

- 5.12.32 Rubble in a matrix of dark blue grey clay (10003) was used as levelling material.
- 5.12.33 A major drain (cut 10036, drain 10037; not illustrated) was cut from above layer 10003 and limited the size of trench 10. Drain 10037 still carried a substantial flow towards the sewer system to the north. Within the original area of trench 10 (west of the final design of trench 10), drain 10037 contained an elbow turning sharply downwards.
- 5.12.34 Two reinforced concrete foundations (10022 and 10031) were present.
- 5.12.35 A layer of brown silt (10002) acted as bedding material for concrete slab surface 10001 and tarmac 10032.
- 5.12.36 The construction of the markets was described as 'phase 5' by Davies (2000).

*ARCUS trench*

- 5.12.37 The cut of the former ARCUS evaluation trench (Davies 2000) was identified in the west of trench 10 (10039). The ARCUS trench was backfilled with dark grey gravel ballast and the tarmac surface had been repaired across both the ARCUS trench and in the general area (10000).

*Impact of development*

- 5.12.38 The development of the market had a limited impact on 19th-century and earlier remains. Although robber trench 10057 had a very deep impact (4.1 m), it did not substantially interfere with survival or interpretation of the remains. The primary impact of the markets was the prior demolition of 19th-century structures. The lack of substantial market structures in the area of trench 10 (it was an outside area) probably contributed to the limited nature of the impact. In general, in the area of trench 10, the ground level was built up rather than reduced during works for the construction of the markets. Preservation of 19th-century and earlier remains was good.

## 5.13 Trench 11

*Rationale*

- 5.13.1 The WSI (Wessex Archaeology 2018a) stated that trench 11 was intended to test for evidence of:
- the projected line of the eastern moat;
  - the profile of the moat, if identified—by augering rather than hand excavation;
  - the relationship between the eastern arm of the moat and the former line of the river Sheaf; and,
  - the extent of disturbance from the 1920s construction of Castle Hill Market, construction works associated with the adjoining Transport Canteen and storage, and later construction works—particularly those associated with changes to vehicular access to the markets in the 1960s.
- 5.13.2 No evidence for the moat was detected within the 2.4 m depth of excavation of trench 11. The extent of 20th-century disturbance was recorded.



### *Location*

- 5.13.3 Trench 11 (**Fig. 28**; **Pl. 67–70**) was located in the north-east of the site, close to the road Castlegate (**Fig. 1**).

### *Overview*

- 5.13.4 At the base of excavation, a sequence of deposits probably represented 18th-century levelling layers deposited prior to construction of a range of slaughterhouses. The slaughterhouses were buried beneath 20th-century levelling deposits.
- 5.13.5 In trench 11, excavation was limited to a depth of 2.4 m below ground level (46.5 m aOD) due to the area available for the excavation. Access was restricted by an access ramp, by the site boundary and by the site compound, comprising cabins and other temporary facilities. The 3 m available width of the trench meant that the box shoring could not be used to excavate deeper than 2.4 m.
- 5.13.6 Although 18th-century layers were the earliest reached, there is strong potential for earlier features, perhaps including the moat, to exist at lower levels in the area of trench 11.

### *Slaughterhouses*

- 5.13.7 Historic maps (**Fig. 6–8**) suggest that a range of slaughterhouses were already in place by 1800.
- 5.13.8 Grey brown silt clay with stone inclusions (11033) formed the earliest context reached (**Pl. 67**). Layer 11033 was overlaid by 11036 (dark brown silt sand) containing clay tobacco pipe dating to the late 18th century. A layer of brown yellow silt clay with stone (11027) came next. Layer 11022 (also recorded as 11026) comprised dark brown silt with sandstone and contained 11 sherds of a variety of pottery and also clay tobacco pipe, overall suggesting an 18th-century deposition date. Layer 11021 comprised grey yellow clay with rubble and ash inclusions. Clay pipe from layer 11021 has been suggested as of early 19th-century date (see artefactual evidence below), however this is on the basis of plain stems and a slightly earlier date consistent with a recovered 18th-century bowl is probable.
- 5.13.9 A construction cut (11029) had been dug through the above made ground layers for the construction of wall foundations for the slaughterhouses. Two foundations were seen (11023 and 11032; **Pl. 68**), comprising rough sandstone bonded with lime mortar.
- 5.13.10 A series of similar walls (11004, 11006, 11009, 11010, 11011 and 11016; **Pl. 68**) delineated the slaughterhouses and comprised handmade brick bonded with lime mortar. East to west aligned three-skin walls 11004, 11006, 11009 formed the southern exterior wall of the slaughterhouses fronting a lane. North to south aligned two-skin walls 11010 and 11011 formed divisions between slaughterhouses. Wall 11016 supported a step in the floor of one of the slaughterhouses. Each slaughterhouse had a sandstone threshold (11005, 11008) indicating the position of the entrance.
- 5.13.11 Remains of three similar sub-square slaughterhouses were excavated; the central slaughterhouse was 4.3 m wide internally (**Pl. 68 and 69**). These results were consistent with historic maps (**Fig. 6–8**).
- 5.13.12 After the walls of the slaughterhouses were constructed, further made ground was introduced prior to the construction of the floors. In one location, this was yellow clay sand with stones (11025); in another location it was instead grey brown silt sand with stones (11030). Late-18th-century clay pipe was recovered from 11025. A layer of black ash

(11024, 11020 and 11019) formed a bed for the floor surfaces and contained 18th-century pottery and clay pipe; 19th-century clay pipe from layer 11024 may be intrusive.

- 5.13.13 The floors of the slaughterhouses comprised high-quality sandstone flags (11013, 11014 and 11015; **PI. 69**) and sloped to carry blood and other liquids away. Floor 11014 sloped to the west towards floor 11015. Floors 11015 and 11013 sloped to the north in the direction of the River Don (**PI. 70**). The same pattern of flooring was probably present in each slaughterhouse.
- 5.13.14 The lane to the south of the slaughterhouses ran from east to west and is not named on historic maps (**Fig. 6–8**). It may have been considered an extension of Chandler's Row, or an associated court. The surface of the lane comprised sandstone setts (11012; **PI. 69**).

#### *Slaughterhouse repairs*

- 5.13.15 Wall 11006 (the south wall of the central slaughterhouse fronting a lane) was partially rebuilt re-using the same handmade brick but bonded with black ash mortar (11007; **PI. 70**).
- 5.13.16 The floor of the western slaughterhouse had been covered in poured concrete to form a new floor (11017; **PI. 70**).

#### *Demolition*

- 5.13.17 Demolition of the slaughterhouses in trench 11 was not thorough, with up to seven courses of bricks surviving above ground level. No attempt had been made to remove the valuable flagstone floors, although one flag had been lifted in each of the central and eastern slaughterhouses prior to demolition, perhaps to inspect the deposits below.
- 5.13.18 A demolition layer was recorded separately in the central slaughterhouse as 11002, in the eastern slaughterhouse as 11003 and in the area of the lane as 11018 (the layer was not present in the western slaughterhouse). The demolition material comprised rubble in a matrix of light brown grey sandy clay. It is probable that this material represents *in situ* demolition material due to the surviving height of the walls buried within it, although it is still possible that it was imported.

#### *Markets and transport canteen*

- 5.13.19 A substantial layer (up to 1.2 m thick) of probably imported ash and rubble (11001) was used to level the area of trench 11 and bed a layer of tarmac (11000) associated with 20th-century vehicular access to the markets and transport canteen. Immediately east of trench 11, probable asbestos-bearing materials (visually identified) were observed within layer 11001. These were immediately reburied. No asbestos-bearing materials were identified within the area of trench 11.
- 5.13.20 A disused yellow plastic gas conduit was present at the west end of trench 11, and constrained excavation prior to the identification by gas professionals that it was disused.

#### *Impact of development*

- 5.13.21 Development in the 20th-century had had no impact on archaeological remains in trench 11, save for the initial incomplete demolition of slaughterhouse structures. Preservation of 18th/19th-century remains was good, and there is the potential for earlier remains at lower levels.

## 6 ARTEFACTUAL EVIDENCE

### 6.1 Introduction

- 6.1.1 This section discusses the finds recovered during the evaluation. Finds were recovered from ten of the 11 trenches excavated (trench 8 yielded no finds), although quantities from trenches 7 and 9 were negligible. Hand-excavated material has been supplemented by some finds extracted from sieved soil samples.
- 6.1.2 The assemblage is of moderate size, and dates predominantly to the post-medieval/modern period, with a smaller proportion of medieval material. The assessment has suggested that there is a certain level of residuality of medieval material in later contexts.
- 6.1.3 All finds have been quantified by material type within each context, and the results are presented in **Appendix 3**, with a summary by material type in **Table 2**.

**Table 2** Finds totals by material type

Material type	Count	Weight (g)
Animal Bone	1074	7882
Ceramic Building Material	127	13530
Clay Tobacco Pipe	664	1741
Glass	469	6223
Leather	152	-
Metal		
Coins	4	-
Copper alloy	38	-
Lead	369	-
Iron	16	-
Other metal	25	-
Mortar/Plaster	54	1184
Other Ceramic	26	3438
Pottery	1488	19464
Shell	16	287
Slag	776	23332
Stone	52	29362
Wood	69	20234

- 6.1.4 The finds assemblage recovered during the evaluation offers a supplement to the material contained in the Butcher and Armstrong archives held by Museums Sheffield deriving from earlier campaigns of investigation on the Castle site. The quantities and range of artefacts recovered from the present work are more restricted, but some similarities have been observed, as well as contrasts. The pottery assemblage, as from the earlier excavations, includes a significant medieval component, but this is the only material type for which this is the case, although some medieval material has been noted amongst the metalwork, as well as (on stratigraphic provenance) the animal bone and metalworking residues. Structural material from the medieval period (apart from the remains recorded *in situ*) is extremely sparse, limited to two architectural stone fragments (both found unstratified), three pieces of ceramic tile, six pieces of structural timber (one reused) and some small fragments of mortar and plaster.

6.1.5 There appears to be little that can be dated to the early post-medieval period (although significant quantities of pottery of this date were encountered during earlier excavations); the post-medieval/modern assemblage recovered appears to date from the 18th century and later. This part of the assemblage represents use of the site during this period for industrial and commercial purposes (steelworks, slaughterhouses, warehouses, markets). The metalwork assemblage in particular includes possible products of steelworking (cutlery, tools), as well as possible raw materials. This material, however, appears to be largely (if not totally) in redeposited contexts.

## 6.2 Pottery

### *Introduction*

6.2.1 The pottery assemblage from the excavations conducted in 2018 on the site of Sheffield Castle was examined by the author in 2018 and 2019. The assemblage consisted of a total of 1488 sherds weighing 19,464 grammes representing a maximum of 1296 vessels. The data are summarised in **Appendix 4 (Tables 32–51)**. **Tables 32–41** cover the assemblages from individual trenches and unstratified contexts. Other tables (**Tables 42–51**), which summarise the representation of ware types by trench are referenced as relevant in the body of the report.

6.2.2 The periodisation used in the report (for reasons set out elsewhere; Cumberpatch 2014a) is as follows:

Medieval	Mid-11th century to c.1450
Post-medieval	c.1450 to c.1720
Early modern	c.1720 to c.1840
Recent	c.1840 to c.1950

6.2.3 After the completion of the report, the results of the C14 analyses became available, three of which proved to be of direct relevance to the pottery assemblage. These were from contexts 1057, 1076 and 5041 and the opportunity was taken to revise the report (November 2019) so as to include the results and a brief discussion of their implications.

### *The pottery*

6.2.4 The earliest pottery to be identified in the assemblage consisted of four sherds of hand-made (ie slab-built rather than wheel-thrown) sandy ware from contexts 4107 and 6039 of probable late 11th to early/mid-12th century date (HM White Sandy ware). The designation of these sherds follows a preliminary review of hand-made medieval pottery in Yorkshire and north-eastern England after the identification of a significant assemblage (which included hand-made Durham-type ware) from Claypath in Durham (Cumberpatch 2018a). In general terms the hand-made wares from the castle can be compared with the Durham-type wares and with the products of other seemingly short-lived local industries including the Hallgate C wares from Doncaster (Buckland *et al.* 1979), the Hallgate A1 and related wares from later excavations in Hallgate (Cumberpatch *et al.* 1998–1999) and the King Street, Duffield (KSD) wares from Derbyshire (Cumberpatch 2002–2003). The Hallgate C and the KSD wares showed evidence of considerable skill in their manufacture and in this they offer a contrast to the much less accomplished hand-made Hallgate A1 and related wares (Cumberpatch *et al.* 1998–1999). Further examples of hand-made wares have been noted by Young and Vince in their discussion of Gritty wares from Castle Gate, Wetherby (Young and Vince nd). These authors also noted the presence of a

hand-made ware, probably dating to the mid/late-11th century in Ripon. The identification of hand-made wares across the wider Yorkshire/north-east region raises a number of questions about the origin and structure of the pottery industry in the early post-Conquest period which are particularly intriguing given the largely aceramic nature of Late Saxon society in the area (Cumberpatch 2016a) and the parallel evidence for the production of high quality wheel-thrown pottery in West Yorkshire at around the same time. Such wares include the Stamford-type wares from Pontefract (Roberts *et al.* 2013) and the wheel-thrown Yorkshire Gritty wares, formerly known by a variety of names including Pimply ware, Hillam-type ware and Gritty ware (Cumberpatch 2002a, Young and Vince nd).

- 6.2.5 In the present case, four sherds of hand-made (HM) White Sandy ware were identified in contexts 4107 and 6039 (**Tables 35 and 37**). All were body sherds, undecorated except for the presence of spots and patches of pale green splashed glaze on the external surfaces. The fabrics of the three sherds from context 6039 contained quartz grains measuring up to 1 mm (along the longest visible axis) and occasional large, rounded white rock fragments up to 2 mm in size. The sherd from context 4107 also had a white, gritty-textured fabric although, in addition to quartz and white rock fragments, the sherd also included red and black iron-rich grit similar to that seen in the later Coal Measures wares and Sheffield-type wares discussed below.
- 6.2.6 More abundant than the hand-made wares were wheel-thrown products of the Doncaster Hallgate potteries represented by a small quantity of Hallgate B ware (contexts 4087 and 4010) and Hallgate A wares (contexts 1048, 1057, 3015, 3057, 3058, 3079, 4062, 5041, 5045 and probably 4087 and 4115). The rim and handle from a Hallgate A ware jug is shown in **Fig. 29, illustration 1**. It is notable that hand-made Hallgate C wares were not identified in the assemblage although a jug and body sherds in Hallgate C3 ware were previously recovered from a well outside the castle but within the medieval town (Cumberpatch 2006).
- 6.2.7 The dating of the Hallgate wares has traditionally followed the pioneering work of Buckland and his colleagues (Buckland *et al.* 1979; 1989) based on material recovered from rescue excavations carried out in Doncaster in the 1960s and 1970s. This scheme sees a sequence from Hallgate C to Hallgate B to Hallgate A spanning the period between later 11th century and the later 13th or early 14th century with Hallgate B being of 12th century date and Hallgate A ware spanning the later 12th to later 13th or early 14th centuries (Buckland *et al.* 1979, 56). This scheme has remained the mainstay of local chronologies (including those used by the present author) despite the discovery of hand-made production (as noted above, considerably inferior in quality to Hallgate C ware) at the Hallgate 95 site (Cumberpatch *et al.* 1998–1999) and the fact that Hallgate A and B wares consistently occur together in the same deposits across Doncaster and on sites outside the town. In some cases, such as Conisbrough Castle (Cumberpatch 2014b; 2015a; 2016b), it might be possible to argue that the problem is a taphonomic one and the result of significant residuality within deposits, but this can hardly explain the situation on such a wide variety of types of sites within and outside Doncaster. Furthermore, a close examination of the evidence used to attribute date ranges to the various types (discussed in Buckland *et al.* 1979, 55–59), shows it to be insecure (Cumberpatch, in prep. 1). In the present assemblage radiocarbon dates for contexts 1057 and 5041 both indicated a date range between AD 1170 and 1260 (UBA-41312 and UBA-41314), which would tend to support the contention that Hallgate A ware may in fact originate in the 12th century. The assemblage from context 1057 included the rim and handle of between one and three Hallgate A ware jugs while all of the pottery (three sherds) from context 5041 was of Hallgate A ware type.

- 6.2.8 Unfortunately, while it has been possible, using published and unpublished data, to present a critique of the status quo, neither time nor opportunity have yet been available to permit the construction of a detailed alternative typo-chronological scheme which will adequately explain the much more complex picture which has emerged from work undertaken since the late 1980s across the region. In the interim, the traditional dates have been cited in the data tables but cannot be defended; a broad 12th- to 13th-century date is perhaps the best that can be suggested for both Hallgate A and B wares, with the important caveat that this may change if an opportunity becomes available in the future to revise the existing scheme in line with the current evidence.
- 6.2.9 Later medieval pottery (early-14th- to mid/late-15th-century) in South Yorkshire is dominated by two groups of wares; Coal Measures ware and Humberware. Both were present in the assemblage under discussion although in relatively small quantities.
- 6.2.10 Coal Measures wares have been the subject of a number of publications and are found widely on sites across South Yorkshire and beyond (Hayfield and Buckland 1989; Cumberpatch 2004a; 2004b). The earlier type, Coal Measures Whiteware (CMW) dates to the 14th or very early 15th century while the later type, Coal Measures Purple ware (CMP), dates to the 15th century and probably continues into the 16th century although the exact date of the end of production is unknown; it may be connected with the disestablishment of the Conisbrough Parks deer park although this requires verification. The use of a dark purple glaze on a hard, reduced body reflects the wider late medieval to post-medieval transition from brightly coloured red-bodied vessels with green glaze to the predominantly purple to black wares of the post-medieval period (Cumberpatch 2003; 2014a).
- 6.2.11 Coal Measures clays, which are found between coal seams, appear to have been exploited by many medieval potters and the products of the Brackenfield pottery near Little Oggston, Chesterfield were also made using this type of clay (Cumberpatch 2004c) One sherd of Brackenfield ware, a strap handle from a jug, was identified in the assemblage (context 1048). The issues around the dating of the Brackenfield industry remain to be addressed and the date range suggested (late-13th- to 15th-century) is undoubtedly far too broad but pending the publication of assemblages from Chesterfield (reviewed elsewhere; Cumberpatch and Thorpe 2002) remains the best estimate available.
- 6.2.12 Two sources are known for the Coal Measures wares in South Yorkshire; Green Lane in Rawmarsh near Rotherham and Firsby Hall Farm near Conisbrough. Neither site has been adequately investigated (Cumberpatch 2004b) although the quantity of Coal Measures wares from sites across southern Yorkshire and neighbouring areas means that we have a good idea of the range of vessel types produced and the date ranges of both types.
- 6.2.13 The author has suggested that an additional type of Coal Measures ware can also be distinguished and that this differs from the Coal Measures Whiteware in the finer texture of the fabric, generally finer finish and a rather more extensive range of vessel types than is seen in the later industry. Although petrological and chemical analysis carried out as part of the regional reference collection project was on too small a scale for the type to be definitively defined and distinguished from the Firsby Hall Farm and Rawmarsh Whitewares it was concluded that it seems possible to sustain the suggestion that other potteries were in operation in the 13th and early 14th centuries using deposits of Coal Measures clay and producing vessels with a finer finish than those from Firsby and

Rawmarsh (Cumberpatch 2002a). The chronological relationship of these possible potteries to those in Hallgate, Doncaster, remains to be established (Cumberpatch 2004b)

- 6.2.14 The same project involved the examination of an assemblage from a site at Upper Haugh on the outskirts of Rawmarsh and this resulted in the definition of another sub-type; Splash Glazed Coal Measures Whiteware which was dated, largely on the evidence of the technique of glazing, to the period between the late 11th and early 13th century. It was described as a soft Coal Measures ware with moderate quantities of rounded quartz grains (0.4–0.5 mm) and sparse fine black grit. The surfaces are buff to white with a grey reduced core. It is distinguished from the later medieval Coal Measures Whiteware type by being softer and rather finer in texture. The glaze is pale yellow to yellow-green in colour and patchy and streaky in application with typical splash glaze pitting (Cumberpatch 2004b).
- 6.2.15 These observations are significant in the current context because of the results of the C14 dating carried out on charred plant remains from the site and specifically from context 1076 (UBA-41313). A date of AD 1040–1210 (at a 95.4% confidence level) was obtained for this context. As discussed below, context 1076 produced just two sherds of pottery; a sherd of North Nottinghamshire Quartz and Shell-tempered ware dating to the period between the 12th- and mid-13th-century (see Young, below) and a sherd of Coal Measures Fineware. Neither sherd was large, both weighing 8 grams, and intrusion into an earlier context cannot be entirely ruled out, but nevertheless, the C14 date is of considerable significance, given the dearth of such dates available for the medieval pottery industry in South Yorkshire. It would seem to support the suggestion made on the basis of the Upper Haugh assemblage that the production of Coal Measures wares began some time before the conventional date for Coal Measures Whiteware, perhaps as early as the mid-11th century. This has wide-ranging implications for the dating of medieval sites across South Yorkshire and in neighbouring areas, particularly when taken together with the early C14 dates for the Stamford ware pottery in Pontefract (Roberts *et al.* 2013) and the questions surrounding the dating of the Hallgate A and B wares mentioned above.
- 6.2.16 Humberware, produced in eastern Yorkshire from the later 13th to the 15th or early 16th century, was an important regional type which enjoyed a wide distribution beyond its area of production. It is known to have been made at Holme-on-Spalding Moor and around the village of Cowick (Hayfield 1992; Hayfield and Grieg 1990; Mayes and Hayfield 1980; Watkins 1987) and possibly elsewhere. Only five sherds were identified (contexts 4024, 1057, 4008 and 10071). Three of these were slightly less than typical in their appearance but were close enough to fall within the Humberware type category. One sherd was identified as of Late Humberware type (context 5009). This represents both the final phase of Humberware manufacture and a distinct departure in terms of vessel forms and fabrics when compared to the earlier wares.
- 6.2.17 A particularly notable feature of the assemblage was the quantity of Sheffield-type ware identified (contexts 1006, 1048, 1053, 1057, 3015, 4065, 4087, 4104, 4115, 9011 and 10071). This type of pottery was first recognised after a small area of undisturbed ground was excavated as part of a larger investigation in the centre of Sheffield, a few hundred meters from the site of the castle (Baker *et al.* 2011; Cumberpatch 2011a; Vince 2011). The assemblage recovered from the site was small but included enough evidence of manufacture to establish it as the location of a medieval pottery. The assemblage from the castle is the largest group of this type of pottery yet identified. Identifiable vessel parts established the presence of a number of jugs, including at least one baluster jug (context 1048; **Fig. 29, illustration 2.**

- 6.2.18 Unfortunately, dating evidence was absent from the Norfolk Street site and at present it is possible to suggest only a later medieval date (late-13th to early/mid-15th century) for the type, based on the general characteristics of the individual sherds and vessels. In this regard it is of interest to note that the C14 date obtained for context 1057 indicated a date between AD 1170 and 1260 (at a 95.4% confidence level) which might imply a slightly earlier date for the type.
- 6.2.19 Other medieval wares could not be identified to specific types and have been designated by generic names based on the characteristics of individual sherds and vessels and with the proposed date ranges drawing on the same rather unsatisfactory data.
- 6.2.20 Context 6039 produced two sherds in a distinctive wheel-thrown White Sandy ware. The sherds were thin-walled with slight external rilling and rare spots of pale green and brown splashed glaze. The fabric was soft, very pale buff to white in colour and contained common to abundant clear and brown quartz up to 0.5 mm in size although occasionally larger with sparse white rock fragments up to 1 mm in size. Very fine mica was visible on the surfaces. The early date (similar to that of the Splash Glazed Sandy ware, described above), is suggested by the fine finish and the presence of splashed glaze on the external surfaces.
- 6.2.21 Context 1048 contained a small sherd of an unidentified type (Splash Glazed Sandy ware) containing fine quartz and red, iron-rich, grit. The presence of splashed glaze suggested an earlier medieval date within the 12th to early/mid-13th centuries.
- 6.2.22 Four sherds (contexts 4104, 4109, 6011 and unstratified) were classified as Buff Sandy ware, distinguished by their buff to pale grey fabrics containing fine quartz and sparse fine rock fragments. Buff sandy and gritty wares are an important component of 11th to 13th century assemblages from sites throughout northern Yorkshire and north-east England. The sherds identified here may be regional imports although at present they cannot be matched to any specific named type, in large part because these wares have not been investigated in detail. The sherd from context 6011 (**Fig. 29, illustration 3**) was an unusual narrow strap handle with a prominent groove along the external edge. The fabric was fine pink buff to pale grey in colour and contained fine quartz and red grit up to 0.6 mm with very fine, sparse, muscovite visible at the surface. The handle had broken at the junction with the body. It did not appear to be a typical jug handle and may have come from a urinal.
- 6.2.23 Reduced Sandy ware (contexts 1048, 3056, 4087, 6039, 6050 and 9011) was defined by a narrow range of fine, grey fabrics, sometimes with thin oxidised margins. All of the fabrics contained quartz, and in some cases at least this was combined with fine black grit, similar to (but finer than) that seen in the Coal Measures and Sheffield-type wares which may suggest the exploitation of similar clay sources. Only one sherd was identifiable to vessel type; a jug from context 3056 represented by a distinctive profiled rim with an external ridge.
- 6.2.24 The Oxidised Sandy ware group (contexts 1040, 1057, 3057, 4040 and 4111) included sherds similar in composition to some of the Reduced Sandy wares but which were oxidised throughout. The date ranges cited in the data tables reflects the character of the individual sherds.
- 6.2.25 One sherd was identified as Chalk-tempered Sandy ware (context 4115). The use of chalk as a tempering medium is known from sites in East Yorkshire (Didsbury 2005, 15) and it is probable that the vessel originated from the Hull area.
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- 6.2.26 Context 4042 contained part of a dripping tray in a coarse Gritty ware fabric (**Fig. 29, illustration 4**). Dripping trays or pans are distinctive sub-rectangular dishes intended to catch the fat dripping from an animal or bird carcass while it is being cooked on a spit. While not common on most medieval sites, a number have been identified from Conisbrough Castle (Cumberpatch 2013; 2014b; 2015b; 2016b).
- 6.2.27 Post-medieval pottery (c.1450–c.1720) was represented by a variety of wares typical of the period. Cistercian ware, the first of the truly post-medieval wares (Cumberpatch 2003), was present in contexts 11022, 1007, 4097, 4107, 6026, 10017 and unstratified. Cistercian ware (which has no connection with the Cistercian Order, other than occurring in Dissolution contexts on monastic sites) was manufactured widely across the Midlands and northern England with the closest known potteries to Sheffield being located in Ticknall (Derbyshire; Spavold and Brown 2005) and Wrenthorpe (West Yorkshire; Moorhouse and Roberts 1992) although it may also have been made in Doncaster (Robinson, pers comm). Two of the sherds (contexts 11022 and 10017) bore white pipeclay motifs. Such designs have been suggested as having religious and specifically Catholic, connotations (Spavold 2009) and as such may have fallen from favour during and after the Reformation, which might suggest that the sherds pre-date the early/mid-16th century. Against this is the fact that the Earls of Norfolk were members of a prominent Catholic family and as such might have continued using such vessels, albeit perhaps discretely, after others had disposed of them. The remainder of the sherds were plain and included two cup or tyg bases and a small rim sherd, probably from a similar vessel.
- 6.2.28 From the beginning of the 17th century, Cistercian ware underwent a typological transformation with larger Blackware vessels replacing the small Cistercian ware cups and tygs. Blackwares are a common component of contexts associated with Civil War activity, most notably at Pontefract Castle where large quantities were recovered from deposits associated with the demolition of the castle in 1649 (Cumberpatch 2002a). In the present case, Blackwares were identified in contexts 4016, 5005, 6026, 10066, 11022, 1006 and 11024). The majority were body sherds but included two rims, one from a large tyg, and a footed base, probably from a similar vessel. One sherd (context 6026) had glaze across a broken edge, normally the sign of a waster although surface cracks can allow glaze to infiltrate while the vessel remained functional.
- 6.2.29 Larger utilitarian vessels (jars and possibly cisterns) in Blackware fabrics are known as Coarse Blackware and were identified in contexts 4107, 6006 and 6026. These appear to continue into the early 18th century (and may be confused with the Midlands Purple wares described below) although true Blackwares are a purely 17th century type.
- 6.2.30 Yellow wares are considerably harder to date with any precision than are Cistercian wares and seem to be broadly contemporary with both Cistercian ware and Blackware, spanning the period between the mid/late 15th century and the later 17th century and probably continuing into the early 18th century. Characterised by its white fabric and bright yellow glaze (clear on the white body), Yellow ware was represented by just four sherds (contexts 1007, 5025, 11022 and unstratified) which included fragments from a small jar and a bowl.
- 6.2.31 One sherd of Surrey Whiteware was identified in the assemblage (context 1007). As the name implies, this type of pottery was manufactured in southern England during the later post-medieval period (Pearce and Vince 1988). Sherds of similar Border ware were present in the assemblages from Pontefract Castle (Cumberpatch 2002a, 186) and

Sandal Castle (Moorhouse 1983, 93) while two sherds were noted (under the earlier name of Tudor Green ware) at Bawtry (Cumberpatch 1996, 60).

- 6.2.32 A small number of sherds of European or possibly European vessels were identified in the assemblage. These included Westerwald stoneware (context 6026) and Martincamp-type ware.
- 6.2.33 Westerwald stonewares, distinguished by the use of dark blue cobalt decoration on a pale grey stoneware body, are relatively common on post-medieval and early modern sites (Gaimster 1997). The example from context 6026 also bore purple detailing on the relief-moulded body but the sherd was too small to identify to a specific vessel type (**Fig. 29, illustration 5**).
- 6.2.34 Martincamp-type flasks (contexts 1007 and 1043) have long been considered to be of northern French origin (Ickowicz 1993) but recent work at Ticknall in Derbyshire (Brown and Spavold 2019) has demonstrated that they were amongst the products of one or more of the Ticknall potteries and possibly also of other potteries in the Midlands. The typical form, a long-necked flask, seemingly designed to be suspended from leather straps and carried over the shoulder, has led to them being referred to as 'pilgrim flasks'. While their distribution is much wider, they are often found in monastic contexts, although production outlasted the Reformation and continued into the 17th century. It is worth noting that amongst the few surviving sherds of pottery from the early 20th century excavations on the site of Beauchief Abbey is a group of Martincamp-type flask fragments, currently held by Museums Sheffield. The name 'Martincamp' has been retained for this report as it was not possible to compare the sherds from the castle directly with examples from Ticknall, but it is likely that this name will, in due course, be replaced by the term coined by Brown and Spavold, 'Ticknall bottle'.
- 6.2.35 Tin Glazed Earthenwares (contexts 1006, 4024, 4115 and 5005) were an important class of pottery in the post-medieval period and were manufactured in northern Europe between the mid-16th and mid-18th centuries. The type was imported from the Netherlands in considerable quantities (hence the popular name for the type; 'Delft ware') but it was also made widely in Britain (London, Bristol, Newcastle, Liverpool, Wincanton, Whitehaven and elsewhere). Unfortunately, it is impossible to distinguish between the sources on the basis of macroscopic or low-magnification microscopic examination and as a result the type is often referred to as of 'Anglo-Dutch' origin. Only when useful parts of painted designs survive is it possible to attribute specific vessels to specific sources. The difficulty of doing this is compounded by the very poor adhesion between the body and the glaze with the result that the glaze is easily damaged. In the present case the sherds were too small (none weighed more than 7 grammes) and damaged for identification to be possible.
- 6.2.36 The term Midlands Purple ware has been used by numerous authors to describe hard, purple glazed vessels of post-medieval and early modern date but there have been few attempts to adequately define, describe and delimit the term. In the present case it has been used quite narrowly to describe vessels with very hard, dense and often semi-vitrified fabrics which, in hand-specimen and at low (x20) magnification, appear to be close to stonewares in their characteristics. Inclusions consist of varying quantities of quartz and red and white rock fragments, some of which have clearly been affected by the intensity of the firing. Ticknall is the best known source of Midlands Purple wares but the quantity and wide distribution of the type would seem to imply the existence of other potteries producing this type of pottery. Only two sherds were identified in the present assemblage, both from context 11022.

- 6.2.37 Although Midlands Purple wares were a durable and robust type, they were progressively replaced from the late 17th century onwards by Brown Glazed Coarsewares which were fired to a lower temperature (as indicated by the character of the fabrics) and so may have been cheaper to manufacture (using less fuel). A distinction has been drawn between Early Brown Glazed Coarsewares (EBGCW) and Brown Glazed Coarsewares (BGCW) on the basis of the fabrics with the former being coarser and containing significant quantities of red grit. This type was much commoner in the assemblages from Butcher's excavations on the site (Cumberpatch 2017, discussed in more detail below) but four sherds were present (contexts 2020, 4002, 1043 and 11022), all but one, body sherds from hollow wares. The exception was the base of a bowl or pancheon.
- 6.2.38 Brown Glazed Coarsewares were much commoner than the earlier variety, notably in trenches 1, 4, 6 and 10. The date range spans the 18th and 19th centuries and the type remained in production into the mid-20th century (Anderson 1963–5; Cumberpatch 2014a). Fabrics tend to be sandy in texture with varying sizes and quantities of quartz with smaller quantities of red and white inclusions. Such variation is inevitable given the widespread nature of production across small potteries using local clay sources (Griffin 2012; Cumberpatch 2014a) over a period of some 250 years or more. The commonest type of vessel, virtually ubiquitous on sites of 18th to early 20th century date, is the pancheon, a large bowl, glazed internally and with a wide variety of rim shapes and which seems to have been used for numerous domestic tasks including preserving fruit and vegetables and making bread dough. Hollow wares forms included large jars and cisterns although only the former were identified in the present assemblage. Such jars seem likely to have been used for storage, particularly of preserved or pickled vegetables. Smaller vessels with the same general characteristics have been termed Brown Glazed Fineware (context 6011) although they are part of essentially the same group of wares.
- 6.2.39 Redware and the closely related Slipware Type 1 are distinctive types with a characteristic fine, rather soft orange fabric which, when combined with clear glaze, gives shiny red surface, typically on the inside of large, shallow dishes and bowls. When plain the type is termed Redware but when decorated with trailed white slip designs (which appear yellow under the glaze) it is known as Slipware type 1. A 17th to very early 18th century date is normally ascribed to the type as it seems to have been largely replaced by other types of Slipware during the 18th century, at least in Yorkshire. The later Slipwares are typically press-moulded dishes with impressed 'pie-crust' rims. Redware was represented by just one sherd (context 11022) while Slipware Type 1 was only a little more common with three sherds from contexts 5029 and 10017.
- 6.2.40 Eighteenth century Slipwares were rather more common in the present assemblage than was the earlier type with sherds from contexts 1006, 1007, 4036, 4037, 5005, 6006, 6026 and 10025. All but two sherds were from press-moulded dishes, the exceptions being from wheel-thrown hollow wares (contexts 1007 and 10025).
- 6.2.41 The Slipwares form part of an important group of early modern wares, termed 'vernacular tablewares' which include Late Blackware, (common throughout the assemblage, as listed in the data tables), Slip Coated ware (contexts 1006, 4037, 5005) and Mottled ware (contexts 3015, 4008, 5009, 6026, 6041 and unstratified). These wares and their important place in the economic history of southern Yorkshire have been discussed in detail elsewhere (Cumberpatch 2014a). All were manufactured at a number of local potteries across South and West Yorkshire, with one of the earliest being located at Sheffield Manor (Beswick 1978; Hadley and Harlan 2011; Cumberpatch 2010; 2011b; 2012) while others flourished at various times during the 18th century. Production does not seem to have continued into the early 19th century, possibly because of the

appearance of a range of cheap, colourful factory-produced kitchenwares from the manufacturers of formal tableware, discussed below. Many of the country potteries continued to produce pottery but shifted the focus of production to utilitarian wares, notably Brown Glazed Coarseware and Brown Glazed Fineware, mentioned above.

- 6.2.42 The 18th century saw a major change in the pottery industry with the appearance White Salt Glazed Stoneware (c.1720–c.1780; see Edwards and Hampson 2005) and, slightly later, the first refined earthenwares; Creamware (c.1740–1820) and Pearlware (c.1780–c.1840), all closely connected with the industrialisation of the pottery industry. Although often linked specifically with Staffordshire, they were in fact manufactured very widely, including in Yorkshire (Griffin 2001; 2005; 2012) although attribution to specific potteries is generally difficult unless the sherds bear maker's marks or, more rarely, unique decorative designs. The wider social significance of the wares, which reflect the importance of the cult of 'civility' (Thomas 2018) in the 18th century, has been discussed by numerous authors, including Kowaleski-Wallace (1997) and Richards (1999), and cannot be dealt with in detail here. Briefly, the character of these wares distinguished them from both earlier types and contemporary vernacular tablewares. Their fine, thin profiles and hard, bright, white finish, combined with the fact that they were much cheaper and more readily available than imported porcelain, made them highly desirable objects, eminently suitable as part of the move towards formal dining which formed an important element in the rise of the 'Georgian Order', a central part of 18th century society and sensibility.
- 6.2.43 White Salt Glazed Stoneware was represented by sherds from contexts 4040, 4115, 5009, 5025, 6011 and unstratified. Both flatwares and hollow wares were represented although in most cases the sherds were too small to be attributed to specific vessel types.
- 6.2.44 Creamwares, including both plain and banded types, were relatively common element in the assemblage (as they frequently are in assemblages from sites in Sheffield, including the Riverside site; Cumberpatch 2005; 2015b) with a maximum of 153 vessels represented from all of trenches (detailed in the data tables). Vessel types included flat and hollow tablewares although in many cases the sherds were too small for the vessel type to be identified.
- 6.2.45 Banded Creamware, characterised by the use of engine-turning and dark coloured slip to form bold patterns around mugs, cups, bowls and jars, was also present in contexts (1006, 4008, 4009, 5005, 6006, 6011 and unstratified).
- 6.2.46 From the latter part of the 18th century Creamwares began to give way to Pearlwares, distinguished by their blue-white finish and the common use of transfer printed designs. Both types are common in assemblages from Sheffield. A wide range of Pearlware tablewares were identified although plain wares were rather rare in comparison to hand-painted, banded and transfer printed examples. The majority of the latter were too small to allow the designs to be identified but context 1001 was distinguished by the fact that it contained a small sherd bearing the tendril pattern, identified by Tomlinson and Tomlinson (2014) as used in the Ferrybridge Pottery in West Yorkshire. Other sherds bore the popular and ubiquitous Willow design with other Chinese style patterns also present.
- 6.2.47 From around 1840 the Pearlware finish was replaced by the brighter Whiteware finish, again often combined with transfer printed decoration. Both plain and transfer printed examples were common in the castle assemblages, as they are on sites across Sheffield. Examples included the normal range of table and kitchenwares with a small number of more unusual vessel types including a vase or planter from context 4007 and part of a jug with a salmon-pink external surface (context 4077). Such sherds have identified as parts

of one pint jugs, often with an official stamp verifying their capacity and associated with public houses (as, for example, on sites excavated in advance of the Inner Ring Road scheme; Cumberpatch 2014c). Transfer printed designs included the popular Asiatic Pheasants and Willow patterns but many others were unidentifiable. Vessel forms included standard types of tableware, as listed in the data tables.

- 6.2.48 Two sherds (from contexts 2001 and 4037) appeared to be pieces of unfinished vessels in refined earthenware fabrics, probably the waste from pottery manufacture. The sherd from context 4037 could be either Pearlware or Whiteware but the fragment from context 2001 appears to be of a late date and thus probably Whiteware. It bore part of a transfer printed maker's mark reading 'BEST QUAL ...' with an angular symbol but not enough survived for it to be identifiable to as specific manufacturer.
- 6.2.49 Like Whiteware, Bone China was a common element in the assemblage with plain, hand painted, moulded and transfer printed examples all common, particularly in Trenches 4 and 5 (notably contexts 5005 and 5034, although transfer printed examples were absent from context 5034). First developed in the late 18th century, Bone China rapidly became the commonest type of porcelain body used by British manufacturers (Barker and Ford 1999). It was well suited to moulding (although not to wheel throwing) and was used for a wide variety of tablewares distinguished by their thin walls, bright white colour and delicate appearance. The examples from the present assemblages included a wide range of tablewares but also included kitchen wares such as pie dishes (contexts 5005, 5034). Decoration included gold overglaze lines, over-glaze painted designs (mainly floral motifs) and underglaze transfer prints (Willow, Two Temples).
- 6.2.50 As noted above, the early 19th century saw the introduction of a range of cheap, colourful kitchen and tablewares in refined earthenware fabrics which seem to have largely replaced the vernacular tablewares and which remained extremely popular throughout the 19th century and into the 20th century. These are very well represented on sites across Sheffield, including in the present case. Banded wares, as the name implies, were decorated with bands and lines of varying colour, often blue but also including red, brown and orange. Bowls were the commonest form but at least one jug was also identified (context 5034). Two sherds (contexts 4009 and 4095) contained sherds of relief banded ware, distinguished by the raised bands around the body. Such sherds usually come from jugs.
- 6.2.51 Cane Coloured wares and Slip Banded Cane Coloured (CC) wares are a common find on 19th century sites in Sheffield. As the names imply the refined earthenware bodies had a pale yellow colour which was enhanced by the clear glaze while the latter were decorated with white, brown or blue lines and bands. Kitchen wares including bowls and pie dishes were amongst the commoner types both in the present assemblage and more widely.
- 6.2.52 Colour Glazed wares, characterised by the use of strongly coloured glaze on white or coloured bodies, were well represented in the assemblage, most notably by teapots from Trenches 4 and 5. Many of these bore the shiny brown 'Rockingham' style glaze which was developed in the later 18th century by the Brameld family who operated the pottery at Swinton (Cox and Cox 2001, 116–120). They were particularly popular with Mary, Marchioness of Rockingham who purchased no fewer than 230 between 1770 and her death in 1804. They were more widely popularised by the Prince of Wales (later George IV), who encountered them when visiting the Wentworth estate in 1807 and who subsequently ordered a quantity of them, thus ensuring their fashionable status. The significance of the concentration of teapots in Trenches 4 and 5 is considered further below.

- 6.2.53 Unglazed Red Earthenwares were present in contexts 1006, 3015, 4040, 4115 and 6006. The majority were from flowerpots, perhaps reflecting the importance of allotments in Sheffield (Flavell 2005).

#### *Shell and quartz-tempered pottery from Sheffield Castle*

##### Introduction

- 6.2.54 Six sherds in quartz and shell tempered fabrics were submitted for examination and reporting. All of the sherds were examined using a x20 binocular microscope and were recorded using the fabric codenames (CNAME) of the City of Lincoln Archaeology Unit (Young, Vince and Nailor 2005). The vessels were quantified using three measures: number of sherds, vessel count and weight. The resulting archive entered onto an Access database and subsequently incorporated into the spreadsheets (LibreOffice CALC) which form part of the site archive and are included as part of the full report. Recording of the assemblage was in accordance with the guidelines laid out in Slowikowski *et al.* (2001) and the PCRG / SGRP / MPRG guidelines (2016).

- 6.2.55 The pottery fell into two groups. The first consisted of three sherds from a single large bowl in a Shell and Quartz Tempered ware (MEDX) recovered from context 4104 (weighing 82 grams in total). The vessel was of medieval type and most probably dates to the period between the mid-12th and mid-14th centuries.

- 6.2.56 The second group consisted of three sherds from two small jars (weighing 15 grammes in total) in North Nottinghamshire Quartz and Shell ware (NNQS) from contexts 1076 and 3056 and were most probably of an early medieval type dating to between the 12th and mid-13th centuries. The details of both groups of sherds are summarised in the data tables.

##### Condition

- 6.2.57 The Shell and Quartz Tempered ware sherds from context 4104 were in a slightly abraded condition. The sherds of North Nottinghamshire Quartz and Shell ware (contexts 1076 and 3056) were also in a slightly abraded condition and both vessels showed evidence of variable leaching of the shell inclusions with the base from context 1076 retaining little visible structural shell even in a freshly broken edge.

##### The range and variety of materials

- 6.2.58 The three sherds from context 4104 came from a single large bowl tempered with fine quartz grains and sparse to moderate calcareous inclusions including fossil shell (MEDX). The vessel was in a reduced fabric with light oxidised surfaces and contained common fine quartz grains below 0.2 mm, mixed but mainly coarse sparse to moderate fossil shell fragments, sparse to common flattened voids some of which contained the remains of carbonised vegetable material, sparse iron-rich grains, occasional fragments of erratic rock, occasional rounded calcareous grains and rare needle-like calcareous minerals that may be gypsum. This fabric suggests an origin in the East Midlands although the author cannot identify a precise source. The everted rim has a single row of triangular stabbing marks around the rim top. Stylistically this large bowl form and decoration belong to the period between the mid-12th and mid-14th centuries.
- 6.2.59 The fabric of all three of the sherds from contexts 1076 and 3056 was consistent with that of vessels found in Nottinghamshire especially around Southwell and termed North Nottinghamshire Quartz and Shell ware (NNQS), although a precise location for the manufacture of the type has not been identified. At present the ware is thought to span the period between the early 12th and mid-13th centuries.

6.2.60 The three sherds presented for examination come from two small jars recovered from deposits 1076 and 3056. Identification of the single basal sherd recovered from deposit 1076 was the more tentative of the two vessels as little actual structural shell survived. The fine quartz inclusions however are typical of the type. Deposit 3056 produced two sherds from a single small jar with a thick external soot deposit and partial internal soot or carbonised deposit. Typologically the vessel shapes were typical of 12th century examples of the ware.

#### Summary

6.2.61 The three sherds from context 4104 come from a single large medieval-type bowl of probable mid-12th to mid-14th century date and originated in the East Midlands.

6.2.62 The three sherds from contexts 1076 and 3056 came from two small jars of early medieval type. Their presence may be considered unusual as previous finds of this ware type have been confined to sites in Nottinghamshire and west Lincolnshire within reach of the River Trent.

#### *The pottery assemblages from Trenches 1 to 11*

##### Trench 1

6.2.63 The assemblage from Trench 1 consisted of 221 sherds of pottery weighing 2699 grammes representing a maximum of 169 vessels. The data are summarised in **Tables 32 and 44**.

6.2.64 Contexts 1001, 1002, 1003, 1005 and 1011 contained small groups of sherds dating to the 18th and 19th centuries with earlier material notable by its absence. The range of types was considerable, given the small size of the individual context groups with Late Blackware, Creamware, transfer printed Pearlware and Late Blackware amongst the earlier component with transfer printed Whiteware, Sponged ware and Cane Coloured ware amongst the later tablewares. Utilitarian wares included Brown Glazed Coarseware and Stoneware, the later including part of a bottle from context 1003. The sherd of transfer printed Pearlware from context 1001 bore a design believed to be unique to the Ferrybridge Pottery (Tomlinson and Tomlinson 2014, 8–9) and which dates to the period between 1808 and 1818.

6.2.65 Context 1007 contained a small but diverse group of post-medieval to early modern sherds which included two sherds of Cistercian ware, a sherd of Surrey Whiteware and fragments from what may be a single Martincamp-type flask, although not all of the sherds joined. They closely resembled a sherd from context 1043 although again the absence of a join precluded a definite link between these contexts and trenches. Context 1043 also contained a sherd from a Martincamp-type flask which was accompanied by a sherd from a mid-19th to early-20th century stoneware jam or marmalade jar and a piece of Brown Glazed Coarseware.

6.2.66 Context 1040 contained just six sherds, all but one of which were of medieval date or early post-medieval date, the exception being a piece of 18th-century Late Blackware. Context 1042 contained a single sherd of Late Medieval Sandy ware, similar to the majority of sherds from context 1040.

6.2.67 Context 1006 contained the largest quantity of pottery from any single context within the trench, of which just two sherds of Unglazed Red Earthenware post-dated the 18th century. Of the remainder, the most readily datable types consisted of 18th century wares, including Late Blackware, Mottled ware, Slipware and Slip Coated ware alongside formal

tablewares of 18th to early 19th century date (Creamware, Pearlware, Edged ware). Smaller quantities of residual medieval and post-medieval pottery were also present including Blackware and Sheffield-type ware with a single small sherd of Tin Glazed Earthenware.

- 6.2.68 Contexts 1053, 1057 and 1076 produced much smaller groups of pottery, all entirely of medieval date and including Hallgate A ware, Sheffield type ware, Humberware and Coal Measures Fineware with a single sherd of North Nottinghamshire Quartz and Shell-tempered ware. The significance of the C14 dates obtained from contexts 1057 and 1076 have been discussed above.
- 6.2.69 Context 1048 contained a distinctive assemblage which, apart from a single small (7 gramme) sherd of Late Blackware was of entirely medieval date and included a sizeable group of Sheffield-type wares including the base of a baluster jug and up to seven other jugs. The group also contained a sherd of Brackenfield 1 ware and three sherds of Hallgate A ware with a small sherd of an unidentified splash-glazed sandy ware.
- 6.2.70 Unstratified pottery consisted of three sherds of Bone China, all from flatwares and then base of a mug in Sponged ware.
- 6.2.71 The majority of contexts which contained pottery were described as 'made ground' (1003, 1005, 1006, 1007, 1040, 1048, 1057 and 1076) while contexts 1001 and 1002 formed a surface and bedding layer. Context 1011 was the fill of a construction cut (1008) for a drain while 1053 was the fill of a pit. The question of 'made ground' and issues surrounding the process of making ground will be discussed further below as these are of importance to the site as a whole. In terms of Trench 1, it should be noted that of the contexts containing only medieval pottery (1053, 1057 and 1076), only one (1053) was the fill of a discrete feature, the other two representing medieval levelling associated with a series of courtyard surfaces of the castle.

#### Trench 2

- 6.2.72 Trench 2 contained an assemblage of just fifteen sherds weighing 209 grammes from three contexts (2001, 2019 and 2020). The data are summarised in **Tables 33 and 45**. Context 2001 was part of the surface layer while both 2019 and 2020 were described as 'made ground'.
- 6.2.73 The material from context 2001 was of 19th and 20th century date and included a sherd of unglazed Whiteware, possibly waste from pottery production (see also context 4037, below). Context 2019 contained just two poorly dated sherds neither of which pre-dated the 18th century (Brown Glazed Coarseware, Brown Salt Glazed Stoneware). In contrast, context 2020 produced a small group of primarily 18th century wares (Late Blackware, Creamware, transfer-printed Pearlware) but also one small sherd of mid- to late-19th-century Whiteware. The context was also notable for containing a sherd of Early Brown Glazed Coarseware, a type that was extremely common in assemblages from earlier excavations on the site but which was rare in the present assemblage, as discussed further below.

#### Trench 3

- 6.2.74 The pottery assemblage from Trench 3 consisted of eighty-three sherds weighing 797 grammes representing a maximum of seventy-four vessels. The data are summarised in **Tables 34 and 46**.



- 6.2.75 A clear bipartite split between two groups of contexts which contained very different assemblages was discernible in Trench 3. Contexts 3002, 3009 and 3015 contained mixed groups of 18th and 19th century pottery with just two sherds of medieval pottery (Hallgate A ware and Sheffield-type ware), both from context 3015. The fact that context 3015 was the fill of a drain associated with the market buildings would suggest that while the medieval pottery was residual it may have been derived from strata associated with the castle. Context 3015 also included a ceramic knurr ball, part of the popular game of knurr and spell or pub cricket, played widely in Yorkshire and neighbouring areas during the 18th and 19th centuries.
- 6.2.76 Contexts 3056, 3057, 3058 and 3079 contrasted sharply with those mentioned above in that they contained exclusively medieval pottery which included a high proportion of Hallgate A ware and, perhaps significantly, no later medieval wares. Although contexts 3056 and 3057 were associated with a medieval demolition phase and 3058 and 3079 with medieval deposits of a different nature, the principal difference between the two pairs of contexts was the more diverse range of material in 3056 and 3057. In particular, context 3056 did not contain any Hallgate A ware, while this type was predominant in contexts 3057, 3058 and 3079. It is possible, however, that the Reduced Sandy wares in context 3056 were also a Doncaster product (unattributed reduced wares are a feature of assemblages from Doncaster), but this is impossible to verify at the present time; in any case the characteristics of these sherds suggested that they were of a similar date to the Hallgate A wares. Context 3056 also included a sherd of North Nottinghamshire Quartz and Shell-tempered ware of 12th- to mid-13th-century date.
- 6.2.77 Unstratified pottery consisted of a very small fragment from the rim of an Edged ware plate.

#### Trench 4

- 6.2.78 Trench 4 contained a substantial assemblage consisting of 483 sherds weighing 7005 grammes representing a maximum of 411 vessels. The data are summarised in **Tables 45 and 47**. The majority of contexts were described in the context register as 'made ground', a very broad description that could be applied to many contexts on sites across Sheffield (as discussed in more detail below). Cross-context joins linked three otherwise unrelated contexts (4002, 4008 and 4037) via the rim and handle of a transfer printed Whiteware mug of late 19th to early 20th century date.
- 6.2.79 Individual sherds of intrinsic interest included a sherd of hand-made White Sandy ware (context 4107), a sherd of biscuit-fired refined earthenware (context 4037) and part of a mug in Banded Pearlware (context 4042).
- 6.2.80 The importance of the hand-made medieval sherds, although small in number has been discussed above. The sherd of biscuit-fired ware is typical of the waste from pottery manufacture that was often sold by the potteries as hard-core for the construction of roads and the foundations of buildings. The importance of the reuse of waste material, primarily domestic but also industrial, has been presented in a preliminary fashion elsewhere (Cumberpatch 2005) although, as will be discussed below, it does not seem to have been as significant on the castle site as it was elsewhere in Sheffield. The presence of this sherd would seem to indicate that, at some level, material was brought to the site although probably in small quantities.
- 6.2.81 The Banded Pearlware mug (context 4042) bore very distinctive decoration consisting of dark brown and red brown bands below the rim, a wide rouletted band on the body above a rilled band immediately above the base and diffuse green circles with an orange dot in

the centre of each on the body. Context 4042 also contained the profile of a medieval dripping tray in a hard gritty fabric (described above) alongside the base of a Humberware jug or jar but these were the only medieval sherds in an assemblage that otherwise consisted of 18th and 19th century wares.

- 6.2.82 Contexts 4001 and 4002 contained a small quantity of 18th century and later wares with one sherd of Early Brown Glazed Coarseware of probable 17th century date. Late 19th to 20th century wares were well represented, consistent with the position of the contexts in the upper part of the trench.
- 6.2.83 Context 4016, the primary fill of a cut associated with a metal stanchion associated with the modern market buildings, contained a small group of 18th- to early-19th-century wares, including Late Blackware and Creamware with a sherd of earlier Blackware. Given the apparent date of the context, all of these sherds are presumably residual in character.
- 6.2.84 The assemblage from context 4037 also contained a quantity of early modern wares (Creamware, Late Blackware, Slip Coated ware, Slipware and Brown Glazed Coarseware) but later material was also present, notably two sherds of transfer-printed Whiteware. The sherd of biscuit-fired ware has been noted above, as has the transfer-printed Whiteware mug which joined with sherds from contexts 4002 and 4008.
- 6.2.85 Contexts 4093, 4088 and 4116 all contained single sherds or vessels in the cases of 4093 and 4116 and a small mixed group in the case of 4088. The sherds from context 4116 joined to form the profile of a Creamware bowl while the sherd from 4093 was of mid- to late-19th-century date. The sherds from context 4088 were of mixed date, spanning the 18th and mid- to late-19th centuries.
- 6.2.86 Context 4010 contained a larger assemblage which consisted primarily of mid- to late-18th- and 19th-century wares with a single residual sherd of Hallgate B ware, of probable 12th-century date (as discussed above). The early modern wares were principally Creamware and Pearlware (including Edged ware) with just two sherds of Late Blackware. The 19th-century component consisted primarily of tablewares (Bone China, Whiteware and other refined earthenwares) and included parts of five teapots (Colour Glazed ware), a small concentration with parallels in Trench 5, described below.
- 6.2.87 Contexts 4007, 4042, 4036 and 4062 all contained mixed groups of 18th- and 19th-century wares with, in the case of 4042 and 4062, rare sherds of residual medieval pottery, including the piece of the dripping tray (context 4042) mentioned above (**Fig. 29, illustration 2**). The later wares included a range of domestic tableware and kitchenwares with several stoneware bottles (context 4042), all typical of assemblages from Sheffield. Context 4062 formed the primary fill of a construction cut associated with a machine base (context 4011). Given the make-up of the assemblage, it might be inferred that this had disturbed underlying medieval and early modern strata or that material from elsewhere on the site had been used to fill the construction cut.
- 6.2.88 The assemblages from contexts 4024, 4009 and 4008 broadly resembled those from the contexts described above. Medieval pottery formed a small residual component in contexts 4008 and 4024 (Humberware and Late Humberware) with a very small piece of Tin Glazed Earthenware from context 4024. The later wares included the normal range of tablewares and kitchen wares with occasional sherds from retail stonewares (bottles). The same may be said of the sherds from contexts 4052 and 4095 although both of these groups were very small in size.

- 6.2.89 Another mixed assemblage was recovered from context 4115. This included a wide range of wares with three medieval sherds, including a piece of Chalk-tempered Sandy ware, most probably from East Yorkshire, a sherd of Sheffield type ware and a small sherd of probable Hallgate A ware. Later pottery included Tin Glazed Earthenware and White Salt Glazed Stoneware alongside the familiar range of early modern formal and vernacular tablewares and a small number of later sherds (Sponged ware and Unglazed Red Earthenware).
- 6.2.90 Contexts 4039, 4040 and 4064 also contained mixed 18th- and 19th-century assemblages although in these cases the early modern wares were slightly more common than the recent types although whether this is chance is unclear; drawing reliable conclusions from such small groups of sherds in situations where residuality is a significant factor is always a difficult matter. In the case of contexts 4108 and 4117, which produced only sherds of early modern date, this was also an issue given that only three vessels were represented in the first case and four in the second.
- 6.2.91 The assemblage from context 4087 was unusual in that it contained only medieval pottery. Hallgate A, Hallgate B and Sheffield type ware were all present with one sherd of an unidentified Reduced Sandy ware. This context should perhaps be considered alongside contexts 4104, 4109 and 4111, described below. Medieval pottery was also present in contexts 4065 and 4107 (including Sheffield-type ware and hand-made White Sandy ware) but in each case it was associated with post-medieval, early modern and recent wares and as such was just one element in what are clearly significantly disturbed deposits. Contexts 4109 and 4111 both produced single sherds of medieval pottery, neither identifiable to known types.
- 6.2.92 Context 4034, a wall, produced just four small sherds (none of them weighing more than 8 grammes) of early modern and recent wares, with the latter of late 19th- or 20th-century date and presumably dating the structure.
- 6.2.93 As noted above, context 4104, like context 4087, produced a small medieval assemblage which included a jug handle in Sheffield type ware, a sherd of Buff Sandy ware and three sherds of Shell and Quartz-tempered ware. It is of interest to note that the latter, probably from a single vessel, appeared to originate in the Midlands rather than Lincolnshire, the more usual source of shell-tempered wares found in South Yorkshire.
- 6.2.94 Context 4106 produced a single small sherd of Creamware while context 4097, associated with the demolition of flue 4091, contained the base of a small Cistercian ware vessel, probably a cup or tyg. Context 4077, also associated with flue 4091, contained just three sherds of mid to late 19th century Whiteware, one of them bearing the Asiatic Pheasants design and two with salmon pink glazed external surfaces. Where found on other sites in Sheffield (see, for example, Cumberpatch 2014c) such sherds have been identified as parts of one pint jugs and are often associated with public houses.
- 6.2.95 Unstratified pottery consisted of a single sherd of Brown Salt Glazed Stoneware.

#### Trench 5

- 6.2.96 Trench 5 contained an assemblage consisting of 274 sherds of pottery weighing 2621.5 grams representing a maximum of 242 vessels. The data are summarised in **Tables 36 and 48**.
- 6.2.97 Contexts 5023, 5024 and 5025 were levelling layers associated with 19th-century steelworks structures. A cross-context join linked contexts 5034 and 5005 via parts of a

teapot of 19th or early 20th century date. (The pottery from 5034 may have been introduced from 5005 or elsewhere; see discussion below.) Teapots were particularly prominent in contexts U/S 5000, 5002 and 5034 and amongst the unstratified pottery (see also Trench 4, above).

- 6.2.98 Contexts 5005 and 5034 contained the greater part of the assemblage from Trench 5 as a whole and, as noted above, were linked by a cross-context join. While context 5005 was made ground associated with the bowling green, context 5034 constituted the primary fill of cut 5032 within which was a drain, 5033, associated with the Castle Market and therefore of a relatively recent date.
- 6.2.99 Context 5005 contained residual 18th and early 19th century wares which included single sherds of Blackware, Tin Glazed Earthenware, Creamware, Banded Creamware, Pearlware, Slipware and Slip Coated ware but both assemblages were dominated by later (mid- to late-19th or early-20th century) material including Bone China, Whiteware, Blue Banded ware and Colour Glazed ware. The Colour Glazed ware sherds included fragments of at least three and perhaps up to thirteen teapots, plus the example that connected the two contexts (see also context 5002). Cups, bowls, mugs or small jugs and pie dishes were prominent amongst the sherds that were identifiable to vessel form. The profile of the assemblage from context 5034 was broadly similar both in terms of the range of later ware types and of vessel forms although the residual early modern component was notable by its absence. Notable items included part of a decorative planter and a small porcelain spoon (**Fig. 29, illustration 6**) of unknown function.
- 6.2.100 The assemblage from context 5002 closely resembled those from context 5005 and 5034 although it was somewhat smaller in size. Tablewares, including teapots and kitchenwares, including pie dishes, were again prominent and the group also included a fragment from an ornamental vessel and part of a stoneware bottle. Context 5038 should also perhaps belong to this group of contexts; although two of the sherds were of 18th century date (Late Blackware and type), it also contained part of a teapot lid and a chip of Bone China from the rim of a cup.
- 6.2.101 Contexts 5009, 5023, 5024, 5025 and 5029 contained small, mixed, assemblages which included early modern and recent wares in varying proportions with a sherd of Late Humberware from context 5009. Nineteenth-century pottery was limited to a small sherd of Bone China from context 5024. Both vernacular and formal tablewares were represented but utilitarian wares were notable by their absence.
- 6.2.102 Contexts 5041 and 5045 both contained exclusively medieval pottery (specifically Hallgate A ware) but the quantity was small; just four sherds, only one of which weighed more than 10 grammes. While a similar general pattern of distribution was also seen in other trenches, Trench 5 was unusual because of the general absence of medieval pottery in other contexts, the exception being the sherd of Late Humberware from context 5009. While context 5045 was described as made ground, context 5041 formed the bedding layer for stone surfaces (5042, 5043 and 5044) belonging to the early castle and probably of early-13th century date or slightly earlier. This date is supported by the C14 date obtained for context 5041, discussed above.
- 6.2.103 Amongst the other notable features of the assemblage from Trench 5 was the scarcity of utilitarian wares with Brown Glazed Coarseware and related types entirely absent and stonewares limited to a bottle (context 5002) and a small number of jars and other vessels. Taken together, this evidence suggests that Trench 5 cut through contexts containing unusual and possibly highly specific, albeit relatively late, assemblages. The

high proportion of teapots and tablewares, together with the scarcity of utilitarian wares, may suggest that the material was derived from a cafe or restaurant. The late date of the Bone China and Whiteware sherds would suggest that this dated to the later 19th or early 20th century.

#### Trench 6

- 6.2.104 Trench 6 contained an assemblage consisting of 228 sherds weighing 4675.5 grammes representing a maximum of 218 vessels. The data are summarised in **Tables 37 and 49**.
- 6.2.105 Contexts 6007, 6006, 6013, 6014 and 6016 all formed part of the upper layers within the trench, immediately below the overburden and all constituted the primary fills of a series of features believed to be associated with the recent market buildings. The largest assemblage came from context 6006 with much smaller quantities from the other contexts. Despite being assigned to the same phase on the site matrix, there were significant differences in these context groups with the material from context 6006 appearing to be earlier in date than that from the remaining contexts. Despite its greater size, this assemblage did not contain any material later in date than the mid-19th century (Pearlware) and the majority was either earlier (Creamware, Late Blackware, Coarse Blackware, Slipware) or earlier/contemporary (Brown Salt Glazed Stoneware). The Brown Glazed Coarsewares were difficult to date with any accuracy but appeared to be of 18th- to 19th-century date rather than purely 19th century. In contrast, the pottery from context 6014 was of exclusively 19th-century types while the sherds from contexts 6007, 6013 and 6016 appeared to be of a similar date, with the caveat that the types involved (Brown Glazed Coarseware, Brown Salt Glazed Stoneware) are less chronologically diagnostic than, for example, Pearlware or Late Blackware. The largest sherd in this group, a piece of Stoneware from context 6013 was, however, of definite mid-19th- to early-20th-century date, considerably later than anything in context 6006.
- 6.2.106 Context 6011 (a synonym for 6006, a 20th-century drain fill) contained a mixed assemblage which included an unusual handle in a medieval Buff Sandy ware fabric alongside a wide range of later pottery including White Salt Glazed Stoneware, Creamware, Late Blackware and transfer printed Whiteware. Although the latter sherd was amongst the smallest in the group (and as such could be intrusive), its presence presumably indicates that the assemblage consisted largely of residual material. The fabric of the medieval handle was a fine pink buff to pale grey in colour and contained fine quartz and red grit up to 0.6 mm with very fine, sparse grains of muscovite visible at the surface. The handle was asymmetrical and had a deep groove along the thicker edge. In form it was not consistent with the profile of a jug handle and it may be from a urinal.
- 6.2.107 The pottery from contexts 6026, 6030 and 6033 (all 'made ground') was similar in terms of the date range and range of ware types to the assemblage from context 6006. Despite the activity resulting in the formation of these contexts being described as of 20th century date, very little of the pottery was as late as this with just one sherd of Colour Glazed ware and one sherd of Brown Salt Glazed Stoneware being of general 19th century type and one small sherd from a stoneware bottle or flagon being of 19th or early 20th century date. All of these later wares were from context 6030. The remainder of the combined assemblage consisted of a variety of types from Cistercian ware to Creamware and Pearlware with a notable group of 17th century Blackwares from context 6026. Context 6026 was also remarkable for the sherd of Westerwald stoneware, one of the few European imports from the site as a whole.
- 6.2.108 Context 6039 produced six sherds of medieval date, five of them in white sandy fabrics of which three were hand-made and two wheel-thrown. Context 6050, the primary fill of a pit

(context 6057), contained a single sherd of Reduced Sandy ware of undetermined (but medieval) date. Both this sherd and a similar sherd from context 6039 were much finer in texture than either the Sheffield-type wares or the Coal Measures Whiteware types and although the inclusions were sparser and finer, they were of the same general type with the quartz and black grit suggesting a similar source and perhaps indicating something of the complexity of the overall situation regarding the production and distribution of medieval pottery in the Sheffield area.

6.2.109 The single sherd from context 6041, the rim of a Mottled ware jar, was of 18th century date.

#### Trench 9

6.2.110 Trench 9 contained a small assemblage of seven sherds weighing 94 grammes representing a maximum of five vessels. All of the pottery came from a single context, 9011, the tertiary fill of context 9007, the castle moat. All of the pottery was of medieval date, as set out in **Table 33**. Sheffield-type ware was the commonest type (three out of the five sherds) with one sherd of Coal Measures Whiteware type and one small sherd in an unidentified Reduced Sandy ware. This would seem, superficially at least, to suggest that this part of the moat contained a fill dating to the 14th or early 15th century but given the small size of the assemblage and the abundant evidence for residuality on the site generally, a more cautious approach to the interpretation of the evidence might be appropriate.

#### Trench 10

6.2.111 Trench 10 contained an assemblage of sixty-five sherds weighing 362 grammes representing a maximum of sixty-four vessels. The data are summarised in **Tables 39 and 50**.

6.2.112 Context 10004 contained a small group of pottery consisting principally of sherds of early modern Creamware but with part of a jar base in Bone China which was of later-19th- or early-20th-century date.

6.2.113 The assemblage from context 10025 was similar to that from context 10004 although it was larger and more diverse in character. Creamwares were again common and were accompanied by sherds of Late Blackware, Slipware and Pearlware but the latest sherds were of mid- to late-19th century Whiteware and some of the stonewares and Brown Glazed Coarsewares may be of a similar date range.

6.2.114 The assemblage from context 10017, the primary fill of a cut (10028) for a wall (10007) consisted mainly of post-medieval and early modern wares (Cistercian ware, Type 1 Slipware, Creamware, Late Blackware) but with a single very small (1 gramme) sherd of Slip Banded Cane Coloured (CC) ware. The pottery from context 10041, although from a 'made ground' context was of exclusively early modern date (Late Blackware, Creamware and 18th century Brown Glazed Coarseware) and in this respect resembled the group from context 10017.

6.2.115 Context 10066 contained three sherds, two of Blackware and Blackware type and one of later medieval to early post-medieval Coal Measures Purple ware. It is possible to regard this small group as relating to the post-civil war demolition of the castle but some caution has to be exercised, given its small size and probably mixed nature. Context 10067 contained just one sherd, a small piece of Coal Measures ware of 14th-century date.

6.2.116 Context 10071 formed part of the bank of the moat. It contained just two sherds, one of Humberware and one of Sheffield-type ware, suggesting a later medieval date for the context.

#### Trench 11

6.2.117 Trench 11 contained a small assemblage consisting of twenty-nine sherds weighing 244 grammes representing a maximum of twenty-eight vessels. The data are summarised in **Tables 40 and 51**.

6.2.118 Contexts 11002 and 11018, both described as 'made ground', contained assemblages which were of later 19th and 20th century date and included various types typical of the period. Kitchen and tablewares were accompanied by two sherds of stoneware from a bottle and a flagon. Two unstratified sherds of Bone China should probably be considered as part of this group.

6.2.119 Context 11003 contained a very small (1 gramme) sherd of transfer printed Pearlware which given the stratigraphic position and the 'made ground' character of the context, may be residual in nature.

6.2.120 Contexts 11020 and 11024, both 'bedding' contexts produced just three sherds of varying date. The sherd from 11020 was the rim of a Creamware plate while context 11024 contained one earlier sherd (Blackware type) and one later sherd (Sponged ware).

6.2.121 Context 11022, a context of uncertain type, contained a mixed group of sherds which included post-medieval wares (Cistercian type, Blackware, Midlands Purple type ware, Yellow ware, Redware) with one sherd of early modern Brown Glazed Coarseware. It contrasted strongly in character with the remainder of the assemblages from the trench.

#### Unstratified pottery

6.2.122 Unstratified pottery attributed to specific trenches has been included in the descriptions above but that without any such designation is listed in **Table 36**. Early modern and recent pottery formed the largest element of this group with much smaller medieval and post-medieval elements.

#### The pottery from the 2018 excavations compared to the pottery assemblages from earlier investigations

6.2.123 In 2016 the author was commissioned by Sheffield University to undertake the analysis and reporting of the pottery recovered during earlier phases of excavation on the site of the castle, currently held by Museums Sheffield. This was completed in 2017 with the production of an archive report (Cumberpatch 2017) which was intended to form part of a wider reassessment of the archives from the castle site. This had led to partial publication (Moreland *et al.* in press). The author is not aware that the project as a whole has resulted in a comprehensive report so references in this section will refer solely to the archive report on the pottery. The majority of the material came from LH Butcher's investigations, only a small part of the material recovered by AL Armstrong having survived.

6.2.124 **Table 37** summarises the data from the 2018 excavations as a list of the wares subdivided by broad chronological period. **Table 38** summarises the data from the Butcher assemblages in a comparable fashion (based upon the data given in Cumberpatch 2017: Table 2, with some modifications). While various interpretations of this data may be possible, for the purposes of this discussion the following aspects are of the most relevance.

- 6.2.125 The range of medieval and late medieval wares represented in the 2018 assemblages were broadly similar to those seen in the Butcher assemblages although a wider range of types was identified in the latter and some wares (including Hallgate B and hand-made White Sandy ware) were present in the 2018 assemblages but not in the Butcher assemblages. Conversely, the Butcher assemblages contained a larger number of unidentified wares as well as types not present in the 2018 assemblages, notably Stamford-type ware.
- 6.2.126 Hallgate A ware, Sheffield-type ware and the various Coal Measures wares formed small but significant components of both assemblages. Regionally important types including Humberware and Brackenfield 1 ware were also present in small quantities in both sets of assemblages. Shell-tempered and Quartz and Shell-tempered wares were present in the Butcher and 2018 assemblages respectively.
- 6.2.127 Medieval and late medieval wares formed a higher proportion of the Butcher assemblages than of the 2018 assemblages; 28.5% as opposed to 10.1%.
- 6.2.128 Post-medieval wares, notably 17th century wares including Blackware and Early Brown Glazed Coarseware, were a great deal commoner in the Butcher assemblages than in the 2018 assemblages; this was not a matter of a few percentage points as such wares formed over 65% of the material recovered by Butcher while they represented just over 3.8% of the material recovered in 2018. This would seem to suggest that the areas of the site investigated by Butcher were amongst those pertaining to deposits relating to the Civil War and its aftermath, including the demolition of the castle. A direct comparison might be Pontefract Castle where similar large assemblages of mid-17th-century pottery were associated with demolition deposits. In contrast, the 2018 excavations, while they may have reached some medieval deposits, do not seem to have reached substantial deposits related to the 17th century history of the castle.
- 6.2.129 Early modern and recent wares formed a much larger proportion of the 2018 material than they did of the Butcher assemblages. Again, these were significant figures; early modern pottery formed just 5.8% of the Butcher material with recent material at just 0.45%. In contrast the figures for the 2018 assemblages were 48% and 37% respectively. It is probable that this discrepancy is, in part at least, the result of changing standards in the recovery and retention of pottery and other artefacts. In 1958 post-medieval archaeology barely existed as a category while today it forms a very significant part of the discipline of archaeology with its own journals, university courses and specialists while excavations, not least in Sheffield, routinely investigate sites of 18th- and 19th-century date as thoroughly as they do earlier sites. More specifically, the 2018 excavations investigated the early modern and recent phases of the site in greater detail and it may be that the size of the trenches as well as their location meant that demolition contexts were not encountered during the excavation.
- 6.2.130 It may be that the combination of the work undertaken as part of the archive project, particularly the mapping of Butcher's trenches, with the results of the 2018 investigations will yield information pertaining to the historic topography of the site and the changes over time which will have had impacts on the survival of medieval and post-medieval strata across the site. This information was not available at the time of writing this pottery report, but is addressed primarily in Moreland *et al.* in press and also to some extent in the discussion below.
- 6.2.131 Two small-scale investigations carried out in 1999 and 2001 also resulted in the recovery of pottery assemblages (Cumberpatch 1999 and 2002b). The first of these involved the



excavation of part of the moat and produced a mixed assemblage of pottery which include the foot of a Low Countries Redware tripod cooking pot (grape) alongside a range of local and regional medieval wares, notably splash glazed gritty ware and Coal Measures wares. The medieval pottery appeared to be largely residual but in some cases was associated with 16th- and 17th-century wares, suggesting that at least some of the contexts investigated may have related to the demolition of the castle.

- 6.2.132 The assemblage from the 2001 excavations was smaller than that from 1999 and included a range of material familiar from the 1999 and 2018 projects. Hallgate and Coal Measures wares were present as were sherds of Buff Sandy ware and Gritty ware, both of probable 12th-century date.

### *Discussion*

#### The medieval castle

- 6.2.133 The medieval assemblages from both the 1958 and 2018 investigations contained relatively small but significant quantities of medieval pottery and it is probable that, within Sheffield, only Sheffield Manor is likely to exceed the castle site in terms of the quantity of medieval pottery recovered (Cumberpatch 2014c, Appendix 2). While the quantities cannot be compared with, for example, assemblages from Doncaster, Lincoln or York, it is possible to draw some general conclusions from the extant material.
- 6.2.134 While local wares (Sheffield-type ware) formed a very significant part of the assemblages (see **Table 38**), regional wares, specifically Hallgate A and B, Coal Measures Whiteware and Humberware were also of significance. A parallel can be drawn between the cases of Conisbrough and Sheffield Castles (and most probably Doncaster Castle as well) in this respect with both drawing on the same potteries for their everyday requirements, implying a considerable volume of production and a well organised system of distribution. Although no figures survive to indicate the actual volume of pottery supplied to these castles, the evidence from Pontefract demonstrates that castles were significant consumers of pottery and no doubt played an important part in the economy of the pottery industry.
- 6.2.135 The presence of other regional wares (Brackenfield 1 ware, Quartz and Shell Tempered wares and probably the Chalk-tempered and white-slipped wares) is perhaps indicative of more casual connections with more distant potteries, perhaps incidental to other connections, social and political in nature. It should also be noted however, that the Brackenfield potteries seem to have been major suppliers of pots to Peveril Castle, despite the transport difficulties and it may be that the relatively small quantity of Brackenfield wares is a matter of chance rather than an accurate reflection of the importance of this source. Smaller quantities of wares from more distant sources (including the Surrey Whiteware sherd) perhaps reflect more the social and political connections of the inhabitants than more purely economic connections.
- 6.2.136 More generally, the results of the C14 dating of plant remains from the site have substantiated questions recently raised by the author regarding the reliability of the established dating framework for the earlier medieval period (11th to 14th century). There is clearly a need for many more C14 dates from sites of medieval date while the issue supports the case for the long-term retention of artefactual assemblages either in established museums or in dedicated regional archive depositories.

#### The post-medieval period and the Civil War

- 6.2.137 The post-medieval period spans a major period of change in society at the political as well as the social level. As argued elsewhere (Cumberpatch 2003), the appearance of

Cistercian ware and other distinctively post-medieval types in the mid-15th century pre-dates the end of the medieval period as conventionally defined (between 1485 and 1530, depending on the perspective of the writer), and would seem to suggest that some form of radical social change, as reflected in material culture, was already under way by the time that the changes in economic and political structures (notably the inception of the Tudor state, ecclesiastical reform and its economic corollaries) were enacted. Changes in colour, style and function of pottery are marked and particularly so in the character of pottery assemblages from castles. As noted above, these were not particularly visible in the assemblages recovered from the 2018 investigations although the evidence from the Butcher assemblages indicates that this was matter of chance and the location of the trenches rather than of any peculiarity related to the history of the castle itself.

#### The castle site in the early modern and recent periods

- 6.2.138 The range of wares and types described in this report was broadly similar to that from other sites in Sheffield, allowing for the inevitable variations between contexts and sites. Vernacular and formal tablewares were both present, supporting the author's contention (Cumberpatch 2014a) that the local, small-scale pottery industry was able to complement the rise of factory scale production by supplying pottery of a traditional type which was probably used in less formal and less public situations than were the formal tablewares. The representation of these latter types suggests that households in the city were well able to afford fashionable tablewares, most probably produced in pottery factories in the Don Valley and in other parts of South and West Yorkshire, despite contemporary and later characterisations of the city as poverty-stricken and lacking in sophistication.
- 6.2.139 The most striking aspect of the majority of assemblages from Sheffield is the extent of residuality evident on the majority of sites. Preliminary documentary research has suggested that this was the result of the deliberate reuse of domestic refuse in the preparation of sites for building work (Cumberpatch 2005) with the result that pottery assemblages often include substantial amounts of material which owes little to activity on the sites themselves but rather relates to a process of large scale redistribution and redeposition of material drawn from across the city. Such assemblages are generally composed of early modern and recent pottery with very little medieval or post-medieval material. In view of this, the possibility exists that the assemblages from the strata overlying the castle foundations and moat could be the result of similar formation processes. Fortunately the characteristic absence of medieval pottery from the majority of sites in Sheffield (Cumberpatch 2014c, Appendix 2) offers a contrast with many of the trench assemblages described above which not only contained significant quantities of medieval pottery but included ware types identified in the Butcher and Armstrong assemblages discussed in the previous section. This would seem to imply that there was less dumping on the site than on many others and that the assemblages do in fact relate to the history of the castle and its site rather than to the activities of the later 18th- and 19th-century builders who were responsible for the creation of the modern city. This conclusion may be supported by the internal consistency of assemblages from, for example, Trench 5, where the distinctive profile of the assemblage seems to indicate its derivation from a specific type of activity. This is not to say that there was no dumping on the site but rather that, in some cases at least, we are dealing with more conventional formation processes. Unfortunately, it is more difficult to be certain about the exact scale and impact of any small-scale dumping events, related perhaps to the construction of specific buildings on the site. In this, the site of the castle may be similar to that of sites around Sheffield Cathedral where there also seems to have been only limited dumping and the strata also seem to be more conventional in character. It is possible that the more detailed, comparative, analysis of the structure and composition of pottery assemblages might allow the definition of specific deposition horizons relating to episodes of dumping

and the exploitation of the waste depots around the city. At present, however, it can be concluded that the site of the castle has seen far less dumping than have other sites in Sheffield and that the bulk of the pottery from the site does in fact relate primarily to activities on the site over its long history. It is to be hoped that future, larger scale investigations will result in data that will link the results of Butcher's investigations with those which yielded the data discussed in this report.

### 6.3 Animal bone

#### *Introduction*

- 6.3.1 Excavations at Sheffield Castle yielded a small assemblage of highly fragmented faunal remains consisting of 1074 fragments (7.9 kg). A total of 176 specimens were recorded, and an additional 59 fragments of interest were recorded as 'non-countable' across Trenches 1–11 (see **Table 2**). A variety of species were identified across the stratigraphic phases at the Sheffield Castle site. The assemblage was primarily associated with post-medieval and early modern deposits; however, a small number of specimens were attributed to the medieval occupation of the site.

#### *Material and methods*

- 6.3.2 The assemblage was analysed and the data entered in a Microsoft Access database. Fields for the database included, but were not limited to trench, context, preservation, element, side, taxon, taphonomic modifications (ie butchery and/or gnawing), ageing, as well as biometric fields. This was concurrent with the recording protocol established at the outset of analysis and was adapted from existing standards (Albarella 2009; Albarella and Davis 1994; Davis 1992). A selective 'diagnostic zone approach' to recording was used. A predetermined list of specific anatomical zones were recorded. When 50% or more of that area was preserved the specimen was fully recorded (eg Watson 1979; Serjeantson 1991; Davis 1992). Specimens that were regarded of interest but did not belong to a 'diagnostic zone' were recorded as 'non-countable', and these were not used in quantifications. The bulk of these specimens of interest were fragments with evidence of anthropogenic modification such as bone-working off-cuts. Established criteria for the diagnostic zone approach can be seen in **Appendix 5**.

#### *Results*

- 6.3.3 The bone surface of the assemblage was generally not well preserved and specimens themselves were highly fragmented. Teeth of domesticates were better represented than post-cranial bones, but a high proportion of teeth were isolated. Assessment of age for the animals, therefore, was largely limited to post-cranial fusion, as only three jaws had more than two teeth present and could therefore be attributed to mandibular wear stages. Trenches 6 (NISP = 48), 10 (NISP = 35), 4 (NISP = 24), and 1 (NISP = 18) yielded the greatest number of animal bones and therefore form the bulk of the interpretation for the assemblage.

#### *Taxonomic diversity*

- 6.3.4 The assemblage was dominated by domestic species (**Table 2**) with cattle, pig, sheep/goat and horse being the most frequently represented animals on the site, respectively. Most of these domestic specimens were recovered from post-medieval made ground deposits, but the presence of residual medieval pottery suggests the potential for some of these specimens to also be residual from earlier phases.
- 6.3.5 Trenches that warranted more in-depth analyses had >10 specimens present, or specimens from securely medieval deposits, or species of interest present. The following trenches, while included in total NISP, had too few remains to comment further:



- 6.3.6 Trench 2 (NISP = 2) produced only two recorded remains. Little can be discerned from this. Additionally, the presence of residual medieval pottery means that the possibility of the animal bone remains also being residual should not be excluded.
- 6.3.7 Trench 8 (NISP = 8) had low abundance (no more than 1 specimen per context) of the three main domesticates. Cat and dog/fox were present (no more than 1 specimen per context), as was black rat (2 specimens) and one domestic goose (coracoid), all of which came from modern made ground deposits.
- 6.3.8 Trench 9 (NISP = 1) yielded only one cattle bone (first phalanx).
- 6.3.9 Trench 10 (NISP= 10) and 11 (NISP = 10) contained a small number of remains, 60% of which were from black rat.

**Table 2** Animal bone recorded by trench

Species	Tr 1	Tr 2	Tr 3	Tr 4	Tr 5	Tr 6	Tr 9	Tr 10	Tr 11	U/S	TOTAL
<i>Bos taurus</i> (cattle)	24			4	3	15	1	22		2	71
cf. <i>Bos/Cervus</i> (cattle/red deer)						1					1
cf. <i>Bos/Equus</i> (cattle/horse)						1					1
<i>Ovis aries</i> (sheep)				1		2					3
cf. <i>Ovis/Capra</i> (sheep/goat)	1			1	2	5		2	2	1	14
<i>Equus caballus</i> (horse)				4				8	2		14
<i>Sus domesticus</i> (pig)	7			9	1	7					24
<i>Cervus elaphus</i> (red deer)				1							1
<i>Dama dama</i> (fallow deer)	2	2		2						1	7
cf. <i>Cervus/Dama</i> (red/fallow)						3		1			4
<i>Canis familiaris</i> (dog)			1								1
cf. <i>Canis/Vulpes</i> (dog/fox)	1				1			1			3
<i>Felis cf. catus</i> (cat)					1						1
<i>Lepus europaeus</i> (hare)						2					2
<i>Oryctolagus cuniculus</i> (rabbit)				2	2	1					5
<i>Rattus cf. rattus</i> (cf. black rat)						2		1	6		9
<i>Anser anser</i> (domestic goose)					1						1
<i>Anser cf. anser</i>						1					1
cf. <i>Gallus/Numida</i> (chicken/guinea fowl)						1					1
cf. <i>Gallus/Numida/Phasianus</i> (chicken/guinea fowl/pheasant)						9					9
<i>Scolopax rusticola</i> (woodcock)			1								1
Gadidae			1								1
<i>Gadus morhua</i> (cod)	1										1
<b>TOTAL</b>	<b>37</b>	<b>3</b>	<b>3</b>	<b>55</b>	<b>23</b>	<b>62</b>	<b>1</b>	<b>35</b>	<b>11</b>	<b>5</b>	<b>176</b>

U/S= unstratified

#### Trench 1

- 6.3.10 Four animal remains were recovered from deposits with residual medieval pottery and notably two of these were fallow deer (1040). One red/fallow deer calcaneum also from 1040 could not be definitely identified but was size compliant with the other fallow deer remains from the deposit. Although 1040 is stratigraphically post-medieval, it is possible the animal remains are residual medieval material. If this is the case, this would be suggestive of activity related to the function and status of the medieval occupation of the castle. Two pig remains were recovered from secure medieval deposits (1042; 1048). The main domesticates were represented in low frequencies from layers associated with the construction of a bowling green in the 18th century (1002–1006), with cattle post-crania being the most abundant. Additionally, cod species (*Gadidae*, and *Gadus morhua*) were

present in these contexts, suggesting access to marine fish in the urban setting (perhaps as dried stockfish).

**Table 3** Animal bone from Trench 1

Species	1002	1003	1004	1006	1040	1042	1048	TOTAL
<i>Bos taurus</i> (cattle)	1		2	5				8
cf. <i>Ovis/Capra</i> (sheep/goat)			1					1
<i>Sus domesticus</i> (pig)				1		1	1	3
cf. <i>Canis/Vulpes</i> (dog/fox)			1					1
cf. <i>Cervus/Dama</i> (red/fallow)	1				1			1
<i>Dama dama</i> (fallow deer)					2			2
Gadidae	1							1
<i>Gadus morhua</i> (cod)		1						1
<b>TOTAL</b>	<b>2</b>	<b>1</b>	<b>4</b>	<b>6</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>19</b>

### Trench 3

- 6.3.11 Three specimens were recorded and identified from Trench 3, all from medieval deposit 3057 (**Table 4**); the diaphysis of a cattle/horse humerus, one dog humerus, and notably the ulna of a woodcock. While the presence of the former two remains cannot provide much information regarding the medieval occupation of the site, beyond the presence of large mammals and dogs, the presence of the Eurasian woodcock (a wading woodland bird) is indicative of status-related activity in the medieval castle.

**Table 4** Animal bone from Trench 3

Species	3057	TOTAL
cf. <i>Bos/Equus</i> (cattle/horse)	1	1
<i>Canis familiaris</i> (dog)	1	1
<i>Scolopax rusticola</i> (woodcock)	1	1
<b>TOTAL</b>	<b>3</b>	<b>3</b>

### Trench 4

**Table 5** Animal bone from Trench 4

Species	4007	4009	4040	4042	4065	4086	4087	4104	4107	4111	TOTAL
<i>Bos taurus</i> (cattle)			1	1	1	1					4
<i>Ovis aries</i> (sheep)							1				1
cf. <i>Ovis/Capra</i> (sheep/goat)							1				1
<i>Sus domesticus</i> (pig)	2						5	1			8
<i>Equus caballus</i> (horse)	1		1				1	1	1		5
<i>Cervus elaphus</i> (red deer)	1										1
<i>Dama dama</i> (fallow deer)										2	2
<i>Oryctolagus cuniculus</i> (rabbit)		1		1							2
<b>TOTAL</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>8</b>			<b>2</b>	<b>12</b>

- 6.3.12 Recovery of animal remains from Trench 4 deposits were slightly more substantial, though most were 'non-countable' fragments from 18th/19th century bone working off-cuts (see below). Of the identified specimens, the three main domesticates were all represented by a handful of recorded remains (**Table 5**). The sheep/goat came from 18th century deposits. One red deer metatarsal (4007) and two fallow deer, one radius and one metatarsal (4111) were also recovered. Context 4111 contained residual medieval pottery

which could indicate that the fallow deer remains were also residual from the medieval phases. The same can be said for the pig mandible from 4087. Notably, this jaw was from an elderly pig which is less common amongst domestic pigs, as they reach their ideal meat weight as sub-adults. The rabbits present could be representative of consumption, but as rabbits are burrowing animals it is also possible that the specimens (4009; 4042) were intrusive.

### Trench 6

- 6.3.13 The specimens recovered from Trench 6 (NISP = 31; **Table 6**), were from 20th-century drain fills and demolition layers. The taxonomic diversity of animal remains in these contexts is indicative of the urban setting of post-medieval Sheffield. The three main domesticates were present throughout (with post-crania and teeth), as were chicken/grouse/pheasant, which in this period were most likely chicken, and one goose carpometacarpus. Notably, three red/fallow deer bones were recovered from modern contexts. Although no residual medieval pottery present was present in these contexts, the origin of the bones in the medieval period cannot be excluded. Alternatively, these remains could indicate a market for venison in urban post-medieval Sheffield.

**Table 6** Animal bone from Trench 6

Species	6011	6013	6014	6016	6026 = 6030	TOTAL	
<i>Bos taurus</i> (cattle)		4	7		4	15	
<i>Ovis aries</i> (sheep)					2	1	3
cf. <i>Ovis/Capra</i> (sheep/goat)			1		3		5
<i>Sus domesticus</i> (pig)	1	1	3		2		7
cf. <i>Cervus/Dama</i> (red/fallow)			2		1		3
cf. <i>Gallus/Numida/Phasianus</i> (chicken/guinea fowl/pheasant)	1				4	4	9
cf. <i>Gallus/Numida</i> (chicken/guinea fowl)					1		1
<i>Oryctolagus cuniculus</i> (rabbit)					1		1
<i>Rattus</i> cf. <i>rattus</i> (black rat)				1		1	2
<i>Anser</i> cf. <i>anser</i>					1		1
<i>Lepus europaeus</i> (hare)						2	2
<b>TOTAL</b>	<b>2</b>	<b>5</b>	<b>13</b>	<b>1</b>	<b>19</b>	<b>8</b>	<b>31</b>

### Trench 10

**Table 7** Animal bone from Trench 10

Species	10000	10017	10025	10071	TOTAL
<i>Bos taurus</i> (cattle)		5	17		22
cf. <i>Ovis/Capra</i> (sheep/goat)			2		2
<i>Equus caballus</i> (horse)				8	8
cf. <i>Canis/Vulpes</i> (dog/fox)				1	1
<i>Rattus</i> cf. <i>rattus</i> (black rat)	1				1
<b>TOTAL</b>	<b>1</b>	<b>5</b>	<b>19</b>	<b>9</b>	<b>34</b>

- 6.3.14 Trench 10 yielded very few post-cranial remains (**Table 7**) but a more substantial number of teeth (NISP = 28), though all of them were loose. The majority of remains, including 17 cattle teeth and two sheep/goat remains (second phalanx and proximal radius) came from 10025, associated with demolition of the 19th-century slaughterhouses. One dog/fox tibia was recovered from 13th–15th century moat bank deposit (10071). While the tibia was size compliant with a fox, it was more morphologically akin to a dog. Six horse teeth (5

incisors, 1 canine), one vestigial metapodial and one humerus were also recovered from 10071. Such scant remains hinder any interpretation beyond that horses were present during the medieval occupation, as were dogs.

### Age

6.3.15 Analysis of age was restricted to post-cranial fusion. The small sample size (NISP = 25) was too small to provide detailed information regarding animal management. The distribution of post-cranial fusion indicates that immature, subadult, and adult domesticates were available to inhabitants throughout the occupation of the site. Fused remains were more abundant although the small sample size does not allow for any trends in exploitation to be identified. The distribution of post-cranial fusion information may be more a result of preservation or recovery bias than management or dietary preferences.

**Table 8** General fusion data according to species

Species	Proximal				Distal				TOTAL
	Fused	Fusing	Fused/Fusing	Unfused	Fused	Fusing	Fused/Fusing	Unfused	
<i>Bos taurus</i> (cattle)	2		2	1	4		2	1	12
<i>Ovis aries</i> (sheep)					1				1
cf. <i>Ovis</i> / <i>Capra</i> (sheep/ goat)	3	2			1	1			7
<i>Equus caballus</i> (horse)	1						1		2
<i>Sus domesticus</i> (pig)	1				1			1	3
<b>TOTAL</b>	<b>7</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>7</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>25</b>

### Taphonomic modification

**Table 9** Worked bone fragments by trench

Modification	Trench 1	Trench 2	Trench 4	Trench 5	Trench 6	Trench 11	TOTAL
Cut	1				1		2
Chop			8	2		1	11
Cut + Chop				1			1
Sawn					3		3
Working Debris			14	4	1		19
Object		1	5	1			7
<b>TOTAL</b>	<b>1</b>	<b>1</b>	<b>27</b>	<b>8</b>	<b>5</b>	<b>1</b>	<b>43</b>

6.3.16 A proportion of bone in post-medieval and early modern contexts was not identifiable to species and recorded as 'non-countable' (NISP = 59). Of these, 23 were recorded as they were specimens of interest with evidence of anthropogenic modification such as cutting, chopping, and sawing (**Table 9**). The largest group of non-countable fragments were bone working debris, the majority of which came from trench 4. Working debris fragments ranged from approximately 0.02 m to 0.10 m and were identifiable by regular striations

associated with fine and broader bladed saws and were invariably rectangular in shape. Additionally, included in these 'non-countable' specimens were worked antler (6026), and incomplete and broken implements (2007, 4024, 4036, 4040, 4108). These fragments are strongly associated with the post-medieval cutlery industry in Sheffield.

- 6.3.17 The remaining 16 fragments were recorded due to evidence of other taphonomic processes (burning and gnawing).

#### *Discussion*

##### Medieval

- 6.3.18 The number of faunal remains from securely medieval deposits were very few, limiting interpretation. However, the presence of some species provides some insight into the medieval occupation of the excavated area. The single woodcock bone recovered from 3057 is particularly notable as the species features strongly in assemblages from medieval central England and to a slightly lesser extent in the north (Albarella and Thomas 2002). Wild bird remains are more common on sites of high status (mainly castles) than in towns or rural sites as evidenced from medieval excavations throughout England (Thomas 2007; Albarella and Thomas 2002; Albarella and Davis 1996). Although wild birds did not represent a food staple or major economy in medieval England, their relative rarity has the potential of highlighting differences in food consumption (Serjeantson 2006; Albarella and Thomas 2002). Historical sources suggest that woodcocks were often hunted and consumed amongst the aristocracy (Cosman 1976). The presence of a woodcock bone indicates that higher status occupants of the castle were likely engaging in the hunting and/or consumption of wild birds.
- 6.3.19 An important aspect of the post-medieval and early modern components of the assemblage is the presence of Cervidae post-crania in 18th/19th century and 20th century deposits. Though the deer remains were predominantly recovered from post-medieval deposits, residual medieval pottery suggests that the origin of these remains may have also been earlier than their stratigraphic position implies. A medieval origin for the deer remains is supported by general trends in deer exploitation in England. By the 13th century, seventy royal forests existed, and higher-ranking members of the nobility had access to private forests. Otherwise, aristocrats used deer parks, and medium-small parks were predominantly stocked with fallow deer (Birrell 2006). An area of deer park extended over the modern Park Hill and Manor districts of Sheffield and reached as far as the east bank of the River Sheaf adjacent to the castle site. Like wild birds, hunted deer are characteristic of high-status sites in medieval England (Grant 1984) whereas by the post-medieval period, the role of deer (specifically fallow deer) had changed (Sykes *et al.* 2016). There is a separation between the content of faunal remains from medieval castle and urban sites with very few deer bones in the latter (Thomas 2007). The presence of fallow deer likely represents a potential social currency, especially in the high-medieval period (Sykes *et al.* 2016; Thomas 2007).
- 6.3.20 The possibility that the fallow deer remains were genuinely of post-medieval origin cannot be ruled out. Fallow deer can be found in post-medieval assemblages throughout England (Sykes *et al.* 2013).

##### Post-Medieval

- 6.3.21 The taxonomic diversity of animal remains in these contexts is indicative of the urban setting of post-medieval Sheffield. The three main domesticates were present throughout (evidenced both by post-cranial remains and teeth), as were chicken/guinea fowl/pheasant, which in this period were most likely chicken, and one domestic goose



carpometacarpus. Additionally, the presence of rat further supports urbanization. As discussed above, red/fallow deer bones were also recovered from post-medieval contexts. As the material came predominantly from made ground, remains cannot be related to specific events. The material may have been imported from depots (see Cumberpatch 2005). However, the species present provide a general picture of life in post-medieval industrialized Sheffield. The occupants of the settlement were primarily consuming cattle, sheep/goat and pig meat, though chicken, goose, cod and possibly rabbit may also have been eaten.

- 6.3.22 Worked bone was present on site and included cutlery handles, as well as off-cuts. Bone and antler were commonly used materials for cutlery handles in the 18th and 19th centuries (Unwin 2002) and working of this material occurred on a significant scale in Sheffield at the time, primarily to supply the cutlery industry (Beauchamp 2002; 1996). As opposed to inconsistencies in worked fragments observed in supply workshops in surrounding hamlets, associated with small scale production (Albarella and Trentacoste 2010), the fragments recovered from the castle site were highly regular suggesting systematic production.

#### *Conclusions*

- 6.3.23 The very small sample size limits the analysis of animal exploitation throughout the occupation of the site. Additionally, taphonomic and methodological limitations (this was a trial trench evaluation) have inhibited phasing of the assemblage, limiting the conclusions that can be drawn about medieval and post-medieval occupation of the site and management strategies. However, some evidence for high-status hunting was present in the form of a single woodcock bone and possibly residual deer bones. It appears that chicken/guinea fowl/pheasant was also exploited during this period. By the post-medieval period, goose and cod appear to have been accessible to industrial occupants of the city but mammalian domesticates remain the most common species. Overall, the assemblage is consistent with established interpretations of the development of the site over time from the medieval castle occupation to the subsequent growth and development of post-medieval, industrial Sheffield. It is also consistent with broader regional trends observed in England.

## **6.4 Ceramic Building Material**

- 6.4.1 The assemblage of ceramic building material (CBM) comprises 127 fragments and is almost entirely of post-medieval/modern date, with a very small medieval component. It includes roof tile (2), floor tile (12 + 12), wall tile (3), brick, sewer pipe (25), flue tile and possible chimney lining (34), electrical insulators (2) and sanitary ware (3).

#### *Medieval*

- 6.4.2 Three fragments are medieval. Two are certainly floor tile; the third is also probably floor tile (the upper surface is missing). The most diagnostic piece is from context 4104, probably a post-medieval made ground deposit containing redeposited medieval material (although see discussion below). This is a triangular tile (cut from a square tile approximately 750 x 750 mm) with one pre-firing line scored obliquely across the right-angled corner, and a deeper, post-firing scoring across one other corner. A plain glazed fragment came from post-medieval made ground 1040, and the undiagnostic fragment from post-medieval made ground 4087 which was closely related to 4104 above.

### *Post-medieval/modern*

- 6.4.3 Roof tile includes both flat peg tile (11 fragments from bedding layer 1042, one from construction cut 6005 and one from made ground 6026) and pantile (one fragment from construction cut 5032).
- 6.4.4 All wall tiles, and ten further fragments of floor tile, are modern (19th/20th-century); these include terracotta examples (13 fragments from made ground 10041, including two with nail holes; nine from made ground deposits 4007, 4009, 4040 and 6026, and one unstratified) and white glazed (three fragments from made ground deposits 2002, 10025 and 11002, one from service cut 3014).
- 6.4.5 There are five post-medieval/modern bricks/brick fragments. Three bricks (two of which are fused together, from made ground 1006) are heat-affected, presumably deriving from furnaces.
- 6.4.6 Twenty-five fragments of sewer pipe date no earlier than c.1850. Most are in salt-glazed stoneware. One other pipe fragment, from a made ground deposit in Trench 11, of undoubted modern date, is in an unusual very hard, dense fragment, and may have fulfilled some industrial function.
- 6.4.7 Flue tile is represented by 31 fragments, all from trench 6 (made ground 6026, 6030 and construction cut 6005). One fragment from trench 1 (made ground 1034) is possibly chimney lining. All of these are likely to be of 19th-century or later date.
- 6.4.8 There are also two electrical insulators and two fragments of sanitary ware, again of 19th-century date or later.
- 6.4.9 Other building material was recovered in the form of small quantities of mortar (53 small fragments) and plaster (two fragments). One piece of plaster is painted red, and this fragment came from a medieval layer (6066) at the base of the stratigraphic sequence in trench 6. The other is a very small fragment of plain white moulded plaster, from 6026.

## **6.5 Clay tobacco pipes**

### *Background*

- 6.5.1 In their *Research Priorities for Post-Medieval Archaeology*, the Society for Post-Medieval Archaeology have identified the systematic collection of clay tobacco pipes as an area of particular importance where more work is needed (Anon 1988, 6).
- 6.5.2 For many years the north-east of England, and in particular Yorkshire, remained little studied so far as pipe research is concerned. This has been partly remedied by PhD research focussing on certain aspects of the clay tobacco pipe industry in Yorkshire during the seventeenth and eighteenth centuries (White 2004). Excavations carried out in more recent years in and around Sheffield are starting to provide more material from the end of the eighteenth century and nineteenth century, allowing pipe researchers to draw up a clearer picture of pipe production and usage in the city at this time. Regional synthesis and discussion of the late 18th and 19th century material from elsewhere in Yorkshire however, remains poorly represented.

### *Description*

- 6.5.3 The excavations at Sheffield Castle produced a total of a total of 664 clay tobacco pipe fragments consisting of 74 bowls, 570 stems and 20 mouthpieces. This material was recovered from 60 pipe-bearing contexts and 10 unstratified deposits.

- 6.5.4 The majority of the pipe fragments are plain stems, but there are a number of 18th-century roll-stamped name marks that can be attributed to makers from Rotherham such as William Wild, Thomas Wild, Benjamin Marsden and Richard Scolah (White 2015).
- 6.5.5 A small number of the plain bowls from the excavations have makers' initials stamped on the bowl facing the smoker. These include the initials TW which is almost certainly Thomas Wild of Rotherham (*fl.* c.1777). One of the roll-stamped stems from Context 6026 is a rare survival in that it joins with a bowl, allowing the associated bowl form to be determined.
- 6.5.6 The group from made ground 6026 is the largest context group from the excavation. This context contains some mid- to late-17th century material including one bowl with a milled heel and two with stamped marks (a gauntlet and a crowned IW). The gauntlet mark is particularly unusual for Yorkshire and may represent a local attempt to copy one of the famous Gauntlet pipes from Wiltshire. There is also a 17th century stem that has been repaired during manufacture, leaving a distinctive flaw in the stem. The majority of the finds, however, date from the 18th century and include some bowls of c.1710–50 with long surviving stems suggesting fresh and little disturbed deposits of this date. The group also contains a number of different eighteenth century roll-stamped stems and a very early glazed mouthpiece, supporting the suggestion from other excavations that the use of glazed tips originated in this area. Many of the eighteenth-century pipes are finely burnished, showing that good quality pipes were in use on the site at this time.
- 6.5.7 A total of 17 of the bowl fragments from the excavations are decorated. Some of these simply have a band of leaves along the bowl seams, but others are more elaborately decorated, for example, the Armorial bowl from made ground 6033, which also bears the name of the maker WILL WILD. The earliest mould decorated bowl from the site includes a series of enclosed scallops with a stag's head on the seam facing the smoker. Pipes decorated with this particular motif appear throughout Yorkshire and this is a design that is known to have been produced by Samuel Lumley of Doncaster c.1790. Made ground 6026 also produced an elaborately decorated late-18th century bowl with the moulded maker's initials PR that provides the full design for a type that was previously only known from fragments.
- 6.5.8 *Catalogue*
- 6.5.9 A full list of the pipes by context, showing the number of bowls, stems and mouthpieces as well as the number of marked or decorated fragments, is presented in **Appendix 6**. In addition, a broad date range is given for each context followed by the most probably date of deposition. General comments relating to each individual context are also given.
- 6.5.10 An illustrated catalogue (**Fig. 29**) of selected pieces from the Sheffield Castle clay tobacco pipe assemblage are described in **Appendix 6**.

## 6.6 Glass

- 6.6.1 The glass assemblage is extensive (469 fragments) but is extremely fragmentary. All is of post-medieval/modern date. It includes free-blown/mould-blown bottles of mid-17th to early 19th-century date, as well as later machine-made bottles and other containers, drinking vessels, glass from internal fixtures (lampshades) and window glass.

### *Containers*

- 6.6.2 The earliest glass recovered comprises 51 fragments from free-blown or mould-blown green wine bottles. One neck from surface 5031 could belong to a bottle of 'onion' or

'mallet' form (late 17th to mid-18th century), and one base from service cut 6014 is from a cylindrical form (mid-18th to early 19th century), but otherwise these fragments can only be broadly dated as mid-17th to early 19th-century. The condition of these fragments (abraded and with surface oxidation), as well as later pieces found in association, suggests that all are residual here. There is also one free-blown pale green phial base of 18th or early 19th-century date (construction cut 6005).

- 6.6.3 Other bottles are 19th-/20th-century machine-made forms and include containers of carbonated and alcoholic drinks. There are examples of Hamilton (or torpedo) bottles, and one Codd closure. It is probable that other bottles and jars contained other foodstuffs (eg condiments) or pharmaceutical preparations, but the assemblage is too fragmentary for specific function to be assigned in most cases, and few containers carry proprietorial marks indicating contents - only five such marks were recorded, of which the most complete (on the Codd bottle) is for Rider Wilson's Table Waters Ltd of Sheffield. The other four are very partial: ...CART... (made ground 1006), ...ERS LTD (made ground 3002), ...ELD... (?Sheffield, drain 3009) and DUNCA... (made ground 11018). There are two ink bottles from drain 3009, one complete square bottle with a cracked-off rim, and the base from a second.

#### *Drinking vessels*

- 6.6.4 Drinking vessels are limited to a clear wine glass stem from made ground 6030, and fragments of two others (one etched) from construction cut 5032.

#### *Other vessel*

- 6.6.5 A significant proportion of the assemblage (152 fragments) consists of opaque glass in a range of colours (white, pale green, pale turquoise, blue and pink); these were concentrated in trench 5 (made ground 5005, construction cut 5032) and appear to belong to lampshades with fluted edges.

#### *Window*

- 6.6.6 Window glass (95 fragments) includes one piece of blue/green 'crown' glass (service cut 6016), and at least nine other fragments are in pale greenish glass which could pre-date the 19th century, but the majority are clear sheet/plate glass, some thick and frosted or reinforced.

#### *Miscellaneous*

- 6.6.7 A small fragment of a narrow tube in clear glass came from made ground 11018.

## **6.7 Leather**

### *Methodology*

- 6.7.1 The leather was examined and recorded in September 2019. A basic record of all the leather examined has been provided (**Appendix 7**) and the material is summarised below.
- 6.7.2 Leather species were identified by hair follicle pattern and thickness using low-powered magnification. Where the grain surface of the leather was heavily worn identification was not always possible. The term bovine has been used when uncertainty arose between mature cattle hide and immature calfskin. The term cattle, rather than cow, has been used as the gender of the animal/animals is unknown. Shoe bottom components and repairs are assumed to be of cattle hide unless stated otherwise. All measurements are in millimetres (mm). No contextual information was provided at the time of submission of the text.

### *Condition*

- 6.7.3 The leather was in varying condition, most was wet when examined but a small amount was dry and desiccated. Some appear to have been formerly associated with coal dust (context 1002), others with oil or a similar substance (context 4009).

### *Summary*

- 6.7.4 A small amount of leather was recovered generating 23 individual records. No complete items were found. The leather comprises principally of highly fragmentary shoe parts, the discarded junction from machine belting and a fragment of horse harness strap. This material is too fragmentary to date closely but cannot date earlier than the second half of the 19th century. The end of a reinforced strap (1), likely to come from harness, was found in context 1002. Substantial shoe parts were found in contexts 4006, 4009, 4010, 4039, 4042. What remains of the shoes were of brass riveted construction, and heavily hobnailed (2, 4, 5, 7, 8, 14, 17, 22). The small fragments of the shoe uppers that survived indicated they had been front lacing suggesting they were working boots. Very small fragments of perforated leather (10, 13, 19) were present in context 4009 and 4040, being associated with the shoe leather, they also may be shoe parts, perhaps used as bottom packing, but their identity is uncertain at present. A very small quantity of secondary waste (11, 16, 18, 21) found with the shoes, including two pieces cut from old shoe parts (16, 18), suggest that the shoes are waste from cobbling (shoe repair), but the shoes themselves are so fragmentary that it is impossible to distinguish them from casual domestic rubbish. The brass riveted junction of a machine belt (15) and small fragments broken from belting (6, 9) were found in contexts 4009 and 4010.

## **6.8 Metalwork**

- 6.8.1 Metalwork includes coins, as well as objects of copper alloy, lead, iron and other metals. The ironwork in particular is in very poor, corroded condition. All objects (apart from lead, and a few of the larger iron objects which were obviously large structural objects items of modern date, were X-radiographed as part of the assessment stage, to act as a basic record, to aid identification and to inform any assessment of conservation requirements (see below). At this stage no detailed catalogue has been compiled, but the metalwork has been subjected to a visual scan in order to characterise it in broad terms.

### *Coins*

- 6.8.2 Four coins were recovered. One is a 1978 penny (7016); the other three (all from 3015) are too corroded for identification, but are almost certainly 20th-century issues.

### *Copper alloy*

- 6.8.3 Copper alloy objects, although suffering from some active corrosion, are generally better preserved, and with a higher proportion of identifiable objects than the ferrous metalwork.
- 6.8.4 Of particular interest is a small toilet implement (**Pl. 39; Fig. 30**) from layer 5040 in trench 5, the matrix between a cobbled surface, which adds to the small collection of medieval personal items found during earlier excavations at the Castle and held in the Butcher and Armstrong archives. The object is made from a narrow strip and is complete. It features a small ear scoop at one end; the opposite end is bifurcated and possibly functioned as a nail cleaner or toothpick. There is evidence of an increase in the range of specialised toilet implements in the later medieval period; nail cleaners and ear scoops were popular from the 14th century. Implements made from strips are considered to be medieval, while those made from wire are later, 15th or 16th century, based on evidence from Norwich (Margeson 1993, 63–4, fig 32).

6.8.5 The range of medieval toilet or cosmetic implements encompasses tweezers, toothpicks, ear scoops and nail cleaners, and it is clear from these objects, and from contemporary literary descriptions and paintings that the medieval person was concerned with the appearance of eyebrows, hairline and beard, and with the cleanliness of ears and nails. Some toilet implements served a single function while others, such as this example, served a dual purpose. Ear scoops were frequently teamed with toothpicks or with tweezers, such as one example from Salisbury (Goodall 2012, cat no 166). Sets of implements were also produced, and the bifurcated end of the Sheffield example is paralleled within a folding set from West Sussex (Portable Antiquities Scheme database, record number SUSS-9C5EE4). The closest parallel found to the Sheffield implement is provided by an example from London, with earscoop and bifurcated toothpick/nail cleaner, although this is made from drawn wire rather than sheet metal (Egan and Pritchard 1991, 378, TEX 88, acc no 3753).

6.8.6 No other objects are definitively datable as medieval (none came from phased medieval layers), and many are clearly of modern date. These include a small safety pin, five buttons, a lid fitting from a Kilner jar, a figure-of-eight chain link, two knob handle fittings, four short lengths of narrow piping, two with crimped ends, and several other miscellaneous fittings. Other objects and fragments, including a plated disc, seven short lengths of wire, and various bar and strip fragments, are of uncertain function but are almost certainly of post-medieval/modern date.

#### *Lead*

6.8.7 Sixteen pieces of lead were found. Apart from two short lengths of window came, this consisted entirely of scrap fragments of sheet and plate. All objects came from post-medieval/modern contexts.

#### *Iron*

6.8.8 The X-radiographs of iron objects have not added greatly to the identification process. There are certainly some structural items, including nails, a section of narrow pipe, a window fastener and a possible hinge; and also tools, including three-square (triangular) files, knife blades and at least one punch (knives and other tools came particularly from trench 4). Some of the blades may be unfinished objects, and in general these and the other tools could have been either used on the site (files, for example, were the most commonly used tool types in manufacturing processes), or represent products in various stages of manufacture, for example from the steelworks.

6.8.9 There is one large annular buckle, of a size appropriate for use on horse harness, two S-hooks and a large chain link. Much of the ironwork, however, consists of miscellaneous bar, rod and sheet fragments of uncertain function. Some of this may represent manufactured bar for sale, or material brought in for further processing.

6.8.10 Two objects came from medieval contexts (nail from layer 4111 in trench 4, and strip/bar from layer 3057, phased with the possible 13th-century demolition levels in trench 3), with four more from a late medieval layer 1042 (unidentifiable objects).

#### *Other metal*

6.8.11 The other metal objects, all of 19th-/20th-century date, include a teaspoon (stamped with the mark of Arthur Price), a small fork (no mark), a container lid with an oily residue, and a squeezed tube of Gordon Moore's Cosmetic Toothpaste.

## 6.9 Shell

- 6.9.1 A very small quantity of shell (16 shells) was recovered by hand; species represented comprise oyster (6), whelk (7), cockle (2) and mussel (1). Amongst the oyster, where valve side could be determined, all are left valves, ie consumption waste. There is also a small fragment of mother-of-pearl, which could represent button-making waste. Shell was recovered from 18th-, 19th- and 20th-century deposits in trenches 1, 4 and 6.

## 6.10 Slag

### *Overview*

- 6.10.1 Slag and possibly related materials with an overall total weight of 17.9 kg, from 39 contexts, was examined visually and broadly categorized according to its probable source.
- 6.10.2 Only 2.28 kg of the total came from medieval contexts, with 0.33 kg from 17th-century contexts, 9.94 kg from 18th–19th-century contexts and 4.29 kg from 20th-century contexts. Much of the material from 18th–20th-century contexts is probably residual, albeit of the same broad late post-medieval–modern period rather than medieval.
- 6.10.3 The medieval material comes from just six contexts (1048, 1061, 1064, 1073, 10071 and 10076), from trenches 1 and 10, with most (1641 g) from context 1073. This includes seven fragments (686 g) of somewhat abraded probable iron smelting tap slag, all pieces relatively dense and with a flow structure visible on the upper surface, along with some undiagnostic slag and a small quantity of fuel ash slag. The remaining 373 g of material from trench 1 comprises undiagnostic ironworking slag. The most likely explanation for the presence of this material in layers of redeposited alluvium is as metalling, and it may not be coincidental that a stone courtyard surface lay below these layers, this surface associated with the early castle prior to its destruction in 1266.
- 6.10.4 The slag from context 10071 amounts to just 15 fragments weighing 272 g, but these include a single, relatively large piece (138 g) of tap slag from iron smelting. Context 10071 represents one of the layers making up the possibly 13th century moat bank. A further 134 g of less diagnostic, more fragmentary and slightly abraded probable smelting slag was obtained from moat fill 10076, which is probably a medieval deposit. The medieval contexts containing slag in both trenches 1 and 10 appear to be roughly contemporary (13th century).
- 6.10.5 A total of 62 fragments of ironworking slag weighing 1034 g came from 17th-century, Civil War slighting deposits in trench 10 (10066, 10067 and 10075). The origin of the slag from 17th-century contexts is unknown. This may be medieval material redeposited during the slighting of the castle, or may representing smelting contemporary with the contexts in which they were found. Much of it is very fragmentary, undiagnostic and all slightly abraded. However, the 26 pieces/539 g from context 10075 includes one large and one smaller piece of tap slag, while the 35 pieces/364 g from context 10067 includes two or three relatively small fragments of tap slag; a single piece (131 g) of dense, moderately vesicular slag from context 10066 is also most likely to derive from iron smelting, though it exhibits no surface flow structure.
- 6.10.6 The vast majority of later material comprises fuel ash slag/clinker, with 9.51 kg from 18th- to 19th-century contexts (mostly from trenches 2 and 4) and 2.60 kg from 20th-century contexts (mostly from trenches 1 and 2). Although not certainly linked to post-medieval metallurgical activity, specifically steelmaking, this is likely to be the source. As with other artefactual categories, much of this material may have been imported to the site (see Cumberpatch 2005). Other debris comprises 1.99 kg of refractory brick fragments, 1.55 kg

from 20th-century contexts (and all from trenches 1 and 6), this also probably derived from furnace structures or flues, 25 sherds of steelmaking crucible (2101 g, trenches 1, 2, 3 and 4) and a single piece of copper alloy dress (17 g, trench 6).

### *Analysis and microscopy*

#### Introduction

- 6.10.7 Two fragments of metallurgical slag recovered from a medieval context (1073) at the site of Sheffield Castle have been subjected to scientific analysis, with the aim of establishing the process origin of the slag. The fragments were analysed at the Wolfson Archaeological Science Laboratories at UCL. Results indicate that one fragment is tap slag and the other furnace slag, both associated with the primary production of iron by bloomery furnace.

#### Materials and methods

- 6.10.8 Both fragments of slag were photographed and measured, and the relative magnetic response of both fragments was also noted. Each fragment was given a unique laboratory identification with the letters WS followed by a number.
- 6.10.9 A small specimen of each slag fragment was cut with a wet abrasive tile cutter, cleaned by light brushing under tap water, and dried. The specimens were then mounted in a polymer resin and polished to a final finish of 1  $\mu\text{m}$ . Each specimen was subjected to reflected light microscopy and basic phase identification. A series of micrographs was taken for further review.

#### Results

- 6.10.10 Photographs of fragments WS-001 and WS-002 are provided in **PI. 71** and **PI. 72** respectively. WS-001 is a dense blue-grey slag with low magnetic response. Its morphology suggests a series of overlapping flows with crinkled cooling surfaces. This is consistent with it being tapped from a furnace. WS-002 is a low-density blue-grey slag with no magnetic response. It has a porous, almost frothy, cross-section with a smooth continuous upper surface. Combined morphological features suggest that it could be either a frothy tap slag fragment or the top of a furnace bottom.
- 6.10.11 The microstructure of WS-001 is made up of multiple overlapping flows of heterogeneous character. Distinct flows are recognised by the magnetite ( $\text{Fe}_3\text{O}_4$ ) enriched cooling surfaces and phase discontinuities (**Fig. 31.1**). The specimen is dominated by fayalite ( $\text{Fe}_2\text{SiO}_4$ ) with variable amounts of dendritic wüstite ( $\text{FeO}$ ) and interstitial glass. Hercynite ( $\text{FeAl}_2\text{O}_4$ ) is present with overall concentration varying by flow (**Fig. 31.2**). Small iron prills are also observed within the slag.
- 6.10.12 The microstructure of WS-002 is more consistent. Phases include large skeletal fayalite and hercynite (cuboid and dendritic) within a glassy matrix. A dark grey phase is also present containing myrmekitic intergrowth of fayalite (**Fig. 32.1**). The colour and association of this phase with olivine suggest that it can be identified as anorthite ( $\text{CaAl}_2\text{Si}_2\text{O}_8$ ), though x-ray microanalysis or x-ray diffraction would be required to offer a more accurate attribution. This specimen also contains a high proportion of large voids. Other frames of WS-002 (**Fig. 32.2**) reveal the presence of large iron prills and large fayalite crystals with sieve structures.

#### Discussion and conclusion

- 6.10.13 The morphology of WS-001 combined with clear evidence within the microstructure of multiple flows exposed to oxidizing conditions reveals it to be a tap slag. Some flows are



notably leaner in iron oxides and hercynite compared to others. With only one specimen, it is impossible to relate this clearly to a particular smelting process. It is worth noting, however, that modern experimenters sometimes note that the first slag taps in a bloomery smelt are often iron rich while later taps are lean (Sauder and Williams 2002). Such patterns could also relate to the differential use of smelting recipes leading to the production of ferritic iron or primary steel (Charlton *et al.* 2010). A more detailed study of microstructural and chemical patterning would be required to explore these hypotheses.

- 6.10.14 The morphology of WS-002 could represent either tap slag or furnace bottom slag. Frothy tap slags are familiar finds at water-powered bloomeries, though vesicular slags are also found inside furnaces near tuyères. The microstructure, however, suggests furnace slag. The size and distribution of the fayalite crystals also give specimen WS-002 a porphyritic character which may indicate a high viscosity liquid within the standard temperatures of a bloomery furnace (1200–1400° C). The sieve structure of some of the fayalite crystals are indicative of resorption processes. This suggests at least one cycle of remelting and recrystallization during the formation of the specimen. The lack of free iron oxides indicates that the atmosphere in which the slag formed was highly reducing. The vesicular structure of this slag points to a high gas (CO and CO<sub>2</sub>) content and strong reducing conditions. Without sufficient iron to flux silica within the charge, the slag will have a higher melting temperature and become stickier. Finally, the presence of myrmekitic phases, like the one provisionally identified as anorthite, form via reactions with calcium and potassium in fuel ash. They are common observations in slag pit furnace blocks and furnace bottoms where slag is pooled in association with charcoal. Their presence is testament to a lack of flow and mixing in the slag. These combined observations make it likely that this was a piece of furnace slag that formed near the tuyère and forming bloom.
- 6.10.15 The two fragments of slag analysed in this study provide clear evidence of primary iron production using a bloomery furnace, and their archaeological context suggests that this was an activity taking place at Sheffield Castle during the 13th century.
- 6.10.16 While detailed operating procedures are impossible to assess in detail because of the small sample size, the evidence suggests that reducing conditions were strong and that the furnace was heavily blown. The blooms produced from such a process can be expected to be heterogeneous in carbon content, but biased toward the ‘steelier’ end of the iron-carbon phase diagram.

## 6.11 Stone

- 6.11.1 Of the stone recovered (original total of 52 fragments), some pieces have been examined and subsequently discarded as unworked. Eleven pieces have been selected as comprising the most interesting in terms of their significance to the Site, with briefer notes on ten further pieces. This small group includes both building material and portable objects, but there is very little that can be definitively dated as medieval.
- Fragment of grinding stone of whitish grit, 130 x 110 x 40 mm. Original diameter around 240 mm. Slightly bevelled edges. Unstratified.
  - Segment (12 mm long) of well-finished moulded stone ring, in section 97 x 80 mm. Original external diameter around 210 mm. Level top, outer face with a sophisticated moulding of Classical nature; inner face with fine grooving, possibly produced by friction. It is not at all clear what this stone is, but it has the feel of being post-medieval rather than medieval. Context 6026.

- Piece of stone roof slate, 155 x 92 x 35 mm, with peg hole, only 8 mm wide in centre but splaying to around 30 mm on both faces. Context 6026.
- Rather more than half of a small grindstone, 217 mm in external diameter and 62 mm thick, with central hole 55 mm square. One face smooth, the other rougher although with a smoothed border. Context 4042.
- Fragment of grindstone 160 x 85 mm and 52 mm thick; original external diameter around 230 mm. One face is probably one side of a central hole 60 mm square. One face smooth, the other rougher with a smoothed border. The edge has an incised cross-cross pattern. Context 4042.
- Fragment of window tracery in fine-grained buff sandstone, overall 143 x 125 x 68 mm. head of a bifurcating mullion between two lights or sub-lights, chamfered on one side and hollow-chamfered on the other; cusping to the lights on both faces. In form appears medieval (late 14th–early 16th century), but was found with relatively modern material and is absolutely unweathered, suggesting that it is in fact a piece of 19th-century Gothic revival work. Alternatively it could have been part of an internal feature such as a screen, but it seems unlikely that this is a genuinely medieval piece. Context 7017.
- Fragment of grindstone 125 x 100 mm and 46mm thick, original diameter around 220 mm, of grey silt stone with carbonaceous plant remains. Incised criss-cross pattern on top, except for border, and similar pattern on edge.
- About half a grindstone around 220 mm in diameter and 58mm thick, with central hole 55mm square, of whitish grit. One smooth face, one rough and raised within a smoothed border 16mm wide. Context 4042.
- Small fragment of a grindstone 100 x 84 mm by 55 mm thick, original diameter perhaps around 220 mm, and of orange-brown millstone grit. Context 4040.
- Large block (**Fig. 30**), apparently a voussoir from a large arch (at least 3 m wide), overall 460 x 350 x 260 mm, of buff medium-grained sandstone, quite badly weathered; there is some evidence that at least some of this weathering may have taken place when the stone was in a secondary context. Despite erosion, patches of light diagonal tooling are still discernible. The voussoir is moulded with a square step and two hollow chamfers, and stylistically would appear to be of 14th or 15th century date. Trench 10, unstratified.
- Block, overall 440 x 350 x 240 mm, rectangular, with abroad chamfer on one angle. This may will be medieval, although there is nothing really diagnostic of date; it could have formed part of the plinth of a substantial building, although where undamaged the faces are relatively unweathered. Trench 10, unstratified.

6.11.2 Other fragments include eight further pieces of stone roof tile and four pieces of slate, probably Welsh slate which only came into common use with the development of the railway network in the mid-19th century.

## 6.12 Wood

6.12.1 Thirty-five pieces of wood were recovered from the site. The assemblage includes three large pieces of structural timber, as well as fragments that may have broken off from large

timbers, and other small fragments. The wood was examined macroscopically for the purposes of this assessment, and samples of each piece taken for wood species identification.

- 6.12.2 The largest piece of wood recovered is part of a large rectangular beam from a medieval layer (3057) in trench 3. This beam is broken at both ends and appears to have been burnt, giving it a twisted appearance. A broken fragment from another large timber was also recovered from the same context; again this is broken at both ends and very little of the original surface remained, although this piece does not appear to have been burnt.
- 6.12.3 Potentially the most interesting piece of timber recovered is a section of a large beam that had been cut down and subsequently re-used. This was recovered from an 11th/12th century layer (6055) in trench 6 (**Pl. 73**). Evidence of a face lap with a large peg can be seen on one side, and a deep contemporary groove has been cut into the side of the beam. Subsequent reduction of the width of the beam left this groove on the edge of the timber. In later re-use the piece had also been chamfered into a chisel point with a flat facet at one end, whilst the other end was more crudely cut back. Nine other fragments of wood were recovered from this context; these pieces are broken fragments from larger timbers. One has possibly been sawn at one end, but no other toolmarks are visible.
- 6.12.4 Another large piece of timber is the broken end of a large squared-off timber post from potentially medieval pit 6073. This piece has lost most of its original surface, and no toolmarks are visible. The flat base of the post has a sub-rectangular depression in the base that may have come from being pressed up against a large stone (the post was set on stone postpad 6071).
- 6.12.5 In the north-east corner of trench 3, three further pieces of wood were recorded from medieval context 3058. These pieces comprise a broken fragment from a larger timber, with possible cut marks and a possible notch on one side; a short section from a roundwood stake which has possibly been chopped off diagonally at one end; and a broken branch that has not been worked.
- 6.12.6 The remainder of the assemblage consisted of three small lath or plank fragments (all from trench 4), two broken fragments from a sawn timber recovered from potentially medieval layer 6077 in trench 6, two small fragments from post-medieval made ground 4009 in the south-west corner of trench 4.

#### *Species identification and suitability for dendrochronology*

##### Introduction

- 6.12.7 Twenty samples of waterlogged wood and two fragments of dry wood were submitted to Archaeology South-East for taxonomic identification and to assess their suitability for dendrochronology. The following report does not provide a full timber record.

##### Methods

- 6.12.8 Wood fragments were hand sectioned along three planes (transverse, radial and tangential), temporarily mounted on slides and viewed under a transmitted light microscope at magnifications up to 500x to facilitate identification. Taxonomic identifications were assigned by comparing suites of anatomical characteristics visible with those documented in reference atlases (Hather 2000; Schoch *et al.* 2004; Schweingruber 1990).

**Table 10** Wood Identification and suitability for dendrochronology

Timber Context Number	Context/ timber sample notes	Notes	Roundwood	Knotwood	Rootwood	Bark/ Sapwood/ Heartwood	Wessex Archaeology Photos	Taxonomic ID.	English Name	Suitable for dendro
3057A		small fragment of roundwood	Y			Y	N	Alnus sp.	alder	N
3057B		subsample from larger piece of timber? (no corresponding photo for this one). Depending on original size and presence of bark or sap wood this could be suitable for dendro				N	N	Quercus sp.	oak	N? (see notes)
3057	T1 of 3	closely spaced growth rings and possibly sufficient for dendro work but as an isolated sample it is unlikely to be suitable, edge may retain some sapwood although difficult to tell as drying may be causing colour differentiation.				poss sapwood	IMGP5390.3057. Timber 1 of 3	Quercus sp.	oak	? (see notes)
3057	T2 of 3	Subsample submitted - very dark, but not charred, fragment from larger timber submitted for identification. Original doesn't look large enough for dendro work				N	IMGP5380.3057. Timber 2 of 3	Quercus sp.	oak	N
3057	T3 of 3	twisted piece of possible roundwood. It is either compressed and twisted, or this is the natural growth form. From the wood anatomy, it looks like the growth form is twisted. ?root wood?	?		?		IMGP5373.3057. timber 3 of 3	Corylus avellana	hazel	N
3078	E-most timber	sub-sample submitted - cross section of part of a branch with knotwood where it attaches to a larger branch/stem, too small for dendro	Y	Y		Y	IMGP5375.3078. E-most timber	Quercus sp.	oak	N
3078	central timber	sub-sample submitted - fragment of larger piece - see photo, possibly from roundwood, not large enough for dendro	?				IMGP5371.3078. central timber	Quercus sp.	oak	N
3078	W-most timber	sub-sample submitted - although fragment from large original piece the original appears fairly thin and without sap or pith from the photo so unlikely to be suitable for dendro work				N	IMGP5364.3078. W-most timber	Quercus sp.	oak	N
6055A		close growth rings, small flat fragment from timber				N	IMGP5368.6055 fragments A-E	Quercus sp.	oak	N
6055B		close growth rings, lumps possibly originating from larger timbers				N	IMGP5368.6055 fragments A-E	Quercus sp.	oak	N
6055C		close growth rings, lumps possibly originating from larger timbers				N	IMGP5368.6055 fragments A-E	Quercus sp.	oak	N



Timber Context Number	Context/ timber sample notes	Notes	Roundwood	Knotwood	Rootwood	Bark/ Sapwood/ Heartwood	Wessex Archaeology Photos	Taxonomic ID.	English Name	Suitable for dendro
6055D		close growth rings, lumps possibly originating from larger timbers				N	IMGP5368.6055 fragments A-E	Quercus sp.	oak	N
6055E		close growth rings, lumps possibly originating from larger timbers				N	IMGP5368.6055 fragments A-E	Quercus sp.	oak	N
6055F		Small fragments displaying poor preservation (difficult to section)				N	IMGP5370.6055 fragments F-I	Quercus sp.	oak	N
6055G		med-close growth rings, blocky fragment probably from a larger timber, very poor preservation of anatomical features				N	IMGP5370.6055 fragments F-I	Quercus sp.	oak	N
6055H		close growth rings, blocky fragment possible from a plank?				N	IMGP5370.6055 fragments F-I	Quercus sp.	oak	N
6055I		close growth rings, wedge shaped fragment				N	IMGP5370.6055 fragments F-I	Quercus sp.	oak	N
6055		large timber/object(?) approx. measurements 33lx27wx13d. With Fe rich mineral encrusting on several surfaces. Some mineral replacement has also occurred. Although large, the growth rings run parallel to the breadth of the object and it is therefore unprobably to provide sufficient rings for dendro dating. The edges have been removed in shaping the piece and no sap wood is evident. Pith or close to pith may be present but this is difficult to determine without sectioning the object.				? Pith (see notes)	IMGP5386.6055J	Quercus sp.	oak	N (see notes)

## Results

- 6.12.9 Taxonomic identifications and notes regarding their suitability for dendrochronological work, presence of sapwood, pith, bark and overall form, are outlined in **Table 10**.
- 6.12.10 The majority of wood samples submitted were small fragments, some of which were subsamples, of waterlogged wood deriving from larger oak timbers. Almost all of the oak displayed tightly spaced growth rings, suggesting they derive from mature, slow grown components of the trees, consistent with the presence of timber. By contrast, eastern-most 'timber' sample 3078 was a subsample of small branch oak wood and differed from the majority of the assemblage. Other roundwood included a small fragment of alder (3057A) and hazel (3057 Timber sample 3 of 3) revealing the presence of taxa other than oak. Two wood samples (4009A and 4009B), retrieved from a late-19th-century context in dry condition were identified as common spruce/ European larch. This identification could not be satisfactorily refined due to inherent difficulties in distinguishing the two taxa (Schweingruber 1990) which is further compounded by the effects of drying.

### *Suitability for dendrochronological dating*

- 6.12.11 Very few fragments were large enough or retained sufficient growth rings, pith or sap that could make them suitable for dendrochronology. One exception is timber sample 3057 Timber 1 of 3 which retains some sapwood (see notes in **Table 10**) and displays closely spaced growth rings. The only other timber that was superficially large enough for dendrochronological work was timber/object 6055, which measured approximately 0.33 m by 0.27 m by 0.13 m in length/width/depth. It appears to be box-halved with considerable further conversion and shaping that have removed the sapwood.

## **6.13 Conservation**

- 6.13.1 No immediate conservation requirements were noted in the field. Potentially vulnerable finds, and therefore potentially in need of conservation treatment, comprise the metalwork and leather objects. The iron objects in particular are heavily corroded and further degradation and disintegration are probably. Metalwork is currently stored in airtight plastic containers with a drying agent (silica gel) and indicator strips. A programme of X-radiography has been carried out, primarily to act as a basic record of the metalwork, some of which is not recommended for long-term curation (see below). Similarly, the leather has not been recommended for long-term curation and so no further conservation work is appropriate.

## **7 ENVIRONMENTAL EVIDENCE (TRIAL TRENCHING ARCHAEOBOTANICAL)**

### **7.1 Introduction**

- 7.1.1 A comprehensive biological sampling strategy was implemented during an archaeological evaluation at the site of Sheffield Castle, Sheffield, South Yorkshire in 2018 by Wessex Archaeology. Samples were selected for full analysis of charred plant macrofossils, waterlogged plant macrofossils, wood, wood charcoal, invertebrate macrofossils and molluscs based on the results of an archaeological evaluation assessment (Wessex Archaeology 2019b). This report concerns the analysis of charred plant macrofossils, waterlogged plant macrofossils, wood and wood charcoal. Separate analyses and reports were conducted on molluscs by Matthew Law (section 8 below) and on invertebrate macrofossils by David Smith (section 9 below).

## 7.2 Aims and objectives

### *Analysis*

7.2.1 The objectives of the archaeobotanical analysis were:

- to identify and fully quantify crop material and other charred plant macrofossils in order to provide evidence for the crop types and other food remains present at the site, and to investigate crop husbandry and crop processing activities;
- to identify and fully quantify waterlogged plant macrofossils in order to provide evidence for the nature of the local environment at the site, and to investigate the types of plant material that may have been brought to the site and for what purpose they were likely to have been collected;
- to identify a representative sample of the wood charcoal assemblage in order to provide evidence for the selection of wood for use as fuel at the site; and,
- to identify a representative sample of the wood assemblage in order to investigate other uses of wood at the site.

### *Additional assessment*

7.2.2 In addition, a sample from borehole 1 (corresponding to the motte deposits encountered in trench 2) and monolith sample 10002 from trench 10 were processed by Ellen Simmons for waterlogged plant macrofossils and wood. The samples were then assessed in order to determine the concentration, diversity, state of preservation and suitability for AMS dating, of any palaeoenvironmental material present. A further aim of this assessment was to evaluate the potential of any palaeoenvironmental material present in the samples to aid in an interpretation of the sampled contexts and gain an understanding of the economy of the site or the local environment.

## 7.3 Methodology

### *Analysis*

7.3.1 The majority of bulk samples were processed by flotation for the recovery of charred plant remains and wood charcoal by Wessex Archaeology using a water separation machine. Floating material was caught on a 250 µm mesh, and the remaining heavy residue was retained in a 500 µm mesh. Flots and heavy residues were air dried. Where potential for the preservation of organic remains by anoxic waterlogging was noted, one litre sub-samples were processed using a water separation machine, with the heavy residues being passed through a stack of sieves of mesh size 5.6 mm, 2 mm, 1 mm and 500 µm. The flots and heavy residues from potential waterlogged samples were kept wet.

7.3.2 A preliminary assessment of the samples was made by scanning using a stereo-binocular microscope (x10–x65) and recording the abundance of the main classes of material present. Samples were selected for further analysis of the environmental evidence on the basis of this initial assessment. The samples were analysed in accordance with Historic England guidelines for environmental archaeology analysis and reporting (Campbell *et al.* 2011).

7.3.3 Identification of the plant material, wood and wood charcoal was carried out by comparison with material in the reference collections at the Department of Archaeology, University of Sheffield and various reference works (eg Schweingruber 1990, Hather 2000, Cappers *et al.* 2006, Jacomet 2006, Poland 2018). Cereal nomenclature follows Zohary *et al.* 2012 and other (wild) plant nomenclature follows Stace 2019. Information relating to the ecology of various plant taxa was sourced from Stace 2019 and Preston *et al.* 2002.

- 7.3.4 Twenty-five wood charcoal fragments greater than 4 mm<sup>3</sup> in size and twenty-five wood charcoal fragments 2–4 mm<sup>3</sup> in size were randomly selected from each sample with the aim of identifying a representative sample of the taxa present (Stuijts 2006). A minimum fragment size of 2 mm in cross-section was chosen for identification, as smaller fragments are difficult to fracture in all three planes and therefore difficult to identify. This may however result in a bias against the representation of species such as lime (*Tilia* sp.) which tend to be fragile and fracture easily into small fragments. Fifty wood fragments greater than 4 mm<sup>3</sup> in size were randomly selected from each sample for identification as smaller fragments of wood are difficult to identify.
- 7.3.5 Wood charcoal and wood was examined using high power binocular reflected light (episcopic) microscopy (x50, x100 and x400), and identifications made based on the anatomic features observed in transverse, radial and tangential planes. A record was also made, where possible, of the ring curvature of the wood and various dendrological features, in order for the part of the woody plant which had been burnt, and the state of wood before charring, to be determined (*cf.* Marguerie and Hunot 2007).
- 7.3.6 Where at least three growth rings are present, ring curvature is designated as weak, intermediate or strong, indicating larger branches or trunk material, intermediate sized branches and smaller branches or twigs. Narrow rings are recorded on charcoal and wood fragments with weak ring curvature where growth ring width is less than 1mm, which corresponds to restrictive growing conditions. The presence of thick walled tyloses in vessel cavities (indicating the presence of heartwood and therefore mature trunk wood), the presence of reaction wood in the vessel cavities (indicating the use of branch wood), the presence of fungal hyphae and insect degradation (indicating the use of dead or rotting wood), and the presence of bark and pith were also recorded. The degree of vitrification of the charcoal fragments was recorded as a measure of preservation, with levels of vitrification classified as either low brilliance refractiveness (degree 1), strong brilliance (degree 2) or total fusion (degree 3).

*Additional assessment*

- 7.3.7 The material from borehole 1 and monolith sample 10002 were processed by the washover method for the recovery of plant remains preserved by anoxic waterlogging, broadly following the techniques outlined in Kenward *et al.* (1980). The samples were disaggregated in water, before being processed by gently washing material through a stack of sieves of mesh sizes 2 mm, 1 mm, 500 µm and 250 µm. Material from each size fraction was stored in distilled water in sealable plastic bags and kept refrigerated, in accordance with Historic England guidelines for the curation of waterlogged macroscopic and invertebrate remains (Robinson 2008).
- 7.3.8 The samples were assessed in accordance with Historic England guidelines for environmental archaeology assessments (Campbell *et al.* 2011). A preliminary assessment of the samples was made by scanning using a stereo-binocular microscope (x10–x65) and recording the abundance of the main classes of material present. The small quantity of plant seeds found in the samples were identified and quantified in full. Preliminary identifications of plant material were carried out by comparison with material in the reference collections at the Department of Archaeology, University of Sheffield and various reference works (eg Cappers *et al.* 2006). Plant nomenclature follows Stace (2019). The composition of the borehole 1 and monolith 10002 samples is recorded in **Appendix 8**. The seed, in the broadest sense, of the plant is always referred to in the tables, unless stated otherwise.



## 7.4 Results

### *Preservation and contamination*

- 7.4.1 Plant macrofossils and wood were preserved by both charring and anoxic waterlogging. Preservation of charred plant material is somewhat poor, with most cereal grains being distorted and identifiable by gross morphology only. Preservation of wood charcoal is relatively good, with minimal evidence for vitrification, whereby charcoal takes on a glassy appearance resulting in anatomical features becoming fused and difficult to identify.
- 7.4.2 Preservation of uncharred plant material and wood present in contexts 3056, 3057 and 3079 from the lower layers of a sequence of rich organic deposits in trench 3 is good, with a rich and diverse assemblage of plant material being present. Preservation of uncharred plant material and wood in pit fills 6060, 6062, 6072, gully fill 6064 and layer 6055 in trench 6 is also good. Uncharred seeds were also found in other contexts from trench 3 and trench 6, as well as in contexts from other trenches. It is not however generally possible to determine with confidence whether this is modern intrusive material or ancient material preserved by anoxic waterlogging.

### *Charred plant macrofossils*

#### Contexts producing charred plant macrofossils

- 7.4.3 Plant macrofossils preserved by charring were found in a series of deposits from trenches 1, 3, 5 and 6 (**Table 11**).
- 7.4.4 In trench 1, layer 1076 is one of a series of deposits thought to be levelling layers for the castle courtyard. Made ground layer 1057, is one of a series of deposits overlying the courtyard surface. A date of cal. AD 1040–1210 was obtained from a barley grain (*Hordeum distichum/vulgare*) which was found in layer 1076, and a date of cal. AD 1170–1260 was obtained from a rye grain (*Secale cereale*) which was found in layer 1057.
- 7.4.5 In trench 5, layers 5041 and 5045 are bedding layers for a surface of cobblestones thought to be the castle courtyard. A date of cal. AD 1170–1260 was obtained from a wheat grain (*Triticum* sp.) found in layer 5041.
- 7.4.6 In trench 3, layer 3062 is one of a series of clay deposits that had been built up in stages as part of the construction of a possible hill or motte. Layer 3079 is associated with a demolition or destruction phase containing 13th-century pottery, the layer is thought to be the result of the destruction of the castle in 1266. Context 3056 is a layer which directly overlays this destruction deposit, containing pottery dating to between the 12th to 14th century and probably represents the immediate rebuilding efforts after the destruction.
- 7.4.7 In trench 6, gully fill 6064, pit fill 6062 and pit fill 6072, are from a group of early cut features. A date of cal. AD 1030–1200 was obtained from a hazel nutshell (*Corylus avellana*) fragment which was found in one of the other pits from group of early cut features (pit fill 6060). The samples from layer 3079, layer 3056 gully fill 6064, pit fill 6062 and pit fill 6072 were sorted for waterlogged plant macrofossils so the charred plant macrofossils present in these samples are recorded in **Table 11**.

### *Crop remains*

- 7.4.8 The crops present both in contexts dated to the 11th–13th century and in contexts dated to the 13th–15th century are hulled barley (*Hordeum distichum/vulgare*), rye (*Secale cereale*) and bread/rivet wheat (*Triticum aestivum/turgidum*). Oat grains (*Avena* sp.) are also frequently present and, although it is not possible to determine whether these are a cultivated crop or crop weed, the presence of diagnostic chaff of possible common oat

(*Avena cf. sativa*) in layer 1057 and layer 3056 indicates that at least some of the oat grains are likely to be crops.

- 7.4.9 Most of the crop remains are cereal grains that are likely to have been charred accidentally during parching or food preparation and re-deposited in the sampled contexts. A large quantity of cereal chaff is however present in layer 1057, indicating the presence of a crop processing by-product. This assemblage includes rachis nodes of rye (*Secale cereale*), barley (*Hordeum vulgare/distichum*) and possible bread wheat (*Triticum cf. aestivum*) as well as cereal culm nodes.

*Wild/weed species*

- 7.4.10 Large quantities of charred wild or weed plant seeds are also present in layer 1057. The taxa present in this assemblage includes a range of common crop weeds or wild plants commonly associated with fertile disturbed habitats including arable fields. This group includes black mustard (*Brassica nigra*), redshank/pale persicaria (*Persicaria maculosa/lapathifolia*), knotgrass (*Polygonum aviculare* agg.), field mouse-ear (*Cerastium arvense*), corncockle (*Agrostemma githago*), cornflower (*Centaurea cyanus*), stinking chamomile (*Anthemis cotula*), corn marigold (*Glebionis segetum*), narrow-fruited cornsalad (*Valerianella dentata*) and rye grass (*Lolium* sp.).
- 7.4.11 Sheep's sorrel (*Rumex acetosella*), which is abundant in layer 1057, is a plant of heaths and short grassland on sandy acidic soils. Seeds of this plant are however frequently found in association with cereal remains and it is likely to have grown as a crop weed in the past, where soil conditions were suitable. Seeds of vetch/vetchling (*Vicia* sp./*Lathyrus* sp.) and clover/medick (*Trifolium* sp./*Melilotus* sp.) are also frequently found in association with charred crop material and are likely to be crop weeds.
- 7.4.12 Other taxa present in layer 1057 are nettle (*Urtica dioica*), common mallow (*Malva sylvestris*), docks (*Rumex* spp.), greater plantain (*Plantago major*), nipplewort (*Lapsana communis*) and hemlock (*Conium maculatum*) which are more commonly associated with waste or rough ground but which may also grow in cultivated fields. Bulbous/meadow/creeping buttercup (*Ranunculus acris/repens/bulbosus*), timothy (*Phleum pratense*) and various small and large seeded grasses (Poaceae) grow in a range of grassy habitats including arable field margins.
- 7.4.13 Another group of taxa in the wild or weed seed assemblage from layer 1057 are commonly associated with damp soils. These include lesser spearwort (*Ranunculus flammula*), blinks (*Montia fontana* ssp. *chondrosperma*), club-rush (*Schoenoplectus* sp.), bristle club-rush (*Isolepis setacea*) and many of the species of sedge potentially present (*Carex* spp.).
- 7.4.14 Many of the wild/weed taxa present in layer 1057 are also present in the smaller and less diverse assemblages of charred wild or weed plant seeds from other medieval contexts at the castle site. Vetch/vetchling, sheep's sorrel, docks, stinking chamomile, rye grass and grasses are the most frequently occurring taxa. The common crop weeds, scentless mayweed (*Tripleurospermum inodorum*) and cleavers (*Galium aparine*), are present in the courtyard bedding layer 5041, but not in layer 1057, and the ruderal taxon ribwort plantain (*Plantago lanceolata*) and common crop weed fat hen (*Cenopodium album*) are present in the earthwork layer 3062.
- 7.4.15 A final group of taxa that are present in the charred plant macrofossil assemblage are the remains of potential collected food plants. These include hazel nutshell (*Corylus avellana*), which is present in most samples, blackberry (*Rubus fruticosus* agg.), which is present in

the courtyard bedding layers 1076 and 1057, wild strawberry (*Fragaria vesca*) and fig (*Ficus carica*), which are present in layer 1057.

**Table 11** Charred plant macrofossils

		Date	AD 1040-1210	AD 1170-1260	AD 1170-1260	13th–15th C	13th–15th C
		Context	1076	1057	5041	5045	3062
		Sample	1009	1003	5004	5003	3003
		Feature					
		Context type	Levelling layer for courtyard	Levelling layer	Bedding layer for stone surface	Bedding layer for stone surface	Layer in earthwork for possible motte
		Sample size (l)	40	10	38	5	8
		Flot size (ml)	500	200	4	5	60
Taxon	Common name	Habitat					
Cereal grain							
<i>Hordeum vulgare/distichum</i> (hulled)	barley	Arable	10	-	-	-	1
<i>Hordeum vulgare/distichum</i>	barley	Arable	5	-	-	-	-
cf. <i>Hordeum vulgare/distichum</i>	possible barley	Arable	-	1	-	-	1
<i>Secale cereale</i>	rye	Arable	-	20	-	-	3
cf. <i>Secale cereale</i>	possible rye	Arable	-	6	-	-	10
<i>Triticum aestivum/turgidum</i>	bread/rivet wheat	Arable	1	2	-	4	4
<i>Triticum</i> cf. <i>aestivum/turgidum</i>	possible bread/rivet wheat	Arable	1	-	-	2	2
<i>Triticum</i> sp.	wheat		-	-	-	-	3
<i>Triticum</i> sp./ <i>Secale cereale</i>	wheat/rye	Arable	-	22	-	-	30
Cereal indet.		Arable	4	-	-	-	-
Cereal chaff							
<i>Avena</i> cf. <i>sativa</i> floret base	possible common oat	Arable	-	16	-	-	-
<b><i>Hordeum distichum/vulgare</i> rachis node</b>	barley	Arable	-	5	-	-	-
<i>Secale cereale</i> rachis node	rye	Arable	-	96	-	-	-
<b><i>Triticum</i> cf. <i>aestivum</i> rachis node</b>	possible bread wheat	Arable	-	1	-	-	-
<b><i>Triticum aestivum/turgidum</i> rachis node</b>	bread/rivet wheat	Arable	-	2	-	-	-
>2mm culm node	cereal straw node	Arable	3	7	1	-	-
Other remains							
<i>Ranunculus bulbosus</i> / <i>acris/repens</i>	bulbous/ meadow/ creeping buttercup	gP	-	2	1	-	-
<i>Ranunculus flammula</i> L.	lesser spearwort	P wet	-	8	-	-	-
<i>Vicia</i> sp./ <i>Lathyrus</i> sp.	vetch/vetchling		-	3	-	-	4
<i>Trifolium</i> sp./ <i>Melilotus</i> sp.	clover/medick		-	4	1	-	-
<i>Rubus fruticosus</i> agg.	bramble	h	4	1	-	-	-
<i>Fragaria vesca</i> L.	wild strawberry	h	-	4	-	-	-
<i>Ficus carica</i> L.	fig		-	1	-	-	-
<i>Urtica dioica</i> L.	common nettle	daP	-	12	4	-	-
<i>Corylus avellana</i> L. >4mm nutshell fragments	hazel	h	3	5	-	-	10
<i>Corylus avellana</i> L. 2-4mm nutshell fragments	hazel	h	-	9	1	-	-
<i>Malva sylvestris</i> L.	common mallow	daP	-	2	-	-	-



			Date	AD 1040-1210	AD 1170-1260	AD 1170-1260	13th–15th C	13th–15th C
			Context	1076	1057	5041	5045	3062
			Sample	1009	1003	5004	5003	3003
			Feature					
			Context type	Levelling layer for courtyard	Levelling layer	Bedding layer for stone surface	Bedding layer for stone surface	Layer in earthwork for possible motte
			Sample size (l)	40	10	38	5	8
			Flot size (ml)	500	200	4	5	60
Taxon	Common name	Habitat						
<i>Malva</i> sp.	mallow		-	7	-	-	-	-
<i>Brassica nigra</i> (L.) W.D.J. Koch	black mustard	daA	-	2	-	-	-	-
<i>Persicaria maculosa/lapathifolia</i>	redshank/pale persicaria	daA	-	2	-	-	-	-
<i>Polygonum aviculare</i> agg.	knotgrass	daA	-	39	-	-	-	-
<b><i>Fallopia convolvulus</i> (L.) A Löve</b>	black bindweed	daA						
<i>Rumex acetosella</i> L.	sheep's sorrel	dgaP acid	-	44	1	-	-	1
<i>Rumex</i> spp.	docks		-	3	1	-	-	2
<i>Cerastium arvense</i> L.	field mouse-ear	daP sandy	-	4	-	-	-	-
<i>Agrostemma githago</i> L.	corncockle	daA	-	7	-	-	-	-
<i>Chenopodium</i> spp.	goosefoots		-	-	-	-	-	1
<i>Chenopodium</i> cf. <i>ficifolium</i>	possible fig-leaved goosefoot	daA	-	-	-	-	-	2
<i>Chenopodium album</i> L.	fat hen	daA	-	-	-	-	-	5
<i>Atriplex</i> spp.	orache		-	-	-	-	-	1
<i>Montia fontana</i> ssp. <i>chondrosperma</i>	blinks	A/P wet	-	4	-	-	-	-
<i>Galium aparine</i> L.	cleavers	daA	-	-	1	-	-	-
<i>Solanum nigrum</i> L.	black nightshade	daA						
<i>Plantago major</i> L.	greater plantain	dgaP	-	4	1	-	-	-
<i>Plantago lanceolata</i> L.	ribwort plantain	dgaP	-	-	-	-	-	1
Asteraceae	daisy family		-	12	-	-	-	-
<i>Centaurea cyanus</i> L.	cornflower	daA	-	1	-	-	-	-
<i>Lapsana communis</i> L.	nipplewort	dahw A/P	-	1	-	-	-	-
<i>Anthemis cotula</i> L.	stinking chamomile	daA	-	4	4	1	-	5
<i>Glebionis segetum</i> (L.) Fourr.	corn marigold	daA	-	9	2	1	-	9
<b><i>Tripleurospermum inodorum</i> (L.) Sch. Bip.</b>	scentless mayweed	daA	-	-	1	-	-	-
<i>Sambucus nigra</i> L.	elder	dhg	-	2	1	-	-	-
<i>Valerianella dentata</i> (L.) Pollich	narrow-fruited cornsalad	aA	-	1	-	-	-	-
<i>Conium maculatum</i> L.	hemlock	dB damp	-	2	-	-	-	-
<i>Juncus</i> spp.	rushes	Pwet	-	-	-	-	-	1
<i>Schoenoplectus</i> sp.	club-rush	Pwet	-	5	1	-	-	-
<i>Isolepis setacea</i> (L.) R. Br.	bristle club-rush	Pwet	-	4	-	-	-	-
<i>Carex</i> spp. (ovoid)	sedges		-	10	-	-	-	-
<i>Carex</i> spp. (trigonous)	sedges		-	22	1	-	-	-
<i>Lolium</i> sp.	rye grass	daA/P	-	5	-	-	-	5
cf. <i>Lolium</i> sp.	possible rye grass		-	2	-	-	-	2



Date	AD 1040-1210	AD 1170-1260	AD 1170-1260	13th–15th C	13th–15th C
Context	1076	1057	5041	5045	3062
Sample	1009	1003	5004	5003	3003
Feature					
Context type	Levelling layer for courtyard	Levelling layer	Bedding layer for stone surface	Bedding layer for stone surface	Layer in earthwork for possible motte
Sample size (l)	40	10	38	5	8
Flot size (ml)	500	200	4	5	60

Taxon	Common name	Habitat					
<i>Avena</i> sp.	oat	daA	-	4	8	-	22
cf. <i>Avena</i> sp.	possible oat	daA	4	2	5	-	27
<i>Phleum pratense</i> L.	timothy	dagP	-	64	-	-	-
<i>Poaceae</i> >2mm	large seeded grasses		9	5	1	1	17
<i>Poaceae</i> <2mm	small seeded grasses		-	78	9	-	5
<i>Tuber/rhizome</i>			1				
Wood charcoal >4mm			+	++++	++	++	+++
Wood charcoal 2-4mm			+	+++++	++++	++++	++

Abundance key, - = < 10 items, + = > 10 items, ++ = > 50 items, +++ = > 100 items, ++++ = > 250 items, +++++ = > 500 items

Habitat key, a = arable, d = disturbed ground and waste places, g = grassland, h = hedgerows and scrub, w = woodland, A = annual, B = biennial, P = perennial, acid = acid soils, sandy = sandy soils damp = damp or wet soils, dry = dry soils

### Waterlogged plant macrofossils

#### Contexts producing waterlogged plant macrofossils

- 7.4.16 Plant macrofossils preserved by anoxic waterlogging were found in a series of deposits from trench 6 and trench 3.
- 7.4.17 In trench 6, gully fill 6064, pit fill 6062, pit fill 6060 and pit fill 6072, are from a group of early cut features sealed by made ground layer 6055. A date of cal. AD 1030–1200 was obtained from a hazel nutshell fragment which was found in pit fill 6060.
- 7.4.18 In trench 3, contexts 3057 and 3079 are associated with a demolition or destruction phase, thought to be the destruction of the castle in 1266 by John D’Eyville. Both contained 13th century pottery. Context 3056 is a layer which directly overlays these destruction deposits containing pottery dating to between the 12th to 14th century and probably represents the immediate rebuilding efforts after the destruction.
- 7.4.19 Samples 6007 (from gully fill 6064), sample 6008 (from pit fill 6062) and sample 3008 (from layer 3056) were initially processed by flotation rather than wet sieving. It was determined during assessment that the rich assemblages of uncharred seeds in these samples are also likely to be ancient material preserved by anoxic waterlogging, rather than modern intrusive material, and it was recommended that they be analysed alongside the samples which had been processed by wet sieving. It should be noted however that the larger volumes of soil and different processing method used for these samples may have resulted in some differential preservation and recovery of plant macrofossils.

#### Wild/weed species

- 7.4.20 The assemblages of waterlogged plant macrofossils from trench 6 and trench 3 share general similarities in terms of the types of habitat indicated (see **Fig. 38**). Samples from

both trenches include high proportions of the seeds of crop weed taxa, such as wild radish (*Raphanus raphanistrum* ssp. *raphanistrum*), stinking chamomile (*Anthemis cotula*) and corn marigold (*Glebionis segetum*). Other frequently occurring plants which are commonly associated with a range of nutrient enriched disturbed habitats are common nettle (*Urtica dioica*), redshank/pale persicaria (*Persicaria maculosa/lapathifolia*), knotgrass (*Polygonum aviculare* agg.), large flowered/common/bifid hemp nettle (*Galeopsis speciosa/tetrahit/bifida*) and nipplewort (*Lapsana communis*). A smaller proportion of samples are composed of ruderal taxa, such as thistles (*Carduus* sp./*Cirsium* sp) and hemlock (*Conium maculatum*).

- 7.4.21 Sheep's sorrel (*Rumex acetosella*), a plant of heaths and short grassland on sandy acidic soils, that can also grow as a crop weed (see 'Charred plant macrofossils' above), is also ubiquitous. Docks (*Rumex* spp.), which include several species commonly associated with waste and rough ground, as well as species of other habitats, are the most abundant taxa type. Some of the dock seeds retained fruiting tepals which enabled a tentative identification of broad-leaved dock (*Rumex* cf. *obtusifolius* var. *obtusifolius*) which is a plant of field margins, hedge banks, roadsides, stream and riverbanks, ditches and neglected cultivated ground.
- 7.4.22 Other taxa that are frequently present in samples from trench 3 and trench 6 are bulbous/meadow/creeping buttercup (*Ranunculus bulbosus/acris/repens*) and tormentil (*Potentilla erecta*), indicating grassy habitats. Seeds of sedges (*Carex* spp.), many species of which are associated with damp soils, are also ubiquitous. Lesser spearwort (*Ranunculus flammula*) which is a plant of wet habitats is frequently present. Raspberry (*Rubus idaeus*), wild strawberry (*Fragaria vesca*), hazelnut (*Corylus avellana*) and elderberry (*Sambucus nigra*), which are all woodland, hedgerow or scrub taxa, are well represented. These are all also edible wild fruits and nuts which may have been collected as food. Fragments of waterlogged wood are the dominant class of material present in all the waterlogged samples, the majority of which are likely to be from wood brought to the site as timber or fuel (see 'Wood' below).
- 7.4.23 There are differences between the taxa present in the cut feature fills/layers and the demolition/destruction deposits. The grassland component of cut feature fills 6064, 6062, 6060 and 6072, layer 6055 and layer 3056 includes taxa associated with meadow or pasture as well as general grassland plants such as common sorrel (*Rumex acetosa*), ragged robin (*Silene flos-cuculi*), selfheal (*Prunella vulgaris*), red bartsia (*Odontites vernus*), hawkweed oxtongue (*Picris hieracoides*), yarrow (*Achillea millefolium*) and burnet saxifrage (*Pimpinella* sp.). Water pepper (*Persicaria hydropiper*), which is a plant of damp mud and wet meadows, is consistently present in the cut feature fills and layers. Seeds of chickweed (*Stellaria media*) and fat hen (*Chenopodium album*), which are plants of nutrient enriched disturbed soils, are also consistently present in these deposits. Sample 6006 from layer 6055 produced a particularly rich assemblage of nettle seeds (*Urtica dioica*), indicating a likely accumulation from nettle plants growing in situ. Gully fill 6064 produced a particularly rich assemblage of seeds and seed fragments of the crop weed corncockle (*Agrostemma githago*). The presence of over fifty whole seeds indicates that this assemblage is likely to be from a dump of seeds removed from cereal crops in the later stages of crop processing, rather than seed remains from cess that were incorporated into flour during milling.
- 7.4.24 The grassland component in demolition/destruction layers 3057 and 3079 includes hairy buttercup (*Ranunculus sardous*), which is a plant of short grassland in areas of disturbance such as verges and tracks on damp soils, greater plantain (*Plantago major*), which is also a plant of open grassland in areas of disturbance such as trampled paths,

and timothy (*Phleum pratense*), which is a plant of a wide range of grassy habitats. Red goosefoot (*Chenopodium rubrum*), which is a plant of nutrient rich trampled mud as well as waste and cultivated ground, is present and the seeds of knotgrass (*Polygonum aviculare* agg.), which is also a plant of nutrient enriched soils, are significantly more abundant in layers 3057 and 3079. Mosses (*Bryophyta*) are more abundant in layers 3057 and 3079 and leaf buds are also present, some of which were tentatively identified as oak (*cf. Quercus* sp.) and hazel (*cf. Corylus avellana*).

- 7.4.25 Samples 3009 and 3013 from demolition/destruction layers 3057 and 3079, both produced very rich assemblages of hazel nutshells, with high proportions of fragments greater than 4 mm in size. This indicates that these nutshells are likely to be primary deposits of waste material from the processing of hazel nuts for consumption, rather than re-deposited material or material which had been subject to trampling. No evidence for animal gnawing and no whole nutshells were present in the assemblage, indicating that it is unlikely to be a natural accumulation from hazel trees growing in situ.
- 7.4.26 Sample 3008 from layer 3056 (which overlays destruction deposits 3057 and 3079) produced a particularly large number of elderberry seeds (*Sambucus nigra*), although this is largely due to the fact that sample 3008 was a 40 litre bulk sample rather than a 1 litre sub-sample. Other taxa in layer 3056, which indicate scrub, hedgerows or woodland, are alder (*Alnus glutinosa*), bugle (*Ajuga reptans*) and downy woundwort (*Stachys germanica*).



**Table 12** Waterlogged plant macrofossils

		Date	11th– 13th C	11th– 13th C	AD 1030- 1200	11th– 13th C	11th– 13th C	13th– 15th C	13th– 15th C	13th– 15th C
		Context number	6064	6062	6060	6072	6055	3056	3057	3079
		Sample number	6007	6008	6009	6011	6006	3008	3009	3013
		Feature number	6063	6061	6059	6067				
		Context type	Gully fill	Pit fill	Pit fill	Pit fill	Layer	Layer	Layer	Layer
		Sample size (l)	32	10	1	1	1	40	1	1
		Flot size (ml)	150	100	100	100	300	300	700	400
Taxon	Common name	Habitat								
Cereal grain										
<i>Hordeum vulgare/distichum</i> (hulled)	barley	Arable						(1ch)		
<i>Triticum aestivum/turgidum</i>	bread/riwet wheat	Arable				(1ch)		(3ch)		
<i>Triticum</i> sp.	wheat	Arable	(1ch)							
<i>Triticum</i> sp./ <i>Secale cereale</i>	wheat/rye	Arable	(2ch)							
Cereal indet.		Arable	(3ch)	(1ch)						(1ch)
Cereal chaff										
<i>Avena sativa</i> floret base	common oat	Arable						(1ch)		
Other remains										
Bryophyta	mosses		++	-	++	-	++	++	++++	++++
<i>Pteridium</i> pinnule	bracken			(1ch)						
<i>Papaver somniferum</i> L.	opium poppy	daA				1				
<i>Ranunculus bulbosus/acris/repens</i>	bulbous/ meadow/ creeping buttercup	gP	2	2	4	-	18	19	13	20
<i>Ranunculus sardous</i> Crantz	hairy buttercup	dgA damp	-	-	-	-	-	-	7	15
<i>Ranunculus flammula</i> L.	lesser spearwort	P wet	6	4	10	4	16	10	2	-
Fabaceae	pea family		-	-	-	-	-	-	-	1
<i>Vicia</i> sp./ <i>Lathyrus</i> sp.	vetch/vetchling		(2ch)							
<i>Prunus spinosa</i> L.	sloe	hw	1	-	-	-	-	-	-	-
<i>Crataegus monogyna</i> Jacq	hawthorn	hw	-	-	-	1	-	-	-	-
<i>Rubus fruticosus</i> agg.	blackberry	hw	106	120	54	-	10	72 (1ch)	3	1
<i>Rubus idaeus</i> L.	raspberry	hw	19	18	4	-	4	8	2	-
<i>Potentilla erecta</i> (L.) Raesch	tormentil	ghwP	3	6	9	1	3	8	-	2
<i>Fragaria vesca</i> L.	wild strawberry	hwP	2	-	1	-	7	5	1	1
<i>Aphanes arvensis</i> L.	parsley-piert	gaA dry	-	-	-	-	-	-	1	-
<i>Urtica dioica</i> L.	common nettle	daP	12	-	15	5	1441	48	58	152
cf. <i>Quercus</i> sp. leaf buds	possible oak	hw	-	-	-	-	-	-	10	5
<i>Alnus glutinosa</i> (L.) Gaertn.	alder	hw wet	-	-	-	-	-	1	1	-
<i>Corylus avellana</i> L. >4mm nutshell fragments	hazel	hw	3	-	5	8	-	6	628	312 (1ch)
<i>Corylus avellana</i> L. 2-4mm nutshell fragments	hazel	hw	3	-	7	2	-	2	182	176 (4ch)





			Date	11th- 13th C	11th- 13th C	AD 1030- 1200	11th- 13th C	11th- 13th C	13th- 15th C	13th- 15th C	13th- 15th C
			Context number	6064	6062	6060	6072	6055	3056	3057	3079
			Sample number	6007	6008	6009	6011	6006	3008	3009	3013
			Feature number	6063	6061	6059	6067				
			Context type	Gully fill	Pit fill	Pit fill	Pit fill	Layer	Layer	Layer	Layer
			Sample size (l)	32	10	1	1	1	40	1	1
			Flot size (ml)	150	100	100	100	300	300	700	400
Taxon	Common name	Habitat									
cf. <i>Corylus avellana</i> L. leaf buds	possible hazel		-	-	-	-	-	-	-	-	2
<i>Elatine hexandra</i> (Lapierre DC.	Six-stamened waterwort	A wet	-	1	-	-	-	-	-	-	-
<i>Viola</i> sp.	violet		5	5	2	-	1	-	-	-	-
<i>Brassica nigra</i> (L.) W.D.J. Koch	black mustard	daA	-	-	-	-	16	-	-	-	-
<i>Raphanus raphanistrum</i> spp. <i>raphanistrum</i> seed pod	wild radish	daA	3	-	-	-	-	-	-	-	-
<i>Raphanus raphanistrum</i> spp. <i>raphanistrum</i> seed pod fragment	wild radish	daA	1	2	-	1	-	2	-	-	1
<i>Persicaria maculosa/lapathifolia</i>	redshank/pale persicaria	daA	1	1	1	2	1	6	2	-	-
<i>Persicaria hydropiper</i> (L.) Delarbre	water-pepper	dgA damp	7	8	6	-	72	2	-	-	-
<i>Polygonum aviculare</i> agg.	knotgrass	daA	16	4	3	1	10	7	165	115	-
<b><i>Fallopia convolvulus</i> (L.) Á Löve</b>	black bindweed	daA	-	-	-	-	5	1	-	-	-
<i>Rumex acetosella</i> L.	sheep's sorrel	dgaP acid	-	28	14	4	4	6 (3ch)	8	13	-
<i>Rumex acetosa</i> L.	common sorrel	gP sandy	16	20	16	21	19	-	-	-	-
<i>Rumex obtusifolius</i> var. <i>obtusifolius</i> tepals	broad-leaved dock	dP	-	-	-	3	7	1	-	-	2
<i>Rumex</i> cf. <i>obtusifolius</i> var. <i>obtusifolius</i> tepals	possible broad- leaved dock		4	9	-	-	55	-	-	-	3
<i>Rumex</i> spp.	docks		497	307	245	150 (2ch)	449	20 (1ch)	48	167	-
<i>Stellaria media</i> (L.) Vill.	common chickweed	daA	5	4	5	5	1	2	-	-	-
<i>Stellaria graminea</i> L.	lesser stitchwort	ghwP	1	-	-	1	1	-	-	-	9
<i>Cerastium arvense</i> L.	field mouse-ear	daP sandy	-	-	-	-	1	-	-	-	11
<i>Spergula arvensis</i> L.	corn spurrey	daA	-	-	-	2	-	-	-	-	-
<i>Agrostemma githago</i> L.	corncockle	daA	56	1	2	-	-	1	-	-	-
<i>Agrostemma githago</i> L. seed fragments	corncockle	daA	55	2	-	-	-	-	-	-	-
<i>Silene dioica</i> (L.) Clairv.	red campion	hwP	-	1	-	-	1	-	-	-	4
<i>Silene flos-cuculi</i> (L.) Clairv.	ragged robin	gw	-	-	-	-	1	-	-	-	-
<i>Chenopodium album</i> L.	fat hen	daA	17	-	2	3	-	7 (1ch)	-	-	-
<i>Chenopodium rubrum</i> L.	red goosefoot	daA	-	-	-	-	-	-	36	25	-
<i>Atriplex</i> spp.	orache		27	7	-	-	2	-	-	-	-
<i>Solanum nigrum</i> L.	black nightshade	daA	-	-	-	-	2	-	-	-	-
<i>Plantago major</i> L.	greater plantain	dgaP	-	-	-	-	-	-	129	142	-
<i>Stachys germanica</i> L.	downy woundwort	ghwB/P	-	-	-	-	-	1	-	-	-



Date	11th-13th C	11th-13th C	AD 1030-1200	11th-13th C	11th-13th C	13th-15th C	13th-15th C	13th-15th C
Context number	6064	6062	6060	6072	6055	3056	3057	3079
Sample number	6007	6008	6009	6011	6006	3008	3009	3013
Feature number	6063	6061	6059	6067				
Context type	Gully fill	Pit fill	Pit fill	Pit fill	Layer	Layer	Layer	Layer
Sample size (l)	32	10	1	1	1	40	1	1
Flot size (ml)	150	100	100	100	300	300	700	400

Taxon	Common name	Habitat	11th-13th C	11th-13th C	AD 1030-1200	11th-13th C	11th-13th C	13th-15th C	13th-15th C	13th-15th C
<i>Stachys sylvatica</i> L.	hedge woundwort	dghwP	4	-	-	-	-	-	-	-
<i>Stachys arvensis</i> (L.) L.	field woundwort	daA	-	-	-	-	-	6	-	-
<i>Stachys cf. arvensis</i>	possible field woundwort		-	-	-	-	-	4	-	-
<i>Ballota nigra</i> L.	black horehound	dhP	1	-	-	-	-	-	-	-
<i>Galeopsis speciosa/tetrahit/bifida</i>	large flowered/common/bifid hemp nettle	daA	5	2	2	-	7	1	2	1
<i>Ajuga reptans</i> L.	bugle	wgP	2	-	-	-	-	1	-	1
<i>Prunella vulgaris</i> L.	selfheal	dgP	-	-	-	-	-	2	-	-
<i>Mentha arvensis</i> L.	corn mint	dagwP	-	-	-	-	2	2	-	-
<i>Odontites vernus</i> (Bellardi) Dumort.	red bartsia	dagA	-	-	-	2	-	-	-	-
Asteraceae	daisy family		-	-	-	-	-	-	-	-
<i>Arctium</i> sp.	burdock	dhwP	1	-	-	-	-	-	-	2
<i>Carduus</i> sp./ <i>Cirsium</i> sp.	thistles		-	-	-	-	8	2	1	2
<i>Lapsana communis</i> L.	nipplewort	dahw A/P	20	4	6	1	16	2	1	3
<i>Picris hieracioides</i> L.	hawkweed oxtongue	dgB/P	-	1	-	-	-	3	-	-
<i>Achillea millefolium</i> L.	yarrow	dgP	-	-	2	1	18	-	-	-
<i>Anthemis cotula</i> L.	stinking chamomile	daA	30	14	11	1 (1ch)	12	2	-	4
<i>Glebionis segetum</i> (L.) Fourr.	corn marigold	daA	49	11	13	4 (1ch)	36	146 (17ch)	27	32
<b><i>Tripleurospermum inodorum</i> (L.) Sch. Bip.</b>	scentless mayweed	daA	4	-	-	-	2	-	-	-
<i>Sambucus nigra</i> L.	elder	dhg	7	5	1	-	-	253	1	-
<i>Valerianella dentata</i> (L.) Pollich	narrow-fruited cornsalad	aA	1	-	-	-	1	-	-	1
<i>Pimpinella</i> sp.	Burnet-saxifrage	dgP	-	8	-	-	-	-	-	-
<i>Aethusa cynapium</i> L.	fool's parsley	daA	-	1	1	-	2	-	-	-
<i>Conium maculatum</i> L.	hemlock	dB damp	12	2	4	-	13	2	1	1
<i>Bupleurum rotundifolium</i> L.	thorow-wax	daA	-	-	-	-	-	-	1	-
cf. <i>Bupleurum rotundifolium</i>	possible thorow-wax		-	-	-	-	-	1	-	-
<i>Apium graveolens</i> L.	wild celery	dB/P wet	-	16	-	-	-	-	-	-
<i>Juncus</i> spp.	rushes		-	8	-	4	166	2	6	24
<i>Schoenoplectus</i> sp.	club-rush	Pwet	-	-	-	-	-	-	3	-
<i>Eleocharis</i> sp.	spike-rush	Pwet	-	-	2	-	-	1	-	1
<i>Isolepis setacea</i> (L.) R. Br.	bristle club-rush	Pwet	-	-	-	-	-	2	-	-
<i>Carex</i> spp. (ovoid)	sedges		4	15	7	2	20	77 (1ch)	15	27



Date	11th–13th C	11th–13th C	AD 1030–1200	11th–13th C	11th–13th C	13th–15th C	13th–15th C	13th–15th C		
Context number	6064	6062	6060	6072	6055	3056	3057	3079		
Sample number	6007	6008	6009	6011	6006	3008	3009	3013		
Feature number	6063	6061	6059	6067						
Context type	Gully fill	Pit fill	Pit fill	Pit fill	Layer	Layer	Layer	Layer		
Sample size (l)	32	10	1	1	1	40	1	1		
Flot size (ml)	150	100	100	100	300	300	700	400		
Taxon	Common name	Habitat								
<i>Carex</i> spp. (trigonus)	sedges		20	15	7	-	21	46	7	3
<i>Lolium</i> sp.	rye grass	daA/P	-	-	-	-	-	(1ch)	-	-
<i>Avena</i> sp.	oat	daA		(2ch)				(12ch)	(1ch)	
cf. <i>Avena</i> sp.	possible oat	daA	(1ch)	(2ch)						
<i>Phleum pratense</i> L.	timothy	dagP	-	-	-	-	-	(1ch)	294	162
<i>Poaceae</i> >2mm	large seeded grasses		-	-	-	-	-	(5ch)	-	-
<i>Poaceae</i> <2mm	small seeded grasses		-	-	-	-	-	(4ch)	-	-
Leaf buds indet.			-	(1ch)	1	-	-	-	3	2
Wood fragments >4mm			+++	+++	+++	+++	+++	+++	+++	+++
Wood fragments 2–4mm			++++	++++	++++	++++	++++	++++	++++	++++
Wood charcoal >4mm				-	-	+		+++	++	+
Wood charcoal 2–4mm			+	++	-	++		++++	+++	++

(ch=charred). Abundance key, - = <10 items, + = > 10 items, ++ = > 50 items, +++ = > 100 items, ++++ = > 250 items, +++++ = > 500 items

Habitat key, a = arable, d = disturbed ground and waste places, g = grassland, h = hedgerows and scrub, w = woodland, A = annual, B = biennial, P = perennial, acid = acid soils, sandy = sandy soils, damp = damp or wet soils, dry = dry soils

### Wood charcoal

#### Contexts producing rich assemblages of wood charcoal

- 7.4.27 Wood charcoal fragments are present in most of the samples taken from the castle site. Rich assemblages of wood charcoal, composed of more than fifty charcoal fragments greater than 2 mm in size in cross section, are present in a series of deposits from trenches 1, 3, 5 and 6.
- 7.4.28 In trench 1, layer 1076 is the uppermost of a series of deposits thought to be levelling layers for the castle courtyard and made ground layer 1057 is one of a series of deposits overlying the courtyard surface. Assemblages of charred plant macrofossils were also found in these contexts. A date of cal. AD 1040–1210 was obtained from a barley grain (*Hordeum distichum/vulgare*) which was found in layer 1076 and a date of cal. AD 1170–1260 was obtained from a rye grain (*Secale cereale*) which was found in layer 1057. Context 1018 is a deposit within an 18th/19th century drain.
- 7.4.29 In trench 6, layer 6047 is one of a series of layers. A radiocarbon date of cal. AD 1220–1270 was obtained from charred hazel nutshell found in the stratigraphically later layer 6044. Layer 6049 is a charcoal lens within layer 6039, perhaps of 13th/14th century date and which contained probably residual 12th century pottery (see stratigraphic narrative and discussion).

- 7.4.30 In trench 5, layer 5039 is a deposit of ironworking slag used to repair the cobblestone surface of the courtyard.
- 7.4.31 In trench 3, layer 3062 is one of a series of clay deposits that had been built up in stages as part of the construction of an earthwork. An assemblage of charred plant macrofossils was also found in this deposit. Layer 3057 is associated with a demolition or destruction phase and was found to contain 13th century pottery. Context 3056 is a layer which directly overlays this destruction deposit and contained pottery falling within a range from the 12th to 14th century. Assemblages of waterlogged plant macrofossils were also found in layers 3062 and 3057.

#### Woody plant species

- 7.4.32 The taxa present in contexts dated to the 11th–12th century, contexts dated to the 13th–15th century and 18th/19th-century drain fill 1018 are very similar, with the exception of a fragment of conifer charcoal in drain fill 1018. In order of frequency in the samples, the taxa present in the medieval contexts are oak, (*Quercus* sp.), hazel (*Corylus avellana*), hawthorn/apple/pear/whitebeams (Pomoideae), alder (*Alnus glutinosa*), ash (*Fraxinus excelsior*), birch (*Betula* sp.), field maple (*Acer campestre*), holly (*Ilex aquifolium*), elm (*Ulmus* sp.), blackthorn (*Prunus* cf. *spinosa*) and poplar/willow (*Populus* sp./*Salix* sp.). The taxa present in 18th/19th century drain fill, in order of frequency, are oak, hazel, birch, alder, poplar/willow, blackthorn, hawthorn/apple/pear/whitebeams, field maple and indeterminate conifer.
- 7.4.33 All the samples are dominated by oak, except for sample 1009 from courtyard levelling layer 1076, which produced relatively equal proportions of oak and hazel. Layer 1076, earthwork layer 3062 and drain fill 1018 produced diverse assemblages of seven or more different taxa while the remainder of the analysed contexts produced assemblages of five taxa or less. The charcoal assemblage from 5039, which is a deposit of ironworking slag used to repair the cobblestone surface of the courtyard, is composed almost entirely of oak. A high proportion of the oak charcoal fragments in all contexts have weak ring curvatures, with tyloses present in the vessel cavities, indicating the use of heartwood from mature trunk wood. Oak charcoal fragments with closely spaced annual growth rings are frequently present in all contexts, indicating oak grown under restricted growing conditions. Fungal hyphae are present in a small proportion of fragments from all contexts, indicating some use of decaying or poorly seasoned wood.

**Table 13** Wood charcoal summary table

Date	AD 1040-1210	AD 1170-1260	11th–13th C	13th/14th C?	13th–15th C	13th–15th C	13th–15th C	13th–15th C	18th C
Context number	1076	1057	6047	6049	5039	3062	3056	3057	1018
Sample number	1009	1003	6004	6005	5001	3003	3008	3009	1000
Feature number									
Context type	Layer	Layer	Layer	Charcoal lens	Layer	Layer	Layer	Layer	Drain fill
Sample size (l)	40	10	40	40	15	8	40	1	15
Flot size (ml)	500	200	10	200	30	60	300	700	120
Taxon (number of fragments)	Common name								
Coniferae indet.	conifer	-	-	-	-	-	-	-	1
<i>Prunus</i> cf.	possible	-	-	-	-	1	-	-	1



<i>spinosa</i>	blackthorn										
Pomoideae	hawthorn/apple/pear/whitebeams	2	4	-	-	-	2	1	-	1	
<i>Ulmus</i> sp.	elm	-	-	-	-	-	4	-	-	-	
<i>Quercus</i> sp.	oak	15	44	36	35	47	17	43	38	40	
<i>Betula</i> sp.	birch	1	-	1	-	-	-	-	-	2	
<i>Alnus glutinosa</i> (L.) Gaertn.	alder	-	-	5	10	-	1	-	-	1	
<i>Corylus avellana</i> L.	hazel	14	-	7	5	2	7	6	2	1	
<i>Acer campestre</i> L.	field maple	4	2	-	-	-	-	-	-	2	
<i>Populus</i> sp./ <i>Salix</i> sp.	poplar/willow	-	-	-	-	-	6	-	-	1	
<i>Fraxinus excelsior</i> L.	ash	7	-	1	-	-	12	-	-	-	
<i>Ilex aquifolium</i> L.	holly	6	-	-	-	-	1	-	-	-	
Indet.		1	-	-	-	-	-	-	10	-	
Dendrological features (number of fragments)	Strong ring curvature	-	-	4	3	-	-	-	-	10	
	Intermediate ring curvature	1	-	2	2	1	3	-	-	13	
	Weak ring curvature	9	23	11	9	27	18	18	4	23	
	Narrow rings	5	13	6	5	21	13	12	4	15	
	Tyloses	17	37	29	24	40	23	41	23	-	
	Reaction wood	5	-	2	2	-	1	-	-	-	
	Fungal hyphae	13	3	7	1	1	9	8	4	13	
	Insect degradation	-	-	-	-	-	-	-	-	-	-
	Presence of pith	-	-	-	-	-	-	-	-	-	-
	Presence of bark	-	-	-	-	-	-	-	-	-	-
Vitrification	5	-	-	1	7	1	-	3	-		

## Wood

### Contexts producing rich assemblages of wood

- 7.4.34 Large quantities of wood preserved by anoxic waterlogging were found in a series of deposits from trench 6 and trench 3, which also produced plant macrofossils preserved by anoxic waterlogging.
- 7.4.35 In trench 6, pit fill 6060 and pit fill 6072 are from a group of early cut features which are sealed by layer 6055. A date of cal. AD 1030–1200 was obtained from a hazel nutshell fragment which was found in pit fill 6060.
- 7.4.36 In trench 3, context 3057 is associated with a demolition or destruction phase, thought to be the destruction of the castle in 1266 by John D'Eyville, and contained 13th century pottery.

### Woody plant species

- 7.4.37 The assemblage of wood fragments preserved by anoxic waterlogging in pit fills 6060 and 6072 included a high proportion of thin flakes of wood possibly indicating wood working debris. The assemblages are dominated by oak but also include some alder and ash. The assemblage of wood fragments from layer 6055 which seals pit fills 6060 and 6072 also produced a high proportion of oak along with hawthorn/apple/pear/whitebeams and hazel.

Demolition/destruction layer 3057 was again dominated by oak along with hawthorn/apple/pear/whitebeams, alder and hazel. Oak fragments with weak ring curvature and tyloses are frequently present in all the assemblages and oak fragments with closely spaced annual growth rings are often present.

**Table 14** Wood summary table

Date	AD 1030-1200	11th-13th C	11th-13th C	13th-15th C	
Context number	6060	6072	6055	3057	
Sample number	6009	6011	6006	3009	
Feature number	6059	6067			
Context type	Pit fill	Pit fill	Layer	Layer	
Sample size (l)	1	1	1	1	
Flot size (ml)	100	100	300	700	
Taxon (number of fragments)	Common name				
Pomoideae	hawthorn/apple/pear/whitebeams	-	-	6	2
<i>Quercus</i> sp.	oak	40	43	38	38
<i>Alnus glutinosa</i> (L.) Gaertn.	alder	3	2	-	1
<i>Corylus avellana</i> L.	hazel	-	-	3	7
<i>Fraxinus excelsior</i> L.	ash	3	3	-	-
Indeterminate		4	2	3	2
Dendrological features (number of fragments)	Strong ring curvature	-	2	1	5
	Intermediate ring curvature	-	-	-	-
	Weak ring curvature	14	16	8	20
	Narrow rings	4	14	2	14
	Tyloses	28	18	10	27
	Reaction wood	-	-	-	-
	Fungal hyphae	-	-	-	-
	Insect degradation	-	-	-	-
	Presence of pith	-	-	-	1
	Presence of bark	-	-	-	4

### *Additional assessment*

#### Preservation

7.4.38 Uncharred seeds and wood were found in samples from borehole 1, which may be ancient material preserved by anoxic waterlogging although it is not possible to determine with confidence whether this is the case. The seeds are well preserved but the wood fragments are poorly preserved, being highly fragmented and with a spongy texture. Wood charcoal fragments were also found in the samples from borehole 1 and in monolith sample 10002. A fragment of hazel nutshell preserved by charring was found in monolith sample 10002. The wood charcoal fragments and charred hazel nutshell are well preserved.

#### Results

##### Borehole 1

7.4.39 A small quantity of uncharred seeds and wood fragments was found in the sample from a depth of 1–1.77 m in borehole 1. The uncharred seeds present include those of nettle (*Urtica dioica*) and hemlock (*Conium maculatum*) which are plants commonly associated with nutrient-rich, disturbed soils. Docks (*Rumex* spp.), which include several species commonly associated with waste and rough ground, as well as species of other habitats,

are also represented, as are seeds of meadow/creeping/bulbous buttercups (*Ranunculus bulbosus/acris/repens*), which are plants of grassy habitats. Seeds of blackberry (*Rubus fruticosus* agg.) and elder (*Sambuccus nigra*), plants that produce edible fruits, are represented, and a small quantity of wood fragments and wood charcoal fragments greater than 2 mm in size in cross section are also present.

7.4.40 The borehole 1 sample from a depth of 1.77–3.25 m produced a very small quantity of uncharred seeds consisting of blackberry, elder and dock. A moderately large assemblage of over fifty wood fragments greater than 2 mm in size in cross section was also found in this sample, along with some wood charcoal.

7.4.41 The borehole 1 sample from a depth of 3.25–4.20 m produced only herbaceous plant roots/stems and a small quantity of wood charcoal fragments greater than 2 mm in cross section.

Monolith sample 10002

7.4.42 The monolith sample from the castle ditch fill produced a relatively rich assemblage of just under fifty wood charcoal fragments over 2 mm in cross section along with one fragment of charred hazel nutshell (*Corylus avellana*).

### *Discussion*

#### Introduction

7.4.43 The assemblages of charred and uncharred plant macrofossils, wood charcoal and wood from Sheffield Castle provide evidence for the utilisation of plants and wood as well as evidence for living conditions and activities carried out within the castle grounds during the 11th–13th century and during the 13th–15th century. One sample of wood charcoal also provides evidence for the utilisation of wood at the site during the 18th/19th centuries.

#### Cultivated and collected plant foods

7.4.44 There are no apparent changes through time in the crop types present in the samples from Sheffield Castle. The crop types present, both from contexts dating to the 11th–13th century and from contexts dated to the 13th–15th century, are common oat, hulled barley, rye and bread/rivet wheat. This suite of crops is typical of the medieval period (Moffett 2006) and typical of other assemblages of charred plant macrofossils from medieval urban sites in Yorkshire, such as 12th–13th century deposits from Low Fisher Gate, Doncaster (Hall *et al.* 2003), 12th–13th century deposits from North Bridge, Doncaster (Carrott *et al.* 1997), 12th–13th century deposits from the Castle ditch at York (Carrott *et al.* 1995b), 11th–13th century deposits from Davygate Centre, York (Carrott *et al.* 1998a) and 11th–12th century deposits from Walmgate, York (Jaques *et al.* 2001).

7.4.45 The charred plant macrofossil assemblages from 12th–13th century and 13th–15th century deposits include a range of typical crop weeds such as corncockle, corn marigold, stinking chamomile, cornflower and rye grass which are likely to have been harvested along with the crops. The increasing presence of stinking chamomile in assemblages dating to the medieval period in England has been related to changes in cultivation practices such the expansion of cultivation onto heavier clay soils (Jones 1981), facilitated by deep plough agriculture (Jones 1981, 1988). Corncockle and cornflower are also both typical crop weeds of the medieval period (Jones 1988; Grieg, 1991). Corn marigold is a frequently occurring taxon in medieval archaeobotanical assemblages from the region and appears to be an indicator for post conquest deposits in York (Tomlinson 1989, 22).

- 7.4.46 The presence of the seeds of sheep's sorrel and corn marigold in the charred plant macrofossil assemblages from 12th–13th century and 13th–15th century deposits, as well as cornflower in 12th–13th century layer 1057, is consistent with the cultivation of crops on the local sandy acid soils of the Sheffield area during the medieval period. Rye is also a crop type which is suited to acidic, well drained soils (Moffett 1994, 59) and cornflower is a characteristic weed of rye (Grieg 1991). The presence of sedges and other damp soil taxa, in conjunction with crop remains, in 12th–13th century and 13th–15th century deposits may indicate cultivation of poorly drained fields or fields subject to seasonal flooding. Many of these taxa, such as the obligate crop weed corncockle, are also present in the waterlogged plant macrofossil assemblage from 12th–13th century and 13th–15th century deposits, indicating that a component of the waterlogged seed assemblage may be comprised of weed seeds removed during crop processing.
- 7.4.47 Other evidence for food is present in the form of charred and uncharred hazel nutshell fragments in 11th–12th century and 13th–15th century deposits, which are likely to be waste from hazel nuts collected for food. Hazel was one of the most common underwood taxa of medieval managed woodlands (Rackham 2003, 205) and would have provided an abundant source of nuts. The local availability of hazel is demonstrated by the frequent occurrence of hazel in the wood charcoal assemblage, along with some wood of hazel in the wood assemblage. The rich deposits of hazel nutshell in demolition/destruction deposits 3057 and 3079 are likely to be primary deposits of waste from the processing of hazel nuts for consumption. Hazel nutshells are frequently present in medieval archaeobotanical assemblages (Grieg 1996).
- 7.4.48 Uncharred seeds of a range of fruits such as blackberry, raspberry, wild strawberry and elderberry, present in 12th–13th century and 13th–15th century deposits, may also be from fruits collected and brought to the site for consumption, although it is possible that some of these seeds may be natural accumulations from scrub vegetation growing at the site. The presence of similar assemblages of edible fruit seeds at medieval sites in York such as 14th–15th century deposits from the Bedern (Hall *et al.* 1993a, 1993b and 1993c) and late medieval deposits from St Saviourgate (Carrott *et al.* 1995c), as well as in 13th–14th century deposits from North Bridge, Doncaster (Carrott *et al.* 1997) and 12th–13th century deposits at South Becks, Beverley (Hall *et al.* 2000) have been interpreted as evidence for food remains, possibly from faeces.
- 7.4.49 No evidence for high status foods was found in the charred and waterlogged plant macrofossil assemblage although a single charred fig seed was found in 12th–13th century made ground layer 1057. Fig is considered likely to be an imported foodstuff in the medieval period (Grieg 1996, 217) but is widely found in medieval urban archaeobotanical assemblages from York such as 11th–13th century deposits at 44–45 Parliament Street (Carrott *et al.* 1995a) and 12th–13th century deposits at St Saviourgate (Carrott *et al.* 1998b), 11th–12th century deposits from 7–9 Aldwark (Tomlinson 1989) and 13th century deposits from the Bedern (Hall *et al.* 1993a, 1993b and 1993c) as well as in 13th century deposits from North Bridge, Doncaster (Carrott *et al.* 1997) and 12th–13th century deposits at South Becks, Beverley (Hall *et al.* 2000).

#### Other uses of plants

- 7.4.50 Made ground layer 3056 and the samples from 11th–13th century deposits in Trench 6 include grassland taxa commonly associated with meadows and pasture such as ragged robin, selfheal and burnet saxifrage, along with a range of other general grassland plants such as tormentil, bulbous/meadow/creeping buttercups, small seeded grasses and water pepper which is a plant of wet mud near to water as well as wet meadows. Buttercups, greater plantain, timothy and other small seeded grasses are also sporadically present in



the charred plant macrofossil assemblage from 11th–13th and 13th–15th century deposits. It is possible that these seeds may have been components of a meadow or pasture flora collected as hay or deposited in dung. Similar grassland taxa are often present in medieval urban archaeobotanical assemblages such as 13th–15th century deposits at the Bedern, York (Hall *et al.* 1993a and 1993c) and 11th–13th century waterlogged plant macrofossil deposits from Davygate Centre, York where the assemblage was interpreted as dumping of hay (Carrott *et al.* 1998). However, no other evidence for hay such as abundant grass/straw fragments were found in the samples, and these grassland plants may just be from overgrown grassy areas within the castle grounds or, in the case of the charred seeds, from grassland taxa growing as crop weeds.

- 7.4.51 Rachis fragments of free threshing cereals, including rye, free threshing wheat and barley (along with some culm nodes), which are present in the charred plant macrofossil assemblage from 11th–13th century layer 1057, are likely to be the by-product of earlier stages of crop processing such as winnowing and coarse sieving (Hillman 1981 and 1984; Jones 1984). Many of the wild/weed plant seeds in the charred plant macrofossil assemblage from layer 1057 are also likely to have been brought onto site along with crops. The majority of these seeds are small, heavy seeds, which are generally found in the by-products of sieving or larger seeds that are normally removed from the crop by hand sorting at a late stage of crop cleaning (Jones 1984). These are often discarded in domestic hearths (Hillman 1981 and 1984; Jones 1984) and may have been dumped along with a few cereal grains, wood charcoal, and other domestic waste. Some of the taxa present in the charred wild or weed seed assemblage, such as rushes and sedges, may however be from plants collected for use as roofing, flooring or bedding material rather than arriving on site as weeds growing in arable fields.

#### Utilisation of wood

- 7.4.52 The predominance of oak in the charcoal and wood assemblages from 12th–13th century deposits, 13th–15th deposits and in the charcoal assemblage from 18th/19th century drain fill (1018) at Sheffield Castle is likely to be at least partly due to the excellent properties of oak as a fuel, which burns slowly but produces a hot flame (Webster 1919, 45; Porter 1990, 93). Oak is also an excellent structural timber and it is likely that offcuts from oak felled for use as timber were used as fuel. The frequency of tyloses in the vessel cavities of the oak charcoal and wood fragments, as well as the predominance of weak ring curvatures, indicates the use of larger branches or mature trunk wood. Eight large pieces of waterlogged wood, which were recovered from demolition/destruction layer 3057, included one fragment of alder, one of hazel and six of oak, suggest that these were used as timber within the castle (Wessex Archaeology 2019b, 34). The assemblages of waterlogged wood fragments from pit fills 6060 and 6072 included many thin flakes of wood, which were primarily identified as oak, along with some alder and ash, and are likely to be debris from woodworking.
- 7.4.53 Oak is one of the most widespread trees in lowland England, growing in both woodland and hedgerows (Rackham 2003, 283). Other tree species present in the wood charcoal assemblage in both 11th–13th century and 13th–15th century deposits, are hazel and ash, as well as field maple which is present in 11th–13th century deposits. Ash is a common woodland tree and is a rapid coloniser of open ground (Tansley 1968, 129). Hazel is a common woodland and underwood tree, which can also grow in hedgerows (Rackham 2003, 203). Field maple is a common woodland, scrub and hedgerow tree which usually grows on base rich soils, often in association with ash and hazel (Rackham 2003, 203). Given the local acidic soil type, this may be an indication that wood resources were brought to the castle from further afield, although this may have been as charcoal rather than wood which is heavy and costly to transport (Rackham 2003, 147).

- 7.4.54 Holly is present in the wood charcoal assemblages from 11th–13th century and 13th–15th century deposits. It is a woodland and wood pasture tree, which also grows as a component of hedgerows (Rackham 2003, 345) and is a common underwood taxon in the oak woods of Sheffield (Spray and Smith 1995). Place name evidence indicates that holly was common in the Sheffield region during the medieval period and was probably planted for use as animal fodder (Spray 1981; Spray and Smith 1995). Hawthorn, apple, pear and members of the whitebeam genus, which are potentially represented by the Pomoideae found, are all common underwood shrubs and trees in deciduous woodland (Rackham 2003, 349). Hawthorn is also one of the predominant taxa in thorny scrub, which becomes established in areas of open grassland whenever grazing pressure is reduced (Rodwell 1991, 339). Birch, which is present in the wood charcoal assemblage from 11th–13th century deposits, is also an underwood tree, and tree of secondary woodland, which is intolerant of shade and readily colonises derelict land (Rackham 2003, 311).
- 7.4.55 Poplar/willow, which cannot be differentiated on morphological characteristics, is present in the wood charcoal assemblage from 13th–15th century deposits. Of the species of poplar potentially represented, black poplar and white poplar are trees which generally do not grow in woodland, and aspen is a tree of secondary woodland (Rackham 2003). Of the species of willow potentially represented all are commonly associated with wet or damp soils by ponds, streams or rivers (Stace 2019), while alder is commonly associated with damp, swampy ground and alluvial river valleys (Rodwell 1991, 30–33). Overall, therefore, the charcoal assemblage indicates the utilisation of mature oak woodland, underwood shrubs or trees, and possibly thorny scrub, alder, as well as willow growing on damp riparian soils.
- 7.4.56 The closely spaced growth rings on many of the oak charcoal fragments indicate restricted growing conditions and may indicate the use of oak trees from well-established dense woodland. Closely spaced growth rings may also indicate management techniques such as coppicing, browsing or shredding, however, as well as poor growing conditions caused by the local environment or climate. A pollen diagram from Ringinglow Bog near Sheffield (Conway 1947) indicates that widespread destruction of forest began in the region at around 1100 AD, with recent radiocarbon results confirming a medieval date for this clearance episode (O'Regan and Loveluck 2019). It is possible that the presence of wood from mature oak trees possibly sourced from well-established dense woodland in the wood charcoal and wood assemblage from Sheffield Castle is evidence of this woodland clearance in this period.
- 7.4.57 The predominance of oak in the wood and wood charcoal assemblage from medieval contexts at Sheffield Castle, as well as the presence of oak charcoal with narrow annual growth rings, is consistent with charcoal assemblages from other medieval sites in Yorkshire. Charcoal assemblages from 12th–15th century deposits at Sandal Castle near Wakefield (Smith, Hooper and Bartley 1983) are also dominated by oak and include oak charcoal fragments with narrow annual growth rings from early 12th century deposits. Charcoal from a probable early 13th century lead working site at Howden Clough, Bradfield (Gale 1999) is again dominated by oak, with narrow rings on most fragments, and charcoal from 13th–14th century deposits at Pontefract Castle (Bastow 2002) is also most frequently of oak.
- 7.4.58 The presence of other tree taxa in the medieval contexts at Sheffield Castle, such as ash and hazel, as well as underwood or scrub taxa such as holly, birch and hawthorn/apple/pear/whitebeams is also consistent with charcoal assemblages from other medieval sites in Yorkshire. Hazel and holly are present present in the 12th–14th century deposits from Sandal Castle, and a greater range of taxa are present in 15th century

deposits including birch, hawthorn/apple/pear/whitebeams and poplar/willow. Birch, hazel, hawthorn/apple/pear/whitebeams and cherry/blackthorn are present at the 13th century lead working site at Howden Clough, and charcoal from 13th–14th century deposits at Pontefract Castle includes ash, hawthorn/apple/pear/whitebeams, hazel, alder and box/holly.

#### Site environment and living conditions

- 7.4.59 The waterlogged plant macrofossils from a series of organic deposits in trench 6 and trench 3 include seeds from plants growing at the site as well as seeds from other sources such as the dumping of settlement waste. Seeds of annual weeds, along with plants of waste or rough ground, grassland taxa and seeds of plants commonly associated with damp soils may provide evidence for generally damp, nutrient-rich, disturbed, muddy soil conditions within the castle grounds, typical of urban occupation deposits from medieval sites.
- 7.4.60 Waterlogged plant macrofossils from 13th–15th century demolition/destruction layers 3057 and 3079 in trench 3 include taxa indicative of short trampled grassland such as hairy buttercup and greater plantain as well as red goosefoot, which indicate areas of bare nutrient-rich mud. Sample 3008 from layer 3056 which overlays destruction deposits 3057 and 3079 produced an assemblage which includes seeds of elder and alder along with seeds of bugle and downy woundwort, which are plants of woodland, hedgerows and shady environments. The presence of these taxa suggests a shaded environment in this area, possibly with some growth of scrub, during the deposition of layer 3056.
- 7.4.61 The seeds of scrub plants such as brambles and elder are also frequently present in the waterlogged plant macrofossil assemblage from other samples in trench 3 as well as in samples from trench 6. This may indicate scrub growing at the site, although the seeds of these plants may also have been a component of cess as they were often found in the castle samples in conjunction with other edible fruit seeds such as raspberry and wild strawberry. Other plant seeds present in the waterlogged plant macrofossil assemblage may have originated in dumped material rather than plants growing in situ. These include seeds from grassland taxa typical of pasture or meadows, which may indicate hay or dung, as well as seeds of rushes and sedges, which may indicate roofing, flooring or bedding material. No other plant macrofossils indicative of hay or roofing/flooring/bedding were found in the assemblage, however, so it is also possible that these seeds were from plants growing at the site.
- 7.4.62 Several sites at York have produced rich assemblages of waterlogged plant remains dating to the medieval period, although most have not been fully analysed and published. Plant remains from 12th and 13th century pits and layers at 7–9 Aldwark, York (Tomlinson, 1989) and from 13th–15th century pits at the Bedern, York (Hall *et al.* 1993a, 1993b and 1993c), have, however, been fully analysed and produced similar assemblages to those from Sheffield Castle, including abundant taxa indicating waste ground and nutrient-rich disturbed soil, arable weeds, and some taxa indicative of damp soil, as well as food plants. Assessment reports on waterlogged plant material from deposits dated to the 11th–12th century at Feasegate (Carrott *et al.* 1998c), and 12th–13th century deposits at St Saviourgate, York (Carrott *et al.* 1998b) provide similar evidence for damp, nutrient rich disturbed soils, along with some evidence for the presence of dumped material in the form of food remains.

#### *Additional assessment*

- 7.4.63 The uncharred seeds that were found at depths of 1–1.77m and 1.77–3.25 m in borehole 1, may represent material preserved by anoxic waterlogging. The presence of wood

fragments in these samples provides support for this interpretation, although it cannot be ascertained with confidence whether this is intrusive modern material or ancient material preserved by anoxic waterlogging. The plant taxa present in these samples are indicative of nutrient-rich, disturbed soils, grassland and some possible scrub vegetation, although the seeds from scrub plants, elder and blackberry, may be from fruits collected as food rather than plants growing at the site. The assemblage is similar to that represented in samples of uncharred plant macrofossils, which are also likely to have been preserved by anoxic waterlogging, from contexts dating to the medieval period in trench 3 and trench 6.

- 7.4.64 The presence of charred hazel nutshell and wood charcoal in monolith sample 10002, along with wood charcoal fragments in samples from borehole 1, are likely to indicate dumping of domestic hearth waste. Charred and uncharred hazel nutshell is present in other samples from the castle site, and wood charcoal fragments are ubiquitous.

#### Recommendations

- 7.4.65 No further analysis of the uncharred plant seeds from borehole 1 at depths of 1–1.77 m and 1.77–3.25 m is recommended, as the small quantity of seeds found have been fully quantified during assessment.
- 7.4.66 No further analysis of the wood fragments from borehole 1 at depths of 1–1.77 m and 1.77–3.25 m is recommended, as the fragments are too small and poorly preserved to be suitable for identification.
- 7.4.67 No further analysis of the wood charcoal assemblage from borehole 1 and in monolith sample 10002 is recommended as the assemblage is too small to provide a representative sample.
- 7.4.68 No material suitable for AMS radiocarbon dating was found in the samples.

### **7.5 Conclusions**

- 7.5.1 Taken together, the charred and waterlogged plant macrofossils, wood wood charcoal from Sheffield Castle provides evidence for the transport to the site of a range of products and the utilisation of a variety of habitat types within the surrounding landscape. Crops including oat, barley, bread/rivet wheat and rye were apparently grown on local acidic, sandy soils, with rye perhaps selected as a crop well suited to such soil types. Grassland plants may also have been brought to site as fodder or grazed in situ and deposited in animal dung. Damp soils around nearby watercourses such as the river Don may have been utilised for the collection of plants such as rushes and sedges for use as flooring, roofing or bedding material. Wood from different environments (alder and possibly willow growing on damp soils, and oak potentially from well-established oak woodland) was collected for use as fuel and in construction. Wood from other trees such as ash, elm and field maple, and underwood or scrub taxa such as hazel, birch, holly, hawthorn/pear/apple/whitebeams and blackthorn, were also used as fuel.
- 7.5.2 The plant macrofossil, wood and charcoal assemblages also provide evidence for activities carried out at the castle, and for the environment and living conditions within the castle. The environment within the castle apparently included damp, muddy, disturbed and nutrient enriched soils, supporting a diverse community of annual weeds, more established perennial vegetation and plants of wet soils. The assemblages also provide evidence for the disposal of waste from various sources within the castle grounds, including material from domestic hearths, hazelnut processing and wood working, and possibly cess deposits, animal fodder/dung and/or roofing/flooring material.

7.5.3 This analysis has demonstrated the potential for the preservation of both charred and waterlogged plant macrofossils and wood at the site of Sheffield Castle. Published archaeobotanical data from urban medieval sites in the region of Sheffield Castle is sparse, so the evidence from this site represents an important addition to our knowledge of plant use and living conditions at a site of this type.

## 8 ENVIRONMENTAL EVIDENCE (TRIAL TRENCHING MOLLUSCS)

### 8.1 Introduction and methods

8.1.1 Mollusc shells from the flots of one sample taken during excavations at Sheffield Castle, Sheffield, West Yorkshire, were presented for analysis. The sample was taken from a 14th–early 15th century lower moat fill, context (9011). The sample had been processed using a modified Siraf-style flotation tank by Wessex Archaeology, and the flots sorted and assessed by Ellen Simmons, University of Sheffield. The shell assemblage was scanned under a low power binocular microscope at 20x magnification. Information on land snail ecology is derived from Evans (1972), Kerney and Cameron (1979), Kerney (1999) and Davies (2008). Nomenclature follows Anderson (2008). As an aid to interpretation, taxa were arranged into groups according to their ecological preferences, following those of Evans (1972). These are:

- 1a. Oxychilidae. ‘Glass snails’, taxonomically related species of shaded places, represented here by *Aegopinella nitidula*, and *Vitrea contracta*.
- 1b. *Carychium tridentatum*. A widespread shade-demanding species.
- 1c. *Discus rotundatus*. A common species of shaded habitats.
- 1d. Other shade-loving species. Represented here by *Lauria cylindracea*, and *Merdigera obscura*.
- 3. Intermediate/ catholic. Molluscs with a broad range of ecological tolerances. Represented here by *Cepaea* sp., *Cochlicopa* cf. *lubrica*, and *Trochulus hispidus*.
- 4a. Commonly open country. Snails associated with open habitats such as short grassland. Represented here by *Vallonia* cf. *excentrica*.

8.1.2 The use of ecological groups, although useful for broad interpretation, can mask fine details, so consideration of the ecology of individual species is also taken into account.

### 8.2 Results and Discussion

8.2.1 Counts of snail shells within the sample are presented in **Table 15**. Snail shells were well-preserved, with a range of juvenile and adult shells present in the assemblage.

8.2.2 The snail assemblage is entirely terrestrial in nature, and dominated by taxa that reflect locally shaded conditions. The dominant species is *Discus rotundatus*, which is common in most moist and shaded habitats, such as in leaf litter, and among stones in waste ground, often occurring in very high numbers. Its dominance here suggests an overgrown environment within the moat.

8.2.3 *Vitrea contracta*, although grouped as a woodland species, is associated with relatively dry habitats. It is commonly found in scree and collapsed wall debris as well as within leaf litter.

- 8.2.4 *Aegopinella nitidula* is found in ground litter and at the base of walls, and may often be found in habitats that are disturbed by humans.
- 8.2.5 *Lauria cylindracea*, a Group 1d species, is a species of shaded habitats, but is also commonly found on walls (Evans 1972, 151).
- 8.2.6 Although *Vallonia cf. excentrica* is a species of open habitats, it may be found under stones and in scrub habitats.

**Table 15** Snails from context 9011

Taxon	Ecological Group	Count
<i>Aegopinella nitidula</i> (Draparnaud, 1805)	1a	32
<i>Vitrea contracta</i> (Westerlund, 1871)	1a	54
<i>Carychium cf. tridentatum</i> (Risso, 1826)	1b	42
<i>Discus rotundatus</i> (Müller, 1774)	1c	109
<i>Lauria cylindracea</i> (da Costa, 1778)	1d	2
<i>Merdigera obscura</i> (Müller, 1774)	1d	4
<i>Cepaea</i> sp.	3	1
<i>Cochlicopa cf. lubrica</i> (Müller, 1774)	3	14
<i>Trochulus hispidus</i> (Linnaeus, 1758)	3	4
<i>Vallonia cf. excentrica</i> Sterki, 1893	4a	1
Snail eggs		3
Number of taxa		10
Number of shells		261

### 8.3 Conclusions

- 8.3.1 The shell assemblage broadly reflects a shaded terrestrial environment. There is no indication that the moat held water in this location at the time that the sediment was accumulating. A likely environmental setting is an overgrown, scrubby habitat with stones and some open patches and abundant ground litter. This would tend to suggest that the sediment sampled was accumulating during a period of rather more relaxed management of the castle moat.
- 8.3.2 The relatively high number of shells and moderate diversity of species within the sample suggests that this was a stable environment over a period of several decades (allowing more species to become established) and that rates of sedimentation were slow (allowing more shells to become incorporated into the sample).

## 9 ENVIRONMENTAL EVIDENCE (TRIAL TRENCHING INSECTS)

### 9.1 Introduction

- 9.1.1 This report presents the results of an analysis of the insect remains from four samples collected during excavations at Sheffield Castle (Site Code 201540). Originally 5 one litre sub-samples were assessed for their insect remains by Kim Vickers who recommended further analysis. Unfortunately, sample 6009/context 6060 could not be located when this full analysis commenced. Two samples of material (sample 3013/context 3075 and sample 3013/context 3079) are dated to the 13th century and come from demolition layers. Two samples are approximately late-11th/12th century in date, one (sample 6011/context 6072) is from a pit fill and one (sample 6006/context 6055) is from the ground layer sealing pit 6072. The sample details and descriptions are provided in **Appendix 8, Table 52**.

9.1.2 It was hoped that analysis of these insect remains would help to indicate the nature of the fills of the pits and features sampled, and to elucidate the living conditions and/or deposit history at Sheffield Castle. It also was hoped that these samples could be compared with the insect faunas that have been recovered from deposits of similar age in York (Kenward and Hall 1995) and London (Smith 2012).

## 9.2 Sample processing and analysis

9.2.1 The sediment from these samples was processed using the standard method of paraffin flotation as outlined in Kenward *et al.* 1980 at the University of Birmingham. The insect remains were sorted from the flots at x10 magnification, stored in ethanol and then 'laid out' for identification. The material that had already been assessed by Kim Vickers was also 'laid out' and examined at the same time.

9.2.2 The Coleoptera (beetles) present in both the whole earth samples and the one litre sub-samples already sorted by Kim Vickers were identified by direct comparison to the Gorham and Girling Collections of British Coleoptera at magnifications between x7–x45, but the two sets of insect material are scored separately. The taxa of insects recovered for each sample and/or sub-sample are presented in **Appendix 8 Table 53**, where the minimum numbers of individual for both sets of material have been recorded. The nomenclature for the Coleoptera (beetles) follows that of Lucht (1987).

9.2.3 Where applicable each species of Coleoptera has been assigned to one, or more, ecological grouping and these are indicated in the second column of **Appendix 8 Table 53**. These groupings are derived from the preliminary classifications outlined by Kenward (1978). The classification used here replicates that used in Kenward and Hall (1995). The groupings, themselves, are described at the end of **Appendix 8 Table 53**. The various proportions of these ecological groups have been calculated and are expressed as percentages of the total Coleoptera present in the faunas; the relative proportions of ecological groups are shown in **Appendix 8 Table 54** and in **Fig. 39.1**. Not all taxa have a coding and some taxa occur in more than one ecological group. As a result, percentages do not always equal 100%.

9.2.4 Some of the Coleoptera have been assigned codes based upon their extent of synanthropy (dependence on human settlement) and these are indicated in the third column of **Table 53**. These codes are based on those used by Kenward (1997) and in Smith *et al.* 2020. The synanthropic groupings are described at the end of **Appendix 8 Table 53**. The relative proportions of these synanthropic groupings, expressed as a percentage of the total fauna, are presented in **Appendix 8 Table 54** and **Fig. 39.2**.

9.2.5 The furthest right-hand column of **Appendix 8 Table 53** lists the host plants associated with the various phytophage (plant eating) species of beetles. This information comes mainly from Koch (1992) and the plant nomenclature used follows that of Stace (2010).

9.2.6 The dipterous (fly) pupae were identified using the drawings in KGV Smith (1973, 1989) and, where possible, by direct comparison to modern specimens identified by Peter Skidmore. The various taxa of flies recovered from these samples are presented in **Appendix 8 Table 52**. The taxonomy used follows that of KGV Smith (1989) for the Diptera.

## 9.3 Nature of the insect faunas recovered

9.3.1 The majority of the insect remains recovered from Sheffield Castle are beetles (Coleoptera) with a very small numbers of ants (Formicoidea) and flies (Diptera). The lack

of fly puparia is surprising since most urban deposits are dominated by fly puparia. This may suggest that this material became incorporated in the archaeological record relatively quickly, after it was deposited, rather than reaching a very advanced state of decay in the open.

*Sample 3013/context 3079*

- 9.3.2 The insect fauna from this 13th century demolition layer was relatively small (30 individuals). It is dominated by a range of taxa that are fairly typical of decaying organic materials found around archaeological settlements; such as, hay, bedding, flooring materials and/or settlement waste. The high proportions of species associated with ecological group 'rt' (decaying organic matter), which accounts for 46% of the fauna recovered, suggest that the material within this deposit had begun to decay. Typical beetles recovered from this kind of rotting material include: the *Cercyon* spp., *Coprophilus striatulus*, *Oxytelus rugosus*, *Oxytelus nitidulus* and *Rhizophagus parallelocolis* (Hansen 1987; Lott 2009). There also are limited indications that rotting wood or timber was present in this material. Both *Cercyon* species and *Trichonyx sulcicollis* are associated with rotting bark and dead timbers from hardwood trees (Koch 1992). The impression gained is that this demolition deposit contained a range of settlement waste and material, which had begun to rot or breakdown.

*Sample 3009/context 3057*

- 9.3.3 This sample produced moderately large insect faunas that suggests it contained a range of settlement waste and materials. Again, the fauna is dominated by a range of beetles that are normally associated with mildly decaying material, which could be typically described as 'settlement waste'. This is indicated by the proportions of the 'rt' (decaying organic matter) ecological group recovered which accounts for 36% of the faunas recovered. Typical beetles found archaeologically within this kind of material include: the hydrophilid *Cercyon* spp., and the 'rove beetles' (*Omalium rivulare*, *O. excavatum*, *Coprophilus striatulus*, *Oxytelus rugosus*, *O. nitidulus*, and *Platystethus arenarius*).
- 9.3.4 A number of beetle species recovered in these samples suggest that drier material, for example, straw, hay, bedding or thatch, may have been incorporated into these deposits. Taxa associated with drier materials include beetles such as *Cryptophagus* spp., *Atomaria* spp., *Enicmus minutus* and *Corticaria* spp. These are all members of the 'rd' (drier organic matter) ecological community, which accounts for 7.5% and 5.5% of the faunas recovered in these two samples.
- 9.3.5 There are some indicators for the presence of structural timbers and wood. The former is indicated by the recovery of the 'woodworm' (*Anobium punctatum*), the 'powder post beetle' (*Lyctus linearis*) and the 'barrel beetle' (*Phloeophagus lignarius*). A range of scolytid 'shot borer beetles' were also recovered which indicate the presence of structural timbers, such as oak or beech (ie *Scolytus intricatus*, *Dryocoetes villosus* and *Xyleborus dryographus*) (Kock 1992).
- 9.3.6 Several beetles recovered are associated with plants that typically grow in rough ground. For example, *Cidnorhynchus quadrimaculatus* is associated with stinging nettle (*Urtica dioica* L.) and *Sitona* spp. with clover (*Trifolium* spp.). Sample 3009 also produced the only indicator for stored grain recovered from this site. This was the 'rust red flour beetle' (*Laemophloeus ferrugineus*) which is commonly associated with decayed grain and other stored products (Smith and Kenward 2013).



*Sample 6011/context 6072*

- 9.3.7 Sample 6011 produced a moderately large insect fauna which indicate the presence of a range of settlement waste. The fauna is dominated by a range of beetles that are normally associated with mildly decaying settlement waste. This is indicated by the proportions of the 'rt' (decaying organic matter). 38% of the fauna is from the 'rt' ecological grouping which normally lives in a range of mildly decaying organic material. Included in this group are the hydrophilid *Megasternum boletophagum* and the 'rove beetles' (*Micropeplus staphylinoides*, *Phyllodrepa floralis*, *Coprophilus striatulus*, *Oxytelus rugosus*, *O. sculpturatus*, *O. nitidulus*, *O. tetracarinatus*, *Platystethus cornutus*, *P. nodifrons*, *Gyrohypnus* spp., *Xantholinus* spp., *Neobisnus* spp. and *Philonthus* spp.). The small staphylinid (*Platystethus arenarius*) and the 'dung beetles' (*Aphodius* spp.) are usually associated with animal dung and stock raising, but these species are thought to also breed in wet and loosely structured urban waste in the archaeological record (Kenward et al. 2004).
- 9.3.8 Drier material, such as hay, may have been incorporated into these deposits. This is indicated by beetles such as *Atomaria* spp., *Corticaria* spp. and *Mycetea hirta* which account for 5% of the fauna recovered.
- 9.3.9 As with sample 3009 the presence of nearby weedy/ rough ground is also indicated. This is suggested by the ground beetles recovered such as, *Clivina fossor*, *Trechoblemus micros* and *Harpalus rufipes* all of which are all common in yards, gardens and open areas near settlement (Luff 2007). Similarly, rough ground is indicated by *Brachypterus urticae* which occurs on stinging nettle (*Urtica dioica* L.).

*Sample 6006/ Context 6055*

- 9.3.10 This context produced a relatively large fauna of beetles (197 individuals) which is dominated by species that are either directly synanthropic (synanthropic groupings sf, st, ss combined = 34 %) or are part of Kenwards 'house fauna' (synanthropic group 'h' = 14.7%).
- 9.3.11 In addition to many synanthropic fauna, like previous samples this fauna includes taxa that are associated with decaying settlement waste. Ecological group 'rt', which is associated with rather decayed organic material, accounts for 32% of the total fauna. This group is composed of many of the same species that occurred in Samples 3009 and 6011, but with the addition of taxa such as Ptiliidae, *Clambus* spp, *Hister* spp. and *Monotoma* spp. There is some evidence for the presence of drier organic material. This is indicated by the presence of a range of lathridiids and Cryptophagid 'mould beetles', but also by the presence of *Typhaea stercorea*, which seems to be associated particularly with this type of drier organic material. This last group of taxa, along with the woodworm (*Anobium punctatum*) and the spider beetle (*Ptinus fur*) are all part of Kenward's house fauna, which clearly attests to the origin of this material. A limited number of beetles are associated again with rough or waste ground. For example, *Ceutorhynchus contratus* is associated with poppies (Papaveraceae) and mignonettes (Resedaceae) and *Gymetron* spp. with plantain (*Plantago* spp.). Similarly, the scolytid (*Phloeophthorus rhododactylus*) is associated with broom (*Cytisus* spp.) or gorse (*Ulex europaeus* L.). The 'ground beetles' recovered, such as *Clivina fossor*, *Trechoblemus micros*, *Bembidion* spp., *Patrobus* spp. and *Pterostichus diligens* are also associated with this type of landscape.

## 9.4 Discussion

- 9.4.1 On the basis of the insect remains recovered, it seems that this range of features from Sheffield Castle all contained a mixture of settlement waste and material, and probably

represent dumping. Unfortunately, it is not possible to be more specific about the nature of this material. Sometimes with urban or high status settlement deposits, we are able to use the insects to assign very specific interpretations. There are a set of 'indicator groups' of beetles and flies that can be used to identify tanning (Hall and Kenward 2011), craft production (Hall and Kenward 2003), cesspits (Smith 2013), house floors (Carrott and Kenward 2001), stabling waste (Kenward and Hall 1997) and roofing thatch (Smith *et al.* 1999), but none of these are strongly evident at Sheffield Castle.

- 9.4.2 Many Medieval and Post-Medieval sites share a similar history of mixed deposition and back filling. This was often the case at 9th–11th century Coppergate, York (Kenward and Hall 1995), Medieval Beverly, Yorkshire (Hall and Kenward 1980), Guildhall London (Smith and Morris 2008) and early modern Birmingham (Smith 2009).

## 10 ENVIRONMENTAL EVIDENCE (BOREHOLE SURVEY)

### 10.1 Introduction

- 10.1.1 This section is derived from the borehole palaeoenvironmental assessment (Wessex Archaeology 2019d). The deposits in the retained cores from BH11 and BH13 were selected for assessment as these showed the greatest potential (Wessex Archaeology 2019c).

### 10.2 Methods

#### *Pollen and spores*

- 10.2.1 Twenty sub-samples of 1 ml volume were processed using standard extraction methods (Moore *et al.* 1991), comprising 12 from borehole BH11 and eight from borehole BH13. Pollen was identified and counted using a Nikon eclipse E400 biological research microscope. A total of 150 pollen grains was counted for each sub-sample in addition to aquatics and fern spores, and where 150 counts were not possible, all pollen and spores were counted from four transects. One *Lycopodium* tablet was added at the beginning of laboratory extraction to enable calculation of pollen concentrations. Pollen and spores were identified to the lowest possible taxonomic level.
- 10.2.2 Plant nomenclature followed Stace (1997) and Bennett *et al.* (1994). Pollen sums are based on total land pollen (TLP) excluding aquatics and fern spores which are calculated as a percentage of TLP plus the sum of the component taxa within the respective category. Identification of indeterminable grains was according to Cushing (1967). The results are presented in tabular form as raw data (**Table 1616 and 17**). Plant taxa are assigned to one of the following groups (trees and shrubs, dwarf shrubs, cultivated, field weeds, ruderals, herbaceous open/undefined, fern spores and aquatics) based on their most likely ecological affinity, although many plant taxa occur in a range of environmental niches (see Stace 1997 for specific plant taxa).

#### *Diatoms*

- 10.2.3 Twenty sub-samples were prepared following standard techniques (Battarbee *et al.* 2001) (**Table 1818 and 19**). Two coverslips were made from each sample and fixed in Naphrax for diatom microscopy. A large area of the coverslips on each slide was scanned for diatoms at magnifications of x400 and x1000 under phase contrast illumination.
- 10.2.4 Diatom floras and taxonomic publications were consulted to assist with diatom identification; these include Hendey (1964), Hartley *et al.* (1996), Krammer and Lange-Bertalot (1986-1991) and Witkowski *et al.* (2000). Diatom species' salinity preferences are

indicated using the halobian groups of Hustedt (1953, 1957: 199), these salinity groups are summarised as follows:

1. Polyhalobian: >30g l<sup>-1</sup>
2. Mesohalobian: 0.2-30g l<sup>-1</sup>
3. Oligohalobian - Halophilous: optimum in slightly brackish water
4. Oligohalobian - Indifferent: optimum in freshwater but tolerant of slightly brackish water
5. Halophobous: exclusively freshwater
6. Unknown: taxa of unknown salinity preference.

#### *Ostracods*

- 10.2.5 Twenty sub-samples were processed for ostracod assessment (**Table 2020 and 21**). The sub-samples were weighed, then broken into small pieces by hand, placed into ceramic bowls, and dried in an oven. Boiling-hot water was then poured over them with a little sodium carbonate added to help disaggregate the clay fraction. Each was left to soak overnight. It was found that breakdown was aided, especially with the organic-rich samples, by re-heating the still soaking samples in the oven for several hours before attempting to wash them. The peats, however, needed processing twice and even then, breakdown was not entirely satisfactory.
- 10.2.6 Sub-samples were then washed through a 75 µm sieve with the remaining residue returned to the ceramic bowl for final drying in the oven. The residues were then stored in labelled plastic bags. For examination, each sample was placed in a nest of sieves (>500 µm, >250 µm, >150 µm, and base pan) and thoroughly shaken. Each grade was then sprinkled onto a picking tray, a little at a time, and viewed under a binocular microscope.
- 10.2.7 The abundance of each ostracod species was estimated semi-quantitatively (one specimen, several specimens, common and abundant/superabundant) by experience and by eye), and colour-coded to provide further ready environmental information. Species identification comes from Athersuch *et al.* (1989) for the brackish and marine ostracods, and Meisch (2000) for the freshwater ostracods, in addition to expert judgement.

### 10.3 Results

#### *Pollen and spores*

##### Borehole BH11

- 10.3.1 Pollen was variably preserved in samples from borehole BH11, typically moderate/poor to poor, with concentrations varying between moderate to very poor. Assessment counts were only possible on five of the 12 samples from BH11, largely within the basal deposits (3.84, 5.0, 5.5, 5.6 and 5.8 m BGL), with pollen present in moderate concentrations and moderate to poor preservation quality. There is moderate to good diversity of pollen taxa in those samples preserving sufficient quantities for assessment (**Table 1616**).
- 10.3.2 The basal pollen sample (5.8 m BGL) is characterised by large quantities of *Corylus avellana* type (hazel), *Alnus glutinosa* (alder) and Poaceae (grass family), whilst subsequent samples at 5.6–5.5 m BGL are dominated instead by significantly quantities of

*Ulmus* (elm) with lesser Lactuceae (lettuce family) and Poaceae. The sample at 5.0 m BGL by contrast contains large quantities of Lactuceae along with *Corylus avellana* type, Poaceae and Asteraceae (daisies). Pollen preserved in the sample at 3.84 m BGL contains large quantities of Filipendula (meadowsweet), Rosaceae (rose family) and Poaceae.

- 10.3.3 Small quantities of cereal-type pollen were recorded in several samples, including *Cerealia* (undiff cereals) and *Avena-Triticum* type (oat-wheat), with a single grain of *Cannabis*-type (*Cannabis*) recorded at 3.84 m BGL. Small quantities of ruderal pollen taxa are preserved in samples where assessment counts were achieved, including *Rumex acetosa*-type (common sorrel), Chenopodiaceae (goosefoot family) and Brassicaceae (cabbage family).
- 10.3.4 A single grain of *Juglans* (walnut) was recorded from the sample at 3.68 m BGL although pollen was otherwise poorly preserved and present in low concentrations in this sample.
- 10.3.5 Fern spores are consistently present throughout the samples, largely comprising Pteropsida (undiff. fern spores), *Dryopteris filix-mas* (male fern), *Pteridium aquilinum* (bracken) and *Polypodium* (polypody).

**Table 16** Results of pollen assessment, borehole BH11

Depth (m BGL)	3.5	3.68	3.84	4	4.53	4.68	4.84	5	5.5	5.6	5.7	5.8
<b>Exotic</b> ( <i>Lycopodium</i> )	2	4	6	10	9	1	10	105	15	13	0	17
<b>Trees and Shrubs</b>												
<i>Betula</i> (birch)	-	-	3	2	1	1	-	2	1	1	-	2
<i>Pinus sylvestris</i> (pine)	-	-	-	-	-	-	-	-	-	1	-	-
<i>Corylus avellana</i> type (hazel)	-	3	4	2	2	-	1	34	7	7	-	69
<i>Ulmus</i> (elm)	-	1	3	-	-	-	-	-	66	91	-	1
<i>Quercus</i> (oak)	-	1	9	2	-	1	-	4	-	3	-	1
<i>Alnus glutinosa</i> (alder)	1	1	6	1	3	-	-	6	4	2	-	22
<i>Fraxinus excelsior</i> (ash)	-	1	3	-	-	-	-	-	-	-	-	-
<i>Acer</i> (maple)	-	2	3	-	-	-	-	-	-	-	-	-
<i>Juglans</i> (walnut)	-	1	-	-	-	-	-	-	-	-	-	-
<i>Salix</i> (willow)	-	-	3	-	-	-	-	-	-	1	-	-
<i>Ilex aquifolium</i> (holly)	-	-	-	-	-	-	-	-	-	1	-	-
<i>Hedera helix</i> (ivy)	-	-	1	-	-	-	-	-	-	-	-	-
<b>Dwarf Shrubs</b>												
Ericaceae (heather family)	-	1	-	-	-	-	-	2	-	-	-	2
<b>Cultivated</b>												
<i>Avena-Triticum</i> type (oat-wheat)	-	1	2	-	-	-	-	1	-	1	-	-
<i>Cerealia</i> type (cereal undiff.)	-	1	10	-	-	2	1	5	5	5	-	1
<i>Cannabis</i> type (cannabis)	-	-	1	-	-	-	-	-	-	-	-	-
<b>Herbs - ruderals</b>												
<i>Rumex acetosa</i> (common sorrel)	-	-	5	-	-	-	-	-	-	1	-	1



Chenopodiaceae (goosefoot family)	-	-	-	-	-	-	-	1	5	1	-	6
<i>Artemisia</i> type (mugwort)	-	-	-	-	-	-	-	1	-	-	-	-
Brassicaceae (cabbage family)	-	-	1	-	-	-	-	-	-	1	-	-
<i>Polygonum aviculare</i> (common knotgrass)	-	-	-	-	-	-	-	-	1	-	-	-
<i>Urtica dioica</i> (stinging nettle)	-	1	1	-	-	-	-	-	-	-	-	-
<b>Herbs - grassland, open and undefined</b>												
Poaceae (grass family)	2	12	30	8	2	-	1	24	20	11	-	31
Cyperaceae (sedge family)	-	-	-	-	1	-	2	6	11	6	-	2
Ranunculaceae (buttercup family)	-	-	-	1	-	-	1	-	-	-	-	1
Caryophyllaceae (pink family)	-	-	-	1	-	-	-	3	-	-	-	-
Rosaceae (rose family)	-	-	24	-	1	-	1	1	1	-	-	1
<i>Filipendula</i> (meadowsweet)	-	-	41	4	6	-	-	-	-	-	-	-
<i>Potentilla</i> (cinquefoil)	-	1	-	-	-	-	-	-	-	-	-	-
Apiaceae (carrot family)	-	-	1	-	-	-	-	-	-	-	-	1
<i>Plantago lanceolata</i> (ribwort plantain)	-	1	1	-	-	-	-	9	3	3	-	2
<i>Centaurea nigra</i> (common knapweed)	-	-	-	-	-	-	-	3	1	-	-	-
<i>Cirsium</i> (thistle)	-	-	1	-	-	-	-	-	-	1	-	-
Lactuceae (lettuce family)	-	4	2	-	1	2	-	52	24	12	1	10
Asteraceae (daisies)	-	1	-	-	-	1	-	17	-	-	-	1
<i>Anthemis</i> (mugwort)	-	-	-	-	-	-	-	1	1	-	-	2
<b>Fern Spores</b>												
Pteropsida undiff. (undifferentiated fern spore)	-	4	25	3	3	10	6	18	67	24	-	25
<i>Pteridium aquilinum</i> (bracken)	-	4	4	4	7	2	3	9	24	22	-	7
<i>Dryopteris filix-mas</i> (male fern)	-	7	13	8	4	28	14	2	-	1	-	-
<i>Polypodium vulgare</i> (common polypody)	-	-	-	1	2	1	1	8	2	1	-	6
Tililtia sphagni	-	1	-	-	-	-	-	-	-	-	-	-
<b>Aquatics</b>												
<i>Potamogeton natans</i> type (pondweed)	-	1	1	-	-	-	-	-	-	-	-	-

<i>Sparganium emersum</i> type (unbranched bur-reed)	-	-	1	-	-	-	-	-	-	-	-	-
<i>Sphagnum</i> (bog moss)	-	1	-	-	-	-	-	-	1	-	-	-
<b>Indeterminables</b>	<b>4</b>	<b>12</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>30</b>	<b>57</b>	<b>25</b>	<b>0</b>	<b>40</b>
<b>TLP</b>	<b>3</b>	<b>33</b>	<b>155</b>	<b>21</b>	<b>17</b>	<b>7</b>	<b>7</b>	<b>172</b>	<b>150</b>	<b>149</b>	<b>1</b>	<b>156</b>
<b>Pollen concentration</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>3</b>
<b>Pollen preservation</b>	<b>4</b>	<b>4</b>	<b>3-4</b>	<b>3-4</b>	<b>3-4</b>	<b>4</b>	<b>4</b>	<b>3-4</b>	<b>3-4</b>	<b>3-4</b>	<b>4</b>	<b>4</b>

Preservation and Concentration: 1 = Excellent, 2 = Good, 3 = Moderate, 4 = Poor, 5 = Very Poor

### Borehole BH13

- 10.3.6 Pollen was uniformly very poorly preserved and present in very poor concentrations in samples from borehole BH13 (**Table 1717**). Full assessment counts were not possible from any of the samples. Occasional pollen grains of arboreal species were present along with consistent small quantities of Lactuceae. Fern spores were present in larger quantities, particularly Pteropsida.

**Table 17** Results of pollen assessment, borehole BH13

Depth (m BGL)	1.8	1.96	2.12	2.28	2.44	2.6	2.76	2.9
<b>Exotic</b> ( <i>Lycopodium</i> )	10	9	24	15	22	4	7	5
<b>Trees and Shrubs</b>								
<i>Betula</i> (birch)	-	-	1	-	-	-	-	-
<i>Pinus sylvestris</i> (pine)	-	-	1	1	-	-	-	-
<i>Corylus avellana</i> type (hazel)	1	2	-	-	-	-	-	-
<i>Alnus glutinosa</i> (alder)	-	-	1	-	-	1	-	-
<b>Herbs - grassland, open and undefined</b>								
Poaceae (grass family)	-	-	-	-	-	-	-	-
Cyperaceae (sedge family)	-	1	-	-	-	1	-	-
Lactuceae (lettuce family)	3	-	5	9	5	2	2	-
Asteraceae (daisies)	-	-	-	1	-	-	-	-
<b>Fern Spores</b>								
Pteropsida undiff. (undifferentiated fern spore)	8	24	78	41	10	6	-	-
<i>Pteridium aquilinum</i> (bracken)	6	5	13	5	-	2	-	-
<i>Dryopteris filix-mas</i> (male fern)	-	1	3	1	-	-	-	-
<i>Sphagnum</i> (bog moss)	1	-	-	-	-	-	-	-
<b>Indeterminable</b>	<b>10</b>	<b>4</b>	<b>6</b>	<b>4</b>	<b>4</b>			
<b>TLP</b>	<b>4</b>	<b>3</b>	<b>8</b>	<b>11</b>	<b>5</b>	<b>4</b>	<b>2</b>	<b>0</b>
<b>Pollen concentration</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>
<b>Pollen preservation</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>

Preservation and Concentration: 1 = Excellent, 2 = Good, 3 = Moderate, 4 = Poor, 5 = Very Poor

### Diatoms

- 10.3.7 Summary results of diatom assessment from boreholes BH11 and BH13 are shown in **Table 1818** with the specific diatom taxa shown in **Table 1919** focusing only on those samples preserving diatoms.

**Table 18** Summary of diatom preservation and potential, boreholes BH11 and BH13.

Diatom Sample Depth	Diatoms	Diatom Numbers	Quality of preservation	Diversity	Assemblage type	Potential for % count
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(m BGL)						
<b>BH11</b>						
3.50	absent	-	-	-	-	none
3.68	absent	-	-	-	-	none
3.84	present	high	good	mod	nonpk acid aero	good
4.00	present	v low	v poor	mod	nonpk aero eut	v low
4.52	present	v low	v poor	mod	nonpk aero eut	v low
4.68	present	ex low	ex poor	-	nonpk aero	none
4.84	present	ex low	ex poor	-	-	none
5.00	absent	-	-	-	-	none
5.50	present	ex low	ex poor	v low	nonpk aero	none
5.60	present	v low	v poor	low	nonpk aero	none
5.70	present	ex low	ex poor	-	nonpk	none
5.80	absent	-	-	-	-	none
<b>BH13</b>						
1.80	present	ex low	ex poor	-	aero	none
1.96	present	ex low	ex poor	-	aero	none
2.12	present	ex low	ex poor	-	-	none
2.28	present	ex low	ex poor	-	-	none
2.44	present	ex low	ex poor	-	-	none
2.60	absent	-	-	-	-	none
2.76	absent	-	-	-	-	none
2.90	absent	-	-	-	-	none

**Table 19** Results of diatom assessment, boreholes BH11 and BH13

Diatom taxa / depth (mbgl)	Borehole BH11								Borehole BH13				
	3.8	4.0	4.52	4.68	4.84	5.5	5.6	5.7	1.8	1.96	2.12	2.28	2.44
<i>Achnanthes hungarica</i>	-	1	1	-	-	-	-	-	-	-	-	-	-
<i>Amphora libyca</i>	-	-	1	-	-	-	-	-	-	-	-	-	-
<i>Amphora</i> sp.	-	1	-	-	-	-	-	-	-	-	-	-	-
<i>Aulacoseira</i> sp.	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Caloneis bacillum</i>	1	-	-	-	-	-	-	-	-	-	-	-	-
Chrysophyte cysts	1	-	-	-	1	-	1	-	-	-	1	-	-
<i>Eunotia alpina</i>	2	-	-	-	-	-	-	-	-	-	-	-	-
<i>Eunotia bilunaris</i>	2	-	-	-	-	-	-	-	-	-	-	-	-
<i>Eunotia pectinalis</i> var. minor	-	-	1	-	-	-	-	-	-	-	-	-	-
<i>Eunotia</i> sp.1 minutissima	1	-	-	-	-	-	-	-	-	-	-	-	-
<i>Frustulia vulgaris</i>	-	-	1	-	-	-	-	-	-	-	-	-	-
<i>Gomphonema acuminatum</i> v.cor.	1	-	-	-	-	-	-	-	-	-	-	-	-
<i>Gomphonema clavatum</i>	1	-	-	-	-	-	-	-	-	-	-	-	-
<i>Gomphonema parvulum</i>	1	-	-	-	-	-	-	-	-	-	-	-	-
<i>Gyrosigma acuminatum</i>	-	-	1	-	-	-	-	-	-	-	-	-	-
<i>Gyrosigma</i> sp.	-	1	1	-	-	-	-	-	-	-	-	-	-
<i>Hantzschia amphioxys</i>	-	1	1	-	-	1	2	-	1	1	-	-	-
<i>Inderminate pennate</i> sp.	-	-	1	-	1	-	-	1	-	-	-	-	-
<i>Navicula</i> (Sellaphora) pupula	3	1	1	-	-	-	-	-	-	-	-	-	-
<i>Navicula cincta</i>	1	1	1	-	-	-	-	-	-	-	-	-	-
<i>Navicula mutica</i>	-	-	-	-	-	1	1	-	-	-	-	-	-
<i>Navicula radiosa</i>	2	-	1	-	-	-	-	1	-	-	-	-	-

Diatom taxa / depth (mbgl)	Borehole BH11								Borehole BH13				
	3.8	4.0	4.52	4.68	4.84	5.5	5.6	5.7	1.8	1.96	2.12	2.28	2.44
Navicula sp.	-	1	-	-	-	-	-	-	-	-	-	-	-
Neidium sp.	-	1	-	-	-	-	-	-	-	-	-	-	-
Nitzschia sp.	-	-	1	-	-	-	-	-	-	-	-	-	-
Pinnularia biceps	1	-	-	-	-	-	-	-	-	-	-	-	-
Pinnularia (abaujensis) gibba	2	-	-	-	-	-	1	1	-	-	-	-	-
Pinnularia brebissonii	-	-	-	-	-	-	-	1	-	-	-	-	-
Pinnularia intermedia	-	-	-	1	-	-	-	-	-	-	-	-	-
Pinnularia microstauron	1	1	1	-	-	-	-	-	-	-	-	-	-
Pinnularia mesolepta	1	-	-	-	-	-	-	-	-	-	-	-	-
Pinnularia sp.	-	1	-	-	-	1	1	-	-	-	1	-	-
Pinnularia subcapitata	3	-	-	-	-	1	-	-	-	-	-	-	-
Pinnularia viridis	1	-	-	-	-	-	-	-	-	-	-	-	-
Pinnularia subcapitata v.hilseana	1	-	-	-	-	-	-	-	-	-	-	-	-
Surirella sp.	-	-	1	-	-	-	-	-	-	-	-	-	-
Tabellaria flocculosa	1	-	-	-	-	-	-	-	-	-	-	-	-
Unknown diatom	-	-	1	-	-	-	-	-	-	-	-	-	-
Unknown naviculaceae	-	-	-	-	-	-	-	-	-	-	-	1	-

(only includes those sampling preserving diatoms).

### Borehole BH11

- 10.3.8 Twelve samples have been assessed from BH11, with diatoms absent from four samples (3.5 m, 3.68 m, 5.0 m and 5.8 m BGL). With the exception of the sample at 3.84 m BGL, in the diatomaceous samples the numbers of diatoms are very low or extremely low, the quality of diatom preservation is very poor or extremely poor. Diatom diversity varies from the presence of a single species to moderate diversity.
- 10.3.9 The diatoms assemblages present in BH11 are composed entirely of non-planktonic species. These are benthic, mud-surface (epipelagic) diatom taxa from shallow water habitats. Diatoms epiphytic on aquatic macrophytes and other submerged surfaces are present in smaller numbers (eg *Tabellaria flocculosa*, *Gomphonema* spp.).
- 10.3.10 The diatomaceous samples of lowest diversity (4.68 m, 4.84 m and 5.5–5.7 m BGL) contain mainly aerophilous taxa. These desiccation-tolerant diatoms include *Hantzschia amphioxys*, *Navicula mutica* and some *Pinnularia* spp.
- 10.3.11 Samples from 4.84 m and 5.6 m BGL contain chrysophyte stomatocysts. The chrysophytes are a group of algae that are often form silica cysts in response to environmental stress such as drying-out of their aquatic habitats. The silica algae assemblages of these samples are therefore consistent with ephemeral aquatic conditions or with semi-terrestrial habitats.
- 10.3.12 From 3.84–4.52 m BGL depth the diatom assemblages are of moderate diversity; in the case of the sample from 3.84 m BGL the diatom assemblage is particularly well preserved suggesting that the diatoms were deposited in an aquatic environment that was relatively stable.
- 10.3.13 The diatom assemblages of these samples are comprised of diatoms from a number of sources. There is a small aerophilous component represented by *Hantzschia amphioxys*. However, there are a range of shallow water benthic diatoms such as *Pinnularia biceps*,



*P. gibba*, *P. microstauron*, *P. mesolepta*, *P. subcapitata*, *P. subcapitata v. hilseana*, *P. viridis*, *Navicula radiosa* and *Frustulia vulgaris*. Attached, non-planktonic diatoms such as *Amphora libyca*, *Eunotia* spp., *Gomphonema* spp. and *Tabellaria flocculosa* are also present.

- 10.3.14 Many of the diatoms are associated with slightly acidic conditions with relatively low nutrient levels (*Eunotia* spp. and some of the *Pinnularia* spp.). However, diatoms such as *Navicula pupula*, *Achnanthes (Lemnicola) hungarica* and *Gomphonema parvulum* are associated with higher nutrient levels. *Achnanthes (Lemnicola) hungarica* is found on the leaves of the aquatic macrophyte *Lemna* that is associated with eutrophic conditions. A few malformed valves of *Eunotia alpina*, *Eunotia bilunaris* and *Eunotia* sp. 1 *minutissima* were recorded at 3.84 m BGL.
- 10.3.15 The presence of higher numbers of these terratological diatom valves can be indicative of pollution such as heavy metal contamination. Another species that is tolerant of similar contaminated environments (and drying environments) is *Navicula cincta*. There therefore appear to be a mixture of taphonomic origins of the well-preserved diatom assemblage found at 3.84 m BGL.

#### Borehole BH13

- 10.3.16 Eight samples have been assessed from BH13. Diatoms are present in the top five samples (1.80–2.44 m BGL). However, the numbers of diatoms in these samples are extremely low and the quality of diatom preservation is extremely poor.
- 10.3.17 Diatoms were identified to the species level only in the top two samples (1.8 m and 1.96 m BGL). *Hantzschia amphioxys* is an aerophilous diatom that can withstand prolonged periods of desiccation. *Hantzschia amphioxys* is for example associated with damp terrestrial habitats and ephemeral water bodies.
- 10.3.18 In the sample from 2.12 m BGL a fragment of *Pinnularia* sp. and a chrysophyte cyst were recorded. Again, these taxa may be associated with aquatic habitats subject to periods of drying out.

#### Ostracods

##### Borehole BH11

- 10.3.19 Twelve samples were analysed from a 2.3 m section covering the interval 3.5–5.8 m BGL from borehole BH11. The results are presented in **Table 2020**. All 12 samples variously contained stone, brick, tile fragments and slag along with fragments of plant remains, insect and charcoal.
- 10.3.20 Freshwater ostracods, cladoceran ephippia and bryozoan statoblasts were present in selected samples between 3.86–4.68 m and 5.7–5.8 m BGL and imply an aquatic environment. The ostracods were all *Cypria ophtalmica* which has a very thick organic template so that the valves will survive even in the most organic sediments. Moreover, in life, it has been called the ‘slum ostracod,’ being found in the most polluted of waters.
- 10.3.21 Cladoceran ephippia are the winter or dry season eggs of cladocera (water-fleas such as *Daphnia*). The extra organic layer protects the resting stages inside from harsh environmental conditions until more favourable times. They are found in standing water, small ponds, seasonal pools and soil of dried puddles.
- 10.3.22 Bryozoan statoblasts are a means for the bryozoan to reproduce asexually, enabling the colony's lineage to survive the variable and uncertain conditions of freshwater

environments. For this they develop a bivalve-like shell of chitin (which are preserved here). These statoblasts can remain dormant for long periods, surviving harsh conditions such as freezing and desiccation, but can be transported by animals and even by the wind.

**Table 20** Results of ostracod assessment, borehole BH11

Depth (m BGL)	3.5	3.68	3.86	4	4.52	4.68	4.84	5	5.5	5.6	5.7	5.8
Cladoceran ehippia	-	-	x	x	x	-	-	-	-	-	-	-
Bryozoan statoblasts	-	-	x	-	-	-	-	-	-	-	x	x
Freshwater ostracods ( <i>Cypria ophthalmica</i> )	-	-	-	x	-	x	-	-	-	-	-	-
Castle moat wet or dry	DRY		WET				DRY			WET		
Contained material												
Brick/stone/tile/slag	x	x	x	x	x	x	x	x	x	x	x	x
Insect remains	-	x	x	x	x	x	-	-	x	x	x	x
Wood/plant debris + seeds	-	-	x	x	x	x	x	x	x	x	x	x
Charcoal/coal	-	-	x	x	-	x	x	x	x	x	x	x
Bone	-	-	-	-	-	x	-	-	-	-	-	-

Freshwater ostracods are listed: x—several specimens. Contained material is listed on a presence (x)/absence basis.

### Borehole BH13

- 10.3.23 Eight samples were analysed from borehole BH13, covering the interval from 1.8–2.9 m BGL. The results are presented in **Table 21**. There are no items of an aquatic nature whatsoever in the sediments of the core, and therefore must be presumed to have derived from a dry environment.

**Table 21** Results of ostracod assessment, borehole BH13

Depth (m BGL)	1.8	1.96	2.12	2.28	2.44	2.6	2.76	2.9
Brick/stone/tile/slag	x	x	x	x	x	x	x	x
Insect remains	x	-	-	-	-	-	-	-
Wood/plant debris + seeds	x	x	x	x	x	-	x	-
Charcoal/coal	x	x	x	x	x	x	x	x
Castle moat wet or dry	DRY							

Contained material is listed on a presence (x)/absence basis.

## 11 SCIENTIFIC DATING

### 11.1 Radiocarbon

#### Methodology

- 11.1.1 Suitable material was identified under a binocular microscope, stored in glass tubes, and sent to the <sup>14</sup>CHRONO Centre at Queens University Belfast for dating. Reporting of the radiocarbon dating results (**Table 222 and 23**) follows international conventions (Bayliss and Marshall 2015; Millard 2014). The calibrated age ranges were calculated with OxCal 4.2.3 (Bronk-Ramsey and Lee 2013) using the IntCal13 curve (Reimer *et al.* 2013). All radiocarbon dates are quoted as uncalibrated years before present (BP), followed by the lab code and the calibrated date-range (cal. BP) at the 2σ (95.4%) confidence, with the end points rounded out to the nearest 10 years.

11.1.2 Five radiocarbon determinations were obtained from material obtained from the moat boreholes. A further five analyses relate to the trial trenches.

*Moat boreholes*

11.1.3 Radiocarbon dating of moat deposits has produced results significantly pre-dating the medieval period, extending from the Late Glacial to the Bronze Age, that in the case of borehole BH11 also show significant inversions.

11.1.4 The results are not consistent with sediment infilling a medieval moat and are considered in more detail in the discussion in the context of the results of the palaeoenvironmental assessment.

**Table 22** Results of AMS dating, boreholes BH11 and BH13.

Borehole	Depth (m BGL)	Material dated	Lab Code	Age (BP)	Age-range (95.4%)
BH11	3.52–3.54	Bulk sediment	UBA-41062	9157±48	cal. BC 8536–8513 (3.5%) cal. BC 8485–8280 (91.9%)
	4.75–4.77		UBA-41063	2622±32	cal. BC 836–771
	5.76–5.78		UBA-40850	4289±25	cal. BC 2925–2880
BH13	1.82–1.84		UBA-41064	7554±42	cal. BC 6477–6356 (93.5%) cal. BC 6290–6269 (1.9%)
	2.86–2.88		UBA-40851	17548±70	cal. BC 19520–18892

*Evaluation trenches*

**Table 23** Results of AMS dating, trenches 1, 5 and 6

Trench	Context	Sample	Material dated	Lab Code	Age (BP)	Age-range (95.4%)
1	1057	1003	Charred plant remains: <i>Secale cereale</i> grain	UBA-41312	818±28	cal. AD 1170–1260
1	1076	1009	Charred plant remains: <i>Hordeum vulgare</i> / <i>distichum</i> grain	UBA-41313	902±25	cal. AD 1040–1210
5	5041	5004	Charred plant remains: <i>Triticum</i> sp. grain	UBA-41314	823±22	cal. AD 1170–1260
6	6044	6002	Charred plant remains: <i>Corylus avellana</i> nutshell	UBA-41315	785±22	cal. AD 1220–1270
6	6060	6009	Waterlogged plant remains: <i>Corylus avellana</i> nutshell	UBA-41316	916±32	cal. AD 1030–1200

## 11.2 Dendrochronology

*Summary*

11.2.1 Two samples from oak timbers from an archaeological excavation of Sheffield Castle, Castlegate, Sheffield, South Yorkshire were submitted for dendrochronological analysis. The tree-ring sequences obtained from these two samples were both successfully matched to dated early medieval English reference sequences, the results obtained suggest this material is from the 11th century AD.

*Tree-ring dating or dendrochronology*

11.2.2 Tree-ring or dendrochronological analysis relies upon a number of basic concepts. Trees in temperate zones of the world have a single growing season and a single resting season each year. The anatomical result of this is an identifiable tree-ring within the trunk of the

tree that has a distinct boundary marking the end of one growing season and the start of the next. Since the growing point of the trunk is the cambium layer directly under the bark, it follows that each year of growth appears on the outside of the previous year of growth. The oldest rings of a trunk are thus in the middle and the most recent rings are directly under the bark. Counting the rings provides an easy method of ageing trees but does not provide a method of dating the trees.

- 11.2.3 In contrast, dendrochronology attempts to provide absolute dates for the rings present in individual timbers. This is achieved by measuring very precisely the widths of each successive ring within a sample and comparing the pattern of narrow and wide rings with reference chronologies built up by previous work. The technique can be successful and reliable only when a number of conditions are met. Firstly, there have to be contemporary chronologies of the relevant species, or genus, of timber from sufficiently nearby that some degree of cross-correlation is possible. For Britain and Ireland there is now a composite tree-ring chronology for oaks stretching back just over 7000 years. There are some periods and areas that are under-represented in this composite. The timbers have to contain a long enough sequence of tree-rings that they match in only one position to other chronologies. In previous studies of archaeological and sub-fossil oaks from Britain samples of material with less than 100 annual rings have proven difficult to date, archaeological material with less than 50 rings is not routinely analysed.
- 11.2.4 Analysis of many thousands of timbers across Britain has also revealed that there is a consistent number of samples for which no reliable date can ever be obtained, even when many more than the minimum number of rings are present. Usually, for any sample group, between a quarter and a half of all samples cannot be reliably dated, although at some sites virtually every timber dates and at a few sites none can be dated.

#### *Methodology*

- 11.2.5 Each sample was assessed for the wood type, the number of rings it contained, and whether the sequence of ring widths could be reliably resolved. For dendrochronological analysis samples usually need to be oak (*Quercus* spp.), to contain 50 or more annual rings, and the sequence needs to be free of aberrant anatomical features such as those caused by physical damage to the tree whilst it was still alive. Standard dendrochronological analysis methods (eg English Heritage 1998) were applied to each suitable sample. A surface equivalent to the original horizontal plane of the parent tree was prepared on each sample with a sequence of increasingly fine bladed tools; surform or plane, Stanley blades, medical scalpel blades, razor blades. This is usually undertaken whilst the samples are frozen as they are not solid enough to take a sharp edge in ordinary circumstances. Their sequences of ring widths were revealed by this laborious preparation method, and once thawed out they could be assessed again for suitability. The complete sequence of the annual growth rings in the suitable samples were then measured to an accuracy of 0.01 mm using a micro-computer based travelling stage. The sequences of ring widths were then plotted onto semi-log graph paper to enable visual comparisons to be made between the sequences and reference data. In addition cross-correlation algorithms (eg Baillie & Pilcher 1973) were employed to search for positions where the ring sequences were highly correlated. Highly correlated positions were checked using the graphs and where these were satisfactory, these locations were used to identify the calendar dates of the measured series.
- 11.2.6 The t-values reported below were derived from the original CROS algorithm (Baillie & Pilcher 1973). A t-value of 3.5 or over is usually indicative of a good match, although this is with the proviso that high t-values at the same relative or absolute position needs to

have been obtained from a range of independent sequences, and that these positions were supported by satisfactory visual matching.

- 11.2.7 The tree-ring analysis initially dates the rings present in the timber. The interpretation of these dates relies upon the nature of the final rings in the sequence. Oak timber contains two types of wood, heartwood and sapwood, the latter is on the outside of the tree and thus contains the most recent growth rings, this material is softer and is not always preserved under archaeological conditions. If the sample ends in the heartwood of the original tree, a *terminus post quem* (TPQ) date for the felling of the tree is indicated by the date of the last ring plus the addition of the minimum expected number of sapwood rings which are missing. This TPQ may be many decades prior to the actual date that a tree was felled, particularly where poor preservation or other loss of outer heartwood has occurred. Where some of the outer sapwood or the heartwood/sapwood boundary survives on the sample, a date range for the felling of a tree can be calculated by using the maximum and minimum number of sapwood rings likely to have been present. For dated samples where the bark edge survived intact, a precise date for the felling of the tree can be directly identified from the date of the last surviving ring.

### Results

- 11.2.8 The supplied dendrochronological material comprised two oak (*Quercus* sp.) samples. Timber 3057 was part of a rectangular beam, whilst 6055 was also part of a rectangular beam, but had been cut down and subsequently re-used (Lorraine Mephram pers comm). Both these oak timbers contained relatively long tree-ring sequences. Both comprised oak heartwood with no clear evidence for surviving sapwood. The complete tree-ring sequences present in both samples were measured successfully (**Table 24**).

**Table 24** Details of the dendrochronological samples. Both were oak (*Quercus* sp.) heartwood. Key: - no sapwood

Timber	Cross-section (mm)	Rings	Sap	Growth (mm/yr)	Result	Interpretation
3057	140 x 110	167	-	0.81	AD825–991	After 1001
6055	240 x 125	129	-	1.16	AD888–1016	After 1026

- 11.2.9 These timbers had quite different growth characteristics and were clearly from separate trees. Both sequences were compared with reference tree-ring data from throughout the British Isles, and much of Europe. This search identified that both samples cross-matched to a range of early medieval chronologies from the region around Sheffield (**Table 25**). It seems likely that the two timbers originated in the vicinity of Sheffield, although since no contemporaneous material has been recovered from the City hitherto all the strongest matching is to material derived some distance outside Sheffield.

**Table 25** Illustrative correlation *t*-values between the sequences and independent oak reference chronologies

	3057 AD 825–991	6055 AD 888–1016
Cheshire, Willaston nr Nantwich (Groves 1990)	5.25	6.28
Lincolnshire, Barton on Humber Coffins (Tyers 2001)	6.44	6.69
Staffordshire, Stafford St Marys & Eastgate (Groves 1987b; a)	5.11	6.87
Yorkshire, Beverley Eastgate (Groves 1992)	8.02	8.13
Yorkshire, York Coppergate (Hillam 2002)	6.81	8.62
Yorkshire, York Queens Hotel (Groves 1993)	5.89	6.71

11.2.10 The material was recovered from different excavation trenches and may not be related. The terminal rings present in the samples were dated to AD 991 and AD 1016 respectively. With the absence of sapwood both samples can be given *terminus post quem* interpretations by the addition of the minimum likely number of missing sapwood rings (10 years for English sourced oak). This provides them with TPQ interpretations of post-AD1001 for 3057, and post-AD1026 for 6055 (**Fig. 33**). It may be tempting to assume these results indicate they are pre-Norman. However, the lack of sapwood means that we have no evidence for how near the original outer surface of the tree we are with these we are with these timbers. One or both could be heavily trimmed, decayed or eroded early Norman timbers. They are relatively unlikely to be much later than the mid-12th century since they would by then have been unusually long lived for native oaks.

### 11.3 Luminescence dating (OSL and pOSL)

#### *Abstract*

11.3.1 Optically stimulated luminescence (OSL) dating was applied to coarse quartz grains extracted from samples taken from the Sheffield Castle site, Sheffield UK. The samples responded reasonably to OSL measurement. Replicate measurements of the sample showed poor reproducibility with skewed De data and high overdispersion. This is assumed to be caused by insufficient bleaching at deposition, or by post-depositional disturbance. The final minimum age was  $2.03 \pm 0.25$  ka.

11.3.2 Samples were also collected for portable luminescence measurements from a number of contexts whose age was known in order to determine the age of other contexts with no chronological control. pOSL data appears to be reasonably internally consistent. pOSL data from Trench 2 above the OSL sample indicates the addition of much later sediments at this locality during the 13th and 10th centuries fitting with other units on site. This is the first use of pOSL in this way and the approach looks promising for use in other similar settings where there is good chronological control on some units/contexts but not others.

#### *Full OSL dating*

##### Introduction

11.3.3 A sample from the Sheffield Castle site, Sheffield UK was submitted for luminescence dating. The sample was assumed not to have been exposed to sunlight during sampling or transportation. All luminescence work was carried out at the Sheffield Luminescence Laboratory (SLL). Upon arrival at SLL, the sample was allocated a Sheffield lab number (**Table 26**), which is used throughout this report. This report provides a brief summary of the procedures employed and results obtained for this sample.

**Table 26** Sample descriptive data

Lab No.	Field Reference	Latitude (°N)	Longitude (°W)	Altitude (m)	Sampling depth (m below present day surface)
Shfd18119	Castle Trench 2	1, 53°23'	1°27'	56	0.7

11.3.4 In order to derive an optically stimulated luminescence (OSL) age both the palaeodose (De - the amount of absorbed dose since the sample was buried) and the dose rate (the estimated radiation flux for the sedimentary bodies) have to be determined. Bateman (2019) gives a detailed explanation of both these parameters. To calculate an age, the palaeodose (expressed in Grays) is divided by the annual dose rate (Grays/yr). An inherent assumption in the age calculation is that the sediment was fully reset or

'bleached' by exposure to sunlight during the last transport event or whilst *in situ* prior to burial and that no post-depositional sediment disturbance has occurred.

- 11.3.5 As part of this investigation, efforts have been taken to establish if the sediment was bleached prior to burial or disturbed by, for example, bioturbation by measuring 24 replicates of the sample. As the OSL signal measured at the single aliquot level is an average of ~2000 grains, the true distribution of De values may be masked. Measurements therefore used a smaller aliquot size of approximately 800 grains to mitigate this. Further measurements at the single grain level would have to be made to check if this is an issue or not.

#### Dose Rate Analysis

- 11.3.6 Naturally occurring potassium (K), thorium (Th), uranium (U) are the main contributors of dose to sedimentary quartz. The concentrations of these elements were determined by inductively coupled plasma mass spectrometry (ICP) at SGS Laboratories, Ontario Canada (**Table 27**). Elemental concentrations were converted to alpha and beta dose rates using data from Adamiec and Aitken (1998), Marsh *et al.* (2002), and Aitken (1998). A field measurement using an EG&G gamma spectrometer was collected and the resultant gamma dose rate used. Calculations took into account attenuation factors relating to sediment grain sizes used, density and palaeomoisture (**Table 28**). Attenuation of dose by moisture used present-day values with a  $\pm 5\%$  error to incorporate fluctuations through time (**Table 28**).

**Table 27** Summary of dosimetry related data

Lab No.	U (ppm)	Th (ppm)	K (%)	D <sub>cosmic</sub>	Moisture (%)	Gamma (μGy/a)	Dose rate (μGy/a)	Dose rate (μGy/a)
Shfd18119	3.04	11.3	2.3	193±10	8	1445±72		4702±240

Cosmic dose is calculated as a linear decay curve at depths below 50 cm. Above this depth, errors in calculation may lead to an underestimation of the cosmic dose contribution.

Gamma dose rate measured on site using a field gamma spectrometer.

Total dose is attenuated for grain size, density and moisture.

**Table 28** Summary of palaeodose data and age

Lab No.	Field Ref.	Depth (m)	De (Gy)	Overdispersion (%)	Dose rate (μGy/a)	Age (ka)
Shfd18119	Castle 1, Trench 2	0.7	9.43±1.01	61	4702±240	2.01±0.24

- 11.3.7 The contribution to dose rates from cosmic sources was calculated using the expression published in Prescott and Hutton (1994, Table 2). The Prescott and Hutton (1994) algorithm was used to calculate the cosmogenic derived dose rate.
- 11.3.8 The dose rates calculated are based on analyses of the sediment sampled at the present day. This assumption is only valid if no movement and/or re-precipitation of the four key elements has taken place since sediment burial and the adjacent sediments to those sampled had similar dose rates. Further analysis would have to be undertaken to establish whether radioactive disequilibrium is present in the dose rate.
- 11.3.9 The sample was prepared under subdued red lighting following the procedure to extract and clean quartz outlined in Bateman and Catt (1996). Material for dating was taken from prepared quartz isolated to a size range of 90–180 μm. The sample underwent measurement using a Risø DA-15 luminescence reader with radiation doses administered using a calibrated <sup>90</sup>strontium beta source. Grains were mounted as a 5 mm diameter monolayer on 9.6 mm diameter stainless still disks using silkospray. Stimulation was with

blue/green LEDs and luminescence detection was through a Hoya U-340 filter. The sample was analysed using the single aliquot regenerative (SAR) approach (Murray and Wintle 2000, 2003), in which an interpolative growth curve is constructed using data derived from repeated measurements of a single aliquot which has been given various laboratory irradiations (**Fig. 34.1**). Five regeneration points were used to characterise growth curves, with the first regeneration point being identical to the last in order to check if sensitivity changes caused by repeated measurement of the same grains are correctly monitored and corrected for by the SAR protocol (known as the 'recycling ratio'). The most appropriate pre-heat temperature for the sample was selected using a dose recovery pre-heat plateau test (**Fig. 34.2**). This resulted in selection of preheat temperatures of 160° C for 10 seconds which was applied prior to each OSL measurement to remove unstable signal generated by laboratory irradiation. De values from individual aliquots were only accepted if they exhibited an OSL signal measurable above background, good growth with dose, recycling values within  $\pm 10\%$  of unity, and the error on the test dose used within the SAR protocol was less than 20%. The sample possessed reasonable luminescence characteristics with a rapid decay of OSL with stimulation and OSL signals dominated by a fast component (**Fig. 34.1**). Within the SAR protocol results which grew well with laboratory dose (**Fig. 34.2**).

#### Sedimentary bleaching behaviour and sample saturation

- 11.3.10 The effects of incomplete bleaching of the sediment during the last period of transport or exposure *in situ* can be profound. Typically, poorly bleached sediments retain a significant level of residual signal from previous phases of sedimentary cycling, leading to inherent inaccuracies in the calculation of a palaeodose value. By plotting the replicate De data for the sample as a probability density function (**Fig. 34.3**) some assessment of whether older or younger material has been included in the sample measurements can be made. In principle a well-bleached sample that has not been subjected to post-depositional disturbance should have replicate De data which is normally distributed and highly reproducible (see Bateman *et al.* 2003, Figure 3; Bateman *et al.* 2007a). Where post-depositional disturbance or incomplete bleaching prior to sample burial has occurred skewing of this distribution may occur and/or replicate reproducibility may be lower (Bateman *et al.* 2007a; Bateman *et al.* 2007b). In the case of poorly bleached material skewing should be evident with a high De tail (eg Olley *et al.* 2004). High De tails may also be indicative of saturated samples and interpolation of the De values from the upper, low gradient part of the growth curve (Murray and Funder 2003).
- 11.3.11 As **Fig. 34.3** demonstrates (see also **Fig. 35**), the De replicate distributions of this sample is not normally distributed (even after outliers are removed) and has high levels of De replicate scatter (OD <20%; values given in **Table 28**). This data shows indications either of partial bleaching or post-depositional disturbance. To mitigate the effects of including older or not fully reset signals in the final De values for age calculation purposes the data was analysed using the Minimum Age Model (MAM) of Galbraith and Green (1990).

#### Age Calculation

- 11.3.12 The age is quoted in years from the present day (2019) and is presented with a one sigma confidence interval which incorporates systematic uncertainties with the dosimetry data, uncertainties with the palaeomoiure content and errors associated with the De determination. **Table 23** shows the final OSL age estimate of  $2.01 \pm 0.24$  ka. Aliquot-specific data for the sample is included in **Fig. 35**. Data shows that the sample had low reproducibility in terms of its palaeodose and therefore ages may over-estimate true burial age.



*Portable luminescence report*

11.3.13 Portable OSL (pOSL) was carried out on a series of samples collected in light tight containers (**Table 29**). These samples fell into two sub-groups. One group where the age was relatively well constrained by context or artefacts. One group where the age was unknown. Under controlled red lighting, all samples had any light exposed material removed and were dried at 30° C. No other sample preparation was undertaken. It is assumed that both the mineralogy and level of light exposure prior to burial of all samples and the back ground radioactivity to all samples was broadly similar. If these assumptions are valid then the magnitude of the pOSL signal should reflect antiquity. Each sample was measured on a SUERC portable luminescence reader for 1 minute using IR light stimulation and 1 minute using Blue light stimulation (See Bateman *et al.* 2015 for details on measurement). The signal from the IR measurements is derived from feldspar minerals in sediments whilst the blue measurement signal is from both quartz and feldspar minerals. A correction procedure was therefore employed on the blue light data to compensate for any changes in the ratio of feldspar to quartz.

**Table 29** Summary of palaeodose data and age

Trench	Context	Known date of context	Basis of established dating	Number and type of samples(s)
1	1079	Older than or equal to 13th–15th century	Stratigraphically precedes deposit 1057 containing 13th–15th century pottery	3 pOSL samples
2	2048 2051	Unknown		8 pOSL samples
2	2061	Unknown		1 pOSL sample
3	3058	13th century	Context contained 13th century pottery	1 pOSL sample
3	3070	Older than or equal to 13th century	Stratigraphically precedes deposit 3058 containing 13th century pottery	1 pOSL sample
3	3071	13th century	Context contained 13th century pottery	3 pOSL samples
5	5041	13th century	Context containing 13th century pottery	3 pOSL samples
6	6066	Unknown, probably medieval?		2 pOSL samples
10	10073	Older than or equal to 13th–15th century	Stratigraphically precedes deposit 10071 containing 13th–15th century pottery	3 pOSL samples

**Table 30** pOSL data of known age samples. Shown are corrected OSL signal, ages (\*or adjusted ages; in years from 2019) and OSL signal accumulation rate. Age adjustment was undertaken to get the OSL accumulation rate similar to other samples (original rate shown in parenthesis)

Sample	OSL (cts)	Age (yr)	Date (nearest 50 years AD)	OSL accumulation rate (cts/yr)
1079	1243±59	650	1350	1.91
3058	1438±66	750	1250	1.92
3070	1204±63	650	1350	1.85
3071	2391±87	1300	700	1.84
5041	415±38	225*	1800	1.85 (0.64)
10073	312±35	175*	1850	1.78 (0.48)

**Table 31** pOSL data of unknown age samples. Shown are corrected OSL signal, estimated

Sample	OSL (cts)	Age (yr)	Date (nearest 50 years AD)	OSL accumulation rate (cts/yr)
2061	1074±71	550	1450	1.95
Trench 2, 14–15	2829±80	1500	500	1.89
Trench 2, 10a–12a	1920±78	1000	1000	1.92
Trench 2, 6a–9a	1309±65	750	1250	1.75
6066	1383±66	775	1250	1.78

- 11.3.14 Based on the pOSL it became apparent that both 10073 and 5041 either had undergone light exposure during sampling or these samples were much younger than assigned in the context (**Table 29**). Both had a very similar pOSL signal so are apparently of similar age/level of bleaching. Using other known ages these samples might be as young as 18th Century (**Fig. 36.1; Table 30**). Samples from 3070, 3058 and 1079 all had similar pOSL signals and are taken to be of 13th century age (**Table 30**). Sample 3071 had a higher pOSL signal and is taken either not to have had the OSL signal reset prior to burial or to be older (**Table 29**). Again using other known age samples sample 3071 might be as old as 7th century.
- 11.3.15 In terms of the unknown age samples the different units identified in trench 2 appeared conformable to the pOSL data (**Fig. 36.1**). Assuming all samples were exposed to sufficient light prior to burial to reset the OSL signal fully, it would appear from using the above known age samples that the uppermost unit in trench 2 is similar in age to samples from 3070, 3058 and 1079 and therefore is probably 13th century in date (**Fig. 36.2; Table 31**). The middle unit is older and maybe as old as the 10th century and the basal unit even older still maybe as old as the 5th century (**Fig. 36.2 Table 30**). The sample from 2061 would appear younger than 3070, 3058 and 1079 and is estimated to be 15th century in date (**Fig. 36.2; Table 30**). Sample 6066 appears of similar age to the uppermost unit in Trench 2 estimated as 13th century (**Fig. 36.2; Table 30**).

### *Conclusions*

- 11.3.16 The OSL age sample was not well reset at burial or has been disturbed giving an age of  $2.01 \pm 0.24$  ka (1st century AD) but despite statistical methods to mitigate this, this age may still be an over-estimation. pOSL samples from the same context in trench 2 also show this unit to be pre-medieval and maybe 5th century in date. The OSL and pOSL data is therefore broadly conformable. pOSL data appears to be reasonably internally consistent. pOSL data from trench 2 may indicate the addition of much later sediments at this locality during the 13th and 10th centuries fitting with other units on site.
- 11.3.17 This is the first use of pOSL in this way and the approach looks promising for use in other similar settings where there is good chronological control on some units/contexts but not others.

## **12 DISCUSSION**

### **12.1 Moat boreholes**

#### *Issues of radiocarbon dating and moat taphonomy*

- 12.1.1 The results of radiocarbon dating from boreholes BH11 and BH13 raise important questions regarding the processes involved in the formation of the moat and the moat deposits. The radiocarbon dates extend from the Late Glacial through to the Bronze Age,

in the case of BH11 exhibiting significant inversions, and in all cases substantially pre-dating the castle. The radiocarbon dates clearly reflect the inclusion of old carbon substantially pre-dating the castle, and the mechanisms responsible for such early dates require consideration as they will have a bearing on interpretation of the moat and the palaeoenvironmental material contained in the boreholes. Factors affecting the radiocarbon dates probably include the following:

- variable in-wash of older inorganic or inert carbon derived from the local sandstone (Silkstone) bedrock, producing anomalously old dates;
- older organic material washed in/eroded into the moat;
- mixing of organic material of different ages through the moat profile.

12.1.2 It remains unclear from the stratigraphic data whether the south moat re-used an earlier watercourse or was purpose-built. However, the dates suggest that older and inert carbon has been washed/eroded into moat, substantially skewing the dates. Inclusion of old/inert carbon is likely to have derived from multiple sources at stages during the life of the moat, whether during the initial stages following excavation of the moat (again, either modifying an earlier channel or as a purpose-built moat) or during later phases of erosion or mixing, particularly if the moat was ever re-cut.

12.1.3 The moat deposits are likely therefore to represent a highly punctuated sequence with key stages of moat deposition either partially eroded, reworked or removed entirely. Detecting the evidence for these taphonomic processes in moats is challenging in the absence of secure stratigraphic or dating evidence. In the absence of secure radiocarbon dates and uncertainty over the impact of taphonomic factors on moat formation, a high degree of uncertainty must be placed on the reliability of the accompanying palaeoenvironmental data as an indicator of environmental conditions contemporary with the castle.

#### *Palaeoenvironment*

12.1.4 The program of palaeoenvironmental assessment has determined that there is minimal preservation of pollen, diatoms and ostracods in borehole BH13, with these remains only locally preserved in borehole BH11.

12.1.5 The anomalous radiocarbon dates and uncertainties regarding the taphonomic factors affecting the moat sediments therefore place doubts on the reliability of the palaeoenvironmental data as a secure indicator of environmental conditions contemporary with the castle. These factors which should be borne in mind when considering the following areas of interest.

#### Was the moat wet or dry?

12.1.6 Where diatom and ostracods survive in the moat boreholes, they suggest the moat was most likely a shallow water environment but with long periods of drying. There is no indication from either diatom or ostracod data to suggest that the moat was ever connected to the Rivers Don or Sheaf.

12.1.7 Many of the diatoms are associated with slightly acidic low nutrient level conditions, and in the case of the sample from 3.84 m BGL there is a higher presence of terratological diatom valves that can be indicative of pollution associated with heavy metal contamination.

- 12.1.8 At the very least the diatom sample from 3.84 m BGL suggests deposition with a relatively stable aquatic environment, but still representing shallow water, likely ponding within the base of a largely dry moat.
- 12.1.9 The results of paleoenvironmental analysis of the moat boreholes should be contrasted with the molluscan evidence from the moat in evaluation trench 9, which indicated that in the 14th century, that part of the south moat was dry.

What was the environment of the castle like?

- 12.1.10 Pollen was only preserved in sufficient quantities from a small number of samples in borehole BH11, largely from the basal deposits, and is challenging to interpret in view of the taphonomic issues.
- 12.1.11 The pollen assemblages are variable with large changes in the principle taxa present across individual samples, primarily hazel and alder at 5.8 m BGL with large quantities of elm at 5.6–5.5 m BGL and a greater herbaceous component at 3.84 m BGL. The preservation of pollen is also variable, including taxa both susceptible and resistant to decay processes.
- 12.1.12 The atypical nature of individual pollen assemblages (ie dominated by large quantities of single taxa that change between subsequent levels) suggests limited post-depositional mixing of pollen through the profile, although the source of both sediment and pollen within specific levels may vary.
- 12.1.13 Pollen at specific levels may therefore contain components of pollen contemporary with the castle, perhaps from specific contexts or via specific depositional pathways, together with pollen in-washed/eroded from multiple non-contemporary sources pre-dating the medieval period.
- 12.1.14 For example, the quantities of elm pollen at 5.6–5.5 m BGL (> 60%) are significantly higher than would be expected in off-site pollen sequences, particularly for the medieval period when large areas of the landscape would have been dominantly open. The high quantities of elm pollen are difficult to explain as a function of differential pollen preservation or in-wash of sediment since this should function to produce a mixed pollen assemblage. The high levels of elm pollen could therefore derive from specific stands of elm tree(s) surrounding the site, with pollen dropping directly from the anthers. Elm wood was sought after in medieval England because of its resistance to decay, particularly in situations where wood came in direct contact with water. Elm was therefore favoured as a component in bridges, lock gates, water wheels and water pipes (Richens 1983). Elm leaves were also favoured as fodder, but it is challenging in the absence of direct evidence to suggest the high elm frequencies are a consequence of the working of elm or use of leaf fodder.
- 12.1.15 The sample from 3.84 m BGL is more consistent with a medieval pollen signal from a moat (despite the radiocarbon date), containing quantities of cereal pollen alongside ruderals (taxa of disturbed environments) with large quantities of meadowsweet and pollen of the rose family; the rose family includes a range of berries. These taxa may reflect waste materials flushed into the moat, including food waste from kitchens and faecal material from latrines; pollen may also have been unknowingly ingested and passed through the intestinal tract. A single grain of cannabis was recorded—perhaps related to use of hemp.

- 12.1.16 The cereal pollen, which is present in small quantities in most samples, could also reflect processing and storage of cereal products in the castle. Cereal pollen is also contained within cereal-based products which can be introduced into the moat through waste products. Rotting waste and faecal material in the moat may also have attracted insects that could also have introduced pollen and may account for some of the high quantities of entomophilous taxa (plants pollinated by insects) including meadowsweet and the rose family.
- 12.1.17 Ruderal pollen taxa may also have been collected along with cereals during harvest and storage, or reflect plants growing in waste ground, and again, either flushed into the moat, or growing on the vegetated edges of the moat.
- 12.1.18 The quantities of fern spores in the pollen samples could reflect a component of the vegetation growing within the moat, along with other herbaceous plants including ruderal taxa and grasses.

### *Conclusions*

- 12.1.19 Assessment of pollen, diatom and ostracods from boreholes BH11 and BH13 have found variable levels of preservation. Little or no palaeoenvironmental remains were preserved in BH13 and this borehole has no potential for further analysis. Although palaeoenvironmental remains were present in sections of borehole BH11, radiocarbon dates significantly pre-date the medieval period.
- 12.1.20 The atypical nature of successive pollen samples suggests that there may be little mixing of sediment and pollen between levels but could instead reflect very specific depositional pathways for pollen.
- 12.1.21 The diatoms and ostracods suggest that the moat was not connected to Rivers Don or Sheaf, but at points contained shallow, perhaps polluted water, likely ponding in the base of the moat. Again, the anomalous radiocarbon dates raise questions regarding the impact of depositional and post-depositional factors on the composition of the palaeoenvironmental assemblages.
- 12.1.22 The geoarchaeological potential of borehole BH11 is considered low and no further work is recommended because of the variable preservation of palaeoenvironmental remains, the unreliable radiocarbon dates and uncertainty regarding the impact of taphonomic processes on the moat sediments.

## **12.2 Natural**

- 12.2.1 The bedrock in the area of the moat has previously been recorded by Davies (2000, 7), Armstrong (1930, 18) and Butcher (see Moreland *et al.* in press). Davies and Butcher described the bedrock as sandy mudstone (siltstone) with an upper more shaley, friable horizon. Davies (working on the east arm of the moat) interpreted that the upper portion of the mudstone had been weathered in geological time, suggesting that at least one part of the Sheaf terrace comprised a cliff of exposed bedrock. It is probable that the eastern arm of the moat was developed along a natural feature such as a meander scar. The results of trench 10 are consistent with this as they demonstrate that there was no rock-cut eastern side to the moat. This topography may have been created by a meander pre-dating the castle cutting first westwards then moving back eastwards towards the current course of the Sheaf.

12.2.2 The bedrock recorded in trenches 7, 8 and 9 was sandier and harder than that recorded by previous workers. This is almost certainly because of truncation of higher, siltier and softer strata affected by weathering.

12.2.3 The British Geological Survey records superficial deposits of alluvium from the area of the site, consistent with the position of the castle at the confluence of two rivers. It is probable that undisturbed alluvium was reached in the base of trench 2 (2053); which was distinct from layers 2051 etc. (interpreted as part of a motte) in that it was veined. No further undisturbed alluvial deposits were identified. In trenches 7, 8 and 9 alluvial deposits had probably been removed by truncation. In trenches 1, 3, 4, 5, 6, 10 and 11, excavation did not extend to sufficient depth to reach undisturbed alluvium.

### 12.3 Potential for early remains

12.3.1 As trenches 1, 3–6, 10 and 11 were halted prior to reaching undisturbed natural, there is potential for earlier remains to exist in these areas. Trenches 1, 3, 5 and 10 halted at 13th-century strata. Trenches 4 and 11 contained only 18th, 19th and 20th century remains. Trench 6 halted at late-11th/12th-century features. In each of these trenches the absence of earlier remains was not demonstrated and there is potential for the preservation of earlier remains.

### 12.4 Early cut features in trench 6 (11th to 12th centuries)

12.4.1 Four cut features in trench 6 (6059, 6061, 6063 and 6067) may represent an entranceway. An early radiocarbon date was obtained from one of them (UBA-41316, 916±32 BP: cal. AD 1030–1200). These features were sealed by layer 6055, which contained a modified piece of wood. Analysis of a dendrochronological result from this timber suggests a Norman date not much later than the mid-12th century. These features were at a low level (50.5 m aOD), below the level of the truncated bedrock recorded nearby in trench 7 (51.48 m aOD; **Fig. 37.1**). As the bedrock was truncated in trench 7, the ground level in the area of trench 7 in the 11th and 12th centuries would have been somewhere above this. For comparison, the level of the modern road Castlegate a short distance to the north was around 0.7 m lower and the modern level of the Don around another 6 m below that. The road Castlegate was first constructed in the early 20th century.

12.4.2 The putative entranceway (6059, 6061, 6063 and 6067) either pre-dated the motte, or was contemporary with the motte but located outside the area of the motte. Insect remains obtained from environmental samples indicate that intensive settlement activity was taking place and that the building or enclosure contained structural timbers. Wood fragments recovered from environmental samples were probably debris from woodworking, but this is probably represents construction debris. The function of the building or enclosure is perhaps revealed by the assemblage of corncockle (*Agrostemma githago*). The presence of over fifty whole seeds indicates a dump removed from cereal crops in the later stages of crop processing. The building or enclosure can therefore be said to have had a function related to arable crop processing. These features represent evidence of early occupation on the bank of the Don and are the earliest securely dated archaeological remains from the castle site and represent significant early remains in the context of the city of Sheffield as a whole.

12.4.3 The second (6073, 6075 etc.) and third (6080, 6082) sub-phases of activity in trench 6 indicate that there was sustained activity in this location following abandonment of the putative entranceway described above. They also indicate a raising of the ground level through iterations of occupation at odds with the deliberate construction of the motte.

Insect assemblages suggest that fill 6072 and layer 6055 were rapidly incorporated into the archaeological sequence, consistent with a rapidly evolving site as evidenced by multiple sub-phases of development. These sub-phases of activity may represent a transition from the early activity attested by the entranceway (6059 etc.) and the 'early castle' phase described below.

- 12.4.4 A pOSL date for the earliest observed context (6066) cut by features 6059 etc. suggested a 13th-century deposition. This result is not considered to be reliable as outlined in the OSL report above and in a commentary below. Layer 6066 almost certainly pre-dates the 13th century.

## 12.5 Motte

- 12.5.1 A series of clean clay deposits were recorded in trenches 2 and 4 (2051, 5049, 2052, 2050, 2048 and 4113). In trench 2, these clean clay deposits were found at an unexpectedly high level behind the castle gatehouse. Clean clay was also apparently reached by Davies and Symonds (2002, trench 2 context 2020) at 51.97m aOD. This layer had been cut by the post-medieval precipice facing the Don and was located well above the level of archaeological remains observed during the 2018 evaluation. This clean clay deposit might fall into the same category as the clean clays observed in the 2018 trenches 2 and 4.
- 12.5.2 These deposits comprise alluvially-derived clays. They were very clean, although in trench 2 they did contain a very small amount of charcoal. The layer encountered by Davies and Symonds was interpreted at the time as undisturbed natural.
- 12.5.3 Environmental assessment of samples from the motte deposits has not produced conclusive results. Windblown seeds recovered from 4113 in trench 4 are likely to be intrusive. Processing of the core from borehole 1 (located inside trench 2) for environmental remains produced a small amount of uncharred seeds and wood fragments which may be intrusive. These were more common in the upper strata which may have been disturbed during trial trenching.
- 12.5.4 Attempts to date the trench 2 deposits using OSL and pOSL techniques were inconsistent and unreliable (see luminescence dating above and commentary below) but do at least seem to show that the clays were laid down in historic rather than geological time.
- 12.5.5 It is suggested that these deposits represent the remains of a motte. A similar appearance to the motte of Oxford Castle (Munby *et al.* 2019) was noted by Andrew Norton who had observed both under excavation (pers. comm.).
- 12.5.6 Mottes are typically Norman in date (eg Pounds 1990). Evidence for Norman activity on the site as a whole comprises a handful of pottery sherds (see Moreland *et al.* in press), radiocarbon determination UBA-41316 (916±32 BP: cal. AD 1030-1200) from trench 6 and two timbers that analysis of dendrochronology has suggested may originate in the post-conquest 11th century (see above). Documentary references to Sheffield Castle begin in 1183-4 (eg Wessex Archaeology 2018a). A Norman presence on the site has therefore been demonstrated and the chronology of a Norman motte is reasonable.
- 12.5.7 The upper layers of the motte in both trenches 2 and 4 were likely disturbed *in situ* during 19th-century construction (2002 = 2019, 2045 and perhaps 2055, and 4114 and 4082 = 4094 = 4095). The motte in trench 4 may have been truncated during construction of flue 4091.

- 12.5.8 The total area of the motte is unknown. A circle drawn in plan to encompass trenches 2 and 4 must be a minimum of 77 m in diameter. This is large but within the range of other examples (cf. Pounds 1990, 16). The width of the modern castle mound from north to south is less than this, under 65 m. The modern castle hill is approximately square; mottes are circular.
- 12.5.9 The original motte was probably centred somewhere within the modern castle mound such that trench 2 (and probably trench 4 and Davies and Symonds 2002 trench 2) were within the area of the motte. The motte was then continuously modified until the present day, both by the addition and removal of material. Additive processes may be evidenced in trenches 1, 3 and 5 (see early castle below). Reductive processes may include slighting, construction of the post-medieval precipice facing the Don, and 20th-century development.
- 12.5.10 However, if both trenches 2 and 4 contain motte deposits, any reasonable circle drawn to include both also covers the area of trench 6. This is problematic given the range of dates (late-11th/12th century and 13th century) obtained from the features near the base of trench 6. It is not expected that the motte occupied the area of the north part of trench 6.
- 12.5.11 The location of the trench 2 motte deposits was unexpected in the context of the gatehouse remains first identified by Armstrong (1930) and preserved on the site. The relationship between these features can be seen on **Fig. 37.2**.
- 12.5.12 It is difficult to reconcile the presence of a motte extending between trenches 2 and 4 with the sequence recorded in the intermediate trench 3 (see below). Perhaps the motte was smaller and occupied only the area of trench 2 (or 4); if this is the case the motte could not be more than around 20 m in diameter, comparable to that at Thorne near Doncaster. It is possible that the layers laid down in trench 3 represent an expansion of the existing motte into a larger earthwork, perhaps a glacis, and perhaps the glacis referred to by Armstrong (1930).

## 12.6 Early castle (11th to mid-13th centuries)

### *Introduction*

- 12.6.1 Deposits associated with the early castle were identified in trenches 1, 3, 5 and 6. In this sense the phrase 'early castle' has been used to identify the castle prior to the destruction of 1266, and primarily intends to identify the castle in the Angevin and early Plantagenet periods. It is equivalent to Armstrong's 'de Lovetot Castle' (Armstrong 1930) however that term is problematic, not least because the castle was in de Furnival hands prior to 1266 (see Moreland *et al.* in press).

### *Dating and general comments*

- 12.6.2 Assignment of deposits and structures to the 'early castle' period is based on the presence of pottery, on four radiocarbon determinations from trenches 1, 5 and 6, and two dendrochronological determinations from trenches 3 and 6.
- 12.6.3 The four earliest layers in trench 1 (1079, 1080, 1077 and 1076) represented make-up levelling for cobbled surface 1075 and as such are assumed to have been deposited during the same building campaign. However, a radiocarbon date (UBA-41313, 902±25 BP: cal. AD 1040-1210) does not overlap with the chronology of one of two recovered sherds of pottery (late-13th to 14th century). The other sherd of pottery (12th- to 13th-century) is broadly contemporary with the *Hordeum* sp. grain used for the radiocarbon determination. As discussed in the pottery section above, there are issues in the relevant



pottery chronologies and the radiocarbon determination should be seen as more reliable than the pottery chronology. It is possible that one or more dating element was intrusive or residual (both the latter sherd of pottery and the cereal grain are small; the pottery weighing only 8 g). The stratigraphic position of these deposits is also informative as they are succeeded by subsequent phases of activity within the broad 'early castle' phase. On balance the evidence points towards the latter end of the radiocarbon range (12th century or the first decade of the 13th century) for these deposits and by extension for cobble surface 1075.

- 12.6.4 The subsequent redeposited alluvial layers (1078, 1074) and slag layer 1073 are not directly dated, however their chronology was established by their stratigraphic position between earlier and later layers. They therefore are approximately early 13th century in date.
- 12.6.5 Further alluvially-derived levelling layers (1072, 1061, 1057, 1062, 1048 and 1049) resembled the earlier layers from trench 1. These layers contained a total of 35 sherds of pottery, all but one of which (an intrusive 18th-century sherd) can be accommodated by the latter end of a radiocarbon determination (UBA-41312, 818±28 BP: cal. AD 1170-1260), suggesting overall a date of AD 1200–1260 for these layers. This secure dating evidence demonstrates strongly that earlier surfaces 1075 (stone) and 1073 (slag) belong to the 'early castle' phase and not later periods.
- 12.6.6 Pit 1052 may have been contemporary with the early castle layers described above, or may have been of any date from the 13th to 15th centuries on the evidence of a single sherd of pottery.
- 12.6.7 In trench 3, stone wall 3064/3076 pre-dates 13th century pottery recovered from layers 3058, 3079, 3057 and 3056. The wall pre-dates destruction layers 3079, 3057 etc. interpreted as the debris of the destruction of the castle in 1266 (see below). The wall, therefore, belongs to the early castle and along with the cobble surfaces is the earliest identified evidence for the use of the stone at Sheffield Castle. The relationship of the wall to the layout of the castle is at present unknown.
- 12.6.8 In trench 6, the 'fourth sub-phase' comprised a series of layers of redeposited alluvium (eg 6044) and cut features (eg 6057). (For earlier sub-phases, see separate section above). A radiocarbon determination (UBA-41315) dated layer 6044 to 785±22 BP: cal. AD 1220-1270, establishing these remains as contemporary with the early castle remains in other trenches. A sherd of pottery was obtained (from 6050) but could not be closely dated. A small amount of slag was similar to that associated with the courtyard surfaces in trenches 1 and 5.
- 12.6.9 The 'fifth sub-phase' in trench 6 (6078 etc.) is undated but probably closely related to the fourth sub-phase. After the fifth sub-phase both the nature of the stratigraphic sequence and the environmental assemblages changed. It is possible that this change represents the destruction of 1266 and subsequent rebuilding.
- 12.6.10 Just to the north-east of trench 6, Davies and Symonds (2002) recorded a pair of square pits (in their trench 2, contexts 2015 and 2022). These were assigned to the 'de Lovetot' castle on the basis of a single sherd of late-twelfth- to fifteenth-century shell tempered pottery, supported by the stratigraphic position of the pits cutting clean clay (2020). The base of cuts 2015 and 2022 were at 51.70m and 51.55m aOD respectively, placing them at the same level as the upper sub-phases of the palimpsest of features in trench 6. Although the precise dating of Davies' pits is uncertain, the initial interpretation that they

were early is reasonable. It is likely that these pits represent a continuation of the activity attested in trench 6.

#### *Courtyards*

- 12.6.11 The discovery and recording of three surfaces associated with the early castle represents a significant result. Although the courtyard surface had been seen by previous workers (eg Armstrong 1930), it had barely been described at all.
- 12.6.12 Layer 1075 represented the first of three iterations of the castle courtyard preserved in trench 1 (two of these dating to the early castle). The stones of 1075 were heavily disturbed, perhaps during redevelopment undertaken during the early castle period. A similar but better-preserved surface was seen in trench 5 (5042/5043/5044). Surface 1075 in trench 1 was at 52.2–52.8 m aOD and surface 5042/5043/5044 in trench 5 was just over a metre higher at 53.9 m aOD some 30 m to the west.
- 12.6.13 The trench 5 surface exhibited evidence that it had been repaired on two occasions, first with stone (5043) and then with slag (5039). Slag was also used to construct the second surface in trench 1, although the ground level was raised slightly in trench 1 between construction of the stone and slag surfaces (it is not possible to give a measurement of the difference in height between the two surfaces due to the disturbance to stone surface 1075; see **Fig. 14**).
- 12.6.14 It is probable that the trench 5 surface was exposed for some five centuries, from construction in the 13th century until it was buried during construction of the bowling green in the 18th. This is important evidence for the survival of the castle after the civil war. In trench 1 a late medieval surface (1033, see below) had replaced the surfaces of the early castle but this too was partially exposed until buried in the 18th century.

#### *Trench 3 remains*

- 12.6.15 Trench 3 contained a sequence of deposits and structures that were unique among the results of the evaluation. A stone structure (3064/3076) may have been a wall or a wall foundation, although Moreland *et al.* (in press) chose to shy away from the 'w'-word and there is no confirmation that much more than two courses survived. The arrangement of the wall within the site does not instantly spark interpretation and any relationship with the gatehouse to the south/south-east is tenuous.
- 12.6.16 The use of stone (3064/3076) as well as wood in the context of the early castle is significant. Stone structures existed on the site before the late-13th-century crenellation.
- 12.6.17 The upper course of stones (3076) was slightly mis-aligned compared to the lower course (3064). It is possible that this altered alignment represented a change in approach during construction or a deliberate stepping out. However, it is most likely that the stones of 3076 had been knocked off alignment during subsequent demolition.

#### *Composition of deposits and comparison with motte*

- 12.6.18 All of the non-structural deposits associated with the early castle comprised redeposited alluvium. These layers represent the intentional raising of the ground level and as such can be described as 'levelling layers' or 'made ground'. The source of this alluvium is expected to be local and associated with the rivers Don and Sheaf.
- 12.6.19 In this respect the early castle deposits resembled the motte deposits of trenches 2 and 4 and also many later strata described below. The motte deposits can be differentiated from 'early castle' deposits by their cleanliness. The early castle redeposited alluvial layers

contained charcoal and pottery and with a visible dirtiness indicative of anthropogenic manipulation. In contrast, the motte deposits were almost unbelievably clean with little indication of the hand of humankind.

#### *Iron slag*

- 12.6.20 A layer of slag (1073) was present in trench 1. At least some pieces comprise iron smelting tap slag and are therefore indicative of iron smelting somewhere in the general vicinity. Similar slag was noted in contexts across trenches 5 and 6, and was also recovered from other contexts in trench 1 that were physically close to slag layer 1073. Wherever the precise smelting location, this result is highly significant as evidence of early iron working in Sheffield and has a contribution to make to the evolving identity of the steel city. The slag was deposited as metallurgical material to form the second surviving iteration of the castle courtyard identified in trench 1.
- 12.6.21 Wood charcoal recovered from layer 1057 associated with slag layer 1073 comprised heartwood of oak (*Quercus* spp.). Although it is not certain that this material was associated with the origins of the slag, it may represent the use of high-quality charcoal for iron production.

#### *Dolomite (magnesian limestone)*

- 12.6.22 Pit 6078 in trench 6 contained a large block of dolomite (magnesian limestone). Documentary records suggest that limestone was imported to the castle in the 15th century (Thomas 1920). Earlier and later imports of limestone are also possible. It is probable, though not certain, that feature 6078 was of early-13th-century date (see dating sub-section below). A band of dolomite runs approximately north to south around 20 km to the east of Sheffield (BGS). Further pieces of dolomite were discovered, probably residually, in post-medieval contexts in trench 6. Himsforth (nd) also noted magnesian limestone discovered on the castle site on the 15 Nov 1927.
- 12.6.23 The environmental report above notes the presence of field maple (*Acer campestre*), a base-loving species. One possibility is that this is further evidence for trade with the limestone regions to the east of Sheffield. The limestone regions of Derbyshire are an alternative source.

## **12.7 Destruction of 1266**

- 12.7.1 Destruction contexts 3079 and 3057 were dated by pottery to the 13th century. Documentary sources record that the castle was slighted at the hands of John D'Eyville during the Second Baron's War in AD 1266 (see eg Belford 1998; Vickers 1992, 13, Hunter 1831, 186).
- 12.7.2 The destruction contexts contained burnt wood which may be evidence for slighting by burning (see Nevell 2019). The deposits also contained unburnt wood which suggests a hurried and incomplete destruction. Vivianite within the deposits may be evidence for the decay of both iron objects and organic remains, perhaps foodstuffs. The profusion of hazel nutshell, presence of blackberry seeds and evidence of nearby cultivated land identified by the environmental analysis support this, although only three fragments of animal bone and no cereal grains were recovered. The hazel nutshell is likely to be a primary deposit of waste from processing and consumption. One of the animal bones was from a woodcock and is indicative of status related activity (hunting or consumption) consistent with a castle site.

- 12.7.3 These destruction contexts have already been associated in print (Nevell 2019, 18) with the destruction contexts attributed by Armstrong (1930) to AD 1266. It is highly likely that the destruction contexts from trench 3 relate to the destruction of the castle in AD 1266 but for the reliability of Armstrong's claims see Moreland *et al.* in press.
- 12.7.4 Although evidence for a 13th-century destructive event was chiefly observed in trench 3, other areas of the site can be interpreted in the light of this history. In trenches 1 and 5, the observed medieval remains may all date to before this event. In trench 6, a change in formation process and environmental assemblages after the fifth sub-phase might relate to a change in management of the castle.

## 12.8 Rebuilding (late-13th and 14th centuries)

### *Landscaping*

- 12.8.1 Trench 3 contains evidence for extensive landscaping, dated by pottery to between the 12th and 14th centuries, and stratigraphically following a 13th-century destructive event. It is likely that this landscaping was associated with the reconstruction of the castle around the time of the licence to crenellate issued in 1270 (Lyte 1913, 447; Davis 2006–7). Insect assemblages recovered from 3079 and 3057 indicate that the destruction layers were rapidly buried and that the campaign of rebuilding is likely to have begun rapidly, perhaps prior to the authorisation of the license.
- 12.8.2 The landscaping works do not appear to have been well-focused. Deposits were laid down (3056), truncated (3080, 3084) and material derived from earlier deposits redeposited (3067, 3055). The overall picture is of a general shuffling around and double-handling of the muck left on the castle mound after the destructive event. This suggests an easy availability of labour at least during the initial stages of the rebuilding.
- 12.8.3 In trench 6, layers 6039, 6049, 6038, 6046 and 6042 post-dated the 'fifth sub-phase' and pre-dated a series of sandstone structures (6029 etc). As noted above, these layers contained environmental assemblages of different character to the earlier layers and it is possible that they represent post-1266 landscaping. An assemblage of six sherds of pottery from 6039 contained residual late-11th- to mid-12th-century material and 12th- to mid-13th century wares. It is possible that some or all of this material was sourced from earlier deposits during the landscaping of the site associated with the license of 1270.

### *Sandstone structures in trench 6*

- 12.8.4 Reliable dating information for the stone structures in trench 6 (6029 etc.) was not obtained. The structures were at the same level (52.0–53.02 m aOD) as structures previously recorded a short distance away by Davies and Symonds in 2002 (51.6–53.41 m aOD). The two sets of structures had a similar appearance and were constructed of the same materials (coal measures sandstone and lime mortar). The structures recorded by Davies and Symonds were dated by a small number of sherds of pottery to the 13th/14th centuries.
- 12.8.5 Two dateable artefacts were associated with the structures in trench 6. A sherd of 18th-century mottled ware from deposit 6041 was recovered by the author securely from below flagstone floor 6037. Secondly, a brick was present securely within the rubble core of wall 6029. The brick was morphologically consistent with a date from the period 1776–1784, although this approach to dating should be treated with caution (see artefactual evidence above). The brick had been re-used at least once and is therefore residual. Historic maps offer little clarity. The structures are located within a wider building depicted in the 18th century (**Fig. 6**).

- 12.8.6 A possible resolution to this dissonance is that the structures were medieval in origin and persisted late after the 17th-century slighting of the castle. These may be surviving castle remains that were incorporated into the landscape of the bowling green and may have enhanced the appearance and status of the environs of the green. The sherd of slipware and brick may perhaps have been introduced during later maintenance and repair. Tobacco pipe and pottery of 18th-century date from the demolition backfill of these structures supports their use in the 18th century.
- 12.8.7 The function of these structures can be clearly read; they comprise a passageway, staircase and retaining wall. The position of these features in the north-west of the site and the change of level they embody are indicative of a position at the edge of the castle mound. A short distance to the north-west, the modern Tap and Barrel public house and adjacent shop (at the time of writing this had most recently been a hydroponics shop; both this and the public house were empty) extended down to the level of the road Castlegate. This either indicates significant truncation to the north-west of trench 6, or that the area of trench 6 represents that maximum extent of the castle mound. The structures recorded in trench 6 were truncated to the north, west and south; their position within the layout of the castle is open to speculation.

#### *East moat*

##### Boundaries

- 12.8.8 Deposits 10071, 10072 and 10073 were interpreted as a bank forming the outside (east side) of the eastern arm of the castle moat. The presence of a constructed bank forming the outside of the moat was an unexpected result as it had been assumed that the moat would be rock-cut on both sides. The inside (west side) of the moat had been shown to be steeply rock-cut during previous excavation (Davies 2000). As discussed above, it is probable that the interior side of the moat exploited an existing meander scar representing a former channel of the River Sheaf. The top of the moat bank was at 47.53 m aOD, whereas the top of the moat cut was just below 48.56 m aOD, a difference of a metre. This is all consistent with the topography of the site.
- 12.8.9 Previous excavation (Davies 2000) assigned the construction of the moat to 'phase 1'. This can now be said to date to the beginning of the 13th–15th century range suggested by the pottery recovered from 10071. It is possible that the moat bank was constructed during the campaign of rebuilding associated with the license of 1270. Earlier or later dates are also possible.
- 12.8.10 Combining the results of trench 10 and the ARCUS trench (Davies 2000), the total width of the moat was around 8.5 m. This is not too dissimilar to Armstrong's estimate of 7.6 m (as given by Davies 2000).

##### Fills

- 12.8.11 Two moat deposits recorded in trench 10 (10078 and 10076) did not contain dating information but probably correlate with Davies' (2000) 'phase 2'. Two sherds of pottery recovered by Davies from deposits belonging to this phase dated to the 11th to 13th and 13th to 14th centuries. A 13th-century date is therefore possible for these fills, perhaps suggesting they were deposited not long after the moat was constructed.

##### Trench 11

- 12.8.12 Although it had been hoped to detect evidence of the castle moat in trench 11, the earliest layers reached in trench 11 were 18th-century levelling layers. The presence, location and alignment of any moat in the vicinity of trench 11 is unknown. There is strong potential

for medieval remains to be present at a depth deeper than the 2.4 m reached by trench 11.

### *South moat*

#### Trench 9

- 12.8.13 A small part of the southern moat was investigated in trench 9, where moat fill 9011 contained pottery suggestive of 14th-century deposition. It is important to note that the 1.2 m of the moat investigated in trench 9 neither represents the top of the moat nor the base of the moat. Deposit 9011 was situated at some mid-point in the sequence of moat fills and cannot be placed within a wider stratigraphic context. Snail shells recovered from the deposit (see below) indicate that in the 14th century in this part of the moat there was a dry, shaded environment suggestive of a period of less intensive management.

#### Borehole survey

- 12.8.14 Four key deposits were recorded within the moat sequence, comprising bedrock, clay moat fill, sandstone rubble and made ground. The fine-grained nature of the clay deposit has been taken to suggest slow deposition within a wet/standing water environment, although some possible disturbance and redeposition is indicated in some cores where there were sub-angular inclusions. The extent of any possible disturbance of the fine-grained moat fills is difficult to gauge, but the introduction of overlying deposits of sandstone rubble in several boreholes is likely to have disturbed the underlying deposits to varying degrees.
- 12.8.15 The precise relationship of the moat system with the Rivers Don and Sheaf is not known. The presence of clays and silts would suggest potential water-lain deposits and support association with the rivers. A subsequent infilling of the moat and separation from the Rivers Don and Sheaf may have resulted in the limited survival or waterlogged deposits (eg borehole BH11).
- 12.8.16 No artefacts were recorded from the southern moat fills, although the date of these deposits may correspond with similar clay and silt deposits recorded from the east moat during previous investigations by Davies (2000) and in trench 10. These fills date from around the 13th century to the 18th. The medieval fills encountered by ARCUS were reported to contain large proportions of degraded bedrock, perhaps reflecting the sandstone rubble identified during the present borehole survey.
- 12.8.17 The lower moat fills were overlain in places by a redeposited yellow brown sandstone rubble (**Fig. 10–12**) that was unrelated to the Silkstone sandstone bedrock underlying the site. This sandstone rubble may have originated as stone imported to the site for the construction of the castle. The structures may have been demolished as part of the Civil-War-era slighting, and the rubble deposited in the moat.
- 12.8.18 In boreholes BH10–BH12 the sandstone rubble was overlain by an upper clay moat fill. This upper moat fill is not present in any of the other moat cores and could have been truncated where sandstone rubble is directly overlain by made ground.
- 12.8.19 The full width and depth of the moat was recorded in Transect 2 (**Fig. 11**) and measured approximately 11 m in width and up to 2.5 m deep (48.39 m aOD). Partial moat profiles were recorded in Transect 1 (**Fig. 10**) with a potential depth to the base of the moat of up to 5 m (45.81 m aOD) and Transect 3 (**Fig. 12**) with a potential depth to the base of the moat of up to 4.2 m deep (45.96 m aOD). The disparity between the depths may be as a result of truncation due to later development on the site.

12.8.20 The production of moat profiles in transects 1 and 3 was hindered by the presence of significant deposits of sandstone rubble, reflecting the turbulent post-medieval history of the castle.

## 12.9 Late medieval (15th/16th centuries)

12.9.1 In the east of trench 1 was a cobblestone surface (1033) with associated bedding layers. The matrix of the cobbles contained a single sherd of fifteenth- to early-sixteenth-century pottery. The surface was at 54.54m aOD, higher than the other surfaces recorded in trenches 1 and 5. This may represent a localised late iteration of the courtyard surface.

12.9.2 A similar cobblestone surface was recorded nearby by Davies and Symonds (2002, trench 1, context 1031) at around 53.2m AOD. The bedding layer for this (coincidentally also assigned context 1033 during a different phase of works) contained a sherd of fifteenth/sixteenth-century pottery. The two fragments may represent a once more extensive cobblestone surface, both located towards the north-east of castle hill.

12.9.3 Although the castle was probably at the zenith of development during this period, these two fragments of cobble surfaces are the only contexts of late medieval/early post-medieval date recorded from any investigation on the castle site. It may be that late medieval/early post-medieval structures were more comprehensively targeted than earlier structures by later slighting and demolition. It may be that the remains of the 'early castle' are better preserved than later castle remains.

12.9.4 Layers overlying surface 1033 were thin (1040, 1041, 1043, 1007 and 1044). These layers probably date variously to the 18th and 19th centuries and may represent a gradual accumulation over some two centuries. It may be that this iteration of the cobblestone surface of the castle was buried below only 0.1 m of material into the 19th century. This interpretation suggests that the ruins of the castle were accessible or readable long after the destruction of the civil war.

## 12.10 Civil war (17th century)

### *Trench 1*

12.10.1 Deposit 1007 contained an assemblage of pottery (30 sherds) consistent with a 17th-century date. It comprised red sand that appeared heat-affected, perhaps derived from firing sandstone masonry. It is probable that this thin (0.15 m deep) deposit was created during civil war slighting (cf. Nevell 2019). Contra to this is a sherd of 19th/20th-century pottery from lower layer 1043; this was perhaps intrusive.

12.10.2 Nearby, an extensive sequence of 17th-century civil war slighting deposits was seen by Davies and Symonds (2002) in their trench 2, filling the undercroft of a castle structure.

### *East moat (trench 10)*

12.10.3 It is possible that the moat had been scoured in this location either prior to, or as part of, the Civil War. The upper interface of the medieval fills continued in a line with the surviving upper interface of the moat bank apparently supporting this possibility. A small part of the bank may have been removed during this possible scouring.

12.10.4 The sequence of jumbled seventeenth-century deposits suggests rapid and dramatic infilling of the moat. The alluvial component of these fills could have come from the castle mound and may represent material that had been first redeposited as part of the mound, then cast down into the moat. Large lumps of tumbled masonry (10063, 10064) were derived from the rubble core of walls with any ashlar or moulded masonry removed. This

material is suggestive of slighting rather than siege, with the re-useable masonry sold off or otherwise removed (see Nevell 2019).

- 12.10.5 The tumble was positioned at the top of the seventeenth-century moat fills and would have been visible in the base of the moat, creating a ruined appearance which may have been a deliberate symbol of the castle's slighting and defeat.
- 12.10.6 Dateable artefacts were sparse: two sherds of seventeenth-century pottery accompanied a residual fifteenth/sixteenth-century sherd in context 10066, and a residual sherd of fourteenth-century pottery was recovered from earlier deposit 10067. The jumbled arrangement of the deposits in section makes it unlikely that 10067 represented a fourteenth-century moat fill; it is probable that this deposit was contemporary with the surrounding deposits. A small number of uncharred plant seeds were recovered although it is probable that these were intrusive. Davies (2000) recorded a layer containing 16th/17th-century pottery (context 0061), which he successfully identified as unlike the surrounding layers, but which he did not have sufficient information to interpret further. This layer is a continuation of the siege/slighting deposits recorded in trench 10.

#### *Comparison with previous excavations*

- 12.10.7 C G Cumberpatch has highlighted the discrepancy between the mid-20th-century Butcher archive, containing a large proportion of Civil War material, and the results of the 2018 excavation (see pottery section above). The 2018 evaluation was designed to target less well understood areas of the site, whereas Butcher's work had a focus on the south moat. For the first time, the 2018 evaluation was interested in the post-medieval development of the site, with significant resources focussed on this period. It is these methodological differences that have produced finds assemblages of different character.

### **12.11 Bowling green (18th century)**

- 12.11.1 Layer 1006 was almost certainly the initial levelling deposit laid down during construction of the bowling green in trench 1. Layer 1006 stratigraphically pre-dated the wall of the bowling green (1055) known from historic maps to have disappeared prior to 1900 (**Fig. 5, 6**). Pottery and clay pipe are generally consistent with an 18th-century date, however, four sherds of pottery and a clay pipe bowl (noted as probably intrusive among the assemblage) were from the 19th/20th century. It is suggested that these sherds were incorrectly assigned to layer 1006 by students or volunteers during initial cleaning. Layer 1006 was exposed across much of the base of trench 1 after initial machining.
- 12.11.2 Layer 1006 was distinct from the medieval layers that stratigraphically preceded it, having an industrial-age character with inclusions of clinker and finds such as clay tobacco pipe. There was a stratigraphic discontinuity between this layer and the underlying strata, suggesting a truncation event. This might have been the Civil War slighting although it could be something else such as levelling activity prior to construction of the bowling green.
- 12.11.3 In trench 5, a series of layers (5038, 5037 and 5036) were similarly associated with the construction of the bowling green and produced a variety of pottery. Four sherds of pottery were assigned to context 5038; two of these were 18th century, one 19th-century and the other 19th- to 20th-century in date. It is likely that at least the later sherds were disturbed by machine excavation and were intrusive in this context.



- 12.11.4 The make-up layers for the construction of the bowling green (in both trenches 1 and 5) were in part ultimately derived from alluvium. It is possible that this material was sourced from existing medieval layers on the site.
- 12.11.5 Remains of the walls of the bowling green were identified along with a related flagstone surface in trench 5. However, the green itself appeared to have been removed. Archaeological evidence for a bowling green surface might comprise buried imported 'sea-washed' turf (Hornby 2015, 18) and/or a clinker bedding layer for the turf (*ibid.*, 20).
- 12.11.6 In trench 1, disturbed sandstone blocks 1019 and demolition layers 1056 and 1058 relate to the demolition of the bowling green and demonstrate that structures associated with the green were incompletely removed during demolition. However, the careful removal of flags from surface 5031 shows that demolition of the bowling green included the removal of materials for re-use. There is potential for the further survival of bowling green structures and elsewhere on the site for other structures contemporary with the bowling green as depicted on 18th-century plans (eg **Fig. 5 and 6**).
- 12.11.7 Hornby (2015, 61, 95, 96, 98 and 100) gives examples of other 18th-century bowling greens established within the baileys of castles, for example at Lewes, Guildford, Tamworth, Great Torrington (with a similar post-medieval history to Sheffield), Ellesmere and in the 19th century at Bishop's Castle. The use of castle sites for bowling may be related to the desire to locate the sport as traditional and respectable. Hornby argues that the same drive is behind the supposed romantic and ancient origins claimed by many bowling clubs. Bowling was popular during the period of the civil war (*ibid.*, 55), including in the vicinity of Sheffield at Bolsterstone (*ibid.*, 50). Continuity of bowling activity from the civil war onwards appears possible, perhaps with initial informal use of slighted castle sites finding expression as formal greens and settings during the early to mid-18th century.
- 12.11.8 The high status of bowling and the district surrounding the bowling green may be demonstrated by the high quality of 18th-century tobacco pipes recovered from the site.

## 12.12 Slaughterhouses (18th and 19th century)

### *18th century*

- 12.12.1 By the mid-eighteenth century the north and east of the site was occupied by rectangular plots or enclosures (Moreland *et al.* in press, 14; Richardson and Dennison 2014a, 21). These plots may have been folds used for temporary containment of stock brought into the city via the Wicker for slaughtering. These enclosures anticipated the development of this part of the site into a slaughterhouse district. The development of the first phase of slaughterhouses in two terraces along the Don, and in the north-east of the site at the river confluence, was undertaken in the late-eighteenth century (Hey 1991, 40) and was complete by 1800 (**Fig. 6**). Proximity to the rivers was convenient for the disposal of the filth of slaughtering.
- 12.12.2 Parts of a range of these 18th-century slaughterhouses were recorded in trench 11. They comprised a row of similar buildings following a regular plan. They were equipped with high-quality sloping floors for the easy removal of liquids. These slaughterhouses showed evidence of repair in the late 19th century/early 20th century and were photographed by Himsworth (nd) and others prior to demolition in the 1920s.
- 12.12.3 At around the same time the slaughterhouses were developed along the Don, the area of trench 10 was landscaped. The remaining shallow moat was buried and wall 10060/10051

constructed. The source material for this wall may have been the locally abundant demolition material from the slighting of the castle. Levelling layers (10046, 10048, 10049, 10050, 10054 and 10056) were laid down to create a terrace (a step between the Sheaf valley and castle hill) that survives to the present day. Davies' (2000) 'phase 3' appears to primarily relate to these 18th-century levelling works.

#### *19th century*

- 12.12.4 By the 19th century the slaughterhouses had expanded to the area of trench 10 (**Fig. 8**). This corresponds with Davies' (2000) 'phase 4'. Pottery of 17th/18th century date recovered from Davies 2000 phase 4 contexts was probably residual, consistent with the results of trench 10, where earlier residual pottery was found in 19th-century contexts. Wall 0010 recorded by Davies was the continuation of wall 10007 recorded in trench 10.
- 12.12.5 Wall 10060/10051 was rebuilt with black ash mortar (10038). This wall followed the top of the bank of the moat and correlates with an unnamed lane depicted on historic maps (**Fig. 5–9**). The results of the evaluation confirm previous speculation (eg Belford 1998, 22) that this lane follows the course of the moat. Flagstone surface 10059 correlates with the surface of the lane.
- 12.12.6 The demolition of the slaughterhouses in the vicinity of trench 10 was probably captured on a set of three photographs taken on the 27 June 1918 by Mrs C E Lees and held by Museums Sheffield (Lees 1918). The photographs appear to depict wall 10060/10051/10038/10006 and photograph 3 may depict robber trench 10057 and surface 10059. The walls in this area had attracted attention as possible relicts of the castle, leading Armstrong (1930, 21) to state that '[s]ome of the walls of these buildings on the Castle Folds Lane frontage were built of masonry in large blocks which had frequently caused them to be mistaken for actual parts of the castle walls.'
- 12.12.7 Animal bone recovered from contexts associated with the slaughterhouses represents only the 'background noise' of activity in industrial Sheffield. Large quantities of slaughtered animal remains were not present. The solid waste products of slaughtering were probably removed to some distant location as would be necessary for any large-scale systematic process.

### **12.13 Yellow brown sand and sand clay layers in trench 4**

- 12.13.1 Excluding the sondage in the north end of the trench, the deepest excavations in trench 4 were small interventions undertaken between steelworks structures that were left preserved *in situ*. Several of these limited windows reached similar yellow brown sand and sand clay layers (4086, 4087, 4100, 4103, 4104, 4107, 4109, 4111, 4117 and 4118). It is probable that these contexts represent different views of the same or closely related strata. These appear to be 18th- or 19th-century pre-construction levelling layers. The material for these layers was probably sourced from the existing medieval strata of the castle mound, resulting in a high level of residual medieval artefacts. The alternative interpretation that these are medieval strata cannot be ruled out.
- 12.13.2 Two of the stratigraphically lowest yellow brown sandy layers from trench 4 (4087 and 4111) contained artefacts of only medieval date. Seven sherds of medieval pottery were recovered from layer 4087 ranging from the 12th century to the late-13th to 15th century. Layer 4111 contained a single sherd of mid-13th- to 14th-century pottery. However, other yellow brown sandy layers with the same morphology and stratigraphic position contained later artefacts alongside residual medieval material. Layer 4104 contained 18th/early-19th century clay pipe alongside six residual sherds of medieval pottery of 12th- to 15th-

century date and medieval floor tile. Layer 4107 contained 19th-century pottery alongside sherds in a range from the 11th- to 18th-centuries. Layers 4086, 4109 and 4117 contained only 18th-/19th-century pottery and clay pipe.

## 12.14 Steelworks (19th century)

### *Overview*

12.14.1 The remains of steelworks known from historic maps (**Fig. 7–9**) were identified in trenches 1–5. In trenches 2 and 5 these remains were limited to walls, fragmentary surfaces and drains which cannot be used to demonstrate much beyond their presence.

### *Trench 1 cementation furnace*

12.14.2 The most significant steelworks remains comprise a cementation furnace recorded in trench 1. The presence of a cementation furnace was known from late-19th century plans (**Fig. 9**). The furnace was poorly preserved, but conformed to the well-developed form of cementation furnaces known from 19th-century examples elsewhere (eg Wessex Archaeology 2018b, 2019e). Similarities include the arrangement of the ash pit and the ganister/crozzle material used in construction. The trench 1 cementation furnace was unusual in the substantial use of stone in its foundations: this may indicate that there was a ready supply of this material from the ruins of the castle.

12.14.3 The use of redeposited ash from a furnace as the backfill (1069, 1071) of the construction cut for cementation furnace in trench 1 probably indicates the presence of a demolished earlier furnace. Cementation furnaces had to be periodically rebuilt (Barraclough 1984, 35, 41, 42, Appendix 31 etc.; Belford 1998c; Wessex Archaeology 2018b, 2019e) and this rebuilding may be what is evidenced here.

12.14.4 The first cementation furnace(s) in Sheffield itself was probably built by Samuel Shore in 1709 (Leader 1901, 71; Ashton 1924, 55; Hey 2005, 93). It has been claimed that the 'oldest [furnace] in Sheffield' was situated on Castle Hill (Himsworth nd, 31st October 1927; Hey 2005, 88). However, Belford suggests that the oldest cementation furnace on Castle Hill was built by Thomas Clegg (Belford 1998b, 16); Samuel Shore's furnace may have been at Steelhouse Lane (Saich 2020).

12.14.5 The Goad Fire Insurance plan of 1896 (**Fig. 9**) shows a circular 40-foot furnace in the works of R and J Smith Bros. This furnace can be seen behind the Royal Hotel in a photograph in the Picture Sheffield collection (s15479). The photograph depicts a standard cementation furnace with a typical conical brick chimney familiar from a preserved example at Doncaster Street and from previous excavations in the city (eg Wessex Archaeology 2018b, 2019e). A furnace in the works of R and J Smith Bros. was described by McCoy and Stenton (2009, 25) as a cupola furnace; subsequent authors have followed this identification (eg Richardson and Dennison 2014, 22) which is probably erroneous on the basis of form and function (see Ashton 1924, 102). A photograph of an unusual structure in Himsworth's diary (nd, 31st October 1927) also held by Picture Sheffield (s10000) further complicates matters. There have probably been a large number of furnaces on Castle Hill throughout the 18th and 19th centuries and it is improbable that the trench 1 furnace is the direct successor to Samuel Shore's 1709 furnace.

### *Trench 3*

12.14.6 Trench 3 contained the remains of a weighbridge indicated on the 1892 Ordnance Survey map (**Fig. 8**) by the letters 'W.M.' (weighing machine). A similar weighbridge has recently been recorded at Grunwergs, Sheffield (Wessex Archaeology in prep). Also in trench 3

were the fragmentary remains of two road surfaces (3019 and 3083) and an associated scheme of drains (3004–7, 3010–12, 3030–3031, 3035, 3037).

#### *Trench 4*

- 12.14.7 Several phases of 19th-century development were attested in trench 4. Flue 4091 stratigraphically pre-dated the other remains. This flue was also located at a lower level than the other 19th-century remains and there may be further undiscovered remains contemporary with the flue buried nearby (potentially including a chimney). Power transmission conduits 4020, 4021 and 4022 may represent belt power or line shafting and were also earlier than other remains although their relationship to flue 4091 is unknown.
- 12.14.8 Multiple phases of walls survived in trench 4, with a machine base (4011) installed towards the end of the sequence. Historic maps suggest a change in use from steelworks to tea warehouse (**Fig 7–9**) but it is unknown how this change in use relates to the archaeological sequence.

#### *Trench 5 pottery assemblage*

- 12.14.9 The pottery report (above) has suggested that the assemblage from Trench 5 was indicative of waste from a 19th-century café or restaurant. It is not possible to substantiate this stratigraphically or with reference to historic maps or documentary sources. Like much of the centre of the site, the area of trench 5 is depicted as a steelworks on 19th-century maps (**Fig. 7–9**). It is possible that the made ground deposits of trench 5 might represent imported material ultimately derived from a restaurant or café, although the author of the pottery report has used the same trench 5 assemblage to argue against the importation of material to the site.

## **12.15 Additional transects**

### *Introduction*

- 12.15.1 Transects 1, 2 and 3 comprise series of boreholes and have been described above.
- 12.15.2 Transect 4 contains three boreholes (BH1–3). Two additional transects have been produced (transects 5–6) to enhance the deposit model produced by borehole survey, and comprise chiefly data obtained from trial trenching. Transects 4–6 are discussed in detail below.

### *Transect 4*

- 12.15.3 Transect 4 (**Fig. 13**) comprises boreholes 1, 2 and 3. These boreholes were situated within trenches 2, 3 and 4 respectively and have been described above alongside the results of those evaluation trenches.
- 12.15.4 Each borehole contains three units. The upper unit has been described as ‘made ground’ representing the backfill of the evaluation trenches and the remains of 19th-century development. The second unit, ‘redeposited silty clay with sandstone gravels’ comprises the trench 2 motte deposits in BH1 and the trench 3 medieval made ground in BH2. In BH3 it is known from the trench 4 results that the upper part of this unit represents 19th-century made ground and pre-construction levelling. There is little to inform interpretation of the rest of the middle unit in BH3; it is probably the same as deposit 4113 and may represent motte deposits analogous to those in trench 2. The final unit represents the underlying coal measures sandstone.
- 12.15.5 The shallowest impact of ‘made ground’ was in BH1, underlining that preservation of the motte extends to a high level. In BH2 the depth of the ‘made ground’ unit is a reflection of

the depth of excavation of evaluation trench 3 and as such is unreliable as an indication of the depth of the impact of post-medieval development. The level of the bedrock does not vary greatly across the transect, although it was lower in BH3 (trench 4). This is in the east of the transect, perhaps contrary to a first impression of the topography of the site. The small sample size of the transect (three boreholes) is limiting to interpretation.

#### *Transect 5*

- 12.15.6 Transect 5 (**Fig. 37.1**) contains data from trenches 1, 5, 6 and 7 and represents a west to east section across the castle mound. However, the four data points (trenches 1, 5, 6 and 7) do not form a straight line and the transect is somewhat of an abstraction. The data used to inform the transect is interpretative and the interpolated information between interventions is speculative.
- 12.15.7 The contexts within the evaluation trenches have been grouped into broadly phased units. Across the four trenches, six units were identified: bedrock, 'early castle' 11th–13th century, 13th/14th century, 18th century, 19th century and modern. The results of evaluation trench 1 were complex; the results of the western end of the trench have been used for the transect.
- 12.15.8 The results of trenches 1 and 5 are broadly similar and demonstrate the general make-up of the castle mound. The main phases of preservation are the early castle, 18th century and 19th century. However, had the east end of trench 1 been used to inform the transect the picture would have been more complex and more phases (including late medieval/early medieval and perhaps 17th century) would have been represented on the transect. The overall makeup of the castle mound is likely to be more complex than the transect suggests. Moving west to trench 6, the levels throughout the sequence drop. This reflects the position of trench 6 at the north-west edge of the castle mound and the presence of the 13th/14th century remains demonstrates that this is a position with potential for preservation of remains from phases not represented in the main sequence. Perhaps one of the most startling results visualised by transect 5 is the low level of the base of the sequence in trench 6, which is shown here to be lower than the level of the bedrock in trench 7. The trench 7 bedrock was heavily truncated, so the original level would have been higher, demonstrating that the natural topography sloped down from west to east.

#### *Transect 6*

- 12.15.9 Transect 6 (**Fig. 37.2**) is a north to south transect across the castle mound and moat. It contains data from trenches 1 and 2, the position of the gatehouse first discovered by Armstrong (1930), and the whole of borehole transect 2. Much of the data used to inform the transect is interpretative and the interpolated information between interventions is speculative.
- 12.15.10 The contexts of evaluation trenches 1 and 2 have been grouped into broad phases as described under transect 5 above.
- 12.15.11 Trench 2 contains material that has been phased as 'Motte'. These may be Norman in date. The position of the motte deposits can be easily seen on the transect. In comparison to trench 1, they occupy the same levels as early castle and 18th century deposits. Their relationship with the castle gatehouse first recorded by Armstrong (1930) can be seen, with the motte forming a hill to the north of the gatehouse.
- 12.15.12 Finally, the moat transect (transect 2) is repeated here to show the relationship between motte, gatehouse and south moat.

## 12.16 OSL and pOSL dating

- 12.16.1 The report above produced by Professor Bateman outlines the somewhat disappointing results of the attempted luminescence dating. The luminescence analysis was produced prior to the radiocarbon analysis (see above). In light of the radiocarbon results we can now say, for example, that the sample from context 1079 (one of those used to calibrate the accumulation rates for the pOSL samples) probably pre-dated 1210 AD at the latest (as it stratigraphically pre-dated UBA-41313). The steer given to inform the luminescence analysis was that this deposit pre-dated the 13th- to 15th-centuries. Likewise, the sample from 6066 (for which luminescence techniques suggested a 13th-century date) is now known to be 12th-century at the latest (as it pre-dates UBA-41316).
- 12.16.2 The sample from 5041 (the bedding for the early castle cobble surface 5042/5043/5044) produced a low reading suggestive of 18th-century expose to light. It is entirely possible that this early castle deposit was disturbed in the 18th century as the deposits overlying the medieval surface were of this date.
- 12.16.3 The difference in accumulation between the sample from 3071 and the other two samples from trench 3 (contexts 3058 and 3070) cannot easily be explained stratigraphically (these deposits are thought to have been contemporary). It is also hard to stratigraphically explain the suggested 19th century date for moat bank deposit 10073. In these examples, it must be that the samples were incompletely 'reset' during redeposition, or perhaps that they were partially reset during sampling.
- 12.16.4 The range of luminescence dates for the trench 2 deposits (otherwise interpreted as a motte) are suspicious. These dates range from 1st century AD (the OSL date) through 6th, 11th and 13th century dates (pOSL). Professor Bateman's commentary above covers these discrepancies. These results are at least valuable in that they demonstrate that the deposits were laid down in historic rather than geological time, and therefore that their deposition was almost certainly anthropogenic.
- 12.16.5 This is a promising technique and care should be taken during future investigations to ensure that 'known age' samples are taken from securely-dated sequences.

## 12.17 Fulfilment of aims

### *Updated project design*

- 12.17.1 The potential of the evaluation results has been pursued to the full extent possible to fulfil the original aims of the project as laid out in the Updated Project Design (Wessex Archaeology 2019b).

## 12.18 Existing research questions

### *Updated project design*

- 12.18.1 The following research questions were identified in the updated project design. They are addressed below in turn.

### *Can the interpretation of probable earthwork defences in trench 2 (and also trench 3 and possibly 4) be refined in light of scientific dating?*

- 12.18.2 The results of OSL and pOSL dating in trench 2 were disappointing as discussed above. A dendrochronology date from trench 3 has enhanced dating. Interpretation of these deposits is discussed under 'Motte' above.

*Can the interpretation of early cut features in trench 6 be refined in light of scientific dating?*

- 12.18.3 AMS dating has proved crucial for the interpretation of these deposits which have been phased to the 11th/12th centuries and the 'early castle' phase as outlined above.

*Is the slag contained within medieval strata (chiefly in the early sequences in trenches 1, 5 and 6 identified above) indicative of medieval ironworking inside the courtyard of Sheffield Castle?*

- 12.18.4 Analysis of the slag revealed that the 'medieval type' slag from these trenches had been recovered from context 1073 and from physically close contexts only. This slag appeared to have been imported to form a metallised surface as one element in a sequence of surfaces. As such, it does not provide evidence for medieval ironworking inside the courtyard of Sheffield Castle. It does represent iron smelting slag from medieval Sheffield and is still a significant result. Furthermore, AMS dating, pottery chronology and stratigraphic relationships have demonstrated that slag 1073 belongs to the pre-1266 'early castle' phase as detailed above.

*What can be said about the layout and development of the castle?*

- 12.18.5 The evaluation contained little information to inform understanding of the layout of the castle.
- 12.18.6 A motte was likely present in the area of trench 2, and perhaps in the area of trench 4 and Davies and Symonds 2002 trench 2. The size, position and layout of the motte are not well understood. The relationship of the motte to the gatehouse and to the archaeological sequences in both trenches 3 and 6 are problematic. The motte developed into the 21st century castle mound through a moderately understood series of both additive and reductive modifications.
- 12.18.7 Courtyard surfaces were present in trenches 1 and 5 from both to the 'early castle' phase and the late medieval/early post-medieval periods. During the 'early castle' phase, a wall foundation ran from north-west to south-east in trench 3.
- 12.18.8 Structures in trench 6 might date to the 13th/14th centuries and represent a staircase and retaining wall at the north-west limit of the castle mound.

*What can the artefactual (particularly faunal) and environmental remains tell us about the lifestyle of the inhabitants of this high status site?*

- 12.18.9 The medieval faunal assemblage was very small and is of limited utility as a source of information about the diet and activities undertaken at the castle. A fox/dog tibia and six horse teeth found their way into the moat bank in trench 10, however these most likely relate to construction rather than the lifestyle of the inhabitants. One of the 13th-century destruction contexts from trench 3 (3057) contained a woodcock ulna, which as discussed in the specialist report above, is an indicator of high-status activity, which may be hunting and/or consumption. The woodcock bone was accompanied by a dog bone and an indeterminate cattle/horse bone. The specialist has also speculated that deer bones recovered from post-medieval contexts may be residual and may have had medieval origins. Deer bones are also an indicator of status related activity in the medieval period.
- 12.18.10 The environmental assemblage contained little evidence relevant to status related consumption. A single charred fig seed (probably imported in this period) was recovered from early castle made ground layer 1057. It may be that the deposits encountered during the evaluation were not those containing high status remains and that other areas of the

castle may have been more associated with status related activity. The environmental assemblages from the 13th-century destruction contexts in trench 3 were modest in status, with consumption of locally available resources such as hazelnut shells and perhaps elderberries.

*What can the rich environmental samples and wood artefacts derived from destruction layers in trench 3 tell us about slighting of the castle, probably in 1266?*

12.18.11 The environmental assemblages from destruction contexts 3057 and 3079 contained large numbers of hazelnut shells representing consumption. A large quantity of elderberry seeds were also present; it is possible that these also represent exploitation of locally-available resources. There is also slight proxy evidence (a single species of beetle) for stored grain. Food in this part of the castle site may have been relatively low status in the mid-13th century.

12.18.12 Insect assemblages suggest the presence of hay, straw, bedding or thatch and structural timbers. This gives some impression of materials that may have been used in the construction of the early castle, and perhaps suggests stables or similar animal housing.

12.18.13 The local environment included elements of scrub and rough trampled grassland. The picture is of a period of less intensive maintenance of the castle site, either before or after destruction.

12.18.14 The mixture of burnt and unburnt wood suggests a hasty an incomplete burning, with the castle site left in a state of disrepair and containing rotting piles of foodstuffs, organic demolition debris (wood etc.). A lack of insect pupae in the assemblages suggests that this material was quickly buried and that reconstruction efforts began rapidly.

*What can be said about the 13th-century transition from the de Lovetot castle to the de Furnival castle in light of the results from trench 3, of the evaluation in general and of Armstrong's work?*

12.18.15 The 13th-century destruction of the castle was evidenced by destruction contexts in trench 3 perhaps indicative of a rapid incomplete slighting including burning. Breaks in the stratigraphic sequence of trenches 1, 6 and perhaps elsewhere may also be evidence of this destructive event, as is a change in character of environmental assemblages recovered from trench 6. The relationship of these results with Armstrong's interpretations is not straightforward and may be unresolvable. This topic is covered in greater detail in Moreland *et al.* in press.

*Is the industrial archaeology typical for Sheffield? How do the steelworks in particular compare with other sites in the city?*

12.18.16 The 19th-century industrial remains are similar to those found on other sites across Sheffield. The cementation furnace in trench 1 was of the well-developed type evidenced elsewhere such as at Hollis Croft and Doncaster Street (Wessex Archaeology 2018b, 2019e). The level of preservation was generally poorer than on some other sites and may be comparable to, say, the Summerfield Street project which recorded a scatter of structures that could be related to historic maps but which provided limited information about the process and circulation of the buildings they represented (Wessex Archaeology 2018c). Better preserved examples of steelmaking and working complexes are known from across the city (eg Wessex Archaeology 2016, 2019e, forthcoming, in prep).



*To what extent did the specific character of the killing shambles (slaughterhouse district) influence development in the north and east of the site?*

12.18.17 The post-medieval slaughterhouse district in the north and east of the castle site is perhaps unique within the context of the city of Sheffield and possesses a number of features which are of interest. These include the design of the slaughterhouses comprising similar repeated units, their form which was tailored to their purpose, their development first along the Don and then expansion along the Sheaf, and their use across two centuries from before 1800 until the 1920s. In the 18th and 19th centuries the north and east of the castle site comprised a district of unique and significant character.

*How did the topography, the standing remains of the castle and the status of the castle site influence development in the 18th, 19th and 20th centuries?*

12.18.18 In the 18th century the castle site was occupied by a bowling green, suggesting a high status district. There is a tradition of establishing bowling greens on castle sites (Hornby 2015). It is possible that sandstone structures in trench 6 represent elements of the castle that survived into at least the 18th century. The courtyard surface in trench 5 was likely still in use until immediately before the construction of the bowling green and a different surface in trench 1 was probably in use, buried beneath a few centimetres of deposit, until the 19th century. It is likely, then, that the bowling green was situated within either the physical remains of the castle or at least the landscape memory of it. A decline in status of the castle site may be related to the construction of the slaughterhouse district (see Clarke 2019) and by the mid-19th century the castle mound had lost its distinctive character. By the early 20th century, the castle was known only in name sustained through the naming of new infrastructure: 'Castle Market', 'Castlegate' etc.

## **12.19 Research questions to inform future work**

12.19.1 Although the potential of the results of the 2018 evaluation has been realised, understanding of Sheffield Castle is incomplete. The evaluation has demonstrated that there is good survival of remains of the castle and subsequent occupation of the site. This is chiefly within the area of the castle mound but also to the east of the mound (in the areas of trenches 10 and 11), with lower potential in the west (trenches 7, 8 and 9). The survival of the moat in trench 9 demonstrates that there is potential across the whole castle site. To date, investigation of Sheffield castle has been confined to the inner bailey and little is known about the large outer bailey to the south.

12.19.2 The results of the evaluation suggest the following research questions which, it is hoped, may help guide and inform future work on the site.

### *Natural*

- How did the topography and natural features of the castle site influence development?
- Can specific geological features such as meander scars be associated with specific features of the castle such as the moat or perhaps the motte? Did the south moat exploit an earlier natural or anthropogenic channel?

### *Potential for early remains*

- How do the stratigraphic sequences of the castle site relate to the underlying geological deposits?
- What is the early (prehistoric, Romano-British and pre-conquest) history of the castle site?

### *Early cut features in trench 6*

- Can the 'first sub-phase' features uncovered in the 2018 trench 6 be placed in a wider context of contemporary archaeological features? Do they represent an entranceway? Are they part of an enclosure, a building or something else?
- What is the relationship of these features with the motte?
- How did use of the area change over time?
- What site formation processes were at work in both the area of trench 6 and the castle site as a whole? How do site formation processes on the castle mound differ from those in other areas of the city?

### *Motte*

- Do the clean clay deposits identified in Wessex Archaeology trenches 2 and 4 and Davies and Symonds 2002 trench 2 indeed represent the remains of a motte?
- What were the dimensions of the motte of Sheffield Castle and where was it located?
- Can the chronology of the motte of Sheffield Castle be refined?
- What is the relationship of the motte deposits with the 'early castle' deposits of trenches 1, 3, 5 and 6?
- What is the relationship of the motte deposits with the various sub-phases of activity in trench 6, including those dated to the 11th/12th centuries?
- How has the motte of Sheffield Castle developed over time to produce the modern castle mound? What was the condition of the motte in each time period?
- What is the landscape context of the motte of Sheffield Castle?

### *Early castle*

- What was the extent of the courtyard surfaces of the castle?
- Are the courtyards unusual in being retained from the early castle beyond the 13th-century?
- How did the development of the layout of the castle influence the survival and repair of courtyard surfaces?
- How does wall foundation 3064/3076 relate to the layout of the early castle?
- What is the relationship between the 13th-century somewhat-dirty redeposited alluvium of trench 3 and the clean redeposited alluvium of the trench 2 motte?
- Can the results of trench 3 be related to the results of previous workers such as Armstrong and Himsworth?

### *Destruction of 1266*

- How common are 13th-century destruction contexts on the castle site?

- How can the 13th-century destruction contexts from trench 3 be contrasted with the claims of Armstrong, Himsworth and others?

#### *Trench 6 structures*

- What is the chronology of the structures (6029 etc.) recorded in trench 6?
- Do the remains of these structures continue beyond the area of the evaluation trench and what is their relationship to the structures recorded nearby by Davies and Symonds in 2002?
- What is the position of the trench 6 structures within the layout of the castle?
- Do the trench 6 structures represent a late survival of the castle after the slighting of the Civil War?
- Did the castle mound ever continue to the north-west of trench 6?

#### *Moat*

- Can the chronology of the east and south moats be refined? What are the relative chronologies of the east and south moats?
- What is the chronology of the west moat?
- What is the alignment of the east moat to the north of trench 10? What is the alignment of the west moat? If they joined the rivers, where did they do so?
- How deep were the east and west moats? What were the shapes of their bases?
- For each section of the moat (east, south and west), were they wet or dry? Did they draw water or discharge water into the Rivers Sheaf and Don? Did this change over time?
- How can the area between the east moat and the River Sheaf be characterised? Was this area developed during the life of the castle?

#### *Late medieval/early post-medieval*

- What was the extent of the late medieval/early post-medieval surface recorded in trench 1 and by Davies and Symonds in 2002?
- What is the relationship of this surface to the 'apartments' recorded by Armstrong and Himsworth and to the wider layout of the castle?
- Were later castle structures subject to more thorough Civil War slighting than earlier structures or is there some other reason for this apparent taphonomic bias? Were early castle structures protected from slighting by removed later structures?

#### *Civil War*

- How extensive was the Civil War slighting of the castle?
- What evidence is there for the Civil War siege of the castle as distinct from slighting?

### *Bowling green*

- Does the bowling green surface survive anywhere on the site?
- Can the north and south limits of the bowling green be defined?
- What was the setting of the bowling green in the 18th century? Did they bowl amongst the standing ruins of the castle? Is there archaeological preservation of any buildings such as those depicted on Fairbank plans contemporary with the bowling green?
- How can the setting of the bowling green be characterised?

### *Slaughterhouses*

- How does the slaughterhouse district compare to examples in other cities?
- What parallels can be drawn for the organisation of slaughtering activity? For example, how can the division of the slaughterhouses into similar, parallel, separate operations be contrasted with the tradition of 'little mesters' in the cutlery trade?

### *Steelworking*

- How did Samuel Shore's supposed 1709 cementation furnace on the castle mound relate to the presence of the high status bowling green?
- Do the remains of further unmapped furnaces survive on the castle mound?
- Is any evidence for the processes, circulation and workflow of the castle mound steelworks preserved on the site?

## **13 ARCHIVE STORAGE AND CURATION**

### **13.1 Museum**

13.1.1 The archive resulting from the evaluation is currently held at the offices of Wessex Archaeology in Sheffield. Museums Sheffield has agreed in principle to accept the archive on completion of the project, under an accession code to be determined. Deposition of any finds with the museum will only be carried out with the full written agreement of the landowner to transfer title of all finds to the museum.

### **13.2 Preparation of the archive**

13.2.1 The archive, which includes paper records, graphics, artefacts, ecofacts and digital data, will be prepared following the standard conditions for the acceptance of excavated archaeological material by Museums Sheffield, and in general following nationally recommended guidelines (SMA 1995; ClfA 2014c; Brown 2011; ADS 2013).

13.2.2 All archive elements will be marked with the accession code, and a full index will be prepared.

### **13.3 Selection policy**

13.3.1 Wessex Archaeology follows national guidelines on selection and retention (SMA 1993; Brown 2011, section 4). In accordance with these, and any specific guidance prepared by the museum, a process of selection and retention will be followed so that only those artefacts or ecofacts that are considered to have potential for future study will be retained.

The selection policy will be agreed with the museum, and will be fully documented in the project archive.

#### **13.4 Security copy**

- 13.4.1 In line with current best practice (eg, Brown 2011), on completion of the project a security copy of the written records will be prepared, in the form of a digital PDF/A file. PDF/A is an ISO-standardised version of the Portable Document Format (PDF) designed for the digital preservation of electronic documents through omission of features ill-suited to long-term archiving.
- 13.4.2 The pottery assemblage should be retained *in toto* and deposited with Museums Sheffield where it will be available for further study in the future. It should not be sampled, downsized, dispersed or used as a teaching collection.

#### **13.5 OASIS**

- 13.5.1 An OASIS online record (<http://oasis.ac.uk/pages/wiki/Main>) has been initiated, with key fields and a .pdf version of the final report submitted. Subject to any contractual requirements on confidentiality, copies of the OASIS record will be integrated into the relevant local and national records and published through the Archaeology Data Service ArchSearch catalogue.

### **14 COPYRIGHT**

#### **14.1 Archive and report copyright**

- 14.1.1 The full copyright of the written/illustrative/digital archive relating to the project will be retained by Wessex Archaeology under the *Copyright, Designs and Patents Act 1988* with all rights reserved. The client will be licenced to use each report for the purposes that it was produced in relation to the project as described in the specification. The museum, however, will be granted an exclusive licence for the use of the archive for educational purposes, including academic research, providing that such use conforms to the *Copyright and Related Rights Regulations 2003*. In some instances, certain regional museums may require absolute transfer of copyright, rather than a licence; this should be dealt with on a case-by-case basis.
- 14.1.2 Information relating to the project will be deposited with the Historic Environment Record (HER) where it can be freely copied without reference to Wessex Archaeology for the purposes of archaeological research or development control within the planning process.

#### **14.2 Third party data copyright**

- 14.2.1 This document and the project archive may contain material that is non-Wessex Archaeology copyright (eg, Ordnance Survey, British Geological Survey, Crown Copyright), or the intellectual property of third parties, which Wessex Archaeology are able to provide for limited reproduction under the terms of our own copyright licences, but for which copyright itself is non-transferable by Wessex Archaeology. Users remain bound by the conditions of the *Copyright, Designs and Patents Act 1988* with regard to multiple copying and electronic dissemination of such material.



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## APPENDICES

### Appendix 1: Trench summaries

<i>Trench 1</i>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
1000	Surface		Modern concrete floor of castle market
1001	Surface		Concrete subsurface with brick inclusions. Possibly earlier surface or bedding layer for 1000
1002	Bedding		Mid grey yellow/brown silty gravelly sandy ash with stone inclusions and finds. Bedding for concrete 1001 and 1000
1003	Made Ground		Blue black ash and clinker with coal and finds
1004	Made Ground		Mid orange red crushed brick with silty ash
1005	Made Ground		Mid yellow brown silt ash clay with grey ashy lenses and stone included heat-affected stone
1006	Made Ground		Mid to dark yellow grey silt clay with stones
1007	Made Ground		Mid orange red sand with brick and stone inclusions
1008	Drain		Cut for culvert 1009 etc. 0.62 m wide, 0.48 m deep
1009	Drain	1008	Culvert lining. Handmade red brick with some firebrick bonded with lime mortar. 3 courses, 1 skin. Some sooty marks suggest re-use of bricks. 0.12 m wide, 0.23 m deep
1010	Drain	1008	Sandstone capping of drain. 0.62 m wide, 0.28 m deep.
1011	Primary fill	1008	Fill of construction cut 1008 for drain 1009 etc. Dark brown silt sand with stones
1012	Secondary fill	1008	Silting up of drain 1009 etc. Dark grey brown silt with stones
1013	Made Ground		Purple red sand and ash with stone inclusions and rubble derived from a cementation furnace (sampled)
1014	Made Ground		Mid orange brown silt clay with charcoal
1015	Made Ground		Mid blue grey clinker with stones and finds
1016	Made Ground		Mid brown grey silt ash rubble with lime mortar and red brick fragments
1017	Secondary fill	1008	Silting up of drain. Mid white ash with small (1–3 mm) stone inclusions
1018	Secondary fill	1008	Silting up of drain. Dark brown silt clay with uncommon fine stone
1019	Tumble		Angular sandstone rubble with silt matrix (1038). Demolition of 1055
1020	Wall		Large sandstone wall with rare handmade bricks. Lime mortared. 2.3 m wide, 0.5 m deep. Same phase of construction as brick wall 1022
1021	Wall		Sandstone and lime mortar wall. Max 6 courses remain. Keyed into return 1036, abutted by 1023.
1022	Wall		Handmade red brick and lime mortar wall. More than 10 courses. Cracked, possibly from weight of 1024. Forms possible access or flue to postulated cementation furnace to S
1023	Wall		Handmade red brick and lime mortar wall. 3 skins, more than 15 courses. Butts 1021. Possibly forms square enclosure with 1039 and 1036.
1024	Surface		Sandstone flag surface possibly indicating later adaptation of steelworks structures. 1.7 m long, 1.22 m wide, 0.09 m deep
1025	Made Ground		Mid grey yellow silt sand rubble with sandstone and red brick
1026	Made Ground		Mid grey brown silt rubble with common sandstone and red brick
1027	Tumble	1037	Light grey brown sandstone rubble associated with drain cut 1037; probably derived from 1020
1028	Foundation		Concrete pad associated with castle market
1029	Wall		Firebrick structure, 2 skins, unmortared. Placed on top of wall 1031, could be rubble. Perhaps demolished from postulated cementation furnace to S. No refractory function in this location
1030	Made Ground		Mid purple red ashy sand with rare stone inclusions. Heat affected deposit ex situ used as demolition backfill/made ground





<b>Trench 1</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
1031	Wall		Sandstone and lime mortar wall. 1 course, 1 skin. Linear striations on stones. Capping for brick wall 1047 which it is mortared to
1032	Metal Plate		Disturbed iron plate with traces of sulphur or similar. Associated with tumble 1026. 0.55 m long, 0.23 m wide, 0.03 m deep
1033	Surface		Cobblestone surface exposed over 2.21 m long, 1.1 m wide and 0.11 m deep
1034	Made Ground		Mid red brown silt clay with red brick fragments
1035	Wall		Sandstone unmortared wall. 1 course. Associated with castle market?
1036	Wall		Sandstone and lime mortar wall. 3 courses, 2 skins. Truncated by 1037. Possibly continues beyond as 1035. Butted by 1039
1037	Construction cut		Construction cut for castle market drain and other activity. 1 m wide, 1.2 m deep
1038	Primary fill	1054	Dark grey silt clay with few inclusions
1039	Wall		Handmade red brick and lime mortar. 2 courses, 2 skins. Keyed into 1023.
1040	Made Ground		Mid yellow brown silt clay with red brick and sandstone
1041	Made Ground		Dark grey black ashy charcoal (70% charcoal)
1042	Bedding		Bedding layer and matrix for cobbles 1033. Mid brown sand silt with gravel
1043	Made Ground		Light brown silt sand. Overlies cobbles 1033. Possibly accumulated during use or abandonment of 1033.
1044	Made Ground		Black charcoal redeposited made ground
1045	Made Ground		Mid red purple sand silt with inclusions of ganister fragments, fire brick and slag probably derived from a cementation furnace thought to be immediately to the S.
1047	Wall	1070	Handmade red brick with some opportunistically used firebricks bonded with lime mortar. 7 courses seen.
1048	Made Ground		Dark yellow brown silt clay with stones, rare handmade red brick fragments and residual medieval pottery
1049	Made Ground		Mid grey yellow silt clay with stones and some rare red brick fragments. Dirty redeposited natural.
1050	Made Ground		Dark grey black ash high in stratigraphic sequence. Made ground associated with castle market
1051	Made Ground		Dark yellow black ash clay with stone and brick fragment inclusions and clay lenses
1052	Pit		Rubbish/stone disposal pit. 1.72 m diameter, 0.65 m deep
1053	Primary fill	1052	Mid yellow brown silt clay with common sandstone inclusions and finds
1054	Construction cut		Very steep cut for wall 1055. 0.93 m wide and 0.26 m deep
1055	Wall	1054	Sandstone unmortared wall. 2 courses. Somewhat disturbed by cut 1037
1056	Bedding		Mid yellow brown silt sand with 60% gravel and mortar. Bedding layer for 1020.
1057	Made Ground		Dark brown black silt with rare stone inclusions, charcoal and medieval pottery
1058	Made Ground		Mid orange brown sand silt with charcoal and lime mortar inclusions
1059	Cut		Cut seen in N-facing section of trench. Uncertain function. Possibly a robber trench? 0.44 m wide, 0.42 m deep, steep sides and flat base
1060	Fill	1059	Dump of redeposited lime mortar filling cut 1059. Uncertain function. Possibly fill of a robber trench?
1061	Made Ground		Bright orange silt clay with large stone inclusions but no finds
1062	Made Ground		Dark black brown clay with common ex situ charcoal and no finds.
1063	Made Ground		Lens within 1013. Light grey white very fine ash with charcoal
1064	Made Ground		Dark black ex situ charcoal made ground
1065	Bedding		Dark black sandy silt with 5% charcoal inclusions. Fine bedding layer below 1033
1066	Bedding		Light pinkish yellow silt clay with 5% charcoal inclusions. Bedding for 1033



<b>Trench 1</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
1067	Bedding		Green yellow silt clay with sandstone inclusions. Bedding layer for 1033
1068	Construction cut		Large construction/levelling cut as part of preparation for construction of 19th century furnace structures. Evident in section 1016 and presumably much larger. At least 0.9 m wide, 0.3 m deep
1069	Primary fill	1068	Primary fill of construction/levelling cut 1068. Mid brown sand silt with 10% charcoal inclusions
1070	Construction cut		Construction cut for wall 1047. 0.15 m deep, unknown width and length
1071	Primary fill	1070	Reddish purple sand silt
1072	Made Ground		Mid blue brown sand with stones
1073	Made Ground		Red black slag up to 0.2 m with charcoal inclusions
1074	Made Ground		Mid orange brown sand clay with charcoal
1075	Tumble		Stone rubble deposit. Stones jumbled but at similar depth and stratigraphic position to courtyard surface seen in trench 5.
1076	Made Ground		Dark blue and purple grey clays with rare stones and medieval pottery
1077	Made Ground		Mid grey brown clay with sandstone, possibly intrusive from 1075
1078	Made Ground		Dark grey blow clay with sandstone and animal bone. Overlies 1075
1079	Made Ground		Pale grey green clay with stones. Redeposited dirty alluvium
1080	Made Ground		Mid brown orange sand with very rare stone. Lens within 1079
1081	Made Ground		Blue black ash and clinker with coal inclusions

<b>Trench 2</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
2000	Surface		Light grey concrete slab of former castle market
2001	Surface		Pinkish red concrete with crushed brick inclusions. Bedding for 2000 or earlier surface
2002	Made Ground		Redeposited natural. Light yellow brown clay with sandstone
2003	Wall	2005	Handmade N-S red brick and lime mortar wall. 4 courses
2004	Wall	2006	Handmade red brick and lime mortar N-S wall. 4 courses, 2 skins
2005	Construction cut		Construction cut for wall 2003. 0.33 m wide, 0.17 m deep
2006	Construction cut		Construction cut for wall 2004. 0.3 m wide, 0.17 m deep
2007	Primary fill	2005	Mid yellow brown silt clay with stones
2008	Primary fill	2006	Mid yellow brown silt clay with stones
2009	Surface		Intermittently preserved sandstone surface. Broken sandstone slabs with lime mortar.
2010	Surface		sandstone surface. Broken sandstone slabs with lime mortar.
2011	Made Ground		Dark red black silt with red brick crush
2012	Made Ground		Dark red black silt with fragments of red brick
2013	Service Cut		Cut for castle market drain. Straight edges - possibly cut by machine. 0.65 m wide, 0.3 m deep.
2014	Primary fill	2013	Dark grey black sand clay with stones
2015	Drain	2013	Concrete containing ceramic drainpipe
2016	Drain	2018	Sandstone drain capping up to 0.53 m. 0.1 m deep.
2017	Secondary fill	2018	Silting up of culverted drain. Dark brown silt
2018	Cut		Construction cut for culverted drain 2016 etc. 0.48 m wide, 0.3 m deep
2019	Made Ground		Redeposited natural. Same as 2002 and 2028. Mid yellow brown clay with sandstone
2020	Made Ground		Dark yellow black ash and silt with bitumen



<b>Trench 2</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
2021	Drain	2018	Lining of culvert. Handmade bricks and opportunistically re-used firebricks. Unmortared. Some lime mortar on bricks indicates re-use. 3 courses
2022	Made Ground		Dark blue black ash with bitumen and slag
2023	Made Ground		Mid yellow brown clay with red brick inclusions
2024	Made Ground		Dark brown red crushed brick
2025	Drain	2026	Ceramic drain pipe set in concrete similar to 2015. SW-NE alignment
2026	Service Cut		Cut for drain associated with castle market. 0.9 m wide and 0.38 m deep
2027	Drain	2026	Red brick lining of drain 2025
2028	Made Ground		Light yellow brown clay with sandstone. Same as 2002 and 2019
2029	Made Ground		Lump of rubble comprising degraded brick and lime mortar. Out of alignment on all three axes - large piece of rubble used as made ground.
2030	Made Ground		Lens of dark grey brown silt with brick fragments
2031	Made Ground		Dirty redeposited natural. Dark yellow brown silt clay with brick, stone, lime mortar, ash and bitumen
2032	Made Ground		Dark grey black clinker and ash with roof slates
2033	Made Ground		Light brown yellow ash with sandstone. Redeposited fuel ash
2034	Made Ground		Dark brown grit sand with brick crush and stone
2035	Drain	2037	Ceramic drain encased in concrete associated with castle market
2036	Drain	2037	Re-used machine brick set in concrete/cement as lining of drain. 3 courses
2037	Service Cut		Cut of drain associated with castle market. 0.35 m wide, 0.36 m deep. NE-SW
2038	Made Ground		Redeposited natural. Light brown yellow clay. Very few inclusions of stone, brick, ash etc. Decently clean
2039	Made Ground		Dark grey black ash and clinker with roof slate inclusions
2040	Made Ground		Light brown orange ash with stone fragments
2041	Construction cut		Construction cut for castle market foundation 2043
2042	Primary fill	2041	Dark grey black silt. Primary fill of construction cut associated with castle market
2043	Foundation	2041	Concrete beam foundation for castle market with rebar steel reinforcement
2044	Primary fill	2037	Redeposited natural. Light yellow brown clay with sandstone
2045	Made Ground		Redeposited natural. Mid yellow brown clay with sandstone
2046	Made Ground		Mid red brick crush with lime mortar inclusions
2047	Primary fill	2018	Dark brown black silt with sandstone
2048	Made Ground		Blue grey clay with sandstone
2049	Made Ground		Red brown clay with sandstone
2050	Made Ground		Orange clay with sandstone
2051	Made Ground	2054	Redeposited Natural. Yellow brown silt clay with sandstone
2052	Made Ground		Redeposited natural. Blue clay with sandstone
2053	Natural		Mid grey yellow clay with sandstone. Veined, so probably undisturbed?
2054	Cut		Possible landscaping cut truncating possible natural 2053
2055	Made Ground		Redeposited natural. Brown yellow coarse stone in clay sand matrix. Continuous with 2045 but comprising larger blocks

<b>Trench 3</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
3000	Surface		Concrete slab of castle market. Light grey white concrete with red brick crush inclusions and thin rebar
3001	Made Ground		Mid red brick crush
3002	Made Ground		Dark grey black silt ash with stones and red brick crush
3003	Made Ground		Mid grey yellow silt clay with red brick crush and sandstone



<b>Trench 3</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
3004	Cut		Cut for culverted drain 3006 etc. 0.82 m wide, 0.86 m deep-
3005	Primary fill	3004	Dark grey brown silt ash with stones and finds
3006	Drain	3004	Handmade red brick and black ash mortar lining of culvert drain. 5 courses, 1 skin. Contains 3013
3007	Drain	3004	Base of culvert. Sandstone slabs and black ash mortar
3008	Drain	3004	Culvert capping. Sandstone slabs. Unmortared
3009	Secondary fill	3004	Silting up of culvert. Dark brown silt clay with stones and brick fragments, pottery and coins
3010	Drain	3004	Sandstone drain lining. Unmortared. 3 courses, 1 skin
3011	Drain	3004	Sandstone culvert base with dark brown silt clay matrix
3012	Drain	3004	Handmade red brick and black ash mortar lining of culvert
3013	Drain	3004	Sandstone block forming a square basin incorporated into culvert. Perhaps a silt trap? 0.35 m by 0.26 m and 0.22 m deep
3014	Service Cut		Cut for concrete drains associated with castle market
3015	Primary fill	3014	Mid grey brown silt clay with stones
3016	Drain	3014	Re-used handmade red brick and cement lining of concrete drain associated with castle market
3017	Drain	3014	Ceramic drainpipe encased in concrete associated with castle market
3018	Made Ground		Redeposited natural. Light grey yellow silt clay with sandstone
3019	Wall		Sandstone cobbles laid to form 1 course, 1 skin wall. At S last block carved to fit wall 3024. Unmortared.
3020	Service Cut		Cut of linear feature assumed to be a service of some kind, perhaps a drain. 0.6 m wide and 1.7 m deep. Contained no service
3021	Fill	3020	Yellow clay with sandstone and grey silt inclusions
3022	Fill	3020	Dark grey brown silt with finds
3023	Surface		Flagstone surface. 1.6 m long, 0.45 m wide, 0.04 m deep. Black ash mortar. S stone cut to fit wall 3024. Poor preservation. Overlies wall 3036
3024	Wall		Handmade red brick and black ash mortar wall. 3 courses, 3 skins. N-S. Continues beyond truncation as 3025 and 3026
3025	Wall		Handmade red brick wall with both lime mortar and black ash mortar suggesting reuse of bricks or repair. 2 courses, at least 4 skins. N-S. Continues beyond truncation as 3024 and 3026
3026	Wall		Handmade red brick and lime mortar wall. 2 courses. N-S. Continues beyond truncation as 3024 and 3025.
3027	Made Ground		Same as 3055. Brown silt clay. Seen in slot investigating cut 3020.
3028	Made Ground		Grey silt clay. Seen in base of slot investigating cut 3020.
3029	Made Ground		Same as 3057. Brown silt clay with charcoal and wood. Seen in base of slot investigating 3020
3030	Cut		Construction cut for culverted drain. 0.94 m wide, 0.36 m deep
3031	Drain	3030	Sandstone culvert lining. Unmortared
3032	Drain	3030	Sandstone drain capping. Unmortared
3033	Secondary fill	3030	Yellow brown silt clay with sandstone. Silting up of drain
3034	Secondary fill	3030	Black brown silt clay with sandstone
3035	Primary fill	3030	Grey brown silt clay with sandstone
3036	Wall		Part of weighbridge. Handmade red brick and black ash mortar. 10 courses
3037	Drain	3030	Base of culvert. Randomly shaped sandstone. 0.94 m wide and 0.36 m deep.
3038	Wall		Handmade red brick wall with black ash mortar. 1 course, 2 skins. E-W. Butts 3025
3039	Made Ground		Dark grey brown silty ashy gravel with red brick rubble
3040	Wall		Handmade red brick and black ash mortar wall. 12 courses. 2 skins
3041	Wall		Handmade red brick and ash mortar wall. 9 courses, 3 skins, N-S. Keyed into



<b>Trench 3</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
			3047 and 3046
3042	Structure		Door frame. E-W. Handmade red brick and black ash mortar. 1 course on iron lintel
3043	Structure		Sandstone block ledge, part of weighbridge. Ash mortar. 2 courses.
3044	Wall		Handmade red brick and ash mortar wall. 12 courses. Very rough.
3045	Foundation		Frogged machine brick and grey ash mortar wall. N-S. 2 courses visible. Part of weighbridge
3046	Wall	3081	Handmade red brick and dark grey ash mortar wall. 11 courses. E-W
3047	Wall		Handmade red brick wall. 10 courses, 3 skins. Part of weighbridge
3048	Stanchion		Handmade red brick and sandstone stanchion. 6 courses of brick capped with sandstone. Part of weighbridge
3049	Stanchion		Handmade red brick and sandstone stanchion. 6 courses of brick capped with sandstone. Part of weighbridge
3050	Stanchion		Chamfered stone block re-used as 19th century wall. Probably originated from castle. Bonded with unusual pale whitish ash mortar, not lime mortar
3051	Surface		Sandstone slab surface with black ash mortar. Lip at edge of weighbridge. Possibly old floor
3052	Surface		Handmade red brick and mid blue grey ash mortar surface. 1 course. Ledge possibly representing part of floor of weighbridge
3053	Wall		Sandstone blocks and dark grey ash mortar wall. 1 course, 1 skin.
3054	Wall		Red brick and ash mortar ledge built into weighbridge wall 3036
3055	Made Ground	3084	Dark brown humic clay with sandstone and charcoal.
3056	Made Ground		Orange yellow silt clay with sandstone, patches of blue clay and charcoal (5%)
3057	Made Ground		Reddish dark brown humic clay silt with sandstone and rich environmental material
3058	Made Ground		Redeposited natural. Bright light blue grey clay with sandstone
3059	Service Cut		Synonym for 3020
3060	Fill	3059	Backfill of archaeological intervention 3020. Recorded after subsequent re-machining.
3061	Made Ground		Yellowish orange silt clay with stone
3062	Made Ground		Brownish blue and orange yellow mixed silty clays with charcoal
3063	Made Ground		Redeposited natural. Orange yellow sand clay with sandstone and less than 1% charcoal
3064	Foundation		Unworked slabs of local bedrock laid to form a rough wall foundation. Unmortared. NW-SE
3065	Construction cut		Construction cut for weighbridge 3050
3066	Primary fill	3065	Grey white sand silt with charcoal
3067	Fill	3080	Greyish mid brown silt
3068	Made Ground		Yellow orange silt clay with sandstone
3069	Fill		Spoil created during machining. Void.
3070	Made Ground		Redeposited natural. Orange blue sand clay with sandstone and charcoal
3071	Made Ground		Redeposited natural. Yellow orange silt clay
3072	Made Ground		Redeposited natural. Blue brown silt clay with sandstone and charcoal
3073	Made Ground		Redeposited natural. Orange yellow sand clay
3074	Made Ground		Redeposited natural. Grey blue silt clay with lenses of orange sand clay and sandstone
3075	Made Ground		Redeposited natural. Grey blue clay with less than 1% charcoal
3076	Wall		Unworked sandstone slabs derived from local bedrock laid as upper course of foundation 3064. On different alignment (still NW-SE) to 3064
3077	Structure		Small sandstone blocks randomly arranged. Could not be investigated further.



<b>Trench 3</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
			Possibly demolition tumble
3079	Made Ground		Demolition material? Blueish dark brown humic clay silt with sandstone, Vivianite and finds
3080	Cut		Landscaping/ground reduction event. Truncates layers 3058 and 3079.
3081	Construction cut		Construction cut for weighbridge 3046 etc.
3082	Made Ground		Synonym for 3039
3083	Surface		Sandstone setts in matrix (3002) of black ash. Road surface.
3084	Cut		Landscaping/ground reduction event. Truncates layers 3056 etc.
3085	Stanchion		Handmade red brick and sandstone stanchion. 6 courses of brick capped with sandstone. Part of weighbridge
3086	Made Ground		

<b>Trench 4</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
4000	Surface		Light grey concrete slab with crush brick inclusions. Associated with castle market.
4001	Bedding		Mid brown red brick crush bedding for 4000
4002	Made Ground		Dark grey black ash with bitumen, slag and clinker
4003	Surface		Sandstone flag floor with black ash mortar
4004	Drain	4048	Concrete containing ceramic drain. N-S. Associated with castle market
4005	Surface		Sandstone flag surface with repairs 4045, 4046 and curb 4047
4006	Wall		Handmade red brick and lime mortar wall. 3 skins. NE-SW
4007	Made Ground		Mid yellow brown clay with rubble, slag and finds
4008	Made Ground	4105	Dark grey black ash with brick crush, slag and finds
4009	Made Ground		Orange brown sand with finds
4010	Made Ground		Light grey brown brick crush with lime mortar
4011	Structure	4061	Large base to support unknown machine or similar. Two large sandstone blocks 0.9 m by 0.4 m by 0.3 m deep.
4012	Drain	4098	Concrete containing ceramic drain associated with castle market
4013	Drain		Concrete containing ceramic drain associated with castle market
4014	Stanchion	4015	Concrete stanchion with damaged/removed metal core
4015	Construction cut		Construction cut for castle market stanchion 4014
4016	Primary fill	4015	Dark grey black ash
4017	Wall		Handmade red brick and lime mortar wall. 4 courses, 3 skins. Built on foundation 4060. E-W
4018	Wall	4102	Handmade red brick wall with lime mortar. 4 courses, 3 skins. E-W. Built on foundation 4060.
4019	Wall		Handmade red brick and lime mortar wall. 1 skin, 1 course. Bricks on edge.
4020	Drain		Handmade red brick and lime mortar probable drain or possible power transmission conduit (belt drive). 2 courses. N-S
4021	Drain		Handmade red brick and lime mortar drain or power transmission conduit (belt drive). 3 courses. N-S.
4022	Drain		Handmade red brick and lime mortar drain or power transmission conduit (belt drive). 3 courses. N-S
4023	Grindstone		Large grindstone probably deposited as imported made ground. Diameter 1.1 m, depth 0.23 m. Edge grinding.
4024	Made Ground		Mid brown grey clay with stone and brick rubble
4025	Service Cut		Cut for drain 4080. Greater than 1 m wide, 0.96 m deep.
4026	Wall		Handmade red brick and black as mortar wall. 2 courses. Lime mortar residue



<b>Trench 4</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
			indicated re-use of bricks. Slightly off N-S alignment.
4027	Wall		Handmade red brick and lime mortar wall. E-W. 5 courses, 2 skins.
4028	Wall		Handmade red brick and sandy lime mortar wall. 4 courses. Different lime mortar on bricks indicated re-use. E-W
4029	Made Ground		Mid brown orange sand with few inclusions
4030	Made Ground	4075	Light brown yellow clay with stone and brick rubble
4031	Wall		Handmade red brick and black ash mortar wall with some opportunistically re-used firebrick. 2 courses.
4032	Foundation		Black ash mortar dump used as foundation for 4031
4033	Wall	4078	Handmade red brick and black ash mortar wall. 4 courses, 2 skins. E-W
4034	Wall		Sandstone and lime mortar wall with occasional handmade red brick. E-W
4035	Wall	4072	Handmade red brick and lime mortar wall. 2 courses, 2 skins. E-W
4036	Made Ground		Dark grey black fuel ash with brick rubble and bitumen
4037	Made Ground		Dark yellow black ash with brick and stone rubble
4038	Made Ground		Mid yellow grey clay
4039	Made Ground		Light grey brown brick and stone rubble
4040	Made Ground		Mid orange brown sand with brick rubble
4041	Made Ground		Dark grey black ash with bitumen, brick fragments, lime mortar
4042	Made Ground		Mid grey brown silt with lime mortar and stones
4043	Primary fill	4078	Dark red brown red brick rubble with charcoal
4044	Made Ground		Mid black brown ash with stones, mortar, roofing slate and brick fragments
4045	Surface		Sandstone cobbles set in black ash mortar
4046	Surface		Sandstone slabs set in black ash mortar
4047	Surface		Sandstone kerb set in black ash mortar
4048	Cut		Cut for drain
4049	Primary fill	4025	Dark black brown brick rubble and ash
4050	Made Ground		Mid brown yellow silt clay with sandstone, brick rubble and coal
4051	Made Ground	4105	Mid grey yellow ash with brick rubble, stones, mortar and coal
4052	Made Ground		Mid brown grey redeposited mortar with 20% red brick fragments
4053	Made Ground		Dark brown red brick crush with coal and mortar
4054	Made Ground		Mid brown yellow clay with brick rubble, roofing slate, stones
4055	Made Ground		Grey black ash and clinker with coal
4056	Made Ground		Mid red brown brick rubble
4057	Primary fill	4078	Dark red brown ash with brick rubble, stones, charcoal, mortar
4058	Primary fill	4078	Mid grey brown ash with stones, slag and coal
4060	Foundation		Sandstone slab foundation for wall 4017, 4018
4061	Construction cut		Construction cut for 4011. 1.2 m long, 1.1 m wide, 0.4 m deep
4062	Primary fill	4061	Brown orange clay with sandstone
4063	Made Ground		Dark black silt
4064	Made Ground		Brown silt clay
4065	Made Ground		Grey brown silt clay with stones
4066	Made Ground		Dark brown black ash with red brick, mortar, coal and stone
4067	Construction cut		Construction cut for wall 4028. 0.02 m wider than wall. 0.5 m deep.
4068	Primary fill	4067	Dark yellow brown clay
4069	Made Ground		Mid brown orange silt clay
4070	Made Ground		Dark black grey sand silt with fine gravel
4071	Made Ground		Dark grey black sand silt with fine gravel
4072	Construction		Construction cut for 4035. Might be same as 4078.



<b>Trench 4</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
	cut		
4073	Primary fill	4072	Mid orange brown sand silt with fine gravel
4074	Made Ground		Light grey sand silt with 50% coarse gravel
4075	Cut		Cut made to make repairs to walls 4027 and 4028
4076	Made Ground		Mid orange grey sand silt with 50% gravel
4077	Made Ground		Mid blue grey clay with gravel
4078	Construction cut		Construction cut for nearly all structures in trench 4 (excluding N end)
4079	Drain	4025	Re-used handmade red bricks, some exhibiting signs of former heating. Used as lining for castle market drain
4080	Drain	4025	Concrete drain presumably containing ceramic pipe. Same as other castle market drains
4081	Made Ground		Dark grey black pure fine silt
4082	Made Ground		Mid grey brown clay with slate and sandstone
4083	Made Ground		Dark brown gritty silt with brick, ash and stone inclusions
4084	Drain		Concrete drain associated with castle market
4085	Wall		Handmade red brick and lime mortar wall. E-W. Some bricks in bad condition - probably re-used
4086	Made Ground		Mid brown yellow sand clay with stone and charcoal
4087	Made Ground		Mid yellow brown sand clay with sandstone and coal
4088	Made Ground	4102	Mixed orange, grey and brown sandy clay with gravel, cobbles, brick and ash
4089	Surface	4102	Lime mortar surface or bed
4090	Made Ground		Dark yellow brown sand clay with stones
4091	Structure	4096	Handmade red brick and firebrick flue. Unmortared. Floor is red brick, sides firebrick. Interior sooty, therefore exhaust flue.
4092	Deposit	4096	Reddish purple fine loose sand. Intentional lining of base of flue 4091, possibly with a refractory function.
4093	Made Ground		Dark orange brown silt clay with sandstone inclusions
4094	Made Ground	4078	Redeposited natural. Bright yellow brown dense clay with stone
4095	Made Ground		Dark brown coarse silt with bricks and stone
4096	Construction cut		Cut for flue 4091. 1.4 m wide, greater than 0.5 m deep
4097	tertiary deposit	4096	Backfill of decommissioned flue. Dark black brown coarse silt with sandstone and brick rubble
4098	Cut		Construction cut for drain 4012
4099	Primary fill	4098	Mid orange brown sand clay with coal, sandstone, brick, mortar, slate
4100	Made Ground		Mid yellow brown sand
4101	Made Ground		Dark grey black coarse silty sand with coal, charcoal, crushed brick and sandstone
4102	Construction cut		Cut for wall 4018
4103	Made Ground		Mid yellow brown sand clay with charcoal, sandstone
4104	Made Ground		Light brown yellow sand clay with gravel, rubble
4105	Construction cut		Construction cut for surface
4106	Secondary fill		Mid green grey clay with stones and charcoal
4107	Made Ground		Yellow brown sand clay with gravel, brick, cobbles, charcoal
4108	Made Ground		Dark brown sand clay with ash, gravel and brick
4109	Made Ground		Light yellow brown sand with charcoal, gravel, cobbles
4110	Wall		Sandstone and lime mortar wall. 1 course. In line with 4034. E-W
4111	Made Ground		Light brown yellow clay with gravel and cobbles





<b>Trench 4</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
4112	Primary fill	4096	Mid-dark brown silt clay with red brick, sandstone, ash etc.
4113	Layer		Mid yellow clay with sandstone. Clean
4114	Made Ground		Mid brown yellow clay with stone
4115	Made Ground		Dark black brown brick rubble in loose silty sand matrix with mortar.
4116	Made Ground		Light orange brown with stones
4117	Made Ground		Mid grey brown silt clay with stone and charcoal
4118	Primary fill		Robber deposit associated with removed wall. Dark yellow brown sand/grit with brick and stone rubble and lumps of hard yellow clay
4119	Wall		Collapsed handmade brick wall in S facing section. E-W
4122	Made Ground		Assigned in post-ex to stratigraphically isolated lower part of 4044. Dark ash with rubble

<b>Trench 5</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
5000	Surface		Light grey white concrete with very fine angular stone and brick inclusions. Slab of castle market
5001	Made Ground		Mid red orange sandy silt with red brick crush
5002	Made Ground		Yellow brown silt clay with rubble
5003	Made Ground		Dark grey black ashy clinker with coal
5004	Made Ground		Pale greyish yellow cobbles in a silt sand matrix
5005	Made Ground		Mid dark yellow brown silt clay with sandstone
5006	Foundation	5011	Mid orange red concrete with brick crush inclusions. Pad for castle market
5007	Wall	5026	Handmade red brick and lime mortar wall. 2 courses, 3 skins. N-S
5008	Wall	5028	Handmade red brick and lime mortar wall. 1 course, 3 skins. Some damage to bricks. E-W
5009	Bedding		Black silt bedding for 5031 and removed flagstone surface
5010	Wall		Sandstone unmortared wall. 3 courses. N-S
5011	Construction cut		Cut for concrete pad 5006
5012	Primary fill	5011	Mid red brown rubble: brick, stone, slate, slag
5013	Made Ground		Dark grey black fine silt with brick rubble
5014	Made Ground		Redeposited natural. Dark yellow brown clay with rubble
5015	Made Ground		Dark black fine charcoal with ash
5016	Made Ground		Dark yellow brown clay with some rubble
5017	Drain	5020	Concrete containing ceramic drain pipe. Like other castle market drains
5018	Made Ground		Dark grey/black fine silt with stone
5019	Made Ground		Dark brown black ash and brick rubble
5020	Service Cut		Cut for drain associated with castle market
5025	Made ground		Synonym for 5036
5026	Construction cut		Cut for wall 5007
5027	Primary fill	5026	Dark black brown clay with stone
5028	Construction cut		Cut for wall 5008
5029	Primary fill	5028	Very dark brown silt clay with stones, lime mortar
5030	Wall	5026	Handmade red brick and lime mortar wall. 2 courses. E-W
5031	Surface		Sandstone flag pierced with iron drain cover.
5032	Construction cut		Cut for drain 5033 associated with castle market
5033	Drain	5032	Concrete containing ceramic pipe drain



<b>Trench 5</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
5034	Primary fill	5032	Dark black brown with stones and finds
5035	Drain	5032	Handmade red brick in ash matrix (not mortar). 5 courses, 2 skins. Lining of drain
5036	Made Ground		Mid orange brown clay with stone
5037	Made Ground		Mid yellow brown silt clay with stones
5038	Made Ground		Redeposited natural. Mid yellow clay with stones and pottery
5039	Made Ground	5046	Red black slag fuel ash clinker
5040	tertiary deposit		Mid red black silt clay overlying surface 5042
5041	Deposit		Matrix between surfaces 5042, 5043, 5044. Mid blue grey silt
5042	Surface		Rough sandstone surface well layed but rough slabs/blocks
5043	Surface		Rough stone surface, possibly a repair to 5042
5044	Surface		Rough stone surface. Cobble-like stones.
5045	Made Ground		Mid yellow brown silt sand with charcoal and stone
5046	Cut		Disturbance introducing deposit 5039 through surfaces 5042, 5043 below

<b>Trench 6</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
6000	Foundation		Large concrete foundation for former 1980s toilet block
6001	Surface		Tarmac loading ramp surface
6002	Made Ground		Grey brown grit with brick, tarmac, stone
6003	Made Ground		Rough brick surface (wide variety of re-used brick) deposited as make up for 6001
6004	Made Ground		Redeposited natural. Yellow brown clay with sandstone
6005	Construction cut		Construction cut for foundation 6000 and inspection chamber 6021
6006	Primary fill	6005	Mid brown clay silt with brick, sandstone, lime mortar
6007	Primary fill	6005	Yellow brown clay with brick and sandstone
6008	Pit		Small pit of late date. 0.5 m diameter, 0.1 m deep
6009	Fill	6008	Mid grey brown silt with sandstone, brick and coal
6013	Primary fill	6014	Dark brown coarse silt with stone, including limestone and brick
6014	Service Cut		Cut for drain or similar service (not observed). E-W
6015	Service Cut		Cut for unseen service, probably a drain, and inspection chamber
6016	Primary fill	6015	Dark grey brown black silt with brick, sandstone
6017	Structure	6015	Inspection chamber. Machine frogged brick with modern cement. 2 skins
6018	Service Cut		Cut for drain 6019
6019	Drain	6018	Cast iron pipe 0.15 m diameter
6020	Primary fill	6018	Mid grey brown loose silt with brick, sandstone etc.
6021	Structure	6005	Inspection chamber. Frogged machine brick with modern cement
6022	Made Ground		Dark black brown sand with sandstone, coal, mortar
6023	Made Ground		Dark orange brown sand clay with sandstone, slate etc.
6024	Pit		Minor pit contemporary with 6015,ie late
6025	Primary fill	6024	Mid grey brown sand silt with stone, brick etc.
6026	Made Ground		Mid-dark grey brown coarse silt with sandstone
6027	Wall		Sandstone and lime mortar wall. Synonym for 6032
6028	Made Ground		Mid grey brown silt sand with stones
6029	Wall	6085	Sandstone and lime mortar wall. 6 courses, 2 skins
6030	Made Ground		Mid grey brown silt with lime mortar, plaster, stone etc.
6031	Wall	6085	Sandstone and lime mortar wall. 6 courses. 1 good face and rubble core
6032	Structure		Staircase. Sandstone and lime mortar. Contains keeping hole with plaster



<b>Trench 6</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
			rendering and iron staining.
6033	Made Ground		Mid orange brown silt sand with stones. Same as 6030 but from within keeping hole
6035	Wall		Sandstone and lime mortar wall. 6 courses, 1 skin. Back truncated by 6014
6036	Surface		Sandstone and lime mortar floor containing square door jamb cut
6037	Surface		Sandstone and lime mortar surface
6038	Made Ground		Dark brown black ash with charcoal
6039	Made Ground		Mid grey yellow silt clay with sandstone
6040	Primary fill	6005	Sub-angular and sub-rounded sandstone within backfill of cut 6005
6041	Made Ground		Mid-dark brown clay silt with sandstone
6042	Made Ground		Grey yellow silt with stone rubble
6043	Made Ground		Mid grey yellow silt clay with sandstone and charcoal
6044	Made Ground		Mid grey brown silt clay with stones and charcoal
6045	Made Ground		Mid grey yellow silt clay with stones
6046	Made Ground		Mid grey brown silt with stones
6047	Made Ground		Dark brown black clay with charcoal and wood
6048	Made Ground		Dark brown black clay with charcoal and wood
6049	Made Ground		Lens within 6039. Dark black brown charcoal and ash
6050	Primary fill	6057	Dark brown black with red mottles. Ash with charcoal
6051	Made Ground		Mid greenish grey silt clay with large limestone block
6052	Made Ground		Dark blue black ashy clay with charcoal
6053	Made Ground		Redeposited natural. Mid greyish yellow silt clay with stones and rare charcoal
6054	Deposit		Machine disturbed rubble. Mid grey brown silt sand with stone rubble
6055	Made Ground	6067	Dark brown black silt clay with wood and stone
6056	Made Ground		Mid grey yellow silt clay with stone
6057	Pit		Shallow pit. 0.7 m wide, 0.28 m deep
6058	Fill	6057	Mid grey yellow silt clay with stones
6059	Pit		Shallow pit. 0.6 m diameter, 0.08 m deep
6060	Fill	6059	Dark brown black clay with wood
6061	Pit		Shallow pit. 0.36 m diameter, 0.05 m deep
6062	Fill	6061	Dark brown black clay with wood
6063	Gully		Gully terminal. 1.11+ m long, 0.38 m wide, 0.1 m deep
6064	Fill	6063	Dark brown black silt clay with wood
6065	Made Ground		Redeposited natural. Mid yellow grey silt clay with stones
6066	Made Ground		Redeposited natural. Alluvial appearance. Mid green grey sand clay with stones and charcoal
6067	Pit		Pit. 1.95 m wide, 0.1 m deep
6068	Cut		Modern borehole
6069	Fill	6068	Orange grey clay with pea gravel
6070	Post	6073	Timber post. 0.12 m wide, 0.17 m deep
6071	Post pad	6073	Post pad for 6070. Sandstone block
6072	Fill	6067	Dark blue/black silt clay with Vivianite, wood and charcoal
6073	Pit		Possibly posthole but post is not centrally located. 0.97 m wide, 0.49 m deep.
6074	Fill	6073	Mid greenish yellow silt clay with charcoal. Contains post 6070 and pad 6071
6075	Pit		Pit. 0.44 m wide, 0.47 m deep
6076	Fill	6075	Dark brown black silt clay with stones and wood
6077	Fill	6075	Mid greyish green silt clay with charcoal and wood
6078	Pit		Pit for disposal of large limestone block. 0.3 m wide, 0.3 m deep
6079	Secondary fill	6075	Dark brown silt loam
6080	Pit		Small pit. 0.31 m wide, 0.17 m deep



<b>Trench 6</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
6081	Secondary fill	6080	Brown yellow clay with lighter and darker patches
6082	Pit		Small pit. 0.1+ m wide, 0.2 m deep
6083	Secondary fill	6082	Brown yellow clay with lighter and darker patches
6084	Primary fill	6078	Yellow disturbed clay with sandstone, ashy lenses and a large limestone block
6085	Construction cut		Large construction/landscaping cut prior to construction of walls 6029, 6031 etc.
6500	Foundation		Concrete footings for 1980s toilet block
6501	Foundation		Light blue foam insulation associated with 1980s toilet block
6502	Stanchion	6509	Grey white concrete with grey stone inclusions and rebar
6503	Wall		Frogged machine brick and cement wall. 3 skins. Base of wall at 3.95 m BGL
6504	Structure		Inspection chamber. Grey white concrete with no inclusions (ie cement). Evidence for upper courses of bricks on top of concrete
6505	Structure	6509	Inspection chamber. White grey sandy concrete with no inclusions (ie cement).
6506	Made Ground		Mid yellow brown clay silt with red brick fragments, coal, ash, mortar, stones
6507	Made Ground		Light yellow clay with stones
6508	Made Ground		Mid brown yellow clay with stone and red brick fragments
6509	Construction cut		Cut for stanchion 6502 and other structures relating to 1980s toilet block
6510	Made Ground	6509	Light grey yellow silt sand with stones
6511	Made Ground	6509	Mid brown stony sand
6512	Made Ground		Mid yellow brown clay with sandstone
6513	Service Cut		Cut for unseen service, probably a drain. 5.06 m wide, 1.27 m deep
6514	Made Ground	6513	Light grey yellow stoney sand
6515	Surface		Light brown grey concrete floor
6516	Made Ground		Light grey brown gritty sand with red brick, stone and roof slate fragments
6517	Deposit		Deposit seen below wall 6503 at a depth of 4 m. Excavation could not be entered. Yellow clay. Natural? Redeposited?

<b>Trench 7</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
7000	Natural		Light brown yellow bedrock
7001	Service Cut		Cut for inspection chamber and drains
7002	Surface	7001	Concrete base for drain pipe 7003
7003	Drain	7001	Cast iron drain pipe
7004	Drain	7001	Ceramic drain pipe
7005	Drain	7001	Cast iron drain pipe
7006	Primary fill	7001	Light yellow brown clay with stone and brick rubble
7007	Made Ground		Mid to dark grey brown silt clay with brick and sandstone rubble
7008	Made Ground		Light yellow brown silt clay with sandstone and brick rubble
7009	Made Ground		Mid to dark brown coarse silt with stone
7010	Made Ground		Dark yellow clay with stone and brick rubble
7011	Made Ground		Light grey brown silt with brick and stone rubble
7012	Structure	7001	Inspection chamber. Machine brick and cement
7013	Service Cut		Cut for drain 7014
7014	Drain	7013	Cast iron drain pipe
7015	Foundation		Concrete foundation for castle market
7016	Made Ground		Light grey brown sand and brick and mortar crush/rubble
7017	Made Ground		Dark grey brown fine silt with brick and sandstone rubble
7018	Made Ground		Light grey white fine silt with brick and concrete rubble
7019	Surface		Concrete surface associated with castle market



<b>Trench 7</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
7020	Service Cut		Cut for drain 7021
7021	Drain	7020	Ceramic drain pipe
7022	Primary fill	7020	Dark black coarse silt with some slate inclusions
7023	Wall	7024	Shallow frogged machine brick and modern cement wall.
7024	Construction cut		Cut for wall 7023. 0.4 m wide, greater than 0.4 m deep
7025	Primary fill	7024	Dark brown mixed silt with brick rubble, stone, ash etc.

<b>Trench 8</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
8000	Surface		Grey white concrete with stone inclusions. Surface of castle market
8001	Foundation	8002	Light brown grey concrete wall forming foundation of castle market
8002	Construction cut		Construction cut for foundation 8001 and pipe 8004
8003	Primary fill	8002	Light yellow brown stoney sand
8004	Pipe	8002	Cast iron pipe
8005	Foundation	8013	Brown-grey concrete pile with stone and rebar inclusions
8006	Foundation	8014	Brown-grey concrete pile with stones and rebar inclusions
8007	Wall		Frogged machine brick and cement wall. 7 courses, 2 skins. N-S
8008	Natural		Mid orange yellow bedrock
8009	Made Ground		Mid orange red crushed brick
8010	Service Cut		Cut for pipe 8011
8011	Pipe	8010	Cast iron pipe
8012	Primary fill	8010	Light brown yellow stoney (90%) sand
8013	Construction cut		Cut for pile 8005
8014	Construction cut		Cut for pile 8006

<b>Trench 9</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
9000	Surface		Light brown grey concrete with stone inclusions. Slab of castle market
9001	Natural		Mid brown orange bedrock
9002	Service Cut		Cut for drain 9003
9003	Drain	9002	Cast iron drain pipe
9004	Primary fill	9002	Mid red brown sand with mortar, brick fragments and stones
9005	Service Cut		Cut for removed electric cable
9006	Primary fill	9005	Mid orange brown grit sand with brick and stone rubble
9007	Ditch		Cut of moat. Over 4 m wide, over 2.4 m deep
9008	Foundation		Light brown concrete pile with stone and rebar inclusions.
9009	Foundation		Light brown concrete pile with stone and rebar inclusions.
9010	Foundation		Light brown concrete pile with stone and rebar inclusions.
9011	tertiary deposit	9007	Mid brown sand clay with some red brick rubble pressed into upper interface.
9012	Construction cut		Cut for pile 9013
9013	Foundation	9012	Light brown concrete pile with stone and rebar inclusions.
9014	Made Ground		Dark brown black grit sand with brick and stone rubble
9015	Structure	9002	Concrete inspection chamber associated with drain 9003
9016	Tertiary fill	9007	Mid-dark brown sand clay with sandstone



<b>Trench 10</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
10000	Surface		Black tarmac associated with castle market
10001	Surface		Grey white concrete surface associated with castle market
10002	Made Ground		Brown silt with red brick crush
10003	Made Ground		Dark blue grey ash with 80% sandstone and 10% red brick rubble
10004	Made Ground	10034	Dark grey black ash with red brick fragments
10005	Wall	10034	Frogged machine brick and cement wall. 13 courses, 3 skins
10006	Wall		Sandstone slabs and dark grey ash mortar. 1 course, 1 skin. NE-SW
10007	Wall	10028	Sandstone slabs and dark grey ash mortar. 1 course 1 skin. E-W
10008	Wall		Handmade brick and mid blue grey ash mortar wall. 4 courses, 3 skins. E-W
10009	Wall		Handmade brick and mid blue grey ash mortar 5 courses, 3 skins. Lime mortar indicated re-use of bricks. E-W
10010	Surface		Kerb. Handmade red brick, unmortared. 1 course, 1 skin. Residual lime mortar indicated re-use
10011	Wall		Handmade red brick in yellow brown sandy mortar. 2 courses, 2 skins. N-S
10012	Surface		Cobble stone surface with brown silt and ash matrix.
10013	Surface		Cobble surface in matrix of ash
10014	Posthole		Square posthole cut 0.15 m wide and 0.3 m deep
10015	Post	10014	Square wooden post 0.15 m wide and 0.4 m deep.
10016	Primary fill	10014	Dark grey black ash
10017	Primary fill	10028	Dark brown grey ash
10018	Primary fill	10028	Dark brown grey clay and ash with gravel
10019	Wall		Frogged machine brick and handmade red brick and mid grey ash mortar wall. 8 courses, 2 skins. Lime mortar indicates re-use.
10020	Wall		Red brick, chiefly opportunistically used machine bull-nosed bricks, also handmade bricks in light blue grey ash mortar. 5 courses, 2 skins. E-W
10021	Surface		Sandstone setts in silt/ash matrix.
10022	Foundation		Concrete cap bonded to rubble below filling gap between structures 10019 and 10020.
10023	Made Ground		Mid brown yellow clay with stones
10024	Made Ground		Black fuel ash and slag
10025	Made Ground		Black fuel ash and slag with lime mortar and red brick rubble
10026	Drain	10027	Concrete encasing ceramic drain. Associated with castle market
10027	Service Cut		Cut for drain 10026
10028	Construction cut		Cut for wall 10007 etc. Major truncation prior to construction of slaughterhouse
10029	Wall		Sandstone rubble and ash mortar. E-W
10030	Primary fill	10027	Dark brown black fuel ash and slag
10031	Stanchion		Concrete stanchion with rebar. Associated with castle market
10032	Surface		Black tarmac modern surface
10033	Made Ground		Brown yellow clay with brick and stone rubble
10034	Construction cut		Cut for wall 10005
10035	Wall	10028	Sandstone and brick rubble in ash mortar. E-W
10036	Drain		Cut for 19th century drain. 3 m wide
10037	Primary fill	10036	Mid brown yellow clay with stone
10038	Wall	10028	Handmade brick and dark grey ash mortar. 2 courses, 1 skin
10039	Modern Feature		Cut of ARCUS trench
10040	Primary fill	10039	Dark grey gravel. Backfill of ARCUS trench



<b>Trench 10</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
10041	Made Ground		Dark grey black fuel ash with lime mortar and rubble
10042	Wall		Sandstone slab foundation
10043	Made Ground		Black ash with fine slag
10044	Made Ground		Dark blue grey clay with gravel, lime mortar and red brick
10045	Made Ground	10028	Dark black ash
10046	Made Ground		Brown orange clay with stones
10047	Made Ground		Dark grey fuel ash with brick, lime mortar, stone
10048	Made Ground		Dark blue black silt clay with brick, ash and charcoal
10049	Made Ground		Dark brown grey clay silt with ash, slag, red brick
10050	Made Ground		Mid brown yellow clay with red brick
10051	Wall		Sandstone blocks and slab with small amounts of lime mortar and plastered on one face. NE-SW
10052	Primary fill	10057	Black fuel ash and slag
10053	Cut		
10054	Made Ground		A few ex situ cobbles in the top of deposit 10056 recorded prior to dropping trench
10055	Made Ground		Mid brown yellow clay with stone
10056	Made Ground		Dark yellow grey clay silt with frequent stone
10057	Robber trench		Cut through surface 10059 probably during demolition of slaughterhouses
10058	Bedding		Dark blue grey silt clay with ash
10059	Surface		Sandstone slab surface
10060	Wall		Sandstone blocks, slabs and other stones. Unmortared. 2 skins roughly, 6 courses approx. Unmortared. NE-SW
10063	Wall		Rough unworked sandstone bonded with lime mortar. NE-SW
10064	Wall		Unworked sandstone and lime mortar wall.
10065	Ditch		Supposed cut for moat. Moat actually formed by bank rather than a cut feature
10066	tertiary deposit	10065	Mid blue grey silt clay with brick rubble
10067	Primary fill	10065	Redeposited natural. Mid grey brown silt clay with charcoal.
10068	Cut		Cut for drain 10068
10069	Primary fill	10068	Black ash
10070	Made Ground		Mid brown yellow clay with stones
10071	Made Ground		Redeposited natural. Mid grey yellow clay
10072	Deposit		Mid blue yellow clay with stone and charcoal. Bank of moat
10073	Deposit		Mid orange yellow clay with stones and charcoal. Bank of moat
10074	tertiary deposit	10065	Mid grey brown silt clay with brick and stone rubble
10075	tertiary deposit	10065	Dark black brown silt clay
10076	Secondary fill	10065	Mid grey blue silt clay
10077	Secondary fill	10065	Light grey silt clay with stones
10078	Secondary fill	10065	Light orange blue silt clay with charcoal

<b>Trench 11</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
11000	Surface		Black tarmac surface
11001	Made Ground		Black and grey ash with brick rubble
11002	Made Ground		Light brown grey rubble with mortar, brick, stone, plaster, slate
11003	Made Ground		Light brown grey rubble with brick, stone, mortar, plaster, slate
11004	Wall		Handmade brick and lime mortar wall rendered to S. E-W. Small black ash



<b>Trench 11</b>			
<b>Context</b>	<b>Interpretation</b>	<b>Fill of</b>	<b>Description</b>
			repair
11005	Surface		Sandstone threshold E-W
11006	Wall		Handmade red brick wall with lime mortar. 6 courses, 3 skins. Rendered to S. E-W
11007	Wall		Frogged machine brick and black ash mortar repair to 11006. No rendering. E-W
11008	Surface		Sandstone threshold. E-W
11009	Wall		Handmade brick and lime mortar wall. 3 courses, 3 skins. Some black ash mortar repair. E-W
11010	Wall		Handmade brick and lime mortar wall. Whitewashed both sides, not rendered. N-S
11011	Wall	11029	Handmade brick and lime mortar wall. Rendered to E. Black ash mortar repairs. N-S
11012	Surface		Sandstone sett surface
11013	Surface		High quality sandstone flags
11014	Surface		High quality sandstone flags
11015	Surface		High quality sandstone flags
11016	Wall		Handmade red brick and lime mortar wall supporting change in level
11017	Surface		Mid white grey concrete with pebble and brick crush inclusions. Upper surface screeded
11018	Made Ground		Dark grey brown sand clay with brick, mortar, tarmac, sandstone and concrete
11019	Made Ground		Dark brown black ash and clinker with stones and mortar
11020	Bedding		Black ash with slag, brick, sandstone
11021	Made Ground		Grey yellow clay with lenses of yellow sand (degraded sandstone), brick, stone and ash
11022	Made Ground	11028	Dark brown silt with sandstone
11023	Foundation		Unworked sandstone and lime mortar roughly made
11024	Bedding		Black grey ash with slag, sandstone and brick
11025	Made Ground		Yellow clay sand with dark grey mottling and sandstone
11027	Made Ground		Dark grey brown sand silt with humic loam
11028	Cut		Interface between two tipping layers. Not a cut
11029	Construction cut		For wall 11011. 0.05 m wider than wall
11030	Made Ground		Mid brown yellow silt clay loam with stone
11031	Foundation		Rough sandstone and lime mortar roughly made
11032	Foundation		Mid grey brown silt gravel with sandstone
11033	Made Ground		Mid grey brown silt clay with stone
11034	Made Ground		Dark brown clay with stones
11035	Cut		Interface between tipping layers. Not a cut
11036	Made Ground	11035	Mid black brown silt sand with stone





## Appendix 2: Borehole data

Location:		435807.419 387674.702	Borehole ID:	BH1 (Trench 2)	Comments: 201540 Sheffield Castle Boreholes from transect across top of castle mound	
Level (top):		55.71m aOD				
Depth		Sediment description		Interpretation	Formation process	
Mbg	mOD					
0– 0.25	55.71– 55.46	Void		Compression gap	A product of the drilling process by where the looser or more compressible deposits are compacted by the downward hammer action of the drilling rig	
0.25– 1.00	55.46– 54.71	Friable mid greyish-brown clay silt. Frequent subangular and subrounded small-large sandstone pebbles and stones (large fragment of sandstone at 0.25-0.35m), occasional small flint pebbles, moderate small-large CBM, glass, mortar and coal fragments. Gradual lower boundary.		Made ground/demolition rubble	The coarser elements OF CBM, sandstone inclusions, glass, mortar and coal within a mixed structureless clay matrix suggest dump/demolition/made ground deposits rather than something that has accumulated over a period of time.	
1.00 - 1.77	54.71– 53.94	Fairly firm silty clay–mottled light greyish-brown, brown and rust coloured. Occasional subangular small-large sandstone pebbles and stones, moderate-frequent iron staining. Gradual lower boundary.		Material used in construction of castle mound	Layers of redeposited natural–oxidised and unoxidised sediment. Sandstone Inclusions suggest this is derived from local bedrock perhaps from excavation of moat	
1.77– 3.25	53.94– 52.46	Fairly firm silty clay–light brown and light grey. Occasional subangular and subrounded small-large sandstone pebbles and stones, moderate-frequent iron staining. Wood (uncharred) at 1.90m. Gradual lower boundary.				
3.25– 4.30	52.46 - 51.41	Fairly friable light yellowish-brown silty clay. Frequent subangular and subrounded small-large sandstone pebbles and stones, frequent iron staining. Gradual lower boundary.				
4.30– 4.6	51.41– 51.11	Friable laminar fine-grained sandstone		Silkstone Bedrock	Deposited as fluvial sediment in a large river channel during the middle Carboniferous period (359–299 ma)	



Location:		435795.281 387678.430	Borehole ID:	BH2 (Trench 3)	Comments: 201540 Sheffield Castle	
Level (top):		55.49m aOD	Drg:			
Depth		Sediment description		Interpretation	Formation process	
Mbg	mOD					
0– 0.28	55.49– 55.21	Void		Compression gap	A product of the drilling process by where the looser or more compressible deposits are compacted by the downward hammer action of the drilling rig	
0.28– 1.0	55.21– 54.49	Friable very dark brown clay silt. Moderate-frequent subangular, subrounded and laminar small-large sandstone pebbles and stones, moderate small-large CBM, mortar, slag and charcoal fragments. Sharp lower boundary		Made ground/demolition rubble	The coarser elements OF CBM, sandstone inclusions, glass, mortar and coal within a mixed structureless clay matrix suggest dump/demolition/made ground deposits rather than something that has accumulated over a period of time.	
1.00– 2.00	54.49– 53.49–	Void		Compression gap	A product of the drilling process by where the looser or more compressible deposits are compacted/or pushed aside by the downward hammer action of the drilling rig	
2.00 – 2.32	53.49– 53.17	Friable very dark brown clay silt. Moderate-frequent subangular, subrounded and laminar small-large sandstone pebbles and stones, moderate small-large CBM, mortar, slag and charcoal fragments. Sharp lower boundary		Made ground/demolition rubble	The coarser elements OF CBM, sandstone inclusions, glass, mortar and coal within a mixed structureless clay matrix suggest dump/demolition/made ground deposits rather than something that has accumulated over a period of time.	
2.32– 4.20	53.17– 51.29	Fairly friable silty clay–mottled mid orange and light grey. Occasional-moderate subangular and subrounded small-large sandstone pebble and stones, moderate iron staining, very occasional organics, (manganese-rich layer at 3.75-4.00m). Gradual lower boundary.		Material used in construction of castle mound	Layers of redeposited natural–oxidised and unoxidised sediment. Sandstone Inclusions suggest this is derived from local bedrock perhaps from excavation of moat	
4.20– 4.40	51.29– 51.09	Friable laminar fine-grained sandstone		Silkstone Bedrock	Deposited as fluvial sediment in a large river channel during the middle Carboniferous period (359–299 ma)	



Location:		435774.330 387684.897	Borehole ID:	BH3 (Trench 4)	Comments: 201540 Sheffield Castle	
Level (top):		55.65m aOD	Drg:			
Depth		Sediment description		Interpretation	Formation process	
Mbg	mOD					
0–0.3	55.65– 55.35	Void		Compression gap	A product of the drilling process by where the looser or more compressible deposits are compacted/or pushed aside by the downward hammer action of the drilling rig	
0.3– 1.27	55.35– 54.38	Fairly friable dark brown very fine sandy silt. Frequent subangular and subrounded small-large sandstone pebbles and stones (large fragment at 0.30m and 1.27m), moderate small-large CBM, mortar and slag fragments. Gradual lower boundary.		Made ground/demolition rubble	The coarser elements OF CBM, sandstone inclusions, glass, mortar and charcoal within a mixed structureless clay matrix suggest dump/demolition/made ground deposits rather than something that has accumulated over a period of time.	
1.27– 1.45	54.38– 54.20	Fairly friable dark grey, slightly sandy silty clay. Becoming lighter towards base of unit. Gradual lower boundary.		Material used in construction of castle mound	Layers of redeposited natural–oxidised and unoxidised sediment. Sandstone Inclusions suggest this is derived from local bedrock perhaps from excavation of moat	
1.45– 1.90	54.20– 53.75	Friable silty clay–mottled mid grey and light greyish-brown. Moderate subangular small-large decayed sandstone fragments, moderate iron staining. Gradual lower boundary				
1.90– 2.20	53.75– 53.45	Fairly friable mid brown, slightly sandy silty clay. Occasional-moderate, angular and subangular, small-medium, sandstone and siltstone pebbles and stones. Gradual lower boundary.				
2.20– 4.80	53.45– 50.85	Fairly friable silty clay–mottled light greyish-brown, mid orange, light grey and rust coloured. Moderate subangular and subrounded small-large sandstone fragments (large fragment at 2.40m), moderate-frequent iron staining.				
4.80 +	50.85	Friable laminar fine-grained sandstone		Siltstone Bedrock	Deposited as fluvial sediment in a large river channel during the middle Carboniferous period (359–299 ma)	



<b>Location:</b>		435770 387636.6	<b>Borehole ID:</b>	BH4	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>		51.9m aOD	<b>Drg:</b>			
Depth		Sediment description			Interpretation	Unit
Mbg	mOD					
0–0.42	51.9– 51.48	Void			Compression gap	
0.42– 0.64	51.48– 51.26	Medium grey very stiff silty clay, no visible structure, occasional disturbed fine lamination, feint Fe mottling, disturbed lower boundary. Unit becomes drier and more friable with depth			Poss moat fill	
0.64– 0.9	51.26– 51.0	Friable weathered laminar fine-grained sandstone			Weathered bedrock	
0.9– 1.0	51.0– 50.0	Friable laminar fine-grained sandstone			Silkstone Bedrock	

<b>Location:</b>		435771.4 387637.2	<b>Borehole ID:</b>	BH5	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>		51.89m aOD	<b>Drg:</b>			
Depth		Sediment description			Interpretation	Unit
Mbg	mOD					
0–0.5	51.89– 51.39	Void			Compression gap	
0.5– 0.65	51.39– 51.24	Friable weathered laminar fine-grained sandstone			Weathered bedrock	
0.65– 0.9	51.24– 50.99	Friable laminar fine-grained sandstone			Silkstone Bedrock	

<b>Location:</b>		435770.3 387642.7	<b>Borehole ID:</b>	BH6	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>		51.83m aOD	<b>Drg:</b>			
Depth		Sediment description			Interpretation	Unit
Mbg	mOD					
0–1.8	51.83– 50.03	Firm grey brown very mixed rubbly clay			Made ground	
1.8– 1.9	50.03– 49.93	Grey mixed clay (no penetration beyond 1.9)			Made ground	



<b>Location:</b>		435772.1 387643.2	<b>Borehole ID:</b>	BH7	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>		51.82m aOD	<b>Drg:</b>			
Depth		Sediment description			Interpretation	Unit
Mbg	mOD					
0–0.8	51.82– 51.02	Void			Compression gap	
0.8– 1.0	51.02– 50.82	Firm grey brown very mixed gritty clay with common Fe mottling			Poss fill of moat	
1.0 – 1.14	50.82– 50.68	Grey clay, dry, friable with a platy structure and a clear lower boundary			Poss fill of moat	
1.14– 1.65	50.68– 50.17	Friable laminar fine grained sandstone			Silkstone Bedrock	

<b>Location:</b>		435802.9 387646.9	<b>Borehole ID:</b>	BH8	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>		51.81m aOD	<b>Drg:</b>			
Depth		Sediment description			Interpretation	Unit
Mbg	mOD					
0–0.43	51.81– 51.38	Void			Compression gap	
0.43– 0.5	51.38– 51.31	Brown rubbly sandy clay			Made ground	
0.5– 0.8	51.31– 51.01	Firm grey clay, moderately Fe mottled, no visible structure, clear lower boundary			Clay fill	
0.8– 1.2	51.01– 50.61	Friable laminar fine grained sandstone, weathered at top of unit			Silkstone Bedrock	

<b>Location:</b>		435803.1 387649.7	<b>Borehole ID:</b>	BH9	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>		51.72m aOD	<b>Drg:</b>			
Depth		Sediment description			Interpretation	Unit
Mbg	mOD					
0 - 0.3	51.72– 51.42	Void			Compression gap	
0.3– 1.0	51.42– 50.72	Yellow brown sandstone rubble			Possibly related to demolition of castle	



<b>Location:</b>		435803.5 387652.3	<b>Borehole ID:</b>	BH10	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>		51.72m aOD	<b>Drg:</b>			
Depth		Sediment description			Interpretation	Unit
Mbg	mOD					
0–0.3	51.72– 51.42	Void			Compression gap	
0.3– 0.6	51.42– 51.12	Loose grey brown rubble			Made ground	
0.6– 0.9	51.12– 50.82	Firm grey clay, mixed with no visible primary structure and occasional small SA stone inclusions, clear lower boundary			Poss upper later moat fill	
0.9– 1.0	50.82– 50.72	Yellow brown sandstone rubble			Possibly related to demolition of castle	

<b>Location:</b>		435803.1 387654.6	<b>Borehole ID:</b>	BH11	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>		51.75m aOD	<b>Drg:</b>			
Depth		Sediment description			Interpretation	Unit
Mbg	mOD					
0– 0.7	51.75– 51.05	Loose grey brown rubble			Made ground	
0.7– 2.0	51.05– 49.75	Firm, mixed grey and black clay, common stone and cbm inclusions			Upper back fill of moat	
2.0 – 2.45	49.75– 49.3	Void			Compression gap	
2.45– 3.0	49.3– 48.75	Rubble and large SA stone inclusions			Possibly related to demolition of castle	
3.0 – 3.5	48.75– 48.25	Void			Compression gap	
3.5– 3.7	48.25– 48.05	Firm mixed brown clay, no visible structure, common Fe mottling, clear lower boundary			Moat fill	
3.7– 4.0	48.05– 47.75	Firm mixed grey black clay, no visible structure, Occasional small stone inclusions			Moat fill	
4.0– 4.5	47.75– 47.25	Void			Compression gap	
4.5– 5.0	47.25– 46.75	Dark grey clay with occasional organic patches and evidence of lateral cracking and occasional feint darker bands.			Moat fill (wet conditions)	



<b>Location:</b>	435803.1 387654.6	<b>Borehole ID:</b>	BH11	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>	51.75m aOD	<b>Drg:</b>			
Depth		Sediment description	Interpretation	Unit	
Mbg	mOD				
5.0– 5.5	46.75– 46.25	Void	Compression gap		
5.5– 5.8	46.25– 45.95	Dark grey clay with occasional organic patches and evidence of lateral cracking and occasional faint darker bands. Clear lower boundary	Moat fill (?standing water)		
5.8– 6.0	45.95– 45.75	Friable laminar fine grained sandstone	Silkstone Bedrock		

<b>Location:</b>	435803.5 387656.8	<b>Borehole ID:</b>	BH12	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>	51.68m aOD	<b>Drg:</b>			
Depth		Sediment description	Interpretation	Unit	
Mbg	mOD				
0–1.0	51.68– 50.68	Mixed rubble made ground	Made ground		
1.0– 1.2	50.68– 50.48	Void	Compression gap		
1.2– 1.6	50.48– 50.08	Disturbed yellow brown sand	Made ground disturbed by coring		
1.6– 2.0	50.08– 49.68	Yellow brown clayey sand with occasional with occasional large sandstone inclusions	Made ground		
2.0– 2.72	49.68– 48.96	Light brown coarse sand with a gradual lower boundary	Poss related to demolition of castle		
2.72– 3.0	48.96– 47.68	Firm dark grey clay with common small black organic flecks	Moat fill		
3.0– 3.7	47.68– 46.98	Void	Compression gap		
3.7– 3.9	46.98– 46.78	Dark grey clay, no visible structure, evidence of lateral cracking	Moat fill		
3.9– 4.0	46.78– 46.68	Friable laminar fine grained sandstone	Silkstone Bedrock		



<b>Location:</b>		435771.6 387647.1	<b>Borehole ID:</b>	BH13	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>		51.79m aOD	<b>Drg:</b>			
Depth		Sediment description			Interpretation	Unit
Mbg	mOD					
0– 1.6	51.79– 50.19	Mixed rubble and clay			Made ground	
1.6– 1.8	50.19– 49.99	Sandstone rubble			Possibly related to demolition of castle	
1.8– 2.35	49.99– 49.44	Firm grey clay, no visible structure, occasional Fe mottling, clear lower boundary			Moat fill	
2.35– 2.9	49.44– 48.89	Soft to firm grey brown clay with occasional small sandstone inclusions, sharp lower boundary			Moat fill	
2.9– 3.2	48.89– 48.59	Friable laminar fine grained sandstone			Silkstone Bedrock	

<b>Location:</b>		435771.3 387649.4	<b>Borehole ID:</b>	BH14	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>		51.79m aOD	<b>Drg:</b>			
Depth		Sediment description			Interpretation	Unit
Mbg	mOD					
0– 0.4	51.79– 51.49	Void			Compression gap	
0.4– 1.0	51.49– 50.79	Stiff yellow brown, clayey rubbly fill			Made ground	
1.0– 1.15	50.79– 50.64	Void			Compression gap	
1.15– 2.5	50.64– 49.29	Stiff yellow brown clay with no visible structure and common Fe mottles			Moat fill	
2.5– 3.4	49.29– 48.39	Stiff grey brown silty clay, no visible structure, occasional Fe mottling			Moat fill	
3.4– 3.48	48.39– 48.31	Friable laminar fine grained sandstone			Silkstone Bedrock	





<b>Location:</b>	435771.5 387651.1	<b>Borehole ID:</b>	BH15	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>	51.68m aOD	<b>Drg:</b>			
<b>Depth</b>		<b>Sediment description</b>		<b>Interpretation</b>	<b>Unit</b>
Mbg	mOD				
0–0.8	51.68– 51.6	Grey brown, well mixed rubble, sand and clay Refused on large pieces of masonry at 0.8m		Made ground	

<b>Location:</b>	435771.6 387654.5	<b>Borehole ID:</b>	BH16	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>	51.65m aOD	<b>Drg:</b>			
<b>Depth</b>		<b>Sediment description</b>		<b>Interpretation</b>	<b>Unit</b>
Mbg	mOD				
0–0.8	51.65– 50.85	Grey brown, well mixed rubble, sand and clay		Made ground	
0.8– 1.0	50.85 – 50.65	Friable laminar fine grained sandstone		Silkstone Bedrock	

<b>Location:</b>	435771.8 387655.8	<b>Borehole ID:</b>	BH17	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>	51.78m aOD	<b>Drg:</b>			
<b>Depth</b>		<b>Sediment description</b>		<b>Interpretation</b>	<b>Unit</b>
Mbg	mOD				
0–0.8	51.78– 50.98	Grey brown, well mixed rubble, sand and clay		Made ground	
0.8– 1.0	50.98– 50.78	Friable laminar fine grained sandstone		Silkstone Bedrock	

<b>Location:</b>	435772.3 387657.4	<b>Borehole ID:</b>	BH18	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>	51.79m aOD	<b>Drg:</b>			
<b>Depth</b>		<b>Sediment description</b>		<b>Interpretation</b>	<b>Unit</b>
Mbg	mOD				
0–0.8	51.79– 50.99	Grey brown, well mixed rubble, sand and clay		Made ground	
0.8– 1.0	50.99– 50.79	Friable laminar fine grained sandstone		Silkstone Bedrock	



<b>Location:</b>		435752.3 387658.1	<b>Borehole ID:</b>	BH19	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>		51.76m aOD	<b>Drg:</b>			
<b>Depth</b>		<b>Sediment description</b>			<b>Interpretation</b>	<b>Unit</b>
Mbg	mOD					
0– 0.5	51.76– 51.26	Void			Compression gap	
0.5– 1.6	51.26– 50.16	Grey brown mixed CBM and stone rubble, clay and soil,			Made ground	
1.6– 1.8	50.16– 49.96	Large SA fragments of sandstone			Poss related to castle demolition	
1.8 – 2.56	49.96– 49.2	Mixed yellow brown clay, containing fragments of brick and charcoal. sharp lower boundary			Moat fill?	
2.56– 2.66	49.2– 49.1	Dark brown silty clay, gradual lower boundary			Moat fill	
2.66– 4.4	49.1– 47.36	Firm mixed grey brown clay, occasional small fragments of charcoal, some evidence of layering within unit, due to dumping rather than laminations			Moat fill	
4.4– 5.8	47.36– 45.96	Stiff grey clay, mixed with occasional SA stone, no visible structure, clear lower boundary			Moat fill	
5.8– 6.0	45.96– 45.76	Friable laminar fine grained sandstone			Silkstone Bedrock	

<b>Location:</b>		435751.1 387656.4	<b>Borehole ID:</b>	BH20	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>		51.76m aOD	<b>Drg:</b>			
<b>Depth</b>		<b>Sediment description</b>			<b>Interpretation</b>	<b>Unit</b>
Mbg	mOD					
0–0.6	51.76– 51.16	Void			Compression gap	
0.6– 1.0	51.16– 50.76	Brick and stone rubble			Made ground	
1.0– 1.8	50.76– 49.96	Brick and stone rubble			Made ground	
1.8– 2.0	49.96– 49.76	Large SA fragments of sandstone			Poss related to castle demolition	
2.0– 3.8	49.76– 47.96	Stiff grey clay, mixed with occasional SA stone, no visible structure, clear lower boundary			Moat fill	



<b>Location:</b>		435751.1 387656.4	<b>Borehole ID:</b>	BH20	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>		51.76m aOD	<b>Drg:</b>			
Depth		Sediment description			Interpretation	Unit
Mbg	mOD					
3.8– 4.0	47.96– 47.76	Friable laminar fine grained sandstone			Silkstone Bedrock	

<b>Location:</b>		435750.1 387655.8	<b>Borehole ID:</b>	BH21	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>		51.75m aOD	<b>Drg:</b>			
Depth		Sediment description			Interpretation	Unit
Mbg	mOD					
0–1.4	51.75– 50.35	Mixed grey brown rubble, sand and clay, coring not possible beyond 1.4m due to large pieces of stone/masonry			Made ground	

<b>Location:</b>		435803.9 387651	<b>Borehole ID:</b>	BH22	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>		51.65m aOD	<b>Drg:</b>			
Depth		Sediment description			Interpretation	Unit
Mbg	mOD					
0–1.4	51.65– 50.25	Mixed grey brown rubble, sand and clay, coring not possible beyond 1.4m due to large pieces of stone/masonry			Made ground	

<b>Location:</b>		435803.3 387653.5	<b>Borehole ID:</b>	BH23	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>		51.71m aOD	<b>Drg:</b>			
Depth		Sediment description			Interpretation	Unit
Mbg	mOD					
0–0.65	51.71– 51.06	Gravel, stone and brick rubble			Made ground	
0.65– 2.0	51.06– 49.71	Grey brown mixed sandy clay with occasional stone and cbm inclusions			Made ground	
2.0– 3.0	49.71– 48.71	Sandstone rubble			Poss related to castle demolition	
3.0– 3.8	48.71– 47.91	Void			Compression gap	



<b>Location:</b>	435803.3 387653.5	<b>Borehole ID:</b>	BH23	<b>Comments:</b> 201540 Sheffield Castle	
<b>Level (top):</b>	51.71m aOD	<b>Drg:</b>			
<b>Depth</b>		<b>Sediment description</b>	<b>Interpretation</b>	<b>Unit</b>	
Mbg	mOD				
3.8– 4.0	47.91– 47.71	Sandstone rubble	Poss related to castle demolition		
4.0– 4.6	47.71– 47.11	Void	Compression gap		
4.6– 5.0	47.11– 46.71–	Firm dark grey sandy clay, sand was coarse, no visible structure	Moat fill		
5.0– 5.73	46.71– 45.98	Void	Compression gap		
5.73– 5.9	45.98– 45.81	Firm dark grey clay, no visible structure, clear lower boundary	Moat fill		
5.9– 6.0	45.81– 45.71	Friable laminar fine grained sandstone	Silkestone Bedrock		



### Appendix 3: All finds by context (number / weight in grammes)

Key: CBM = ceramic building material; Cu = copper alloy; Fe = iron; Pb = lead; OM = other metal

Context	Animal Bone	Clay Pipe	Glass	Leather (no.)	Metal (no.)	Pottery	Slag	Stone	Wood (no.)	Other finds
1001						1/2				
1002	7/92	2/6	9/126	3	4 Fe	1/2				
1003	3/23	6/13	3/68		1 Fe	26/478				1 shell
1004	1/1	1/1								
1005	1/4	2/6			7 Fe	4/140	12/142			1 CBM
1006	45/485	51/129	2/31		1 Fe	81/1184	1/447	1/5160		1 CBM
1007	174/1015	5/24	3/20		4 Fe	32/457	8/340	1/460		
1011	6/44	3/3	5/51			8/49				
1013		3/8					8/571			
1032					12 Fe					
1034		2/9			1 Fe	1/300	9/1076			1 shell
1040	12/58					10/198				1 shell
1042	7/39		1/17		4 Fe	1/16				11 CBM
1043	5/3		2/4		2 Fe	3/25				
1046			1/8		1 Fe					
1048	52/262					44/706		3/39		
1053	3/7					1/10				
1057						16/283				
1061							2/42			
1064							4/292			4 CBM
1066	10/5									
1073							21/1655			
1076	2/1				1 OM	2/17	30/25			
1078	3/19									



Context	Animal Bone	Clay Pipe	Glass	Leather (no.)	Metal (no.)	Pottery	Slag	Stone	Wood (no.)	Other finds
1104					1 Cu					
2001			6/24		17 Fe	6/71	2/115	1/15		
2007					2 fe		1/20			
2008					4 Fe					
2012					7 Fe					
2013		3/9								
2014			1/8		1 Fe		5/1600			
2019	2/2	1/1	6/9		1 Cu	2/12	16/796			
2020		3/6	5/20			9/186	23/864			
3002			1/21			3/5				
3003					1 Cu					
3005			1/14							
3008			19/1776		8 Fe	37/606				
3015	4/33	3/4	16/57			19/289				
3022	3/11									
3039								2/61		
3055	3/5									
3056	1/1					5/24				
3057	5/144				1 Fe	10/37			3	
3058	6/43					11/58			5	
3062	2/8							1/1094		
3078									3	
3079	2/8					2/25				
3085						1/80				
4001			8/125			3/50				
4002	1/8	1/5	3/196		5 Cu; 2 Fe	14/241				1 shell



Context	Animal Bone	Clay Pipe	Glass	Leather (no.)	Metal (no.)	Pottery	Slag	Stone	Wood (no.)	Other finds
4006				7						
4007	17/105	7/15	6/51	2	3 fe	19/397	12/486			
4008	20/46	18/43	4/7	1	14 Fe	54/674	15/499			
4009	24/163	14/17	2/12	99	1 Cu; 75 Fe; 19 OM	19/77			7	1 CBM
4010	5/26	19/32	11/81	4	1 Cu; 9 Fe	113/1145	1/23			
4014					8 Fe					
4016	1/1		3/15			29/136				
4017				1						
4024	2/4	11/40	5/29		1 Cu; 3 Fe	7/101	1/2	1/296		
4034	2/22					4/19				7 shell
4036	3/14	10/23	2/40		1 Cu; 3 Fe	30/1523	6/170			1 shell
4037	7/26	4/21			1 Cu; 2 Fe; 1 OM	19/597		1/15		
4039		5/25		5	3 Fe	5/28				
4040	15/749	11/35	2/50	8	12 Fe	40/525	22/865	2/776		2 shell
4042	9/46	5/11		21	53 Fe; 1 Pb	52/1540	1/50	2/3774	1	2 mortar
4043			1/1							
4044					1 Fe	1/42				
4052		5/9	7/22	1	1 Cu; 4 Fe	5/32				
4062	1/5					5/50				
4064	6/14					1/14				
4065	1/21		1/3		1 Fe	2/5	4/165			
4077						2/20				
4086	10/115	1/2			3 Cu					
4087	19/138						4/153			
4088		8/18	2/4			8/51				
4090	123/88									



Context	Animal Bone	Clay Pipe	Glass	Leather (no.)	Metal (no.)	Pottery	Slag	Stone	Wood (no.)	Other finds
4093					3 Fe	3/57				
4095		7/12	2/37			9/474	6/699			
4097					1 Fe	4/289			1	
4098										4 mortar
4099						4/8				
4101					2 Cu					
4104	5/28	1/1			1 Fe	5/205	81/3311			
4106		1/3				2/7				
4107	5/38				6 Fe	6/48	21/699			
4108	2/23	1/2				9/256				
4109	1/12	2/6				1/5	11/173			
4111	4/93				1 Fe	1/10				
4115	2/40	26/35	7/39			32/419	56/1929	3/1316		7 mortar
4116						8/77				
4117	6/13	2/3				4/3				
5002	2/9	1/4	3/10		2 Fe	27/469				
5005	20/105	16/46	38/161		4 Pb	72/664				
5009	21/89	17/34	4/35			11/48				
5023		1/2				1/1				
5024	1/2	12/27	1/6			4/28	2/67			
5025	62/296					3/8	1/146			
5029	4/9	4/6				3/40				
5034	12/53	3/6	159/858		9 Cu; 23 Fe; 4 Pb	172/1797	2/43			1 CBM
5038						4/9	20/28	3/1028		
5039							255/4330			
5040					1 Cu					





Context	Animal Bone	Clay Pipe	Glass	Leather (no.)	Metal (no.)	Pottery	Slag	Stone	Wood (no.)	Other finds
5041						3/20				
5045	5/8					1/2	11/64			
6006	14/64	29/68	14/337		6 Fe	133/3216	1/7			
6007	1/54	3/12				2/24		1/394		
6013	7/249	5/18				2/375				
6014	37/634	6/19	2/61		3 Fe	5/106		1/34		
6016	1/1	7/15	8/116		1 Cu; 2 Fe	5/117				
6026	80/770	208/589	18/203		3 Cu; 10 Fe	71/2156		8/5822	1	17 mortar; 2 shell
6029										1 CBM
6030	27/25	24/75	8/111		6 Fe; 2 Pb	17/328	1/5			2 mortar
6032										17 mortar
6033	2/4	7/17				3/235				2 mortar
6039	2/14					9/65				
6041						1/45				
6044	10/43									1 mortar
6047	1/1								2	
6050						1/7				
6051	1/49									
6055	1/24								10	
6060	1/1									
6066										1 plaster
6070									1	
6077									1	
7016	1/5				1 Cu; 1 OM					
7017		2/8						1/1299		
9011	2/24				2 Pb	5/93		1/12		



Context	Animal Bone	Clay Pipe	Glass	Leather (no.)	Metal (no.)	Pottery	Slag	Stone	Wood (no.)	Other finds
10004			1/13			6/116				
10017	10/48				1 Fe	12/53		1/3		
10025	27/145	13/32	7/60		1 Cu; 3 Fe	32/199		1/9		1 CBM
10041		1/3			3 Fe	10/60				13 CBM
10049							3/18	1/7		
10055		1/2								
10066						3/11	1/131			1 CBM
10067			2/1			1/3	33/346			
10071	23/512		1/4			2/34	1/138			
10075							26/539			
10076							14/134	3/212		
10078								2/303		
11002			4/99		1 OM	4/16				
11003	1/1	1/1	8/94		1 Cu; 6 Fe	1/1				
11018	9/28	1/7	17/154		13 fe	10/166				1 CBM; 1 mortar
11019			3/230			1/7				
11020	2/42	5/18	5/446			1/15				
11021	9/42	6/16								
11022	6/12	7/10			1 Fe	11/79	22/127	3/162		
11024	2/29	8/37	1/14		1 Fe; 2 Pb; 1 OM	2/11		1/245		
11025		1/1								
11036		1/2								4 CBM
Tr 1 U/S			1/5			5/25				
Tr 10 U/S	1/32	2/5						2/2		
Tr 11 U/S					1 misc					
Tr 3 U/S						1/2				



Context	Animal Bone	Clay Pipe	Glass	Leather (no.)	Metal (no.)	Pottery	Slag	Stone	Wood (no.)	Other finds
Tr 4 U/S						1/2				
Tr 5 U/S			1/137			6/181				
Tr 6 u/s	2/41									
u/s	17/266	37/82	2/34			88/1010		3/6762		
<b>Total</b>	<b>1074/7882</b>	<b>673/1739</b>	<b>455/6155</b>	<b>152</b>	<b>42 Cu; 369 Fe; 16 Pb; 25 OM</b>	<b>1608/26229</b>	<b>776/23332</b>	<b>50/29300</b>	<b>35</b>	

## Appendix 4: Pottery data

**Table 32** Pottery from Trench 1

Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
1001	TP Pearlware	1	2	1	Footring base	Flatware	Tendrill pattern	1808–1818	Ferrybridge Pottery; see Tomlinson and Tomlinson 2014	
1002	TP Whiteware	1	2	1	Rim	Plate	Asiatic Pheasants	M–LC19th		
1003	Brown Salt Glazed Stoneware	1	3	1	BS	Hollow ware	U/Dec	C18th		
1003	Cane Coloured ware	14	111	1	Base & handle stump	Mug/jug	Footed base; moulded lower handle terminal	C19th	Shattered base w/ a slightly splayed foot & ridges above	
1003	Creamware	1	3	1	Rim	Plate	Wavy, beaded rim	c.1740–c.1820		
1003	Creamware?	1	7	1	BS	Hollow ware	U/Dec	LC18th–EC19th	Very light if Creamware	
1003	Late Blackware	1	37	1	Footed base & handle	Mug/porringer	Black glaze int & partially ext above foot	C18th	Fine hard red fabric; stump of a small strap handle	
1003	Sponged ware	5	9	1	BS	Plate	Blue sponging int only	c.1830+		
1003	Stoneware	1	24	1	BS	Bottle	Green lead glaze ext	M–LC19th	Very heavily burnt w/ blistered glaze	
1003	TP Whiteware	1	1	1	BS	Hollow ware	Leaf & tendrill design ext	M–LC19th		
1005	TP Whiteware	1	2	1	BS	Plate	Floral design int	M–LC19th		
1006	Banded Creamware	2	3	2	BS	Cup/bowl	Rilled band w/ green paint below a mottled pale brown band ext	c.1740–c.1820		
1006	Blackware type	2	53	1	Footed base	Hollow ware	Black glaze int & ext	C17th	Hard, dense dark red fabric	
1006	Brown Glazed Coarseware	1	107	1	Rim	Pancheon	Brown glaze int only	MC18th–C19th	Sub-rectangular section clubbed rim	
1006	Brown Glazed Coarseware	1	15	1	Base	Pancheon	Dark brown glaze int only; red slip ext	LC18th–C19th	Hard, fine red fabric	
1006	Brown Glazed Coarseware	1	57	1	Base	Pancheon	Brown glaze int, pale orange slip ext	MC18th–C19th	Pale orange fabric w/ sparse fine grit	



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
1006	Brown Glazed Coarseware	2	65	1	BS	Pancheon	Dark brown glaze int only	LC18th–C19th	Hard fine red fabric	
1006	Brown Glazed Coarseware	1	15	1	Rim	Bowl	Patches of brown glaze on folded rim	LC18th–C19th		
1006	Brown Glazed Coarseware	1	12	1	BS	Hollow ware	Brown glaze int & ext; prominent rilling ext	LC18th–C19th		
1006	Brown Glazed Coarseware	2	78	2	BS	Pancheon	Brown glaze int only	MC18th–C19th		
1006	Brown Glazed Coarseware	4	100	1	BS	Pancheon	Brown glaze int only	MC18th–C19th		
1006	Brown Glazed Coarseware	8	66	8	BS	Hollow ware	Brown glaze int & ext	MC18th–C19th		
1006	Brown Glazed Coarseware	1	8	1	BS	Bowl	Rilled ext; brown glaze int only	MC18th–C19th		
1006	Brown Glazed Coarseware	1	10	1	Base	Bowl	Dark brown glaze ext	MC18th–C19th	Prominent use-wear on underside base	
1006	Brown Glazed Coarseware	1	8	1	BS	U/ID	Brown glaze on surfaces	MC18th–C19th		
1006	Brown Glazed Coarseware	1	9	1	BS/Ext flake	Hollow ware	Applied strip?	C18th		
1006	Brown Glazed Coarseware	1	8	1	Base	Hollow ware	Brown glaze int & partially ext	C18th–C19th		
1006	Brown Salt Glazed Stoneware	1	18	1	BS	Lid?	Brown salt glaze int & ext	C19th		
1006	Brown Salt Glazed Stoneware	1	3	1	BS	Hollow ware	Parallel combed wavy lines ext; brown salt glaze ext, glaze fumed int	C18th–EC19th		
1006	Brown Salt Glazed Stoneware	1	14	1	BS	Bowl	Brown salt glaze int & ext; triple incised lines ext	MC18th–MC19th		
1006	Brown Salt Glazed Stoneware	1	2	1	Handle	Mug	U/Dec	C18th	Small handle	
1006	Brown Salt Glazed Stoneware	1	5	1	BS	Hollow ware	Brown salt glaze int & ext	C18th		
1006	Creamware	1	7	1	Rim	Bowl	U/Dec	c.1740–c.1820	Folded rim w/ cavity	



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
1006	Creamware	1	20	1	BS	Flatware	U/Dec	c.1740– c.1820		
1006	Creamware	4	8	4	BS	Flatware	U/Dec	c.1740– c.1820		
1006	Creamware	3	10	3	BS	Plate	U/Dec	c.1740– c.1820	Beaded rim	
1006	Creamware	2	10	2	Footring base	Plate	U/Dec	c.1740– c.1820		
1006	Creamware	2	7	2	BS	Plate	U/Dec	c.1740– c.1820		
1006	Creamware	1	1	1	BS	Hollow ware	U/Dec	c.1740– c.1820		
1006	Edged ware	1	1	1	BS	Hollow ware	Beaded rim w/ feather- edged paint	LC18th– EC19th		
1006	Fine Redware	1	1	1	Rim	Hollow ware	Groove ext	MC18th– EC19th	Very thin-walled vessel w/ shiny glaze int & ext	
1006	Late Blackware	1	23	1	BS	Hollow ware	Black glaze int & partially ext	C18th	Hard fine dark red fabric; closer to Blackware but pattern of glaze is later	
1006	Late Blackware	1	16	1	Footed base	Hollow ware	Dark brown glaze int & ext	C18th	Fine red fabric	
1006	Late Blackware	4	25	4	BS	Hollow ware	Black glaze int & ext	C18th	Hard, fine dark red fabric	
1006	Late Blackware	1	8	1	Base	Hollow ware	Black glaze int & partially ext	C18th	Fine buff fabric	
1006	Late Blackware	1	4	1	Rim	Bowl	Black glaze int & ext	C18th	Fine buff fabric; round, slightly clubbed rim	
1006	Late Blackware	1	5	1	BS	Hollow ware	Black glaze int & ext	C18th	Dark orange fabric	
1006	Late Blackware	1	1	1	BS	Hollow ware	Black glaze int & partially ext	C18th	Hard fine dark red fabric	
1006	Late Blackware	1	2	1	BS	Hollow ware	Dark brown glaze int & ext	C18th		
1006	Pearlware	2	2	2	BS	Cup/bowl	Fine ribbing ext	c.1780– c.1840		
1006	Pearlware	2	17	1	Base	Mug/jug	U/Dec	c.1780– c.1840		
1006	Pearlware	1	2	1	BS	Flatware?	U/Dec	c.1780– c.1840		
1006	Pearlware	1	2	1	Flat base	Flatware	U/Dec	c.1780– c.1840		



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
1006	Sheffield type ware	1	18	1	Base	Hollow ware	Spots of green glaze ext	LC13th–E/MC15th	See text for discussion	
1006	Sheffield type ware	1	79	1	Base	Hollow ware	Patchy clear glaze int & ext; knife trimmed underside of base & ext walls	LC13th–E/MC15th	A very thick base	
1006	Slip Coated ware	2	13	2	BS	Hollow ware	Thin red slip int & ext w/ dark glaze int & partially ext	C18th	Light buff fabric w/ common white rock frags	
1006	Slipware	1	10	1	Base	Dish/bowl	Brown, red-brown & white trailed slip int; chipped & flaked	C18th	Fine white fabric	
1006	Tin Glazed Earthenware	1	7	1	BS	Flatware	Hand painted blue linear design int	MC16th–MC18th		
1006	Unglazed Red Earthenware	3	22	1	BS	Hollow ware	Double impressed line ext	MC19th–EC20th		
1006	Unglazed Red Earthenware	1	10	1	BS	Hollow ware	U/Dec	MC19th–EC20th		
1007	Brown Glazed Coarseware type	1	10	1	BS	Hollow ware	Mottled brown glaze int; patchy brown glaze ext	C17th–EC18th		
1007	Cistercian ware	1	5	1	BS	Cup/tyg	Dark brown glaze int & ext	c.1450–c.1600		
1007	Cistercian ware	1	2	1	Rim	Cup/tyg	Dark brown glaze int & ext	c.1450–c.1600	Plain rim	
1007	Martincamp-type earthenware	24	330	19	BS	Flask	Light clear glaze fuming ext; rare spots of glaze ext	LC16th–C17th	Pale orange fabric w/ sparse fine white streaks; see also cxt 1043	
1007	Slipware	1	19	1	BS	Hollow ware	Trailed white slip ext forming a rectilinear design; brown glaze ext & patchy int	LC17th–C18th	Fine pale orange fabric	
1007	Surrey Whiteware type	1	3	1	Rim	U/ID	Thin, shiny bright green glaze int & ext	C16th–C17th	Fine white fabric	
1007	Yellow ware	1	15	1	Base	Hollow ware	Clear (yellow/orange) glaze int	LC16th–C17th	Fine white fabric	
1011	Brown Glazed Coarseware	1	31	1	BS	Pancheon	Brown glaze int only	C18th–C19th	Thick-walled sherd	



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
1011	Brown Glazed Coarseware	1	3	1	BS	Dish/bowl	Brown glaze int only	C18th–C19th	Thin-walled sherd	
1011	Cane Coloured ware	1	2	1	Base	Pie dish	U/Dec	C19th		
1011	Creamware	5	11	5	BS	Flatware	U/Dec	c.1740–c.1820		
1040	Late Blackware	1	6	1	BS	Hollow ware	Black glaze int & ext	C18th	Dark orange fabric w/ moderate fine quartz & black grit	
1040	Late Medieval Sandy ware	5	25	4	BS	Hollow ware	Clear to green glaze int & ext	C15th–EC16th	Dull orange homogeneous fabric; see also cxt 1042	
1040	Oxidised Sandy ware	2	10	1	BS	Hollow ware	Dull green glaze ext	C13th–C14th	Dense dark orange fabric w/ moderate fine quartz & round rock frags <0.5mm	
1042	Late Medieval Sandy ware	1	15	1	BS	Hollow ware	Clear to green glaze int & ext	C15th–EC16th	Dull orange homogeneous fabric; see also cxt 1040	
1043	Early Brown Glazed Coarseware type	1	10	1	BS	Hollow ware	Hard, thin brown glaze int; glaze fuming ext	C17th–EC18th	Hard, dense grey-purple fabric w/ light streaks	
1043	Martincamp-type earthenware	1	7	1	BS	Flask	Light clear glaze fuming ext	LC16th–C17th	See also cxt 1007	
1043	Stoneware	1	8	1	BS	Jam jar	Wide fluting ext	MC19th–EC20th		
1048	Brackenfield 01 ware	2	38	1	Strap handle	Jug	Very pale green glaze ext	LC13th–EC15th?	Narrow strap handle in a soft white fabric; see Cumberpatch 2004c	
1048	Hallgate A type	1	61	1	Rod handle	Jug	Patchy green splashed glaze on top of handle	E–MC13th	Grey core, patchy orange margins	
1048	Hallgate A type	1	5	1	BS	Hollow ware	Thin clear glaze ext	C13th		
1048	Hallgate A type	1	1	1	BS	Hollow ware	Brown glaze ext	C13th		
1048	Late Blackware	1	7	1	BS	Hollow ware	Shiny brown glaze int & ext	C18th	Fine red fabric	
1048	Reduced Sandy ware	2	12	1	BS	Hollow ware	Dark green glaze ext	Medieval	A fine pale grey sandy fabric w/ sparse fine black grit & rock frags <0.3mm; probable pot disc diam 44.9mm	
1048	Reduced Sandy ware	1	8	1	BS	Hollow ware	Dark green-brown glaze ext	LC13th–C14th	A fine, dense grey fabric w/ a dull orange int margin; occ rock frags up to 1mm	
1048	Sheffield type ware	1	179	1	Splayed base	Baluster jug	Patchy green glaze on foot & underside of base	LC13th–E/MC15th	Pale grey core, pale buff-yellow margins; slightly finer than some examples; stacking	2





Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
									scar on underside of base	
1048	Sheffield type ware	9	87	5	BS	Jug	Applied & impressed strips w/ dark metallic glaze;	LC13th–E/MC15th	Light buff-yellow fabric w/ abundant quartz, red & black grit up to 1mm, sparse flat tock frags <2mm	
1048	Sheffield type ware	2	36	1	Strap handle	Jug	Shallow impressions on edges of handle w/ app & imp strip in the centre	LC13th–E/MC15th	Typical white Coal Measures type fabric; slightly coarser than body sherds	
1048	Sheffield type ware	2	24	2	BS/neck	Jug	Bright green glaze ext (friable & decayed) over combed wavy & horizontal lines	LC13th–E/MC15th	A whiter fabric than is typical but with the same range of typical Coal Measures inclusions	
1048	Sheffield type ware	6	72	1	Rim & rod handle	Jug	Dull green-brown glaze ext	LC13th–E/MC15th	Hard sandy fabric w/ buff int & ext margins & a grey core; quartz & black grit up to 0.5mm w/ larger round rock frags	
1048	Sheffield type ware	1	45	1	Neck & handle	Jug	Friable decayed green glaze ext	LC13th–E/MC15th	Buff-grey margins w/ a pale grey core containing a typical range of Coal Measures inclusions	
1048	Sheffield type ware	1	10	1	BS	Hollow ware	Pale green glaze over combed wavy lines ext	LC13th–E/MC15th	A fine buff-yellow fabric w/ abundant quartz & black grit <0.5mm	
1048	Sheffield type ware	6	18	6	BS	Hollow ware	Green glaze ext	LC13th–E/MC15th	Buff to buff-yellow sandy fabric w/ quartz & black grit up to 0.5mm & sparse rounded rock frags up to 1.5mm	
1048	Sheffield type ware	1	36	1	Base	Hollow ware	U/Dec (pitted & abraded underside)	LC13th–E/MC15th	Thick base; pale orange ext margin, buff core & int surface; common quartz & rounded red 'pebbles' up to 1mm, occ larger	
1048	Sheffield type ware	1	3	1	BS	Hollow ware	Thin friable green glaze ext	LC13th–E/MC15th		
1048	Sheffield type ware	1	10	1	Rim	Jug	U/Dec	LC13th–E/MC15th	Short, rectangular, flat-topped rim w/ pulled spout; buff body w/ quartz & red grit up to 0.5mm, sparse large round rock frags	
1048	Sheffield type ware	1	8	1	Rim	Jug	Dull green glaze ext	LC13th–E/MC15th	Rounded clubbed rim; pink-buff fabric w/ abundant quartz, black grit & round white rock frags up to 0.5mm	
1048	Sheffield type ware	1	8	1	BS	Hollow ware	Patchy green glaze ext; pitted & abraded ext	LC13th–E/MC15th	Soft pale orange sandy fabric w/ fine quartz & black grit up to 0.5mm w/ sparse round rock frags up to 1mm	
1048	Splash Glazed	1	4	1	BS	Hollow ware	Spots of dull green	LC12th–	Pale orange fabric w/ moderate quartz &	



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
	Sandy ware						splashed glaze ext	E/MC13th	red grit up to 0.5mm, rarely larger	
1053	Sheffield type ware	1	9	1	BS	Hollow ware	Patchy dark brown glaze ext; possibly overfired	LC13th–E/MC15th	See text for discussion	
1057	Hallgate A type	9	229	3	Rim & rod handle	Jug	Clear (red-brown) glaze ext	C13th	Orange sandy fabric w/ abundant quartz; clubbed flat topped rim; see text for discussion; C14 date 1170–1260, 95.4% 2 sigma	1
1057	Humberware type	1	5	1	BS	Hollow ware	Pale green glaze ext	LC13th–C15th	Pale grey w/ orange int; fine sandy fabric; C14 date 1170–1260, 95.4% 2 sigma	
1057	Oxidised Sandy ware	1	4	1	BS	Hollow ware	U/Dec	Medieval	A soft orange fabric w/ common fine quartz <0.5mm; slightly abraded; C14 date 1170–1260, 95.4% 2 sigma	
1057	Sheffield type ware	3	28	2	BS	Hollow ware	Patchy pale green glaze ext w/ sparse mottling	LC13th–E/MC15th	White fabric w/ abundant quartz & dark red grit w/ sparse rock frags up to 2mm; C14 date 1170–1260, 95.4% 2 sigma	
1076	Coal Measures Fine ware type	1	8	1	BS	Hollow ware	Dull green glaze ext	LC13th–C14th	Pale grey core w/ dull orange-buff margins; fine quartz & black grit <0.4mm & rare platy rock frags; C14 date 1040–1210, 95.4% 2 sigma	
1076	North Nottinghamshire Quartz & Shell	1	8	1	Base	Small jar?	U/Dec	C12th–MC13th	Surfaces leached well into the body; fairly flat base; C14 date 1040–1210, 95.4% 2 sigma	
U/S	Bone China	4	17	3	BS	Flatware	U/Dec	LC19th–C20th		
U/S 1000	Sponged ware	1	8	1	Footed base	Mug	Blue sponged design ext	c.1840+		
	<b>Total</b>	<b>221</b>	<b>2688</b>	<b>169</b>						



**Table 33** Pottery from Trench 2

Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
2001	Brown Salt Glazed Stoneware	2	37	2	BS	Hollow ware	Brown salt glaze ext only	C19th	Possibly bottle fragments	
2001	Colour Glazed ware	1	6	1	BS	Hollow ware	Shiny black glaze int & ext	C19th	Hard, fine red fabric	
2001	Unglazed Whiteware	1	1	1	BS	Hollow ware	U/Dec	MC19th–EC20th	Printed label ext; 'BEST QUAL ...' w/ an angular symbol	
2001	Whiteware	1	5	1	Rim	Plate	Blue line & thin band around int of rim	LC19th–EC20th		
2019	Brown Glazed Coarseware	1	10	1	BS	Bowl	Brown glaze int only	C18th–C19th	Pale orange fabric w/ fine lighter streaks; sparse red grit & quartz	
2019	Brown Salt Glazed Stoneware	1	2	1	BS	Mug/bowl	Thin incised line ext	C18th–EC19th		
2020	Brown Salt Glazed Stoneware	1	2	1	BS	Hollow ware	U/Dec	C18th		
2020	Creamware	1	1	1	Rim	Bowl	U/Dec	c.1740–c.1820	Plain rounded rim	
2020	Early Brown Glazed Coarseware	1	130	1	Base	Bowl/pancheon	Thin hard brown glaze int only	LC17th–C18th	Hard, fine red fabric w/ occ red grit; knife-trimmed ext	
2020	Late Blackware	1	2	1	BS	Hollow ware	Black glaze int & partially ext	C18th		
2020	Late Blackware type	1	7	1	BS	Hollow ware	Black glaze int only	C18th	Thicker than normal for Late Blackware	
2020	TP Pearlware	2	2	2	BS	Flatware	U/ID Chinese style designs int	c.1780–1840		
2020	Whiteware	1	4	1	BS	Hollow ware	U/Dec	M–LC19th		
	<b>Total</b>	<b>15</b>	<b>209</b>	<b>15</b>						

**Table 34** Pottery from Trench 3

Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
3002	Creamware	1	1	1	BS	U/ID	U/Dec	c.1740– c.1820	Light Creamware, possibly late	
3002	Late Blackware	1	2	1	BS	Hollow ware	Black glaze int & partially ext	C18th	Hard fine dark red fabric	
3002	Whiteware	1	2	1	BS	Flatware	Orange band w/ overglaze gold line	LC19th– EC20th		
3008	Blue Banded ware	1	8	1	Rim	Bowl	Blue band below rim & lines on body	C19th		
3008	Bone China	4	161	1	Profile	Mug	U/Dec	LC19th– C20th	Large institutional pint mug	
3008	Cane Coloured ware	29	375	29	Base & BS	Bowl?	U/Dec	C19th	Thick sherds; probably fragments from a large bowl	
3008	Edged ware	1	1	1	BS	Plate	Low relief moulded rim w/ blue paint	EC19th		
3008	TP Whiteware	1	1	1	BS	Flatware	Floral design int	M–LC19th		
3015	Creamware	1	2	1	BS	Hollow ware	U/Dec	c.1740– c.1820		
3015	Creamware	1	10	1	Recessed base	Hollow ware	Recessed base w/ rounded foot	c.1740– c.1820		
3015	Hallgate A type	1	23	1	Base	Hollow ware	Very small spots of glaze ext	LC13th– C15th	Grey core w/ dark orange int & ext margins; fine quart w/ sparse larger red grit	
3015	Knurr ball	1	5	1	Fragment	Knurr ball	U/Dec	C19th	White glazed ceramic ball	
3015	Late Blackware	1	7	1	Base	Hollow ware	Black glaze int only	C18th	Light buff fabric	
3015	Late Blackware	1	3	1	BS	Hollow ware	Black glaze int & partially ext	C18th	Hard fine dark red fabric	
3015	Late Blackware	1	1	1	BS	Hollow ware	Black glaze int & ext	C18th	Fine dark red fabric	
3015	Mottled ware	1	5	1	BS	Hollow ware	Mottled glaze int & ext	C18th	Fine dark orange fabric w/ occ red grit	
3015	Sheffield type ware	1	12	1	BS	Hollow ware	Dull green glaze ext over wavy lines ext	LC13th– E/MC15th	Dark grey w/ thin buff ext margin w/ moderate quartz & black grit <0.5mm; much finer than typical Sheffield type ware	
3015	TP Pearlware	1	2	1	Flat base	Plate	Willow	M–LC19th		



3015	TP Whiteware	1	8	1	BS	Hollow ware	Odd pale grey TP design ext	M-LC19th	
3015	TP Whiteware	1	11	1	Rim	Plate	Willow	M-LC19th	
3015	TP Whiteware	1	1	1	BS	Hollow ware	U/ID geometric TP design ext	MC19th-EC20th	
3015	Unglazed Red Earthenware	1	1	1	Rim	Flowerpot	U/Dec	M-LC19th	Plain rounded rim
3015	Whiteware	1	6	1	Base	Hollow ware	U/Dec	M-LC19th	
3056	Reduced Sandy ware	1	5	1	Rim	Jug	U/Dec	C13th-EC14th	Unusual profiled rim w/ external ridge; hard, fine, pale grey fabric
3056	Reduced Sandy ware	1	10	1	BS	Hollow ware	Patchy green-brown glaze ext	C13th-EC14th	Hard fine reduced fabric w/ sparse quartz up to 0.5mm
3056	Reduced Sandy ware	1	1	1	BS	Hollow ware	Flaky green glaze ext	C13th-EC14th	Fine reduced fabric w/ common fine quartz <0.5mm
3056	North Nottinghamshire Quartz & Shell	2	10	1	BS	Hollow ware	U/Dec	C12th-MC13th	Partially leached surfaces; thick external soot, partially sooted or carbonised deposit internally/partial iron-rich deposit
3057	Hallgate A type	1	13	1	Rim	Jug	Decayed splashed glaze ext	E-MC13th	Fine hard red fabric; collared rim
3057	Hallgate A type	5	13	5	BS	Hollow ware	Dark green glaze ext	C13th	Hard, fine reduced fabric w/ thin orange margins; see also cxt 3058 for a group of similar sherds
3057	Hallgate A type	3	7	1	BS	Hollow ware	Dark green glaze ext on a rilled body	C13th	Hard, fine reduced fabric w/ thin orange margins; see also cxt 3058 for a group of similar sherds
3057	Oxidised Sandy ware	1	9	1	Base	Hollow ware	U/Dec	LC12th-LC13th	Heavily burnt & sooted ext; soft pale orange fabric w/ moderate, well-sorted quartz up to 0.5mm, occ up to 1mm
3058	Hallgate A type	2	18	1	Base	Hollow ware	Patchy green splash glaze on underside	C13th	Slightly sagging base; see also cxt 3057
3058	Hallgate A type	6	21	5	BS	Hollow ware	Patchy green glaze ext	C13th	Sooted ext; see also cxt 3057
3058	Hallgate A type	2	10	1	BS	Hollow ware	Dark green glaze ext on a rilled surface	C13th	Sooted ext; see also cxt 3057
3058	Hallgate A type ware	1	7	1	BS	Hollow ware	Green glaze ext w/ app & imp strip	M-LC13th	Hard dark orange fabric w/ grey ext margin
3079	Hallgate A type	1	22	1	Base	Hollow ware	Spots of dark overfired glaze ext	C13th	Slightly sagging base
3079	Hallgate A type	1	2	1	BS	Hollow ware	Patchy clear glaze ext	C13th	Sooted ext



U/S	Edged ware	1	1	1	Rim	Plate	Low relief moulded rim w/ dark blue paint	LC18th– EC19th		
	<b>Total</b>	<b>83</b>	<b>797</b>	<b>74</b>						



**Table 35** Pottery from Trench 4

Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
4001	Late Blackware	2	4	2	BS	Hollow ware	Black glaze int & ext	C18th		
4002	Blue Banded ware	3	9	1	Rim	Bowl	Pale blue band below rim w/ thin blue slip lines on body	C19th	Plain rim	
4002	Bone China	1	37	1	Profile	Plate	Thin gold lines on rim & internally	LC19th–EC20th		
4002	Bone China	1	10	1	Base	Flatware	U/Dec	LC19th–EC20th		
4002	Early Brown Glazed Coarseware	1	10	1	BS	Hollow ware	Thick brown glaze int; glaze fumed ext	C17th	A dark orange fabric w/ abundant quartz, round red grit & black grit up to 0.8mm	
4002	Late Blackware	3	47	3	BS	Hollow ware	Black glaze int & partially ext	C18th		
4002	Slip Banded CC ware	1	11	1	Rim	Bowl	Narrow white bands w/ thin brown slip lines ext	C19th	Plain rim	
4002	Stoneware	1	74	1	Recessed base	Jam jar	Widely spaced fluting ext	MC19th–EC20th		
4007	Brown Glazed Coarseware	1	10	1	BS	Hollow ware	Brown glaze int & partially ext; rilled ext surface	LC18th–C19th	Bright orange fabric w/ sparse red grit	
4007	Brown Glazed Coarseware	1	20	1	BS	Pancheon	Brown glaze int; red slip ext	LC18th–C19th	Bright orange fabric w/ sparse red & white grit	
4007	Brown Glazed Coarseware	1	6	1	BS	U/ID	Brown glaze on surviving face	LC18th–C19th		
4007	Blue Banded ware	1	5	1	BS	Hollow ware	Thin blue lip lines ext	C19th		
4007	Brown Salt Glazed Stoneware	1	2	1	BS	Hollow ware	Incised lines ext	MC18th–EC19th		
4007	Cane Coloured ware	1	5	1	BS	Hollow ware	White slip int	C19th		
4007	Cane Coloured ware	1	7	1	BS	Hollow ware	U/Dec	C19th		
4007	Late Blackware	1	2	1	BS	Hollow ware	Black glaze int & ext	C18th	Fine red fabric	



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
4007	Late Blackware	1	1	1	BS	Hollow ware	Brown glaze ext only	C18th	Fine red fabric	
4007	Porcelain	1	4	1	Base	Flatware?	U/Dec	LC19th– EC20th	Part of a circular printed maker's mark '...ERMAN ...'	
4007	TP Whiteware	1	2	1	BS	Hollow ware	Dark blue floral design int & ext	M–LC19th		
4007	Whiteware	1	5	1	Rim	Vase/planter	Low relief moulded leaf/shamrock pattern w/ green band around rim	MC19th– EC20th	Green band diffuses into a pale green surface ext	
4007	Whiteware	2	3	2	BS	Hollow ware	U/Dec	M–LC19th		
4008	Banded Creamware	1	2	1	BS	Hollow ware	Turned relief lines w/ brown slip on raised ridges	c.1740– c.1820		
4008	Banded Creamware	1	1	1	BS	Hollow ware	Brown slip band ext w/ swirled pattern ext	c.1740– c.1820		
4008	Banded ware	1	9	1	Rim	Bowl	Rilled band below rim w/ pale blue paint	LC18th– EC19th		
4008	Brown Glazed Coarseware	4	76	4	BS	Pancheon	Red-brown glaze int only	C18th– C19th		
4008	Brown Glazed Coarseware	1	8	1	BS	Hollow ware	Black glaze int & ext	C18th– EC19th	Red sandy fabric	
4008	Blue Banded ware	2	14	2	Rim	Hollow ware	Pale blue band below rim w/ blue slip lines on body	C19th		
4008	Blue Banded ware	1	10	1	Rim	Hollow ware	Dark blue band below rim w/ lines on body	C19th		
4008	Bone China	1	1	1	BS	Hollow ware	U/Dec	MC19th– EC20th		
4008	Brown Salt Glazed Stoneware	1	3	1	BS	Bowl	U/Dec	C19th		
4008	Creamware	2	1	2	BS	Hollow ware	U/Dec	c.1740– c.1820		
4008	Creamware	1	1	1	Handle	Cup/mug	U/Dec	c.1740– c.1820		
4008	Humberware type	1	2	1	BS	Hollow ware	Green glaze ext	LC13th– EC15th	Fine reduced fabric	





Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
4008	Late Blackware	1	152	1	Base	Jar	Dark brown glaze int	C18th	Hard, fine red fabric; larger than normal vessel	
4008	Late Blackware	1	100	1	BS	Hollow ware	Brown glaze int & partially ext; rilled ext	C18th	White mortar-like deposit ext	
4008	Late Blackware type	3	7	3	BS	Hollow ware	Black glaze int only	C18th	Fine red fabric	
4008	Late Blackware type	5	19	4	BS	Hollow ware	Black glaze int & ext	C18th	Fine red fabric	
4008	Mottled ware	1	8	1	BS	Hollow ware	Mottled glaze int & ext	C18th	Pale buff fabric	
4008	Pearlware	1	1	1	Rim	Plate	Hand painted geometric pattern around inside of rim	c.1780–c.1840		
4008	Slip Banded CC ware	1	1	1	BS	Hollow ware	Dark brown lines & a white band ext	C19th		
4008	TP Bone China	1	5	1	Rim	Hollow ware	Two Temples	C19th	Thin-walled vessel; mug or jug?	
4008	TP Bone China	2	3	2	BS	Hollow ware	U/ID TP design ext	M–LC19th		
4008	TP Pearlware	1	3	1	BS	Hollow ware	Dark blue TP design int	c.1780–c.1840		
4008	TP Whiteware	2	24	1	Rim	Mug/jug	Blurred print; floral motifs in arched panels	M–LC19th	Contact scar ext	
4008	TP Whiteware	2	69	1	Base & body	Mug/jug	Red printed floral design ext	M–LC19th	Recessed base; handle stump above base	
4008	TP Whiteware	1	12	1	Handle	Mug/jug	Red printed geometric pattern on spine of handle	M–LC19th	Part of the red-printed base	
4008	TP Whiteware	1	5	1	Rim	Mug/jug	Green printed floral design ext	M–LC19th		
4008	TP Whiteware	2	2	1	BS	Hollow ware	Pale green printed floral/leaf design ext	M–LC19th		
4008	TP Whiteware	1	1	1	BS	Hollow ware	U/ID sepia/green pattern ext	M–LC19th		
4008	Whiteware	1	2	1	Handle	Cup/mug	U/Dec	M–LC19th	Could be Pearlware	
4008	Whiteware	2	2	2	BS	Hollow ware	U/Dec	M–LC19th		



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
4009	Banded Creamware	1	2	1	Rim	Hollow ware	Short vertical rim; red slip patterning on body	c.1740–c.1820		
4009	Blue Banded ware	5	19	3	Rim	Bowl	Blue band below rim w/ narrow lines on body	C19th	Plain rim	
4009	Blue Banded ware	4	13	4	BS	Bowl	Blue lines ext	C19th		
4009	Blue Banded ware	1	2	1	BS	Bowl	Blue band ext	C19th		
4009	Bone China	1	4	1	Footring base	Plate	U/Dec	LC19th–EC20th		
4009	Bone China	3	8	3	Rim	Plate	U/Dec	LC19th–EC20th		
4009	Relief Banded ware	1	22	1	Recessed base	Jug?	Wide relief bands on body	M–LC19th	Crazed & discoloured; jug-sized base	
4009	TP Whiteware	1	1	1	BS	Flatware	Asiatic Pheasants	M–LC19th		
4009	Whiteware	1	1	1	BS	U/ID	U/Dec	M–LC19th		
4010	Banded ware	1	13	1	Rim	Bowl	White slip lines ext on a red body; white slip int	C19th	Plain rim	
4010	Banded ware	1	3	1	Rim	Hollow ware	Dark brow lines & red-brown band ext	C19th	Plain rim	
4010	Blue Banded ware	2	11	1	Rim	Bowl	Wide blue band below rim	C19th		
4010	Blue Banded ware	4	6	4	BS	Bowl	Blue slip lines ext	C19th		
4010	Bone China	2	28	1	Rim	Mug	Gold line on rim w/ three thin lines below rim	LC19th–EC20th	Handle scar	
4010	Bone China	1	6	1	Footring base	Plate	U/Dec	M–LC19th		
4010	Bone China	2	4	2	BS & handle	Cup	Gold flash on spine of handle	M–LC19th	Two cup handles, one w/ body attached	
4010	Brown Salt Glazed Stoneware	1	46	1	Flat base	Hollow ware	U/Dec	C19th		
4010	Brown Salt Glazed Stoneware	1	15	1	Flat base	Hollow ware	U/Dec	MC18th–EC19th	Slightly distorted base	



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
4010	Brown Salt Glazed Stoneware	2	11	1	BS	Hollow ware	Fine incised lines ext	C19th		
4010	Brown Salt Glazed Stoneware	1	10	1	BS	Hollow ware	Stamped & rouletted pattern ext	C19th		
4010	Brown Salt Glazed Stoneware	1	2	1	Rim	Dish	U/Dec	C19th		
4010	Brown Salt Glazed Stoneware	1	1	1	Rim	Hollow ware	U/Dec	C19th	Thin walled vessel w/ simple rim	
4010	Brown Salt Glazed Stoneware	2	199	1	Base	Hollow ware	Brown salt glaze ext only, grey int surface	C19th		
4010	Cane Coloured ware	1	4	1	Ring foot base	Bowl	U/Dec	C19th		
4010	Cane Coloured ware	2	4	2	BS	Hollow ware	U/Dec	C19th		
4010	Colour Glazed ware	3	70	1	Rim & body	Teapot	Black glaze int & ext	C19th	Wide angular shoulder w/ a lid-seated rim; fine dark red fabric	
4010	Colour Glazed ware	1	44	1	Recessed base	Teapot	Black glaze int & ext	C19th	Hard fine red fabric	
4010	Colour Glazed ware	7	47	7	BS	Hollow ware	Black glaze int & ext	C19th	Hard fine red fabric	
4010	Colour Glazed ware	1	40	1	BS & handle	Teapot	Mottled brown glaze int & ext	C19th	Square-sectioned handle	
4010	Colour Glazed ware	1	8	1	BS	Teapot	Brown int & ext w/ a diffuse white band ext	C19th		
4010	Colour Glazed ware	1	75	1	Lid	Teapot	Black glaze int & ext	C19th	Complete apart from the central knob	
4010	Creamware	4	39	2	Rim	Large plate	U/Dec	c.1740–c.1820	Thick vessel, plain rim	
4010	Creamware	1	5	1	Rim	Dish	Beaded rim	c.1740–c.1820		
4010	Creamware	1	11	1	Rim	Bowl	Plain rim	c.1740–c.1820	Plain rim	
4010	Creamware	1	2	1	Rim	Plate	Wavy rim w/ beaded rim	c.1740–c.1820		



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
4010	Creamware	4	8	4	BS	Flatware	U/Dec	c.1740– c.1820		
4010	Creamware	8	17	8	BS	Hollow ware	U/Dec	c.1740– c.1820		
4010	Creamware	1	6	1	BS	Plate	U/Dec	c.1740– c.1820	Thick plate or soup bowl	
4010	Creamware	1	1	1	Rim	Cup/bowl	U/Dec	c.1740– c.1820		
4010	Edged ware	1	34	1	Profile	Plate	Wavy edge w/ low relief moulding & blue feather- edge paint	LC18th– EC19th	Recessed base	
4010	Edged ware	1	3	1	Rim	Hollow ware	Wavy edge w/ low relief moulding & blue feather- edge paint	LC18th– EC19th		
4010	Hallgate B ware	1	5	1	BS	Hollow ware	Dark green glaze w/ darker mottling	C12th	See text for discussion	
4010	Late Blackware	1	11	1	Rim	Dish	Black glaze int only	C18th	Sharply everted wide flat rim	
4010	Late Blackware	1	14	1	BS	Hollow ware	Black glaze int & partially ext	C18th	Bright orange fabric w/ sparse red grit	
4010	Pearlware	1	14	1	Recessed base	Plate	U/Dec	c.1780– c.1840		
4010	Pearlware	2	4	1	Base	Flatware?	Stamped star and square grid on underside of base	c.1780– c.1840		
4010	Pearlware	1	2	1	Rim	Cup/bowl	Hand-painted floral design; blue & orange flower w/ green leaves ext	c.1780– c.1840		
4010	Pearlware	1	4	1	Rim	Cup/bowl	Two thin orange lines int; orange line & dots ext; ?floral design	c.1780– c.1840		
4010	Pearlware?	1	3	1	Recessed base	Plate	U/Dec	c.1780– c.1840	Heavily discoloured	
4010	Porcelain	1	1	1	Rod handle?	Cup?	Dark blue surface	LC19th– EC20th	cf context 4034	
4010	Slip Banded CC ware	2	11	1	BS	Hollow ware	Two white slip lines ext	C19th	Discoloured	



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
4010	Slip Banded CC ware	1	7	1	BS	Hollow ware	Two white slip lines ext	C19th	Light coloured cane coloured ware	
4010	Slip Banded CC ware	1	1	1	BS	Hollow ware	White slip band ext w/ diffuse colouration	C19th		
4010	Stoneware	2	22	1	Rim	Jam jar	Narrow fluting ext	MC19th– EC20th		
4010	Stoneware	7	116	6	BS	Flagon	Pale brown lead glaze ext, cream int	MC19th– EC20th		
4010	Stoneware	1	20	1	BS & handle	Flagon	Pale brown lead glaze ext, cream int	MC19th– EC20th	Strap handle	
4010	Stoneware	1	6	1	BS	Hollow ware	Grey lead glaze int & ext	MC19th– EC20th		
4010	TP Whiteware	1	49	1	Rim	Large plate	Black printed floral design int; realistic rather than stylised	M–LC19th		
4010	TP Whiteware	2	21	2	Base	Flatware	Floral design int	M–LC19th		
4010	TP Whiteware	1	5	1	Footring base	Plate	Part of a floral design int	M–LC19th		
4010	TP Whiteware	1	4	1	Rim	Cup/bowl	Chinese landscape w/ pagoda ext; geometric frieze int	M–LC19th		
4010	TP Whiteware	4	3	4	Rim & BS	Cup/bowl	U/ID blue printed pattern int & ext	M–LC19th		
4010	TP Whiteware	1	2	1	BS	Hollow ware	U/UD black printed design ext	M–LC19th		
4010	TP Whiteware	1	1	1	BS	Hollow ware	Green printed design w/ trees ext	M–LC19th		
4010	TP Whiteware	1	2	1	Rim	Cup/bowl	Very dark blue Chinese landscape ext, geometric border int	M–LC19th		
4010	Whiteware	1	2	1	Rim	Plate/saucer	Hand-painted black line inside rim	M–LC19th		
4010	Whiteware	1	1	1	BS	Hollow ware	Part of a hand-painted floral design int	M–LC19th		
4010	Whiteware?	1	5	1	BS	Hollow ware	Trace of a blue printed design	M–LC19th	Severely discoloured	
4010	Whiteware?	1	0.5	1	BS	Plate	U/Dec	M–LC19th	Could be Pearlware	



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
4016	Banded ware	2	5	2	BS	Hollow ware	Dark brown, red-brown & blue slip lines ext	LC18th–C19th	Pearlware body	
4016	Brown Glazed Coarseware	2	43	2	BS	Bowl	Brown glaze int only	LC18th–C19th		
4016	Blackware	1	5	1	BS	Hollow ware	Black glaze int & ext	C17th	Fine hard dark red fabric	
4016	Brown Salt Glazed Stoneware	1	11	1	BS	Hollow ware	Brown salt glaze ext only	C19th		
4016	Creamware	1	2	1	Rim	Plate	Beaded wavy rim w/ raised ribs	c.1740–c.1820		
4016	Creamware	2	2	2	Rim	Plate	Beaded rim	c.1740–c.1820		
4016	Creamware	2	5	2	BS	Flatware	U/Dec	c.1740–c.1820		
4016	Fine Redware	1	2	1	Rim	Hollow ware	Clear glaze int & ext on a fine red fabric	M/LC18th–E/MC19th		
4016	Late Blackware	11	30	9	BS	Hollow ware	Black glaze int & partially ext	C18th	Fine red fabric	
4016	Late Blackware	4	17	4	BS	Hollow ware	Black glaze int & partially ext	C18th	Fine red fabric	
4024	Blue Banded ware	1	11	1	Rim	Bowl	Blue band & lines ext	C19th	Plain rim	
4024	Brown Salt Glazed Stoneware	1	7	1	Rim	Bowl	Thin incised lines ext; small clubbed rim	LC18th–C19th		
4024	Creamware	1	12	1	Recessed base	Plate	U/Dec	c.1740–c.1820		
4024	Humberware	1	36	1	Base	Jug/jar	Patchy green glaze ext	LC13th–C15th	Small vessel (by Humberware standards); flat base w/ stacking scar on underside of base	
4024	Slip Banded CC ware	1	2	1	BS	Hollow ware	Blue & brown slip lines ext	C19th		
4024	Sponged ware	1	3	1	Rim	Flatware	Blue sponged decoration int & ext	c.1830+		
4024	Stoneware	1	34	1	Rim & spout	Bottle	Brown mottled glaze	C19th		
4024	Tin Glazed Earthenware	1	1	1	BS	Hollow ware	U/Dec	MC16th–MC18th		



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
4034	Blue Banded ware	1	4	1	Rim	Bowl	Blue band below rim	C19th		
4034	Brown Salt Glazed Stoneware	1	7	1	BS/handle	Mug	Flattened handle terminal	C18th		
4034	Porcelain	1	3	1	BS	Hollow ware	Dark blue ext surface	LC19th– EC20th	See also cxt 4010	
4034	Whiteware	1	5	1	Footring base	Dish?	Overglaze gold design int only	LC19th– EC20th		
4036	Banded ware	1	4	1	Rim	Bowl	Three red slip lines ext	C19th	Plain round rim	
4036	Brown Glazed Coarseware	1	98	1	Rim	Bowl	Hard purple-brown glaze int & ext	MC18th– C19th	Hard red fabric	
4036	Brown Glazed Coarseware	1	142	1	Rim	Pancheon	Brown glaze int only	MC18th– C19th	Heavy flat-topped square-sectioned rim; folded w/ groove ext	
4036	Brown Glazed Coarseware	1	125	1	Rim	Pancheon	Brown glaze int & on top of rim	MC18th– C19th	Square-sectioned rim w/ elaborated lower lobe	
4036	Brown Glazed Coarseware	1	166	1	Rim	Pancheon	Brown glaze on inside of body	MC18th– C19th	Heavy square-sectioned rim w/ wide shallow groove on ext edge	
4036	Brown Glazed Coarseware	2	98	2	BS	Pancheon	Brown glaze int on a rilled surface	MC18th– C19th		
4036	Brown Glazed Coarseware	1	23	1	Base	Pancheon	Brown glaze int only	MC18th– C19th		
4036	Brown Salt Glazed Stoneware	2	78	1	Rim & body	Bowl	Stamped & rouletted lines & patterns ext	C19th	Odd abrasion; possibly from running water	
4036	Creamware?	1	5	1	Rim	Bowl	U/Dec	c.1740– c.1820	Very heavily crazed & discoloured surfaces	
4036	Edged ware	1	6	1	Rim	Plate	Wavy rim w/ blue feather-edge paint	LC18th– EC19th		
4036	Late Blackware	5	33	1	BS	Hollow ware	Black glaze int & partially ext	C18th	Hard fine red fabric	
4036	Late Blackware	1	24	1	BS	Hollow ware	Shiny black glaze int & ext	C18th	Hard fine dark red fabric	
4036	Late Blackware type	1	47	1	Rim	Bowl	Black glaze int & on rim; turned ext surface	C18th	Hard fine dark red fabric	
4036	Slip Banded CC ware	1	3	1	BS	Hollow ware	Thin white slip lines ext	C19th		



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
4036	Slipware	1	85	1	Rim	Dish	White on red feathered slip patten w/ a pie-crust rim	C18th	Press-moulded dish	
4036	Stoneware	1	25	1	BS & handle	Bottle/flagon	Lead glaze ext	M-LC19th		
4036	Stoneware	1	7	1	Recessed base	Jar?	U/Dec	C19th	Lead glaze int & ext	
4036	TP Whiteware	1	1	1	Rim	Cup/bowl	Green printed stylised floral design ext	M-LC19th		
4037	Brown Glazed Coarseware	1	86	1	Profile	Bowl	Black glaze int & patches ext	C18th-EC19th	Shallow bowl w/ a sharply everted flat rim	
4037	Brown Glazed Coarseware	4	211	2	Pancheon	Bowl/pancheon	Brown glaze int; rilling ext	C18th-EC19th	Bright orange fabric w/ sparse fine quartz & red grit	
4037	Biscuit-fired ware	1	5	1	BS	Hollow ware	U/Dec	MC18th-C19th	Waste from pottery manufacture	
4037	Brown Salt Glazed Stoneware	1	35	1	Footed base	Bowl	Brown salt glaze int & ext	MC18th-C19th		
4037	Creamware	2	4	2	BS	Hollow ware	U/Dec	c.1740-c.1820		
4037	Late Blackware	2	5	2	BS	Hollow ware	Black glaze int & ext	C18th		
4037	Slip Coated ware	1	6	1	Rim	Hollow ware	Black glaze w/ red slip int & ext	C18th	Everted rim	
4037	Slipware	1	6	1	BS	Dish	White slip int	C18th	Press-moulded dish	
4037	TP Whiteware	1	7	1	Rim	Plate	Asiatic Pheasants; wavy edged plate	M-LC19th		
4037	TP Whiteware	1	16	1	Flat base	Flatware	Black printed design int	M-LC19th		
4039	Banded ware	1	1	1	BS	Hollow ware	Blue bands ext	C19th		
4039	Brown Salt Glazed Stoneware	1	12	1	Rim	Bowl	Brown salt glaze int; grey to pale brown salt glaze ext	C18th-EC19th	Small everted rim	
4039	Creamware	1	7	1	Rim	Plate	Beaded rim	c.1740-c.1820		
4039	TP Whiteware	1	7	1	Footring base	Plate	Asiatic Pheasants	M-LC19th		





Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
4040	Brown Salt Glazed Stoneware	3	80	2	BS	Bowl	Brown salt glaze int & ext	LC18th–C19th		
4040	Brown Salt Glazed Stoneware	2	21	1	BS	Bowl	Dark brown salt glaze ext	LC18th–C19th		
4040	Brown Salt Glazed Stoneware	1	51	1	BS	Hollow ware	Brown salt glaze ext w/ a ridge & incised line	LC18th–C19th	Cylindrical vessel	
4040	Brown Salt Glazed Stoneware	3	21	1	BS	Bowl	Brown salt glaze ext	LC18th–C19th	Lump of decayed iron int	
4040	Cane Coloured ware	2	108	1	Recessed base	Jug/jar	U/Dec	C19th		
4040	Creamware	1	4	1	Footring base	Plate	U/Dec	c.1740–c.1820		
4040	Creamware	2	4	2	BS	Flatware	U/Dec	c.1740–c.1820		
4040	Creamware	1	1	1	Rim	Flatware	U/Dec	c.1740–c.1820		
4040	Edged ware	1	7	1	Rim	Plate	Wavy rim w/ blue feather-edged paint	LC18th–EC19th		
4040	Late Blackware	1	38	1	BS & handle stump	Jug/handled jar	Partial black glaze ext	C18th		
4040	Late Blackware	2	14	2	BS	Hollow ware	Black glaze ext only	C18th		
4040	Late Blackware	1	11	1	BS	Hollow ware	Black glaze int & partially ext	C18th		
4040	Oxidised Sandy ware	1	9	1	Rim	Jug	Patchy clear splashed glaze ext	C12th–E/MC13th	Elaborately profiled rim; a fine pale orange fabric w/ common fine quartz & sparse red/black grit <0.5mm	
4040	Pearlware	3	6	1	Rim	Saucer/dish	Hand-painted blue flower, green leaf & orange bud	LC18th–EC19th		
4040	Slip Banded CC ware	2	7	2	Rim & BS	Hollow ware	White lip lines ext	C19th		
4040	TP Pearlware	2	6	1	Rim	Dish	Black printed design int; church or large house	EC19th	Black lines on rim & around RP printed design	



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
4040	TP Whiteware	2	5	1	Rim	Cup/bowl	Black printed rural scene w/ trees and a thatched cottage	M-LC19th	Black line on rim	
4040	TP Whiteware	1	0.5	1	Rim	Flatware	Chinese style border int	M-LC19th		
4040	TP Whiteware	1	0.5	1	BS	Hollow ware	U/ID TP design ext	M-LC19th		
4040	Unglazed Red Earthenware	3	55	3	BS	Hollow ware	U/Dec	C19th		
4040	White Salt Glazed Stoneware	1	1	1	Rim	Cup/bowl	U/Dec	c.1720– c.1780	A very small everted rim	
4042	Banded Pearlware	3	37	1	Rim & BS	Mug	Complex decoration; see text	c.1780– c.1840		
4042	Brown Glazed Coarseware	1	109	1	Rim	Pancheon	Dark brown glaze int	LC18th– C19th	Clubbed triangular rim	
4042	Brown Glazed Coarseware	1	36	1	Base	Pancheon	Brown glazed int only	LC18th– C19th	Use-wear on underside; slight abrasion	
4042	Brown Glazed Coarseware	3	112	3	BS	Pancheon	Brown glaze int only	LC18th– C19th		
4042	Blue Banded ware	12	201	5	Rim & BS	Bowl	Blue band below rim, two blue lines on the body	C19th	One round bowl & one sherd from another bowl	
4042	Bone China	1	1	1	BS	Flatware	U/Dec	M-LC19th		
4042	Brown Salt Glazed Stoneware	2	150	1	Profile	Bowl	Brown ext, buff int; rouletted bands ext	C19th	Clubbed rim	
4042	Brown Salt Glazed Stoneware	1	16	1	Rim	Bowl	Double incised line below clubbed rim	C19th		
4042	Brown Salt Glazed Stoneware	1	10	1	Rim	Bowl	U/Dec	C19th	Clubbed rim	
4042	Brown Salt Glazed Stoneware	1	4	1	BS	Hollow ware	Brown int & ext	C18th– EC19th	Fresh break	
4042	Cane Coloured ware	1	9	1	BS	Hollow ware	U/Dec	C19th		



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
4042	Creamware	1	2	1	Footring base	Plate	U/Dec	c.1740– c.1820		
4042	Creamware	2	3	2	BS	Hollow ware	U/Dec	c.1740– c.1820		
4042	Gritty ware	1	60	1	Profile	Drip tray	Green glaze int only	C13th– C14th	Thick-walled dripping tray w/ a thick base & rounded rim; sooted ext	4
4042	Humberware	1	41	1	Base	Jug/jar	Patchy green glaze ext	LC13th– C15th	Small vessel (by Humberware standards); flat base w/ stacking scar on underside of base	
4042	Late Blackware	2	12	2	BS	Hollow ware	Black glaze int & ext	C18th		
4042	Pearlware	1	4	1	BS	Hollow ware	U/Dec	c.1780– c.1840		
4042	Stoneware	2	525	1	Base & body	Bottle	Mottled brown lead glaze ext	C19th		
4042	Stoneware	3	121	3	BS/Shoulder	Bottle	Buff salt glaze int & ext	C19th		
4042	Stoneware	1	3	1	BS	Hollow ware	Brown lead glaze int & ext	M–LC19th		
4042	TP Pearlware	1	2	1	Rim	Saucer	Gold line on rim; U/ID TP design int	c.1780– c.1840		
4042	TP Whiteware	1	33	1	Ring foot base	Bowl	Traces of transfer printed design on foot	M–LC19th		
4042	TP Whiteware	2	19	2	Rim & BS	Mug/jug	Blue TP vine leaf & grape design ext & frieze int	M–LC19th		
4042	TP Whiteware	1	7	1	Rim	Small plate	Chinese landscape border int	M–LC19th		
4042	TP Whiteware	2	6	2	BS	Hollow ware	U/ID black printed design ext	M–LC19th		
4042	TP Whiteware	1	2	1	Footring base	Plate	Chinese landscape int	M–LC19th		
4042	TP Whiteware	1	1	1	Rim	Flatware	Chinese landscape int	M–LC19th		
4042	Whiteware	1	2	1	Rim	Jug?	U/Dec	M–LC19th		
4042	Whiteware?	1	2	1	Footring base	Flatware	U/Dec	M–LC19th	Could be late Pearlware	
4052	Brown Glazed Coarseware	1	23	1	BS	Hollow ware	Brown glaze int only	MC18th– C19th	Rilled body ext	



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
4052	Bone China	1	2	1	BS	Hollow ware	U/Dec	LC19th– EC20th		
4052	Late Blackware	1	2	1	BS	Hollow ware	Black glaze int & ext	C18th		
4052	Stoneware	1	2	1	BS	Jam jar	Vertical fluting ext	MC19th– EC20th		
4052	Whiteware	1	2	1	Base	Hollow ware	U/Dec	M–LC19th		
4062	Brown Glazed Coarseware	1	10	1	Base	Bowl	Brown glaze int only	LC18th– C19th		
4062	Hallgate A type	1	33	1	Rod handle	Jug	Patchy dark green glaze on top of handle	C13th	Grey core w/ patchy orange margins; abundant quartz & sparse red grit	
4062	Late Blackware type	2	6	2	BS	Hollow ware	Brown glaze int & ext	C18th	Fine red fabric but closer to fine Brown Glazed Coarseware than Late Blackware	
4062	TP Whiteware	1	2	1	Rim	Plate	U/ID TP design int	M–LC19th		
4064	Brown Glazed Coarseware	1	14	1	BS	Hollow ware	Small splash of glaze int; dull red slip ext	C19th	Could be Unglazed Red Earthenware except for the spot of glaze	
4065	Sheffield type ware	1	3	1	BS	Hollow ware	Mottled green glaze ext	LC13th– E/MC15th	Hard, even fabric, pale grey w/ a thin buff int margin; abundant quartz & black grit up to 0.8mm, mainly around 0.5mm	
4065	Whiteware	1	1	1	BS	Hollow ware	U/Dec	M–LC19th		
4077	TP Whiteware	2	13	1	Footring base	Plate	Asiatic Pheasants	M–LC19th		
4077	Whiteware	2	6	2	BS	Hollow ware	Salmon pink glaze ext	M–LC19th	Probably part of a one pint jug	
4087	Hallgate A type ware	1	29	1	Strap handle	Jug	Dark green glaze on upper surface	C13th	Thick, narrow strap handle in a coarse sandy fabric	
4087	Hallgate A type ware	1	2	1	BS	Hollow ware	Pale green glaze ext	C13th	Abundant quartz up to 0.5mm, rarely larger	
4087	Hallgate B type ware	1	8	1	Strap handle	Jug	Green glaze ext	C12th	Slightly harder & denser than typical HaB ware	
4087	Reduced Sandy ware	1	5	1	BS	Hollow ware	Green glaze ext	LC13th– C14th	Common quartz up, to 0.5mm in a pale grey fabric	
4087	Sheffield type ware	1	5	1	BS	Hollow ware	Spots of clear/pale yellow glaze ext	LC13th– E/MC15th	Pale grey core w/ buff int & ext margins; abundant quartz & red/black grit up to 0.5mm, occ larger, sparse round rock frags up to 3mm	



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
4087	Sheffield type ware	1	9	1	BS	Hollow ware	Ridges & grooves ext under brown glaze ext	LC13th–E/MC15th	Buff fabric w/ abundant quartz & black grit up to 0.5mm, occ up to 1mm w/ round rock frags up to 3mm	
4087	Sheffield type ware	1	6	1	Base	Hollow ware	Patchy green glaze ext	LC13th–E/MC15th	Pale grey w/ buff int & ext margins; abundant fine quartz & black grit up to 0.5mm, occ larger; finer than some examples of Sheffield type ware	
4088	Brown Glazed Coarseware	3	31	3	BS	Pancheon	Brown glaze int only	LC18th–C19th		
4088	Brown Salt Glazed Stoneware	2	14	2	BS	Hollow ware	Low relief stamped/rouletted patterns ext	C19th		
4088	Creamware	1	1	1	BS	Hollow ware	U/Dec	c.1740–c.1820		
4088	Slip Banded CC ware	1	3	1	BS	Bowl	Dark brown, pale blue & white slip bands ext	C19th		
4088	TP Whiteware	1	1	1	BS	Hollow ware	Chinese landscape ext	M–LC19th		
4093	TP Whiteware	1	1	1	Rim	Cup/bowl	U/ID Chinese-style border int	M–LC19th		
4095	Brown Glazed Coarseware	1	7	1	Base	Bowl	Brown glaze int only	C18th–C19th		
4095	Creamware	2	3	2	BS	Flatware	U/Dec	c.1740–c.1820		
4095	Relief Banded ware	1	90	1	Recessed base	Jug	Relief bands ext w/ moulded handle terminal	C19th		
4097	Cistercian ware	1	20	1	Footed base	Hollow ware	Black glaze int & ext	c.1450–c.1600		
4099	Creamware	3	4	2	BS	Flatware	U/Dec	c.1740–c.1820	Fresh breaks	
4099	Creamware	1	6	1	Rim	Dish	U/Dec	c.1740–c.1820	Sharply everted flat rim	
4104	Buff Sandy ware	2	6	1	BS	Hollow ware	Pale green glaze ext	C13th–EC14th	Pale grey core w/ buff int & ext margins; abundant fine quartz & sparse rock frags up to 0.5mm, occ up to 1mm	
4104	Sheffield type ware	1	18	1	Strap handle	Jug	Thick dark green glaze ext	LC13th–E/MC15th	White to pale grey fabric w/ common quartz up to 1mm & round rock frags up to 3mm	



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
4104	Shell and quartz-tempered ware	3	82	1	Rim & BS	Large bowl	Triangular impressions on top of thick everted rim	MC12th–MC14th	Pale orange fabric w/ abundant fine quartz w/ sparse large white shell fragments; occ erratic & occ calcareous, needle-like minerals; gypsum?	
4106	Creamware	1	4	1	Ring foot base	Cup/bowl	U/Dec	c.1740–c.1820		
4107	Brown Salt Glazed Stoneware	1	2	1	BS	Hollow ware	Brown salt glaze ext	C18th–EC19th		
4107	Cistercian ware	1	6	1	Footed base	Cup/tyg	Black glaze int & ext	c.1450–c.1600		
4107	Coarse Blackware	1	7	1	BS	Hollow ware	Black glaze int & ext	C17th	Hard fine dark red fabric	
4107	HM White Sandy ware	1	20	1	BS	Hollow ware	Spots & patches of pale green splashed glaze ext	LC11th–E/MC12th	See text; cf cxt 6039	
4107	TP Whiteware	1	3	1	Footring base	Plate	Asiatic Pheasants	M–LC19th		
4107	Whiteware	1	7	1	Splayed base	Bowl	U/Dec	M–LC19th	Rounded ring foot base	
4108	Brown Salt Glazed Stoneware	7	213	1	Profile	Bowl	U/Dec	MC18th–EC19th	Round bowl w/ a small footed base	
4108	Creamware	1	43	1	Ring foot base	Bowl	U/Dec	c.1740–c.1820	Round ring foot base	
4108	Creamware	1	1	1	BS	Hollow ware	U/Dec	c.1740–c.1820		
4109	Buff Sandy ware	1	5	1	Base	Hollow ware	Smoothed int	LC12th–C13th	A soft, fine buff body w/ common fine quartz & sparse black grit <0.4mm; local type but much finer than known local wares	
4111	Oxidised Sandy ware	1	10	1	BS	Hollow ware	Thin hard green glaze ext	M/LC13th–C14th	Finer than Hallgate A but otherwise similar	
4115	Banded ware	1	2	1	BS	Hollow ware	Blue & orange bands w/ engine-turned 'inlaid' pattern ext	C19th		
4115	Brown Glazed Coarseware	1	13	1	BS	Hollow ware	Brown glaze int only & partly ext; rilled ext	C18th–C19th		



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
4115	Brown Glazed Coarseware	2	22	2	BS	Hollow ware	Brown glaze int	C18th–C19th	Orange fabric w/ fine white streaks	
4115	Brown Glazed Coarseware	2	107	2	Base	Pancheon	Brown glaze int only; knife-trimmed ext	C18th–C19th		
4115	Brown Salt Glazed Stoneware	1	15	1	BS	Hollow ware	Brown salt glaze int & ext	LC18th–C19th		
4115	Brown Salt Glazed Stoneware	2	23	2	Base	Hollow ware	Brown salt glaze int only	LC18th–C19th		
4115	Chalk-Tempered Sandy ware	1	9	1	BS	Hollow ware	Green-brown glaze ext	MC13th–C14th	A fine sandy fabric w/ common fine quartz 0.5mm & large, sparse white chalk grains up to 4mm	
4115	Creamware	1	23	1	Recessed base	Bowl	U/Dec	c.1740–c.1820		
4115	Creamware	5	4	5	BS	Flatware	U/Dec	c.1740–c.1820		
4115	Creamware	1	1	1	Rim	Hollow ware	Cup/bowl	c.1740–c.1820		
4115	Creamware	1	2	1	BS	Hollow ware	U/Dec	c.1740–c.1820	Light-coloured Creamware	
4115	Hallgate A type?	1	2	1	BS	Hollow ware	U/Dec (very heavily chipped & abraded)	C13th ?	Small chipped & abraded fragment	
4115	Late Blackware	2	49	2	Base	Hollow ware	Patchy black glaze int only	C18th	Hard, slightly sandy red fabric	
4115	Late Blackware	2	17	2	BS	Hollow ware	Black glaze int & ext	C18th	Hard, fine dark red fabric	
4115	Late Blackware	1	32	1	BS	Hollow ware	Black glaze int only	C18h	Hard fine dark red fabric	
4115	Late Blackware	1	9	1	BS	Hollow ware	Patchy clear glaze int & ext	C18th	Hard fine red fabric; concretion int & ext	
4115	Porcelain	1	1	1	Rim	Hollow ware	U/Dec	LC18th–C19th	Rather crude porcelain	
4115	Sheffield type ware	1	15	1	Base	Hollow ware	Green glaze int only	LC13th–E/MC15th	Wide grey core w/ buff int & ext margins; common quartz & black grit up to 0.8mm, rarely larger; not s coarse or abundant as some examples	
4115	Sponged ware	1	1	1	BS	Hollow ware	Blue sponging ext	c.1840+	Could be TP design ext	



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
4115	Tin Glazed Earthenware	1	3	1	Rim	Hollow ware	Blue & white tin glaze ext; mainly flaked & abraded	MC16th–MC18th		
4115	Unglazed Red Earthenware	1	64	1	BS	Flowerpot?	Thin red slip ext	C19th–EC20th		
4115	Unglazed Red Earthenware	1	2	1	Fragment	U/ID	U/Dec	Undated	Heavily burnt fragment	
4115	White Salt Glazed Stoneware	1	3	1	BS	Flatware	U/Dec	c.1720–c.1780		
4116	Creamware	8	76	1	Profile	Bowl	U/Dec	c.1740–c.1820	Round bowl w/ an angular ring foot base	
4117	Bone China	1	1	1	BS	Hollow ware	U/Dec	C19th		
4117	Brown Salt Glazed Stoneware	1	0.5	1	BS	Hollow ware	U/Dec	LC18th–C19th		
4117	Creamware	2	2	2	BS	Hollow ware	U/Dec	c.1740–c.1820		
4002&4008&4037	TP Whiteware	8	88	1	Rim & handle	Mug	Stylised floral design ext w/ thin gold lines	LC19th–EC20th		
U/S	Brown Salt Glazed Stoneware	1	23	1	BS	Hollow ware	Deep groove ext	LC18th–C19th		
	<b>Total</b>	<b>48</b>	<b>700</b>	<b>3</b>	<b>5</b>	<b>409</b>				





**Table 36** Pottery from Trench 5

Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
4001	Late Blackware	2	4	2	BS	Hollow ware	Black glaze int & ext	C18th		
5002	Blue Banded ware	2	15	2	Rim	Bowl	Blue band below rim	C19th		
5002	Bone China	1	4	1	Rim	Cup/mug	Three thin gold lines below a pale green overglaze band, mainly abraded	LC19th–EC20th		
5002	Bone China	1	1	1	BS	Hollow ware	Three thin gold lines int only	LC19th–EC20th		
5002	Bone China	1	10	1	BS	Hollow ware	Fluted body	LC19th–EC20th		
5002	Bone China	2	64	2	Rim	Pie dish	Pale cream finish	LC19th–EC20th		
5002	Cane Coloured ware	1	8	1	BS	Hollow ware	U/Dec	19th		
5002	Cane Coloured ware	1	12	1	Rim	Large bowl	White slip int w/ low relief moulding ext	LC19th–C20th	Large kitchen bowl	
5002	Colour Glazed ware	2	95	1	Lid	Teapot	Dark brown 'Rockingham' style glaze ext	C19th	Light buff fabric	
5002	Colour Glazed ware	3	61	3	Lid	Teapot	Dark brown 'Rockingham' style glaze ext	C19th	One knob, two rim frags; buff & red fabrics	
5002	Colour Glazed ware	3	12	3	BS	Teapot	Dark brown 'Rockingham' style glaze ext	C19th	Fine red refined earthenware fabrics	
5002	Colour Glazed ware	1	16	1	Lid-seated rim	Teapot	Dark brown 'Rockingham' style glaze ext	C19th	Fine white fabric	
5002	Porcelain	2	40	1	Fragment	Ornament	Complex moulded fragment from an unidentified ornament	LC19th–EC20th		
5002	Stoneware	3	47	1	BS	Bottle	U/Dec	MC19th–E20th	Grey stoneware	



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
5005	Banded Creamware	1	2	1	BS	Hollow ware	Vertical brown stripes w/ green-painted rilled band ext	c.1740–c.1820		
5005	Blackware	1	3	1	BS	Hollow ware	Black glaze int & ext; ridge ext	C17th–EC18th	Hard fine red fabric w/ fine white grit	
5005	Blue Banded ware	1	22	1	Rim	Bowl	Blue band w/ three blue lines above & below	C19th	Very similar to a sherd from 5034	
5005	Blue Banded ware	1	12	1	BS	Bowl	Blue band w/ a double blue lines ext	C19th	Very similar to a sherd from 5034	
5005	Blue Banded ware	1	2	1	Rim	Bowl	Three thin blue lines ext	C19th	Plain rim	
5005	Blue Banded ware	1	2	1	Rim	Bowl	Three irregular blue lines ext	C19th		
5005	Blue Banded ware	1	1	1	Rim	Bowl	Blue band w/ double blue slip lines ext	C19th		
5005	Bone China	2	37	1	Ring foot base	Cup	U/Dec	MC19th–EC20th		
5005	Bone China	1	34	1	Ring foot base	Cup	U/Dec	MC19th–EC20th		
5005	Bone China	1	10	1	BS & handle	Cup	Gold flash on rim, gold line around body	LC19th–EC20th		
5005	Bone China	6	7	6	BS	Cup/mug	U/Dec	LC19th–EC20th		
5005	Bone China	1	28	1	Rim	Dish	U/Dec	LC19th–EC20th	Narrow, slightly dished rim	
5005	Bone China	1	10	1	Rim	Dish	U/Dec	LC19th–EC20th	Narrow, slightly dished rim	
5005	Bone China	1	4	1	BS	Flatware	Single gold line int	LC19th–EC20th		
5005	Bone China	1	3	1	BS	Hollow ware	Overglaze red printed design ext	LC19th–EC20th		
5005	Bone China	2	5	2	BS	Hollow ware	Single gold overglaze line ext	LC19th–EC20th		
5005	Bone China	4	17	4	BS	Hollow ware	U/Dec	LC19th–EC20th		
5005	Bone China	1	4	1	Handle	Jug	Square-section handle w/ moulded design on edges	LC19th–EC20th		



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
5005	Bone China	2	18	1	Rim	Mug/jug	Three thin overglaze gold lines ext	LC19th–EC20th		
5005	Bone China	1	1	1	Rim	Mug/jug	Single gold line on body	LC19th–EC20th		
5005	Bone China	1	11	1	Base	Pie dish	U/Dec	LC19th–EC20th	Flat base	
5005	Bone China	1	31	1	Footring base	Plate	U/Dec	1910–1935	Brown printed maker's mark; HENRY ALCOCK / Cobridge /ENGLAND; Godden 1991:27	
5005	Bone China	1	1	1	Rim	Plate/saucer	Three thin gold lines below rim	LC19th–EC20th		
5005	Brown Glazed Coarseware	1	15	1	Footed base	Hollow ware	Brown glaze int	LC18th–C19th		
5005	Brown Salt Glazed Stoneware	1	26	1	BS	Hollow ware	Rouletted bands ext	C19th		
5005	Brown Salt Glazed Stoneware	1	8	1	Rim	Jar	Incised line below everted rim	C19th		
5005	Cane Coloured ware	1	27	1	Rim	Bowl	White slip int; relief moulded ext surface	LC19th–EC20th		
5005	Creamware	1	3	1	Footring base	Plate	U/Dec	c.1740–c.1820		
5005	Pearlware	1	1	1	Rim	Hollow ware	Vertical rim w/ hand-painted blue diamond grid pattern ext	c.1780–c.1840		
5005	Slip Coated ware	1	5	1	Handle	Mug/porringer	Thin red slip under glaze	C18th		
5005	Slipware	1	6	1	BS	Dish	White, red-brown & dark brown slip int	C18th	Press-moulded dish	
5005	Stoneware	1	6	1	BS	Jar	U/Dec	MC19th–EC20th	Grey stoneware	
5005	Tin Glazed Earthenware	1	6	1	BS	Flatware	Hand painted blue floral design int	MC16th–MC18th		
5005	TP Bone China	1	2	1	Rim	Cup	Willow border	C19th		
5005	TP Bone China	1	1	1	Rim	Cup	Dark blue TP Chinese landscape design ext w/ border int	C19th		



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
5005	TP Bone China	3	4	3	BS	Cup/bowl	Dark blue transfer printed Chinese style designs ext	C19th		
5005	TP Bone China	1	3	1	BS	Hollow ware	Willow?	C19th		
5005	TP Whiteware	4	17	1	Rim	Plate	Asiatic Pheasants	MC19th– EC20th		
5005	Whiteware	1	3	1	Rim	Dish	U/Dec	LC19th– EC20th		
5005	Whiteware	1	29	1	Rim	Hollow ware	Double over-glaze gold lines ext & on lip	LC19th– EC20th	Curved rim	
5005	Whiteware	1	2	1	BS	Hollow ware	U/Dec	LC19th– EC20th		
5005	Whiteware	1	6	1	Footring base	Plate	U/Dec	LC19th– EC20th		
5009	Creamware	1	2	1	Ring foot base	Cup/bowl	U/Dec	c.1740– c.1820		
5009	Creamware	1	1	1	BS	Flatware	U/Dec	c.1740– c.1820		
5009	Late Blackware	1	7	1	BS	Hollow ware	Black glaze int	C18th		
5009	Late Humberware type	1	12	1	BS	Hollow ware	Mottled green glaze int & ext	C15th– C16th	Hard, fine grey fabric	
5009	Mottled ware	5	22	5	BS	Cup/bowl	Darker mottling ext; clear w/ sparse mottling int	C18th	Light buff fabric	
5009	Mottled ware	1	3	1	BS	Hollow ware	Darker mottling ext; clear w/ sparse mottling int; double groove ext	C18th		
5009	White Salt Glazed Stoneware	1	1	1	Ring foot base	Cup/bowl	U/Dec	c.1720– c.1780		
5023	Late Blackware	1	1	1	BS	Hollow ware	Black glaze int & ext	C18th		
5024	Bone China	1	4	1	Rim	Flatware	Relief moulded pattern ext	C19th	Odd sherd	



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
5024	Brown Salt Glazed Stoneware	1	9	1	BS	Hollow ware	Low relief rouletted band ext	LC18th–C19th		
5024	Late Blackware	2	15	2	BS	Hollow ware	Black glaze int & ext	C18th		
5025	White Salt Glazed Stoneware	2	7	2	BS	Flatware	U/Dec	c.1720–c.1780		
5025	Yellow ware	1	1	1	Rim	Small jar	Yellow glaze int & ext	C17th–EC18th	Small thin-walled jar w/ small overhanging rim	
5029	Brown Salt Glazed Stoneware	1	1	1	Rim	Hollow ware	Small sharply everted rim on a thin-walled vessel	C18th		
5029	Slipware type 1	1	31	1	Rim	Dish	Trailed white slip line inside clubbed rim	C17th–EC18th	Soft orange fabric	
5029	Slipware type 1	1	7	1	BS	Dish	Parallel trailed white slip lines int	C17th–EC18th	Soft orange fabric	
5034	Blue Banded ware	2	7	2	Rim	Bowl	Blue bands & lines ext	C19th		
5034	Blue Banded ware	1	6	1	BS	Hollow ware	One broad blue band & lines ext	C19th		
5034	Blue Banded ware	3	24	2	BS	Hollow ware	Blue bands & lines ext	C19th		
5034	Blue Banded ware	1	7	1	BS	Hollow ware	Three blue lines ext	C19th		
5034	Blue Banded ware	2	65	1	Rim & body	Jug	Broad blue bands ext	C19th	Jug with bulbous body	
5034	Bone China	1	34	1	Ring foot base	Cup	Overglaze gold stylised flower inside base	LC19th–EC20th		
5034	Bone China	2	15	2	Ring foot base	Cup	Overglaze gold stylised flower inside base	LC19th–EC20th		
5034	Bone China	2	9	2	Handle	Cup	Gold flash on spines of handle	LC19th–EC20th		
5034	Bone China	2	15	2	BS & handle	Cup	U/Dec	LC19th–EC20th		
5034	Bone China	9	30	9	BS	Cup	U/Dec	LC19th–EC20th		
5034	Bone China	3	6	2	Rim	Cup	Three hand-painted thin gold lines ext	LC19th–EC20th		



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
5034	Bone China	1	2	1	Rim	Cup/bowl	Cream coloured finish	LC19th– EC20th		
5034	Bone China	4	11	4	Rim	Cup/mug	Dark red band below rim above double thin gold lines ext	LC19th– EC20th		
5034	Bone China	3	5	2	BS	Cup/mug	Single thin gold line ext	LC19th– EC20th	One sherd crazed & discoloured	
5034	Bone China	1	14	1	Base	Eggcup	U/Dec	LC19th– EC20th		
5034	Bone China	5	69	5	BS	Flatware	Cream coloured finish	LC19th– EC20th		
5034	Bone China	2	6	2	BS	Flatware?	Overglaze gold stylised flower on int surface	LC19th– EC20th		
5034	Bone China	1	2	1	BS	Hollow ware	Overglaze painted green & purple floral design	C19th		
5034	Bone China	2	10	1	Rim	Hollow ware	Wavy lobate rim w/ low relief moulding ext	LC19th– EC20th		
5034	Bone China	1	75	1	Recessed base	Hollow ware	Wide fluting ext	LC19th– EC20th	Base of a decorative vessel; planter/vase	
5034	Bone China	1	8	1	Rim	Hollow ware	Wavy rim	LC19th– EC20th		
5034	Bone China	7	103	7	BS	Hollow ware	Cream coloured finish	LC19th– EC20th		
5034	Bone China	1	3	1	BS	Hollow ware	Cream coloured finish	LC19th– EC20th		
5034	Bone China	1	2	1	BS	Hollow ware	Cream coloured finish; ridged body	LC19th– EC20th		
5034	Bone China	5	137	4	Rim	Pie dish	Cream coloured finish	LC19th– EC20th	Narrow, sharply everted rim	
5034	Bone China	2	39	1	Flat base	Pie dish	U/Dec	LC19th– EC20th		
5034	Bone China	4	83	4	Flat base	Pie dish	U/Dec	LC19th– EC20th		
5034	Bone China	4	29	4	Rim & footring base	Plate	Single gold lines int & on rim	LC19th– EC20th		
5034	Bone China	1	5	1	Footring base	Plate	Double gold line in w/ part of pink band; overglaze	LC19th– EC20th		



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
5034	Bone China	1	6	1	Footring base	Plate	U/Dec	LC19th–EC20th		
5034	Bone China	2	2	2	Rim	Saucer	Single gold line on rim	LC19th–EC20th		
5034	Bone China	1	7	1	Rim	Saucer	Single gold line on rim & on inner surface	LC19th–EC20th		
5034	Bone China	1	21	1	Profile	Saucer	Gold line on rim; fluted int w/ overglaze floral decoration	LC19th–EC20th		
5034	Bone China	5	30	4	BS	U/ID	Curved fluting	LC19th–EC20th		
5034	Bone China	4	25	4	BS	U/ID	Low relief moulding ext	LC19th–EC20th		
5034	Cane Coloured ware	2	22	2	Rim	Bowl	White slip int; relief moulded ext surface	LC19th–C20th	Large kitchen bowl; see also cxt 5005	
5034	Colour Glazed ware	1	6	1	BS	Planter	Yellow int; relief moulded ext surface	MC19th–EC20th		
5034	Colour Glazed ware	7	14	7	BS	Teapot	Shiny brown glaze int & ext	C19th–EC20th		
5034	Colour Glazed ware	3	42	3	Recessed base	Teapot	Relief moulded ext; shiny brown glaze int & ext	C19th–EC20th		
5034	Colour Glazed ware	3	16	3	BS & shoulder	Teapot	Dark brown glaze int & ext	C19th–EC20th		
5034	Colour Glazed ware	1	3	1	BS	U/ID	Red int, yellow-green glaze ext	LC19th–EC20th		
5034	Porcelain	1	1	1	BS	Hollow ware	Fluted body w/ overglaze gold design	LC19th–EC20th		
5034	Porcelain	1	3	1	Rim	Hollow ware	Gold line on rim; pale pink ext surface	LC19th–EC20th		
5034	Porcelain	1	6	1	Complete	Spoon	U/Dec	LC18th–C19th	Small porcelain spoon	6
5034	Sponged ware	2	9	1	Rim	Hollow ware	Blue sponging ext & inside of rim	c.1840+		
5034	TP Whiteware	1	5	1	BS	Flatware	Asiatic Pheasants	M–LC19th		
5034	TP Whiteware	1	13	1	BS	Hollow ware	Finely printed grey-green floral design	M–LC19th		



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
5034	TP Whiteware	1	7	1	BS	Hollow ware	Fluted body w/ overglaze floral design ext	C19th		
5034	TP Whiteware	1	13	1	BS	Hollow ware	Sepia printed leaf & floral design w/ yellow detailing	M-LC19th		
5034	TP Whiteware	3	5	3	BS	Hollow ware	U/ID Chinese landscape ext	M-LC19th		
5034	TP Whiteware	1	1	1	BS	Hollow ware	Dark blue Chinese landscape ext	M-LC19th		
5034	TP Whiteware	1	2	1	Rim	Plate	Asiatic Pheasants	M-LC19th		
5034	Whiteware	4	51	4	BS	Bowl	Overglaze pink band w/ double gold lines	LC19th- EC20th		
5034	Whiteware	2	23	2	Recessed base	Cup	U/Dec	LC19th- EC20th		
5034	Whiteware	1	2	1	Flat base	Dish	U/Dec	LC19th- EC20th		
5034	Whiteware	1	6	1	BS	Flatware	Part of a pale green hand-painted design on one side	LC19th- EC20th		
5034	Whiteware	1	6	1	BS	Hollow ware	Stylised green leaf pattern w/ gold outlines	LC19th- EC20th		
5034	Whiteware	1	4	1	BS	Hollow ware	Diffuse green band ext	MC19th- EC20th		
5034	Whiteware	5	10	5	BS	Hollow ware	U/Dec	MC19th- EC20th		
5034	Whiteware	1	20	1	BS	Hollow ware	U/Dec	LC19th- EC20th	Heavily discoloured & crazed	
5034	Whiteware	1	6	1	Recessed base	Jar	U/Dec	LC19th- EC20th		
5034	Whiteware	2	14	2	Rim	Mug	Three thin gold lines below rim	LC19th- EC20th		
5034	Whiteware	1	8	1	Footring base	Plate	U/Dec	LC19th- EC20th		
5034	Whiteware	1	3	1	Rim	Plate/saucer	Blue band & thin blue line inside rim	LC19th- EC20th		
5034	Whiteware	1	10	1	Rim	Saucer	Gold line on rim	LC19th- EC20th		





Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
5034	Whiteware	2	25	1	Lid?	U/ID	Relief moulded pattern; pink & gold hand-painted detailing	LC19th–EC20th		
5038	Bone China	1	0.5	1	Rim	Cup	Thin gold line ext	LC19th–EC20th		
5038	Colour Glazed ware	1	4	1	Lid	Teapot	Shiny black glaze int & ext	C19th		
5038	Late Blackware	1	1	1	BS	Hollow ware	Black glaze on one side	C18th		
5038	Late Blackware type	1	3	1	BS	Hollow ware	Brown glaze on int surface, red slip ext	C18th	Slightly coarser than Late Blackware; bright orange	
5041	Hallgate A type	1	12	1	Base	Hollow ware	Patch of glaze on underside of base	C13th	See text for discussion of date range; C14 date 1170–1260 (95.4% 2 sigma)	
5041	Hallgate A type	1	1	1	BS	Hollow ware	Green-brown glaze ext	C13th	See text for discussion of date range; C14 date 1170–1260 (95.4% 2 sigma)	
5041	Hallgate A type	1	6	1	Base	Hollow ware	U/Dec	C13th	See text for discussion of date range; C14 date 1170–1260 (95.4% 2 sigma)	
5045	Hallgate A type	1	2	1	Rim	Jug	Green glaze ext	C13th	Flat-topped rim	
5034&5005	Colour Glazed ware	14	201	1	Base, handle & rim	Teapot	Relief moulded body w/ shiny brown glaze int & ext	C19th–EC20th		
U/S 5000	Colour Glazed ware	1	84	1	Lid	Teapot	Concentric ridges around decorative knob; dark brown glaze	C19th		
U/S 5000	Colour Glazed ware	1	24	1	Lid	Teapot	Shiny brown 'Rockingham' style glaze	C19th		
U/S	Bone China	1	3	1	BS	Hollow ware	Multi-coloured transfer print ext	C20th		
U/S	Brown Salt Glazed Stoneware	1	28	1	Lid	Stewpot	Double concentric ridge & groove on top of lid	C19th		
U/S	Colour Glazed ware	1	29	1	Lid	Teapot	Black glaze int & ext	C19th		
U/S	Colour Glazed ware	1	11	1	Recessed base	Teapot	Relief moulded body w/ shiny brown glaze int & ext	C19th	Buff fabric	



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Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
	<b>Total</b>	27 4	2621. 5	242						

**Table 37** Pottery from Trench 6

Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
1001	TP Pearlware	1	2	1	Footring base	Flatware	Tendrill pattern	1808–1818	Ferrybridge Pottery; see Tomlinson and Tomlinson 2014	
6006	Banded Creamware	2	11	1	BS	Jug/jar	Inlaid & turned brown grid pattern ext	c.1740–c.1820	Flaked ext	
6006	Banded Creamware	1	3	1	Rim	Jug/jar	Red-brown grid pattern below rim above a brown band	c.1740–c.1820	Inlaid & turned grid patterns ext	
6006	Brown Glazed Coarseware	2	70	1	Base	Pancheon	Brown glaze int only	C18th–C19th	Use-wear on underside	
6006	Brown Glazed Coarseware	1	106	1	Base	Pancheon	Brown glaze int only	C18th–C19th		
6006	Brown Glazed Coarseware	2	81	2	Base	Pancheon	Brown glaze int only	C18th–C19th		
6006	Brown Glazed Coarseware	1	80	1	Rim	Pancheon	Brown glaze int only; splashed on rim	C18th–C19th	Heavy, sharply everted square-sectioned rim	
6006	Brown Glazed Coarseware	19	449	19	BS	Pancheon	Brown glaze int only	C18th–C19th		
6006	Brown Glazed Coarseware	7	93	7	BS	Pancheon	Brown glaze int; prominent rilling ext	C18th–C19th		
6006	Brown Glazed Coarseware	1	8	1	BS & rim	Bowl	Brown glaze int only	C18th–C19th		
6006	Brown Glazed Coarseware	1	39	1	BS/handle	Handled bowl/jar	Brown glaze int only	C18th–C19th	Lateral handle w/ finger impression	
6006	Brown Glazed Coarseware type	3	32	3	BS/Flakes	Pancheon	U/Dec (int surface missing)	C18th–C19th		
6006	Brown Glazed Coarseware type	1	38	1	Rim/Flake	Pancheon	U/Dec (int surface missing)	C18th–C19th		
6006	Brown Salt Glazed Stoneware	1	32	1	Footed base	Bowl	Brown salt glaze int & ext	C18th–EC19th		
6006	Brown Salt Glazed Stoneware	1	3	1	Handle	Mug	Low relief ridges on top of handle	C18th		
6006	Brown Salt Glazed	1	7	1	Rim	Bowl	Three shallow grooves below small everted rim	C18th	Thin-walled bowl	



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
	Stoneware									
6006	Brown Salt Glazed Stoneware	1	4	1	Rim	Bowl	Two deep grooves below small everted rim	C18th		
6006	Brown Salt Glazed Stoneware	2	17	1	BS	Hollow ware	Neck & shoulder	MC18th–EC19th		
6006	Brown Salt Glazed Stoneware	7	30	7	BS	Hollow ware	U/Dec	C18th–EC19th		
6006	Brown Salt Glazed Stoneware	1	2	1	Rim	Bowl	U/Dec	MC18th–EC19th	Clubbed folded rim w/ cavity	
6006	Brown Salt Glazed Stoneware	1	13	1	BS	Hollow ware	Band of ridges & grooves ext	MC18th–EC19th		
6006	Coarse Blackware	1	34	1	BS	Hollow ware	Black glaze int, glaze fuming ext	C18th		
6006	Creamware	1	24	1	Ring foot base	Bowl	U/Dec	c.1740–c.1820		
6006	Creamware	4	22	4	Footring base	Plate	U/Dec	c.1740–c.1820	Plate or soup bowl	
6006	Creamware	1	5	1	Rim	Plate	Wavy rim w/ beaded rim	c.1740–c.1820		
6006	Creamware	7	15	7	BS	Hollow ware	U/Dec	c.1740–c.1820		
6006	Creamware	1	7	1	Handle	Mug/jug	U/Dec	c.1740–c.1820		
6006	Creamware	5	8	5	BS	Flatware	U/Dec	c.1740–c.1820		
6006	Creamware	1	1	1	Rim	Plate	U/Dec	c.1740–c.1820		
6006	Creamware	1	2	1	BS	Plate	U/Dec	c.1740–c.1820		
6006	Creamware	1	3	1	Rim	Bowl	U/Dec	c.1740–c.1820	Plain rim	
6006	Creamware	1	1	1	Rim	Plate	U/Dec	c.1740–c.1820		



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
6006	Creamware	1	3	1	Rim	Bowl	Small, sub-square rim w/ groove on top	c.1740– c.1820		
6006	Creamware	1	3	1	Rim	Dish	U/Dec	c.1740– c.1820	Small, sharply everted rim	
6006	Late Blackware	1	48	1	Footed base	Cup/porringer	Black glaze int	C18th	Hard orange fabric; partial sooting on underside	
6006	Late Blackware	1	40	1	Footed base	Bowl	Black glaze int	C18th	Hard orange fabric	
6006	Late Blackware	1	25	1	Footed base	Bowl/porringe r	Black glaze int	C18th	Hard orange fabric	
6006	Late Blackware	1	29	1	Footed base	Hollow ware	Black glaze int	C18th	Hard dark red fabric	
6006	Late Blackware	1	15	1	Footed base	Hollow ware	Black glaze int	C18th	Pale orange fabric	
6006	Late Blackware	1	9	1	Footed base	Hollow ware	Black glaze int	C18th	Fine orange fabric	
6006	Late Blackware	1	20	1	Rim	Jar	Black glaze int & ext	C18th	Hard, fine dark red fabric; sharply curved, overhanging rim	
6006	Late Blackware	1	44	1	Rim	Dish	Black glaze int w/ glaze fuming ext	C18th	Hard, fine dark red fabric; sharply everted rim w/ slightly dished top	
6006	Late Blackware	8	73	8	BS	Hollow ware	Black glaze int & partially ext	C18th	Hard, fine dark red fabric	
6006	Late Blackware type	10	80	10	BS	Hollow ware	Black glaze int & partially ext	C18th	Fine bright orange fabric; slightly larger than typical Late Blackware vessels	
6006	Late Medieval Sandy ware	1	22	1	BS	Dish/bowl	Green glaze int & ext	LC15th– EC17th	Hard fine dark grey fabric	
6006	Pearlware	1	12	1	Rim	Bowl	Hand-painted geometric frieze inside rim	c.1780– c.1840	Spots of blue paint ext	
6006	Pearlware	4	20	4	Footring base	Plate	U/Dec	c.1780– c.1840		
6006	Pearlware	1	3	1	Ring foot base	Cup/bowl	Trace of blue design ext	c.1780– c.1840	Angular ring foot	
6006	Pearlware	3	5	3	BS	Flatware	U/Dec	c.1780– c.1840		
6006	Pearlware	1	1	1	Ring foot base	Bowl	Hand-painted star int	c.1780– c.1840		
6006	Pearlware	1	1	1	BS	Dish/bowl	Blue surface int	c.1780– c.1840		



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
6006	Pearlware	1	3	1	BS	Plate	U/Dec	c.1780– c.1840		
6006	Slipware	1	5	1	BS	U/ID	Brown glaze int & ext w/ trailed white slip on one side	C18th	Fine orange fabric w/ rare red grit	
6006	TP Pearlware	1	1	1	BS	Hollow ware	Unidentified TP design in dark blue	c.1780– c.1840		
6006	TP Pearlware	1	0.5	1	Rim	Cup	Wavy rim w/ a gold line on rim & U/ID TP design int	c.1780– c.1840		
6006	Unglazed Red Earthenware	1	16	1	Base	Bowl	U/Dec	C18th– C19th		
6007	Brown Glazed Coarseware	2	24	2	BS	Pancheon	Black glaze int only	C19th	One sherd rilled ext	
6011	Banded Creamware	1	3	1	BS	Hollow ware	Inlaid & turned brown grid pattern ext	c.1740– c.1820	See also cxt 6006	
6011	Blue Banded ware	1	3	1	BS	Hollow ware	Thin blue lines ext	C19th		
6011	Brown Glazed Coarseware	1	111	1	Rim & handle	Handled pancheon	Brown glaze int only	C18th– C19th	Heavy square rim w/ triple ridge ext; lateral handle scar below rim	
6011	Brown Glazed Coarseware	1	65	1	Base	Jar	Brown glaze int only	C18th– EC19th	Slightly inwardly sloping walls	
6011	Brown Glazed Coarseware	4	107	4	BS	Pancheon	Brown glaze int only	C18th– C19th		
6011	Brown Glazed Coarseware	1	62	1	Base	Pancheon	Brown glaze int	C18th– C19th	Use-wear on underside of base	
6011	Brown Glazed Fineware	1	21	1	Rim	Bowl	Dark brown glaze int only	C18th– EC19th	Sharply everted rim; wedge-shaped profile	
6011	Brown Glazed Fineware	1	14	1	BS	Hollow ware	Purple-brown glaze int & ext w/ ridges & grooves ext	C18th– EC19th		
6011	Buff Sandy ware	1	23	1	Strap handle	Urinal?	Flaky friable green-brown splashed glaze ext	C12th– M/LC13th	Odd strap handle w/ groove on edge; see text	3
6011	Creamware	1	7	1	Rim	Plate	Wavy beaded rim	c.1740– c.1820		
6011	Late Blackware	1	26	1	BS	Hollow ware	Black glaze int & partially ext	C18th		
6011	Mottled Coarseware	1	119	1	Base	Jar	Mottled glaze int & ext	C18th	Red fabric w/ quartz & red grit	



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
6011	TP Whiteware	1	3	1	Rim	Plate	Blurred Asiatic Pheasants design int	M-LC19th		
6011	White Salt Glazed Stoneware	1	2	1	BS	Flatware	U/Dec	c.1720–c.1780		
6013	Late Blackware	1	5	1	Rim	Hollow ware	Black glaze int & ext; clubbed everted rim	C18th		
6013	Stoneware	1	366	1	BS	Hollow ware	Wide raised cordon ext	MC19th–E20th	Grey stoneware	
6014	Brown Glazed Coarseware	1	24	1	BS	Pancheon	Brown glaze int only	C19th		
6014	Brown Salt Glazed Stoneware	1	34	1	BS	Hollow ware	Brown salt glaze ext; grey salt glaze int	C19th		
6014	Colour Glazed ware	1	12	1	Lid-seated rim	Teapot	Diffuse 'tiger-stripe' lustre surface	C19th		
6014	Stoneware	1	29	1	BS	Hollow ware	Cane coloured salt glaze ext; white slip int	C19th		
6016	Brown Glazed Coarseware	1	55	1	Base	Pancheon	Brown glaze int only	C19th	Use-wear on underside of base	
6016	Brown Glazed Coarseware	2	21	1	BS	Pancheon	Brown glaze int only	C19th		
6016	Brown Salt Glazed Stoneware	1	23	1	Rim	Lid	Brown salt glaze int & ext	C19th		
6026	Blackware	1	3	1	Rim	Hollow ware	Black glaze int & ext	C17th	Fine dark red fabric	
6026	Blackware	1	4	1	BS	Hollow ware	Black glaze int & ext	C17th	Hard fine red fabric; black glaze over one broken edge; waster?	
6026	Blackware	1	3	1	BS	Hollow ware	Black glaze int & ext w/ ext ridge	C17th	Fine red fabric	
6026	Blackware	1	2	1	BS	Hollow ware	Black glaze int & ext	C17th	Fine dark red fabric	
6026	Blackware	1	6	1	Rim	Mug/tyg	Black glaze int & ext	C17th	Hard, fine dark red fabric	
6026	Brown Glazed Coarseware	1	37	1	Handle	Handled vessel	Brown glaze all over	C18th–C19th		
6026	Brown Glazed Coarseware	5	439	1	Rim	Pancheon	Black glaze int only	C18th–C19th	Sub-square clubbed rim	
6026	Brown Glazed	2	245	1	Rim	Pancheon	Brown glaze int only	C18th–	Flat-topped clubbed rim w/ external	



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
	Coarseware							C19th	groove & elongated lower angle	
6026	Brown Glazed Coarseware	2	51	1	Rim	Pancheon	Brown glaze int only	C18th–C19th	Clubbed sub-square rim; chipped & flaked	
6026	Brown Glazed Coarseware	1	117	1	Rim	Pancheon	Brown glaze int only	C18th–C19th	Thick, wide, flat-topped rim w/ external groove	
6026	Brown Glazed Coarseware	2	133	2	Rim	Pancheon	Brown glaze int only	C18th–C19th	Clubbed, sub-square rim w/ shallow groove ext	
6026	Brown Glazed Coarseware	13	161	13	BS	Pancheon	Brown glaze int only	C18th–C19th		
6026	Brown Glazed Coarseware	1	53	1	Base	Pancheon	Brown glaze int only	C18th–C19th		
6026	Brown Salt Glazed Stoneware	1	1	1	Rim	Dish	Flat everted rim w/ ridge on top	MC18th–C19th		
6026	Brown Salt Glazed Stoneware	1	3	1	BS	Hollow ware	U/Dec	MC18th–EC19th		
6026	Brown Salt Glazed Stoneware	1	4	1	Rim	Hollow ware	Groove below rim	MC18th–C19th		
6026	Cistercian ware	1	1	1	BS	Hollow ware	Black glaze int & ext	c.1450–c.1600	Hard fine red fabric	
6026	Coarse Blackware	1	11	1	BS	Hollow ware	Hard brown glaze int & ext	C17th–EC18th	Hard fine dark red fabric	
6026	Creamware	1	1	1	Rim	Cup/bowl	U/Dec	c.1740–c.1820	Burnt & discoloured	
6026	Creamware	1	3	1	BS	Flatware	U/Dec	c.1740–c.1820		
6026	Creamware	1	2	1	BS	Hollow ware	U/Dec	c.1740–c.1820		
6026	Creamware	1	2	1	BS	Hollow ware	U/Dec	c.1740–c.1820		
6026	Late Blackware	1	30	1	BS & handle stump	Mug/jug	Black glaze int & partially ext	C18th	Fine hard bright orange fabric	
6026	Late Blackware type	5	25	5	BS	Hollow ware	Black glaze int & ext	C18th	Fine bright orange fabric	
6026	Mottled	2	11	2	BS	Hollow ware	Mottled red-brown glaze	C18th	Bright orange fine sandy fabrics; fresh	





Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
	Coarseware						int & ext		breaks	
6026	Mottled Coarseware	1	10	1	BS	Hollow ware	Mottled brown glaze int & ext	C18th	Light buff fabric w/ white streaks & abundant quartz & rock frags <1mm	
6026	Mottled ware	1	1	1	BS	Hollow ware	Mottled glaze int & ext	C18th	Light buff fabric	
6026	Pearlware	1	1	1	Rim	Bowl	Hand-painted blue linear design inside rim	c.1780– c.1840		
6026	Slipware	1	5	1	BS	Dish	Parallel dark brown, red-brown & white slip int	C18th	Press-moulded dish	
6026	Slipware	1	2	1	BS	Dish	Dark brown & white feathered slip int	C18th	Press-moulded dish	
6026	Slipware	1	25	1	Rim	Dish	Brown on white slip lines int; pie-crust contact scar on rim	C18th	Press-moulded dish; thick black deposit ext	
6026	TP Pearlware	1	1	1	BS	Hollow ware	U/ID TP design ext	c.1780– c.1840		
6026	Westerwald Stoneware	1	9	1	BS	Hollow ware	Blue & purple paint over relief moulded design	C17th– EC18th		5
6030	Brown Salt Glazed Stoneware	1	5	1	Rim	Dish	U/Dec	C19th	Wide flat rim	
6030	Colour Glazed ware	1	2	1	Handle	Cup	Shiny black glaze	C19th	Hard fine red fabric	
6030	Creamware	1	4	1	Rim	Bowl	U/Dec	c.1740– c.1820		
6030	Late Blackware	1	11	1	BS	Hollow ware	Black glaze int & ext	C18th	Hard, dark red fabric	
6030	Late Blackware	1	28	1	Footed base	Jar/porringer	Black glaze int only	C18th	Hard dark orange fabric w/ common fine quartz & occ red grit	
6030	Stoneware	1	9	1	BS	Bottle/flagon	Green glaze int & ext	MC19th– EC20th		
6033	Brown Glazed Coarseware	2	195	2	Rim	Pancheon	Brown glaze int	MC18th– C19th	Square-sectioned rim w/ groove around ext angle; wide shallow bowl	
6033	Brown Glazed Coarseware	1	39	1	BS	Pancheon	Brown glaze int	MC18th– C19th		
6039	HM White Sandy ware	3	20	3	BS	Hollow ware	Small spots & patches of very pale green splashed glaze ext	LC11th– E/MC12th	See text; cf cxt 4107	
6039	Reduced Sandy	1	10	1	BS	Hollow ware	Thick shiny friable brown	Medieval	Fine grey fabric w/ pale buff & grey	



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
	ware						glaze ext		margins; common quartz & black grit up to 0.5mm	
6039	White Sandy ware	2	21	2	BS	Hollow ware	Smoothed ext; spots of splash glaze ext	C12th–M/LC13th	See text	
6041	Mottled ware	1	45	1	Rim	Jar	Mottled glaze int & ext	C18th	Small footed base; slightly everted rim; wide, shallow jar	
6050	Reduced Sandy ware	1	7	1	BS	Hollow ware	Flaky friable brown glaze ext	Medieval	Fine grey fabric w/ pale buff & grey margins; common quartz & black grit <0.5mm	
	<b>Total</b>	<b>22 8</b>	<b>4675. 5</b>	<b>218</b>						



**Table 38** Pottery from Trench 9

Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
9011	Coal Measures Whiteware type	1	12	1	BS	Hollow ware	Yellow-brown glaze ext over horizontal impressed lines	C14th	Fine yellow-buff sandy fabric w/common, well-sorted quartz & red grit up to 0.5mm, rarely larger	
9011	Reduced Sandy ware	1	2	1	BS	Hollow ware	U/Dec	Late Medieval	Hard, fine, dense fabric; grey core w/ thin orange margins int & ext	
9011	Sheffield type ware	2	27	1	BS	Hollow ware	U/Dec	LC13th–LC14th	Thick white gritty fabric w/ abundant quartz & black grit up to 1mm, white rock up to 2mm	
9011	Sheffield type ware	1	24	1	BS	Hollow ware	U/Dec	LC13th–LC14th	Hard, dense reduced fabric w/ abundant quartz & black grit up to 1mm	
9011	Sheffield type ware	2	29	1	BS	Hollow ware	Ridges & grooves ext w/ yellow-brown mottled glaze ext	C14th–EC15th	Pale grey reduced fabric w/ abundant quartz & black grit up to 1mm; cf CMP type ware	
	<b>Total</b>	<b>7</b>	<b>94</b>	<b>5</b>						



**Table 39** Pottery from Trench 10

Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
10004	Bone China	1	37	1	Recessed base	Jar	U/Dec	LC19th–C20th	Plain jar w/ a recessed base	
10004	Brown Salt Glazed Stoneware	1	2	1	BS	Hollow ware	Brown salt glaze ext	LC18th–C19th		
10004	Creamware	1	9	1	Rim	Plate	U/Dec	c.1740–c.1820	Wide flat plain rim	
10004	Creamware	2	10	2	Rim	Plate	Beaded rim	c.1740–c.1820		
10004	Creamware	1	6	1	BS	Flatware	U/Dec	c.1740–c.1820		
10004	Creamware	1	1	1	BS	U/ID	Green stripe int	c.1740–c.1820		
10004	Edged ware	1	6	1	Rim	Plate	Wavy edge w/ relief-moulded Grass pattern w/ blue paint	LC18th–EC19th		
10017	Brown Glazed Coarseware	1	14	1	Base	Bowl	Brown glaze int only	LC18th–C19th		
10017	Cistercian ware	1	3	1	BS	Hollow ware	Applied & incised pipe-clay decoration ext	c.1450–c.1600	Hard fine dark red fabric	
10017	Creamware	1	4	1	Rim	Bowl	U/Dec	c.1740–c.1820	Contact scar ext	
10017	Creamware	3	4	3	BS	Hollow ware	U/Dec	c.1740–c.1820		
10017	Creamware	1	3	1	BS	Jug?	U/Dec	c.1740–c.1820		
10017	Late Blackware	1	5	1	BS	Hollow ware	Black glaze int & partially ext	C18th		
10017	Late Blackware	2	5	2	BS	Hollow ware	Black glaze int & ext	C18th	Fine red fabric	
10017	Slip Banded CC ware	1	1	1	BS	Hollow ware	Thin white slip lines ext	C19th		
10017	Slipware type 1	1	14	1	Base	Dish	White slip int under clear glaze, possible red slip ext	C17th–EC18th	Chipped & abraded	
10025	Banded ware	1	5	1	Rim	Hollow ware	Low relief rouletted band w/ a blue line & a diffuse brown line ext	C19th		



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
10025	Brown Glazed Coarseware	1	22	1	Base	Bowl/pancheon	Black glaze int only	LC18th–C19th		
10025	Brown Glazed Coarseware	1	21	1	Base	Bowl/pancheon	Red-brown glaze int only	LC18th–C19th	Burnt on underside	
10025	Brown Glazed Coarseware	1	13	1	BS	Pancheon	Black glaze int only over rilled surface	C19th		
10025	Brown Salt Glazed Stoneware	1	2	1	Handle	Cup/mug	Shiny brown salt glaze	C18th–EC19th		
10025	Brown Salt Glazed Stoneware	1	9	1	Base	Hollow ware	Brown salt glaze int & ext	C18th		
10025	Brown Salt Glazed Stoneware	1	6	1	BS	Bowl	Double incised line above base	LC18th–C19th		
10025	Brown Salt Glazed Stoneware	4	10	4	BS	Hollow ware	U/Dec	C19th		
10025	Brown Salt Glazed Stoneware	1	4	1	Rim	Hollow ware	Ridges below rounded rim	C19th		
10025	Creamware	1	4	1	Rim	Plate	Wavy edge w/ a beaded rim	c.1740–c.1820		
10025	Creamware	1	3	1	Handle	Jug	Moulded handle terminal	c.1740–c.1820		
10025	Creamware	1	3	1	BS/flake	Hollow ware	U/Dec	c.1740–c.1820		
10025	Creamware	2	5	2	Footring base	Plate	U/Dec	c.1740–c.1820	Light coloured (late) Creamware	
10025	Creamware	3	11	3	BS	Flatware	U/Dec	c.1740–c.1820		
10025	Creamware	2	5	2	BS	Bowl	U/Dec	c.1740–c.1820		
10025	Creamware	1	1	1	Rim	Bowl	U/Dec	c.1740–c.1820		
10025	Creamware	1	1	1	BS	Hollow ware	U/Dec	c.1740–c.1820		
10025	Fine Redware	1	4	1	BS	Hollow ware	Clear glaze int & ext	LC18th–C19th	Fine red fabric	



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
10025	Late Blackware	1	4	1	Rim	Hollow ware	Black glaze int & ext	C18th	Curved overhanging rim	
10025	Pearlware	1	1	1	BS/Flake	Hollow ware	U/Dec	c.1780– c.1840		
10025	Slipware	1	3	1	BS	Hollow ware	Clear glaze int & ext w/ red slip ext	C18th	Part of a slip decorated jar	
10025	TP Whiteware	1	3	1	Ringfoot base	Plate	Black printed tree design int	M–LC19th		
10025	Whiteware	1	3	1	Handle	Mug/jug	Partial blue deign ext; sponged?	M–LC19th		
10041	Brown Glazed Coarseware	1	5	1	BS	Dish/bowl	Brown glaze int only	C18th		
10041	Creamware	2	4	1	Rim	Plate	Beaded rim	c.1740– c.1820		
10041	Creamware	1	2	1	Footring base	Plate	U/Dec	c.1740– c.1820		
10041	Creamware	1	0.5	1	BS	Hollow ware	U/Dec	c.1740– c.1820		
10041	Late Blackware	1	21	1	Footed base	Bowl/porringer	Black glaze int only	C18th	Fine red fabric	
10041	Late Blackware	2	11	2	BS	Hollow ware	Black glaze int & ext	C18th	Fine red fabric	
10041	Late Blackware	1	3	1	Base	Hollow ware	Black glaze int only	C18th	Fine red fabric	
10066	Blackware	1	2	1	BS	Hollow ware	Black glaze on one surface	C17th	Hard fine dark red fabric	
10066	Blackware type	1	3	1	BS	Hollow ware	Brown glaze w/ sparse fine mottling int & ext	C17th	Hard fine dark red fabric	
10066	Coal Measures Purple ware	1	6	1	BS	Hollow ware	Mottled purple/brown glaze ext	C15th– C16th	Hard, dense reduced fabric w/ quartz & black grit	
10067	Coal Measures type ware	1	3	1	BS	Hollow ware	Pale green glaze ext	C14th	Fine reduced pale grey fabric w/ moderate black grit	
10071	Humberware type	1	19	1	BS	Hollow ware	Spots of pale green glaze ext	LC13th– C15th	Buff-orange to pale grey sandy fabric w/ moderate fine quartz up to 1mm	
10071	Sheffield type ware	1	15	1	BS	Hollow ware	Green-brown glaze ext	LC13th– E/MC15th	Hard, dense, pale grey reduced fabric w/ abundant quartz & black grit up to 0.8mm	
	<b>Total</b>	<b>65</b>	<b>362</b>	<b>64</b>						



**Table 40** Pottery from Trench 11

Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
11002	Porcelain	1	4	1	Rim	Hollow ware	Overglaze printed blue & black design ext	LC19th–C20th		
11002	Sponge Printed ware	1	1	1	Rim	Hollow ware	Green printed design ext	c.1840+		
11002	Whiteware	1	7	1	Rim	U/ID	Relief bands ext	LC19th–C20th		
11003	TP Pearlware	1	1	1	BS	Hollow ware	U/ID TP design ext	c.1780–c.1840		
11018	Bone china	4	35	4	BS	Hollow ware	U/Dec	LC19th–EC20th		
11018	Bone china	1	6	1	Footring base	Plate	U/Dec	LC19th–EC20th		
11018	Bone china	1	15	1	BS	Hollow ware	U/Dec	LC19th–EC20th		
11018	Sponged ware	1	5	1	Rim	Pie dish	Blue sponging on narrow everted rim	c.1840+		
11018	Stoneware	1	17	1	BS/shoulder	Bottle	Brown ext, green int	MC19th–RC20th		
11018	Stoneware	1	40	1	Strap handle	Flagon	Green lead glaze; ridges & grooves on top of handle	MC19th–EC20th		
11020	Creamware	1	15	1	Rim	Plate	U/Dec	c.1740–c.1780	Wide flat rim	
11022	Blackware	1	3	1	Rim	Hollow ware	Black glaze int & ext	C17th	Hard fine dark red fabric	
11022	Brown Glazed Coarseware	1	12	1	BS	Hollow ware	Hard shiny brown glaze ext	C18th–EC19th	Fine red fabric	
11022	Cistercian type ware	1	4	1	BS	Hollow ware	Applied pipeclay disc w/ incised line; probably a flower motif	c.1450–c.1600	A soft pale orange fabric w/ clear glaze ext; quite unlike the normal Cistercian ware; underfired?	
11022	Early Brown Glazed Coarseware type	1	5	1	BS	Hollow ware	Shiny brown glaze ext	C17th	Common quartz & round red grit up to 1.5mm, mainly finer	
11022	Fine Redware	2	3	2	BS	Hollow ware	Thin brown glaze int & ext	LC17th–C18th	Fine red fabrics	
11022	Midlands Purple type	2	27	1	BS	Hollow ware	Thin hard patchy purple glaze int	C16th–C17th	Hard, dense red fabric w/ sparse red & white grit up to 1mm; fresh break	



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
11022	Midlands Purple type	1	8	1	BS	Hollow ware	U/Dec	C16th–C17th	Hard, dense, semi-vitrified fabric w/ quartz & white grit; overfired & slightly distorted	
11022	Redware	1	8	1	BS	Dish	Clear (red) slip int; red slip ext	C17th–EC18th	Typical soft red fabric	
11022	Yellow ware	1	8	1	BS	Bowl	Clear (yellow) glaze int only; buff ext surface	LC16th–C17th	Fine white fabric	
11024	Blackware type	1	8	1	BS	Hollow ware	Black glaze int & ext	LC17th	Hard fine dark red fabric	
11024	Sponged ware	1	3	1	Rim	Plate	Blue sponging int only	c.1840+		
U/S	Bone China	1	8	1	Footring base	Plate	U/Dec	LC19th–C20th		
U/S	Bone China	1	1	1	BS	Hollow ware	Red-gold lustre design ext	MC19th–EC20th		
	<b>Total</b>	<b>29</b>	<b>244</b>	<b>28</b>						





**Table 41** Unstratified pottery

Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
U/S	Banded Creamware	1	2	1	BS	Hollow ware	Rilled band w/ green paint	c.1740– c.1820		
U/S	Brown Glazed Coarseware	1	15	1	BS	Pancheon	Shiny brown glaze int	LC18th– C19th	Pale orange fabric	
U/S	Brown Glazed Coarseware	1	57	1	BS	Hollow ware	Brown glaze int & ext	MC18th– C19th	Hard, dense orange fabric w/ fine white streaks	
U/S	Brown Glazed Coarseware	1	55	1	BS	Pancheon	Dark brown glaze int only	MC18th– C19th		
U/S	Brown Glazed Coarseware	4	100	4	BS	Pancheon	Dark brown glaze int only	LC18th– C19th		
U/S	Brown Glazed Coarseware	2	20	2	BS	Hollow ware	Dark brown glaze int & ext	LC18th– C19th		
U/S	Brown Glazed Coarseware	1	10	1	BS	Hollow ware	Dark brown glaze int & ext	C18th– EC19th		
U/S	Brown Glazed Coarseware	1	23	1	BS	Hollow ware	Dark brown glaze int & ext	C18th– C19th	Odd wrinkled glaze finish ext	
U/S	Brown Glazed Coarseware	2	12	2	BS	Pancheon	Brown glaze int only	LC18th– C19th		
U/S	Brown Glazed Coarseware type	1	5	1	BS	Hollow ware	Red slip ext	C19th		
U/S	Blue Banded ware	2	2	1	BS	Hollow ware	Pale blue slip lines ext	C19th		
U/S	Blue Banded ware	1	1	1	Rim	Bowl	Part of a blue band below rim	C19th		
U/S	Blue Banded ware	2	3	2	BS	Hollow ware	Blue bands & lines ext	C19th		
U/S	Bone China	4	28	1	Rim & body	Jug	Overglaze print ext w/ coloured detailing; rural scene	E–MC20th	Wavy rim w/ gold line; a decorative rather than practical jug	
U/S	Bone China	1	3	1	BS	Hollow ware	U/Dec	MC19th– EC20th		
U/S	Bone China	1	0.5	1	BS	Cup/bowl	Three thin overglaze gold lines ext	LC19th– C20th		
U/S	Brown Salt Glazed Stoneware	2	31	1	Lid-seated rim	Jar	Ridge around ext of rim	C19th		



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
U/S	Buff Sandy ware	1	10	1	BS	Hollow ware	Patchy pale green splashed glaze ext	LC12th–C13th	Probably part of a pot disc; type uncertain	
U/S	Cane Coloured ware	2	9	1	BS	Hollow ware	U/Dec	C19th	Pale cane coloured ware	
U/S	Cane Coloured ware	1	6	1	BS	Bowl?	White slip int only	LC19th–EC20th		
U/S	Cane Coloured ware	2	2	2	BS	Hollow ware	U/Dec	C19th		
U/S	Cistercian ware	1	3	1	BS	Hollow ware	Dark brown glaze int & ext	c.1450 - c.1600		
U/S	Colour Glazed ware	2	51	1	Spout	Teapot	Dark brown Rockingham style glaze	C19th		
U/S	Creamware	1	6	1	Footring base	Plate	U/Dec	c.1740–c.1820		
U/S	Creamware	1	1	1	Rim	Plate	Beaded rim	c.1740–c.1820		
U/S	Creamware	3	4	3	BS	Flatware	U/Dec	c.1740–c.1820		
U/S	Creamware	2	2	2	Rim	Cup/bowl	U/Dec	c.1740–c.1820		
U/S	Creamware	1	0.5	1	BS	U/ID	U/Dec	c.1740–c.1820		
U/S	Late Blackware	2	7	1	BS	Hollow ware	Black glaze int & partially ext	C18th		
U/S	Late Blackware	1	19	1	BS & handle	Jug?	Black glaze int & ext	C18th	Fine dark red fabric	
U/S	Late Blackware	2	4	2	BS	Hollow ware	Black glaze int & ext	C18th	Fine red fabrics; fresh breaks	
U/S	Late Blackware	1	3	1	BS	Hollow ware	Black glaze int & partially ext	C18th		
U/S	Late Blackware	3	6	3	BS	Hollow ware	Black glaze int & ext	C18th	Fine red fabric	
U/S	Mottled ware	1	3	1	BS	Hollow ware	Mottled brown glaze int & ext	C18th	Fine buff fabric	
U/S	Pearlware	1	3	1	Rim	Cup/bowl	Diffuse, hand-painted linear frieze inside rim	c.1780–c.1840		
U/S	Pearlware	1	2	1	BS	Hollow ware	U/Dec	c.1780–c.1840		
U/S	Porcelain	1	2	1	BS	U/ID	U/Dec	LC18th–C19th		



Context	Type	No	Wt	ENV	Part	Form	Decoration	Date range	Notes	Fig
U/S	Slip Banded CC ware	2	3	1	BS	Hollow ware	Blue, white & dark brown slip lines ext	C19th		
U/S	Stoneware	2	58	2	BS	Bottle	Pale brown ext surface	MC19th– EC20th		
U/S	TP Bone China	1	5	1	Rim	Plate	Chinese style border int	MC19th– EC20th		
U/S	TP Bone China	1	2	1	BS	Flatware	Two Temples	M–LC19th		
U/S	TP Whiteware	1	1	1	Rim	Plate	Asiatic Pheasants	M–LC19th		
U/S	TP Whiteware	1	2	1	Rim	Plate/saucer	U/ID TP design int	M–LC19th		
U/S	TP Whiteware	1	2	1	BS	Hollow ware	Blue TP vermicelli pattern ext	MC19th– EC20th		
U/S	TP Whiteware	1	0.5	1	Rim	Cup/bowl	U/ID TP design int	M–LC19th		
U/S	TP Whiteware	1	2	1	Rim	Flatware	U/ID TP design int	M–LC19th		
U/S	TP Whiteware	2	1	2	BS	Flatware	U/ID TP design int	M–LC19th		
U/S	Whiteware	3	91	2	Profile	Plate	U/Dec	LC19th– C20th		
U/S	Whiteware	1	4	1	Handle	Mug/jug	Ridges & grooves on top of handle	M–LC19th		
U/S	Whiteware	1	60	1	Recessed base	Jug?	Vertical fluting/ridges w/ part of an overglaze painted design ext	MC19th– EC20th		
U/S	Whiteware	2	2	1	Rim	Flatware	U/Dec	MC19th– EC20th		
U/S	White Salt Glazed Stoneware	1	2	1	BS	Hollow ware	U/Dec	c.1720– c.1780		
U/S 1104	Creamware	1	6	1	Rim	Plate	U/Dec	c.1740– c.1820		
U/S 1104	Yellow ware	1	12	1	BS	Hollow ware	Clear glaze int w/ sparse dark mottling	C16th– C17th		
U/S 1104	Late Blackware	1	1	1	BS	Hollow ware	Black glaze int & ext	C19th		
U/S 1104	Coal Measures Purple ware	1	3	1	BS	Hollow ware	Dark mottled brown glaze ext; applied strip ext	C15th– C16th	Hard, dense reduced fabric w/ abundant quartz & round black grit up to 0.6mm, occ larger	
	<b>Total</b>	<b>83</b>	<b>769</b>	<b>72</b>						

**Table 42** Summary of ware types represented in the 2018 assemblage

Period	Type	Estimated (maximum) number of vessels	Percentage of total
Med	Brackenfield 01 ware	1	0.076
Med	Buff Sandy ware	4	0.31
Med	Chalk-tempered Sandy ware	1	0.076
Med	Coal Measures Fine ware type	1	0.076
Med	Coal Measures ware type	1	0.076
Med	Coal Measures Whiteware type	1	0.076
Med	Gritty ware	1	0.076
Med	Hallgate A type	28	2.1
Med	Hallgate A type ware	3	0.23
Med	Hallgate A type?	1	0.076
Med	Hallgate B type ware	1	0.076
Med	Hallgate B ware	1	0.076
Med	HM White Sandy ware	4	0.31
Med	Humberware	2	0.15
Med	Humberware type	3	0.23
Med	Oxidised Sandy ware	5	0.38
Med	Reduced Sandy ware	9	0.69
Med	Sheffield type ware	39	3
Med	Shell and quartz-tempered ware	6	0.46
Med	Splash Glazed Sandy ware	1	0.076
Med	White Sandy ware	2	0.15
<b>Sub-total</b>		<b>115</b>	<b>8.77</b>
L-Med	Cistercian type ware	1	0.076
L-Med	Cistercian ware	7	0.53
L-Med	Coal Measures Purple ware	2	0.15
L-Med	Late Medieval Sandy ware	6	0.46
L-Med	Surrey Whiteware type	1	0.076
<b>Sub-total</b>		<b>17</b>	<b>1.292</b>
P-Med	Blackware	9	0.69
P-Med	Blackware type	3	0.23
P-Med	Coarse Blackware	3	0.23
P-Med	Early Brown Glazed Coarseware	2	0.15
P-Med	Early Brown Glazed Coarseware type	2	0.15
P-Med	Late Humberware type	1	0.076
P-Med	Martincamp-type earthenware	20	1.5
P-Med	Midlands Purple type	2	0.15
P-Med	Redware	1	0.076
P-Med	Slipware type 1	3	0.23
P-Med	Westerwald Stoneware	1	0.076
P-Med	Yellow ware	4	0.31
<b>Sub-total</b>		<b>51</b>	<b>3.868</b>



Period	Type	Estimated (maximum) number of vessels	Percentage of total
E-Mod	Banded Creamware	10	0.76
E-Mod	Banded Pearlware	1	0.076
E-Mod	Brown Glazed Coarseware	151	11.62
E-Mod	Brown Glazed Coarseware type	6	0.46
E-Mod	Brown Glazed Fineware	2	0.15
E-Mod	Brown Salt Glazed Stoneware	78	6
E-Mod	Creamware	151	11.6
E-Mod	Creamware?	2	0.15
E-Mod	Edged ware	8	0.61
E-Mod	Fine Redware	5	0.38
E-Mod	Late Blackware	103	7.9
E-Mod	Late Blackware type	27	2.1
E-Mod	Mottled Coarseware	4	0.31
E-Mod	Mottled ware	11	0.84
E-Mod	Pearlware	29	2.23
E-Mod	Pearlware?	1	0.076
E-Mod	Slip Coated ware	4	0.31
E-Mod	Slipware	10	0.76
P-Med	Tin Glazed Earthenware	4	0.31
E-Mod	TP Pearlware	11	0.84
E-Mod	White Salt Glazed Stoneware	7	0.53
E-Mod/Recent	Biscuit-fired ware	1	0.076
<b>Sub-total</b>		<b>626</b>	<b>48.088</b>
Recent	Banded ware	9	0.69
Recent	Blue Banded ware	45	3.4
Recent	Bone China	136	10.4
Recent	Cane Coloured ware	47	3.6
Recent	Colour Glazed ware	45	3.4
Recent	Knurr ball	1	0.076
Recent	Porcelain	10	0.76
Recent	Relief Banded ware	2	0.15
Recent	Slip Banded CC ware	12	0.92
Recent	Sponge Printed ware	1	0.076
Recent	Sponged ware	7	0.53
Recent	Stoneware	30	2.3
Recent	TP Bone China	11	0.84
Recent	TP Whiteware	67	5.1
Recent	Unglazed Red Earthenware	9	0.69
Recent	Unglazed Whiteware	1	0.076
Recent	Whiteware	54	4.1
Recent	Whiteware?	3	0.23
<b>Sub-total</b>		<b>490</b>	<b>37.338</b>
	<b>Total</b>	<b>1299</b>	<b>99.36</b>



**Table 43** Summary of ware types from the Butcher archive (1958)

Period	Type	Estimated maximum number of vessels	% of total
Med	Brackenfield 01	5	0.33
Med	Brackenfield 01 type	1	0.06
Med	Buff Coal Measures ware	1	0.06
Med	Buff Sandy ware	6	0.4
Med	Buff-White Sandy Coal Measures ware	11	0.7
Med	Coal Measures Fineware type	10	0.6
Med	Coal Measures Gritty ware	6	0.4
Med	Coal Measures type ware	1	0.06
Med	Coal Measures Whiteware	8	0.5
Med	Coal Measures Whiteware type	18	1.2
Med	Coal Measures Whiteware variant	1	0.06
Med	Coarse Orange-Buff Sandy ware	1	0.06
Med	Doncaster type?	1	0.06
Med	Fine Coal Measures type ware	1	0.06
Med	Fine Reduced Sandy ware	3	0.2
Med	Fine Whiteware	1	0.06
Med	Hallgate A	11	0.7
Med	Hallgate A type	5	0.3
Med	Humberware	2	0.1
Med	Lincs Early Medieval Shelly ware	1	0.06
Med	Lincolnshire Fine-shelled ware	2	0.1
Med	Medieval Whiteware	1	0.06
Med	North Lincolnshire Shell-tempered ware	13	0.8
Med	Pink-Buff Coal Measures ware	1	0.06
Med	Pink-Buff Micaceous Sandy ware	1	0.06
Med	Reduced Sandy ware	16	1.1
Med	Reduced Sandy ware type	1	0.06
Med	Stamford ware A type	1	0.06
L-Med	Sheffield type ware	40	2.6
L-Med	Sheffield type ware?	1	0.06
Med	White-slipped Sandy ware	2	0.1
<b>Sub-total</b>		<b>173</b>	<b>11.03</b>
L-Med	Cistercian type ware	5	0.3
L-Med	Cistercian ware	69	4.5
L-Med	Coal Measures Purple ware	66	4.3
L-Med	Coal Measures Purple ware type	47	3.1
L-Med	Fine Coal Measures Purple ware	11	0.7
L-Med	Fine Coal Measures Purple ware type	20	1.3
L-Med	Green Glazed Reduced ware	1	0.06
L-Med	Green Glazed Sandy ware	1	0.06



Period	Type	Estimated maximum number of vessels	% of total
L-Med	Late Medieval Gritty ware	3	0.2
L-Med	Late Oxidised Sandy ware	6	0.4
L-Med	Local Coal Measures Whiteware	25	1.6
L-Med	Local Oxidised Sandy ware	4	0.3
L-Med	Local Reduced Sandy ware	1	0.06
L-Med	Low Countries Redware	2	0.1
L-Med	Raeren Stoneware	1	0.06
<b>Sub-total</b>		<b>262</b>	<b>17.04</b>
P-Med	Blackware	108	7
P-Med	Blackware type	29	1.9
P-Med	Cistercian/Blackware	12	0.8
P-Med	Coarse Blackware	89	5.8
P-Med	Coarse Blackware type	3	0.2
P-Med	Early Brown Glazed Coarseware	371	24.3
P-Med	Early Brown Glazed Coarseware type	18	1.2
P-Med	Early Brown Glazed Coarseware?	1	0.06
P-Med	Early Brown Glazed Coarseware/CMW	1	0.06
P-Med	Early Brown Glazed Fineware	10	0.6
P-Med	Frechen-Koln	4	0.3
P-Med	Frechen-Koln type	1	0.06
P-Med	German Stoneware	4	0.3
P-Med	Late Humberware	1	0.06
P-Med	Martincamp stoneware	1	0.06
P-Med	Midlands Purple 03	37	2.4
P-Med	Midlands Purple 03 type	10	0.6
P-Med	Midlands Purple type ware	82	5.3
P-Med	Post-medieval Reduced Sandy ware	1	0.06
P-Med	Post-medieval Sandy ware	18	1.2
P-Med	Purple Glazed Whiteware	6	0.4
P-Med	Purple-glazed Buff Sandy ware	1	0.06
P-Med	Purple-glazed Sandy ware	15	0.2
P-Med	Redware	45	3
P-Med	Redware type	29	2
P-Med	Redware type?	2	0.1
P-Med	Slipware type 1	9	0.6
P-Med	Unglazed Buff/White ware	1	0.06
P-Med	Unglazed Redware	52	3.4
P-Med	Unglazed Redware type	2	0.1
P-Med	Unglazed Redware?	1	0.06
P-Med	Yellow ware	31	2
<b>Sub-total</b>		<b>995</b>	<b>65.1</b>
E-Mod	Brown Glazed Coarseware	1	0.06



Period	Type	Estimated maximum number of vessels	% of total
E-Mod	Brown Glazed Fineware	4	0.3
E-Mod	Brown Salt Glazed Stoneware	6	0.4
E-Mod	Creamware	1	0.06
E-Mod	Fine Redware	10	0.6
E-Mod	Late Blackware	2	0.1
E-Mod	Mottled Coarseware	16	1
E-Mod	Mottled ware	6	0.4
E-Mod	Mottled ware?	1	0.06
E-Mod	Pearlware	1	0.06
E-Mod	Slipware	28	1.8
E-Mod	Tin Glazed Earthenware	1	0.06
E-Mod	White Salt Glazed Stoneware	1	0.06
E-Mod	Yellow Glazed Coarseware	9	0.6
E-Mod	Yellow Glazed Coarseware type	2	0.1
<b>Sub-total</b>		<b>89</b>	<b>5.8</b>
Recent	Bone China	1	0.06
Recent	Cane Coloured ware	1	0.06
Recent	Colour Glazed ware	2	0.1
Recent	Transfer-printed Whiteware	2	0.1
Recent	Whiteware	1	0.06
<b>Sub-total</b>		<b>7</b>	<b>0.45</b>
<b>Total</b>		<b>1526</b>	

**Table 44** Summary of ware types from Trench 1

Type	Estimated (maximum) number of vessels
Banded Creamware	2
Blackware type	1
Bone China	3
Brackenfield 01 ware	1
Brown Glazed Coarseware	24
Brown Glazed Coarseware type	1
Brown Salt Glazed Stoneware	6
Cane Coloured ware	2
Cistercian ware	2
Coal Measures Fine ware type	1
Creamware	20
Creamware?	1
Early Brown Glazed Coarseware type	1
Edged ware	1
Fine Redware	1
Hallgate A type	6





Type	Estimated (maximum) number of vessels
Humberware type	1
Late Blackware	14
Late Medieval Sandy ware	5
Martincamp-type earthenware	20
Oxidised Sandy ware	2
Pearlware	5
Reduced Sandy ware	2
Sheffield type ware	28
Shell and quartz-tempered ware	1
Slip Coated ware	2
Slipware	2
Splash Glazed Sandy ware	1
Sponged ware	2
Stoneware	2
Surrey Whiteware type	1
Tin Glazed Earthenware	1
TP Pearlware	1
TP Whiteware	3
Unglazed Red Earthenware	2
Yellow ware	1
<b>Total</b>	<b>169</b>

**Table 45** Summary of ware types from Trench 2

Type	Estimated (maximum) number of vessels
Brown Glazed Coarseware	1
Brown Salt Glazed Stoneware	4
Colour Glazed ware	1
Creamware	1
Early Brown Glazed Coarseware	1
Late Blackware	1
Late Blackware type	1
TP Pearlware	2
Unglazed Whiteware	1
Whiteware	2
<b>Total</b>	<b>15</b>

**Table 46** Summary of ware types from Trench 3

Type	Estimated (maximum) number of vessels
Blue Banded ware	1
Bone China	1
Cane Coloured ware	29



Type	Estimated (maximum) number of vessels
Creamware	3
Edged ware	2
Hallgate A type	17
Hallgate A type ware	1
Knurr ball	1
Late Blackware	4
Mottled ware	1
Oxidised Sandy ware	1
Reduced Sandy ware	3
Sheffield type ware	1
Shell and quartz-tempered ware	2
TP Pearlware	1
TP Whiteware	4
Unglazed Red Earthenware	1
Whiteware	2
<b>Total</b>	<b>75</b>

**Table 47** Summary of ware types from Trench 4

Type	Estimated (maximum) number of vessels
Banded Creamware	3
Banded Pearlware	1
Banded ware	8
Biscuit-fired ware	1
Blackware	1
Blue Banded ware	25
Bone China	14
Brown Glazed Coarseware	37
Brown Salt Glazed Stoneware	33
Buff Sandy ware	2
Cane Coloured ware	7
Chalk-Tempered Sandy ware	1
Cistercian ware	2
Coarse Blackware	1
Colour Glazed ware	12
Creamware	58
Creamware?	1
Early Brown Glazed Coarseware	1
Edged ware	4
Fine Redware	1
Gritty ware	1
Hallgate A type	1
Hallgate A type ware	2



Type	Estimated (maximum) number of vessels
Hallgate A type?	1
Hallgate B type ware	1
Hallgate B ware	1
HM White Sandy ware	1
Humberware	2
Humberware type	1
Late Blackware	41
Late Blackware type	10
Mottled ware	1
Oxidised Sandy ware	2
Pearlware	7
Pearlware?	1
Porcelain	4
Reduced Sandy ware	1
Relief Banded ware	2
Sheffield type ware	6
Shell and quartz-tempered ware	3
Slip Banded CC ware	10
Slip Coated ware	1
Slipware	2
Sponged ware	2
Stoneware	19
Tin Glazed Earthenware	2
TP Bone China	3
TP Pearlware	3
TP Whiteware	41
Unglazed Red Earthenware	5
White Salt Glazed Stoneware	2
Whiteware	16
Whiteware?	3
<b>Total</b>	<b>411</b>

**Table 48** Summary of ware types from Trench 5

Type	Estimated (maximum) number of vessels
Banded Creamware	1
Blackware	1
Blue Banded ware	14
Bone China	106
Brown Glazed Coarseware	1
Brown Salt Glazed Stoneware	5
Cane Coloured ware	5
Colour Glazed ware	29



Type	Estimated (maximum) number of vessels
Creamware	3
Hallgate A type	4
Late Blackware	5
Late Blackware type	1
Late Humberware type	1
Mottled ware	6
Pearlware	1
Porcelain	4
Slip Coated ware	1
Slipware	1
Slipware type 1	2
Sponged ware	1
Stoneware	2
Tin Glazed Earthenware	1
TP Bone China	6
TP Whiteware	10
White Salt Glazed Stoneware	3
Whiteware	27
Yellow ware	1
<b>Total</b>	<b>242</b>

**Table 49** Summary of ware types from Trench 6

Type	Estimated (maximum) number of vessels
Banded Creamware	3
Blackware	5
Blue Banded ware	1
Brown Glazed Coarseware	69
Brown Glazed Coarseware type	4
Brown Glazed Fineware	2
Brown Salt Glazed Stoneware	20
Buff Sandy ware	1
Cistercian ware	1
Coarse Blackware	2
Colour Glazed ware	2
Creamware	31
HM White Sandy ware	3
Late Blackware	21
Late Blackware type	15
Late Medieval Sandy ware	1
Mottled Coarseware	4
Mottled ware	2



Type	Estimated (maximum) number of vessels
Pearlware	13
Reduced Sandy ware	2
Slipware	4
Stoneware	3
TP Pearlware	3
TP Whiteware	1
Unglazed Red Earthenware	1
Westerwald Stoneware	1
White Salt Glazed Stoneware	1
White Sandy ware	2
<b>Total</b>	<b>218</b>

**Table 50** Summary of ware types from Trench 10

Type	Estimated (maximum) number of vessels
Banded ware	1
Blackware	1
Blackware type	1
Bone China	1
Brown Glazed Coarseware	5
Brown Salt Glazed Stoneware	9
Cistercian ware	1
Coal Measures Purple ware	1
Coal Measures type ware	1
Creamware	25
Edged ware	1
Fine Redware	1
Humberware type	1
Late Blackware	8
Pearlware	1
Sheffield type ware	1
Slip Banded CC ware	1
Slipware	1
Slipware type 1	1
TP Whiteware	1
Whiteware	1
<b>Total</b>	<b>64</b>

**Table 51** Summary of ware types from Trench 11

Type	Estimated (maximum) number of vessels
Blackware	1
Blackware type	1



Type	Estimated (maximum) number of vessels
Bone china	8
Brown Glazed Coarseware	1
Cistercian type ware	1
Creamware	1
Early Brown Glazed Coarseware type	1
Fine Redware	2
Midlands Purple type	2
Porcelain	1
Redware	1
Sponge Printed ware	1
Sponged ware	2
Stoneware	2
TP Pearlware	1
Whiteware	1
Yellow ware	1
<b>Total</b>	<b>28</b>



## Appendix 5: Animal bone countability criteria

Teeth & Post-cranial Bones	Criteria
Upper teeth occlusal surface (mammals)	At least half
Lower teeth occlusal surface (mammals)	At least half
Cranium (zygomaticus) (mammals)	At least half of zygomatic arch
Atlas (mammals)	At least half
Axis (mammals)	At least half
Scapula glenoid cavity (mammals) or articular end (birds)	At least half of glenoid cavity
Coracoid proximal (birds)	At least half of an epiphysis
Humerus distal (mammals and birds)	At least half of an epiphysis
Humerus proximal (mammals and birds)	At least half of an epiphysis
Radius distal (mammals)	At least half of an epiphysis
Radius proximal (mammals)	At least half of an epiphysis
Ulna prox. articulation (mammals and birds)	At least half of prox. Articulation
Carpals (mammals)	At least half
Metacarpal distal (mammals)	At least half of the epiphysis; proximal end should also be present
Carpometacarpus (birds)	At least half of proximal end
Pelvis (mammals)	At least half of acetabulum, ischial part
Femur distal (mammals and birds)	At least half of an epiphysis
Femur proximal (mammals and birds)	At least half of an epiphysis
Tibia distal (mammals and birds)	At least half of an epiphysis
Tibia proximal (mammals and birds)	At least half of an epiphysis
Astragalus (lateral half) (mammals)	At least half
Calcaneum (mammals)	sustentaculum present
Scafocuboid (or scafoid or cuboid) (mammals)	At least half
Metatarsal distal (mammals and birds)	At least half of the epiphysis; proximal end should also be present
Metapodial distal (mammals)	At least half of the epiphysis; proximal end should also be present
Phalanges 1, 2 and 3 proximal (mammals)	Proximal end, at least half of the epiphysis



## Appendix 6: Clay tobacco pipe catalogue

Key: SF = small finds number; B = bowl; S = stem; M = mouthpiece

Ctxt	SF	B	S	M	Tot	Range	Deposit	Marks	Dec	Comments
1002			2		<b>2</b>	1700-1820	1750-1820	-	-	Plain stems, one finely burnished.
1003		1	4	1	<b>6</b>	1750-1880	1830-1860	-	Leaf dec seams	Plain stems; one brown glazed mouthpiece all late C18th/C19th single bowl fragment has leaf decorated seams.
1004			1		<b>1</b>	1700-1800	1700-1800	-	-	Plain stem.
1005			2		<b>2</b>	1760-1850	1800-1850			Plain stems, one appears to be burnished and is C18th the other is C19th
1006		6	48		<b>54</b>	1760-1840	1800-1840	x2 GW bowl mark; x1 THO WILD stem mark; X1 cut mark on heel	x1 flute and panel	48 stems (29 of which are burnished); 1 c1600-1680 heel bowl with a cut mark across the heel; x3 (totalling 4 fragments) c1740-1780 spur bowl two marked with a GW bowl mark.; x1 C19th bowl fragment. Good group with the exception of the later mould decorated bowl, which appears to be intrusive.
1007		1	4		<b>5</b>	1650-1680	1650-1670			Consistent C17th group with a plain heel bowl and stems with large stem bores.
1008			3		<b>3</b>	1800-1900	1800-1900			Plain C19th stem fragments.
1013			1		<b>1</b>	1700-1800	1700-1800			Plain stem. Bag also has two fragments of bone.
1034		1	1		<b>2</b>	1800-1880	1830-1860			Plain spur bowl and plain stem.
2019			1		<b>1</b>	1750-1820	1750-1820			Plain stem late C18th or early C19th
2020		1	2		<b>3</b>	1780-1840	1780-1840			Plain bowl C19th bowl fragment (highly fired); two plain stems one with traces of brown glaze, both from long-stemmed pipes.





Ctxt	SF	B	S	M	Tot	Range	Deposit	Marks	Dec	Comments
3015			3		<b>3</b>	1640-1850+	1850+			Three plain stem fragments one C17th, C18th, and one C19th. The C19th fragment is just flaring out into a nipple mouthpiece from a short-stemmed cutty type pipe dating 1850 or later.
4002			1		<b>1</b>	1790-1820	1790-1820			Plain and very poorly executed long-stem with a ground end.
4007			7		<b>7</b>	1780-1830	1800-1830			Plain stems, one C18th fragment the rest C19th, one of which has traces of brown glaze.
4008		3	13		<b>16</b>	1760-1860	1830-1860		Leaf decorated seams	C18th heel bowl which is burnished; x2 C19th bowl fragments, most complete of which has leaf decorated seams; stems are all plain but at least two are burnished and would be contemporary with the C18th bowl fragment.
4008			2		<b>2</b>	1790-1850	1790-1850			Plain C19th stem fragments.
4009		2	10	2	<b>14</b>	1800-1900	1850-1900		Basket	C19th mould decorated basket design bowl with joining stem; rest of the stems are plain and poorly made but appear to be from long-stemmed pipes; the two mouthpieces are both nipple type from a short-stemmed cutty pipe.
4010		1	17		<b>18</b>	1780-1850	1780-1850			Plain bowl fragment and plain stems. Some of the stems are late C18th but the bulk are C19th. The bowl fragment has been sanded and would have had a meerscham wash originally. Group includes one piece of bone.
4024		3	8		<b>11</b>	1780-1850	1800-1850		x1 Basket; x1 ribbed seam	Two of the bowls have moulded decoration, the third is plain. The stems are also plain and most appear to be C19th some are quite long pieces clearly from long-stemmed pipes.



Ctxt	SF	B	S	M	Tot	Range	Deposit	Marks	Dec	Comments
4036			10		<b>10</b>	1650-1840	1800-1840			Group of plain stems one is clearly C17th century, rest are late C18th or early C19th. One fragment appears to have a ground end.
4037		1	3		<b>4</b>	1800-1850	1800-1850			Large plain C19th bowl with a distinctive internal bowl cross; The stems are plain and appear to be from long-stemmed pipes.
4039			1		<b>1</b>	1790-1850	1790-1850			Plain C19th stem fragment
4040		3	7		<b>10</b>	1750-1860	1850-1860	x1 moulded FC spur mark	Leaf decorated seams	C19th mould decorated bowl with elaborate leaf decorated seams and the moulded makers initials FC - probably to be Frederick Cartwright (1854-1860) - the F initial is upside-down; two other C19th spurs and plain stems. Group includes a piece of bone.
4042			6		<b>6</b>	1790-1850	1790-1850			Plain C19th stem fragments.
4052		1	4		<b>5</b>	1800-1850	1800-1850			Plain C19th spur bowl fragmnt and four plain stems two with fresh breaks but no joins.
4086			1		<b>1</b>	1740-1800	1740-1760			Plain burnished C18th stem fragment.
4088			8		<b>8</b>	1790-1850	1790-1850			Plain C19th stem fragments.
4095			7		<b>7</b>	1790-1850	1790-1850			Plain C19th stem fragments.
4104			1		<b>1</b>	1790-1850	1790-1850			Plain C19th stem fragment.
4106			1		<b>1</b>	1740-1760	1740-1760	WILD stem mark		C18th marked stem.
4108			1		<b>1</b>	1790-1850	1790-1850			Plain C19th stem fragment.
4109		1	1		<b>2</b>	1740-1800	1740-1800			Burnished bowl and stem fragment.
4115			26		<b>26</b>	1780-1850	1800-1850			Group of plain stems three with traces of brown glaze.
4117			2		<b>2</b>	1750-1850	1750-1850			Two plain stems - one C18th one C19th
5005		1	15		<b>16</b>	1640-1850	1800-1850			Single C18th bowl fragment; all stems are plain and include C17th, C18th and C19th fragments.



Ctxt	SF	B	S	M	Tot	Range	Deposit	Marks	Dec	Comments
5023			1		<b>1</b>	1730-1800	1730-1800			Single C18th stem fragment.
5024			12		<b>12</b>	1750-1850	1750-1850			Group of plain stems from the C18th and C19th.
5029			4		<b>4</b>	1650-1850	1800-1850			Group of plain stems including C17th and C19th fragments.
5031		1	14		<b>15</b>	1660-1800	1780-1800	x1 Roll stamp stem		Small group of fragments of mixed date. C17th heel fragment with joining stem (fresh break) and a number of plain stems of late C17th, C18th and early C19th date. Includes one C18th stem fragment with a roll stamp mark.
5034			3		<b>3</b>	1750-1850	1800-1850			Plain C19th stems.
6006		3	11	1	<b>15</b>	1680-1830	1780-1830	x1 milled heel		Mixed group with x2 C17th bowl fragments and a single C19th bowl/stem junction. The stems and mouthpieces are all plain and mixed C17th-early C19th date.
6007		1	3		<b>4</b>	1750-1800	1780-1800	x1 TW bowl stamp		Nice marked C18th bowl, possibly a product of Thomas Wild of Rotherham. Stems more probably to be early C19th but from a long-stemmed pipe.
6011		2	11		<b>13</b>	1640-1800	1780-1800	1x milled heel; x2 stem stamps incl. WILL WILD		Small group of fragments of mixed date. C17th heel bowl; C18th marked stems and plain C19th stem fragments. Group includes one piece of bone.
6013			5		<b>5</b>	1750-1800	1750-1800			Plain stems mostly C18th burnished examples, but there is a single C19th plain stem.
6014			6		<b>6</b>	1680-1780	1750-1780	x1 THO WILD stem stamp		Group of stems mainly late C18th or early C19th including one marked with a THO WILD stem mark.
6016			7		<b>7</b>	1750-1850	1750-1850			Plain stems of late C18th or early C19th date.



Ctxt	SF	B	S	M	Tot	Range	Deposit	Marks	Dec	Comments
6026		26	167	15	<b>208</b>	1610-1800	1770-1800	x3 moulded spur marks OO and x1 ring and dot; x1 mould decorated bowl PR; x2 TW bowl stamps; x1 W bowl stamp; x1 gauntlet heel stamp; x 1 crowned IW heel stamp; x6 WILL WILD stem stamps; x1 THO WILD stem stamp; x1 SCORA stem stamp; x1 BENJAMIN MARSDEN stem stamp; x2 other stem stamps; x1 milled heel	x3 enclosed flutes (x1 with a stag's head); x1 floral decoration (mould has been altered)	Very good C18th group many of which are marked or decorated. Excavations in Tenter Street, Sheffield produced a similar bowl fragment to the mould decorated PR fragment in this group.
6030		3	22		<b>25</b>	1640-1830	1800-1830	x1 milled heel; x1 moulded heel marks OO; x1 stamped stem	floral bowl with LDS	Small group of fragments of mixed date. C17th bowl with a milled heel and x2 plain stems; C18th bowl fragment with a moulded OO mark and a x1 roll stamp stem; rest plain stems of early C19th date.
6033		1	6		<b>7</b>	1750-1830	1800-1830	x1 Moulded bowl mark WILL WILD	Armorial bowl with WILL WILD moulded lettering	Nice armorial bowl fragment marked WILL WILD which has an internal bowl cross; the rest of this group is made up of late C18th-early C19th plain stems.
7017		1	1		<b>2</b>	1750-1860	1830-1860	x1 WILL WILD stem stamp		Single C18th marked stem and a plain C19th bowl.
10025		1	12		<b>13</b>	1650-1850	1800-1850		x1 mould decorated bowl ?acorn/hooft	Small fragment of C19th mould decorated bowl; rest of group plain stems of mixed late C17th to C19th



Ctxt	SF	B	S	M	Tot	Range	Deposit	Marks	Dec	Comments
										date.
10041			1		<b>1</b>	1610-1700	1640-1700			Plain C17th stem fragment.
10055			1		<b>1</b>	1800-1850	1800-1850			Plain C19th stem fragment.
11003			1		<b>1</b>	1780-1830	1780-1830			Plain stem fragment of late C18th or early C19th.
11018			1		<b>1</b>	1700-1800	1700-1800			Stem of possible C18th date; heavily encrusted.
11020		3	2		<b>5</b>	1750-1800	1780-1800			Three joining bowl fragments from a late C18th bowl; the stem fragments are both plain and could be late C18th or early C19th.
11021		1	5		<b>6</b>	1650-1830	1800-1830	x1 moulded ring and dot spur mark		Small mixed group of fragments. Single stem that is probably to be C17th; x2 plain stems and a bowl fragment with a moulded ring and dot mark from the C18th and x2 plain C19th stems.
11022	11001	1	6		<b>7</b>	1610-1800	1700-1800			Small group of tiny fragments but all appear to be C18th although there is one burnt stem fragment that could be C17th or C18th.
11024		3	5		<b>8</b>	1780-1840	1820-1840		x1 enclosed flutes bowl with a stag's head; x2 floral decorated bowls (possibly from the same mould)	Three mould decorated bowls x1 late C18th and x2 C19th; all the stems are plain and of C19th date from long-stemmed pipes.
11025			1		<b>1</b>	1750-1800	1750-1800			Plain late C18th stem.
11036	11002		1		<b>1</b>	1750-1850	1750-1800			Plain stem of late C18th or early C19th date.
u/s			2		<b>2</b>	1800-1900	1800-1900			Plain C19th stem fragments.
u/s		1	9		<b>10</b>	1800-1850	1800-1850			C19th group which includes a spur fragment and a piece of stem with traces of moulded decoration; all other stems are plain.



Ctxt	SF	B	S	M	Tot	Range	Deposit	Marks	Dec	Comments
u/s			1		1	1800-1850	1800-1850			Plain C19th stem.
u/s			1		1	1780-1850	1780-1850			Plain late C18th or early C19th stem.
u/s			3		3	1800-1850	1800-1850			Plain C19th stems.
u/s			6		6	1800-1920	1870-1920			Plain stems mostly C19th; one fragment is from a short-stemmed pipe and has traces of brown varnish dating it to late C19th or early C20th.
u/s			12	1	13	1650-1850	1800-1850			Plain stems dating from mid to late C18th to C19th; one fragment has traces of brown glaze. The single mouthpiece is most probably from a long-stemmed pipe.
U/S TR3			1		1	1800-1850	1800-1850			Plain C19th stem.
u/s TR4			1		1	1790-1830	1790-1830			Plain late C18th or early C19th stem.
u/s TR5			1		1	1700-1800	1750-1800			Plain C18th stem.
<b>Totals:</b>		<b>73</b>	<b>569</b>	<b>20</b>	<b>662</b>					

*Illustrated catalogue*

This catalogue illustrates (**Fig. 29**) and describes selected pieces from the Sheffield Castle clay tobacco pipe assemblage. All the pipe illustrations were prepared by one of the authors (SDW) and are shown at life size, with broken lines being used to indicate burnished surfaces. The die details of the roll stamped stem marks are at twice life size and were prepared by the other author (DAH) and form part of the as yet unpublished National Clay Tobacco Pipe Stamp Catalogue (NCTPSC), a copy of which can be found in the National Pipe Archive ([www.pipearchive.co.uk](http://www.pipearchive.co.uk)). Each illustrated piece is dated and described, with its context number being given at the end of the initial description. All of the stamped marks have been impressed for the NCTPSC and a cast reference has been allocated to each mark. This cast reference is noted in the following descriptions, together with the unique die number for the mark where a twice life-size drawing has been prepared.

- 1 Heel bowl of c1640-1660 with a milled band across the heel. The pipe has a bottered rim which is half milled. There is no internal bowl cross and the pipe is unburnished. The stem bore is 7/64" (Context: 6006).
- 2 Heel bowl of c1650-1670 with an internally trimmed and bottered rim which is half milled. There is no internal bowl cross; the pipe has a well burnished surface with a stem bore of 6/64". The heel is stamped with a relief mark comprising the crowned initials IW (Context: 6026; Cast 746.39).

Initials with a crown are known from a range of sites across Yorkshire and include the initials IH, SH, IT and IW (White 2004, 87). The IW maker has not yet been identified but two similar marks have been recorded previously. The first is on a heel bowl of c.1650–1670 (Wakefield Museum Social History Collection; White 2004, Fig 158.8). The second is on a transitional period bowl dating from c.1690–1710 recovered from Oakwell Hall (Tolson Memorial Museum, Huddersfield Acc. 11083; White 2004, Fig 150.11).

- 3 Heel bowl of c.1650–1670 with a milled band across the heel. The pipe has a bottered rim but is not milled. There is no internal bowl cross; the bowl is well burnished with a stem bore of 5/64" (Context: 6030).
- 4 Heel bowl of c.1660–1680 with a bottered and fully milled rim. The band of milling is set very low on the rim. The pipe has no internal bowl cross; it is well burnished with a stem bore of 7/64". The heel has the relief mark in the form of a left-handed gauntlet within a circular milled border (Context: 6026; Cast Ref: 746.38).

This gauntlet mark is unusual for Yorkshire and appears to be the first of its kind recorded in the county. The form of the bowl and the mark is reminiscent of pipes produced in the West Country by the Gauntlet family. This family were renowned for producing high quality pipes and their mark came to be considered a mark of excellence that was widely copied. In the mid-1660s a contemporary writer, Fuller, noted a court case where a pipe-maker was being sued for pirating the gauntlet mark (Brown 1959, 243). This example from Sheffield Castle would appear to be a locally produced copy of this West Country mark.

- 5 Spur bowl of c.1720–1750 with a trimmed heel. The rim has been internally trimmed and bottered. There is no internal bowl cross; the pipe is well burnished and has a stem bore of 5/64” (Context: 6026).
- 6 Spur bowl of c.1720–1750 with a trimmed spur. The rim has been internally trimmed and bottered. There is no internal bowl cross; the pipe is well burnished and has a stem bore of 5/64”. There is a very distinctive mould flaw on the side of the spur (on the smokers right). On the back of the bowl facing the smoker is an incuse stamped mark comprising the incuse initials GW (Context: 1006; Cast Ref: 746.41; Higgins Die 2221).

This was the only GW mark recovered from the site and there are no known makers with the initials GW working in Yorkshire in the first half of the eighteenth century. However, given the presence of various other pipes made by the Wild family of Rotherham, both from this site and from others in Sheffield, it seems probable that the GW mark represents another member of this prolific pipe making family.

- 7 Heel bowl of c.1720–1750 with a trimmed heel. The rim has been internally trimmed and bottered. There is no internal bowl cross; the pipe is well burnished and has a stem bore of 5/64”. On both sides of the heel is a relief moulded ring motif. On the back of the bowl facing the smoker are the incuse stamped initials TW (Context 6026; Cast Ref: 747.19; Higgins Die 2055).

This is one of four examples of pipes with a TW bowl mark recovered from the site. The most obvious candidate for this particular mark is Thomas Wild of Rotherham. There are three separate references to a pipemaker named Thomas Wild of Rotherham, which relate to at least two and possibly three different makers of the same name, rather than one individual (White 2004, 185). The first reference is in 1716 when the son of Thomas Wild of Rotherham, pipemaker, was apprenticed to a William Smith, file smith at Attercliffe. The second reference is to a marriage in Rotherham of Thomas Wild to Elizabeth Wainwright on the 14 April 1718. The third and final reference is in 1777 when Thomas Wild of Rotherham appears in the Quarter Sessions Records for Sheffield.

In a survey of the clay tobacco pipes from Yorkshire (White 2004) at least seventeen roll-stamped stem marks bearing Thomas Wild’s name, including four from Sheffield, were recorded. Thomas Wild appears to have been quite a prolific pipe maker and his products turn up all across Yorkshire and parts of north Nottinghamshire. At least five different dies are known, three of which are very similar with the name THO:WILD under a border containing a wavy line (Higgins Dies 1513, 1832 and 2190). One of these examples, from Wood Hall moated site, occurs on the same stem as a separate ‘Midlands style’ border (White 2004, Fig 148.1). The fourth type (Higgins Die 1833) has a more complex ‘Midlands style’ decorative border as part of the same die as the lettering, while the fifth is a much more elaborate mark that includes a stag flanked by a pair of flower motifs above the lettering (Higgins Cast Refs 198.3 and 198.4). The example from Staveley dates from the first half of the eighteenth century (Higgins Die 2190).

Although none of the TW bowl marks have so far been directly linked to pipes bearing a full-name Thomas Wild mark it seems likely that they were used by



the same maker. It is interesting to note that where full-name stem marks have been recovered, TW bowl marks are often also present. It therefore seems most likely that the TW bowl marks can be attributed to Thomas Wild of Rotherham.

- 8 Bowl of c1720-1750 that would almost certainly have been a spur type, although this is now missing. The pipe has an internally trimmed rim. There is no internal bowl cross; the pipe is well burnished and has a stem bore of 5/64". Approximately 73 mm from the back of the bowl is a roll stamp mark reading THO WILD (Context: 6026; Cast Ref 747.1; Higgins Die 1513).

This particular pipe is important since it provides one of the rare examples of an early eighteenth century pipe bowl with its associated roll-stamped stem mark. For details of Thomas Wild, see No. 7 above.

- 9 Twice life-size die detail of a second Thomas Wild mark (Higgins Die 1833) dating from c 1720-1750. Three examples of this mark were recovered from the site, one each from Contexts 6014, 6026 and 6030 (Cast Refs: 746.40, 749.14 and 749.15). For details of Thomas Wild, see No. 7 above.
- 10 Twice life-size die detail of a Benjamin Marsden mark (Context: 6026; Cast Ref: 747.2; Higgins Die 1834).

Benjamin Marsden was born in c1715, son of Godfrey Marsden, and baptised on 22 February 1714/15 at Thrybergh, near Rotherham (Thorn 2008). Benjamin married Hannah Rodgers of Rotherham on 26 July 1737. They had at least three children James (baptised 4 January 1737/8) George (born 1739) and Hannah (baptised 28 November 1742) (White 2004, 175; Thorn 2008). There is another Rotherham/Sheffield link here as both boys went on to be connected with the cutlery trade in Sheffield. James was apprenticed to Samuel Fowler, cutler of Attercliffe in 1749, and by 1763 both James and George were living in Attercliffe. At this time George's occupation is recorded as a cutler and it is quite possible that James was also a cutler by this date.

- 11 Twice life-size die detail of a Richard Scora mark (Context: 6026; Cast Ref: 747.6; Higgins Die 2183) dating from c.1720–1750.

The site produced a single mark that can be attributed to Richard Scora (Scorah) of Rawmarsh. There are two recorded pipe makers named Richard Scora who worked at Rawmarsh during the eighteenth century. It is possible that the first Richard Scora, baptised in September 1689, was the son of Jonathan Scora. Richard (I) married Mary Calver in October 1718 and the couple were baptising children between 1720 and 1736. In 1748 Richard took William Fitch apprentice. At the time of Mary's death in 1767 she is described as a 'wife' rather than a 'widow', so it is presumed that Richard was still alive at this date. This gives a likely working period of c.1710, when Richard would have been 21, to c.1760, when he would have been 71, for this maker.

The second Richard Scora married Elizabeth Capper in October 1783 and the couple were baptising children between 1784 and 1793. This second Richard Scora would have been working far too late to have been responsible for the Scora marks recovered from Sheffield castle.

The earlier Richard Scora is known to have had at least five different dies that he used to make his pipes (Higgins Die Nos. 1508, 1509, 1510, 1511 and 2183).

- 12 Twice life-size die detail of a William Wild mark (Higgins Die 1925). Nine examples were recovered from the excavations at Sheffield Castle (one from Context 4106; one from Context 6011; six from Context 6026 and one from Context 7017).

William Wild was a pipemaker working in Rotherham from at least 1764 to 1774 (White 2004, 185). He first appears in the marriage registers for Rotherham on 5 November 1764 when he married Sarah Marsden. The next reference comes from a letter dated 6 February 1771, when William Wild is writing to complain about an apprentice of his (Edward Wilson of Newark) who had run away (Newark Museum). The third and final reference to William is from 1774 when William is mentioned in Guest's History (Oswald 1975, 202). This reference has not been relocated, but it may relate to the occasion in 1774 when Wild is listed as a pipe maker when he subscribed towards the cost of a new organ for the church (<https://www.genuki.org.uk/>).

- 13 Spur bowl of c.1780–1800. The pipe has an internally trimmed rim. There is no internal bowl cross and the stem bore measures 5/64". There is a relief moulded ring motif on both sides of the spur. The bowl is mould decorated with five wide scallops on either side of the bowl, which are enclosed in a narrow border. On the back of the bowl facing the smoker is a stylised stags head (Context: 11024).

A number of bowls of this type have been found in the Sheffield, and elsewhere in Yorkshire, including Doncaster. Examples of similar bowls have been found in waste from an eighteenth-century pipe kiln belonging to Samuel Lumley who was working in Church Street, Doncaster, until c.1782 (White 2004, 33).

- 14 Spur bowl of c.1780–1810. The pipe has a cut rim with traces of a mould line which indicates that the mould has been repaired or altered during its lifetime. There is no internal bowl cross and the pipe has a stem bore of 4/64". The bowl is mould decorated with a floral plant motif, with leaf decorated seams. On the smoker's right the design comprises a sprig of flowers with no leaves; on the smoker's left the design includes leaves as well as flowers (Context: 6030).
- 15 Spur bowl of c1780-1810. The pipe has a cut rim and an internal bowl cross; the stem bore is 5/64" (Context: 11024).

The bowl is mould decorated with a floral motif with faint traces of a line of dots around the rim. There are two pipes of this design which appear to have been produced in the same mould. Another example of this design, probably from the same mould, was recovered from excavations in Tenter Street, Sheffield.

- 16 Spur bowl of c.1790–1810. The pipe has a cut rim with traces of a mould line below the rim, which indicates that the mould has been repaired or altered during its lifetime. There is no internal bowl cross; the stem bore is 5/64" (Context 6030).

The main decorative motif comprises a sprig of flowers which is moulded on to both sides of the pipe. On the sides of the spur is a relief moulded ring motif. On the left hand side of the bowl (as smoked) there is a faint letter P on the left hand side of the main flower, a little below the rim and beneath the mould line (the area the other side of the flower where another letter would be expected is missing). The seams of the pipe are unusual in that, rather than the standard leaf decoration, they are decorated with half a flower on each side. When the two halves of the mould come together, this produces a line of six-petaled flowers along the seams.

Another example of this distinctive bowl has been recorded by one of the authors (SDW) from excavations in Tenter Street, Sheffield, with the initials PR moulded in relief on the smokers left, flanking the flower motif. The Tenter Street example also has a row of dots around the rim, which are missing from the Sheffield Castle example. This shows that the Tenter Street is earlier than the Sheffield Castle example, which has a mould line showing that the top of the bowl has been modified by the addition of a metal plate, either to repair a section that has become worn from use or to heighten the mould so as to produce a taller bowl form. The maker (PR) has not yet been identified.

- 17 Damaged spur bowl with armorial decoration dating from c.1740–1790. The illustrated example is a complete example of the same design that was recovered from previous excavations on the site of Sheffield Castle (now in Sheffield City Museum; Acc. No. 1995.90.15). Both examples are almost certainly from the same mould. The pipe has a cut rim and an internal bowl cross; the stem bore is 5/64" (Context: 6033).

The moulded decoration comprises a coat of arms with lion and unicorn supporters. The banner beneath the arms bears the name WILLIAM WILD (for details of William Wild, see No. 12 above).

## Appendix 7: Catalogue of leather

### *Context 1002*

#### 1 Leather strap, stitched

Two lengths and three smaller fragments of strap with a row of closely spaced, oblique grain/flesh stitching along each side. Includes two thicknesses of strap with tooled edges and a straight, stitched end, the other end broken, and fragments that had been sandwiched between the two as a reinforcement. The stitching appears machined. Leather bovine, worn and compacted, black in colour. Condition: wet, possibly in proximity to coal dust. Length 110+ mm, width 22 mm, thickness 3.53 mm; length 100+ mm, width 21 mm, thickness 3.27 mm. fragments length 31+ mm width 22 mm, thickness 3.31 mm; length 30+ mm, width 15+ mm, thickness 3.05 mm; length 20+ mm, width 20 mm, thickness 2.79 mm. 201540, 1002

### *Context 4006*

#### 2 Leather shoe, fragmentary, front lacing, brass riveted construction, left foot, adult size

Shoe bottom: Midsole of elegant narrow shape with a natural tread, medium waist and wide seat the toe and part of the seat area now missing. Holes from hobnailing at the tread and seat. Waist area of sole with middle packing attached by an iron hobnail shank, 94+x54+ mm; fragment of middle edge packing with impression of upper lasting margin and hobnail holes present, 50+x50+ mm Upper: vamp broken along the lasting margin and the front seams, with a blunt squared toe and areas of double lapped seam present at the short convex rounded throat. Hole worn directly about the great toe joint suggesting a bunion. Leather worn no grain pattern surviving. Surviving length toe to throat around 130+ mm. Fragment broken from the right side of quarter with a double stitched lapped seam with brogue detail and lasting margin with a double row of brass rivets (now iron coloured due to iron staining), surviving height 54+ mm. Front facing with a double lapped seam around the edge and three round punched lace holes surviving. Upper seams machine stitched. Leather upper presumed bovine, no grain pattern surviving. Condition: wet. 201540, 4006

### *Context 4008*

#### 3 Leather shoe bottom packing

Rectangular piece with one original edge, others broken, with three small nail holes present. Probably broken from a shoe bottom, 25+x17+x2.21 mm. Leather compacted, presumed bovine, no grain pattern visible. Condition: damp. 201540, 4008

### *Context 4009, bag 1 of 3*

#### 4 Leather shoe, fragmentary, brass riveted construction, left foot

Waist and upper seat area of sole with a double row of brass rivets along each side. Surviving length 103+ mm, waist width 43 mm, max surviving width 67+ mm. Fragments broken from a heavily hobnailed tread sole and a leather shank. Condition: dry, desiccated. 201540, 4009

Leather shank with four hobnail holes along its length, apparently from a different shoe bottom, length 112 mm, width 13 mm, 4 mm thick. Condition: dry, desiccated. 201540, 4009

#### 5 Leather remains of 2 shoes, highly fragmentary

Shoe bottom fragments including the blunt squared toe area with a double row of metal rivets, small fragments of sole with large holes from hobnails, fragments of midsole and middle packing, heel jump. Upper fragments including a matching blunt squared toe area of vamp with a large hole and all edges broken and no lasting margin surviving, two upper fragments, including an area of the front edge with a double stitched lapped seam, front opening with two lace holes, one with a metal eyelet. Also a fragment from the front opening of a second shoe with three lace holes surviving with smaller spacing. Condition: wet. 201540, 4009

#### 6 Leather machine belt fragment

Fragment with a pair of large parallel slits along one edge. Condition: wet. 201540, 4009

*Context 4009, bag 2 of 3*

#### 7 Leather shoe, brass riveted construction, right foot, adult size

Shoe bottom; lower tread, medium waist and wide seat of sole with a single row of brass rivets along each side, the rivets have iron staining. A scored line across the lower waist on the grain side marks the former position of a separate heel lift (now missing). A single row of brass rivets running across the upper waist area marks the former position of a separate tread sole (now missing). The sole has a gently convex moulded profile. A fragment of insole or midsole is attached at the waist area, grain upward to the foot. The impression of a leather shank is visible on the upper face (interior) of the sole. Condition: wet. Surviving length around 155+ mm, waist width 48 mm, seat width 66+ mm. 201540, 4009

*Context 4009, bag 3 of 3*

#### 8 Leather highly fragmentary shoe remains, riveted construction

Shoe bottom: nine fragments with large hobnail holes present, fragments with small rivet holes, and a possible heel lift. Upper: five fragments including areas of double stitched lapped seam, four fragments of front opening with lace holes, two of which have metal eyelets and machine stitching. Condition: wet. 201540, 4009

#### 9 Leather machine belt fragments

Three pieces with parallel slits along the surviving edges, one with a large central rivet hole. Condition: wet. 201540, 4009

#### 10 Leather perforated fragments

Two fragments with series of very small, equally spaced holes over the entire surface. Condition: wet. 201540, 4009

#### 11 Leather secondary waste

Three trimmings of worn cattle hide. Length 121 mm, width 8–10 mm, thickness 3 mm; length 81mm, width 1–7mm, thickness 5 mm; length 77 mm, width 3–9 mm, thickness 2.5 mm. Condition: wet. 201540, 4009

*Context 4009, separate bag*

#### 12 Shoe bottom fragment

Fragment with broken hobnail hole present. Condition: wet, brown 'oily' 201540, 4009

#### 13 Leather perforated piece

Rectangular piece with two parallel cut edges, broken at each end, the surface covered by rows of small evenly-spaced holes with a single large round hole in the centre. Possibly broken from a shoe facing with a central lace hole? Leather no

grain pattern visible. Length 53+ mm, width 25 mm, 3 mm thick. Condition: wet, brown 'oily'. 201540, 4009

*Context 4010*

14 Leather shoe bottom fragments

Fragment broken from the waist area of shoe sole with a convex moulded profile and hobnail holes 53+x52+ mm. Two matching heel lifts with concave curving heel breast, worn, with a large central hole for a hobnail, length 53+ mm, width 63 mm. Condition: wet. 201540, 4010

15 Leather machine belt junction

Three thicknesses of strap joined together by brass rivets with circular washers, diameter 14 mm, cut across each end. The upper (inner) strap has a row of oblique parallel slits along each side. Leather cattle hide around 3.5 mm thick, combined thickness around 10 mm. Surviving length approximately 70+ mm, max width 53 mm. Condition: wet. 201540, 4010

*Context 4017*

16 Leather secondary waste

Triangular piece cut from an old shoe sole with a stitching channel present, probably cut from the lower edge of a tread sole. Leather cattle hide around 4 mm thick. Length 56+ mm, max width 42+ mm. Condition: wet. 201540, 4010

*Context 4039*

17 Leather shoe bottom fragment

Broken fragment from the waist area of a hobnailed shoe bottom component, surviving length 36+ mm, width 53 mm. Condition: wet. 201540, 4039

18 Leather secondary waste

Fragment cut from a shoe bottom component, no distinguishing features 31x12x3.5 mm. Skived trimming 20x4x2 mm. Condition: wet. 201540, 4039

*Context 4040*

19 Leather perforated fragment.

Sub-square shaped fragment all edges torn, pierced by seven rows of equally spaced small round punched holes, diameter 1–2 mm, 37+x37+x2 mm. Condition: wet. 201540, 4040

20 Leather shoe bottom fragments

Rectangular shank with a large round central hole, 9 mm in diameter, broken across a second. Surviving length 50+ mm, width 32 mm, thickness 2 mm: 5 fragments with hobnail holes present. Leather worn bovine. Condition: wet. 201540, 4040

21 Leather secondary waste

Rectangular offcut with worn edges 58x23x2.5 mm. Leather presumed bovine. Condition: wet. 201540, 4040

*Context 4042*

22 Leather shoe, highly fragmentary, riveted construction

Around 33 fragments broken from a large shoe bottom with large worn hobnail holes, includes a small area of brass riveting and upper lasting margin. Max width of surviving tread area 125+ mm. Condition: wet. 201540, 4042



*Context 4052*

23 Leather shoe bottom packing

Rectangular piece with straight sides and end, one end broken, with two rows of three small paired holes. Similar to that from context 4008 above. Leather compacted, worn, presumed bovine. Length 50+ mm, width 18 mm, thickness 2.70 mm. Condition: dry, desiccated, some white fungal growth present. 201540, 4052



## Appendix 8: Environmental data

### Wood charcoal

Sample 1009, layer 1076								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
1	>4 mm	<i>Corylus avellana</i>	2		1	1		
2	>4 mm	<i>Corylus avellana</i>	1					
3	>4 mm	<i>Ilex aquifolium</i>						
4	>4 mm	<i>Corylus avellana</i>	1		1	1		
5	>4 mm	<i>Corylus avellana</i>			1			
6	>4 mm	<i>Acer campestre</i>						
7	>4 mm	<i>Quercus</i> sp.	1nr	1				
8	>4 mm	<i>Quercus</i> sp.		1		1		1
9	>4 mm	<i>Ilex aquifolium</i>						
10	>4 mm	<i>Corylus avellana</i>	1		1			1
11	>4 mm	<i>Ilex aquifolium</i>						
12	>4 mm	<i>Quercus</i> sp.		1		1		
13	>4 mm	<i>Corylus avellana</i>				1		
14	>4 mm	<i>Ilex aquifolium</i>						
15	>4 mm	<i>Acer campestre</i>						
16	>4 mm	Pomoideae	1			1		
17	>4 mm	<i>Fraxinus excelsior</i>	1nr	1		1		1
18	>4 mm	<i>Quercus</i> sp.	1nr	1				
19	>4 mm	<i>Ilex aquifolium</i>				1		
20	>4 mm	<i>Acer campestre</i>						
21	>4 mm	<i>Fraxinus excelsior</i>				1		
22	>4 mm	<i>Corylus avellana</i>			1			
23	>4 mm	<i>Corylus avellana</i>						
24	>4 mm	<i>Quercus</i> sp.		1				2
25	>4 mm	<i>Quercus</i> sp.	1nr	1				
26	2-4 mm	<i>Quercus</i> sp.		1				
27	2-4 mm	<i>Acer campestre</i>						
28	2-4 mm	<i>Corylus avellana</i>						
29	2-4 mm	<i>Fraxinus excelsior</i>		1				
30	2-4 mm	<i>Quercus</i> sp.		1				2
31	2-4 mm	<i>Fraxinus excelsior</i>						
32	2-4 mm	<i>Quercus</i> sp.		1				
33	2-4 mm	Indeterminate						
34	2-4 mm	<i>Fraxinus excelsior</i>		1		1		
35	2-4 mm	<i>Fraxinus excelsior</i>						
36	2-4 mm	<i>Betula</i> sp.						
37	2-4 mm	<i>Quercus</i> sp.		1				
38	2-4 mm	<i>Quercus</i> sp.		1		1		
39	2-4 mm	<i>Corylus avellana</i>						





Sample 1009, layer 1076								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
40	2-4 mm	<i>Quercus</i> sp.	1nr	1				
41	2-4 mm	<i>Corylus avellana</i>						
42	2-4 mm	<i>Quercus</i> sp.						
43	2-4 mm	<i>Corylus avellana</i>						
44	2-4 mm	<i>Quercus</i> sp.		1		1		
45	2-4 mm	<i>Ilex aquifolium</i>						
46	2-4 mm	<i>Quercus</i> sp.		1		1		
47	2-4 mm	<i>Fraxinus excelsior</i>						
48	2-4 mm	<i>Corylus avellana</i>						
49	2-4 mm	Pomoideae						
50	2-4 mm	<i>Corylus avellana</i>						

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1 mm wide). <sup>b</sup>1 = yes. <sup>c</sup>1 = low brilliance; 2 = strong brilliance; 3 = total fusion

Sample 1003, layer 1057								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
1	>4 mm	<i>Quercus</i> sp.	1nr	1				
2	>4 mm	<i>Quercus</i> sp.	1	1				
3	>4 mm	<i>Quercus</i> sp.	1	1				
4	>4 mm	<i>Quercus</i> sp.	1	1				
5	>4 mm	<i>Quercus</i> sp.	1nr	1		1		
6	>4 mm	Pomoideae						
7	>4 mm	<i>Quercus</i> sp.	1	1				
8	>4 mm	<i>Quercus</i> sp.	1	1				
9	>4 mm	<i>Quercus</i> sp.	1	1				
10	>4 mm	<i>Quercus</i> sp.	1	1				
11	>4 mm	<i>Acer campestre</i>						
12	>4 mm	<i>Quercus</i> sp.		1				
13	>4 mm	<i>Quercus</i> sp.	1nr					
14	>4 mm	<i>Quercus</i> sp.	1nr	1		1		
15	>4 mm	<i>Quercus</i> sp.	1nr	1				
16	>4 mm	<i>Quercus</i> sp.	1nr	1				
17	>4 mm	<i>Quercus</i> sp.	1nr	1				
18	>4 mm	<i>Quercus</i> sp.	1nr	1				
19	>4 mm	<i>Quercus</i> sp.	1nr	1				
20	>4 mm	<i>Quercus</i> sp.	1nr	1				
21	>4 mm	<i>Quercus</i> sp.		1				
22	>4 mm	<i>Quercus</i> sp.	1	1				
23	>4 mm	<i>Quercus</i> sp.	1	1		1		
24	>4 mm	Pomoideae						
25	>4 mm	<i>Quercus</i> sp.	1	1				
26	2-4 mm	<i>Quercus</i> sp.	1nr	1				
27	2-4 mm	<i>Quercus</i> sp.		1				
28	2-4 mm	<i>Quercus</i> sp.	1nr	1				



Sample 1003, layer 1057								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
29	2-4 mm	<i>Quercus</i> sp.		1				
30	2-4 mm	<i>Quercus</i> sp.		1				
31	2-4 mm	<i>Quercus</i> sp.		1				
32	2-4 mm	<i>Quercus</i> sp.		1				
33	2-4 mm	<i>Quercus</i> sp.		1				
34	2-4 mm	<i>Quercus</i> sp.		1				
35	2-4 mm	<i>Quercus</i> sp.		1				
36	2-4 mm	<i>Quercus</i> sp.						
37	2-4 mm	<i>Quercus</i> sp.		1				
38	2-4 mm	<i>Quercus</i> sp.						
39	2-4 mm	<i>Quercus</i> sp.		1				
40	2-4 mm	<i>Quercus</i> sp.						
41	2-4 mm	<i>Quercus</i> sp.		1				
42	2-4 mm	Pomoideae						
43	2-4 mm	Pomoideae						
44	2-4 mm	<i>Acer campestre</i>						
45	2-4 mm	<i>Quercus</i> sp.						
46	2-4 mm	<i>Quercus</i> sp.						
47	2-4 mm	<i>Quercus</i> sp.	1nr	1				
48	2-4 mm	<i>Quercus</i> sp.		1				
49	2-4 mm	<i>Quercus</i> sp.						
50	2-4 mm	<i>Quercus</i> sp.		1				

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1 mm wide). <sup>b</sup>1 = yes. <sup>c</sup>1 = low brilliance; 2 = strong brilliance; 3 = total fusion

Sample 6004, layer 6047								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
1	>4 mm	<i>Quercus</i> sp.	1nr	1		1		
2	>4 mm	<i>Quercus</i> sp.	1	1				
3	>4 mm	<i>Quercus</i> sp.						
4	>4 mm	<i>Corylus avellana</i>	2		1			
5	>4 mm	<i>Quercus</i> sp.	1	1				
6	>4 mm	<i>Quercus</i> sp.		1				
7	>4 mm	<i>Corylus avellana</i>	2					
8	>4 mm	<i>Quercus</i> sp.	1	1				
9	>4 mm	<i>Quercus</i> sp.	1	1		1		
10	>4 mm	<i>Quercus</i> sp.	1	1		1		
11	>4 mm	<i>Corylus avellana</i>			1	1		
12	>4 mm	<i>Fraxinus excelsior</i>						
13	>4 mm	<i>Quercus</i> sp.		1				
14	>4 mm	<i>Quercus</i> sp.		1				
15	>4 mm	<i>Corylus avellana</i>	3					
16	>4 mm	<i>Quercus</i> sp.						
17	>4 mm	<i>Quercus</i> sp.	1nr	1				



Sample 6004, layer 6047								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
18	>4 mm	<i>Quercus</i> sp.	1nr	1		1		
19	>4 mm	<i>Alnus glutinosa</i>						
20	>4 mm	<i>Alnus glutinosa</i>				1		
21	>4 mm	<i>Quercus</i> sp.	1nr	1				
22	>4 mm	<i>Quercus</i> sp.	1nr	1				
23	>4 mm	<i>Betula</i> sp.	3					
24	>4 mm	<i>Quercus</i> sp.		1				
25	>4 mm	<i>Corylus avellana</i>	3					
26	2-4 mm	<i>Quercus</i> sp.		1				
27	2-4 mm	<i>Quercus</i> sp.	1nr	1		1		
28	2-4 mm	<i>Alnus glutinosa</i>						
29	2-4 mm	<i>Quercus</i> sp.		1				
30	2-4 mm	<i>Corylus avellana</i>						
31	2-4 mm	<i>Quercus</i> sp.		1				
32	2-4 mm	<i>Quercus</i> sp.						
33	2-4 mm	<i>Quercus</i> sp.		1				
34	2-4 mm	<i>Quercus</i> sp.						
35	2-4 mm	<i>Quercus</i> sp.						
36	2-4 mm	<i>Quercus</i> sp.		1				
37	2-4 mm	<i>Quercus</i> sp.		1				
38	2-4 mm	<i>Quercus</i> sp.		1				
39	2-4 mm	<i>Quercus</i> sp.						
40	2-4 mm	<i>Quercus</i> sp.		1				
41	2-4 mm	<i>Quercus</i> sp.						
42	2-4 mm	<i>Quercus</i> sp.		1				
43	2-4 mm	<i>Quercus</i> sp.		1				
44	2-4 mm	<i>Corylus avellana</i>	3					
45	2-4 mm	<i>Quercus</i> sp.		1				
46	2-4 mm	<i>Quercus</i> sp.		1				
47	2-4 mm	<i>Quercus</i> sp.		1				
48	2-4 mm	<i>Alnus glutinosa</i>						
49	2-4 mm	<i>Quercus</i> sp.		1				
50	2-4 mm	<i>Alnus glutinosa</i>						

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1 mm wide). <sup>b</sup>1 = yes. <sup>c</sup>1 = low brilliance; 2 = strong brilliance; 3 = total fusion

Sample 6005, charcoal lens 6049								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
1	>4 mm	<i>Corylus avellana</i>	1		1			
2	>4 mm	<i>Alnus glutinosa</i>						
3	>4 mm	<i>Quercus</i> sp.	1	1				
4	>4 mm	<i>Quercus</i> sp.	1	1				
5	>4 mm	<i>Alnus glutinosa</i>	2					
6	>4 mm	<i>Quercus</i> sp.		1				



Sample 6005, charcoal lens 6049								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
7	>4 mm	<i>Quercus</i> sp.	1nr	1				
8	>4 mm	<i>Quercus</i> sp.						
9	>4 mm	<i>Quercus</i> sp.		1				
10	>4 mm	<i>Quercus</i> sp.	3					
11	>4 mm	<i>Alnus glutinosa</i>						
12	>4 mm	<i>Corylus avellana</i>	2					
13	>4 mm	<i>Quercus</i> sp.	1nr	1				
14	>4 mm	<i>Quercus</i> sp.	1	1				
15	>4 mm	<i>Quercus</i> sp.		1				
16	>4 mm	<i>Quercus</i> sp.		1				
17	>4 mm	<i>Quercus</i> sp.	1nr	1				
18	>4 mm	<i>Corylus avellana</i>						
19	>4 mm	<i>Quercus</i> sp.		1				
20	>4 mm	<i>Quercus</i> sp.						
21	>4 mm	<i>Quercus</i> sp.		1				
22	>4 mm	<i>Quercus</i> sp.		1				
23	>4 mm	<i>Quercus</i> sp.						
24	>4 mm	<i>Quercus</i> sp.		1				
25	>4 mm	<i>Quercus</i> sp.		1				2
26	2-4 mm	<i>Corylus avellana</i>	3					
27	2-4 mm	<i>Alnus glutinosa</i>						
28	2-4 mm	<i>Alnus glutinosa</i>						
29	2-4 mm	<i>Quercus</i> sp.		1				
30	2-4 mm	<i>Quercus</i> sp.						
31	2-4 mm	<i>Quercus</i> sp.		1				
32	2-4 mm	<i>Corylus avellana</i>	3					
33	2-4 mm	<i>Quercus</i> sp.						
34	2-4 mm	<i>Quercus</i> sp.						
35	2-4 mm	<i>Quercus</i> sp.		1				
36	2-4 mm	<i>Quercus</i> sp.		1				
37	2-4 mm	<i>Alnus glutinosa</i>						
38	2-4 mm	<i>Quercus</i> sp.	1nr	1				
39	2-4 mm	<i>Quercus</i> sp.						
40	2-4 mm	<i>Quercus</i> sp.		1				
41	2-4 mm	<i>Quercus</i> sp.		1				
42	2-4 mm	<i>Quercus</i> sp.	1nr	1				
43	2-4 mm	<i>Alnus glutinosa</i>						
44	2-4 mm	<i>Quercus</i> sp.		1				
45	2-4 mm	<i>Alnus glutinosa</i>			1			
46	2-4 mm	<i>Quercus</i> sp.						
47	2-4 mm	<i>Alnus glutinosa</i>						
48	2-4 mm	<i>Quercus</i> sp.						
49	2-4 mm	<i>Alnus glutinosa</i>				1		



**Sample 6005, charcoal lens 6049**

Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
50	2-4 mm	<i>Quercus</i> sp.						

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1 mm wide). <sup>b</sup>1 = yes. <sup>c</sup>1 = low brilliance; 2 = strong brilliance; 3 = total fusion

**Sample 5001, layer 5039**

Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
1	>4 mm	<i>Quercus</i> sp.	1nr	1				
2	>4 mm	<i>Quercus</i> sp.	1nr	1				
3	>4 mm	<i>Quercus</i> sp.	1nr					
4	>4 mm	<i>Quercus</i> sp.	1nr	1				2
5	>4 mm	<i>Quercus</i> sp.		1		1		
6	>4 mm	<i>Quercus</i> sp.	1nr	1				
7	>4 mm	<i>Quercus</i> sp.		1				
8	>4 mm	<i>Quercus</i> sp.	1					
9	>4 mm	<i>Quercus</i> sp.	1					
10	>4 mm	<i>Quercus</i> sp.	1nr	1				
11	>4 mm	<i>Quercus</i> sp.	1	1				
12	>4 mm	<i>Quercus</i> sp.						
13	>4 mm	<i>Quercus</i> sp.	1nr	1				2
14	>4 mm	<i>Quercus</i> sp.	1nr	1				
15	>4 mm	<i>Quercus</i> sp.	1nr	1				
16	>4 mm	<i>Quercus</i> sp.		1				
17	>4 mm	<i>Quercus</i> sp.		1				2
18	>4 mm	<i>Quercus</i> sp.	1nr	1				2
19	>4 mm	<i>Quercus</i> sp.	1nr	1				
20	>4 mm	<i>Quercus</i> sp.	2					
21	>4 mm	<i>Quercus</i> sp.		1				
22	>4 mm	<i>Quercus</i> sp.		1				
23	>4 mm	<i>Quercus</i> sp.	1nr	1				
24	>4 mm	<i>Quercus</i> sp.	1nr	1				
25	>4 mm	<i>Quercus</i> sp.	1nr					
26	2-4 mm	<i>Corylus avellana</i>						
27	2-4 mm	<i>Quercus</i> sp.	1nr	1				2
28	2-4 mm	<i>Quercus</i> sp.	1nr	1				
29	2-4 mm	<i>Quercus</i> sp.		1				
30	2-4 mm	<i>Quercus</i> sp.	1nr	1				
31	2-4 mm	<i>Prunus</i> cf. <i>spinosa</i>	1					
32	2-4 mm	<i>Quercus</i> sp.	1nr	1				
33	2-4 mm	<i>Quercus</i> sp.		1				
34	2-4 mm	<i>Quercus</i> sp.		1				
35	2-4 mm	<i>Quercus</i> sp.		1				
36	2-4 mm	<i>Quercus</i> sp.		1				1
37	2-4 mm	<i>Quercus</i> sp.	1nr	1				2
38	2-4 mm	<i>Quercus</i> sp.	1nr	1				



Sample 5001, layer 5039								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
39	2-4 mm	<i>Quercus</i> sp.		1				
40	2-4 mm	<i>Quercus</i> sp.		1				
41	2-4 mm	<i>Quercus</i> sp.		1				
42	2-4 mm	<i>Quercus</i> sp.		1				
43	2-4 mm	<i>Quercus</i> sp.	1	1				
44	2-4 mm	<i>Quercus</i> sp.						
45	2-4 mm	<i>Quercus</i> sp.	1	1				
46	2-4 mm	<i>Quercus</i> sp.	1nr	1				
47	2-4 mm	<i>Quercus</i> sp.		1				
48	2-4 mm	<i>Quercus</i> sp.		1				
49	2-4 mm	<i>Quercus</i> sp.		1				
50	2-4 mm	<i>Corylus avellana</i>						

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1 mm wide). <sup>b</sup>1 = yes. <sup>c</sup>1 = low brilliance; 2 = strong brilliance; 3 = total fusion

Sample 3003, layer 3062								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
1	>4 mm	<i>Ulmus</i> sp.	1					
2	>4 mm	<i>Ilex aquifolium</i>						
3	>4 mm	<i>Corylus avellana</i>	1			1		
4	>4 mm	<i>Quercus</i> sp.	1nr	1				
5	>4 mm	<i>Ulmus</i> sp.	1					
6	>4 mm	<i>Corylus avellana</i>	2					
7	>4 mm	<i>Corylus avellana</i>						
8	>4 mm	<i>Corylus avellana</i>	2					
9	>4 mm	<i>Corylus avellana</i>	2		1			
10	>4 mm	<i>Fraxinus excelsior</i>						
11	>4 mm	<i>Fraxinus excelsior</i>						
12	>4 mm	<i>Fraxinus excelsior</i>	1nr	1		1		
13	>4 mm	<i>Fraxinus excelsior</i>	1nr	1		1		
14	>4 mm	<i>Ulmus</i> sp.	1					
15	>4 mm	<i>Corylus avellana</i>	1			1		1
16	>4 mm	<i>Quercus</i> sp.	1nr	1		1		
17	>4 mm	<i>Quercus</i> sp.	1nr	1		1		
18	>4 mm	<i>Quercus</i> sp.		1				
19	>4 mm	<i>Quercus</i> sp.		1				
20	>4 mm	<i>Fraxinus excelsior</i>	1nr			1		
21	>4 mm	<i>Corylus avellana</i>						
22	>4 mm	<i>Quercus</i> sp.	1nr	1				
23	>4 mm	Pomoideae						
24	>4 mm	Pomoideae						
25	>4 mm	<i>Ulmus</i> sp.						



Sample 3003, layer 3062								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
26	2-4 mm	<i>Populus / Salix</i>						
27	2-4 mm	<i>Quercus</i> sp.		1				
28	2-4 mm	<i>Populus / Salix</i>						
29	2-4 mm	<i>Quercus</i> sp.		1				
30	2-4 mm	<i>Populus / Salix</i>				1		
31	2-4 mm	<i>Quercus</i> sp.		1				
32	2-4 mm	<i>Quercus</i> sp.	1nr	1				
33	2-4 mm	<i>Quercus</i> sp.	1nr	1				
34	2-4 mm	<i>Populus / Salix</i>						
35	2-4 mm	<i>Quercus</i> sp.	1nr	1				
36	2-4 mm	<i>Alnus glutinosa</i>						
37	2-4 mm	<i>Quercus</i> sp.		1				
38	2-4 mm	<i>Quercus</i> sp.		1				
39	2-4 mm	<i>Quercus</i> sp.	1nr	1				
40	2-4 mm	<i>Quercus</i> sp.		1				
41	2-4 mm	<i>Fraxinus excelsior</i>						
42	2-4 mm	<i>Fraxinus excelsior</i>	1nr	1		1		
43	2-4 mm	<i>Populus / Salix</i>						
44	2-4 mm	<i>Fraxinus excelsior</i>	1nr	1				
45	2-4 mm	<i>Fraxinus excelsior</i>		1				
46	2-4 mm	<i>Quercus</i> sp.		1				
47	2-4 mm	<i>Fraxinus excelsior</i>		1				
48	2-4 mm	<i>Fraxinus excelsior</i>						
49	2-4 mm	<i>Fraxinus excelsior</i>						
50	2-4 mm	<i>Populus / Salix</i>						

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1 mm wide). <sup>b</sup>1 = yes. <sup>c</sup>1 = low brilliance; 2 = strong brilliance; 3 = total fusion

Sample 3008, layer 3056								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
1	>4 mm	<i>Quercus</i> sp.	1nr	1		1		
2	>4 mm	<i>Quercus</i> sp.		1		1		
3	>4 mm	<i>Quercus</i> sp.	1nr	1				
4	>4 mm	<i>Quercus</i> sp.	1nr	1				
5	>4 mm	<i>Quercus</i> sp.	1nr	1				
6	>4 mm	<i>Quercus</i> sp.	1	1				
7	>4 mm	<i>Quercus</i> sp.	1	1		1		
8	>4 mm	<i>Quercus</i> sp.	1nr	1				
9	>4 mm	<i>Corylus avellana</i>						
10	>4 mm	<i>Quercus</i> sp.	1	1				
11	>4 mm	<i>Quercus</i> sp.	1	1				
12	>4 mm	<i>Corylus avellana</i>						



Sample 3008, layer 3056								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
13	>4 mm	<i>Quercus</i> sp.	1nr	1				
14	>4 mm	<i>Quercus</i> sp.	1nr	1				
15	>4 mm	<i>Quercus</i> sp.	1nr	1				
16	>4 mm	<i>Quercus</i> sp.	1	1				
17	>4 mm	<i>Quercus</i> sp.	1	1		1		
18	>4 mm	<i>Quercus</i> sp.		1				
19	>4 mm	<i>Quercus</i> sp.		1				
20	>4 mm	<i>Quercus</i> sp.	1nr	1		1		
21	>4 mm	<i>Quercus</i> sp.		1				
22	>4 mm	<i>Quercus</i> sp.		1		1		
23	>4 mm	<i>Quercus</i> sp.	1nr	1				
24	>4 mm	<i>Quercus</i> sp.	1nr	1				
25	>4 mm	<i>Quercus</i> sp.	1nr	1		1		
26	2-4 mm	<i>Quercus</i> sp.		1				
27	2-4 mm	<i>Corylus avellana</i>						
28	2-4 mm	<i>Quercus</i> sp.		1		1		
29	2-4 mm	<i>Quercus</i> sp.		1				
30	2-4 mm	<i>Corylus avellana</i>						
31	2-4 mm	<i>Quercus</i> sp.		1				
32	2-4 mm	<i>Quercus</i> sp.		1				
33	2-4 mm	<i>Quercus</i> sp.		1				
34	2-4 mm	<i>Corylus avellana</i>						
35	2-4 mm	<i>Quercus</i> sp.		1				
36	2-4 mm	<i>Quercus</i> sp.		1				
37	2-4 mm	<i>Quercus</i> sp.		1				
38	2-4 mm	Pomoideae						
39	2-4 mm	<i>Quercus</i> sp.		1				
40	2-4 mm	<i>Quercus</i> sp.		1				
41	2-4 mm	<i>Quercus</i> sp.		1				
42	2-4 mm	<i>Corylus avellana</i>						
43	2-4 mm	<i>Quercus</i> sp.						
44	2-4 mm	<i>Quercus</i> sp.		1				
45	2-4 mm	<i>Quercus</i> sp.		1				
46	2-4 mm	<i>Quercus</i> sp.		1				
47	2-4 mm	<i>Quercus</i> sp.		1				
48	2-4 mm	<i>Quercus</i> sp.		1				
49	2-4 mm	<i>Quercus</i> sp.		1				
50	2-4 mm	<i>Quercus</i> sp.						

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1 mm wide). <sup>b</sup>1 = yes. <sup>c</sup>1 = low brilliance; 2 = strong brilliance; 3 = total fusion

Sample 3009, layer 3057								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
1	>4 mm	<i>Quercus</i> sp.		1				





Sample 3009, layer 3057								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
2	>4 mm	<i>Quercus</i> sp.				1		
3	>4 mm	<i>Quercus</i> sp.		1				
4	>4 mm	Indeterminate						
5	>4 mm	<i>Quercus</i> sp.	1nr	1				
6	>4 mm	<i>Quercus</i> sp.	1nr					
7	>4 mm	<i>Corylus avellana</i>						
8	>4 mm	Indeterminate						
9	>4 mm	<i>Quercus</i> sp.		1				
10	>4 mm	<i>Quercus</i> sp.						
11	>4 mm	<i>Quercus</i> sp.		1				
12	>4 mm	Indeterminate						
13	>4 mm	Indeterminate						
14	>4 mm	<i>Quercus</i> sp.				1		
15	>4 mm	Indeterminate						
16	2-4 mm	<i>Quercus</i> sp.		1				
17	2-4 mm	<i>Quercus</i> sp.		1				
18	2-4 mm	<i>Quercus</i> sp.		1				
19	2-4 mm	<i>Quercus</i> sp.		1				
20	2-4 mm	<i>Quercus</i> sp.		1				
21	2-4 mm	Indeterminate						
22	2-4 mm	<i>Quercus</i> sp.						
23	2-4 mm	<i>Quercus</i> sp.		1				
24	2-4 mm	<i>Quercus</i> sp.						
25	2-4 mm	<i>Quercus</i> sp.		1				
26	2-4 mm	<i>Quercus</i> sp.		1				
27	2-4 mm	<i>Corylus avellana</i>						
28	2-4 mm	<i>Quercus</i> sp.		1				
29	2-4 mm	<i>Quercus</i> sp.		1		1		
30	2-4 mm	<i>Quercus</i> sp.	1nr	1				2
31	2-4 mm	<i>Quercus</i> sp.						
32	2-4 mm	<i>Quercus</i> sp.		1				
33	2-4 mm	<i>Quercus</i> sp.						
34	2-4 mm	<i>Quercus</i> sp.		1				2
35	2-4 mm	<i>Quercus</i> sp.		1				
36	2-4 mm	<i>Quercus</i> sp.	1nr	1				
37	2-4 mm	<i>Quercus</i> sp.		1				
38	2-4 mm	Indeterminate						
39	2-4 mm	<i>Quercus</i> sp.						
40	2-4 mm	<i>Quercus</i> sp.				1		
41	2-4 mm	<i>Quercus</i> sp.						
42	2-4 mm	<i>Quercus</i> sp.						2
43	2-4 mm	Indeterminate						
44	2-4 mm	<i>Quercus</i> sp.						



Sample 3009, layer 3057								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
45	2-4 mm	<i>Quercus</i> sp.						
46	2-4 mm	Indeterminate						
47	2-4 mm	<i>Quercus</i> sp.		1				
48	2-4 mm	Indeterminate						
49	2-4 mm	<i>Quercus</i> sp.		1				
50	2-4 mm	<i>Quercus</i> sp.						

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1 mm wide). <sup>b</sup>1 = yes. <sup>c</sup>1 = low brilliance; 2 = strong brilliance; 3 = total fusion

Sample 1000, layer 1018								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
1	>4 mm	<i>Quercus</i> sp.	2	1				
2	>4 mm	<i>Quercus</i> sp.	3nr			1		
3	>4 mm	<i>Quercus</i> sp.	2nr			1		
4	>4 mm	<i>Quercus</i> sp.	2nr			1		
5	>4 mm	<i>Quercus</i> sp.	2nr					
6	>4 mm	<i>Quercus</i> sp.	2nr					
7	>4 mm	<i>Quercus</i> sp.	2nr					
8	>4 mm	<i>Quercus</i> sp.	2nr			1		
9	>4 mm	<i>Quercus</i> sp.	2nr			1		
10	>4 mm	<i>Quercus</i> sp.	2nr			1		
11	>4 mm	<i>Quercus</i> sp.	1nr	1				
12	>4 mm	<i>Quercus</i> sp.	2nr			1		
13	>4 mm	<i>Quercus</i> sp.	2nr					
14	>4 mm	<i>Quercus</i> sp.	2nr			1		
15	>4 mm	<i>Quercus</i> sp.	3nr					
16	>4 mm	<i>Quercus</i> sp.	3nr			1		
17	>4 mm	<i>Prunus</i> cf. <i>spinosa</i>	3					
18	>4 mm	<i>Quercus</i> sp.	2nr			1		
19	>4 mm	<i>Quercus</i> sp.	3nr				1	
20	>4 mm	<i>Quercus</i> sp.	2nr			1		
21	>4 mm	<i>Quercus</i> sp.	3nr					
22	>4 mm	<i>Populus</i> spp. / <i>Salix</i> spp.						
23	>4 mm	<i>Quercus</i> sp.	1nr			1		
24	>4 mm	Pomoideae	3					
25	>4 mm	<i>Quercus</i> sp.	3nr					
26	2-4 mm	<i>Quercus</i> sp.						
27	2-4 mm	<i>Quercus</i> sp.	3nr					
28	2-4 mm	<i>Quercus</i> sp.						
29	2-4 mm	<i>Betula</i> sp.						
30	2-4 mm	<i>Quercus</i> sp.	3nr					
31	2-4 mm	Coniferous indet.						
32	2-4 mm	<i>Quercus</i> sp.				1		



Sample 1000, layer 1018								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
33	2-4 mm	<i>Quercus</i> sp.						
34	2-4 mm	<i>Quercus</i> sp.						
35	2-4 mm	<i>Quercus</i> sp.						
36	2-4 mm	<i>Quercus</i> sp.						
37	2-4 mm	<i>Quercus</i> sp.						
38	2-4 mm	<i>Betula</i> sp.						
39	2-4 mm	<i>Acer campestre</i>						
40	2-4 mm	<i>Quercus</i> sp.						
41	2-4 mm	<i>Quercus</i> sp.						
42	2-4 mm	<i>Alnus glutinosa</i>						
43	2-4 mm	<i>Corylus avellana</i>						
44	2-4 mm	<i>Quercus</i> sp.						
45	2-4 mm	<i>Quercus</i> sp.						
46	2-4 mm	<i>Quercus</i> sp.						
47	2-4 mm	<i>Acer campestre</i>						
48	2-4 mm	<i>Quercus</i> sp.						
49	2-4 mm	<i>Quercus</i> sp.						
50	2-4 mm	<i>Quercus</i> sp.						

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1 mm wide). <sup>b</sup>1 = yes. <sup>c</sup>1 = low brilliance; 2 = strong brilliance; 3 = total fusion

## Wood

Sample 6009, pit fill 6060								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Bark <sup>b</sup>
1	>4 mm	<i>Quercus</i> sp.	1nr	1				
2	>4 mm	<i>Quercus</i> sp.	1	1				
3	>4 mm	<i>Alnus glutinosa</i>						
4	>4 mm	<i>Quercus</i> sp.	1	1				
5	>4 mm	<i>Quercus</i> sp.	1	1				
6	>4 mm	<i>Quercus</i> sp.	1	1				
7	>4 mm	<i>Quercus</i> sp.	1	1				
8	>4 mm	<i>Quercus</i> sp.	1	1				
9	>4 mm	<i>Quercus</i> sp.		1				
10	>4 mm	<i>Quercus</i> sp.		1				
11	>4 mm	Indeterminate						
12	>4 mm	<i>Quercus</i> sp.		1				
13	>4 mm	<i>Quercus</i> sp.		1				
14	>4 mm	<i>Quercus</i> sp.	1	1				
15	>4 mm	<i>Quercus</i> sp.	1	1				
16	>4 mm	<i>Quercus</i> sp.		1				
17	>4 mm	Indeterminate						
18	>4 mm	<i>Quercus</i> sp.	1	1				
19	>4 mm	Indeterminate						
20	>4 mm	<i>Alnus glutinosa</i>						



Sample 6009, pit fill 6060								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Bark <sup>b</sup>
21	>4 mm	<i>Quercus</i> sp.						
22	>4 mm	<i>Quercus</i> sp.						
23	>4 mm	<i>Quercus</i> sp.		1				
24	>4 mm	<i>Quercus</i> sp.						
25	>4 mm	<i>Quercus</i> sp.						
26	>4 mm	<i>Quercus</i> sp.		1				
27	>4 mm	<i>Quercus</i> sp.	1nr	1				
28	>4 mm	<i>Fraxinus excelsior</i>						
29	>4 mm	<i>Quercus</i> sp.		1				
30	>4 mm	<i>Quercus</i> sp.						
31	>4 mm	<i>Quercus</i> sp.						
32	>4 mm	<i>Quercus</i> sp.		1				
33	>4 mm	<i>Quercus</i> sp.	1nr	1				
34	>4 mm	<i>Quercus</i> sp.		1				
35	>4 mm	<i>Quercus</i> sp.		1				
36	>4 mm	<i>Quercus</i> sp.	1					
37	>4 mm	<i>Quercus</i> sp.		1				
38	>4 mm	<i>Alnus glutinosa</i>						
39	>4 mm	<i>Quercus</i> sp.		1				
40	>4 mm	<i>Fraxinus excelsior</i>						
41	>4 mm	<i>Quercus</i> sp.						
42	>4 mm	Indeterminate						
43	>4 mm	<i>Quercus</i> sp.		1				
44	>4 mm	<i>Fraxinus excelsior</i>						
45	>4 mm	<i>Quercus</i> sp.		1				
46	>4 mm	<i>Quercus</i> sp.						
47	>4 mm	<i>Quercus</i> sp.						
48	>4 mm	<i>Quercus</i> sp.	1nr	1				
49	>4 mm	<i>Quercus</i> sp.						
50	>4 mm	<i>Quercus</i> sp.						

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1 mm wide). <sup>b</sup>1 = yes.

Sample 6011, pit fill 6072								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Bark <sup>b</sup>
1	>4 mm	<i>Quercus</i> sp.	1nr	1				
2	>4 mm	<i>Quercus</i> sp.	1					
3	>4 mm	<i>Quercus</i> sp.						
4	>4 mm	<i>Quercus</i> sp.						
5	>4 mm	<i>Quercus</i> sp.						
6	>4 mm	<i>Quercus</i> sp.						
7	>4 mm	<i>Quercus</i> sp.	1					
8	>4 mm	<i>Quercus</i> sp.		1				



Sample 6011, pit fill 6072								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Bark <sup>b</sup>
9	>4 mm	<i>Quercus</i> sp.	1nr	1				
10	>4 mm	<i>Quercus</i> sp.						
11	>4 mm	<i>Quercus</i> sp.	1nr	1				
12	>4 mm	<i>Quercus</i> sp.	1nr	1				
13	>4 mm	<i>Quercus</i> sp.	1nr	1				
14	>4 mm	<i>Quercus</i> sp.	3					
15	>4 mm	<i>Alnus glutinosa</i>						
16	>4 mm	<i>Fraxinus excelsior</i>						
17	>4 mm	<i>Quercus</i> sp.	1nr	1				
18	>4 mm	<i>Quercus</i> sp.						
19	>4 mm	<i>Quercus</i> sp.	1nr	1				
20	>4 mm	Indeterminate						
21	>4 mm	<i>Quercus</i> sp.						
22	>4 mm	<i>Quercus</i> sp.	1nr	1				
23	>4 mm	<i>Quercus</i> sp.						
24	>4 mm	<i>Quercus</i> sp.	1nr	1				
25	>4 mm	<i>Quercus</i> sp.	1nr	1				
26	2-4 mm	<i>Quercus</i> sp.						
27	2-4 mm	<i>Fraxinus excelsior</i>						
28	2-4 mm	<i>Quercus</i> sp.	1nr	1				
29	2-4 mm	Indeterminate						
30	2-4 mm	<i>Alnus glutinosa</i>						
31	2-4 mm	<i>Quercus</i> sp.						
32	2-4 mm	<i>Quercus</i> sp.						
33	2-4 mm	<i>Quercus</i> sp.		1				
34	2-4 mm	<i>Quercus</i> sp.						
35	2-4 mm	<i>Quercus</i> sp.						
36	2-4 mm	<i>Quercus</i> sp.						
37	2-4 mm	<i>Quercus</i> sp.	3					
38	2-4 mm	<i>Fraxinus excelsior</i>						
39	2-4 mm	<i>Quercus</i> sp.						
40	2-4 mm	<i>Quercus</i> sp.						
41	2-4 mm	<i>Quercus</i> sp.						
42	2-4 mm	<i>Quercus</i> sp.	1nr	1				
43	2-4 mm	<i>Quercus</i> sp.		1				
44	2-4 mm	<i>Quercus</i> sp.		1				
45	2-4 mm	<i>Quercus</i> sp.						
46	2-4 mm	<i>Quercus</i> sp.	1nr	1				
47	2-4 mm	<i>Quercus</i> sp.	1nr	1				
48	2-4 mm	<i>Quercus</i> sp.		1				
49	2-4 mm	<i>Quercus</i> sp.						
50	2-4 mm	<i>Quercus</i> sp.						

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1 mm wide). <sup>b</sup>1 = yes.



Sample 6006, layer 6055								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Bark <sup>b</sup>
1	>4 mm	<i>Quercus</i> sp.	1nr	1				
2	>4 mm	<i>Quercus</i> sp.	1	1				
3	>4 mm	<i>Quercus</i> sp.	1					
4	>4 mm	<i>Quercus</i> sp.	1					
5	>4 mm	<i>Quercus</i> sp.	1	1				
6	>4 mm	<i>Corylus avellana</i>						
7	>4 mm	<i>Quercus</i> sp.		1				
8	>4 mm	Pomoideae						
9	>4 mm	<i>Quercus</i> sp.						
10	>4 mm	Pomoideae						
11	>4 mm	<i>Corylus avellana</i>						
12	>4 mm	<i>Quercus</i> sp.						
13	>4 mm	<i>Quercus</i> sp.						
14	>4 mm	<i>Quercus</i> sp.						
15	>4 mm	<i>Quercus</i> sp.						
16	>4 mm	<i>Quercus</i> sp.						
17	>4 mm	<i>Quercus</i> sp.						
18	>4 mm	Indeterminate						
19	>4 mm	<i>Quercus</i> sp.						
20	>4 mm	Pomoideae						
21	>4 mm	<i>Quercus</i> sp.						
22	>4 mm	<i>Corylus avellana</i>						
23	>4 mm	<i>Quercus</i> sp.						
24	>4 mm	<i>Quercus</i> sp.						
25	>4 mm	<i>Quercus</i> sp.	1nr	1				
26	>4 mm	<i>Quercus</i> sp.						
27	>4 mm	<i>Quercus</i> sp.						
28	>4 mm	<i>Quercus</i> sp.		1				
29	>4 mm	Pomoideae						
30	>4 mm	Indeterminate						
31	>4 mm	<i>Quercus</i> sp.						
32	>4 mm	<i>Quercus</i> sp.						
33	>4 mm	<i>Quercus</i> sp.						
34	>4 mm	<i>Quercus</i> sp.						
35	>4 mm	<i>Quercus</i> sp.		1				
36	>4 mm	<i>Quercus</i> sp.						
37	>4 mm	<i>Quercus</i> sp.		1				
38	>4 mm	<i>Quercus</i> sp.		1				
39	>4 mm	<i>Quercus</i> sp.						
40	>4 mm	<i>Quercus</i> sp.		1				
41	>4 mm	<i>Quercus</i> sp.						
42	>4 mm	<i>Quercus</i> sp.						



Sample 6006, layer 6055								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Bark <sup>b</sup>
43	>4 mm	Pomoideae						
44	>4 mm	<i>Quercus</i> sp.						
45	>4 mm	<i>Quercus</i> sp.						
46	>4 mm	<i>Quercus</i> sp.						
47	>4 mm	<i>Quercus</i> sp.						
48	>4 mm	Pomoideae	3					
49	>4 mm	Indeterminate						
50	>4 mm	<i>Quercus</i> sp.						

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1 mm wide). <sup>b</sup>1 = yes.

Sample 3009, layer 3057								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Bark <sup>b</sup>
1	>4 mm	<i>Quercus</i> sp.		1				1
2	>4 mm	<i>Corylus avellana</i>						
3	>4 mm	<i>Quercus</i> sp.	1nr	1				
4	>4 mm	<i>Corylus avellana</i>						
5	>4 mm	<i>Quercus</i> sp.	1nr	1				
6	>4 mm	<i>Quercus</i> sp.	1	1				1
7	>4 mm	<i>Quercus</i> sp.		1				
8	>4 mm	<i>Quercus</i> sp.	1	1				
9	>4 mm	<i>Quercus</i> sp.	1nr	1				
10	>4 mm	<i>Quercus</i> sp.						1
11	>4 mm	<i>Alnus glutinosa</i>						
12	>4 mm	<i>Quercus</i> sp.		1				
13	>4 mm	<i>Quercus</i> sp.	1	1				
14	>4 mm	<i>Quercus</i> sp.	1	1				
15	>4 mm	<i>Quercus</i> sp.						1
16	>4 mm	<i>Quercus</i> sp.	1nr	1				
17	>4 mm	Indeterminate						
18	>4 mm	<i>Quercus</i> sp.		1				
19	>4 mm	<i>Quercus</i> sp.	1nr	1				
20	>4 mm	<i>Quercus</i> sp.	1	1				
21	>4 mm	<i>Quercus</i> sp.						
22	>4 mm	<i>Quercus</i> sp.	1nr	1				
23	>4 mm	<i>Quercus</i> sp.	3					
24	>4 mm	<i>Corylus avellana</i>						
25	>4 mm	<i>Quercus</i> sp.		1				
26	>4 mm	<i>Quercus</i> sp.	1nr	1				
27	>4 mm	<i>Quercus</i> sp.	1nr	1				
28	>4 mm	<i>Quercus</i> sp.	3				1	
29	>4 mm	Indeterminate						
30	>4 mm	Pomoideae						



Sample 3009, layer 3057								
Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Bark <sup>b</sup>
31	>4 mm	<i>Corylus avellana</i>	3					
32	>4 mm	<i>Quercus</i> sp.	1nr	1				
33	>4 mm	<i>Quercus</i> sp.		1				
34	>4 mm	<i>Quercus</i> sp.	1nr	1				
35	>4 mm	<i>Quercus</i> sp.	1nr	1				
36	>4 mm	<i>Corylus avellana</i>						
37	>4 mm	<i>Quercus</i> sp.		1				
38	>4 mm	<i>Quercus</i> sp.						
39	>4 mm	<i>Quercus</i> sp.						
40	>4 mm	<i>Quercus</i> sp.	1nr	1				
41	>4 mm	<i>Quercus</i> sp.						
42	>4 mm	<i>Corylus avellana</i>	3					
43	>4 mm	<i>Quercus</i> sp.	1nr	1				
44	>4 mm	<i>Corylus avellana</i>						
45	>4 mm	<i>Quercus</i> sp.						
46	>4 mm	Pomoideae						
47	>4 mm	<i>Quercus</i> sp.	3					
48	>4 mm	<i>Quercus</i> sp.	1					
49	>4 mm	<i>Quercus</i> sp.		1				
50	>4 mm	<i>Quercus</i> sp.	1nr	1				

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1 mm wide). <sup>b</sup>1 = yes.

### Borehole 1

	Borehole number	1	1	1
	Depth	1–1.77 m	1.77–3.25 m	3.25–4.20 m
	Sample volume (litres)	1	1	1
Taxon	Common name			
<i>Ranunculus bulbosus</i> / <i>acris</i> / <i>repens</i>	bulbous/ meadow/ creeping buttercup	14		
<i>Rubus fruticosus</i> agg.	blackberry	7	4	
<i>Urtica dioica</i> L.	common nettle	21		
<i>Viola</i> sp.	violet	1		
<i>Rumex</i> spp.	docks	2	1	
<i>Conium maculatum</i> L.	hemlock	1		
<i>Sambucus nigra</i> L.	elder	1	3	
Herbaceous plant roots / stems				25
>2 mm wood fragments		3	54	
>2 mm wood charcoal fragments		6	14	3





**Monolith sample 10002**

	<b>Sample number</b>	<b>10002</b>
	<b>Trench</b>	<b>10</b>
	<b>Context type</b>	<b>Castle ditch fill</b>
	<b>Sample volume (litres)</b>	<b>1</b>
<b>Taxon</b>	<b>Common name</b>	
<i>Corylus avellana</i> L. 2-4 mm nutshell fragments	hazel	1 (ch)
>2 mm wood charcoal fragments		41

ch= charred



## Appendix 9: Insect data

**Table 52** Context, feature, phase and archaeological descriptions for the samples from Sheffield Castle

Sample number	Context number	Description and contents	Date
3013	3079	demolition/destruction layer	13th century
3009	3057	demolition/destruction layer	13th century
6011	6072	pit fill	late-11th/12th century
6006	6055	ground layer	Medieval, sealed deposit 6072

**Table 53** The insect remains from Sheffield Castle (Taxonomy follows Lucht 1987)

	Eco codes	Syn codes					Plant associations for phytophages (taken from Koch 1992)
<b>Sample number</b>			<b>3013</b>	<b>3009</b>	<b>6011</b>	<b>6006</b>	
<b>Context number</b>			3079	3057	6072	6055	
<b>Weight kg.</b>			10.5	7	8	8	
<b>Volume lt</b>			11	10	6	8	
<b>COLEOPTERA</b>							
<b>Carabidae</b>							
<i>Clivina fossor</i> (L.)	oa		-	-	1	5	
<i>T. quadristriatus</i> (Schrk) / <i>T. obtusus</i> Er.	oa		-	-	1	-	
<i>Trechoblemus micros</i> (Hbst.)	oa		-	-	1	3	
<i>Bembidion</i> spp.	oa		1	-	1	12	
<i>Patrobus</i> sp.	oa		-	-	-	2	
<i>Harpalus rufipes</i> (Geer)	oa		-	-	2	-	
<i>Pterostichus diligens</i> (Sturm)	oa		-	-	-	3	
<i>Pterostichus melanarius</i> (Ill.)	oa		-	1	-	-	
<i>Platynus obscurus</i> (Herbst.)	oa		-	-	-	1	
<i>Dromius</i> spp.	oa		-	-	-	1	
<b>Dytiscidae</b>							
<i>Hydroporus</i> spp.	oa-w		-	-	-	-	
<b>Hydraenidae</b>							
<i>Hydraena</i> spp.	oa-w		-	1	-	2	
<i>Helophorus grandis</i> (Ill.)	oa-w		-	-	-	1	
<i>Helophorus</i> spp.	oa-w		-	1	-	1	
<b>Hydrophilidae</b>							
<i>Coelostoma orbiculare</i> (F.)	oa-w		-	-	-	1	
<i>Cercyon analis</i> (Payk.)	rt	sf	-	-	-	5	
<i>Cercyon</i> spp.	rt		-	2	-	-	
<i>Megasternum boletophagum</i> (Marsh.)	rt		-	-	1	5	
<i>Cryptopleurum minutum</i> (F.)	rf	st	-	-	-	2	
<b>Histeridae</b>							
Histeridae Gen and spp. indet.			-	-	-	1	
<b>Clamidae</b>							
<i>Clambus</i> spp.			-	-	1	2	
<b>Catopidae</b>							
<i>Catops</i> spp.			-	-	1	-	
<b>Ptiliidae</b>							
Ptiliidae Genus & spp. indet.	rt		-	-	1	4	
<i>Acrotrichis</i> spp.	rt		-	-	-	2	
<b>Staphylinidae</b>							



	Eco codes	Syn codes					Plant associations for phytophages (taken from Koch 1992)
<b>Sample number</b>			<b>3013</b>	<b>3009</b>	<b>6011</b>	<b>6006</b>	
<i>Micropeplus staphylinoides</i> (Marsh.)	rt		-	-	1	4	
<i>Metopsia gallica</i> (Koch)			-	-	-	1	
<i>Phyllodrepa floralis</i> (Payk.)	rt		-	-	1	-	
<i>Omalius rivulare</i> (Payk.)	rt	sf	-	1	-	-	
<i>O. caesum</i> Grav.	rt	st	-	-	-	2	
<i>O. excavatum</i> Steph.	rt	sf	-	1	-	-	
<i>Omalius</i> spp.	rt		-	1	2	-	
<i>Xylodromus concinnus</i> (Marsh.)	rt-h	st	-	1	-	4	
<i>Lesteva</i> spp.	oa-d		-	-	2	2	
<i>Coprophilus striatulus</i> (F.)	rt	st	1	2	-	2	
<i>Trogophloeus bilineatus</i> (Steph.)	rt	sf	-	1	-	2	
<i>Trogophloeus ?corticinus</i> (Grav.)	rt		1	-	-	-	
<i>Trogophloeus</i> spp.			-	-	2	-	
<i>Oxytelus rugosus</i> (F.)	rt		4	5	3	6	
<i>Oxytelus sculpturatus</i> Grav.	rt	sf	1	-	2	-	
<i>Oxytelus nitidulus</i> Grav.	rt-d		6	3	16	9	
<i>Oxytelus tetracarinus</i> (Block)	rt		-	-	1	-	
<i>Platystethus arenarius</i> (Fourc.)	ff		-	1	1	15	
<i>Platystethus cornutus</i> (Grav.)	oa-d		-	-	1	-	
<i>Platystethus nodifrons</i> (Man.)	oa-d		-	-	10	-	
<i>Stilicis orbiculatus</i> (Payk.)			-	-	-	3	
<i>Stenus</i> spp.			1	2	4	6	
<i>Lathrobium</i> spp.	oa	st	-	1	-	2	
<i>Gyrohypnus fracticornis</i> (Müll.)	rt	st	-	-	1	3	
<i>Xantholinus</i> spp.			-	-	1	4	
<i>Neobisnius</i> spp.	rt		-	-	3	3	
<i>Philonthus</i> spp.			1	1	3	4	
<i>Quedius</i> spp.			-	-	-	3	
<i>Philonthus</i> spp.			-	-	-	1	
<i>Tachinus rufipes</i> (Geer.)		st	1	-	-	2	
<i>Tachinus</i> spp.		sf	-	2	-	-	
<i>Boitobius</i> spp.	rt		-	-	-	1	
<i>Falagria</i> spp.	rt		-	1	-	-	
Aleocharinidae Genus & spp. Indet.			5	4	8	11	
<b>Pselaphidae</b>							
<i>Trichonyx sulcicollis</i> (Reichb.)			1	-	-	1	
<i>Trissemus impressus</i> (Panz.)			-	-	1	-	
<b>Elateridae</b>							
<i>Agrotius</i> spp.	oa		-	-	1	-	
<b>Byturidae</b>							
<i>Byturus tomentosus</i> (Geer)	oa		-	1	-	-	Normally associated with <i>Rubus</i> spp. (brambles etc.)
<b>Nitidulidae</b>							
<i>Brachypterus urticae</i> (F.)	oa-p		-	-	1	2	<i>Urtica dioica</i> L. (stinging nettle)
<b>Rhizophagidae</b>							
<i>Rhizophagus parallellocollis</i> Gyll.	rt	sf	1	-	1	-	
<b>Cucujidae</b>							
<i>Monotoma</i> spp.	rt	sf	-	-	-	2	
<i>Laemophloeus ferrugineus</i> (Steph.)	g	ss	-	1	-	-	
<b>Cryptophagidae</b>							
<i>Cryptophagus</i> spp.	rd-h	sf	-	2	-	7	
<i>Atomaria</i> spp.	rd-h	st	-	1	3	4	



	Eco codes	Syn codes					Plant associations for phytophages (taken from Koch 1992)
<b>Sample number</b>			3013	3009	6011	6006	
<b>Lathridiidae</b>							
<i>Enicmus minutus</i> (Group)	rd-h	st	1	1	-	3	
<i>Enicmus transversus</i> (Ol.)	rd		1	-	-	-	
<i>Cartodere ruficollis</i> (Marsh.)	rd	sf	-	-	-	1	
<i>Corticaria/ corticarina</i> spp.	rt	sf	-	1	2	9	
<b>Mycetophagidae</b>							
<i>Typhaea stercorea</i> (L.)	rd	ss	-	-	-	2	
<b>Colydiidae</b>							
<i>Cerylon</i> sp.	l		1	-	-	-	
<b>Endomychidae</b>							
<i>Mycetaea hirta</i> (Marsh.)	rd-h	ss	-	-	2	5	
<b>Lyctidae</b>							
<i>Lyctus linearis</i> (Goeze)	l-h	sf	-	1	-	-	
<b>Anobiidae</b>							
<i>Anobium punctatum</i> (Geer)	l-h	sf	-	1	3	6	
<b>Ptinidae</b>							
<i>Ptinus fur</i> (L.)	rd-h	sf	-	-	-	1	
<b>Scarabaeidae</b>							
<i>Aphodius sphaelatus</i> (Panz.) or <i>A. prodromus</i> (Brahm)	oa-rf		-	1	1	-	
<i>Aphodius ?lapponum</i> Gyll.	oa-rf		-	-	1	-	
<i>Aphodius fimetarius</i> (L.)	oa-rf		1	-	-	-	
<i>Aphodius</i> spp.	oa-rf		-	-	-	1	
<b>Chrysomelidae</b>							
<i>Phyllotreta</i> spp.	oa		-	1	2	1	
<i>Chaetocnema concinna</i> (Marsh.)	oa		-	2	1	2	
<b>Bruchidae</b>							
<i>Bruchus pisorum</i> (L.)	oa-pu		-	-	-	1	
<b>Scolytidae</b>							
<i>Scolytus intricatus</i> (Ratz.)	oa-l		-	1	-	-	
<i>Phloeophthorus rhododactylus</i> (Marsh.)	oa-l		-	-	-	1	Often on <i>Cytisus</i> species (Brooms) or <i>Ulex europaeus</i> L. (gorse)
<i>Dryocoetes villosus</i> (F.)	oa-l		1	2	-	-	Usually <i>Quercus</i> (oak) but also <i>Fagus</i> (beech)
<i>Xyleborus dryographus</i> (Ratz.)	oa-l		-	1	-	-	Usually <i>Quercus</i> (oak) but also <i>Fagus</i> (beech)
<b>Curculionidae</b>							
<i>Apion</i> spp.	oa-p		-	-	-	1	
<i>Sitona</i> spp.	oa		-	1	-	-	
<i>Leiosoma deflexum</i> (Panz.)	oa-ws		-	1	-	-	<i>Caltha palustris</i> L. (Marsh marigold)
<i>Phloeophagus lignarius</i> (Marsh.)	l		-	1	-	-	
<i>Ceutorhynchus ?contractus</i> (Marsh.)	oa-p		-	-	-	1	Usually associated with RESEDACEAE (Mignonette Family) and PAPAVERACEAE (Poppy Family)
<i>Cidnorhinus quadrimaculatus</i> (L.)	oa-p		-	1	-	2	<i>Urtica dioica</i> L. (stinging nettle)
<i>Rhinoncus</i> spp.	oa-p		1	-	-	-	Usually on <i>Polygonum</i> (knotgrass)
<i>Gymnetron</i> spp.			-	-	-	1	
<b>DIPTERA</b>							
SUBORDER							
CYCLORRHAPHA							
Family, genus & spp. indet.			-	-	1	-	



	Eco codes	Syn codes					Plant associations for phytophages (taken from Koch 1992)
<b>Sample number</b>			3013300960116006				
<b>Drosophilidae</b>							
<i>Drosophila</i> sp.			2	-	-	-	
<b>Calliphoridae</b>							
<i>Calliphora</i> spp.			-	-	-	1	
<b>HYMENOPTERA</b>							
Formicoidea Family Genus and spp. indet.			-	7	1	1	

**Ecological coding** (Kenward and Hall 1995)

oa - Species which will not breed in human housing.

w- aquatic species.

c-species associated with salt water and coastal areas

d- species associated with damp watersides and river banks.

rd- species primarily associated with drier organic matter.

rf - species primarily associated with foul organic matter often dung.

rt - insects associated with decaying organic matter, but not belonging to either the rd or rf groups.

g- species associated with grain.

l - species associated with timber.

p-phytophage species often associated with waste areas or grassland and pasture

pu-species associated with pulses (peas and beans)

h - members of the 'house fauna' this is a very arbitrary group based on archaeological associations (Hall and Kenward 1990).

**Synanthropic coding** (Kenward 1997)

sf - facultative synanthropes - common in 'natural' habitats but clearly favoured by artificial ones.

st - typically synanthropes - particularly favoured by artificial habitats but believed to be able to survive in nature in the long term.

ss - strong synanthropes - essentially dependant on human activity for survival.

h- species thought to be particularly associated with human occupation (Kenward and Hall 1995).

**Table 54** The relative proportions of ecological and synanthropic groups for the insect remains from Sheffield Castle (see bottom of **Table 49**) for the key to abbreviations for ecological groups)

Sample	3013	3009	6011	6006
total number individuals	30	53	91	197
Total number of taxa	18	37	39	61
oa%	13.3%	30.2%	28.6%	24.4%
w%	0.0%	5.7%	0.0%	2.5%
d%	20.0%	5.7%	31.9%	5.6%
p%	3.3%	1.9%	1.1%	3.0%
l%	6.7%	13.2%	3.3%	3.6%
rd%	6.7%	7.5%	5.5%	11.7%
rf%	3.3%	3.8%	3.3%	9.1%
rt%	46.7%	35.8%	38.5%	32.0%
sf%	6.7%	18.9%	8.8%	16.8%
st%	10.0%	11.3%	4.4%	12.2%
ss%	0.0%	1.9%	2.2%	3.6%
h%	3.3%	13.2%	8.8%	14.7%



## Appendix 10: Geoarchaeological sample data

### Sediment descriptions sample 3010

Location:201540 Sheffield Castle	Monolith sample:3010	Drawing: 3010	Comments: Sample through series of redeposited natural layers	
Depth	Context	Sediment description	Interpretation	
0-0.07m	-	VOID		
0.07-0.31m	3058	Fairly firm 2.5Y 4/3 olive brown, clay silt. Occasional small-large subangular siltstone pebbles and small stones, very occasional flint. Some iron staining present. Clear, wavy lower boundary. Troels-Smith classification: Argilla granosa (Ag)3, Argilla steatodes (As)1 Nigror (Nig.)1 Stratificatio (Str.)0 Elasticitas (Elas.)0 Siccitas (Sicc.)3	Some redoximorphic activity, low energy deposition	Construction layers associated with earthwork
0.31-0.62m	3074	Firm 2.5Y 4/3 olive brown, clay silt. Occasional small-large subangular siltstone pebbles and small stones, very occasional flint, occasional-moderate medium grey clay patches. Some iron staining present. Clear, wavy lower boundary. Slightly greyer than unit above. Troels-Smith classification: Ag3, As1 Nig.1 Str.0 Elas.0 Sicc.3 Limes superior (Lim.)0	As above but the clay patches suggest higher energy or anthropogenic intervention	
0.62-0.72m	3070	Fairly firm 2.5Y 4/3 olive brown, clay silt. Occasional charcoal flecks and fragments, occasional medium subrounded sandstone pebbles. Some iron staining. Gradual, wavy lower boundary. Troels-Smith classification: Ag3, As1 Nig.1 Str.0 Elas.0 Sicc.3 Lim.0	As above and charcoal suggests human activity, at least in the vicinity	



Location:201540 Sheffield Castle	Monolith sample:3010	Drawing: 3010	Comments: Sample through series of redeposited natural layers	
Depth	Context	Sediment description	Interpretation	
0.72-0.85m	3070	Fairly firm 2.5Y 4/3 olive brown, clay silt. Occasional charcoal flecks, occasional large subrounded sandstone pebbles, occasional-moderate large grey clay patches. Occasional iron staining. Abrupt, wavy lower boundary.  Troels-Smith classification: Ag3, As1 Nig.1 Str.0 Elas.0 Sicc.3 Lim.0	As above	
0.85-0.95m	3063	Firm 2.5Y 4/4 olive brown, clay silt. Occasional medium-large subangular sandstone pebbles. Occasional iron staining.  Troels-Smith classification: Ag3, As1, Grana minora+ Nig.1 Str.0 Elas.0 Sicc.3 Lim.0	As above	

Troels-Smith (1955) classification: Argilla steatodes (As), Argilla granosa (Ag), Grana minora (Gmin), Grana majora (Gmaj) - 0=absence of, 4=maximum; Nigror (Nig.), Stratificatio (Str.), Elasticitas (Elas.), Siccitas (Sicc.), Limes superior (Lim.); Nig. 0=white, 4=black; Str. 0=homogeneous, 4=strong laminations; Elas. 0=clay, 4=peat, Sicc. 0=water, 4=dry; Lim. 0=>1cm, 1=<1cm and >2mm, 2=<2mm and >1mm, 3=<1mm and >0.5mm, 4=<0.5mm.





### Sediment descriptions sample 3011

Location: 201540 Sheffield Castle	Monolith sample:3011	Drawing: 3008	Comments: Sample through redeposited natural layers	
Depth	Context	Sediment description	Interpretation	
0-0.13m	-	VOID		
0.13-0.24m	3039	Fairly friable 7.5YR 2.5/1 black, silty clay. Frequent cream, sandy clay mortar inclusions, occasional charcoal flecks, occasional layers of 5YR 3/2 dark reddish brown, clay silt. Sharp, smooth lower boundary.  Troels-Smith classification: Argilla steatodes (As)2 Argilla granosa (Ag)2 Nigror (Nig.)4 Stratificatio (Str.)0 Elasticitas (Elas.)0 Siccitas (Sicc.)3	Inclusions are anthropogenically derived. Layers suggest separate events.	19th-century demolition/backfill layer
0.24-0.27m	3055	Friable 7.5YR 2.5/1 black, silty fine sand. Possible laminations of silt and sand. Sharp, smooth lower boundary.  Troels-Smith classification: Ag2, Grana minora (Gmin)2 Nig.4 Str.0 Elas.0 Sicc.3 Limes superior (Lim.)3	Possible laminations suggest separate events	Material redeposited after destructive event
0.27-0.34m	3056	Fairly friable 2.5Y 4/4 olive brown, sandy silt. Mottled light yellow and light grey, sand inclusions from degraded sandstone. Occasional small-large subrounded sandstone pebbles, occasional uncharred wood (large fragment at 0.32m). Increasing sand towards base of unit. Clear, wavy lower boundary.  Troels-Smith classification: Ag3, Gmin1, As+ Nig.4 Str.0 Elas.0 Sicc.3 Lim.3	Mottling is indicative of redeposited natural. Increase in sandiness is mixing with sandstone inclusions from unit below. Uncharred wood suggests human activity	



Location: 201540 Sheffield Castle	Monolith sample:3011	Drawing: 3008	Comments: Sample through redeposited natural layers	
Depth	Context	Sediment description	Interpretation	
0.34- 0.61m	3057/3079/3062	Fairly friable 10YR 2/1 black, clay silt. Occasional small- large degraded sandstone pebbles, moderate uncharred wood fragments, occasional vivianite flecks. Troels-Smith classification: Ag2, As2 Nig.4 Str.0 Elas.0 Sicc.3 Lim.2	Uncharred wood may be from wooden structure nearby and therefore deliberate. Vivianite indicates the presence of organic material and iron-rich sediment.	13th-century destructive event



### Sediment descriptions sample 3012

Location: 201540 Sheffield Castle	Monolith sample:3012	Drawing: 3007	Comments: Sample through redeposited natural layers	
Depth	Context	Sediment description	Interpretation	
0.-0.10m	-	VOID		
0.10-0.17m	3055	Fairly friable 10YR 3/2 very dark greyish brown, silty clay. Very occasional small-large rounded sandstone pebbles. Clear, wavy lower boundary.  Troels-Smith classification: Argilla steatodes (As)2 Argilla granosa (Ag)2 Nigror (Nig.)3 Stratificatio (Str.)0 Elasticitas (Elas.)0 Siccitas (Sicc.)4		Material redeposited after destructive event
0.17-0.26m	3056	Friable 2.5Y 4/3 olive brown, clay silt. Very occasional charcoal flecks, very occasional small-large rounded sandstone pebbles. Sharp, smooth lower boundary.  Troels-Smith classification: As2, Ag2 Nig.2 Str.0 Elas.0 Sicc.4 Limes superior (Lim.)0		
0.26-0.44m	3057	Fairly friable 7.5YR 2.5/1 black, clay silt. Frequent uncharred wood fragments (large fragment at 0.26m, flat fragment at 0.43m), occasional vivianite flecks. Clear, wavy lower boundary.  Troels-Smith classification: As2, Ag2 Nig4. Str.0 Elas.0 Sicc.4 Lim.4	Uncharred wood may be associated with nearby structure and therefore deliberate. Vivianite indicates presence of organic material and iron-rich sediment.	13th-century destructive event
0.44-0.54m	3079	Friable 7.5YR 2.5/1 black, clay silt. Occasional small fragments of degraded sandstone, occasional uncharred wood fragments, occasional vivianite flecks.  Troels-Smith classification: As2, Ag2 Nig.4 Str.0 Elas.0 Sicc.4 Lim.0	As above	



### Sediment descriptions sample 10001

Location: 201540 Sheffield Castle	Monolith sample:10001	Drawing: 10004	Comments: Sample through moat	
Depth	Context	Sediment description	Interpretation	
0-0.05m	-	VOID		
0.05-0.59m	10048	Firm 2.5Y 3/3 dark olive brown, silty clay. Occasional charcoal flecks, occasional manganese flecks and fragments increasing with depth. occasional clay patches (light orangeish yellow), occasional small-large sandstone pebbles. Troels-Smith classification Argilla granosa (Ag)3, Argilla steatodes (As)1, Grana minora (Gmin)+ Nigror (Nig.)3 Stratificatio (Str.)0 Elasticitas (Elas.)1 Siccitas (Sicc.)3	Mixing of inclusions and clay patches suggests higher energy deposition (possibly human)	18th-century levelling layers
0.59-0.89m	10050	Firm 2.5Y 4/4 olive brown, silty clay. Mottled light brown and mid orange with small clay patches (light grey and light yellow). Occasional charcoal flecks, very occasional small-large sandstone pebbles and large subrounded sandstone stones. Abrupt, smooth lower boundary. Troels-Smith classification: Ag2, As2, Gmin+ Nig.2/3 Str.0 Elas.0 Sicc.4 Lim.3	As above	
0.89-0.93m	10050	Stiff 10YR 4/6 dark yellowish brown, silty clay. No inclusions. Abrupt, wavy lower boundary. Troels-Smith classification: As3, Ag1 Nig.2 Str.0 Elas.0 Sicc.4 Lim.2		
0.93-0.98m	10050	Stiff 2.5Y 4/4 olive brown, silty clay. Very occasional small pebbles/pea gravel. Troels-Smith classification: Ag2, As2 Nig.2/3 Str.0 Elas.0 Sicc.3 Lim.3		



## Sediment descriptions sample 10002

Location: 201540 Sheffield Castle		Monolith sample:10002	Drawing: 10006	Comments: Sample through moat	
Depth	Context	Subsamples	Sediment description	Interpretation	
0-0.40m	10066/10067	Microfossils (pollen, diatoms) Macrofossils	Homogeneous stiff 2.5Y 4/4 olive brown, silty clay. Occasional charcoal flecks and fragments, moderate clay patches, moderate small-large sandstone and siltstone pebbles, occasional degraded sandstone, occasional manganese flecks and fragments.  Troels-Smith classification: Argilla granosa (Ag)2, Argilla steatodes (As)2, Grana minora (Gmin)+ Nigror (Nig.)3 Stratificatio (Str.)0 Elasticitas (Elas.)1 Siccitas (Sicc.) 3	Colour indicates oxidation. Inclusions suggest deliberate infilling. Manganese concretions indicate gleying/ wetting drying	&  17th-century silthning debris



## Appendix 11: OASIS form

OASIS ID: wessexar1-322479

### Project details

Project name	Sheffield Castle, Sheffield
Short description of the project	<p>Wessex Archaeology were commissioned by Sheffield City Council to undertake an archaeological evaluation and borehole survey at the site of Sheffield Castle. Clean clay deposits probably represented earthwork defences including the bank of the moat and a possible motte. The courtyard surface of the castle was excavated. A substantial medieval sandstone foundation was accompanied by layers of redeposited clay. Medieval layers post-dating the partial demolition of the foundation were rich in organic material. Medieval moat fills were reached only below 5.75 m BGL. The outer side of the moat was formed by a bank of clay at a lower level than the rock-cut inner side recorded by previous excavation. Demolition deposits perhaps associated with the civil war were recorded in the moat. However, the majority of the depth of moat fills comprised 19th century material. The base of the moat was not reached. An assemblage of medieval pottery was recovered. 18th century levelling layers and walls were probably associated with a bowling green known from historic maps. The remains of 19th-century structures chiefly included walls but also surfaces and other structures associated with steelworks, a tea warehouse and a wheelwright's shop. Structures in the east of trench 1 were probably associated with an adjacent but unexcavated cementation furnace.</p>
Project dates	Start: 13-08-2018 End: 19-10-2018
Previous/future work	Yes / Not known
Any associated project reference codes	201540 - Contracting Unit No.
Type of project	Field evaluation
Site status	Listed Building
Current Land use	Vacant Land 1 - Vacant land previously developed
Monument type	CASTLE Medieval
Monument type	MOAT Medieval
Monument type	STEELWORKS Post Medieval
Significant Finds	POTTERY Medieval
Significant Finds	EAR SCOOP Medieval
Methods and techniques	"Environmental Sampling", "Sample Trenches", "Targeted Trenches"
Development type	Not recorded
Prompt	Voluntary/self-interest
Position in the planning process	Pre-application

### Project location



Country	England
Site location	SOUTH YORKSHIRE SHEFFIELD SHEFFIELD Sheffield Castle
Postcode	S1 2AD
Study area	1.34 Hectares
Site coordinates	435788 387680 435788 00 00 N 387680 00 00 E Point
Height OD / Depth	Min: 49m Max: 56m

#### Project creators

Name of Organisation	Wessex Archaeology
Project brief originator	Wessex Archaeology
Project design originator	Wessex archaeology
Project director/manager	Milica Rajic
Project supervisor	Ashley Tuck
Type of sponsor/funding body	City Council
Name of sponsor/funding body	Sheffield City Council

#### Project archives

Physical Archive recipient	Museums Sheffield
Physical Contents	"Animal Bones","Ceramics","Glass","Industrial","Leather","Metal","Wood","Worked bone","Worked stone/lithics"
Digital Archive recipient	Museums Sheffield
Digital Contents	"none"
Digital Media available	"Images raster / digital photography","Text"
Paper Archive recipient	Museums Sheffield
Paper Contents	"none"
Paper Media available	"Context sheet","Diary","Drawing","Matrices","Miscellaneous Material","Notebook - Excavation',' Research',' General Notes","Photograph","Plan","Report","Section"

#### Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
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Title	Sheffield Castle, Sheffield: Archaeological Evaluation Interim Report
Author(s)/Editor(s)	Tuck, A.
Other bibliographic details	201540.02
Date	2018
Issuer or publisher	Wessex Archaeology
Place of issue or publication	Sheffield
Description	A4 laser printed report
Entered by	Ashley Tuck (a.tuck@wessexarch.co.uk)
Entered on	9 November 2018



## Appendix 11: Unedited external specialist reports

*Chris Cumberpatch*

### **Medieval and later pottery from excavations in 2018 on the site of Sheffield Castle (Site code 210540)**

C.G. Cumberpatch BA PhD  
Freelance Archaeologist

#### **Tables**

Table 1	Archive table: All pottery from the 2018 excavations
Table 2	Pottery from Trench 1
Table 3	Pottery from Trench 2
Table 4	Pottery from Trench 3
Table 5	Pottery from Trench 4
Table 6	Pottery from Trench 5
Table 7	Pottery from Trench 6
Table 8	Pottery from Trench 9
Table 9	Pottery from Trench 10
Table 10	Pottery from Trench 11
Table 11	Pottery from unstratified contexts
Table 12	Ceramic building material found amongst the pottery assemblage
Table 13	Crucible fragments found amongst the pottery assemblage
Table 14	Other material (stone, glass, bone, clay tobacco pipes etc) found amongst the pottery assemblage
Table 15	Archive table: Summary of ware types represented in the 2018 assemblage
Table 16	Summary of ware types from the Butcher archive (1958)
Table 17	Summary of ware types from Trench 1
Table 18	Summary of ware types from Trench 2
Table 19	Summary of ware types from Trench 3
Table 20	Summary of ware types from Trench 4
Table 21	Summary of ware types from Trench 5
Table 22	Summary of ware types from Trench 6
Table 23	Summary of ware types from Trench 10
Table 24	Summary of ware types from Trench 11

#### **Figures**

Figure 1	Context 1057 Rim and handle from a Hallgate A ware jug
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Figure 2	Context 1048 Base of a baluster jug in Sheffield type ware
Figure 3	Context 6011 urinal handle in Buff Sandy ware
Figure 4	Context 4042 Dripping tray in a Gritty ware fabric
Figure 5	Context 6026 Westerwald ware
Figure 6	Context 5034 Porcelain spoon
Figure 7	Context 4104 Bowl with decorated rim in Shell and Quartz-tempered ware

## Introduction

The pottery assemblage from the excavations conducted in 2018 on the site of Sheffield Castle was examined by the author in 2018 and 2019. The assemblage consisted of a total of 1488 sherds weighing 19,464 grams representing a maximum of 1296 vessels. The data are summarised in Tables 1 – 24. A small quantity of ceramic building material, crucible fragments and other material was included with the pottery but lies outside the scope of this report. These items are listed in Tables 12, 13 and 14. Table 1 lists all of the pottery and is intended for archival use. Tables 2 – 11 cover the assemblages from individual trenches and unstratified contexts. These are intended to be included in the grey literature report. Other tables, which summarise the representation of ware types by trench are referenced as relevant in the body of the report.

The periodisation used in the report (for reasons set out elsewhere; Cumberpatch 2014a) is as follows:

Medieval	Mid 11 <sup>th</sup> century to c.1450
Post-medieval	c.1450 – c.1720
Early modern	c.1720 – c.1840
Recent	c.1840 – c.1950

After the completion of the report, the results of the C<sup>14</sup> analyses became available, three of which proved to be of direct relevance to the pottery assemblage. These were from contexts 1057, 1076 and 5041 and the opportunity was taken to revise the report (November 2019) so as to include the results and a brief discussion of their implications.

## The pottery

The earliest pottery to be identified in the assemblage consisted of four sherds of hand-made (i.e. slab-built rather than wheel-thrown) sandy ware from contexts 4107 and 6039 of probable late 11<sup>th</sup> to early/mid 12<sup>th</sup> century date (*HM White Sandy ware*). The designation of these sherds follows a preliminary review of hand-made medieval pottery in Yorkshire and north-eastern England after the identification of a significant assemblage (which included hand-made Durham-type ware) from Claypath in Durham (Cumberpatch 2018a). In general terms the hand-made wares from the castle can be compared with the

Durham-type wares and with the products of other seemingly short-lived local industries including the Hallgate C wares from Doncaster (Buckland *et al* 1979), the Hallgate A1 and related wares from later excavations in Hallgate (Cumberpatch *et al* 1998-1999) and the King Street, Duffield (KSD) wares from Derbyshire (Cumberpatch 2002-2003). The Hallgate C and the KSD wares showed evidence of considerable skill in their manufacture and in this they offer a contrast to the much less accomplished hand-made Hallgate A1 and related wares (Cumberpatch *et al* 1998-1999). Further examples of hand-made wares have been noted by Young and Vince in their discussion of Gritty wares from Castle Gate, Wetherby (Young and Vince nd). These authors also noted the presence of a hand-made ware, probably dating to the mid / late 11<sup>th</sup> century, in Ripon. The identification of hand-made wares across the wider Yorkshire / north-east region raises a number of questions about the origin and structure of the pottery industry in the early post-Conquest period which are particularly intriguing given the largely aceramic nature of Late Saxon society in the area (Cumberpatch 2016a) and the parallel evidence for the production of high quality wheel-thrown pottery in West Yorkshire at around the same time. Such wares include the Stamford-type wares from Pontefract (Roberts *et al* 2013) and the wheel-thrown Yorkshire Gritty wares, formerly known by a variety of names including Pimply ware, Hillam-type ware and Gritty ware (Cumberpatch 2002a, Young and Vince nd).

In the present case, four sherds of hand-made (HM) White Sandy ware were identified in contexts 4107 and 6039 (Tables 5 and 7). All were body sherds, undecorated except for the presence of spots and patches of pale green splashed glaze on the external surfaces. The fabrics of the three sherds from context 6039 contained quartz grains measuring up to 1mm (along the longest visible axis) and occasional large, rounded white rock fragments up to 2mm in size. The sherd from context 4107 also had a white, gritty-textured fabric although, in addition to quartz and white rock fragments, the sherd also included red and black iron-rich grit similar to that seen in the later Coal Measures wares and Sheffield-type wares discussed below.

More abundant than the hand-made wares were wheel-thrown products of the Doncaster Hallgate potteries represented by a small quantity of *Hallgate B ware* (contexts 4087 and 4010) and *Hallgate A wares* (contexts 1048, 1057, 3015, 3057, 3058, 3079, 4062, 5041, 5045 and probably 4087 and 4115). The rim and handle from a Hallgate A ware jug is shown in Figure 1. It is notable that hand-made Hallgate C wares were not identified in the assemblage although a jug and body sherds in Hallgate C3 ware were recovered from a well outside the castle but within the medieval town (Cumberpatch 2006).

The dating of the Hallgate wares has traditionally followed the pioneering work of Buckland and his colleagues (Buckland *et al* 1979, 1989) based on material recovered from rescue excavations carried out in Doncaster in the 1960s and 1970s. This scheme sees a sequence from Hallgate C to Hallgate B to Hallgate A spanning the period between later 11<sup>th</sup> century and the later 13<sup>th</sup> or early 14<sup>th</sup> century with Hallgate B being of 12<sup>th</sup> century date and Hallgate A ware spanning the later 12<sup>th</sup> to later 13<sup>th</sup> or early 14<sup>th</sup> centuries (Buckland *et al*

1979:56). This scheme has remained the mainstay of local chronologies (including those used by the present author) despite the discovery of hand-made production (as noted above, considerably inferior in quality to Hallgate C ware) at the Hallgate 95 site (Cumberpatch *et al*, 1998-1999) and the fact that Hallgate A and B wares consistently occur together in the same deposits across Doncaster and on sites outside the town. In some cases, such as Conisbrough Castle (Cumberpatch 2014b, 2015a, 2016b), it might be possible to argue that the problem is a taphonomic one and the result of significant residuality within deposits, but this can hardly explain the situation on such a wide variety of types of sites within and outside Doncaster. Furthermore, a close examination of the evidence used to attribute date ranges to the various types (discussed in Buckland *et al* 1979: 55-59), shows it to be insecure (Cumberpatch, in prep. 1). In the present assemblage C<sup>14</sup> dates for contexts 1057 and 5041 both indicated a date range between AD 1170 and 1260, which would tend to support the contention that Hallgate A ware may in fact originate in the 12<sup>th</sup> century. The assemblage from context 1057 included the rim and handle of between one and three Hallgate A ware jugs while all of the pottery (three sherds) from context 5041 was of Hallgate A ware type.

Unfortunately, while it has been possible, using published and unpublished data, to present a critique of the *status quo*, neither time nor opportunity have yet been available to permit the construction of a detailed alternative typo-chronological scheme which will adequately explain the much more complex picture which has emerged from work undertaken since the late 1980s across the region. Although this work is in progress, the fact that it lies outside the remit of the developer-funded reporting of pottery assemblages, means that no timescale can be placed on its completion or publication. In the interim, the traditional dates have been cited in the data tables but cannot be defended; a broad 12<sup>th</sup> to 13<sup>th</sup> century date is perhaps the best that can be suggested for both Hallgate A and B wares, with the important caveat that this may change if an opportunity becomes available in the future to revise the existing scheme in line with the current evidence.

Later medieval pottery (early 14<sup>th</sup> to mid/late 15<sup>th</sup> century) in South Yorkshire is dominated by two groups of wares; Coal Measures ware and Humberware. Both were present in the assemblage under discussion although in relatively small quantities.

Coal Measures wares have been the subject of a number of publications and are found widely on sites across South Yorkshire and beyond (Hayfield and Buckland 1989, Cumberpatch 2004a, 2004b). The earlier type, *Coal Measures Whiteware* (CMW) dates to the 14<sup>th</sup> or very early 15<sup>th</sup> century while the later type, *Coal Measures Purple ware* (CMP), dates to the 15<sup>th</sup> century and probably continues into the 16<sup>th</sup> century although the exact date of the end of production is unknown; it may be connected with the disestablishment of the Conisbrough Parks deer park although this requires verification. The use of a dark purple glaze on a hard, reduced body reflects the wider late medieval to post-medieval transition from brightly coloured red-bodied vessels with green glaze to the predominantly purple to black wares of the post-medieval period (Cumberpatch 2003, 2014a).

Coal Measures clays, which are found between coal seams, appear to have been

exploited by many medieval potters and the products of the Brackenfield pottery near Little Oggston, Chesterfield were also made using this type of clay (Cumberpatch 2004c) One sherd of Brackenfield ware, a strap handle from a jug, was identified in the assemblage (context 1048). The issues around the dating of the Brackenfield industry remain to be addressed and the date range suggested (late 13<sup>th</sup> to 15<sup>th</sup> century) is undoubtedly far too broad but pending the publication of assemblages from Chesterfield (reviewed elsewhere; Cumberpatch and Thorpe 2002) remains the best estimate available.

Two sources are known for the Coal Measures wares in South Yorkshire; Green Lane in Rawmarsh near Rotherham and Firsby Hall Farm near Conisbrough. Neither site has been adequately investigated (Cumberpatch 2004b) although the quantity of Coal Measures wares from sites across southern Yorkshire and neighbouring areas means that we have a good idea of the range of vessel types produced and the date ranges of both types.

The author has suggested that an additional type of Coal Measures ware can also be distinguished and that this differs from the Coal Measures Whiteware in the finer texture of the fabric, generally finer finish and a rather more extensive range of vessel types than is seen in the later industry. Although petrological and chemical analysis carried out as part of the regional reference collection project was on too small a scale for the type to be definitively defined and distinguished from the Firsby Hall Farm and Rawmarsh Whitewares it was concluded that

it seems possible to sustain the suggestion that other potteries were in operation in the 13<sup>th</sup> and early 14<sup>th</sup> centuries using deposits of Coal Measures clay and producing vessels with a finer finish than those from Firsby and Rawmarsh (Cumberpatch 2002a). The chronological relationship of these possible potteries to those in Hallgate, Doncaster, remains to be established (Cumberpatch 2004b)

The same project involved the examination of an assemblage from a site at Upper Haugh on the outskirts of Rawmarsh and this resulted in the definition of another sub-type; Splash Glazed Coal Measures Whiteware which was dated, largely on the evidence of the technique of glazing, to the period between the late 11<sup>th</sup> and early 13<sup>th</sup> century. It was described as

a soft Coal Measures ware with moderate quantities of rounded quartz grains (0.4mm –0.5mm) and sparse fine black grit. The surfaces are buff to white with a grey reduced core. It is distinguished from the later medieval Coal Measures Whiteware type by being softer and rather finer in texture. The glaze is pale yellow to yellow-green in colour and patchy and streaky in application with typical splash glaze pitting (Cumberpatch 2004b).

These observations are significant in the current context because of the the results of the C<sup>14</sup> dating carried out on charred plant remains from the site and specifically from context 1076. A date of AD 1040 – 1210 (as a 95.4% confidence level) was obtained for this context. As discussed below, context 1076 produced just two sherds of pottery; a sherd of North

Nottinghamshire Quartz and Shell-tempered ware dating to the period between the 12<sup>th</sup> and mid 13<sup>th</sup> century (See Young, below) and a sherd of Coal Measures Fineware. Neither sherd was large, both weighing 8 grams, and intrusion into an earlier context cannot be entirely ruled out but nevertheless, the C<sup>14</sup> date is of considerable significance, given the dearth of such dates available for the medieval pottery industry in South Yorkshire. It would seem to support the suggestion made on the basis of the Upper Haugh assemblage that the production of Coal Measures wares began some time before the conventional date for Coal Measures Whiteware, perhaps as early as the mid 11<sup>th</sup> century. This has wide-ranging implications for the dating of medieval sites across South Yorkshire and in neighbouring areas, particularly when taken together with the early C14 dates for the Stamford ware pottery in Pontefract (Roberts *et al* 2013) and the questions surrounding the dating of the Hallgate A and B wares mentioned above.

*Humberware*, produced in eastern Yorkshire from the later 13<sup>th</sup> to the 15<sup>th</sup> or early 16<sup>th</sup> century, was an important regional type which enjoyed a wide distribution beyond its area of production. It is known to have been made at Holme-on-Spalding Moor and around the village of Cowick (Hayfield 1992, Hayfield and Grieg 1990, Mayes and Hayfield 1980, Watkins 1987) and possibly elsewhere. Only five sherds were identified (contexts 4024, 1057, 4008 and 10071), three were slightly less than typical in their appearance but were close enough to fall within the Humberware type category. One sherd was identified as of *Late Humberware* type (context 5009). This represents both the final phase of Humberware manufacture and a distinct departure in terms of vessel forms and fabrics when compared to the earlier wares.

A particularly notable feature of the assemblage was the quantity of *Sheffield-type ware* identified (contexts 1006, 1048, 1053, 1057, 3015, 4065, 4087, 4104, 4115, 9011 and 10071). This type of pottery was first recognised after a small area of undisturbed ground was excavated as part of a larger investigation in the centre of Sheffield, a few hundred meters from the site of the castle (Baker *et al* 2011, Cumberpatch 2011a, Vince 2011). The assemblage recovered from the site was small but included enough evidence of manufacture to establish it as the location of a medieval pottery. The assemblage from the castle is the largest group of this type of pottery yet identified. Identifiable vessel parts established the presence of a number of jugs, including at least one baluster jug (context 1048; Figure 2).

Unfortunately, dating evidence was absent from the Norfolk Street site and at present it is possible to suggest only a later medieval date (late 13<sup>th</sup> to early/mid 15<sup>th</sup> century) for the type, based on the general characteristics of the individual sherds and vessels. In this regard it is of interest to note that the C<sup>14</sup> date obtained for context 1057 indicated a date between AD 1170 and 1260 (at a 95.4% confidence level) which might imply a slightly earlier date for the type.

Other medieval wares could not be identified to specific types and have been designated by generic names based on the characteristics of individual sherds and vessels and with the proposed date ranges drawing on the same rather unsatisfactory data.

Context 6039 produced two sherds in a distinctive wheel-thrown *White Sandy ware*. The sherds were thin-walled with slight external rilling and rare spots of pale green and brown splashed glaze. The fabric was soft, very pale buff to white in colour and contained common to abundant clear and brown quartz up to 0.5mm in size although occasionally larger with sparse white rock fragments up to 1mm in size. Very fine mica was visible on the surfaces. The early date (similar to that of the Splash Glazed Sandy ware, described above), is suggested by the fine finish and the presence of splashed glaze on the external surfaces.

Context 1048 contained a small sherd of an unidentified type (*Splash Glazed Sandy ware*) containing fine quartz and red, iron-rich, grit. The presence of splashed glaze suggested an earlier medieval date within the 12<sup>th</sup> to early/mid 13<sup>th</sup> centuries.

Four sherds (contexts 4104, 4109, 6011 and unstratified) were classified as *Buff Sandy ware*, distinguished by their buff to pale grey fabrics containing fine quartz and sparse fine rock fragments. Buff sandy and gritty wares are an important component of 11<sup>th</sup> to 13<sup>th</sup> century assemblages from sites throughout northern Yorkshire and north-east England. The sherds identified here may be regional imports although at present they cannot be matched to any specific named type, in large part because these wares have not been investigated in detail. The sherd from context 6011 (Figure 3) was an unusual narrow strap handle with a prominent groove along the external edge. The fabric was fine pink buff to pale grey in colour and contained fine quartz and red grit up to 0.6mm with very fine, sparse, muscovite visible at the surface. The handle had broken at the junction with the body. It did not appear to be a typical jug handle and may have come from a urinal.

*Reduced Sandy ware* (contexts 1048, 3056, 4087, 6039, 6050 and 9011) was defined by a narrow range of fine, grey fabrics, sometimes with thin oxidised margins. All of the fabrics contained quartz and in some cases at least this was combined with fine black grit, similar to (but finer than) that seen in the Coal Measures and Sheffield-type wares which may suggest the exploitation of similar clay sources. Only one sherd was identifiable to vessel type; a jug from context 3056 represented by a distinctive profiled rim with an external ridge.

The *Oxidised Sandy ware* group (contexts 1040, 1057, 3057, 4040 and 4111) included sherds similar in composition to some of the Reduced Sandy wares but which were oxidised throughout. The date ranges cited in the data tables reflects the character of the individual sherds.

One sherd was identified as *Chalk-tempered Sandy ware* (context 4115). The use of chalk as a tempering medium is known from sites in East Yorkshire (Didsbury 2005:15) and it is probable that the vessel originated from the Hull area.

Context 4042 contained part of a dripping tray in a coarse *Gritty ware* fabric (Figure 4). Dripping trays or pans are distinctive sub-rectangular dishes intended to catch the fat dripping from an animal or bird carcass while it is being cooked on a spit. While not common on most medieval sites, a number have been identified from Conisbrough Castle (Cumberpatch 2013, 2014b, 2015b, 2016b).

Post-medieval pottery (c.1450 – c.1720) was represented by a variety of wares typical

of the period. *Cistercian ware*, the first of the truly post-medieval wares (Cumberpatch 2003), was present in contexts 11022, 1007, 4097, 4107, 6026, 10017 and unstratified. Cistercian ware (which has no connection with the Cistercian Order, other than occurring in Dissolution contexts on monastic sites) was manufactured widely across the Midlands and northern England with the closest known potteries to Sheffield being located in Ticknall (Derbyshire; Spavold and Brown 2005) and Wrenthorpe (West Yorkshire; Moorhouse and Roberts 1992) although it may also have been made in Doncaster (Robinson, pers comm). Two of the sherds (contexts 11022 and 10017) bore white pipeclay motifs. Such designs have been suggested as having religious and specifically Catholic, connotations (Spavold 2009) and as such may have fallen from favour during and after the Reformation, which might suggest that the sherds pre-date the early/mid 16<sup>th</sup> century. Against this is the fact that the Earls of Norfolk were members of a prominent Catholic family and as such might have continued using such vessels, albeit perhaps discretely, after others had disposed of them. The remainder of the sherds were plain and included two cup or tyg bases and a small rim sherd, probably from a similar vessel.

From the beginning of the 17<sup>th</sup> century Cistercian ware underwent a typological transformation with larger *Blackware* vessels replacing the small Cistercian ware cups and tygs. Blackwares are a common component of contexts associated with Civil War activity, most notably at Pontefract Castle where large quantities were recovered from deposits associated with the demolition of the castle in 1649 (Cumberpatch 2002a). In the present case, Blackwares were identified in contexts 4016, 5005, 6026, 10066, 11022, 1006 and 11024). The majority were body sherds but included two rims, one from a large tyg, and a footed base, probably from a similar vessel. One sherd (context 6026) had glaze across a broken edge, normally the sign of a waster although surface cracks can allow glaze to infiltrate while the vessel remained functional.

Larger utilitarian vessels (jars and possibly cisterns) in Blackware fabrics are known as *Coarse Blackware* and were identified in contexts 4107, 6006 and 6026. These appear to continue into the early 18<sup>th</sup> century (and may be confused with the Midlands Purple wares described below) although true Blackwares are a purely 17<sup>th</sup> century type.

*Yellow wares* are considerably harder to date with any precision than are Cistercian wares and seem to be broadly contemporary with both Cistercian ware and Blackware, spanning the period between the mid/late 15<sup>th</sup> century and the later 17<sup>th</sup> century and probably continuing into the early 18<sup>th</sup> century. Characterised by its white fabric and bright yellow glaze (clear on the white body), Yellow ware was represented by just four sherds (contexts 1007, 5025, 11022 and U/S 1104) which included fragments from a small jar and a bowl.

One sherd of *Surrey Whiteware* was identified in the assemblage (context 1007). As the name implies, this type of pottery was manufactured in southern England during the later post-medieval period (Pearce and Vince 1988). Sherds of similar Border ware were present in the assemblages from Pontefract Castle (Cumberpatch 2002a; 186) and Sandal Castle (Moorhouse 1983: 93) while two sherds were noted (under the earlier name of Tudor Green



ware) at Bawtry (Cumberpatch 1996: 60).

A small number of sherds of European or possibly European vessels were identified in the assemblage. These included *Westerwald stoneware* (context 6026) and *Martincamp-type ware*.

Westerwald stonewares, distinguished by the use of dark blue cobalt decoration on a pale grey stoneware body, are relatively common on post-medieval and early modern sites (Gaimster 1997). The example from context 6026 also bore purple detailing on the relief-moulded body but the sherd was too small to identify to a specific vessel type (Figure 5).

Martincamp-type flasks (contexts 1007 and 1043) have long been considered to be of northern French origin (Ickowicz 1993) but recent work at Ticknall in Derbyshire (Brown and Spavold 2019) has demonstrated that they were amongst the products of one or more of the Ticknall potteries and possibly also of other potteries in the Midlands. The typical form, a long-necked flask, seemingly designed to be suspended from leather straps and carried over the shoulder, has led to them being referred to as 'pilgrim flasks'. While their distribution is much wider, they are often found in monastic contexts, although production outlasted the Reformation and continued into the 17<sup>th</sup> century. It is worth noting that amongst the few surviving sherds of pottery from the early 20<sup>th</sup> century excavations on the site of Beauchief Abbey is a group of Martincamp-type flask fragments, currently held by Museums Sheffield. The name 'Martincamp' has been retained for this report as it was not possible to compare the sherds from the castle directly with examples from Ticknall, but it is likely that this name will, in due course, be replaced by the term coined by Brown and Spavold, 'Ticknall bottle'.

*Tin Glazed Earthenwares* (contexts 1006, 4024, 4115 and 5005) were an important class of pottery in the post-medieval period and were manufactured in northern Europe between the mid 16<sup>th</sup> and mid 18<sup>th</sup> centuries. The type was imported from the Netherlands in considerable quantities (hence the popular name for the type; 'Delft ware') but it was also made widely in Britain (London, Bristol, Newcastle, Liverpool, Wincanton, Whitehaven and elsewhere). Unfortunately it is impossible to distinguish between the sources on the basis of macroscopic or low-magnification microscopic examination and as a result the type is often referred to as of 'Anglo-Dutch' origin. Only when useful parts of painted designs survive is it possible to attribute specific vessels to specific sources. The difficulty of doing this is compounded by the very poor adhesion between the body and the glaze with the result that the glaze is easily damaged. Such damage may have occurred during the use-life of the vessel but excavation, processing, bagging and transport generally have a more profound effect on the condition of the sherds. In the present case the sherds were too small (none weighed more than 7 grams) and damaged for identification to be possible.

The term *Midlands Purple ware* has been used by numerous authors to describe hard, purple glazed vessels of post-medieval and early modern date but there have been few attempts to adequately define, describe and delimit the term. In the present case it has been used quite narrowly to describe vessels with very hard, dense and often semi-vitrified fabrics which, in hand-specimen and at low (x20) magnification, appear to be close to stonewares in

their characteristics. Inclusions consist of varying quantities of quartz and red and white rock fragments, some of which have clearly been affected by the intensity of the firing. Ticknall is the best known source of Midlands Purple wares but the quantity and wide distribution of the type would seem to imply the existence of other potteries producing this type of pottery. Only two sherds were identified in the present assemblage, both from context 11022.

Although Midlands Purple wares were a durable and robust type, they were progressively replaced from the late 17<sup>th</sup> century onwards by Brown Glazed Coarsewares which were fired to a lower temperature (as indicated by the character of the fabrics) and so may have been cheaper to manufacture (using less fuel). A distinction has been drawn between *Early Brown Glazed Coarsewares* (EBGCW) and *Brown Glazed Coarsewares* (BGCW) on the basis of the fabrics with the former being coarser and containing significant quantities of red grit. This type was much commoner in the assemblages from Butcher's excavations on the site (Cumberpatch 2017, discussed in more detail below) but four sherds were present (contexts 2020, 4002, 1043 and 11022), all but one, body sherds from hollow wares. The exception was the base of a bowl or pancheon.

Brown Glazed Coarsewares were much commoner than the earlier variety, notably in trenches 1, 4, 6 and 10. The date range spans the 18<sup>th</sup> and 19<sup>th</sup> centuries and the type remained in production into the mid 20<sup>th</sup> century (Anderson 1963-5, Cumberpatch 2014a). Fabrics tend to be sandy in texture with varying sizes and quantities of quartz with smaller quantities of red and white inclusions. Such variation is inevitable given the widespread nature of production across small potteries using local clay sources (Griffin 2012, Cumberpatch 2014a) over a period of some 250 years or more. The commonest type of vessel, virtually ubiquitous on sites of 18<sup>th</sup> to early 20<sup>th</sup> century date, is the pancheon, a large bowl, glazed internally and with a wide variety of rim shapes and which seems to have been used for numerous domestic tasks including preserving fruit and vegetables and making bread dough. Hollow wares forms included large jars and cisterns although only the former were identified in the present assemblage. Such jars seem likely to have been used for storage, particularly of preserved or pickled vegetables. Smaller vessels with the same general characteristics have been termed *Brown Glazed Fineware* (context 6011) although they are part of essentially the same group of wares.

*Redware* and the closely related *Slipware Type 1* are distinctive types with a characteristic fine, rather soft orange fabric which, when combined with clear glaze, gives shiny red surface, typically on the inside of large, shallow dishes and bowls. When plain the type is termed Redware but when decorated with trailed white slip designs (which appear yellow under the glaze) it is known as Slipware type 1. A 17<sup>th</sup> to very early 18<sup>th</sup> century date is normally ascribed to the type as it seems to have been largely replaced by other types of *Slipware* during the 18<sup>th</sup> century, at least in Yorkshire. The later Slipwares are typically press-moulded dishes with impressed 'pie-crust' rims. Redware was represented by just one sherd (context 11022) while Slipware Type 1 was only a little more common with three sherds from contexts 5029 and 10017.

Eighteenth century Slipwares were rather more common in the present assemblage than was the earlier type with sherds from contexts 1006, 1007, 4036, 4037, 5005, 6006, 6026 and 10025. All but two sherds were from press-moulded dishes, the exceptions being from wheel-thrown hollow wares (contexts 1007 and 10025).

The Slipwares form part of an important group of early modern wares, termed 'vernacular tablewares' which include *Late Blackware*, (common throughout the assemblage, as listed in the data tables), *Slip Coated ware* (contexts 1006, 4037, 5005) and *Mottled ware* (contexts 3015, 4008, 5009, 6026, 6041 and unstratified). These wares and their important place in the economic history of southern Yorkshire have been discussed in detail elsewhere (Cumberpatch 2014a). All were manufactured at a number of local potteries across South and West Yorkshire, with one of the earliest being located at Sheffield Manor (Beswick 1978, Hadley and Harlan 2011, Cumberpatch 2010, 2011b, 2012) while others flourished at various times during the 18<sup>th</sup> century. Production does not seem to have continued into the early 19<sup>th</sup> century, possibly because of the appearance of a range of cheap, colourful factory-produced kitchenwares from the manufacturers of formal tableware, discussed below. Many of the country potteries continued to produce pottery but shifted the focus of production to utilitarian wares, notably Brown Glazed Coarseware and Brown Glazed Fineware, mentioned above.

The 18<sup>th</sup> century saw a major change in the pottery industry with the appearance *White Salt Glazed Stoneware* (c.1720 – c.1780; see Edwards and Hampson 2005) and, slightly later, the first refined earthenwares; *Creamware* (c.1740 – 1820) and *Pearlware* (c.1780 – c.1840), all closely connected with the industrialisation of the pottery industry. Although often linked specifically with Staffordshire, they were in fact manufactured very widely, including in Yorkshire (Griffin 2001, 2005, 2012) although attribution to specific potteries is generally difficult unless the sherds bear maker's marks or, more rarely, unique decorative designs. The wider social significance of the wares, which reflect the importance of the cult of 'civility' (Thomas 2018) in the 18<sup>th</sup> century, has been discussed by numerous authors, including Kowaleski-Wallace (1997) and Richards (1999), and cannot be dealt with in detail here. Briefly, the character of these wares distinguished them from both earlier types and contemporary vernacular tablewares. Their fine, thin profiles and hard, bright, white finish, combined with the fact that they were much cheaper and more readily available than imported porcelain, made them highly desirable objects, eminently suitable as part of the move towards formal dining which formed an important element in the rise of the 'Georgian Order', a central part of 18<sup>th</sup> century society and sensibility.

White Salt Glazed Stoneware was represented by sherds from contexts 4040, 4115, 5009, 5025, 6011 and unstratified. Both flatwares and hollow wares were represented although in most cases the sherds were too small to be attributed to specific vessel types.

Creamwares, including both plain and banded types, were relatively common element in the assemblage (as they frequently are in assemblages from sites in Sheffield, including the Riverside site; Cumberpatch 2005, 2015b) with a maximum of 153 vessels represented from

all of trenches (detailed in the data tables). Vessel types included flat and hollow tablewares although in many cases the sherds were too small for the vessel type to be identified.

Banded Creamware, characterised by the use of engine-turning and dark coloured slip to form bold patterns around mugs, cups, bowls and jars, was also present in contexts (1006, 4008, 4009, 5005, 6006, 6011 and unstratified).

From the latter part of the 18<sup>th</sup> century Creamwares began to give way to Pearlwares, distinguished by their blue-white finish and the common use of transfer printed designs. Both types are common in assemblages from Sheffield. A wide range of Pearlware tablewares were identified although plain wares were rather rare in comparison to hand-painted, banded and transfer printed examples. The majority of the latter were too small to allow the designs to be identified but context 1001 was distinguished by the fact that it contained a small sherd bearing the tendril pattern, identified by Tomlinson and Tomlinson (2014) as used in the Ferrybridge Pottery in West Yorkshire. Other sherds bore the popular and ubiquitous Willow design with other Chinese style patterns also present.

From around 1840 the Pearlware finish was replaced by the brighter Whiteware finish, again often combined with transfer printed decoration. Both plain and transfer printed examples were common in the castle assemblages, as they are on sites across Sheffield. Examples included the normal range of table and kitchenwares with a small number of more unusual vessel types including a vase or planter from context 4007 and part of a jug with a salmon-pink external surface (context 4077). Such sherds have identified as parts of one pint jugs, often with an official stamp verifying their capacity and associated with public houses (as, for example, on sites excavated in advance of the Inner Ring Road scheme; Cumberpatch, unpublished). Transfer printed designs included the popular Asiatic Pheasants and Willow patterns but many others were unidentifiable. Vessel forms included standard types of tableware, as listed in the data tables.

Two sherds (from contexts 2001 and 4037) appeared to be pieces of unfinished vessels in refined earthenware fabrics, probably the waste from pottery manufacture. The sherd from context 4037 could be either Pearlware or Whiteware but the fragment from context 2001 appears to be of a late date and thus probably Whiteware. It bore part of a transfer printed maker's mark reading 'BEST QUAL ...' with an angular symbol but not enough survived for it to be identifiable to a specific manufacturer.

Like Whiteware, *Bone China* was a common element in the assemblage with plain, hand painted, moulded and transfer printed examples all common, particularly in Trenches 4 and 5 (notably contexts 5005 and 5034, although transfer printed examples were absent from context 5034). First developed in the late 18<sup>th</sup> century, Bone China rapidly became the commonest type of porcelain body used by British manufacturers (Barker and Ford nd). It was well suited to moulding (although not to wheel throwing) and was used for a wide variety of tablewares distinguished by their thin walls, bright white colour and delicate appearance. The examples from the present assemblages included a wide range of tablewares but also included kitchen wares such as pie dishes (contexts 5005, 5034). Decoration

included gold overglaze lines, over-glaze painted designs (mainly floral motifs) and underglaze transfer prints (Willow, Two Temples).

As noted above, the early 19<sup>th</sup> century saw the introduction of a range of cheap, colourful kitchen and tablewares in refined earthenware fabrics which seem to have largely replaced the vernacular tablewares and which remained extremely popular throughout the 19<sup>th</sup> century and into the 20<sup>th</sup> century. These are very well represented on sites across Sheffield, including in the present case. *Banded wares*, as the name implies, were decorated with bands and lines of varying colour, often blue but also including red, brown and orange. Bowls were the commonest form but at least one jug was also identified (context 5034). Two sherds (contexts 4009 and 4095) contained sherds of relief banded ware, distinguished by the raised bands around the body. Such sherds usually come from jugs.

*Cane Coloured wares* and *Slip Banded Cane Coloured (CC) wares* are a common find on 19<sup>th</sup> century sites in Sheffield. As the names imply the refined earthenware bodies had a pale yellow colour which was enhanced by the clear glaze while the latter were decorated with white, brown or blue lines and bands. Kitchen wares including bowls and pie dishes were amongst the commoner types both in the present assemblage and more widely.

*Colour Glazed wares*, characterised by the use of strongly coloured glaze on white or coloured bodies, were well represented in the assemblage, most notably by teapots from Trenches 4 and 5. Many of these bore the shiny brown 'Rockingham' style glaze which was developed in the later 18<sup>th</sup> century by the Brameld family who operated the pottery at Swinton (Cox and Cox 2001:116 – 120). They were particularly popular with Mary, Marchioness of Rockingham who purchased no fewer than 230 between 1770 and her death in 1804. They were more widely popularised by the Prince of Wales (later George IV), who encountered them when visiting the Wentworth estate in 1807 and who subsequently ordered a quantity of them, thus ensuring their fashionable status. The significance of the concentration of teapots in Trenches 4 and 5 is considered further below.

Unglazed Red Earthenwares were present in contexts 1006, 3015, 4040, 4115 and 6006. The majority were from flowerpots, perhaps reflecting the importance of allotments in Sheffield (Flavell 2005).

## **Shell and quartz-tempered pottery from Sheffield Castle**

Jane Young

### *Introduction*

Six sherds in quartz and shell tempered fabrics were submitted for examination and reporting. All of the sherds were examined using a x20 binocular microscope and were recorded using the fabric codenames (CNAME) of the City of Lincoln Archaeology Unit (Young, Vince and Nailor 2005). The vessels were quantified using three measures: number of sherds, vessel count and weight. The resulting archive entered onto an Access database and subsequently incorporated into the spreadsheets (LibreOffice CALC) which form part of

the site archive and are included as part of the full report. Recording of the assemblage was in accordance with the guidelines laid out in Slowikowski *et al* (2001) and the PCRG / SGRP / MPRG guidelines (2016).

The pottery fell into two groups. The first consisted of three sherds from a single large bowl in a Shell and Quartz Tempered ware (MEDX) recovered from context 4104 (weighing 82 grams in total). The vessel was of medieval type and most probably dates to the period between the mid 12<sup>th</sup> and mid 14<sup>th</sup> centuries.

The second group consisted of three sherds from two small jars (weighing 15 grams in total) in North Nottinghamshire Quartz and Shell ware (NNQS) from contexts 1076 and 3056 and were most probably of an early medieval type dating to between the 12<sup>th</sup> and mid 13<sup>th</sup> centuries. The details of both groups of sherds are summarised in the data tables.

### *Condition*

The Shell and Quartz Tempered ware sherds from context 4104 were in a slightly abraded condition. The sherds of North Nottinghamshire Quartz and Shell ware (contexts 1076 and 3056) were also in a slightly abraded condition and both vessels showed evidence of variable leaching of the shell inclusions with the base from context 1076 retaining little visible structural shell even in a freshly broken edge.

### *The range and variety of materials*

The three sherds from context 4104 came from a single large bowl tempered with fine quartz grains and sparse to moderate calcareous inclusions including fossil shell (MEDX). The vessel was in a reduced fabric with light oxidised surfaces and contained common fine quartz grains below 0.2mm, mixed but mainly coarse sparse to moderate fossil shell fragments, sparse to common flattened voids some of which contained the remains of carbonised vegetable material, sparse iron-rich grains, occasional fragments of erratic rock, occasional rounded calcareous grains and rare needle-like calcareous minerals that may be gypsum. This fabric suggests an origin in the East Midlands although the author cannot identify a precise source. The everted rim has a single row of triangular stabbing marks around the rim top. Stylistically this large bowl form and decoration belong to the period between the mid 12<sup>th</sup> and mid 14<sup>th</sup> centuries (Figure 7).

The fabric of all three of the sherds from contexts 1076 and 3056 was consistent with that of vessels found in Nottinghamshire especially around Southwell and termed North Nottinghamshire Quartz and Shell ware (NNQS), although a precise location for the manufacture of the type has not been identified. At present the ware is thought to span the period between the early 12<sup>th</sup> and mid 13<sup>th</sup> centuries.

The three sherds presented for examination come from two small jars recovered from deposits 1076 and 3056. Identification of the single basal sherd recovered from deposit 1076 was the more tentative of the two vessels as little actual structural shell survived. The fine quartz inclusions however are typical of the type. Deposit 3056 produced two sherds from a

single small jar with a thick external soot deposit and partial internal soot or carbonised deposit. Typologically the vessel shapes were typical of 12<sup>th</sup> century examples of the ware.

### *Summary*

The three sherds from context 4014 come from a single large medieval-type bowl of probable mid-12<sup>th</sup> to mid-14<sup>th</sup> century date and originated in the East Midlands.

The three sherds from contexts 1076 and 3056 came from two small jars of early medieval type. Their presence may be considered unusual as previous finds of this ware type have been confined to sites in Nottinghamshire and west Lincolnshire within reach of the River Trent.

## **The pottery assemblages from Trenches 1 to 11**

### *Trench 1*

The assemblage from Trench 1 consisted of 221 sherds of pottery weighing 2699 grams representing a maximum of 169 vessels. The data are summarised in Tables 2 and 17.

Contexts 1001, 1002, 1003, 1005 and 1011 contained small groups of sherds dating to the 18<sup>th</sup> and 19<sup>th</sup> centuries with earlier material notable by its absence. The range of types was considerable, given the small size of the individual context groups with Late Blackware, Creamware, transfer printed Pearlware and Late Blackware amongst the earlier component with transfer printed Whiteware, Sponged ware and Cane Coloured ware amongst the later tablewares. Utilitarian wares included Brown Glazed Coarseware and Stoneware, the later including part of a bottle from context 1003. The sherd of transfer printed Pearlware from context 1001 bore a design believed to be unique to the Ferrybridge Pottery (Tomlinson & Tomlinson 2014:8-9) and which dates to the period between 1808 and 1818.

Context 1007 contained a small but diverse group of post-medieval to early modern sherds which included two sherds of Cistercian ware, a sherd of Surrey Whiteware and fragments from what may be a single Martincamp-type flask, although not all of the sherds joined. They closely resembled a sherd from context 19043 although again the absence of a join precluded a definite link between these contexts and trenches. Context 1043 also contained a sherd from a Martincamp-type flask which was accompanied by a sherd from a mid 19<sup>th</sup> to early 20<sup>th</sup> century stoneware jam or marmalade jar and a piece of Brown Glazed Coarseware.

Context 1040 contained just six sherds, all but one of which were of medieval date or early post-medieval date, the exception being a piece of 18<sup>th</sup> century Late Blackware. Context 1042 contained a single sherd of Late Medieval Sandy ware, similar to the majority of sherds from context 1040.

Context 1006 contained the largest quantity of pottery from any single context within the trench, of which just two sherds of Unglazed Red Earthenware post-dated the 18<sup>th</sup> century. Of the remainder, the most readily datable types consisted of 18<sup>th</sup> century wares, including Late Blackware, Mottled ware, Slipware and Slip Coated ware alongside formal

tablewares of 18<sup>th</sup> to early 19<sup>th</sup> century date (Creamware, Pearlware, Edged ware). Smaller quantities of residual medieval and post-medieval pottery were also present including Blackware and Sheffield-type ware with a single small sherd of Tin Glazed Earthenware.

Contexts 1053, 1057 and 1076 produced much smaller groups of pottery, all entirely of medieval date and including Hallgate A ware, Sheffield type ware, Humberware and Coal Measures Fineware with a single sherd of North Nottinghamshire Quartz and Shell-tempered ware. The significance of the C<sup>14</sup> dates obtained from contexts 1057 and 1076 have been discussed above.

Context 1048 contained a distinctive assemblage which, apart from a single small (7 gram) sherd of Late Blackware was of entirely medieval date and included a sizeable group of Sheffield-type wares including the base of a baluster jug and up to seven other jugs. The group also contained a sherd of Brackenfield 1 ware and three sherds of Hallgate A ware with a small sherd of an unidentified splash-glazed sandy ware.

Unstratified pottery consisted of three sherds of Bone China, all from flatwares and then base of a mug in Sponged ware.

The majority of contexts which contained pottery were described as 'made ground' (1003, 1005, 1006, 1007, 1040, 1048, 1057 and 1076) while contexts 1001 and 1002 formed a surface and bedding layer. Context 1011 was the fill of a construction cut (1008) for a drain while 1053 was the fill of a pit. The question of 'made ground' and issues surrounding the process of making ground will be discussed further below as these are of importance to the site as a whole. In terms of Trench 1, it should be noted that of the contexts containing only medieval pottery (1053, 1057 and 1076), only one (1053) was the fill of a discrete feature, the other two being listed as 'made ground'. It is possible that these represent a medieval phase of activity related to the construction, maintenance or use of the castle although without further information, this is difficult to substantiate.

### *Trench 2*

Trench 2 contained an assemblage of just fifteen sherds weighing 209 grams from three contexts (2001, 2019 and 2020). The data are summarised in Tables 3 and 18. Context 2001 was part of the surface layer while both 2019 and 2020 were described as 'made ground'.

The material from context 2001 was of 19<sup>th</sup> and 20<sup>th</sup> century date and included a sherd of unglazed Whiteware, possibly waste from pottery production (see also context 4037, below). Context 2019 contained just two poorly dated sherds neither of which pre-dated the 18<sup>th</sup> century (Brown Glazed Coarseware, Brown Salt Glazed Stoneware). In contrast, context 2020 produced a small group of primarily 18<sup>th</sup> century wares (Late Blackware, Creamware, transfer-printed Pearlware) but also one small sherd of mid to late 19<sup>th</sup> century Whiteware. The context was also notable for containing a sherd of Early Brown Glazed Coarseware, a type that was extremely common in assemblages from earlier excavations on the site but which was rare in the present assemblage, as discussed further below.



### *Trench 3*

The pottery assemblage from Trench 3 consisted of eighty-three sherds weighing 797 grams representing a maximum of seventy-four vessels. The data are summarised in Tables 4 and 19.

A clear bipartite split between two groups of contexts which contained very different assemblages was discernible in Trench 3. Contexts 3002, 3008 and 3015 contained mixed groups of 18<sup>th</sup> and 19<sup>th</sup> century pottery with just two sherds of medieval pottery (Hallgate A ware and Sheffield-type ware), both from context 3015. The fact that context 3015 was the fill of a drain associated with the market buildings would suggest that while the medieval pottery was residual it may have been derived from strata associated with the castle. Context 3015 also included a ceramic knurr ball, part of the popular game of knurr and spell or pub cricket, played widely in Yorkshire and neighbouring areas during the 18<sup>th</sup> and 19<sup>th</sup> centuries.

Contexts 3056, 3057, 3058 and 3079 contrasted sharply with those mentioned above in that they contained exclusively medieval pottery which included a high proportion of Hallgate A ware and, perhaps significantly, no later medieval wares. Although contexts 3056 and 3057 were associated with a medieval demolition phase and 3058 and 3079 with medieval deposits of a different nature, the principal difference between the two pairs of contexts was the more diverse range of material in 3056 and 3057. In particular, context 3056 did not contain any Hallgate A ware, while this type was predominant in contexts 3057, 3058 and 3079. It is possible, however, that the Reduced Sandy wares in context 3056 were also a Doncaster product (unattributed reduced wares are a feature of assemblages from Doncaster) but this is impossible to verify at the present time; in any case the characteristics of these sherds suggested that they were of a similar date to the Hallgate A wares. Context 3056 also included a sherd of North Nottinghamshire Quartz and Shell-tempered ware of 12<sup>th</sup> to mid 13<sup>th</sup> century date.

Unstratified pottery consisted of a very small fragment from the rim of an Edged ware plate.

### *Trench 4*

Trench 4 contained a substantial assemblage consisting of 483 sherds weighing 7005 grams representing a maximum of 411 vessels. The data are summarised in Tables 5 and 20. The majority of contexts were described in the context register as 'made ground', a very broad description that could be applied to many contexts on sites across Sheffield (as discussed in more detail below) but with little information as to inferences that might be drawn from them regarding the formation processes involved in their creation. Cross-context joins linked three of the contexts; 4002, 4008 and 4037 (all 'made ground') via the rim and handle of a transfer printed Whiteware mug of late 19<sup>th</sup> to early 20<sup>th</sup> century date.

Individual sherds of intrinsic interest included a sherd of hand-made White Sandy ware (context 4107), a sherd of biscuit-fired refined earthenware (context 4037) and part of a

mug in Banded Pearlware (context 4042).

The importance of the hand-made medieval sherds, although small in number has been discussed above. The sherd of biscuit-fired ware is typical of the waste from pottery manufacture that was often sold by the potteries as hard-core for the construction of roads and the foundations of buildings. The importance of the reuse of waste material, primarily domestic but also industrial, has been presented in a preliminary fashion elsewhere (Cumberpatch 2005) although, as will be discussed below, it does not seem to have been as significant on the castle site as it was elsewhere in Sheffield. The presence of this sherd would seem to indicate that, at some level, material was brought to the site although probably in small quantities.

The Banded Pearlware mug (context 4042) bore very distinctive decoration consisting of dark brown and red brown bands below the rim, a wide rouletted band on the body above a rilled band immediately above the base and diffuse green circles with an orange dot in the centre of each on the body. Context 4042 also contained the profile of a medieval dripping tray in a hard gritty fabric (described above) alongside the base of a Humberware jug or jar but these were the only medieval sherds in an assemblage that otherwise consisted of 18<sup>th</sup> and 19<sup>th</sup> century wares.

Contexts 4001 and 4002 contained a small quantity of 18<sup>th</sup> century and later wares with one sherd of Early Brown Glazed Coarseware of probable 17<sup>th</sup> century date. Late 19<sup>th</sup> to 20<sup>th</sup> century wares were well represented, consistent with the position of the contexts in the upper part of the trench.

Context 4016, the primary fill of a cut associated with a metal stanchion associated with the modern market buildings, contained a small group of 18<sup>th</sup> to early 19<sup>th</sup> century wares, including Late Blackware and Creamware with a sherd of earlier Blackware. Given the apparent date of the context, all of these sherds are presumably residual in character.

The assemblage from context 4037 also contained a quantity of early modern wares (Creamware, Late Blackware, Slip Coated ware, Slipware and Brown Glazed Coarseware) but later material was also present, notably two sherds of transfer-printed Whiteware. The sherd of biscuit-fired ware has been noted above, as has the transfer-printed Whiteware mug which joined with sherds from contexts 4002 and 4008.

Contexts 4093, 4088 and 4116 all contained single sherds or vessels in the cases of 4093 and 4116 and a small mixed group in the case of 4088. The sherds from context 4116 joined to form the profile of a Creamware bowl while the sherd from 4093 was of mid to late 19<sup>th</sup> century date. The sherds from context 4088 were of mixed date, spanning the 18<sup>th</sup> and mid to late 19<sup>th</sup> century.

Context 4010 contained a larger assemblage which consisted primarily of mid to late 18<sup>th</sup> and 19<sup>th</sup> century wares with a single residual sherd of Hallgate B ware, of probable 12<sup>th</sup> century date (as discussed above). The early modern wares were principally Creamware and Pearlware (including Edged ware) with just two sherds of Late Blackware. The 19<sup>th</sup> century component consisted primarily of tablewares (Bone China, Whiteware and other refined

earthenwares) and included parts of five teapots (Colour Glazed ware), a small concentration with parallels in Trench 5, described below.

Contexts 4007, 4042, 4036 and 4062 all contained mixed groups of 18<sup>th</sup> and 19<sup>th</sup> century wares with, in the case of 4042 and 4062, rare sherds of residual medieval pottery, including the piece of the dripping tray (context 4042) mentioned above (Figure 4). The later wares included a range of domestic tableware and kitchenwares with several stoneware bottles (context 4042), all typical of assemblages from Sheffield. Context 4062 formed the primary fill of a construction cut associated with a machine base (context 4011). Given the make-up of the assemblage, it might be inferred that this had disturbed underlying medieval and early modern strata or that material from elsewhere on the site had been used to fill the construction cut.

The assemblages from contexts 4024, 4009 and 4008 broadly resembled those from the contexts described above. Medieval pottery formed a small residual component in contexts 4008 and 4024 (Humberware and Late Humberware) with a very small piece of Tin Glazed Earthenware from context 4024. The later wares included the normal range of tablewares and kitchen wares with occasional sherds from retail stonewares (bottles). The same may be said of the sherds from contexts 4052 and 4095 although both of these groups were very small in size.

Another mixed assemblage was recovered from context 4115. This included a wide range of wares with three medieval sherds, including a piece of Chalk-tempered Sandy ware, most probably from East Yorkshire, a sherd of Sheffield type ware and a small sherd of probable Hallgate A ware. Later pottery included Tin Glazed Earthenware and White Salt Glazed Stoneware alongside the familiar range of early modern formal and vernacular tablewares and a small number of later sherds (Sponged ware and Unglazed Red Earthenware).

Contexts 4039, 4040 and 4064 also contained mixed 18<sup>th</sup> and 19<sup>th</sup> century assemblages although in these cases the early modern wares were slightly more common than the recent types although whether this is more than the effects of chance is unclear; drawing reliable conclusions from such small groups of sherds in situations where residuality is a significant factor is always a difficult matter. In the case of contexts 4108 and 4117, which produced only sherds of early modern date, this was also an issue given that only three vessels were represented in the first case and four in the second.

The assemblage from context 4087 was unusual in that it contained only medieval pottery. Hallgate A, Hallgate B and Sheffield type ware were all present with one sherd of an unidentified Reduced Sandy ware. This context should perhaps be considered alongside contexts 4104, 4109 and 4111, described below. Medieval pottery was also present in contexts 4065 and 4107 (including Sheffield-type ware and hand-made White Sandy ware) but in each case it was associated with post-medieval, early modern and recent wares and as such was just one element in what are clearly significantly disturbed deposits. Contexts 4109 and 4111 both produced single sherds of medieval pottery, neither identifiable to known

types.

Context 4034, a wall, produced just four small sherds (none of them weighing more than 8 grams) of early modern and recent wares, with the latter of late 19<sup>th</sup> or 20<sup>th</sup> century date and presumably dating the structure.

As noted above, context 4104, like context 4087, produced a small medieval assemblage which included a jug handle in Sheffield type ware, a sherd of Buff Sandy ware and three sherds of Shell and Quartz-tempered ware (Figure 7). It is of interest to note that the latter, probably from a single vessel, appeared to originate in the Midlands rather than Lincolnshire, the more usual source of shell-tempered wares found in South Yorkshire.

Context 4106, the secondary fill of an unspecified feature, produced a single small sherd of Creamware while context 4097, the tertiary deposit within the construction cut for a flue, contained the base of a small Cistercian ware vessel, probably a cup or tyg.

Context 4077, not located on the trench matrix, contained just three sherds of mid to late 19<sup>th</sup> century Whiteware, one of them bearing the Asiatic Pheasants design and two with salmon pink glazed external surfaces. Where found on other sites in Sheffield (see, for example, Cumberpatch 2014c) such sherds have been identified as parts of one pint jugs and are often associated with public houses.

Unstratified pottery consisted of a single sherd of Brown Salt Glazed Stoneware.

### *Trench 5*

Trench 5 contained an assemblage consisting of 274 sherds of pottery weighing 2621.5 grams representing a maximum of 242 vessels. The data are summarised in Tables 6 and 21.

Contexts 5023, 5024 and 5025 were omitted from the context register and their character remains unknown but the remaining contexts included both the ubiquitous 'made ground' as well as the fills of a number of specific features. A cross-context join linked contexts 5034 and 5005 via parts of a teapot of 19<sup>th</sup> or early 20<sup>th</sup> century date. Teapots were particularly prominent in contexts U/S 5000, 5002 and 5034 and amongst the unstratified pottery (see also Trench 4, above).

Contexts 5005 and 5034 contained the greater part of the assemblage from Trench 5 as a whole and, as noted above, were linked by a cross-context join. While context 5005 was described as 'made ground', context 5034 constituted the primary fill of cut 5032 within which was a drain, 5033, associated with the Castle Market and therefore of a relatively recent date.

Context 5005 contained residual 18<sup>th</sup> and early 19<sup>th</sup> century wares which included single sherds of Blackware, Tin Glazed Earthenware, Creamware, Banded Creamware, Pearlware, Slipware and Slip Coated ware but both assemblages were dominated by later (mid to late 19<sup>th</sup> or early 20<sup>th</sup> century) material including Bone China, Whiteware, Blue Banded ware and Colour Glazed ware. The Colour Glazed ware sherds included fragments of at least three and perhaps up to thirteen teapots, plus the example that connected the two

contexts (see also context 5002). Cups, bowls, mugs or small jugs and pie dishes were prominent amongst the sherds that were identifiable to vessel form. The profile of the assemblage from context 5034 was broadly similar both in terms of the range of later wares types and of vessel forms although the residual early modern component was notable by its absence. Notable items included part of a decorative planter and a small porcelain spoon (Figure 6) of unknown function.

The assemblage from context 5002 closely resembled those from context 5005 and 5034 although it was somewhat smaller in size. Tablewares, including teapots and kitchenwares, including pie dishes, were again prominent and the group also included a fragment from an ornamental vessel and part of a stoneware bottle. Context 5038 should also perhaps belong to this group of contexts; although two of the sherds were of 18<sup>th</sup> century date (Late Blackware and type), it also contained part of a teapot lid and a chip of Bone China from the rim of a cup.

Contexts 5009, 5023, 5024, 5025 and 5029 contained small, mixed, assemblages which included early modern and recent wares in varying proportions with a sherd of Late Humberware from context 5009. Nineteenth century pottery was limited to a small sherd of Bone China from context 5024. Both vernacular and formal tablewares were represented but utilitarian wares were notable by their absence.

Contexts 5041 and 5045 both contained exclusively medieval pottery (specifically Hallgate A ware) but the quantity was small; just four sherds, only one of which weighed more than 10 grams. While a similar general pattern of distribution was also seen in other trenches, Trench 5 was unusual because of the general absence of medieval pottery in other contexts, the exception being the sherd of Late Humberware from context 5009. While context 5045 was described as made ground, context 5041 formed the matrix between three stone surfaces (5042, 5043 and 5044) although the date of these is unknown. Given the extent of residuality on the site generally, it might be presuming too much to suggest a medieval date on the basis of just three sherds of pottery although the C14 date obtained for context 5041, discussed above, should be noted.

Amongst the other notable features of the assemblage from Trench 5 was the scarcity of utilitarian wares with Brown Glazed Coarseware and related types entirely absent and stonewares limited to a bottle (context 5002) and a small number of jars and other vessels. Taken together, this evidence suggests that Trench 5 cut through contexts containing unusual and possibly highly specific, albeit relatively late, assemblages. The high proportion of teapots and tablewares, together with the scarcity of utilitarian wares, may suggest that the material was derived from a cafe or restaurant. The late date of the Bone China and Whiteware sherds would suggest that this dated to the later 19<sup>th</sup> or early 20<sup>th</sup> century.

### *Trench 6*

Trench 6 contained an assemblage consisting of 228 sherds weighing 4675.5 grams representing a maximum of 218 vessels. The data are summarised in Tables 7 and 22.

Contexts 6007, 6006, 6013, 6014 and 6016 all formed part of the upper layers within the trench, immediately below the overburden and all constituted the primary fills of a series of features believed to be associated with the recent market buildings. The largest assemblage came from context 6006 with much smaller quantities from the other contexts. Despite being assigned to the same phase on the site matrix, there were significant differences in these context groups with the material from context 6006 appearing to be earlier in date than that from the remaining contexts. Despite its greater size, this assemblage did not contain any material later in date than the mid 19<sup>th</sup> century (Pearlware) and the majority was either earlier (Creamware, Late Blackware, Coarse Blackware, Slipware) or earlier/contemporary (Brown Salt Glazed Stoneware). The Brown Glazed Coarsewares were difficult to date with any accuracy but appeared to be of 18<sup>th</sup> to 19<sup>th</sup> century date rather than purely 19<sup>th</sup> century. In contrast, the pottery from context 6014 was of exclusively 19<sup>th</sup> century type while the sherds from contexts 6007, 6013 and 6016 appeared to be of a similar date, with the caveat that the types involved (Brown Glazed Coarseware, Brown Salt Glazed Stoneware) are less chronologically diagnostic than, for example, Pearlware or Late Blackware. The largest sherd in this group, a piece of Stoneware from context 6013 was, however, of definite mid 19<sup>th</sup> to early 20<sup>th</sup> century date, considerably later than anything in context 6006.

Context 6011 (not mentioned in the context register) contained a mixed assemblage which included an unusual handle in a medieval Buff Sandy ware fabric alongside a wide range of later pottery including White Salt Glazed Stoneware, Creamware, Late Blackware and transfer printed Whiteware. Although the latter sherd was amongst the smallest in the group (and as such could be intrusive), its presence presumably indicates that the assemblage consisted largely of residual material. The fabric of the medieval handle was a fine pink buff to pale grey in colour and contained fine quartz and red grit up to 0.6mm with very fine, sparse grains of muscovite visible at the surface. The handle was asymmetrical and had a deep groove along the thicker edge. In form it was not consistent with the profile of a jug handle and it may be from a urinal.

The pottery from contexts 6026, 6030 and 6033 (all 'made ground') was similar in terms of the date range and range of ware types to the assemblage from context 6006. Despite the activity resulting in the formation of these contexts being described as of 20<sup>th</sup> century date, very little of the pottery was as late as this with just one sherd of Colour Glazed ware and one sherd of Brown Salt Glazed Stoneware being of general 19<sup>th</sup> century type and one small sherd from a stoneware bottle or flagon being of 19<sup>th</sup> or early 20<sup>th</sup> century date. All of these later wares were from context 6030. The remainder of the combined assemblage consisted of a variety of types from Cistercian ware to Creamware and Pearlware with a notable group of 17<sup>th</sup> century Blackwares from context 6026. Context 6026 was also remarkable for the sherd of Westerwald stoneware, one of the few European imports from the site as a whole.

Context 6039 produced six sherds of medieval date, five of them in white sandy

fabrics of which three were hand-made and two wheel-thrown. Context 6050, the primary fill of a pit (context 6057), contained a single sherd of Reduced Sandy ware of undetermined (but medieval) date. Both this sherd and a similar sherd from context 6039 were much finer in texture than either the Sheffield-type wares or the Coal Measures Whiteware types and although the inclusions were sparser and finer, they were of the same general type with the quartz and black grit suggesting a similar source and perhaps indicating something of the complexity of the overall situation regarding the production and distribution of medieval pottery in the Sheffield area.

The single sherd from context 6041, the rim of a Mottled ware jar, was of 18<sup>th</sup> century date.

### *Trench 9*

Trench 9 contained a small assemblage of seven sherds weighing 94 grams representing a maximum of five vessels. All of the pottery came from a single context, 9011, the tertiary fill of context 9007, the castle moat. All of the pottery was of medieval date, as set out in Table 8. Sheffield-type ware was the commonest type (three out of the five sherds) with one sherd of Coal Measures Whiteware type and one small sherd in an unidentified Reduced Sandy ware. This would seem, superficially at least, to suggest that this part of the moat contained a fill dating to the 14<sup>th</sup> or early 15<sup>th</sup> century but given the small size of the assemblage and the abundant evidence for residuality on the site generally, a more cautious approach to the interpretation of the evidence might be appropriate.

### *Trench 10*

Trench 10 contained an assemblage of sixty-five sherds weighing 362 grams representing a maximum of sixty-four vessels. The data are summarised in Tables 9 and 23.

The majority of contexts were described as 'made ground' but 10066 and 10067 filled context 10065, the moat or a bank associated with the moat and of medieval date.

Context 10004 contained a small group of pottery consisting principally of sherds of early modern Creamware but with part of a jar base in Bone China which was of later 19<sup>th</sup> or early 20<sup>th</sup> century date.

The assemblage from context 10025 was similar to that from context 10004 although it was larger and more diverse in character. Creamwares were again common and were accompanied by sherds of Late Blackware, Slipware and Pearlware but the latest sherds were of mid to late 19<sup>th</sup> century Whiteware and some of the stonewares and Brown Glazed Coarsewares may be of a similar date range.

The assemblage from context 10017, the primary fill of a cut (10028) for a wall (10007) consisted mainly of post-medieval and early modern wares (Cistercian ware, Type 1 Slipware, Creamware, Late Blackware) but with a single very small (1 gram) sherd of Slip Banded Cane Coloured (CC) ware. The pottery from context 10041, although from a 'made ground' context was of exclusively early modern date (Late Blackware, Creamware and 18<sup>th</sup>

century Brown Glazed Coarseware) and in this respect resembled the group from context 10017.

As noted above, contexts 10066 and 10067 were associated with a feature forming an integral part of the castle (10065). Context 10066 contained three sherds, two of Blackware and Blackware type and one of later medieval to early post-medieval Coal Measures Purple ware. It is possible to regard this small group as relating to the post-civil war demolition of the castle but some caution has to be exercised, given its small size and probably mixed nature. Context 10067, the primary fill of the feature, contained just one sherd, a small piece of Coal Measures ware of 14<sup>th</sup> century date.

The status of context 10071 was uncertain. On one hand it was describe as 'made ground' but also as redeposited natural, the same term as used to describe context 10067. It contained just two sherds, one of Humberware and one of Sheffield-type ware, suggesting a later medieval date for the context.

### *Trench 11*

Trench 11 contained a small assemblage consisting of twenty-nine sherds weighing 244 grams representing a maximum of twenty-eight vessels. The data are summarised in Tables 10 and 24.

Contexts 11002 and 11018, both described as 'made ground', contained assemblages which were of later 19<sup>th</sup> and 20<sup>th</sup> century date and included various types typical of the period. Kitchen and tablewares were accompanied by two sherds of stoneware from a bottle and a flagon. Two unstratified sherds of Bone China should probably be considered as part of this group.

Context 11003 contained a very small (1 gram) sherd of transfer printed Pearlware which given the stratigraphic position and the 'made ground' character of the context, may be residual in nature.

Contexts 11020 and 11024, both 'bedding' contexts produced just three sherds of varying date. The sherd from 11020 was the rim of a Creamware plate while context 11024 contained one earlier sherd (Blackware type) and one later sherd (Sponged ware).

Context 11022, a context of uncertain type, contained a mixed group of sherds which included post-medieval wares (Cistercian type, Blackware, Midlands Purple type ware, Yellow ware, Redware) with one sherd of early modern Brown Glazed Coarseware. It contrasted strongly in character with the remainder of the assemblages from the trench.

### *Unstratified pottery*

Unstratified pottery attributed to specific trenches has been included in the descriptions above but that without any such designation is listed in Table 11. Early modern and recent pottery formed the largest element of this group with much smaller medieval and post-medieval elements.



## **The pottery from the 2018 excavations compared to the pottery assemblages from earlier investigations**

In 2016 the author was commissioned by Sheffield University to undertake the analysis and reporting of the pottery recovered during earlier phases of excavation on the site of the castle, currently held by Museums Sheffield. This was completed in 2017 with the production of an archive report (Cumberpatch 2017) which was intended to form part of a wider reassessment of the archives from the castle site. The author is not aware that the project as a whole has resulted in a comprehensive report so references in this section will refer solely to the archive report on the pottery. The majority of the material came from L.H. Butcher's investigations, only a small part of the material recovered by A.L. Armstrong having survived.

Table 15 summarises the data from the 2018 excavations as a list of the wares subdivided by broad chronological period. Table 16 summarises the data from the Butcher assemblages in a comparable fashion (based upon the data given in Cumberpatch 2017: Table 2, with some modifications). While various interpretations of this data may be possible, for the purposes of this discussion the following aspects are of the most relevance:

- The range of medieval and late medieval wares represented in the 2018 assemblages were broadly similar to those seen in the Butcher assemblages although a wider range of types was identified in the latter and some wares (including Hallgate B and hand-made White Sandy ware) were present in the 2018 assemblages but not in the Butcher assemblages. Conversely, the Butcher assemblages contained a larger number of unidentified wares as well as types not present in the 2018 assemblages, notably Stamford-type ware;
- Hallgate A ware, Sheffield-type ware and the various Coal Measures wares formed small but significant components of both assemblages. Regionally important types including Humberware and Brackenfield 1 ware were also present in small quantities in both sets of assemblages. Shell-tempered and Quartz and Shell-tempered wares were present in the Butcher and 2018 assemblages respectively;
- Medieval and late medieval wares formed a higher proportion of the Butcher assemblages than of the 2018 assemblages; 28.5% as opposed to 10.1%;
- Post-medieval wares, notably 17<sup>th</sup> century wares including Blackware and Early Brown Glazed Coarseware, were a great deal commoner in the Butcher assemblages than in the 2018 assemblages; this was not a matter of a few percentage points as such wares formed over 65% of the material recovered by Butcher while they represented just over 3.8% of the material recovered in 2018. This would seem to suggest that the areas of the site investigated by Butcher were amongst those pertaining to the final

phase of the castle's existence and in particular to deposits relating to the Civil War and its aftermath, including the demolition of the castle. A direct comparison might be Pontefract Castle where similar large assemblages of mid 17<sup>th</sup> century pottery were associated with demolition deposits;. In contrast, the 2018 excavations, while they may have reached some medieval deposits, do not seem to have reached any deposits related to the 17<sup>th</sup> century history of the castle.

- Early modern and recent wares formed a much larger proportion of the 2018 material than they did of the Butcher assemblages. Again, these were significant figures; early modern pottery formed just 5.8% of the Butcher material with recent material at just 0.45%. In contrast the figures for the 2018 assemblages were 48% and 37% respectively. It is probable that this discrepancy is, in part at least, the result of changing standards in the recovery and retention of pottery and other artefacts. In 1958 post-medieval archaeology barely existed as a category while today it forms a very significant part of the discipline of archaeology with its own journals, university courses and specialists while excavations, not least in Sheffield, routinely investigate sites of 18<sup>th</sup> and 19<sup>th</sup> century date as thoroughly as they do earlier sites. More specifically, the 2018 excavations investigated the early modern and recent phases of the site in greater detail and it may be that the size of the trenches as well as their location meant that demolition contexts were not encountered during the excavation.

It may be that the combination of the work undertaken as part of the archive project, particularly the mapping of Butcher's trenches, with the results of the 2018 investigations will yield information pertaining to the historic topography of the site and the changes over time which will have had impacts on the survival of medieval and post-medieval strata across the site. This information was not available at the time of writing.

Two small scale investigations carried out in 1999 and 2001 also resulted in the recovery of pottery assemblages (Cumberpatch 1999 and 2002b). The first of these involved the excavation of part of the moat and produced a mixed assemblage of pottery which include the foot of a Low Countries Redware tripod cooking pot (*grape*) alongside a range of local and regional medieval wares, notably splash glazed gritty ware and Coal Measures wares. The medieval pottery appeared to be largely residual but in some cases was associated with 16<sup>th</sup> and 17<sup>th</sup> century wares, suggesting that at least some of the contexts investigated may have related to the demolition of the castle.

The assemblage from the 2001 excavations was smaller than that from 1999 and included a range of material familiar from the 1999 and 2018 projects. Hallgate and Coal Measures wares were present as were sherds of Buff Sandy ware and Gritty ware, both of probable 12<sup>th</sup> century date.

## Discussion

### *The medieval castle*

The medieval assemblages from both the 1958 and 2018 investigations both contained relatively small but significant quantities of medieval pottery and it is probable that, within Sheffield, only Sheffield Manor is likely to exceed the castle site in terms of the quantity of medieval pottery recovered (Cumberpatch 2014c; Appendix 2). While the quantities cannot be compared with, for example, assemblages from Doncaster, Lincoln or York, it is possible to draw some general conclusions from the extant material.

While local wares (Sheffield-type ware) formed a very significant part of the assemblages (see Tables 1 and 15), regional wares, specifically Hallgate A and B, Coal Measures Whiteware and Humberware were also of significance. A parallel can be drawn between the cases of Conisbrough and Sheffield Castles (and most probably Doncaster Castle as well) in this respect with both drawing on the same potteries for their everyday requirements, implying a considerable volume of production and a well organised system of distribution. Although no figures survive to indicate the actual volume of pottery supplied to these castles, the evidence from Pontefract demonstrates that castles were significant consumers of pottery and no doubt played an important part in the economy of the pottery industry.

The presence of other regional wares (Brackenfield 01 ware, Quartz and Shell Tempered wares and probably the Chalk-tempered and white-slipped wares) is perhaps indicative of more casual connections with more distant potteries, perhaps incidental to other connections, social and political in nature. It should also be noted however, that the Brackenfield potteries seem to have been major suppliers of pots to Peveril Castle, despite the transport difficulties and it may be that the relatively small quantity of Brackenfield wares is a matter of chance rather than an accurate reflection of the importance of this source. Smaller quantities of wares from more distant sources (including the Surrey Whiteware sherd) perhaps reflect more the social and political connections of the inhabitants than more purely economic connections.

More generally, the results of the C<sup>14</sup> dating of plant remains from the site have substantiated questions recently raised by the author regarding the reliability of the established dating framework for the earlier medieval period (11<sup>th</sup> to 14<sup>th</sup> century). There is clearly a need for many more C<sup>14</sup> dates from sites of medieval date while the issue supports the case for the long-term retention of artefactual assemblages either in established museums or in dedicated regional archive depositories.

### *The post-medieval period and the Civil War*

The post-medieval period spans a major period of change in society at the political as well as the social level. As argued elsewhere (Cumberpatch 2003), the appearance of Cistercian ware and other distinctively post-medieval types in the mid-15<sup>th</sup> century pre-dates the end of the medieval period as conventionally defined (between 1485 and 1530, depending on the perspective of the writer), and would seem to suggest that some form of radical social

change, as reflected in material culture, was already under way by the time that the changes in economic and political structures (notably the inception of the Tudor state, ecclesiastical reform and its economic corollaries) were enacted. While discussion of the significance of the post-medieval period in terms of changes in the colour, style and function of pottery remains (inexplicably) muted within archaeology, its secondary effects are marked and particularly so in the character of pottery assemblages from castles. As noted above, these were not particularly visible in the assemblages recovered from the 2018 investigations although the evidence from the Butcher assemblages indicates that this was matter of chance and the location of the trenches rather than of any peculiarity related to the history of the castle itself.

#### *The castle site in the early modern and recent periods*

Excavations in Sheffield between 1998 and 2008 on sites subsequently destroyed by the construction of office blocks, student residences, retail and other commercial premises produced some large and significant assemblages with very specific and distinctive characteristics. Although the bankruptcy and closure of Sheffield University's archaeology unit (ARCUS) precluded any overall synthesis of the data or the more detailed investigation of specific themes repeatedly highlighted by the preliminary analyses, certain distinctive aspects of the assemblages were evident and have been referred to in conference papers (Cumberpatch 2005) and review documents (Cumberpatch 2018b). Some of these observations are of relevance to the interpretation of the current assemblage and as such will be discussed briefly here. It should be noted that one key assemblage, from the Sheffield Riverside development, has been published in outline form only (Cumberpatch 2015b) and the published text was based on a partial and preliminary record of the assemblage. The important group of assemblages from the Inner Ring Road scheme was slightly better served in that a full record was made but the interpretation remains partial, awaiting the completion of the stratigraphic narrative (Cumberpatch 2014c). This makes formal comparisons between the assemblages from these sites and the nearby castle site rather difficult.

The range of wares and types described in this report was broadly similar to that from other sites, allowing for the inevitable variations between contexts and sites. Vernacular and formal tablewares were both present, supporting the author's contention (2014a) that the local, small-scale, pottery industry was able to complement the rise of factory scale production by supplying pottery of a traditional type which was probably used in less formal and less public situations than were the formal tablewares. The representation of these latter types suggests that households in the city were well able to afford fashionable tablewares, most probably produced in pottery factories in the Don Valley and in other parts of South and West Yorkshire, despite contemporary and later characterisations of the city as poverty-stricken and lacking in sophistication.

The most striking aspect of the majority of assemblages from Sheffield is the extent of residuality evident on the majority of sites. Preliminary documentary research has suggested

that this was the result of the deliberate reuse of domestic refuse in the preparation of sites for building work (Cumberpatch 2005) with the result that pottery assemblages often include substantial amounts of material which owes little to activity on the sites themselves but rather relates to a process of large scale redistribution and redeposition of material drawn from across the city. Such assemblages are generally composed of early modern and recent pottery with very little medieval or post-medieval material. In view of this, the possibility exists that the assemblages from the strata overlying the castle foundations and moat could be the result of similar formation processes. Fortunately the characteristic absence of medieval pottery from the majority of sites in Sheffield (Cumberpatch 2014c: Appendix 2) offers a contrast with many of the trench assemblages described above which not only contained significant quantities of medieval pottery but included ware types identified in the Butcher and Armstrong assemblages discussed in the previous section. This would seem to imply that there was less dumping on the site than on many others and that the assemblages do in fact relate to the history of the castle and its site rather than to the activities of the later 18<sup>th</sup> and 19<sup>th</sup> century builders who were responsible for the creation of the modern city. This conclusion may be supported by the internal consistency of assemblages from, for example, Trench 5, where the distinctive profile of the assemblage seems to indicate its derivation from a specific type of activity. This is not to say that there was no dumping on the site but rather that, in some cases at least, we are dealing with more conventional formation processes. Unfortunately, it is more difficult to be certain about the exact scale and impact of any small scale dumping events, related perhaps to the construction of specific buildings on the site. In this, the site of the castle may be similar to that of sites around Sheffield Cathedral where there also seems to have been only limited dumping and the strata also seem to be more conventional in character. It is possible that the more detailed, comparative, analysis of the structure and composition of pottery assemblages might allow the definition of specific deposition horizons relating to episodes of dumping and the exploitation of the waste depots around the city. At present, however, it can be concluded that the site of the castle has seen far less dumping than have other sites in Sheffield and that the bulk of the pottery from the site does in fact relate primarily to activities on the site over its long history. It is to be hoped that future, larger scale investigations will result in data that will link the results of Butcher's investigations with those which yielded the data discussed in this report.

### **Curation and archiving**

Once the project is complete the pottery assemblage should be deposited with Museums Sheffield where it will be available for further study in the future. It should not be sampled, downsized, dispersed or used as a teaching collection.

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Morgan Windle

## Animal bone

### Introduction

Excavations at Sheffield Castle yielded a small assemblage of highly fragmented faunal remains consisting of 1074 fragments (7.9kg). A total of 176 specimens were recorded, and an additional 59 fragments of interest were recorded as 'non-countable' across Trenches 1-11 (see Table 1 and section 1.1. below). A variety of species were identified across the stratigraphic phases at the Sheffield Castle site (see 1.2.0-1.2.2). The assemblage was primarily associated with post-medieval and early modern deposits; however, a small number of specimens were attributed to the medieval occupation of the site.

### Material & Methods

Due to the small amount of material, the assemblage was analysed at once and the data entered in a Microsoft Access database. Fields for the database included, but were not limited to trench, context, preservation, element, side, taxon, taphonomic modifications (i.e. butchery and/or gnawing), ageing, as well as biometric fields. This was concurrent with the recording protocol established at the outset of analysis and was adapted from Albarella (2009), Albarella & Davis (1994), and Davis (1992). A selective 'diagnostic zone approach' to recording was used. This entailed that only a predetermined list of specific anatomical zones were recorded. When 50% or more of that area was preserved the specimen was regularly recorded (e.g. Watson 1979; Serjeantson 1991; Davis 1992). Specimens that were regarded of interest but did not belong to a 'diagnostic zone' were recorded as 'non-countable', but these were not used in quantifications. This bulk of these specimens of interest were fragments with evidence of anthropogenic modification such as bone-working off-cuts (see 1.2.2). Established criteria for the diagnostic zone approach can be seen in Appendix A.

### Results

Generally, the bone surface of the assemblage was not well preserved and specimens themselves were highly fragmented. Teeth of domesticates were better represented than post-cranial bones, but a high proportion of teeth were isolated. Assessment of age for the animals, therefore, was largely limited to post-cranial fusion, as only three jaws had more than two teeth present and could therefore be attributed to mandibular wear stages. Trench 6 (NISP = 48), 10 (NISP = 35), 4 (NISP = 24), and 1 (NISP = 18) yielded the greatest number of animal bones from the trenches and therefore form the bulk of the interpretation for the assemblage.

### Taxonomic diversity

The assemblage was dominated by domestic species (Table 1) with cattle, pig, sheep/goat and horse being the most frequently represented animals on the site, respectively. Most of these domestic specimens were recovered from post-medieval century made ground deposits, but the presence of residual medieval pottery suggests the potential for some of these specimens to also be residual from earlier phases.

Trenches that warranted more in-depth analyses had >10 specimens present, or specimens from securely medieval deposits, or species of interest present. The following trenches, while included in total NISP, had too few remains to comment further:

- Trench 2 (NISP = 2) produced only two recorded remains. Little can be discerned from this. Additionally, the presence of residual medieval pottery means that the possibility of the animal bone remains also being residual should not be excluded.
- Trench 8 (NISP= 8) had low abundance (no more than 1 specimen per context) of the three main domesticates. Cat and dog/fox were present (no more than 1 specimen per context), as was black rat (2 specimens) and one domestic goose (coracoid), all of which came from 18<sup>th</sup>-19<sup>th</sup> century made ground deposits.
- Trench 9 (NISP = 1) yielded only one cattle bone (1st phalanx)
- Trench 10 (NISP= 10) and 11 (NISP = 10) a small number of remains, 60% of which were from black rat.

Species	Tr. 1	Tr. 2	Tr. 3	Tr. 4	Tr. 5	Tr. 6	Tr. 9	Tr. 10	Tr. 11	U/S	TOTAL
<i>Bos taurus</i> (cattle)	24			4	3	15	1	22		2	71
cf. <i>Bos/Cervus</i> (cattle/red deer)						1					1
cf. <i>Bos/Equus</i> (cattle/horse)						1					1
<i>Ovis aries</i> (sheep)				1		2					3
cf. <i>Ovis/Capra</i> (sheep/goat)	1			1	2	5		2	2	1	14
<i>Equus caballus</i> (horse)				4				8	2		14
<i>Sus domesticus</i> (pig)	7			9	1	7					24
<i>Cervus elaphus</i> (red deer)				1							1
<i>Dama dama</i> (fallow deer)	2	2		2						1	7
cf. <i>Cervus/Dama</i> (red/fallow)						3		1			4
<i>Canis familiaris</i> (dog)			1								1
cf. <i>Canis/Vulpes</i> (dog/fox)	1				1			1			3
<i>Felis cf. catus</i> (cat)					1						1
<i>Lepus europaeus</i> (hare)						2					2
<i>Oryctolagus cuniculus</i> (rabbit)				2	2	1					5
<i>Rattus cf. rattus</i> (cf. black rat)						2		1	6		9
<i>Anser anser</i> (domestic goose)					1						1
<i>Anser cf. anser</i>						1					1
cf. <i>Gallus/Numida</i> (chicken/guinea fowl)						1					1
cf. <i>Gallus/Numida/Phasianus</i> (chicken/guinea fowl/pheasant)						9					9
<i>Scolopax rusticola</i> (woodcock)			1								1
Gadidae			1								1
<i>Gadus morhua</i> (cod)	1										1



TOTAL	37	3	3	55	23	62	1	35	11	5	176
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### Trench 1

Four remains were recovered from deposits with residual medieval pottery and notably, two of these were fallow deer (1040). One red/fallow deer calcaneum also from 1040 could not be definitely identified but was size compliant with the other fallow deer remains from the deposit. It is possible these remains to be residual medieval remains. If this is the case, this would be suggestive of activity related to the function and status of the medieval occupation, as a castle. Two pig remains were recovered from secure medieval deposits (1042; 1048). The main domesticates were represented in low frequencies from layers associated with the construction of a bowling green in the 18<sup>th</sup> century (1002-1006), with cattle post-crania being the most abundant. Additionally, cod species (*Gadidae*, and

Species	1002	1003	1004	1006	1040	1042	1048	TOTAL
<i>Bos taurus</i> (cattle)	1		2	5				8
cf. <i>Ovis/Capra</i> (sheep/goat)			1					1
<i>Sus domesticus</i> (pig)				1		1	1	3
cf. <i>Canis/Vulpes</i> (dog/fox)			1					1
cf. <i>Cervus/Dama</i> (red/fallow)	1				1			1
<i>Dama dama</i> (fallow deer)					2			2
<i>Gadidae</i>	1							1
<i>Gadus morhua</i> (cod)		1						1
<b>TOTAL</b>	<b>2</b>	<b>1</b>	<b>4</b>	<b>6</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>19</b>

*Gadus morhua*) were present in these contexts, suggesting access to marine fish in the urban setting (probably as stock fish).

Table 3: List of postcranial bones recorded in Trench 3

### Trench 3

Three specimens were recorded and identified from Trench 3, all from the medieval deposit of 3057 (Table 3); the diaphysis of a cattle/horse humerus, one dog humerus, and notably the ulna of a woodcock. While the presence of the former two remains cannot provide much information regarding the medieval occupation of the site, beyond the presence of large mammals and dogs in the vicinity the site, the latter presence of the Eurasian woodcock (a wading woodland bird) is indicative of status related activity in the medieval castle.

Species	3057	TOTAL
cf. Bos/Equus (cattle/horse)	1	1
<i>Canis familiaris</i> (dog)	1	1
<i>Scolopax rusticola</i> (woodcock)	1	1
<b>TOTAL</b>	<b>3</b>	<b>3</b>

#### Trench 4

Recovery of animal remains from Trench 4 deposits were slightly more substantial, though most were 'non-countable' fragments from 18<sup>th</sup>/19<sup>th</sup> century bone working off-cuts (see 1.2.2). Of the identified specimens, the three main domesticates were all represented by a handful of recorded remains (Table 4). The sheep/goat came from 18th century deposits. One red deer metatarsal (4007) and two fallow deer, one radius and one metatarsal (4111) were also recovered. 4111 had residual medieval pottery which could mean that the fallow deer remains could be residual from the medieval phases. The same can be said for the pig mandible from 4087. Notably, this jaw was from an elderly pig which is less common amongst domestic pigs, as they reach their ideal meat weight as subadults. The rabbits present could be representative of consumption, but as rabbits are burrowing animals it is also possible that the specimens (4009; 4042) were intrusive.

Table 4: List of post-cranial specimens recorded in **Trench 4**

Species	4007	4009	4040	4042	4086	4087	4111	TOTAL
<i>Bos taurus</i> (cattle)			1		1			2
<i>Ovis aries</i> (sheep)						1		1
cf. <i>Ovis/Capra</i> (sheep/goat)						1		1
<i>Sus domesticus</i> (pig)	2							2
<i>Equus caballus</i> (horse)			1					1
<i>Cervus elaphus</i> (red deer)	1							1
<i>Dama dama</i> (fallow deer)							2	2
<i>Oryctolagus cuniculus</i> (rabbit)		1		1				2
<b>TOTAL</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>12</b>

Table 5: List of teeth recorded in **Trench 4**

Species	4007	4042	4065	4087	4104	4107	TOTAL
<i>Bos taurus</i> (cattle)		1	1				2
<i>Sus domesticus</i> (pig)				5	1		6
<i>Equus caballus</i> (horse)	1			1	1	1	4
<b>TOTAL</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>6</b>	<b>2</b>	<b>1</b>	<b>12</b>

#### Trench 6

Only two animal remains were recovered from the possible medieval deposit of 6011, one pig canine (male) and one femur from a chicken/guinea fowl/pheasant (Table 5-6). Due to the similarities in size and morphology of these three birds, this specimen could not be definitively identified though, it is most probably a chicken, which is by far the most abundant species for the period and area.

The remaining specimens recovered (6013, 6014, 6016, 6026=6030) from Trench 6 (NISP = 29), were from post medieval (17<sup>th</sup>-19<sup>th</sup> century) and came from primary fills. The taxonomic diversity of animal remains in these contexts is indicative of the urban setting of post-medieval Sheffield. The three main domesticates were present throughout (with post-crania and teeth), as were chicken/grouse/pheasant, which in this period were most likely chicken, and one goose carpometacarpus. Notably, three red/fallow deer bones were recovered from contexts without residual medieval pottery present. This is not to say, however, that residuality of the bones can be excluded. Equally possible, these remains could indicate a market for venison in urban post-medieval Sheffield.

Table 5: List of post-cranial specimens recorded in **Trench 6**

<b>Species</b>	6011	6013	6014	6016	6026 = 6030	<b>TOTAL</b>	
<i>Bos taurus</i> (cattle)		2	3		3	8	
<i>Ovis aries</i> (sheep)					1	1	
cf. <i>Ovis/Capra</i> (sheep/goat)					2	2	
<i>Sus domesticus</i> (pig)			1			1	
cf. <i>Cervus/Dama</i> (red/fallow)			2		1	3	
cf. <i>Gallus/Numida/Phasianus</i> (chicken/guinea fowl/pheasant)	1				4	4	9
cf. <i>Gallus/Numida</i> (chicken/guinea fowl)					1		1
<i>Oryctolagus cuniculus</i> (rabbit)					1		1
<i>Rattus cf. rattus</i> (black rat)				1		1	2
<i>Anser cf. anser</i>					1		1
<i>Lepus europaeus</i> (hare)						2	2
<b>TOTAL</b>	1	2	6	1	14	7	<b>31</b>

Table 6: List of teeth specimens recorded in **Trench 6**

<b>Species</b>	6011	6013	6014	6026	6030	<b>TOTAL</b>
<i>Bos taurus</i> (cattle)		2	4	1		7
<i>Ovis aries</i> (sheep)				1	1	2
cf. <i>Ovis/Capra</i> (sheep/goat)			1	1		2
<i>Sus domesticus</i> (pig)	1	1	2	2		6
<b>TOTAL</b>		3	7	5	1	<b>17</b>

### Trench 10

Trench 10 yielded very few post-cranial remains (Table 9) but a more substantial number of teeth (Table 10, NISP= 28), though all of them were loose. The majority of remains, including 17 cattle teeth and two sheep/goat remains (2<sup>nd</sup> phalanx and proximal radius) came from 10025, associated with the 18<sup>th</sup>-19<sup>th</sup> century slaughterhouses (Sheffield Castle Archaeological Evaluation Post-Excavation Assessment Report 2019). One dog/fox tibia was recovered from 13<sup>th</sup>-15<sup>th</sup> century moat bank deposit (10071). While the tibia was size compliant with a fox, it was more morphologically akin to a dog. Six horse teeth (5 incisors, 1 canine), one vestigial metapodial and one humerus were also recovered from 10071. Such scant remains hinder any interpretation beyond that horses were present during the medieval occupation, as were dogs.

**Table 7: List of post-cranial specimens recorded in Trench 10. All were loose.**



Species	10000	10025	10071	TOTAL
cf. Ovis/Capra (sheep/goat)		2		2
<i>Equus caballus</i> (horse)			2	2
cf. Canis/Vulpes (dog/fox)			1	1
<i>Rattus cf. rattus</i> (black rat)	1			1
<b>TOTAL</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>6</b>

Table 8: List of teeth specimens recorded in **Trench 10**. All were loose.

Species	10017	10025	10071	TOTAL
<i>Bos taurus</i> (cattle)	5	17		22
<i>Equus caballus</i> (horse)			6	6
<b>TOTAL</b>	<b>5</b>	<b>17</b>	<b>6</b>	<b>28</b>

## Age

As mentioned, any assessment of age was restricted to post-cranial fusion. The small sample (NISP = 25) size provides limited information regarding animal management. Bones that could accurately be assigned fusion stages (fused, fusing, or unfused) were too few (NISP = 25, across entire assemblage). The distribution of post-cranial fusion indicates that immature, subadult, and adult domesticates were available to inhabitants, throughout the occupation of the site. Fused remains were more abundant; however, the small sample size does not allow for any trends in exploitation to be identified. It should be noted that the distribution of post-cranial fusion information could be more a result of preservation or recovery bias than because of management or dietary preferences.

Table 9: General fusion data according to species.

Species	Proximal				Distal				TOTAL
	Fused	Fusing	Fused/Fusing	Unfused	Fused	Fusing	Fused/Fusing	Unfused	
<i>Bos taurus</i> (cattle)	2		2	1	4		2	1	12
<i>Ovis aries</i> (sheep)					1				1
cf. Ovis/Capra (sheep/goat)	3	2			1	1			7
<i>Equus caballus</i> (horse)	1						1		2
<i>Sus domesticus</i> (pig)	1				1			1	3
<b>TOTAL</b>	<b>7</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>7</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>25</b>

## Taphonomic Modification

A proportion of bone in post-medieval and early modern contexts was not identifiable to species and recorded as 'non-countable' (NISP = 59). 23 of these were recorded as they were specimens of interest with evidence of anthropogenic modification such as cutting, chopping, and sawing (Table 10). The largest group of non-countable fragments were bone working debris, the majority of which came from Trench 4. Working debris fragments ranged from approximately 2-10 centimetres and were identifiable by regular striations associated



with fine and broader bladed saws and were invariably rectangular in shape. Additionally, included in these 'non-countable' specimens were worked antler (6026), and incomplete and broken implements (2007; 4024; 4036; 4040; 4108). These fragments are strongly associated with the post-medieval cutlery industry in Sheffield.

The remaining 16 fragments were recorded due to evidence of other taphonomic processes (burning and gnawing).

Table 10: worked bone fragments by trench.

<i>Modification</i>	Trench 1	Trench 2	Trench 4	Trench 5	Trench 6	Trench 11	<b>TOTAL</b>
Cut	1				1		2
Chop			8	2		1	11
Cut + Chop				1			1
Sawn					3		3
Working Debris			14	4	1		19
Object		1	5	1			7
<b>TOTAL</b>	1	1	27	8	5	1	43

## Discussion

### *Medieval*

While the number of faunal remains from securely medieval deposits were very few, limiting interpretations, the presence of a few species provides some insight into the medieval occupation of the excavated area. The single woodcock bone recovered from 3057 is particularly notable as the species feature strongly in medieval central England and to a slightly lesser extent in the north (Albarella & Thomas 2002). Namely, wild birds are much more common on sites of high status (mainly castles) than in towns or rural sites as evidenced from medieval excavations throughout England (Thomas 2007; Albarella & Thomas 2002; Albarella & Davis 1996). Although wild birds did not represent a food staple or major economy in medieval England, their relative rarity has the potential of highlighting differences in food consumption (Serjeantson 2006; Albarella & Thomas 2002). The presence of woodcocks among other species of birds were also often hunted and consumed amongst the aristocracy, as demonstrated by Consistent with historical sources (Cosman 1976). The presence of a woodcock bone, even though only from a destruction deposit, indicates that higher status occupants of the castle were likely engaging in the hunting of wild birds.

An important aspect of the post-medieval and early modern components of the assemblage is the presence of Cervidae post-crania in 18th/19th century and 20th century deposits. Though the deer remains were predominantly recovered from post-medieval deposits, residual medieval pottery suggests that these remains may have also been earlier than their stratigraphic position implies. That the deer remains are from the medieval phases is further supported by general trends in deer exploitation in England. By the 13<sup>th</sup> century, seventy royal forests still existed, and higher-ranking members of the nobility had access to private forests. Otherwise, aristocrats used deer parks, and medium-small parks were predominantly stocked with fallow deer (Birrell 2006). Like wild birds, hunted deer are characteristic of high-status sites in medieval England (Grant 1984) whereas by the post-medieval period, the role of deer (specifically fallow deer) had changed (Sykes et al. 2016).

Considering the demonstrated clear separation between castle and urban sites (Thomas 2007), with either no or very few deer bones in the latter, the presence of fallow deer likely represents a potential social currency, especially in the high-medieval period (Sykes et al. 2016; Thomas 2007). The possibility of fallow deer being genuinely a post-medieval origin cannot be completely ruled out, as fallow deer are still present in post-medieval sites throughout England (Sykes et al. 2013).

### Post-Medieval

The taxonomic diversity of animal remains in these contexts is indicative of the urban setting of post-medieval Sheffield. The three main domesticates were present throughout (with post-crania and teeth), as were chicken/guinea fowl/pheasant, which in this period were most likely chicken, and one domestic goose *carpometacarpus*. Additionally, the presence of what is rat further supports urbanization. Notably, three red/fallow deer bones were recovered from contexts without residual medieval pottery present. This is not to say that residuality of the bones can, however, be excluded. Equally possible, these remains could indicate a market for deer in urban post-medieval Sheffield. As the material also came predominantly from made ground, remains cannot be related to specific events. However, the species present provide a general picture of life in post-medieval industrialized Sheffield. Namely, that occupants were primarily consuming cattle, sheep/goat and pig meat, though chicken, goose, cod and possibly rabbit were also eaten.

Worked bone was present on site and included cutlery handles, as well as off-cuts from the working process. Bone and antler commonly used materials for cutlery handles in the 18<sup>th</sup> and 19<sup>th</sup> centuries (Unwin 2002) and working of this material occurred on a significant scale in Sheffield at the time, primarily to supply the cutlery industry (Beauchamp 2002; 1996). As opposed to inconsistencies in worked fragments observed in supply workshops in surrounding hamlets, associated with small scale production (Albarella & Trentacoste 2010), the fragments recovered from the castle site were highly regular suggesting that production was occurring in or near the site. All of this is concurrent with historical records, and Evaluation Post-Excavation Assessment Report (Wessex 2019) interpretation of deposits (particularly 1002,1003, 5005, 5034, 6026 = 6030) associated with post-medieval occupation and 20<sup>th</sup> century markets.

### Conclusions

This very small sample size limits the analysis of animal exploitation throughout the occupation of the site. Additionally, the limited age data due to taphonomic and recovery reasons inhibit conclusive information to be discerned for the medieval and post-medieval occupation phases of the site with regards to management strategies. However, hunting appears to have been engaged in by the occupants of the medieval castle as evidenced by the presence of deer bones, as well as the single woodcock bone, and is indicative of status related consumption. It appears that chicken was also exploited during this period. By the post-medieval period, goose and cod appear to have been accessible to industrial occupants of the city but mammalian domesticates remain the most common species. Overall, the assemblage adheres to historical records of the sites development overtime. Namely, the from the medieval castle occupation to the subsequent growth and development of post-medieval, industrial Sheffield (Sheffield Castle Archaeological Evaluation Post-Excavation Assessment Report 2019). This also falls within broader regional trends in observed in England.

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## APPENDIX A

Teeth & Post-cranial Bones	Criteria
Upper teeth occlusal surface (mammals)	At least half
Lower teeth occlusal surface (mammals)	At least half
Cranium (zygomaticus) (mammals)	At least half of zygomatic arch
Atlas (mammals)	At least half
Axis (mammals)	At least half
Scapula glenoid cavity (mammals) or articular end	At least half of glenoid cavity



(birds)	
Coracoid proximal (birds)	At least half of an epiphysis
Humerus distal (mammals and birds)	At least half of an epiphysis
Humerus proximal (mammals and birds)	At least half of an epiphysis
Radius distal (mammals)	At least half of an epiphysis
Radius proximal (mammals)	At least half of an epiphysis
Ulna prox. articulation (mammals and birds)	At least half of prox. Articulation
Carpals (mammals)	At least half
Metacarpal distal (mammals)	At least half of the epiphysis; proximal end should also be present
Carpometacarpus (birds)	At least half of proximal end
Pelvis (mammals)	At least half of acetabulum, ischial part
Femur distal (mammals and birds)	At least half of an epiphysis
Femur proximal (mammals and birds)	At least half of an epiphysis
Tibia distal (mammals and birds)	At least half of an epiphysis
Tibia proximal (mammals and birds)	At least half of an epiphysis
Astragalus (lateral half) (mammals)	At least half
Calcaneum (mammals)	sustentaculum present
Scafocuboid (or scafoid or cuboid) (mammals)	At least half
Metatarsal distal (mammals and birds)	At least half of the epiphysis; proximal end should also be present
Metapodial distal (mammals)	At least half of the epiphysis; proximal end should also be present
Phalanges 1, 2 and 3 proximal (mammals)	Proximal end, at least half of the epiphysis

SD White and DA Higgins

## Assessment of the Clay Tobacco Pipes from Sheffield Castle, Sheffield, South Yorkshire (Project Code 201540)

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*23 January 2019*

### 1. Background

- 1.1 This assessment considers the clay tobacco pipes recovered by Wessex Archaeology from excavations at Sheffield Castle (Project Code 201540).
- 1.2 In their *Research Priorities for Post-Medieval Archaeology*, the Society for Post-Medieval Archaeology have identified the systematic collection of clay tobacco pipes as an area of particular importance where more work is needed (Anon 1988, 6).
- 1.3 For many years the North-east of England, and in particular Yorkshire, remained little studied so far as pipe research is concerned. This has been partly remedied by PhD research focussing on certain aspects of the clay tobacco pipe industry in Yorkshire during the seventeenth and eighteenth centuries (White 2004). Excavations carried out in more recent years in and around Sheffield are starting to provide more material from the end of the eighteenth century and nineteenth century, allowing pipe researchers to draw up a clearer picture of pipe production and usage in the city at this time. Regional synthesis and discussion of the late eighteenth and nineteenth century material from elsewhere in Yorkshire however, remains poorly represented.

### 2. Description of the Finds

- 2.1 The excavations at Sheffield Castle produced a total of a total of 662 clay tobacco pipe fragments consisting of 73 bowls, 569 stems and 20 mouthpieces. This material was recovered from 59 pipe-bearing contexts and 10 unstratified deposits.
- 2.2 The majority of the pipe fragments are plain stems, but there are a number of eighteenth-century roll-stamped name marks that can be attributed to makers from Rotherham such as William Wild, Thomas Wild, Benjamin Marsden and Richard Scolah (White 2015).
- 2.3 A small number of the plain bowls from the excavations have makers' initials stamped on the bowl facing the smoker. These include the initials TW which is almost certainly Thomas Wild of Rotherham (*fl. c.1777*). One of the roll-stamped stems from Context 6026 is a rare survival in that it joins with a bowl, allowing the associated bowl form to be determined.

- 2.4 Context 6026 is the largest group from the excavation. This context contains some mid-to late-seventeenth century material including one bowl with a milled heel and two with stamped marks (a gauntlet and a crowned IW). The gauntlet mark is particularly unusual for Yorkshire and may represent a local attempt to copy one of the famous Gauntlet pipes from Wiltshire. There is also a seventeenth century stem that has been repaired during manufacture, leaving a distinctive flaw in the stem. The majority of the finds, however, date from the eighteenth century and include some bowls of c1710-50 with long surviving stems suggesting fresh and little disturbed deposits of this date. The group also contains a number of different eighteenth century roll-stamped stems and a very early glazed mouthpiece, supporting the suggestion from other excavations that the use of glazed tips originated in this area. Many of the eighteenth-century pipes are finely burnished, showing that good quality pipes were in use on the site at this time.
- 2.5 A total of 17 of the bowl fragments from the excavations are decorated. Some of these simply have a band of leaves along the bowl seams, but others are more elaborately decorated, for example, the Armorial bowl from Context 6033, which also bears the name of the maker WILL WILD. The earliest mould decorated bowl from the site includes a series of enclosed scallops with a stag's head on the seam facing the smoker. Pipes decorated with this particular motif appear throughout Yorkshire and this is a design that is known to have been produced by Samuel Lumley of Doncaster c1790. Context 6026 also produced an elaborately decorated late eighteenth century bowl with the moulded maker's initials PR that provides the full design for a type that was previously only known from fragments.
- 2.6 The following table gives a context summary showing the number of bowls (B), stems (S) and mouthpieces (M) from each context as well as the number of marked (Marks) or decorated fragments (Dec). In addition, a broad date range is given for each context followed by the most probably date of deposition. General comments relating to each individual context are also given.

Ctxt	SF	B	S	M	Tot	Range	Deposit	Marks	Dec	Comments
1002			2		2	1700-1820	1750-1820	-	-	Plain stems, one finely burnished.
1003		1	4	1	6	1750-1880	1830-1860	-	Leaf dec seams	Plains stems; one brown glazed mouthpiece all late C18th/C19th single bowl fragment has leaf decorated seams.
1004			1		1	1700-1800	1700-1800	-	-	Plain stem.
1005			2		2	1760-1850	1800-1850			Plain stems, one appears to be burnished and is C18th the other is C19th
1006		6	48		54	1760-1840	1800-1840	x2 GW bowl mark; x1 THO WILD stem mark; X1 cut mark on heel	x1 flute and panel	48 stems (29 of which are burnished); 1 c1600-1680 heel bowl with a cut mark across the heel; x3 (totalling 4 fragments) c1740-1780 spur bowl two marked with a GW bowl mark.; x1 C19th bowl fragment. Good group with the exception of the later mould decorated bowl, which appears to be intrusive.
1007		1	4		5	1650-1680	1650-1670			Consistent C17th group with a plain heel bowl and stems with large stem bores.



Ctxt	SF	B	S	M	Tot	Range	Deposit	Marks	Dec	Comments
1008			3		<b>3</b>	1800-1900	1800-1900			Plain C19th stem fragments.
1013			1		<b>1</b>	1700-1800	1700-1800			Plain stem. Bag also has two fragments of bone.
1034		1	1		<b>2</b>	1800-1880	1830-1860			Plain spur bowl and plain stem.
2019			1		<b>1</b>	1750-1820	1750-1820			Plain stem late C18th or early C19th
2020		1	2		<b>3</b>	1780-1840	1780-1840			Plain bowl C19th bowl fragment (highly fired); two plain stems one with traces of brown glaze, both from long-stemmed pipes.
3015			3		<b>3</b>	1640-1850+	1850+			Three plain stem fragments one C17th, C18th, and one C19th. The C19th fragment is just flaring out into a nipple mouthpiece from a short-stemmed cutty type pipe dating 1850 or later.
4002			1		<b>1</b>	1790-1820	1790-1820			Plain and very poorly executed long-stem with a ground end.
4007			7		<b>7</b>	1780-1830	1800-1830			Plain stems, one C18th fragment the rest C19th, one of which has traces of brown glaze.
4008		3	13		<b>16</b>	1760-1860	1830-1860		Leaf decorated seams	C18th heel bowl which is burnished; x2 C19th bowl fragments, most complete of which has leaf decorated seams; stems are all plain but at least two are burnished and would be contemporary with the C18th bowl fragment.
4008			2		<b>2</b>	1790-1850	1790-1850			Plain C19th stem fragments.
4009		1	10	2	<b>13</b>	1800-1900	1850-1900		Basket	C19th mould decorated basket design bowl with joining stem; rest of the stems are plain and poorly made but appear to be from long-stemmed pipes; the two mouthpieces are both nipple type from a short-stemmed cutty pipe.
4010		1	17		<b>18</b>	1780-1850	1780-1850			Plain bowl fragment and plain stems. Some of the stems are late C18th but the bulk are C19th. The bowl fragment has been sanded and would have had a meerschaum wash originally. Group includes one piece of bone.
4024		3	8		<b>11</b>	1780-1850	1800-1850		x1 Basket; x1 ribbed seam	Two of the bowls have moulded decoration, the third is plain. The stems are also plain and most appear to be C19th some are quite long pieces clearly from long-stemmed pipes.
4036			10		<b>10</b>	1650-1840	1800-1840			Group of plain stems one is clearly C17th century, rest are late C18th or early C19th. One fragment appears to have a ground end.
4037		1	3		<b>4</b>	1800-1850	1800-1850			Large plain C19th bowl with a distinctive internal bowl cross; The stems are plain and appear to be from long-stemmed pipes.



Ctxt	SF	B	S	M	Tot	Range	Deposit	Marks	Dec	Comments
4040		3	7		<b>10</b>	1750-1860	1850-1860	x1 moulded FC spur mark	Leaf decorated seams	C19th mould decorated bowl with elaborate leaf decorated seams and the moulded makers initials FC - probably to be Frederick Cartwright (1854-1860) - the F initial is upside-down; two other C19th spurs and plain stems. Group includes a piece of bone.
4042			6		<b>6</b>	1790-1850	1790-1850			Plain C19th stem fragments.
4052		1	4		<b>5</b>	1800-1850	1800-1850			Plain C19th spur bowl fragmnt and four plain stems two with fresh breaks but no joins.
4086			1		<b>1</b>	1740-1800	1740-1760			Plain burnished C18th stem fragment.
4088			8		<b>8</b>	1790-1850	1790-1850			Plain C19th stem fragments.
4095			7		<b>7</b>	1790-1850	1790-1850			Plain C19th stem fragments.
4104			1		<b>1</b>	1790-1850	1790-1850			Plain C19th stem fragment.
4106			1		<b>1</b>	1740-1760	1740-1760	WILD stem mark		C18th marked stem.
4108			1		<b>1</b>	1790-1850	1790-1850			Plain C19th stem fragment.
4109		1	1		<b>2</b>	1740-1800	1740-1800			Burnished bowl and stem fragment.
4115			26		<b>26</b>	1780-1850	1800-1850			Group of plain stems three with traces of brown glaze.
4117			2		<b>2</b>	1750-1850	1750-1850			Two plain stems - one C18th one C19th
5005		1	15		<b>16</b>	1640-1850	1800-1850			Single C18th bowl fragment; all stems are plain and include C17th, C18th and C19th fragments.
5023			1		<b>1</b>	1730-1800	1730-1800			Single C18th stem fragment.
5024			12		<b>12</b>	1750-1850	1750-1850			Group of plain stems from the C18th and C19th.
5029			4		<b>4</b>	1650-1850	1800-1850			Group of plain stems including C17th and C19th fragments.
5031		1	14		<b>15</b>	1660-1800	1780-1800	x1 Roll stamp stem		Small group of fragments of mixed date. C17th heel fragment with joining stem (fresh break) and a number of plain stems of late C17th, C18th and early C19th date. Includes one C18th stem fragment with a roll stamp mark.
5034			3		<b>3</b>	1750-1850	1800-1850			Plain C19th stems.
6006		3	11	1	<b>15</b>	1680-1830	1780-1830	x1 milled heel		Mixed group with x2 C17th bowl fragments and a single C19th bowl/stem junction. The stems and mouthpieces are all plain and mixed C17th-early C19th date.
6007		1	3		<b>4</b>	1750-1800	1780-1800	x1 TW bowl stamp		Nice marked C18th bowl, possibly a product of Thomas Wild of Rotherham. Stems more probably to be early C19th but from a long-stemmed pipe.
6011		2	11		<b>13</b>	1640-1800	1780-1800	1x milled heel; x2 stem stamps incl. WILL WILD		Small group of fragments of mixed date. C17th heel bowl; C18th marked stems and plain C19th stem fragments. Group includes one piece of bone.
6013			5		<b>5</b>	1750-1800	1750-1800			Plain stems mostly C18th burnished examples, but there is





Ctxt	SF	B	S	M	Tot	Range	Deposit	Marks	Dec	Comments
										a single C19th plain stem.
6014			6		6	1680-1780	1750-1780	x1 THO WILD stem stamp		Group of stems mainly late C18th or early C19th including one marked with a THO WILD stem mark.
6016			7		7	1750-1850	1750-1850			Plain stems of late C18th or early C19th date.
6026		26	167	15	208	1610-1800	1770-1800	x3 moulded spur marks OO and x1 ring and dot; x1 mould decorated bowl PR; x2 TW bowl stamps; x1 W bowl stamp; x1 gauntlet heel stamp; x 1 crowned IW heel stamp; x6 WILL WILD stem stamps; x1 THO WILD stem stamp; x1 SCORA stem stamp; x1 BENJAMIN MARSDEN stem stamp; x2 other stem stamps; x1 milled heel	x3 enclosed flutes (x1 with a stag's head); x1 floral decoration (mould has been altered)	Very good C18th group many of which are marked or decorated. Excavations in Tenter Street, Sheffield produced a similar bowl fragment to the mould decorated PR fragment in this group.
6030		3	22		25	1640-1830	1800-1830	x1 milled heel; x1 moulded heel marks OO; x1 stamped stem	floral bowl with LDS	Small group of fragments of mixed date. C17th bowl with a milled heel and x2 plain stems; C18th bowl fragment with a moulded OO mark and a x1 roll stamp stem; rest plain stems of early C19th date.
6033		1	6		7	1750-1830	1800-1830	x1 Moulded bowl mark WILL WILD	Armorial bowl with WILL WILD moulded lettering	Nice armorial bowl fragment marked WILL WILD which has an internal bowl cross; the rest of this group is made up of late C18th-early C19th plain stems.
7017		1	1		2	1750-1860	1830-1860	x1 WILL WILD stem stamp		Single C18th marked stem and a plain C19th bowl.
10025		1	12		13	1650-1850	1800-1850		x1 mould decorated bowl ?acorn/hoof	Small fragment of C19th mould decorated bowl; rest of group plain stems of mixed late C17th to C19th date.
10041			1		1	1610-1700	1640-1700			Plain C17th stem fragment.
10055			1		1	1800-1850	1800-1850			Plain C19th stem fragment.
11003			1		1	1780-1830	1780-1830			Plain stem fragment of late C18th or early C19th.
11018			1		1	1700-1800	1700-1800			Stem of possible C18th date; heavily encrusted.



Ctxt	SF	B	S	M	Tot	Range	Deposit	Marks	Dec	Comments
11020		3	2		5	1750-1800	1780-1800			Three joining bowl fragments from a late C18th bowl; the stem fragments are both plain and could be late C18th or early C19th.
11021		1	5		6	1650-1830	1800-1830	x1 moulded ring and dot spur mark		Small mixed group of fragments. Single stem that is probably to be C17th; x2 plain stems and a bowl fragment with a moulded ring and dot mark from the C18th and x2 plain C19th stems.
11022	11001	1	6		7	1610-1800	1700-1800			Small group of tiny fragments but all appear to be C18th although there is one burnt stem fragment that could be C17th or C18th.
11024		3	5		8	1780-1840	1820-1840	x1 enclosed flutes bowl with a stag's head; x2 floral decorated bowls (possibly from the same mould)		Three mould decorated bowls x1 late C18th and x2 C19th; all the stems are plain and of C19th date from long-stemmed pipes.
11025			1		1	1750-1800	1750-1800			Plain late C18th stem.
11036	11002		1		1	1750-1850	1750-1800			Plain stem of late C18th or early C19th date.
u/s			2		2	1800-1900	1800-1900			Plain C19th stem fragments.
u/s		1	9		10	1800-1850	1800-1850			C19th group which includes a spur fragment and a piece of stem with traces of moulded decoration; all other stems are plain.
u/s			1		1	1800-1850	1800-1850			Plain C19th stem.
u/s			1		1	1780-1850	1780-1850			Plain late C18th or early C19th stem.
u/s			3		3	1800-1850	1800-1850			Plain C19th stems.
u/s			6		6	1800-1920	1870-1920			Plain stems mostly C19th; one fragment is from a short-stemmed pipe and has traces of brown varnish dating it to late C19th or early C20th.
u/s			12	1	13	1650-1850	1800-1850			Plain stems dating from mid to late C18th to C19th; one fragment has traces of brown glaze. The single mouthpiece is most probably from a long-stemmed pipe.
U/S TR3			1		1	1800-1850	1800-1850			Plain C19th stem.
u/s TR4			1		1	1790-1830	1790-1830			Plain late C18th or early C19th stem.
u/s TR5			1		1	1700-1800	1750-1800			Plain C18th stem.
<b>Totals:</b>		73	569	20	662					

### 3. Assessment of the Pipes

- 3.1 Pipe fragments offer one of the most accurate and reliable classes of artefact for dating deposits of this period. The excavated pipes should be able to provide a valuable contribution to the identification and phasing of these contexts.
- 3.2 Clay tobacco pipes also have two other significant attributes; their regional diversity allows them to be used to study trade and marketing contacts while differing qualities allow for an examination of social status. Although only a relatively small number of marked pipes are present in this assemblage they should be able to go some way towards assessing the catchment area from which services and supplies were drawn.
- 3.3 The earliest bowl fragments recovered from the site date from c1660-1680. All the other bowls from the site appear to date from the early eighteenth century through to the mid to late nineteenth century and include some interesting decorated fragments.
- 3.4 A number of the stems recovered from the excavation are nicely burnished eighteenth-century types with makers' names included on them.

#### **4. Recommendations for Study**

- 4.1 The pipe fragments should be individually examined to check for any further marked or decorated pieces and to check the provisional dating given above. The context summary should be updated as necessary.
- 4.2 There is probably little more that can be said about the plain stems from the assemblage than has already been presented in the table in section 2.6 above. However, the assemblage from excavations as a whole, and in particular context 6026, does include a number of interesting marked and decorated bowl fragments ranging from the seventeenth to early nineteenth century, some of which are previously unrecorded. It would therefore be worth examining and recording all the bowl fragments and any marked stems in more detail so as to make them directly comparable with other excavated finds from the region.
- 4.3 Illustrations for publication at 1:1 should be prepared of selected marks, bowl forms and decorated fragments, particularly those that are previously unrecorded. It is estimated that approximately ten drawings will be required for the final report.
- 4.4 A publication report should be prepared to describe the assemblage as a whole, highlight the most important elements and set the group as a whole in its broader context. This report should describe the work carried out and present a synthesis of the pipe evidence from the site.

#### **5. References**

Anon, (1988) *Research Priorities for Post-Medieval Archaeology*, Society for Post-Medieval Archaeology, 9pp.

White, S. D., (2004) *The Dynamics of Regionalisation and Trade: Yorkshire Clay Tobacco Pipes c1600-1800*, in P. Davey and D. A. Higgins (eds.) *The Archaeology of the Clay Tobacco Pipe*, **XVIII**, British Archaeological Reports (British Series 374), Oxford, 567pp.



White, S. D., (2015) 'Clay Tobacco Pipes', in P. Andrews *et al.*, *Riverside Exchange, Sheffield. Investigations on the site of the Town Mill, Cutlers' Wheel, Marshal's Steelworks and the Naylor Victors Works*, Wessex Archaeology, 20-30.

## Sheffield Castle, Sheffield, South Yorkshire (Project Code: 201540) – Illustrated Catalogue of Selected Clay Tobacco Pipes

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This catalogue illustrates and describes selected pieces from the Sheffield Castle clay tobacco pipe assemblage. All the pipe illustrations were prepared by one of the authors (SDW) and are shown at life size, with broken lines being used to indicate burnished surfaces. The die details of the roll stamped stem marks are at twice life size and were prepared by the other author (DAH) and form part of the as yet unpublished National Clay Tobacco Pipe Stamp Catalogue (NCTPSC), a copy of which can be found in the National Pipe Archive ([www.pipearchive.co.uk](http://www.pipearchive.co.uk)). Each illustrated piece is dated and described, with its context number being given at the end of the initial description. All of the stamped marks have been impressed for the NCTPSC and a cast reference has been allocated to each mark. This cast reference is noted in the following descriptions, together with the unique die number for the mark where a twice life-size drawing has been prepared.

1. Heel bowl of *c*1640-1660 with a milled band across the heel. The pipe has a bottered rim which is half milled. There is no internal bowl cross and the pipe is unburnished. The stem bore is 7/64" (Context: 6006).
2. Heel bowl of *c*1650-1670 with an internally trimmed and bottered rim which is half milled. There is no internal bowl cross; the pipe has a well burnished surface with a stem bore of 6/64". The heel is stamped with a relief mark comprising the crowned initials IW (Context: 6026; Cast 746.39).

Initials with a crown are known from a range of sites across Yorkshire and include the initials IH, SH, IT and IW (White 2004, 87). The IW maker has not yet been identified but two similar marks have been recorded previously. The first is on a heel bowl of *c*1650-1670 (Wakefield Museum Social History Collection; White 2004, Fig 158.8). The second is on a transitional period bowl dating from *c*1690-1710 recovered from Oakwell Hall (Tolson Memorial Museum, Huddersfield Acc. 11083; White 2004, Fig 150.11).

3. Heel bowl of *c*1650-1670 with a milled band across the heel. The pipe has a bottered rim but is not milled. There is no internal bowl cross; the bowl is well burnished with a stem bore of 5/64" (Context: 6030).
4. Heel bowl of *c*1660-1680 with a bottered and fully milled rim. The band of milling is set very low on the rim. The pipe has no internal bowl cross; it is well burnished with a stem bore of 7/64". The heel has the relief mark in the form of a left-handed gauntlet within a circular milled border (Context: 6026; Cast Ref: 746.38)

This gauntlet mark is unusual for Yorkshire and appears to be the first of its kind recorded in the county. The form of the bowl and the mark is reminiscent of pipes produced in the West Country by the Gauntlet family. This family were renowned for

producing high quality pipes and their mark came to be considered a mark of excellence that was widely copied. In the mid-1660s a contemporary writer, Fuller, noted a court case where a pipe-maker was being sued for pirating the gauntlet mark (Brown 1959, 243). This example from Sheffield Castle would appear to be a locally produced copy of this West Country mark.

5. Spur bowl of c1720-1750 with a trimmed heel. The rim has been internally trimmed and bottered. There is no internal bowl cross; the pipe is well burnished and has a stem bore of 5/64" (Context: 6026).
6. Spur bowl of c1720-1750 with a trimmed spur. The rim has been internally trimmed and bottered. There is no internal bowl cross; the pipe is well burnished and has a stem bore of 5/64". There is a very distinctive mould flaw on the side of the spur (on the smokers right). On the back of the bowl facing the smoker is an incuse stamped mark comprising the incuse initials GW (Context: 1006; Cast Ref: 746.41; Higgins Die 2221).

This was the only GW mark was recovered from the site and there are no known makers with the initials GW working in Yorkshire in the first half of the eighteenth century. However, given the presence of various other pipes made by the Wild family of Rotherham, both from this site and from others in Sheffield, it seems probable that the GW mark represents another member of this prolific pipe making family.

7. Heel bowl of c1720-1750 with a trimmed heel. The rim has been internally trimmed and bottered. There is no internal bowl cross; the pipe is well burnished and has a stem bore of 5/64". On both sides of the heel is a relief moulded ring motif. On the back of the bowl facing the smoker are the incuse stamped initials TW (Context 6026; Cast Ref: 747.19; Higgins Die 2055).

This is one of four examples of pipes with a TW bowl mark recovered from the site. The most obvious candidate for this particular mark is Thomas Wild of Rotherham. There are three separate references to a pipemaker named Thomas Wild of Rotherham, which relate to at least two and possibly three different makers of the same name, rather than one individual (White 2004, 185). The first reference is in 1716 when the son of Thomas Wild of Rotherham, pipemaker, was apprenticed to a William Smith, file smith at Attercliffe. The second reference is to a marriage in Rotherham of Thomas Wild to Elizabeth Wainwright on the 14 April 1718. The third and final reference is in 1777 when Thomas Wild of Rotherham appears in the Quarter Sessions Records for Sheffield.

In a survey of the clay tobacco pipes from Yorkshire (White 2004) at least seventeen roll-stamped stem marks bearing Thomas Wild's name, including four from Sheffield, were recorded. Thomas Wild appears to have been quite a prolific pipe maker and his products turn up all across Yorkshire and parts of north Nottinghamshire. At least five different dies are known, three of which are very similar with the name THO:WILD under a border containing a wavy line (Higgins Dies 1513, 1832 and 2190). One of these examples, from Wood Hall moated site, occurs on the same stem as a separate 'Midlands style' border (White 2004, Fig 148.1). The fourth type (Higgins Die 1833) has a more complex 'Midlands style' decorative border as part of the same die as the lettering, while the fifth is a much more elaborate mark that includes a stag flanked by a pair of flower motifs above the lettering (Higgins Cast

Refs 198.3 and 198.4). The example from Staveley dates from the first half of the eighteenth century (Higgins Die 2190).

Although none of the TW bowl marks have so far been directly linked to pipes bearing a full-name Thomas Wild mark it seems likely that they were used by the same maker. It is interesting to note that where full-name stem marks have been recovered, TW bowl marks are often also present. It therefore seems most likely that the TW bowl marks can be attributed to Thomas Wild of Rotherham.

8. Bowl of c1720-1750 that would almost certainly have been a spur type, although this is now missing. The pipe has an internally trimmed rim. There is no internal bowl cross; the pipe is well burnished and has a stem bore of 5/64". Approximately 73mm from the back of the bowl is a roll stamp mark reading THO WILD (Context: 6026; Cast Ref 747.1; Higgins Die 1513).

This particular pipe is important since it provides one of the rare examples of an early eighteenth century pipe bowl with its associated roll-stamped stem mark. For details of Thomas Wild, see No. 7 above.

9. Twice life-size die detail of a second Thomas Wild mark (Higgins Die 1833) dating from c 1720-1750. Three examples of this mark were recovered from the site, one each from Contexts 6014, 6026 and 6030 (Cast Refs: 746.40, 749.14 and 749.15). For details of Thomas Wild, see No. 7 above.
10. Twice life-size die detail of a Benjamin Marsden mark (Context: 6026; Cast Ref: 747.2; Higgins Die 1834).

Benjamin Marsden was born in c1715, son of Godfrey Marsden, and baptised on 22 February 1714/15 at Thrybergh, near Rotherham (Thorn 2008). Benjamin married Hannah Rodgers of Rotherham on 26 July 1737. They had at least three children James (baptised 4 January 1737/8) George (born 1739) and Hannah (baptised 28 November 1742) (White 2004, 175; Thorn 2008). There is another Rotherham/Sheffield link here as both boys went on to be connected with the cutlery trade in Sheffield. James was apprenticed to Samuel Fowler, cutler of Attercliffe in 1749, and by 1763 both James and George were living in Attercliffe. At this time George's occupation is recorded as a cutler and it is quite possible that James was also a cutler by this date.

11. Twice life-size die detail of a Richard Scora mark (Context: 6026; Cast Ref: 747.6; Higgins Die 2183) dating from c 1720-1750.

The site produced a single mark that can be attributed to Richard Scora (Scorah) of Rawmarsh. There are two recorded pipe makers named Richard Scora who worked at Rawmarsh during the eighteenth century. It is possible that the first Richard Scora, baptised in September 1689, was the son of Jonathan Scora. Richard (I) married Mary Calver in October 1718 and the couple were baptising children between 1720 and 1736. In 1748 Richard took William Fitch apprentice. At the time of Mary's death in 1767 she is described as a 'wife' rather than a 'widow', so it is presumed that Richard was still alive at this date. This gives a likely working period of c1710, when Richard would have been 21, to c1760, when he would have been 71, for this maker.

The second Richard Scora married Elizabeth Capper in October 1783 and the couple were baptising children between 1784 and 1793. This second Richard Scora would have been working far too late to have been responsible for the Scora marks recovered from Sheffield castle.

The earlier Richard Scora is known to have had at least five different dies that he used to make his pipes (Higgins Die Nos. 1508, 1509, 1510, 1511 and 2183).

12. Twice life-size die detail of a William Wild mark (Higgins Die 1925). Nine examples were recovered from the excavations at Sheffield Castle (one from Context 4106; one from Context 6011; six from Context 6026 and one from Context 7017).

William Wild was a pipemaker working in Rotherham from at least 1764 to 1774 (White 2004, 185). He first appears in the marriage registers for Rotherham on 5 November 1764 when he married Sarah Marsden. The next reference comes from a letter dated 6 February 1771, when William Wild is writing to complain about an apprentice of his (Edward Wilson of Newark) who had run away (Newark Museum). The third and final reference to William is from 1774 when William is mentioned in Guest's History (Oswald 1975, 202). This reference has not been relocated, but it may relate to the occasion in 1774 when Wild is listed as a pipe maker when he subscribed towards the cost of a new organ for the church (<https://www.genuki.org.uk/>).

13. Spur bowl of c1780-1800. The pipe has an internally trimmed rim. There is no internal bowl cross and the stem bore measures 5/64". There is a relief moulded ring motif on both sides of the spur. The bowl is mould decorated with five wide scallops on either side of the bowl, which are enclosed in a narrow border. On the back of the bowl facing the smoker is a stylised stags head (Context: 11024).

A number of bowls of this type have been found in the Sheffield, and elsewhere in Yorkshire, including Doncaster. Examples of similar bowls have been found in waste from an eighteenth-century pipe kiln belonging to Samuel Lumley who was working in Church Street, Doncaster, until c1782 (White 2004, 33).

14. Spur bowl of c1780-1810. The pipe has a cut rim with traces of a mould line which indicates that the mould has been repaired or altered during its lifetime. There is no internal bowl cross and the pipe has a stem bore of 4/64". The bowl is mould decorated with a floral plant motif, with leaf decorated seams. On the smokers right the design comprises a sprig of flowers with no leaves; on the smokers left the design includes leaves as well as flowers (Context: 6030).

15. Spur bowl of c1780-1810. The pipe has a cut rim and an internal bowl cross; the stem bore is 5/64" (Context: 11024).

The bowl is mould decorated with a floral motif with faint traces of a line of dots around the rim. There are two pipes of this design which appear to have been produced in the same mould. Another example of this design, probably from the same mould, was recovered from excavations in Tenter Street, Sheffield.



16. Spur bowl of c1790-1810. The pipe has a cut rim with traces of a mould line below the rim, which indicates that the mould has been repaired or altered during its lifetime. There is no internal bowl cross; the stem bore is 5/64" (Context 6030).

The main decorative motif comprises a sprig of flowers which is moulded on to both sides of the pipe. On the sides of the spur is a relief moulded ring motif. On the left hand side of the bowl (as smoked) there is a faint letter P on the left hand side of the main flower, a little below the rim and beneath the mould line (the area the other side of the flower where another letter would be expected is missing). The seams of the pipe are unusual in that, rather than the standard leaf decoration, they are decorated with half a flower on each side. When the two halves of the mould come together, this produces a line of six-petaled flowers along the seams.

Another example of this distinctive bowl has been recorded by one of the authors (SDW) from excavations in Tenter Street, Sheffield, with the initials PR moulded in relief on the smokers left, flanking the flower motif. The Tenter Street example also has a row of dots around the rim, which are missing from the Sheffield Castle example. This shows that the Tenter Street is earlier than the Sheffield Castle example, which has a mould line showing that the top of the bowl has been modified by the addition of a metal plate, either to repair a section that has become worn from use or to heighten the mould so as to produce a taller bowl form. The maker (PR) has not yet been identified.

17. Damaged spur bowl with armorial decoration dating from c1740-1790. The illustrated example is a complete example of the same design that was recovered from previous excavations on the site of Sheffield Castle (now in Sheffield City Museum; Acc. No. 1995.90.15). Both examples are almost certainly from the same mould. The pipe has a cut rim and an internal bowl cross; the stem bore is 5/64" (Context: 6033).

The moulded decoration comprises a coat of arms with lion and unicorn supporters. The banner beneath the arms bears the name WILLIAM WILD (for details of William Wild, see No. 12 above).

## References

Brown, W. E., 1959, 'Tobacco and Clay Pipes' in 'A History of Wiltshire', *Victoria County History Wiltshire*, 4, 240-244.

Oswald, A., 1975, *Clay Pipes for the Archaeologist*, British Archaeological Reports, British Series 14, Oxford, 207pp.

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Quita Mould

## Leather from Sheffield Castle, new material (201540)

Submitted to Wessex Archaeology 10/09/2019

### Methodology:

The leather was examined and recorded in September 2019. A basic record of all the leather examined has been provided and the material is summarised below.

Leather species were identified by hair follicle pattern and thickness using low-powered magnification. Where the grain surface of the leather was heavily worn identification was not always possible. The term bovine has been used when uncertainty arose between mature cattle hide and immature calfskin. The term cattle, rather than cow, has been used as the gender of the animal/animals is unknown. Shoe bottom components and repairs are assumed to be of cattle hide unless stated otherwise. All measurements are in millimetres (mm). No contextual information was provided at the time of submission of the text.

### Condition:

The leather was in varying condition, most was wet when examined but a small amount was dry and desiccated. Some appear to have been formerly associated with coal dust (context 1002), others with oil or a similar substance (context 4009).

### Summary:

A small amount of leather was recovered generating 23 individual records. No complete items were found. The leather comprises principally of highly fragmentary shoe parts, the discarded junction from machine belting and a fragment of horse harness strap. This material is too fragmentary to date closely but cannot date earlier than the second half of the 19<sup>th</sup> century. The end of a reinforced strap (**1**), likely to come from harness, was found in context 1002. Substantial shoe parts were found in contexts 4006, 4009, 4010, 4039, 4042. What remains of the shoes were of brass riveted construction, and heavily hobnailed (**2, 4, 5, 7, 8, 14, 17, 22**). The small fragments of the shoe uppers that survived indicated they had been front lacing suggesting they were working boots. Very small fragments of perforated leather (**10, 13, 19**) were present in context 4009 and 4040, being associated with the shoe leather, they also may be shoe parts, perhaps used as bottom packing, but their identity is uncertain at present. A very small quantity of secondary waste (**11, 16, 18, 21**) found with the shoes, including two pieces cut from old shoe parts (**16, 18**), suggest that the shoes are waste from cobbling (shoe repair), but the shoes themselves are so fragmentary that it is impossible to distinguish them from casual domestic rubbish. The brass riveted junction of a machine belt (**15**) and small fragments broken from belting (**6, 9**) were found in contexts 4009 and 4010.

## Catalogue of leather recovered from Sheffield Castle, new interventions

(201540). In context order

### Context 1002

#### 1 Leather strap, stitched

Two lengths and 3 smaller fragments of strap with a row of closely spaced, oblique grain/flesh stitching along each side. Includes two thicknesses of strap with tooled edges and a straight, stitched end, the other end broken, and fragments that had been sandwiched between the two as a reinforcement. The stitching appears machined. Leather bovine, worn and compacted, black in colour. Condition: wet, possibly in proximity to coal dust. Length 110+mm, width 22mm, thickness 3.53mm; length 100+mm, width 21mm, thickness 3.27mm. fragments length 31+ width 22mm, thickness 3.31mm; length 30+mm, width 15+mm, thickness 3.05mm; length 20+mm, width 20mm, thickness 2.79mm. **201540, 1002**

### Context 4006

**2 Leather shoe, fragmentary, front lacing, brass riveted construction, left foot, adult size**

**Shoe bottom: Midsole** of elegant narrow shape with a natural tread, medium waist and wide seat the toe and part of the seat area now missing. Holes from hobnailing at the tread and seat. Waist area of **sole** with **middle packing** attached by an iron hobnail shank, 94+x54+mm; fragment of **middle edge packing** with impression of upper lasting margin and hobnail holes present, 50+x50+mm **Upper: vamp** broken along the lasting margin and the front seams, with a blunt squared toe and areas of double lapped seam present at the short convex rounded throat. Hole worn directly about the great toe joint suggesting a bunion. Leather worn no grain pattern surviving. Surviving length toe to throat c. 130+mm. Fragment broken from the right side of **quarter** with a double stitched lapped seam with brogue detail and lasting margin with a double row of brass rivets (now iron coloured due to iron staining), surviving height 54+mm. Front facing with a double lapped seam around the edge and 3 round punched lace holes surviving. Upper seams machine stitched. Leather upper presumed bovine, no grain pattern surviving. Condition: wet. **201540, 4006**

**Context 4008**

**3 Leather shoe bottom packing.** Rectangular piece with one original edge, others broken, with 3 small nail holes present. Probably broken from a shoe bottom, 25+17+2.21mm. Leather compacted, presumed bovine, no grain pattern visible. Condition: damp. **201540, 4008**

**Context 4009****Bag 1 of 3****4 Leather shoe, fragmentary, brass riveted construction, left foot.**

Waist and upper seat area of **sole** with a double row of brass rivets along each side. Surviving length 103+mm, waist width 43mm, max surviving width 67+mm. Fragments broken from a heavily hobnailed **tread sole** and a leather **shank**. Condition: dry, desiccated. **201540, 4009**

Leather **shank** with 4 hobnail holes along its length, apparently from a different shoe bottom, length 112mm, width 13mm, 4mm thick. Condition: dry, desiccated. **201540, 4009**

**5 Leather remains of 2 shoes, highly fragmentary**

**Shoe bottom** fragments including the blunt squared toe area with a double row of metal rivets, small fragments of **sole** with large holes from hobnails, fragments of **midsole** and **middle packing, heel jump. Upper fragments** including a matching blunt squared toe area of vamp with a large hole and all edges broken and no lasting margin surviving, 2 upper fragments, including an area of the front edge with a double stitched lapped seam, front opening with 2 lace holes, 1 with a metal eyelet. Also a fragment from the **front opening** of a **second shoe** with 3 lace holes surviving with smaller spacing. Condition: wet. **201540, 4009**

**6 Leather machine belt fragment:** fragment with a **pair** of large **parallel slits** along one edge. Condition: wet. **201540, 4009**

**Bag 2 of 3****7 Leather shoe, brass riveted construction, right foot, adult size**

**Shoe bottom;** lower tread, medium waist and wide seat of **sole** with a single row of brass rivets along each side, the rivets have iron staining. A scored line across the lower waist on the grain side marks the former position of a separate heel lift (now missing). A single row of brass rivets running across the upper waist area marks the former position of a separate tread sole (now missing). The sole has a gently convex moulded profile A fragment of **insole or midsole** is attached at the waist area, grain upward to the foot. The impression of a leather shank is visible on the upper face (interior) of the sole. Condition: wet. Surviving length c. 155+mm, waist width 48mm, seat width 66+mm. **201540, 4009**

**Bag 3 of 3****8 Leather highly fragmentary shoe remains, riveted construction.**

**Shoe bottom:** 9 fragments with large hobnail holes present, fragments with small rivet holes, and a possible heel lift. Upper: 5 fragments including areas of double stitched lapped seam, 4 fragments of front opening with lace holes, 2 of which have metal eyelets and machine stitching. Condition: wet. **201540, 4009**

**9 Leather machine belt fragments:** 3 pieces with parallel slits along the surviving edges, 1 with a large central rivet hole. Condition: wet. **201540, 4009**

**10 Leather perforated fragments:** 2 fragments with series of very small, equally spaced holes over the entire surface. Condition: wet. **201540, 4009**

**11 Leather secondary waste:** 3 trimmings of worn cattle hide. Length 121mm, width 8-10mm, thickness 3mm; length 81mm, width 1-7mm, thickness 5mm; length 77mm, width 3-9mm, thickness 2.5mm. Condition: wet. **201540, 4009**

#### **Separate bag**

**12 Shoe bottom fragment:** fragment with broken hobnail hole present. Condition: wet, brown 'oily' **201540, 4009**

**13 Leather perforated piece:** rectangular piece with 2 parallel cut edges, broken at each end, the surface covered by rows of small evenly-spaced holes with a single large round hole in the centre. Possibly broken from a shoe facing with a central lace hole? Leather no grain pattern visible. Length 53+mm, width 25mm, 3mm thick. Condition: wet, brown 'oily'. **201540, 4009**

#### **Context 4010**

**14 Leather shoe bottom fragments:** Fragment broken from the waist area of shoe sole with a convex moulded profile and hobnail holes 53+x52+mm. 2 matching heel lifts with concave curving heel breast, worn, with a large central hole for a hobnail, length 53+mm, width 63mm. Condition: wet. **201540, 4010**

**15 Leather machine belt junction:** 3 thicknesses of strap joined together by brass rivets with circular washers, diameter 14mm, cut across each end. The upper (inner) strap has a row of oblique parallel slits along each side. Leather cattle hide c. 3.5mm thick, combined thickness c. 10mm. Surviving length c 70+mm, max width 53mm. Condition: wet. **201540, 4010**

#### **Context 4017**

**16 Leather secondary waste:** triangular piece cut from an old shoe sole with a stitching channel present, probably cut from the lower edge of a tread sole. Leather cattle hide c. 4mm thick. Length 56+mm, max width 42+mm Condition: wet. **201540, 4010**

#### **Context 4039**

**17 Leather shoe bottom fragment;** broken fragment from the waist area of a hobnailed shoe bottom component, surviving length 36+mm, width 53mm. Condition: wet. **201540, 4039**

**18 Leather secondary waste:** fragment cut from a shoe bottom component, no distinguishing features 31x12x3.5mm. Skived trimming 20x4x2mm. Condition: wet. **201540, 4039**

#### **Context 4040**

**19 Leather perforated fragment:** sub-square shaped fragment all edges torn, pierced by 7 rows of equally spaced small round punched holes, diameter 1-2mm, 37+x37+x2mm. Condition: wet. **201540, 4040**

**20 Leather shoe bottom fragments:** rectangular shank with a large round central hole, 9mm in diameter, broken across a second. Surviving length 50+mm, width 32mm, thickness 2mm: 5 fragments with hobnail holes present. Leather worn bovine. Condition: wet. **201540, 4040**

**21 Leather secondary waste:** rectangular offcut with worn edges 58x23x2.5mm. Leather presumed bovine. Condition: wet. **201540, 4040**

#### **Context 4042**

**22 Leather shoe, highly fragmentary, riveted construction:** c. 33 fragments broken from a large shoe bottom with large worn hobnail holes, includes a small area of brass riveting



and upper lasting margin. Max width of surviving tread area 125+mm. Condition: wet.

**201540, 4042**

**Context 4052**

**23 Leather shoe bottom packing:** rectangular piece with straight sides and end, one end broken, with 2 rows of 3 small paired holes. Similar to that from context 4008 above. Leather compacted, worn, presumed bovine. Length 50+mm, width 18mm, thickness 2.70mm.

Condition: dry, desiccated, some white fungal growth present. **201540, 4052**

Roderick MacKenzie and Michael Charlton

## Metallurgical analysis of slag from the site of Sheffield Castle.

Authors: Roderick Mackenzie and Michael Charlton

### Introduction

Two fragments of metallurgical slag recovered from a medieval context (1073) at the site of Sheffield Castle have been subjected to scientific analysis, with the aim of establishing the process origin of the slag. The fragments were analysed at the Wolfson Archaeological Science Laboratories at UCL. Results indicate that one fragment is tap slag and the other furnace slag, both associated with the primary production of iron by bloomery furnace.

### Materials and methods

Both fragments of slag were photographed and measured, and the relative magnetic response of both fragments was also noted. Each fragment was given a unique laboratory identification with the letters *WS* followed by a number.

A small specimen of each slag fragment was cut with a wet abrasive tile cutter, cleaned by light brushing under tap water, and dried. The specimens were then mounted in a polymer resin and polished to a final finish of 1 $\mu$ m. Each specimen was subjected to reflected light microscopy and basic phase identification. A series of micrographs was taken for further review.

### Results

Photographs of fragments *WS-001* and *WS-002* are provided in Figures 1 and 2, respectively. *WS-001* is a dense blue-grey slag with low magnetic response. Its morphology suggests a series of overlapping flows with crinkled cooling surfaces. This is consistent with it being tapped from a furnace. *WS-002* is a low density blue-grey slag with no magnetic response. It has a porous, almost frothy, cross-section with a smooth continuous upper surface. Combined morphological features suggest that it could be either a frothy tap slag fragment or the top of a furnace bottom.

**WS-001**  
Project **WS201540**  
Context **1073**  
Tap Slag



Figure 1: Specimen *WS-001*

WS-002  
Project WS 201540  
Context 1073  
Porous slag

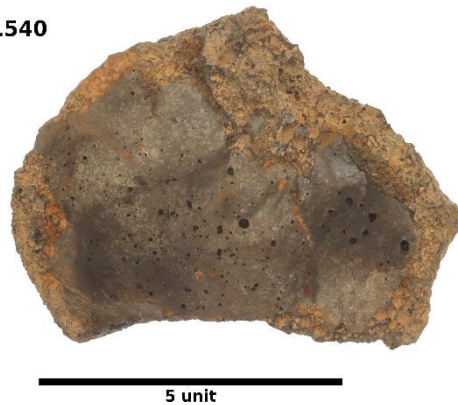


Figure 2: Specimen WS-002

The microstructure of WS-001 is made up of multiple overlapping flows of heterogeneous character. Distinct flows are recognised by the magnetite ( $\text{Fe}_3\text{O}_4$ ) enriched cooling surfaces and phase discontinuities (Figure 3). The specimen is dominated by fayalite ( $\text{Fe}_2\text{SiO}_4$ ) with variable amounts of dendritic wüstite ( $\text{FeO}$ ) and interstitial glass. Hercynite ( $\text{FeAl}_2\text{O}_4$ ) is present with overall concentration varying by flow (Figure 4). Small iron prills are also observed within the slag.

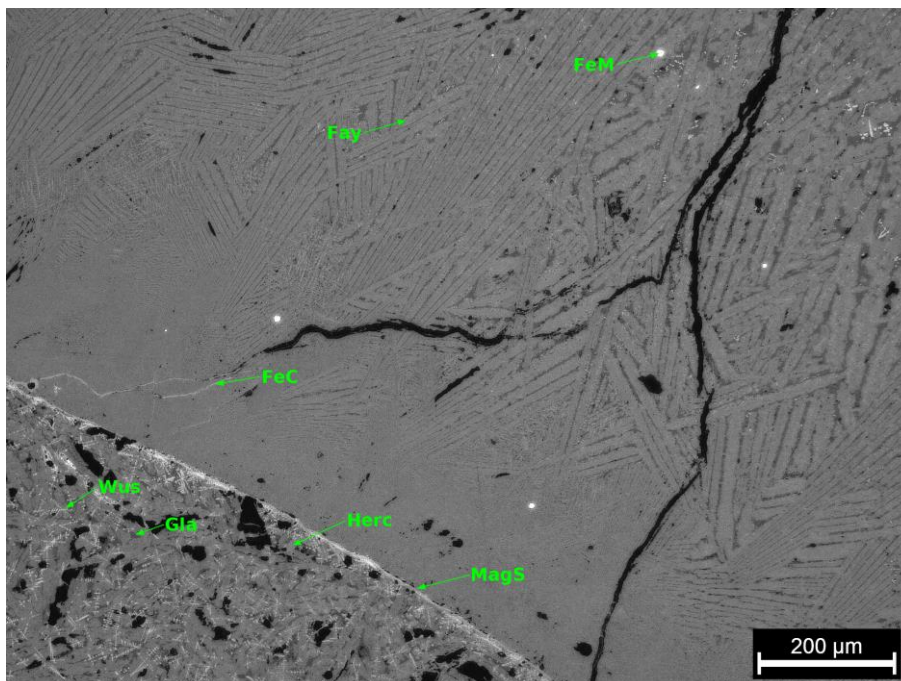


Figure 3: Micrograph of WS-001 showing flow boundary and phase discontinuities. Phases include chained and feathery fayalite of variable size (Fay); dendritic wüstite (Wus), glass (Gla), hercynite (Herc), iron prills (FeM), magnetite (MagS), and an iron corrosion product (FeC).

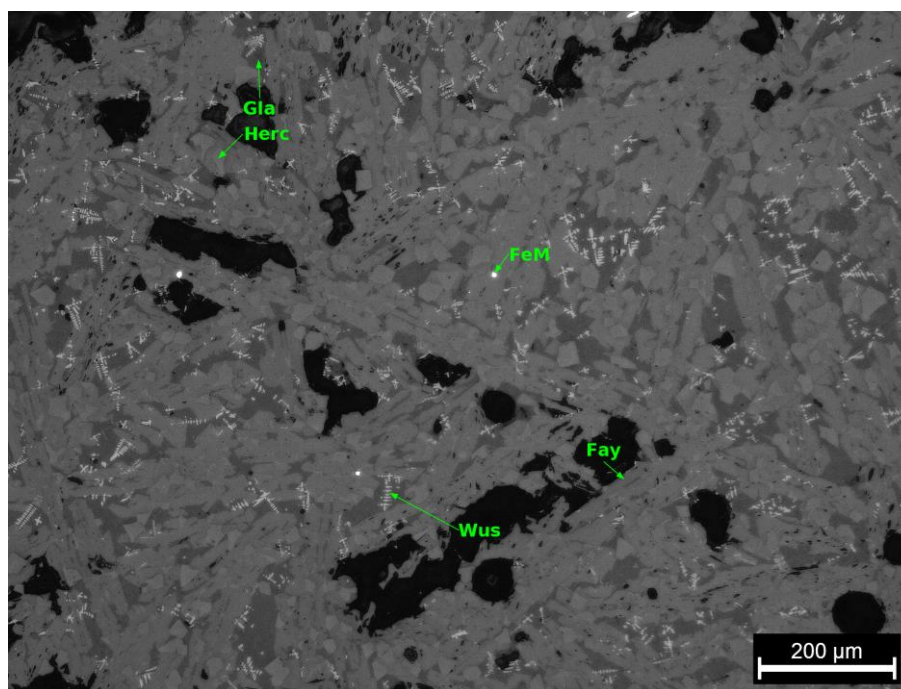


Figure 4: Micrograph of WS-001 showing skeletal fayalite (Fay); dendritic wüstite (Wus), glass (Gla), hercynite (Herc), and iron prills (FeM).

The microstructure of WS-002 is more consistent. Phases include large skeletal fayalite and hercynite (cuboid and dendritic) within a glassy matrix. A dark grey phase is also present containing myrmekitic intergrowth of fayalite (Figure 5). The colour and association of this phase with olivine suggest that it can be identified as anorthite ( $\text{CaAl}_2\text{Si}_2\text{O}_8$ ), though x-ray microanalysis or x-ray diffraction would be required to offer a more accurate attribution. This specimen also contains a high proportion of large voids. Other frames of WS-002 (Figure 6) reveal the presence of large iron prills and large fayalite crystals with sieve structures.

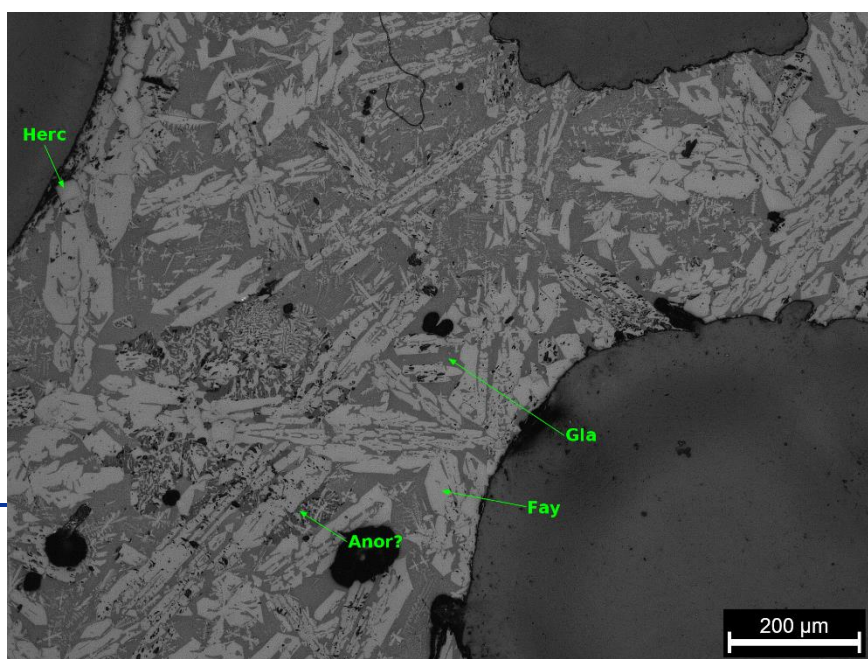




Figure 5: Micrograph of WS-002 showing skeletal fayalite (Fay), glass (Gla), hercynite (Herc), and a dark gray phase associated with myrmekitic olivine that may be anorthite (Anor?). Note the presence of large vesicles.

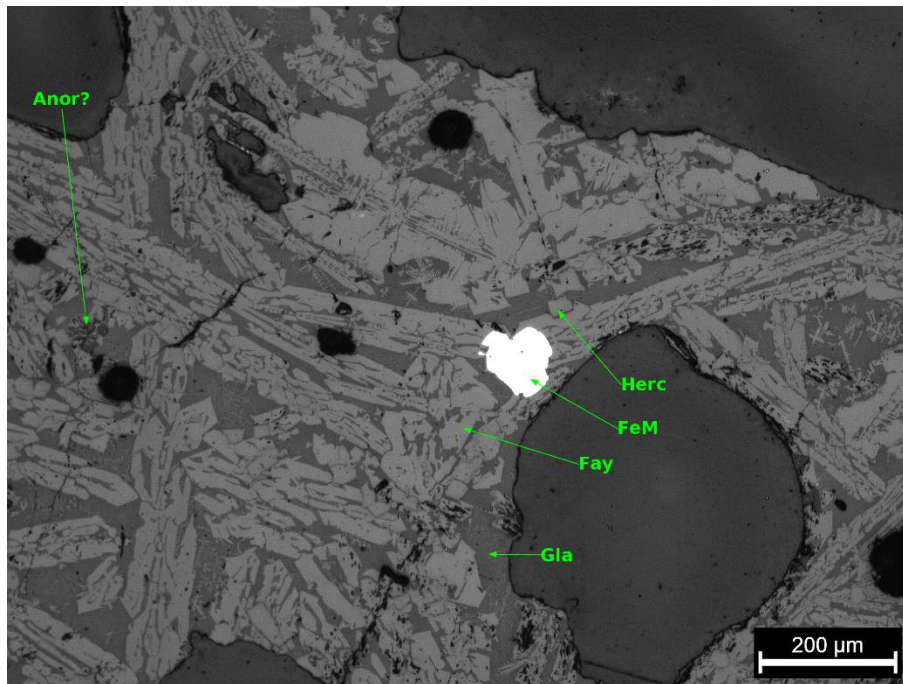


Figure 6: Micrograph of WS-002 showing skeletal, chained, and sieve fayalite (Fay), glass (Gla), hercynite (Herc), iron metal (FeM) and a dark grey phase associated with myrmekitic olivine that may be anorthite (Anor?). Note the presence of large vesicles.

## Discussion and conclusion

The morphology of WS-001 combined with clear evidence within the microstructure of multiple flows exposed to oxidizing conditions reveals it to be a tap slag. Some flows are notably leaner in iron oxides and hercynite compared to others. With only one specimen, it is impossible to relate this clearly to a smelting process. It is worth noting, however, that modern experimenters sometimes note that the first slag taps in a bloomery smelt are often iron rich while later taps are lean (Sauder and Williams, 2002). Such patterns could also relate to the differential use of smelting recipes leading to the production of ferritic iron or primary steel (Charlton et al., 2010). A more detailed study of microstructural and chemical patterning would be required to explore these hypotheses.

The morphology of WS-002 could represent either tap slag or furnace bottom slag. Frothy tap slags are familiar finds at water-powered bloomeries, though vesicular slags are also found inside furnaces near tuyères. The microstructure, however, biases the identification toward furnace slag. The size and distribution of the fayalite

crystals also give specimen WS-002 a porphyritic character which may indicate a high viscosity liquid within the standard temperatures of a bloomery furnace (1200-1400 °C). The sieve structure of some of the fayalite crystals are indicative of resorption processes. This suggests at least one cycle of remelting and recrystallization during the formation of the specimen. The lack of free iron oxides indicates that the atmosphere in which the slag formed was highly reducing. The vesicular structure of this slag points to a high gas (CO and CO<sub>2</sub>) content and strong reducing conditions. Without sufficient iron to flux silica within the charge, the slag will have a higher melting temperature and become stickier. Finally, the presence of myrmekitic phases, like the one provisionally identified as anorthite, form via reactions with calcium and potassium in fuel ash. They are common observations in slag pit furnace blocks and furnace bottoms where slag is pooled in association with charcoal. Their presence is testament to a lack of flow and mixing in the slag. These combined observations make it likely that this was a piece of furnace slag that formed near the tuyère and forming bloom.

The two fragments of slag analysed in this study provide clear evidence of primary iron production using a bloomery furnace, and their archaeological context suggests that this was an activity taking place at Sheffield Castle during the medieval period (13<sup>th</sup> century?).

While detailed operating procedures are impossible to assess in detail because of the small sample size, the evidence suggests that reducing conditions were strong and that the furnace was heavily blown. The blooms produced from such a process can be expected to be heterogeneous in carbon content, but biased toward the 'steelier' end of the iron-carbon phase diagram.

## References

- Charlton, M.F., Crew, P., Rehren, T., Shennan, S.J., 2010. *Explaining the evolution of ironmaking recipes - An example from northwest Wales*. J. Anthropol. Archaeol. 29. <https://doi.org/10.1016/j.jaa.2010.05.001>
- Sauder, L., Williams, S., 2002. *A practical treatise on the smelting and smithing of bloomery iron*. Historical Metallurgy 36, 122–131.



*Peter Ryder*

# Lapidary Material from Sheffield Castle Excavation

Recording January 2019



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B.A., M.Phil, F.S.A

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## **Sheffield Castle. Lapidary Material inspected and recorded Monday 7<sup>th</sup> January 2019**

On the morning of Monday 7<sup>th</sup> January a selection of stone artefacts from the Castle excavation, mostly small and being kept in the Wessex Archaeology North Offices in Healey (Sheffield) , were inspected, and ten pieces photographed and drawn; in the afternoon a collection of twenty to thirty larger stones, stored on site, were examined.

### **Stones drawn**

(the numbering is my own; any context number or label is referenced in bold type with the individual descriptions)

(1) **201540 Unstratified Stone**. Fragment of grinding stone of whitish grit, 130 x 110 x 40mm. Original diameter c240 mm. Slightly bevelled edges.

(2) **201540 (6026)**. (Stones 2 and 3 in same bag). 12mm long segment of a well-finished moulded stone ring, in section 97 x 80mm. Original external diameter c210 mm. Level top, outer face with a sophisticated moulding of Classical nature, inner face with fine grooving, possibly produced by friction. It is not at all clear what this stone is, but it has the feel of being post-medieval rather than medieval.

(3) Piece of stone roof slate, 155 x 92 mm and 35 mm thick, with peg hole, only 8 mm wide in centre but splaying to c 30 mm on both faces.

(4) **201540 (4042)** (Stones 4 and 5 in same bag) Rather more than half of a small grindstone, 217 mm in external diameter and 62 mm thick, with central hole 55 mm square. One face smooth, the other much rougher although with a smoothed border .

(5) Fragment of grindstone 160 x 85 mm and 52 mm thick, original external diameter c 230 mm. One face is probably one side of a central hole 60mm square. One face smooth, the other rougher with smoothed border. The edge has an incised criss-cross pattern.

(6) **201540 (7017)** Fragment of window tracery in fine-grained buff sandstone, overall 143 x 125 x 68 mm. Head of a bifurcating mullion between two lights or sub-lights, chamfered on one side and hollow-chamfered on the other. Cusping

to the lights on both faces. In form this is very much a medieval piece -more specifically between the late 14th and early 16th century - but the facts that it was apparently found with relatively modern material, and that it is sharp-edged and absolutely unweathered, must make one suspicious that it is a piece of Gothic revival work from the 19th century. Alternatively it may have been part of some internal feature such as a screen (there is no evidence for any glazing, which rather supports this) but given that it is known that there were Victorian Gothic buildings in the immediate vicinity, it seems unlikely that this is a genuinely medieval piece.

(7) **201540 4042** (Stones 7 and 8 in same bag). Fragment of grindstone 125 x 110 mm and 46 mm thick, original diameter c. 220 mm, of grey silt stone with carbonaceous plant remains. Incised criss-cross pattern on top, except for border, and similar pattern on edge.

(8) About half a grindstone c 220 mm in diameter and 58 mm thick, with central hole 55 mm square, of whitish grit. One smooth face, one rough and raised within a smoothed border 16 mm wide.

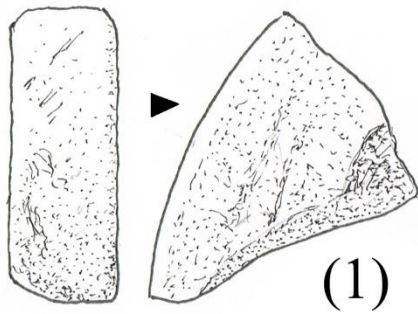
(9) 4040 Small fragment of a grindstone 100 x 84 mm x 55 mm thick, original diameter perhaps c 220 mm, and of orange/brown millstone grit.

(10) **(Loose in Office)** Large block, apparently a voussoir from a large arch (at least 3 m wide), overall 460 x 350 x 260 mm, of buff medium-grained sandstone, quite badly weathered; there is some evidence that this weathering, or at least some of it, may have taken place when the stone was in a secondary context (ie the joints, which one would expect to be protected when the voussoir was in situ, are weathered). Despite erosion light diagonal tooling is still discernible in some areas. The voussoir is moulded with a square step and two hollow chamfers, and stylistically would appear to be of 14<sup>th</sup> or 15<sup>th</sup> century date. It is difficult to see this as being anything other than a genuinely medieval piece.

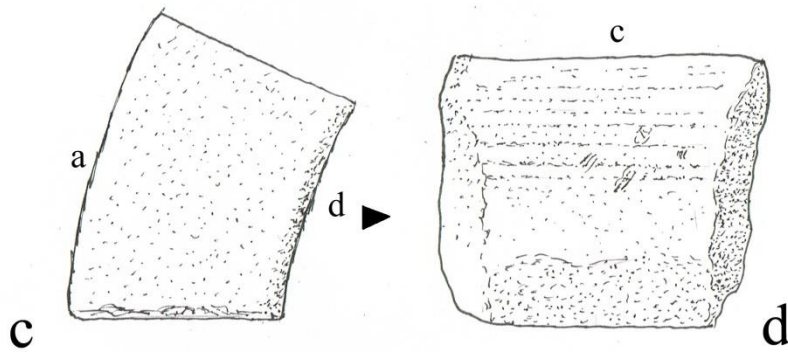
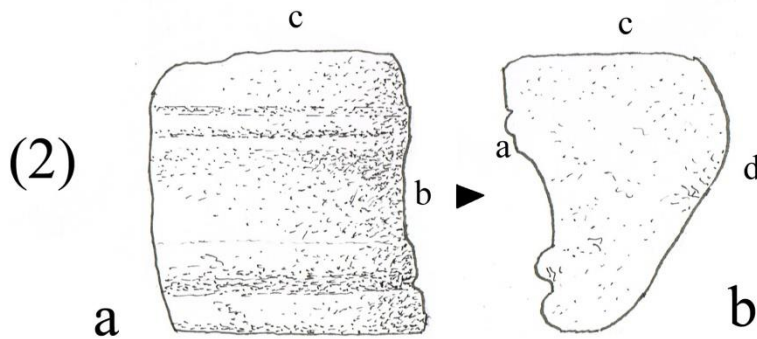
(11) **A block currently in store on the Castle site.** Overall 440 x 350 x 240 mm, rectangular, with a broad chamfer on one angle. This may well be medieval, although there is nothing really diagnostic of date; it could have formed part of the plinth of a substantial building, although where undamaged the faces are relatively unweathered

# Lapidary Material from Sheffield Castle Excavation

Stones drawn at 1:2

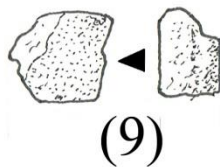
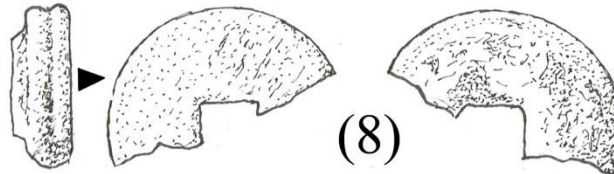
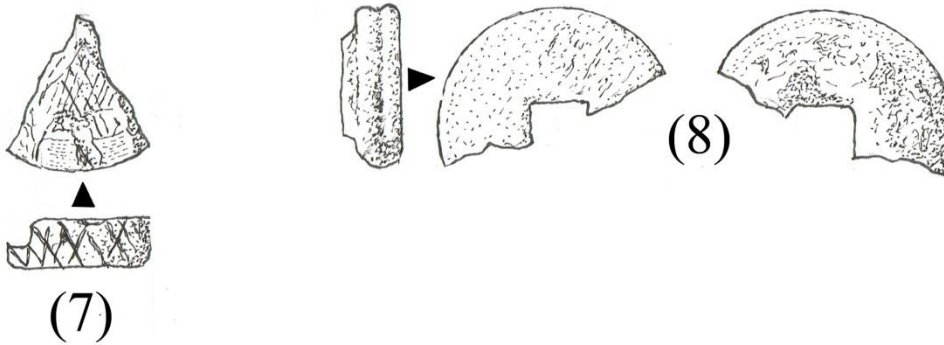
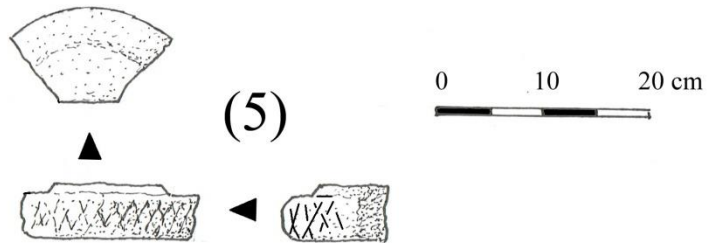
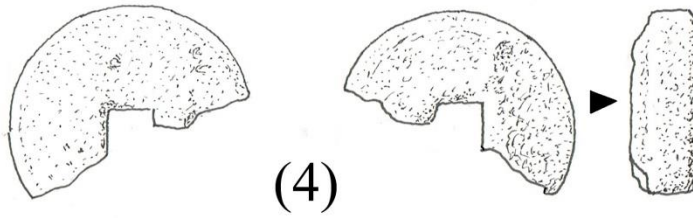


0 5 10 cm



# Lapidary Material from Sheffield Castle Excavation

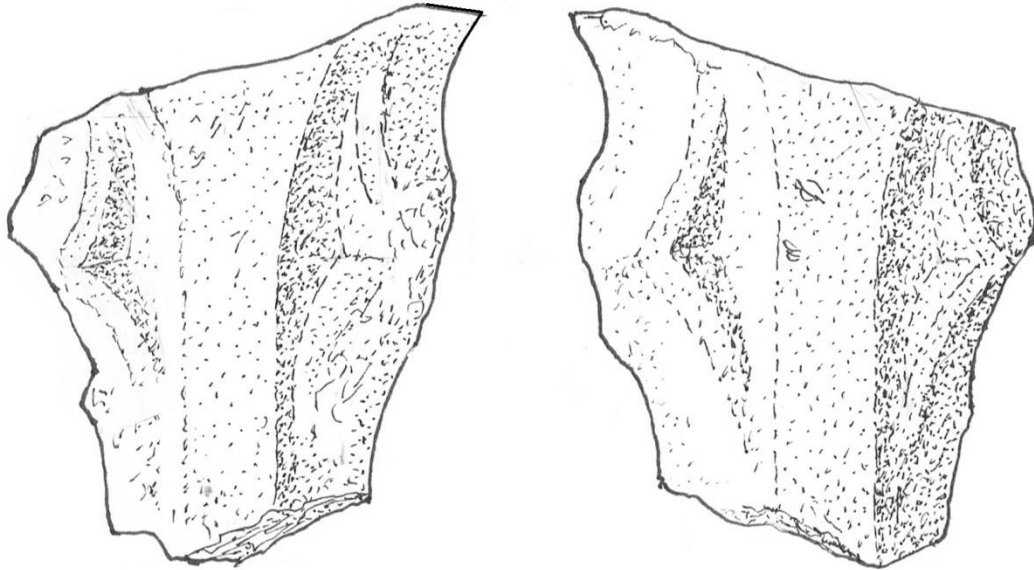
Stones drawn at 1:5





# Lapidary Material from Sheffield Castle Excavation

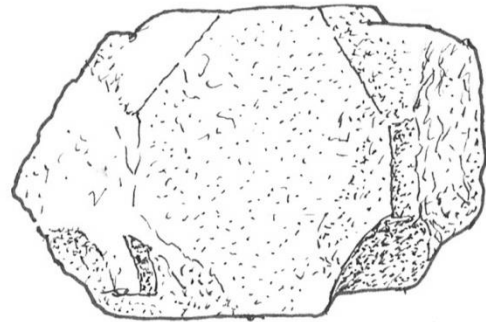
Stones drawn at 1:2



(6)

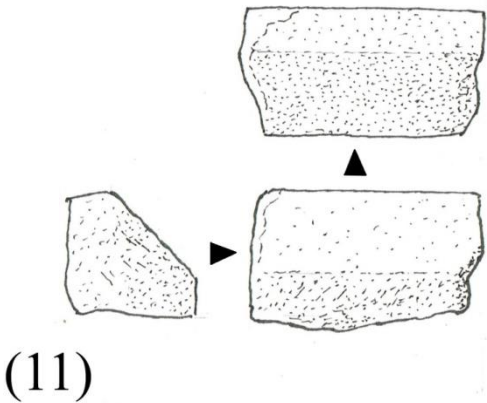
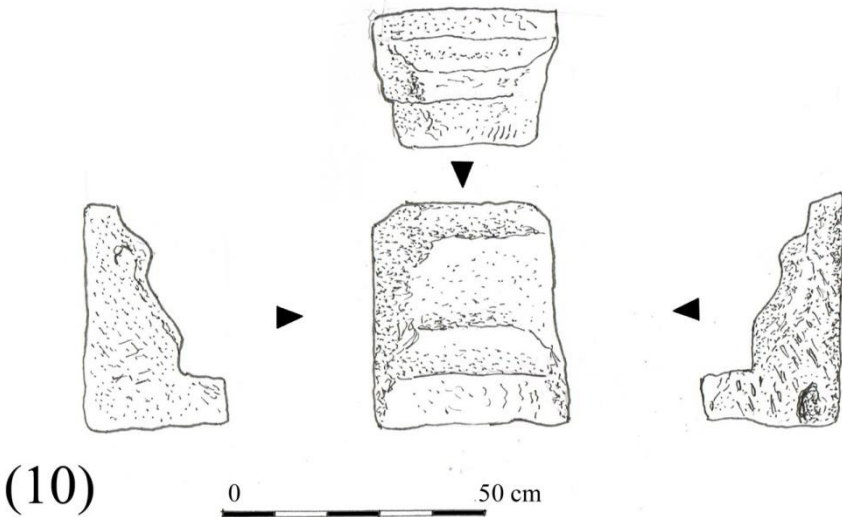


0 5 10 cm

A scale bar with markings at 0, 5, and 10 cm, used for reference in the drawings.

PFR Jan 2019

Lapidary Material from  
Sheffield Castle Excavation  
Stones drawn at 1:10



**Comments on other material that was not drawn (not an exclusive list)**

(1002) Spherule 1.5 m in diameter, perhaps of ceramic material – a stopped from a drink bottle?

(1005) brick fragment with slag.

(1007) triangular piece of flagstone 195 x 100 mm and 20 mm thick. Natural?

(1017) Flake of ?chert 35 x 18 mm

(1034) Slag, three pieces.

(2001) Another fragment of probably Welsh slate 80 x 40 mm x 3 mm thick.

201540 (3062). Fossil, piece of Stigmaria (tree root). (see photograph)



(4024) Welsh slate 165 x 11 mm by 7 mm thick, broken. 19<sup>th</sup> or 20<sup>th</sup> century (this material only came into common use with the development of the railway network in the mid-19<sup>th</sup> century)

(4040) Fragment 90 x 40 x 10 mm thick, one smooth face with scratches (see photograph)



201540 (4115). Two irregular stones, 130 x 12 x 33 mm and 80 x 80 x 30 mm.

(6007) Stone with carbonaceous material, probably natural.

201540 (6026) Bag of material, including four stone slates, the largest 200 x 180 x 20 mm. One includes fossil plant remains (see photograph, below)  
Stone slates such as this were a ubiquitous roofing material (in areas in which they were available before the Industrial Revolution; their pierced holes are for pegs, either of wood or sometimes the more durable sheep bone (hence 'sheepshank roofs').



(9011) Fragment of fossil 46 x 24 mm

(10025) Half spherule 23 mm diameter. See comment on 1002540 (9011)



(11024) stone slate 10 x 85 mm and 15 mm thick with peghole.

201540 'Unstratified' stone slate 180 x 160 mm x 15 mm thick with peghole, burned in part.

**Peter F Ryder January 23<sup>rd</sup> 2019**

Lucy Allott

## Wessex Archaeology – 201540: Sheffield Castle wood assessment

Lucy Allott

### Introduction

Twenty samples of waterlogged wood and two fragments of dry wood were submitted to Archaeology South-East for taxonomic identification and to assess their suitability for dendrochronology. The following report does not provide a full timber record.

### Methods

Wood fragments were hand sectioned along three planes (transverse, radial and tangential), temporarily mounted on slides and viewed under a transmitted light microscope at magnifications up to 500x to facilitate identification. Taxonomic identifications were assigned by comparing suites of anatomical characteristics visible with those documented in reference atlases (Hather 2000; Schoch *et al.* 2004; Schweingruber 1990).

### Results

Taxonomic identifications and notes regarding their suitability for dendrochronological work, presence of sapwood, pith, bark and overall form, are outlined in Table 1.

The majority of wood samples submitted were small fragments, some of which were subsamples, of waterlogged wood deriving from larger oak timbers. Almost all of the oak displayed tightly spaced growth rings, suggesting they derive from mature, slow grown components of the trees, consistent with the presence of timber. By contrast, eastern-most 'timber' sample [3078] was a subsample of small branch oak wood and differed from the majority of the assemblage. Other roundwood included a small fragment of alder [3057A] and hazel [3057] (Timber sample 3 of 3) revealing the presence of taxa other than oak. Two wood samples [4009 A and B], retrieved from site in a dry condition, were identified as common spruce/ European larch. This identification could not be satisfactorily refined due to inherent difficulties in distinguishing the two taxa (Schweingruber 1990) which is further compounded by the effects of drying.

### Suitability for dendrochronological dating

Very few fragments were large enough or retained sufficient growth rings, pith or sap that could make them suitable for dendrochronology. One exception is timber sample [3057] (T 1 of 3) which may retain some sapwood (see notes in Table 1) and displays closely spaced growth rings suggesting it could retain sufficient rings for dating. It should be noted, however, that this is an isolated sample, which may lessen its potential for dating. The only other timber that was superficially large enough for dendro work was timber/object [6055], which measured approximately 33x27x13cm in length/width/depth. It appears to be box-halved with considerable further conversion and shaping that have removed the sapwood. It is possible that pith, or close to the pith, is retained however this could only be fully determined if sectioned. The growth rings run parallel to the breadth of the object and it is therefore unprobably to provide sufficient rings for dendro dating.

### References

Hather, J. G. 2000. *The Identification of the Northern European Woods: A Guide for archaeologists and conservators.* Archetype Publications Ltd, London.

Schoch, W., Heller, I., Schweingruber, F. H., & Kienast, F. 2004. *Wood anatomy of central European Species.* Online version: [www.woodanatomy.ch](http://www.woodanatomy.ch)



Schweingruber, F.H. 1990. *Microscopic Wood Anatomy: structural variability of stems and twigs in recent and subfossil woods from Central Europe*. Swiss Federal Institute for Forest, Snow and Landscape Research





Table 1: Wood Identification and suitability for dendrochronology

Timber Context Number	Context/timber sample notes	Notes	Roundwood	Knotwood	rootwood	Bark/ Sapwood/ Heartwood	Wessex Archaeology Photos	Taxonomic ID.	English Name	Suitable for dendro
3057A		small fragment of roundwood	Y			Y	N	Alnus sp.	alder	N
3057B		subsample from larger piece of timber? (no corresponding photo for this one). Depending on original size and presence of bark or sap wood this could be suitable for dendro				N	N	Quercus sp.	oak	N? (see notes)
3057	T 1 of 3	closely spaced growth rings and possibly sufficient for dendro work but as an isolated sample it is unprobably to be suitable, edge may retain some sapwood although difficult to tell as drying may be causing colour differentiation.				poss sapwood	IMGP5390.3057. Timber 1 of 3	Quercus sp.	oak	? (see notes)
3057	T2 of 3	Subsample submitted - very dark, but not charred, fragment from larger timber submitted for identification. Original doesn't look large enough for dendro work				N	IMGP5380.3057. Timber 2 of 3	Quercus sp.	oak	N



Timber Context Number	Context/timber sample notes	Notes	Roundwood	Knotwood	rootwood	Bark/ Sapwood/ Heartwood	Wessex Archaeology Photos	Taxonomic ID.	English Name	Suitable for dendro
3057	T3 of 3	twisted piece of possible roundwood. It is either compressed and twisted, or this is the natural growth form. From the wood anatomy, it looks like the growth form is twisted. ?root wood?	?		?		IMGP5373.3057. timber 3 of 3	Corylus avellana	hazel	N
3078	E-most timber	sub-sample submitted - cross section of part of a branch with knotwood where it attaches to a larger branch/stem, too small for dendro	Y	Y		Y	IMGP5375.3078. E-most timber	Quercus sp.	oak	N
3078	central timber	sub-sample submitted - fragment of larger piece - see photo, possibly from roundwood, not large enough for dendro	?				IMGP5371.3078. central timber	Quercus sp.	oak	N
3078	W-most timber	sub-sample submitted - although fragment from large original piece the original appears fairly thin and without sap or pith from the photo so unprobably to be suitable for dendro work				N	IMGP5364.3078. W-most timber	Quercus sp.	oak	N
6055A		close growth rings, small flat fragment from timber				N	IMGP5368.6055 fragments A-E	Quercus sp.	oak	N
6055B		close growth rings, lumps possibly originating from larger timbers				N	IMGP5368.6055 fragments A-E	Quercus sp.	oak	N



Timber Context Number	Context/timber sample notes	Notes	Roundwood	Knotwood	rootwood	Bark/ Sapwood/ Heartwood	Wessex Archaeology Photos	Taxonomic ID.	English Name	Suitable for dendro
6055C		close growth rings, lumps possibly originating from larger timbers				N	IMGP5368.6055 fragments A-E	Quercus sp.	oak	N
6055D		close growth rings, lumps possibly originating from larger timbers				N	IMGP5368.6055 fragments A-E	Quercus sp.	oak	N
6055E		close growth rings, lumps possibly originating from larger timbers				N	IMGP5368.6055 fragments A-E	Quercus sp.	oak	N
6055F		Small fragments displaying poor preservation (difficult to section)				N	IMGP5370.6055 fragments F-I	Quercus sp.	oak	N
6055G		med-close growth rings, blocky fragment probably from a larger timber, very poor preservation of anatomical features				N	IMGP5370.6055 fragments F-I	Quercus sp.	oak	N
6055H		close growth rings, blocky fragment possible from a plank?				N	IMGP5370.6055 fragments F-I	Quercus sp.	oak	N
6055I		close growth rings, wedge shaped fragment				N	IMGP5370.6055 fragments F-I	Quercus sp.	oak	N



Timber Context Number	Context/timber sample notes	Notes	Roundwood	Knotwood	rootwood	Bark/ Sapwood/ Heartwood	Wessex Archaeology Photos	Taxonomic ID.	English Name	Suitable for dendro
6055		large timber/object(?) approx. measurements 33x27wx13d. With Fe rich mineral encrusting on several surfaces. Some mineral replacement has also occurred. Although large, the growth rings run parallel to the breadth of the object and it is therefore unprobably to provide sufficient rings for denrdo dating. The edges have been removed in shaping the piece and no sap wood is evident. Pith or close to pith may be present but this is difficult to determine without sectioning the object.				? Pith (see notes)	IMGP5386.6055 J	Quercus sp.	oak	N (see notes)
6070		medium spaced growth rings (wider spaced than in other specimens), no evidence of sapwood although difficult to tell as preservation poor, wood flaking and drying. Blackened from surrounding soils? Not charred				N	IMGP5384.6070	Quercus sp.	oak	N
6077		Subsample submitted - small fragments from possible plank - shown in photo, original doesn't look to retain sufficient rings, sapwood or pith so not suitable for dendro				N	IMGP5376.6077	Quercus sp.	oak	N



Timber Context Number	Context/timber sample notes	Notes	Roundwood	Knotwood	rootwood	Bark/ Sapwood/ Heartwood	Wessex Archaeology Photos	Taxonomic ID.	English Name	Suitable for dendro
4009A		sample recovered dry, retained dry, Identification has not been refined to genus because larch and spruce can be difficult to differentiate on basis of wood anatomy and this is compounded by the effects of drying and collapsing of cell structures.				N	IMGP5383.4009	Picea/ Larix sp.	Common spruce/ European Larch	N
4009B		sample recovered dry, retained dry, Identification has not been refined to genus because larch and spruce can be difficult to differentiate on basis of wood anatomy and this is compounded by the effects of drying and collapsing of cell structures.				N	IMGP5383.4009	Picea/ Larix sp.	Common spruce/ European Larch	N

Ellen Simmons and Glynis Jones

## Sheffield Castle, Sheffield – Archaeobotanical Report

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### Introduction

A comprehensive biological sampling strategy was implemented during an archaeological evaluation at the site of Sheffield Castle, Sheffield, South Yorkshire (NGR: 435805, 387684) in 2018 by Wessex Archaeology. Samples were selected for full analysis of charred plant macrofossils, waterlogged plant macrofossils, wood, wood charcoal, invertebrate macrofossils and molluscs based on the results of an archaeological evaluation assessment (Wessex Archaeology 2019). This report concerns the analysis of charred plant macrofossils, waterlogged plant macrofossils, wood and wood charcoal. Analyses and reports were conducted on invertebrate macrofossils by Smith (2020), and on molluscs by Law (2019).

### Aims and objectives

- To identify and fully quantify crop material and other charred plant macrofossils in order to provide evidence for the crop types and other food remains present at the site, and to investigate crop husbandry and crop processing activities.
- To identify and fully quantify waterlogged plant macrofossils in order to provide evidence for the nature of the local environment at the site, and to investigate the types of plant material that may have been brought to the site and for what purpose they were likely to have been collected.
- To identify a representative sample of the wood charcoal assemblage in order to provide evidence for the selection of wood for use as fuel at the site.
- To identify a representative sample of the wood assemblage in order to investigate other uses of wood at the site.

### Methodology

The bulk samples were processed by flotation for the recovery of charred plant remains and wood charcoal by Wessex Archaeology using a water separation machine. Floating material was caught on a 250µm mesh, and the remaining heavy residue was retained in a 500µm mesh. Flots and heavy residues were air dried. Where potential for the preservation of organic remains by anoxic waterlogging was noted, one litre sub-samples were processed using a water separation machine, with the heavy residues being passed through a stack of sieves of mesh size 5.6mm, 2mm, 1mm and 500µm. The flots and heavy residues from potential waterlogged samples were kept wet.

A preliminary assessment of the samples was made by scanning using a stereo-binocular microscope (x10 - x65) and recording the abundance of the main classes of material present. Samples were selected for further analysis of the environmental evidence on the basis of this initial assessment. The samples were analysed in accordance with Historic England guidelines for environmental archaeology analysis and reporting (Campbell *et al.* 2011).

Identification of the plant material, wood and wood charcoal was carried out by comparison with material in the reference collections at the Department of Archaeology, University of Sheffield and various reference works (e.g. Schweingruber 1990; Hather 2000; Cappers *et al.* 2006; Jacomet 2006; Poland 2018). Cereal nomenclature follows Zohary *et al.* (2012) and other (wild) plant nomenclature follows Stace (2019). Information relating to the ecology of various plant taxa was sourced from Stace (2019) and Preston *et al.* (2002)

Twenty-five wood charcoal fragments greater than 4mm<sup>3</sup> in size and twenty-five wood charcoal fragments 2-4mm<sup>3</sup> in size were randomly selected from each sample with the aim of identifying a representative sample of the taxa present (Stuijts 2006). A minimum fragment size of 2mm in cross-section was chosen for identification, as smaller fragments are difficult to fracture in all three planes and therefore difficult to identify. This may however result in a bias against the representation of species such as lime (*Tilia* sp.) which tend to be fragile and fracture easily into small fragments. Fifty wood fragments greater than 4mm<sup>3</sup> in size were randomly selected from each sample for identification as smaller fragments of wood are difficult to identify.

Wood charcoal and wood was examined using high power binocular reflected light (episcopic) microscopy (x 50, x 100 and x 400), and identifications made based on the anatomic features observed in transverse, radial and tangential planes. A record was also made, where possible, of the ring curvature of the wood and various dendrological features, in order for the part of the woody plant which had been burnt, and the state of wood before charring, to be determined (*cf.* Marguerie and Hunot 2007).

Where at least three growth rings are present, ring curvature is designated as weak, intermediate or strong, indicating larger branches or trunk material, intermediate sized branches and smaller branches or twigs. Narrow rings are recorded on charcoal and wood fragments with weak ring curvature where growth ring width is less than 1mm, which corresponds to restrictive growing conditions. The presence of thick walled tyloses in vessel cavities (indicating the presence of heartwood and therefore mature trunk wood), the presence of reaction wood in the vessel cavities (indicating the use of branch wood), the presence of fungal hyphae and insect degradation (indicating the use of dead or rotting wood), and the presence of bark and pith were also recorded. The degree of vitrification of the charcoal fragments was recorded as a measure of preservation, with levels of vitrification classified as either low brilliance refractiveness (degree 1), strong brilliance (degree 2) or total fusion (degree 3).

## Results

### **Preservation and contamination**

Plant macrofossils and wood were preserved by both charring and anoxic waterlogging. Preservation of charred plant material is somewhat poor, with most cereal grains being distorted and identifiable by gross morphology only. Preservation of wood charcoal is relatively good, with minimal evidence for vitrification, whereby charcoal takes on a glassy appearance resulting in anatomical features becoming fused and difficult to identify.

Preservation of uncharred plant material and wood present in contexts 3056, 3057 and 3079 from the lower layers of a sequence of rich organic deposits in Trench 3 is good, with a rich and diverse assemblage of plant material being present.

Preservation of uncharred plant material and wood in pit fills 6060, 6062, 6072, gully fill 6064 and layer 6055 in Trench 6 is also good. Uncharred seeds were also found in other contexts from Trench 3 and Trench 6, as well as in contexts from other trenches. It is not however generally possible to determine with confidence whether

this is modern intrusive material or ancient material preserved by anoxic waterlogging.

### **Charred plant macrofossils**

#### **Contexts producing charred plant macrofossils**

Plant macrofossils preserved by charring were found in a series of deposits from Trench 1, Trench 3, Trench 5 and Trench 6 (Table 1).

In Trench 1, layer 1076 is one of a series of deposits thought to be levelling layers for the castle courtyard. Made ground layer (1057), is one of a series of deposits overlying the courtyard surface. A date of cal. AD 1040-1210 was obtained from a barley grain (*Hordeum distichum/vulgare*) which was found in layer 1076, and a date of cal. AD 1170-1260 was obtained from a rye grain (*Secale cereale*) which was found in layer 1057.

In Trench 5, layers 5041 and 5045 are bedding layers for a surface of rough cobblestones thought to be the castle courtyard. A date of cal. AD 1170-1260 was obtained from a wheat grain (*Triticum* sp.) found in layer 5041.

In Trench 3, layer 3062 is one of a series of clay deposits that had been built up in stages as part of the construction of a possible hill or motte. Layer 3079 is associated with a demolition or destruction phase, thought to be the destruction of the castle in 1266 by John de Eyvill, and contained 13<sup>th</sup> century pottery. Context 3056 is a layer which directly overlays this destruction deposit and contained pottery dating to between the 12<sup>th</sup> to 14<sup>th</sup> century.

In Trench 6, gully fill 6064, pit fill 6062 and pit fill 6072, are from a group of early cut features. A date of cal. AD 1030-1200 was obtained from a hazel nutshell (*Corylus avellana*) fragment which was found in one of the other pits from group of early cut features (pit fill 6060). The samples from layer 3079, layer 3056 gully fill 6064, pit fill 6062 and pit fill 6072 were sorted for waterlogged plant macrofossils so the charred plant macrofossils present in these samples are recorded in Table 2.

#### **Crop remains**

The crops present both in contexts dated to the 11<sup>th</sup> – 13<sup>th</sup> century and in contexts dated to the 13<sup>th</sup> – 15<sup>th</sup> century are hulled barley (*Hordeum distichum/vulgare*), rye (*Secale cereale*) and bread/rivet wheat (*Triticum aestivum/turgidum*). Oat grains (*Avena* sp.) are also frequently present and, although it is not possible to determine whether these are a cultivated crop or crop weed, the presence of diagnostic chaff of possible common oat (*Avena* cf. *sativa*) in layer 1057 and layer 3056 indicates that at least some of the oat grains are likely to be crops.

Most of the crop remains are cereal grains that are likely to have been charred accidentally during parching or food preparation and re-deposited in the sampled contexts. A large quantity of cereal chaff is however present in layer 1057, indicating the presence of a crop processing by-product. This assemblage includes rachis nodes of rye (*Secale cereale*), barley (*Hordeum vulgare/distichum*) and possible bread wheat (*Triticum* cf. *aestivum*) as well as cereal culm nodes.

#### **Wild/weed species**

Large quantities of charred wild or weed plant seeds are also present in layer 1057. The taxa present in this assemblage includes a range of common crop weeds or wild plants commonly associated with fertile disturbed habitats including arable fields. This group includes black mustard (*Brassica nigra*), redshank/pale persicaria (*Persicaria maculosa/lapathifolia*), knotgrass (*Polygonum aviculare* agg.), field mouse-ear (*Cerastium arvense*), corncockle (*Agrostemma githago*), cornflower (*Centaurea cyanus*), stinking chamomile (*Anthemis cotula*), corn marigold (*Glebionis segetum*), narrow-fruited cornsalad (*Valerianella dentata*) and rye grass (*Lolium* sp.).



Sheep's sorrel (*Rumex acetosella*), which is abundant in layer 1057, is a plant of heaths and short grassland on sandy acidic soils. Seeds of this plant are however frequently found in association with cereal remains and it is likely to have grown as a crop weed in the past, where soil conditions were suitable. Seeds of vetch/vetchling (*Vicia* sp./*Lathyrus* sp.) and clover/medick (*Trifolium* sp./*Melilotus* sp.) are also frequently found in association with charred crop material and are likely to be crop weeds.

Other taxa present in layer 1057 are nettle (*Urtica dioica*), common mallow (*Malva sylvestris*), docks (*Rumex* spp.), greater plantain (*Plantago major*), nipplewort (*Lapsana communis*) and hemlock (*Conium maculatum*) which are more commonly associated with waste or rough ground but which may also grow in cultivated fields. Bulbous/meadow/creeping buttercup (*Ranunculus acris/repens/bulbosus*), timothy (*Phleum pratense*) and various small and large seeded grasses (Poaceae) grow in a range of grassy habitats including arable field margins.

Another group of taxa in the wild or weed seed assemblage from layer 1057 are commonly associated with damp soils. These include lesser spearwort (*Ranunculus flammula*), blinks (*Montia fontana* ssp. *chondrosperma*), club-rush (*Schoenoplectus* sp.), bristle club-rush (*Isolepis setacea*) and many of the species of sedge potentially present (*Carex* spp.).

Many of the wild/weed taxa present in layer 1057 are also present in the smaller and less diverse assemblages of charred wild or weed plant seeds from other medieval contexts at the castle site. Vetch/vetchling, sheep's sorrel, docks, stinking chamomile, rye grass and grasses are the most frequently occurring taxa. The common crop weeds, scentless mayweed (*Tripleurospermum inodorum*) and cleavers (*Galium aparine*), are present in the courtyard bedding layer 5041, but not in layer 1057, and the ruderal taxon ribwort plantain (*Plantago lanceolata*) and common crop weed fat hen (*Cenopodium album*) are present in the earthwork layer 3062.

A final group of taxa that are present in the charred plant macrofossil assemblage are the remains of potential collected food plants. These include hazel nutshell (*Corylus avellana*), which is present in most samples, blackberry (*Rubus fruticosus* agg.), which is present in the courtyard bedding layers 1076 and 1057, wild strawberry (*Fragaria vesca*) and fig (*Ficus carica*), which are present in layer 1057.

**Table 1 - charred plant macrofossils**

	Date		AD 1040- 1210	AD 1170- 1260	AD 1170- 1260	13 <sup>th</sup> – 15 <sup>th</sup> C	13 <sup>th</sup> – 15 <sup>th</sup> C
	Context		1076	1057	5041	5045	3062
	Sample		1009	1003	5004	5003	3003
	Feature						
	Context type		Levelling layer for courtyard	Levelling layer	Bedding layer for stone surface	Bedding layer for stone surface	Layer in earthwork for possible motte
	Sample size (l)		40	10	38	5	8
	Flot size (ml)		500	200	4	5	60
Taxon	Common name	Habitat					
<b>Cereal grain</b>							
<i>Hordeum vulgare/distichum</i> (hulled)	barley	Arable	10	-	-	-	1
<i>Hordeum vulgare/distichum</i> cf. <i>Hordeum vulgare/distichum</i>	barley	Arable	5	-	-	-	-
<i>Secale cereale</i> cf. <i>Secale cereale</i>	possible barley	Arable	-	1	-	-	1
<i>Secale cereale</i> cf. <i>Secale cereale</i>	rye	Arable	-	20	-	-	3
<i>Secale cereale</i> cf. <i>Secale cereale</i>	possible rye	Arable	-	6	-	-	10



	Date		AD 1040- 1210 1076	AD 1170- 1260 1057	AD 1170- 1260 5041	13 <sup>th</sup> – 15 <sup>th</sup> C 5045	13 <sup>th</sup> – 15 <sup>th</sup> C 3062
	Context						
	Sample		1009	1003	5004	5003	3003
<i>Triticum aestivum/turgidum</i>	bread/rivet wheat	Arable	1	2	-	4	4
<i>Triticum cf. aestivum/turgidum</i>	possible bread/rivet wheat	Arable	1	-	-	2	2
<i>Triticum sp.</i>	wheat		-	-	-	-	3
<i>Triticum sp./Secale cereale</i>	wheat/rye	Arable	-	22	-	-	30
Cereal indet.		Arable	4	-	-	-	-
Cereal chaff							
<i>Avena cf. sativa</i> floret base	possible common oat	Arable	-	16	-	-	-
<b>Hordeum distichum/vulgare rachis node</b>	barley	Arable	-	5	-	-	-
<i>Secale cereale</i> rachis node	rye	Arable	-	96	-	-	-
<b>Triticum cf. aestivum rachis node</b>	possible bread wheat	Arable	-	1	-	-	-
<b>Triticum aestivum/turgidum rachis node</b>	bread/rivet wheat	Arable	-	2	-	-	-
>2mm culm node	cereal straw node	Arable	3	7	1	-	-
Other remains							
<i>Ranunculus bulbosus /acris/repens</i>	bulbous/meadow/creeping buttercup	gP	-	2	1	-	-
<i>Ranunculus flammula</i> L.	lesser spearwort	P wet	-	8	-	-	-
<i>Vicia sp./Lathyrus sp.</i>	vetch/vetchling		-	3	-	-	4
<i>Trifolium sp./Melilotus sp.</i>	clover/medick		-	4	1	-	-
<i>Rubus fruticosus</i> agg.	bramble	h	4	1	-	-	-
<i>Fragaria vesca</i> L.	wild strawberry	h	-	4	-	-	-
<i>Ficus carica</i> L.	fig		-	1	-	-	-
<i>Urtica dioica</i> L.	common nettle	daP	-	12	4	-	-
<i>Corylus avellana</i> L. >4mm nutshell fragments	hazel	h	3	5	-	-	10
<i>Corylus avellana</i> L. 2-4mm nutshell fragments	hazel	h	-	9	1	-	-
<i>Malva sylvestris</i> L.	common mallow	daP	-	2	-	-	-
<i>Malva</i> sp.	mallow		-	7	-	-	-
<i>Brassica nigra</i> (L.) W.D.J. Koch	black mustard	daA	-	2	-	-	-
<i>Persicaria maculosa/lapathifolia</i>	redshank/pale persicaria	daA	-	2	-	-	-
<i>Polygonum aviculare</i> agg.	knotgrass	daA	-	39	-	-	-
<b>Fallopia convolvulus (L.) Á Löve</b>	black bindweed	daA					
<i>Rumex acetosella</i> L.	sheep's sorrel	dgaP acid	-	44	1	-	1
<i>Rumex</i> spp.	docks		-	3	1	-	2
<i>Cerastium arvense</i> L.	field mouse-ear	daP sandy	-	4	-	-	-
<i>Agrostemma githago</i> L.	corncockle	daA	-	7	-	-	-
<i>Chenopodium</i> spp.	goosefoots		-	-	-	-	1
<i>Chenopodium cf. ficifolium</i>	possible fig-leaved goosefoot	daA	-	-	-	-	2
<i>Chenopodium album</i> L.	fat hen	daA	-	-	-	-	5
<i>Atriplex</i> spp.	orache		-	-	-	-	1



	Date		AD 1040- 1210	AD 1170- 1260	AD 1170- 1260	13 <sup>th</sup> – 15 <sup>th</sup> C	13 <sup>th</sup> – 15 <sup>th</sup> C
	Context		1076	1057	5041	5045	3062
	Sample		1009	1003	5004	5003	3003
<i>Montia fontana</i> ssp. <i>chondrosperma</i>	blinks	A/P wet	-	4	-	-	-
<i>Galium aparine</i> L.	cleavers	daA	-	-	1	-	-
<i>Solanum nigrum</i> L.	black nightshade	daA	-	-	-	-	-
<i>Plantago major</i> L.	greater plantain	dgaP	-	4	1	-	-
<i>Plantago lanceolata</i> L.	ribwort plantain	dgaP	-	-	-	-	1
Asteraceae	daisy family		-	12	-	-	-
<i>Centaurea cyanus</i> L.	cornflower	daA	-	1	-	-	-
<i>Lapsana communis</i> L.	nipplewort	dahw A/P	-	1	-	-	-
<i>Anthemis cotula</i> L.	stinking chamomile	daA	-	4	4	1	5
<i>Glebionis segetum</i> (L.) Fourn.	corn marigold	daA	-	9	2	1	9
<b>Tripleurospermum inodorum</b> (L.) Sch. Bip.	scentless mayweed	daA	-	-	1	-	-
<i>Sambucus nigra</i> L.	elder	dhg	-	2	1	-	-
<i>Valerianella dentata</i> (L.) Pollich	narrow-fruited cornsalad	aA	-	1	-	-	-
<i>Conium maculatum</i> L.	hemlock	dB	-	2	-	-	-
<i>Juncus</i> spp.	rushes	damp Pwet	-	-	-	-	1
<i>Schoenoplectus</i> sp.	club-rush	Pwet	-	5	1	-	-
<i>Isolepis setacea</i> (L.) R. Br.	bristle club-rush	Pwet	-	4	-	-	-
<i>Carex</i> spp. (ovoid)	sedges		-	10	-	-	-
<i>Carex</i> spp. (trigonous)	sedges		-	22	1	-	-
<i>Lolium</i> sp.	rye grass	daA/P	-	5	-	-	5
cf. <i>Lolium</i> sp.	possible rye grass		-	2	-	-	2
<i>Avena</i> sp.	oat	daA	-	4	8	-	22
cf. <i>Avena</i> sp.	possible oat	daA	4	2	5	-	27
<i>Phleum pratense</i> L.	timothy	dagP	-	64	-	-	-
Poaceae >2mm	large seeded grasses		9	5	1	1	17
Poaceae <2mm	small seeded grasses		-	78	9	-	5
Tuber/rhizome			1				
Wood charcoal >4mm			+	++++	++	++	+++
Wood charcoal 2-4mm			+	+++++	++++	++++	++

Abundance key, - = < 10 items, + = > 10 items, ++ = > 50 items, +++ = > 100 items, ++++ = > 250 items, +++++ = > 500 items

Habitat key, a = arable, d = disturbed ground and waste places, g = grassland, h = hedgerows and scrub, w = woodland, A = annual, B = biennial, P = perennial, acid = acid soils, sandy = sandy soils damp = damp or wet soils, dry = dry soils

### Waterlogged plant macrofossils

#### Contexts producing waterlogged plant macrofossils

Plant macrofossils preserved by anoxic waterlogging were found in a series of deposits from Trench 6 and Trench 3.

In Trench 6, gully fill 6064, pit fill 6062, pit fill 6060 and pit fill 6072, are from a group of early cut features sealed by made ground layer 6055. A date of cal. AD 1030-1200 was obtained from a hazel nutshell fragment which was found in pit fill 6060.

In Trench 3, contexts 3057 and 3079 are associated with a demolition or destruction phase, thought to be the destruction of the castle in 1266 by John de Eyvill, and both contained 13<sup>th</sup> century pottery. Context 3056 is a layer which directly overlays these destruction deposits and contained pottery dating to between the 12<sup>th</sup> to 14<sup>th</sup> century.

Samples 6007 (from gully fill 6064), sample 6008 (from pit fill 6062) and sample 3008 (from layer 3056) were initially processed by flotation rather than wet sieving. It was determined during assessment that the rich assemblages of uncharred seeds in these samples are also likely to be ancient material preserved by anoxic waterlogging, rather than modern intrusive material, and it was recommended that they be analysed alongside the samples which had been processed by wet sieving. It should be noted however that the larger volumes of soil and different processing method used for these samples may have resulted in some differential preservation and recovery of plant macrofossils.

#### *Wild/weed species*

The assemblages of waterlogged plant macrofossils from Trench 6 and Trench 3 share general similarities in terms of the types of habitat indicated (see Figure 1). Samples from both trenches include high proportions of the seeds of crop weed taxa, such as wild radish (*Raphanus raphanistrum* ssp. *raphanistrum*), stinking chamomile (*Anthemis cotula*) and corn marigold (*Glebionis segetum*). Other frequently occurring plants which are commonly associated with a range of nutrient enriched disturbed habitats are common nettle (*Urtica dioica*), redshank/pale persicaria (*Persicaria maculosa/lapathifolia*), knotgrass (*Polygonum aviculare* agg.), large flowered/common/bifid hemp nettle (*Galeopsis speciosa/tetrahit/bifida*) and nipplewort (*Lapsana communis*). A smaller proportion of samples are composed of ruderal taxa, such as thistles (*Carduus* sp./*Cirsium* sp) and hemlock (*Conium maculatum*).

Sheep's sorrel (*Rumex acetosella*), a plant of heaths and short grassland on sandy acidic soils, that can also grow as a crop weed (see 'Charred plant macrofossils' above), is also ubiquitous. Docks (*Rumex* spp.), which include several species commonly associated with waste and rough ground, as well as species of other habitats, are the most abundant taxa type. Some of the dock seeds retained fruiting tepals which enabled a tentative identification of broad-leaved dock (*Rumex* cf. *obtusifolius* var. *obtusifolius*) which is a plant of field margins, hedge banks, roadsides, stream and riverbanks, ditches and neglected cultivated ground. Other taxa that are frequently present in samples from Trench 3 and Trench 6 are bulbous/meadow/creeping buttercup (*Ranunculus bulbosus/acris/repens*) and tormentil (*Potentilla erecta*), indicating grassy habitats. Seeds of sedges (*Carex* spp.), many species of which are associated with damp soils, are also ubiquitous. Lesser spearwort (*Ranunculus flammula*) which is a plant of wet habitats is frequently present. Raspberry (*Rubus idaeus*), wild strawberry (*Fragaria vesca*), hazelnut (*Corylus avellana*) and elderberry (*Sambucus nigra*), which are all woodland, hedgerow or scrub taxa, are well represented. These are all also edible wild fruits and nuts which may have been collected as food. Fragments of waterlogged wood are the dominant class of material present in all the waterlogged samples, the majority of which are likely to be from wood brought to the site as timber or fuel (see 'Wood' below).

There are differences between the taxa present in the cut feature fills/layers and the demolition/destruction deposits. The grassland component of cut feature fills 6064, 6062, 6060 and 6072, layer 6055 and layer 3056 includes taxa associated with meadow or pasture as well as general grassland plants such as common sorrel (*Rumex acetosa*), ragged robin (*Silene flos-cuculi*), selfheal (*Prunella vulgaris*), red bartsia (*Odontites vernus*), hawkweed oxtongue (*Picris hieracoides*), yarrow (*Achillea millefolium*) and burnet saxifrage (*Pimpinella* sp.). Water pepper (*Persicaria hydropiper*), which is a plant of damp mud and wet meadows, is consistently present in the cut feature fills and layers. Seeds of chickweed (*Stellaria media*) and fat hen (*Chenopodium album*), which are plants of nutrient enriched disturbed soils, are also consistently present in these deposits. Sample 6006 from layer 6055 produced a

particularly rich assemblage of nettle seeds (*Urtica dioica*), indicating a likely accumulation from nettle plants growing *in situ*. Gully fill 6064 produced a particularly rich assemblage of seeds and seed fragments of the crop weed corncockle (*Agrostemma githago*). The presence of over fifty whole seeds indicates that this assemblage is likely to be from a dump of seeds removed from cereal crops in the later stages of crop processing, rather than seed remains from cess that were incorporated into flour during milling.

The grassland component in demolition/destruction layers 3057 and 3079 includes hairy buttercup (*Ranunculus sardous*), which is a plant of short grassland in areas of disturbance such as verges and tracks on damp soils, greater plantain (*Plantago major*), which is also a plant of open grassland in areas of disturbance such as trampled paths, and timothy (*Phleum pratense*), which is a plant of a wide range of grassy habitats. Red goosefoot (*Chenopodium rubrum*), which is a plant of nutrient rich trampled mud as well as waste and cultivated ground, is present and the seeds of knotgrass (*Polygonum aviculare* agg.), which is also a plant of nutrient enriched soils, are significantly more abundant in layers 3057 and 3079. Mosses (Bryophyta) are more abundant in layers 3057 and 3079 and leaf buds are also present, some of which were tentatively identified as oak (cf. *Quercus* sp.) and hazel (cf. *Corylus avellana*).

Samples 3009 and 3013 from demolition/destruction layers 3057 and 3079, both produced very rich assemblages of hazel nutshells, with high proportions of fragments greater than 4mm in size. This indicates that these nutshells are likely to be primary deposits of waste material from the processing of hazel nuts for consumption, rather than re-deposited material or material which had been subject to trampling. No evidence for animal gnawing and no whole nutshells were present in the assemblage, indicating that it is unlikely to be a natural accumulation from hazel trees growing *in situ*.

Sample 3008 from layer 3056 (which overlays destruction deposits 3057 and 3079) produced a particularly large number of elderberry seeds (*Sambucus nigra*), although this is largely due to the fact that sample 3008 was a 40 litre bulk sample rather than a 1 litre sub-sample. Other taxa in layer 3056, which indicate scrub, hedgerows or woodland, are alder (*Alnus glutinosa*), bugle (*Ajuga reptans*) and downy woundwort (*Stachys germanica*).

Figure 1 – percentage composition of waterlogged plant taxa by habitat type

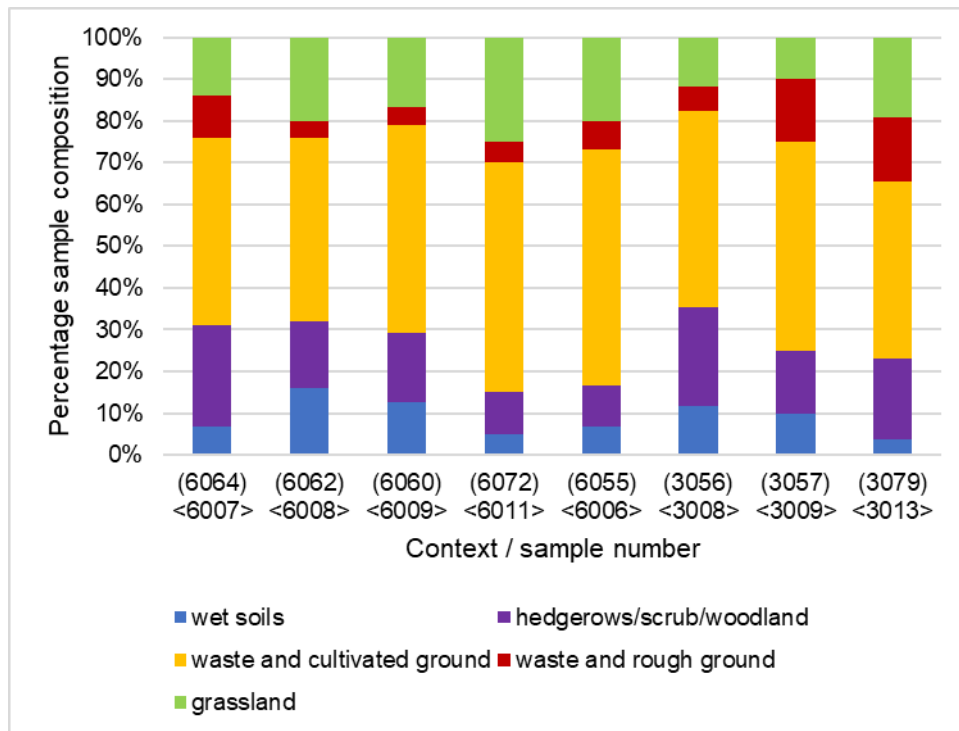


Table 2 - waterlogged plant macrofossils

Date	11 <sup>th</sup>	11 <sup>th</sup>	AD	11 <sup>th</sup>	11 <sup>th</sup>	13 <sup>th</sup> –	13 <sup>th</sup>	13 <sup>th</sup>
	–	–	103	–	–	15 <sup>th</sup>	–	–
	13 <sup>th</sup>	13 <sup>th</sup>	0-	13 <sup>th</sup>	13 <sup>th</sup>	C	15 <sup>th</sup>	15 <sup>th</sup>
	C	C	120	C	C		C	C
			0					
Context number	606	606	606	607	6055	3056	3057	3079
Sample number	4	2	0	2	6006	3008	3009	3013
Feature number	606	606	605	606				
Context type	3	1	9	7				
Context type	Gully fill	Pit fill	Pit fill	Pit fill	Layer	Layer	Layer	Layer
Sample size (l)	32	10	1	1	1	40	1	1
Flot size (ml)	150	100	100	100	300	300	700	400
Taxon	Common name	Habitat						
<b>Cereal grain</b>								
<i>Hordeum vulgare/distichum</i> (hulled)	barley	Arable					(1ch)	
<i>Triticum aestivum/turgidum</i>	bread/rivet wheat	Arable		(1ch)			(3ch)	
<i>Triticum sp.</i>	wheat	Arable		(1ch)				
<i>Triticum sp./Secale cereale</i>	wheat/rye	Arable		(2ch)				
<i>Cereal indet.</i>		Arable		(3ch)	(1ch)			(1ch)
<b>Cereal chaff</b>								
<i>Avena sativa</i> floret base	common oat	Arable					(1ch)	
<b>Other remains</b>								
Bryophyta	mosses		++	-	++	-	++	++
							+++	+++
							+	+



Date			11 <sup>th</sup>	11 <sup>th</sup>	AD	11 <sup>th</sup>	11 <sup>th</sup>	13 <sup>th</sup> –	13 <sup>th</sup>	13 <sup>th</sup>
			–	–	103	–	–	15 <sup>th</sup>	–	–
			13 <sup>th</sup>	13 <sup>th</sup>	0-	13 <sup>th</sup>	13 <sup>th</sup>	C	15 <sup>th</sup>	15 <sup>th</sup>
			C	C	120	C	C		C	C
					0					
	Context number		606	606	606	607	6055	3056	3057	3079
			4	2	0	2				
	Sample number		600	600	600	601	6006	3008	3009	3013
			7	8	9	1				
	Feature number		606	606	605	606				
			3	1	9	7				
<i>Pteridium</i>	bracken			(1ch						
	)									
<i>Papaver</i>	opium poppy	daA				1				
<i>somniferum</i> L.										
<i>Ranunculus</i>	bulbous/	gP	2	2	4	-	18	19	13	20
<i>bulbosus/acris/</i>	meadow/									
<i>repens</i>	creeping									
	buttercup									
<i>Ranunculus</i>	hairy buttercup	dgA	-	-	-	-	-	-	7	15
<i>sardous</i> Crantz		damp								
<i>Ranunculus</i>	lesser spearwort	P wet	6	4	10	4	16	10	2	-
<i>flammula</i> L.										
Fabaceae	pea family		-	-	-	-	-	-	-	1
<i>Vicia</i> sp./ <i>Lathyrus</i>	vetch/vetchling		(2ch							
sp.			)							
<i>Prunus spinosa</i> L.	sloe	hw	1	-	-	-	-	-	-	-
<i>Crataegus</i>	hawthorn	hw	-	-	-	1	-	-	-	-
<i>monogyna</i> Jacq										
<i>Rubus fruticosus</i>	blackberry	hw	106	120	54	-	10	72	3	1
agg.								(1ch)		
<i>Rubus idaeus</i> L.	raspberry	hw	19	18	4	-	4	8	2	-
<i>Potentilla erecta</i>	tormentil	ghwP	3	6	9	1	3	8	-	2
(L.) Raesch										
<i>Fragaria vesca</i> L.	wild strawberry	hwP	2	-	1	-	7	5	1	1
<i>Aphanes arvensis</i>	parsley-piert	gaA dry	-	-	-	-	-	-	1	-
L.										
<i>Urtica dioica</i> L.	common nettle	daP	12	-	15	5	1441	48	58	152
cf. <i>Quercus</i> sp. leaf	possible oak	hw	-	-	-	-	-	-	10	5
buds										
<i>Alnus glutinosa</i> (L.)	alder	hw wet	-	-	-	-	-	1	1	-
Gaertn.										
<i>Corylus avellana</i> L.	hazel	hw	3	-	5	8	-	6	628	312
>4mm nutshell										(1ch)
fragments										
<i>Corylus avellana</i> L.	hazel	hw	3	-	7	2	-	2	182	176
2-4mm nutshell										(4ch)
fragments										
cf. <i>Corylus avellana</i>	possible hazel		-	-	-	-	-	-	-	2
L. leaf buds										
<i>Elatine hexandra</i>	Six-stamened	A wet	-	1	-	-	-	-	-	-
(Lapierre DC.	waterwort									
<i>Viola</i> sp.	violet		5	5	2	-	1	-	-	-
<i>Brassica nigra</i> (L.)	black mustard	daA	-	-	-	-	16	-	-	-
W.D.J. Koch										
<i>Raphanus</i>	wild radish	daA	3	-	-	-	-	-	-	-
<i>raphanistrum</i> spp.										
<i>raphanistrum</i> seed										
pod										
<i>Raphanus</i>	wild radish	daA	1	2	-	1	-	2	-	1
<i>raphanistrum</i> spp.										
<i>raphanistrum</i> seed										
pod fragment										
<i>Persicaria</i>	redshank/pale	daA	1	1	1	2	1	6	2	-
<i>maculosa/lapathifolia</i>	persicaria									
<i>Persicaria</i>	water-pepper	dgA	7	8	6	-	72	2	-	-
<i>hydropiper</i> (L.)		damp								
Delarbre										
<i>Polygonum</i>	knotgrass	daA	16	4	3	1	10	7	165	115
<i>aviculare</i> agg.										



	Date		11 <sup>th</sup> – 13 <sup>th</sup> C	11 <sup>th</sup> – 13 <sup>th</sup> C	AD 103 0- 120 0	11 <sup>th</sup> – 13 <sup>th</sup> C	11 <sup>th</sup> – 13 <sup>th</sup> C	13 <sup>th</sup> – 15 <sup>th</sup> C	13 <sup>th</sup> – 15 <sup>th</sup> C	13 <sup>th</sup> – 15 <sup>th</sup> C
	Context number		606 4	606 2	606 0	607 2	6055	3056	3057	3079
	Sample number		600 7	600 8	600 9	601 1	6006	3008	3009	3013
	Feature number		606 3	606 1	605 9	606 7				
<b>Fallopia convolvulus (L.) Á Löve</b>	black bindweed	daA	-	-	-	-	5	1	-	-
<i>Rumex acetosella</i> L.	sheep's sorrel	dgaP acid	-	28	14	4	4	6 (3ch)	8	13
<i>Rumex acetosa</i> L.	common sorrel	gP sandy	16	20	16	21	19	-	-	-
<i>Rumex obtusifolius</i> var. <i>obtusifolius</i> tepals	broad-leaved dock	dP	-	-	-	3	7	1	-	2
<i>Rumex</i> cf. <i>obtusifolius</i> var. <i>obtusifolius</i> tepals	possible broad-leaved dock		4	9	-	-	55	-	-	3
<i>Rumex</i> spp.	docks		497	307	245	150 (2ch)	449	20 (1ch)	48	167
<i>Stellaria media</i> (L.) Vill.	common chickweed	daA	5	4	5	5	1	2	-	-
<i>Stellaria graminea</i> L.	lesser stitchwort	ghwP	1	-	-	1	1	-	-	9
<i>Cerastium arvense</i> L.	field mouse-ear	daP sandy	-	-	-	-	1	-	-	11
<i>Spergula arvensis</i> L.	corn spurrey	daA	-	-	-	2	-	-	-	-
<i>Agrostemma githago</i> L.	corncockle	daA	56	1	2	-	-	1	-	-
<i>Agrostemma githago</i> L. seed fragments	corncockle	daA	55	2	-	-	-	-	-	-
<i>Silene dioica</i> (L.) Clairv.	red campion	hwP	-	1	-	-	1	-	-	4
<i>Silene flos-cuculi</i> (L.) Clairv.	ragged robin	gw	-	-	-	-	1	-	-	-
<i>Chenopodium album</i> L.	fat hen	daA	17	-	2	3	-	7 (1ch)	-	-
<i>Chenopodium rubrum</i> L.	red goosefoot	daA	-	-	-	-	-	-	36	25
<i>Atriplex</i> spp.	orache		27	7	-	-	2	-	-	-
<i>Solanum nigrum</i> L.	black nightshade	daA	-	-	-	-	2	-	-	-
<i>Plantago major</i> L.	greater plantain	dgaP	-	-	-	-	-	-	129	142
<i>Stachys germanica</i> L.	downy woundwort	ghwB/P	-	-	-	-	-	1	-	-
<i>Stachys sylvatica</i> L.	hedge woundwort	dghwP	4	-	-	-	-	-	-	-
<i>Stachys arvensis</i> (L.) L.	field woundwort	daA	-	-	-	-	-	6	-	-
<i>Stachys</i> cf. <i>arvensis</i>	possible field woundwort		-	-	-	-	-	4	-	-
<i>Ballota nigra</i> L.	black horehound	dhP	1	-	-	-	-	-	-	-
<i>Galeopsis speciosa/tetrahit/bifida</i>	large flowered/common /bifid hemp nettle	daA	5	2	2	-	7	1	2	1
<i>Ajuga reptans</i> L.	bugle	wgP	2	-	-	-	-	1	-	1
<i>Prunella vulgaris</i> L.	selfheal	dgP	-	-	-	-	-	2	-	-
<i>Mentha arvensis</i> L.	corn mint	dagwP	-	-	-	-	2	2	-	-
<i>Odontites vernus</i> (Bellardi) Dumort.	red bartsia	dagA	-	-	-	2	-	-	-	-
Asteraceae	daisy family		-	-	-	-	-	-	-	-
<i>Arctium</i> sp.	burdock	dhwP	1	-	-	-	-	-	-	2





	Date		11 <sup>th</sup>	11 <sup>th</sup>	AD	11 <sup>th</sup>	11 <sup>th</sup>	13 <sup>th</sup> –	13 <sup>th</sup>	13 <sup>th</sup>
			–	–	103	–	–	15 <sup>th</sup>	–	–
			13 <sup>th</sup>	13 <sup>th</sup>	0-	13 <sup>th</sup>	13 <sup>th</sup>	C	15 <sup>th</sup>	15 <sup>th</sup>
			C	C	120	C	C		C	C
					0					
	Context number		606	606	606	607	6055	3056	3057	3079
	Sample number		4	2	0	2				
	Feature number		600	600	600	601	6006	3008	3009	3013
			7	8	9	1				
			606	606	605	606				
			3	1	9	7				
<i>Carduus</i>	thistles		-	-	-	-	8	2	1	2
sp./ <i>Cirsium</i> sp.										
<i>Lapsana communis</i>	nipplewort	dahw	20	4	6	1	16	2	1	3
L.		A/P								
<i>Picris hieracioides</i>	hawkweed	dgB/P	-	1	-	-	-	3	-	-
L.	oxtongue									
<i>Achillea millefolium</i>	yarrow	dgP	-	-	2	1	18	-	-	-
L.										
<i>Anthemis cotula</i> L.	stinking chamomile	daA	30	14	11	1	12	2	-	4
						(1ch				
						)				
<i>Glebionis segetum</i>	corn marigold	daA	49	11	13	4	36	146	27	32
(L.) Fourr.						(1ch		(17ch		
						)		)		
<b><i>Tripleurospermu</i></b>	scentless	daA	4	-	-	-	2	-	-	-
<b><i>m inodorum</i> (L.)</b>	mayweed									
<b>Sch. Bip.</b>										
<i>Sambucus nigra</i> L.	elder	dhg	7	5	1	-	-	253	1	-
<i>Valerianella</i>	narrow-fruited	aA	1	-	-	-	1	-	-	1
<i>dentata</i> (L.) Pollich	cornsalad									
<i>Pimpinella</i> sp.	Burnet-saxifrage	dgP	-	8	-	-	-	-	-	-
<i>Aethusa cynapium</i>	fool's parsley	daA	-	1	1	-	2	-	-	-
L.										
<i>Conium maculatum</i>	hemlock	dB	12	2	4	-	13	2	1	1
L.		damp								
<i>Bupleurum</i>	thorow-wax	daA	-	-	-	-	-	-	1	-
<i>rotundifolium</i> L.										
cf. <i>Bupleurum</i>	possible thorow-		-	-	-	-	-	1	-	-
<i>rotundifolium</i>	wax									
<i>Apium graveolens</i>	wild celery	dB/P	-	16	-	-	-	-	-	-
L.		wet								
<i>Juncus</i> spp.	rushes		-	8	-	4	166	2	6	24
<i>Schoenoplectus</i> sp.	club-rush	Pwet	-	-	-	-	-	-	3	-
<i>Eleocharis</i> sp.	spike-rush	Pwet	-	-	2	-	-	1	-	1
<i>Isolepis setacea</i>	bristle club-rush	Pwet	-	-	-	-	-	2	-	-
(L.) R. Br.										
<i>Carex</i> spp. (ovoid)	sedges		4	15	7	2	20	77	15	27
								(1ch)		
<i>Carex</i> spp. (trigonous)	sedges		20	15	7	-	21	46	7	3
<i>Lolium</i> sp.	rye grass	daA/P	-	-	-	-	-	(1ch)	-	-
<i>Avena</i> sp.	oat	daA		(2ch				(12ch	(1ch)	
				)				)		
cf. <i>Avena</i> sp.	possible oat	daA	(1ch	(2ch						
			)	)						
<i>Phleum pratense</i> L.	timothy	dagP	-	-	-	-	-	(1ch)	294	162
<i>Poaceae</i> >2mm	large seeded		-	-	-	-	-	(5ch)	-	-
	grasses									
<i>Poaceae</i> <2mm	small seeded		-	-	-	-	-	(4ch)	-	-
	grasses									
Leaf buds indet.			-	(1ch	1	-	-	-	3	2
				)						
<i>Wood fragments</i>			+++	+++	+++	+++	+++	+++	+++	+++
>4mm										
<i>Wood fragments</i> 2-4mm			+++	+++	+++	+++	+++	++++	+++	+++
			+	+	+	+	+		+	+
<i>Wood charcoal</i> >4mm			-	-	-	+		+++	++	+
<i>Wood charcoal</i> 2-			+	++	-	++		++++	+++	++



Date	11 <sup>th</sup>	11 <sup>th</sup>	AD	11 <sup>th</sup>	11 <sup>th</sup>	13 <sup>th</sup> – 15 <sup>th</sup>	13 <sup>th</sup>	13 <sup>th</sup>
	–	–	103	–	–	C	–	–
	13 <sup>th</sup>	13 <sup>th</sup>	0-	13 <sup>th</sup>	13 <sup>th</sup>	C	15 <sup>th</sup>	15 <sup>th</sup>
	C	C	120	C	C		C	C
			0					
Context number	606	606	606	607	6055	3056	3057	3079
	4	2	0	2				
Sample number	600	600	600	601	6006	3008	3009	3013
	7	8	9	1				
Feature number	606	606	605	606				
	3	1	9	7				

4mm

(ch=charred). Abundance key, - = <10 items, + = > 10 items, ++ = > 50 items, +++ = > 100 items, ++++ = > 250 items, +++++ = > 500 items

Habitat key, a = arable, d = disturbed ground and waste places, g = grassland, h = hedgerows and scrub, w = woodland, A = annual, B = biennial, P = perennial, acid = acid soils, sandy = sandy soils, damp = damp or wet soils, dry = dry soils

### Wood charcoal

#### Contexts producing rich assemblages of wood charcoal

Wood charcoal fragments are present in most of the samples taken from the castle site. Rich assemblages of wood charcoal, composed of more than fifty charcoal fragments greater than 2mm in size in cross section, are present in a series of deposits from Trench 1, Trench 3, Trench 5 and Trench 6.

In Trench 1, layer 1076 is the uppermost of a series of deposits thought to be levelling layers for the castle courtyard and made ground layer 1057 is one of a series of deposits overlying the courtyard surface. Assemblages of charred plant macrofossils were also found in these contexts. A date of cal. AD 1040-1210 was obtained from a barley grain (*Hordeum distichum/vulgare*) which was found in layer 1076 and a date of cal. AD 1170-1260 was obtained from a rye grain (*Secale cereale*) which was found in layer 1057. Context 1018 is a deposit within an 18<sup>th</sup> century drain.

In Trench 6, layer 6047 is one of a series of layers within a machine dug sondage. A radiocarbon date of cal. AD 1220-1270 was obtained from charred hazel nutshell found in the stratigraphically later layer 6044. Layer 6049 is a charcoal lens within layer 6039 which contained 12<sup>th</sup> century pottery.

In Trench 5, layer 5039 is a deposit of ironworking slag used to repair the cobblestone surface of the courtyard.

In Trench 3, layer 3062 is one of a series of clay deposits that had been built up in stages as part of the construction of a possible hill or motte. An assemblage of charred plant macrofossils was also found in this deposit. Layer 3057 is associated with a demolition or destruction phase and was found to contain 13<sup>th</sup> century pottery. Context 3056 is a layer which directly overlays this destruction deposit and contained pottery falling within a range from the 12<sup>th</sup> to 14<sup>th</sup> century. Assemblages of waterlogged plant macrofossils were also found in layers 3062 and 3057.

#### Woody plant species

The taxa present in contexts dated to the 11<sup>th</sup> – 12<sup>th</sup> century, contexts dated to the 13<sup>th</sup> – 15<sup>th</sup> century and 18<sup>th</sup> century drain fill 1018 are very similar, with the exception of a fragment of conifer charcoal in drain fill 1018. In order of frequency in the samples, the taxa present in the medieval contexts are oak, (*Quercus* sp.), hazel (*Corylus avellana*), hawthorn/apple/pear/whitebeams (Pomoideae), alder (*Alnus glutinosa*), ash (*Fraxinus excelsior*), birch (*Betula* sp.), field maple (*Acer campestre*), holly (*Ilex aquifolium*), elm (*Ulmus* sp.), blackthorn (*Prunus* cf. *spinosa*) and poplar/willow (*Populus* sp./*Salix* sp.). The taxa present in 18<sup>th</sup> century drain fill, in order of frequency, are oak, hazel, birch, alder, poplar/willow, blackthorn, hawthorn/apple/pear/whitebeams, field maple and indeterminate conifer.

**All the samples are dominated by oak, except for sample 1009 from courtyard levelling layer 1076, which produced relatively equal proportions of oak and hazel. Layer 1076,**



earthwork layer 3062 and drain fill 1018 produced diverse assemblages of seven or more different taxa while the remainder of the analysed contexts produced assemblages of five taxa or less. The charcoal assemblage from 5039, which is a deposit of ironworking slag used to repair the cobblestone surface of the courtyard, is composed almost entirely of oak. A high proportion of the oak charcoal fragments in all contexts have weak ring curvatures, with tyloses present in the vessel cavities, indicating the use of heartwood from mature trunk wood. Oak charcoal fragments with closely spaced annual growth rings are frequently present in all contexts, indicating oak grown under restricted growing conditions. Fungal hyphae are present in a small proportion of fragments from all contexts, indicating some use of decaying or poorly seasoned wood.

Table 3 - wood charcoal summary table

	Date	AD 1040- 1210	AD 1170- 1260	11 <sup>th</sup> - 13 <sup>th</sup> C	12 <sup>th</sup> C?	13 <sup>th</sup> - 15 <sup>th</sup> C	13 <sup>th</sup> - 15 <sup>th</sup> C	13 <sup>th</sup> - 15 <sup>th</sup> C	13 <sup>th</sup> - 15 <sup>th</sup> C	18 <sup>th</sup> C
	Context number	1076	1057	6047	6049	5039	3062	3056	3057	1018
	Sample number	1009	1003	6004	6005	5001	3003	3008	3009	1000
	Feature number									
	Context type	Layer	Layer	Layer	Charcoal lens	Layer	Layer	Layer	Layer	Drain fill
	Sample size (l)	40	10	40	40	15	8	40	1	15
	Flot size (ml)	500	200	10	200	30	60	300	700	120
Taxon (number of fragments)	Common name									
Coniferae indet.	conifer	-	-	-	-	-	-	-	-	1
<i>Prunus</i> cf. <i>spinosa</i>	possible blackthorn	-	-	-	-	1	-	-	-	1
Pomoideae	hawthorn/a pple/pear/w hitebeams	2	4	-	-	-	2	1	-	1
<i>Ulmus</i> sp.	elm	-	-	-	-	-	4	-	-	-
<i>Quercus</i> sp.	oak	15	44	36	35	47	17	43	38	40
<i>Betula</i> sp.	birch	1	-	1	-	-	-	-	-	2
<i>Alnus</i> <i>glutinosa</i> (L.) Gaertn.	alder	-	-	5	10	-	1	-	-	1
<i>Corylus</i> <i>avellana</i> L.	hazel	14	-	7	5	2	7	6	2	1
<i>Acer</i> <i>campestre</i> L.	field maple	4	2	-	-	-	-	-	-	2
<i>Populus</i> sp./ <i>Salix</i> sp.	poplar/willo w	-	-	-	-	-	6	-	-	1
<i>Fraxinus</i> <i>excelsior</i> L.	ash	7	-	1	-	-	12	-	-	-
<i>Ilex</i> <i>aquifolium</i> L.	holly	6	-	-	-	-	1	-	-	-
Indet.		1	-	-	-	-	-	-	10	-
Dendrologica l features (number of fragments)	Strong ring curvature	-	-	4	3	-	-	-	-	10
	Intermediat e ring curvature	1	-	2	2	1	3	-	-	13
	Weak ring curvature	9	23	11	9	27	18	18	4	23
	Narrow rings	5	13	6	5	21	13	12	4	15
	Tyloses	17	37	29	24	40	23	41	23	-
	Reaction	5	-	2	2	-	1	-	-	-

wood									
Fungal hyphae	13	3	7	1	1	9	8	4	13
Insect degradation	-	-	-	-	-	-	-	-	-
Presence of pith	-	-	-	-	-	-	-	-	-
Presence of bark	-	-	-	-	-	-	-	-	-
Vitrification	5	-	-	1	7	1	-	3	-

## Wood

### Contexts producing rich assemblages of wood

Large quantities of wood preserved by anoxic waterlogging were found in a series of deposits from Trench 6 and Trench 3, which also produced plant macrofossils preserved by anoxic waterlogging.

In Trench 6, pit fill 6060 and pit fill 6072 are from a group of early cut features which are sealed by layer 6055. A date of cal. AD 1030-1200 was obtained from a hazel nutshell fragment which was found in pit fill 6060.

In Trench 3, context 3057 is associated with a demolition or destruction phase, thought to be the destruction of the castle in 1266 by John de Eyvill, and contained 13<sup>th</sup> century pottery.

### Woody plant species

The assemblage of wood fragments preserved by anoxic waterlogging in pit fills 6060 and 6072 included a high proportion of thin flakes of wood possibly indicating wood working debris. The assemblages are dominated by oak but also include some alder and ash. The assemblage of wood fragments from layer 6055 which seals pit fills 6060 and 6072 also produced a high proportion of oak along with hawthorn/apple/pear/whitebeams and hazel. Demolition/destruction layer 3057 was again dominated by oak along with hawthorn/apple/pear/whitebeams, alder and hazel. Oak fragments with weak ring curvature and tyloses are frequently present in all the assemblages and oak fragments with closely spaced annual growth rings are often present.

**Table 4 - wood summary table**

	Date	AD 1030-1200	11 <sup>th</sup> – 13 <sup>th</sup> C	11 <sup>th</sup> – 13 <sup>th</sup> C	13 <sup>th</sup> – 15 <sup>th</sup> C
	Context number	6060	6072	6055	3057
	Sample number	6009	6011	6006	3009
	Feature number	6059	6067		
	Context type	Pit fill	Pit fill	Layer	Layer
	Sample size (l)	1	1	1	1
	Flot size (ml)	100	100	300	700
Taxon (number of fragments)	Common name				
Pomoideae	hawthorn/apple/pear/whitebeams	-	-	6	2
<i>Quercus</i> sp.	oak	40	43	38	38
<i>Alnus glutinosa</i> (L.) Gaertn.	alder	3	2	-	1
<i>Corylus avellana</i> L.	hazel	-	-	3	7
<i>Fraxinus excelsior</i> L.	ash	3	3	-	-
Indeterminate		4	2	3	2
Dendrological features (number of fragments)	Strong ring curvature	-	2	1	5
	Intermediate ring curvature	-	-	-	-
	Weak ring curvature	14	16	8	20
	Narrow rings	4	14	2	14
	Tyloses	28	18	10	27

Reaction wood	-	-	-	-
Fungal hyphae	-	-	-	-
Insect degradation	-	-	-	-
Presence of pith	-	-	-	1
Presence of bark	-	-	-	4

## Discussion

The assemblages of charred and uncharred plant macrofossils, wood charcoal and wood from Sheffield Castle provide evidence for the utilisation of plants and wood as well as evidence for living conditions and activities carried out within the castle grounds during the 11<sup>th</sup> – 13<sup>th</sup> century and during the 13<sup>th</sup> -15<sup>th</sup> century. One sample of wood charcoal also provides evidence for the utilisation of wood at the site during the 18<sup>th</sup> century.

### *Cultivated and collected plant foods*

There are no apparent changes through time in the crop types present in the samples from Sheffield Castle. The crop types present, both from contexts dating to the 11<sup>th</sup> – 13<sup>th</sup> century and from contexts dated to the 13<sup>th</sup> -15<sup>th</sup> century, are common oat, hulled barley, rye and bread/rivet wheat. This suite of crops is typical of the medieval period (Moffett 2006) and typical of other assemblages of charred plant macrofossils from medieval urban sites in Yorkshire, such as 12<sup>th</sup> – 13<sup>th</sup> century deposits from Low Fisher Gate, Doncaster (Hall *et al.* 2003), 12<sup>th</sup> – 13<sup>th</sup> century deposits from North Bridge, Doncaster (Carrott *et al.* 1997), 12<sup>th</sup> – 13<sup>th</sup> century deposits from the Castle ditch at York (Carrott *et al.* 1995b), 11<sup>th</sup> – 13<sup>th</sup> century deposits from Davygate Centre, York (Carrott *et al.* 1998a) and 11<sup>th</sup> – 12<sup>th</sup> century deposits from Walmgate, York (Jaques *et al.* 2001).

The charred plant macrofossil assemblages from 12<sup>th</sup> – 13<sup>th</sup> century and 13<sup>th</sup> – 15<sup>th</sup> century deposits include a range of typical crop weeds such as corncockle, corn marigold, stinking chamomile, cornflower and rye grass which are likely to have been harvested along with the crops. The increasing presence of stinking chamomile in assemblages dating to the medieval period in England has been related to changes in cultivation practices such the expansion of cultivation onto heavier clay soils (Jones 1981), facilitated by deep plough agriculture (Jones 1981, 1988). Corncockle and cornflower are also both typical crop weeds of the medieval period (Jones 1988; Grieg, 1991). Corn marigold is a frequently occurring taxon in medieval archaeobotanical assemblages from the region and appears to be an indicator for post conquest deposits in York (Tomlinson 1989, 22).

The presence of the seeds of sheep's sorrel and corn marigold in the charred plant macrofossil assemblages from 12<sup>th</sup> – 13<sup>th</sup> century and 13<sup>th</sup> – 15<sup>th</sup> century deposits, as well as cornflower in 12<sup>th</sup> – 13<sup>th</sup> century layer 1057, is consistent with the cultivation of crops on the local sandy acid soils of the Sheffield area during the medieval period (National Soil Resources Institute). Rye is also a crop type which is suited to acidic, well drained soils (Moffett 1994, 59) and cornflower is a characteristic weed of rye (Grieg 1991). The presence of sedges and other damp soil taxa, in conjunction with crop remains, in 12<sup>th</sup> – 13<sup>th</sup> century and 13<sup>th</sup> – 15<sup>th</sup> century deposits may indicate cultivation of poorly drained fields or fields subject to seasonal flooding. Many of these taxa, such as the obligate crop weed corncockle, are also present in the waterlogged plant macrofossil assemblage from 12<sup>th</sup> – 13<sup>th</sup> century and 13<sup>th</sup> – 15<sup>th</sup> century deposits, indicating that a component of the waterlogged seed assemblage may be comprised of weed seeds removed during crop processing.

Other evidence for food is present in the form of charred and uncharred hazel nutshell fragments in 11<sup>th</sup>-12<sup>th</sup> century and 13<sup>th</sup> – 15<sup>th</sup> century deposits, which are likely to be waste from hazel nuts collected for food. Hazel was one of the most common underwood taxa of medieval managed woodlands (Rackham 2003, 205)

and would have provided an abundant source of nuts. The local availability of hazel is demonstrated by the frequent occurrence of hazel in the wood charcoal assemblage, along with some wood of hazel in the wood assemblage. The rich deposits of hazel nutshell in demolition/destruction deposits 3057 and 3079 are likely to be primary deposits of waste from the processing of hazel nuts for consumption. Hazel nutshells are frequently present in medieval archaeobotanical assemblages (Grieg 1996).

Uncharred seeds of a range of fruits such as blackberry, raspberry, wild strawberry and elderberry, present in 12<sup>th</sup>-13<sup>th</sup> century and 13<sup>th</sup> – 15<sup>th</sup> century deposits, may also be from fruits collected and brought to the site for consumption, although it is possible that some of these seeds may be natural accumulations from scrub vegetation growing at the site. The presence of similar assemblages of edible fruit seeds at medieval sites in York such as 14<sup>th</sup> – 15<sup>th</sup> century deposits from the Bedern (Hall *et al.* 1993a, 1993b and 1993c) and late medieval deposits from St Saviourgate (Carrott *et al.* 1995c), as well as in 13<sup>th</sup> – 14<sup>th</sup> century deposits from North Bridge, Doncaster (Carrott *et al.* 1997) and 12<sup>th</sup> – 13<sup>th</sup> century deposits at South Becks, Beverley (Hall *et al.* 2000) have been interpreted as evidence for food remains, possibly from faeces.

No evidence for high status foods was found in the charred and waterlogged plant macrofossil assemblage although a single charred fig seed was found in 12<sup>th</sup> – 13<sup>th</sup> century made ground layer 1057. Fig is considered likely to be an imported foodstuff in the medieval period (Grieg 1996, 217) but is widely found in medieval urban archaeobotanical assemblages from York such as 11<sup>th</sup> – 13<sup>th</sup> century deposits at 44-45 Parliament Street (Carrott *et al.* 1995a) and 12<sup>th</sup> – 13<sup>th</sup> century deposits at St Saviourgate (Carrott *et al.* 1998b), 11<sup>th</sup> - 12<sup>th</sup> century deposits from 7-9 Aldwark (Tomlinson 1989) and 13<sup>th</sup> century deposits from the Bedern (Hall *et al.* 1993a, 1993b and 1993c) as well as in 13<sup>th</sup> century deposits from North Bridge, Doncaster (Carrott *et al.* 1997) and 12<sup>th</sup> – 13<sup>th</sup> century deposits at South Becks, Beverley (Hall *et al.* 2000).

#### *Other uses of plants*

Made ground layer 3056 and the samples from 11<sup>th</sup> – 13<sup>th</sup> century deposits in Trench 6 include grassland taxa commonly associated with meadows and pasture such as ragged robin, selfheal and burnet saxifrage, along with a range of other general grassland plants such as tormentil, bulbous/meadow/creeping buttercups, small seeded grasses and water pepper which is a plant of wet mud near to water as well as wet meadows. Buttercups, greater plantain, timothy and other small seeded grasses are also sporadically present in the charred plant macrofossil assemblage from 11<sup>th</sup>-13<sup>th</sup> and 13<sup>th</sup> – 15<sup>th</sup> century deposits. It is possible that these seeds may have been components of a meadow or pasture flora collected as hay or deposited in dung. Similar grassland taxa are often present in medieval urban archaeobotanical assemblages such as 13<sup>th</sup> – 15<sup>th</sup> century deposits at the Bedern, York (Hall *et al.* 1993a and 1993c) and 11<sup>th</sup> to 13<sup>th</sup> century waterlogged plant macrofossil deposits from Davygate Centre, York where the assemblage was interpreted as dumping of hay (Carrott *et al.* 1998). However, no other evidence for hay such as abundant grass/straw fragments were found in the samples, and these grassland plants may just be from overgrown grassy areas within the castle grounds or, in the case of the charred seeds, from grassland taxa growing as crop weeds.

Rachis fragments of free threshing cereals, including rye, free threshing wheat and barley (along with some culm nodes), which are present in the charred plant macrofossil assemblage from 11<sup>th</sup> – 13<sup>th</sup> century layer 1057, are likely to be the by-product of earlier stages of crop processing such as winnowing and coarse sieving (Hillman 1981 and 1984; Jones 1984). Many of the wild/weed plant seeds in the charred plant macrofossil assemblage from layer 1057 are also likely to have been

brought onto site along with crops. The majority of these seeds are small, heavy seeds, which are generally found in the by-products of sieving or larger seeds that are normally removed from the crop by hand sorting at a late stage of crop cleaning (Jones 1984). These are often discarded in domestic hearths (Hillman 1981 and 1984; Jones 1984) and may have been dumped along with a few cereal grains, wood charcoal, and other domestic waste. Some of the taxa present in the charred wild or weed seed assemblage, such as rushes and sedges, may however be from plants collected for use as roofing, flooring or bedding material rather than arriving on site as weeds growing in arable fields.

#### *Utilisation of wood*

The predominance of oak in the charcoal and wood assemblages from 12<sup>th</sup> – 13<sup>th</sup> century deposits, 13<sup>th</sup> – 15<sup>th</sup> deposits and in the charcoal assemblage from 18<sup>th</sup> century drain fill (1018) at Sheffield Castle is likely to be at least partly due to the excellent properties of oak as a fuel, which burns slowly but produces a hot flame (Webster 1919, 45; Porter 1990, 93). Oak is also an excellent structural timber and it is likely that offcuts from oak felled for use as timber were used as fuel. The frequency of tyloses in the vessel cavities of the oak charcoal and wood fragments, as well as the predominance of weak ring curvatures, indicates the use of larger branches or mature trunk wood. Eight large pieces of waterlogged wood, which were recovered from demolition/destruction layer 3057, included one fragment of alder, one of hazel and six of oak, suggest that these were used as timber within the castle (Wessex Archaeology 2019, 34). The assemblages of waterlogged wood fragments from pit fills 6060 and 6072 included many thin flakes of wood, which were primarily identified as oak, along with some alder and ash, and are likely to be debris from woodworking.

Oak is one of the most widespread trees in lowland England, growing in both woodland and hedgerows (Rackham 2003, 283). Other tree species present in the wood charcoal assemblage in both 11<sup>th</sup> – 13<sup>th</sup> century and 13<sup>th</sup> – 15<sup>th</sup> century deposits, are hazel and ash, as well as field maple which is present in 11<sup>th</sup> – 13<sup>th</sup> century deposits. Ash is a common woodland tree and is a rapid coloniser of open ground (Tansley 1968, 129). Hazel is a common woodland and underwood tree, which can also grow in hedgerows (Rackham 2003, 203). Field maple is a common woodland, scrub and hedgerow tree which usually grows on base rich soils, often in association with ash and hazel (Rackham 2003, 203). Given the local acidic soil type, this may be an indication that wood resources were brought to the castle from further afield, although this may have been as charcoal rather than wood which is heavy and costly to transport (Rackham 2003, 147).

Holly is present in the wood charcoal assemblages from 11<sup>th</sup>-13<sup>th</sup> century and 13<sup>th</sup> – 15<sup>th</sup> century deposits. It is a woodland and wood pasture tree, which also grows as a component of hedgerows (Rackham 2003, 345) and is a common underwood taxon in the oak woods of Sheffield (Spray and Smith 1995). Place name evidence indicates that holly was common in the Sheffield region during the medieval period and was probably planted for use as animal fodder (Spray 1981; Spray and Smith 1995). Hawthorn, apple, pear and members of the whitebeam genus, which are potentially represented by the Pomoideae found, are all common underwood shrubs and trees in deciduous woodland (Rackham 2003, 349). Hawthorn is also one of the predominant taxa in thorny scrub, which becomes established in areas of open grassland whenever grazing pressure is reduced (Rodwell 1991, 339). Birch, which is present in the wood charcoal assemblage from 11<sup>th</sup> – 13<sup>th</sup> century deposits, is also an underwood tree, and tree of secondary woodland, which is intolerant of shade and readily colonises derelict land (Rackham 2003, 311).

Poplar/willow, which cannot be differentiated on morphological characteristics, is present in the wood charcoal assemblage from 13<sup>th</sup> – 15<sup>th</sup> century deposits. Of the

species of poplar potentially represented, black poplar and white poplar are trees which generally do not grow in woodland, and aspen is a tree of secondary woodland (Rackham 2003). Of the species of willow potentially represented all are commonly associated with wet or damp soils by ponds, streams or rivers (Stace 2019), while alder is commonly associated with damp, swampy ground and alluvial river valleys (Rodwell 1991, 30-33). Overall, therefore, the charcoal assemblage indicates the utilisation of mature oak woodland, underwood shrubs or trees, and possibly thorny scrub, alder, as well as willow growing on damp riparian soils.

The closely spaced growth rings on many of the oak charcoal fragments indicate restricted growing conditions and may indicate the use of oak trees from well-established dense woodland. Closely spaced growth rings may also indicate management techniques such as coppicing, browsing or shredding, however, as well as poor growing conditions caused by the local environment or climate. A pollen diagram from Ringinglow Bog near Sheffield (Conway 1947) indicates that widespread destruction of forest began in the region at around 1100 AD, with recent radiocarbon results confirming a medieval date for this clearance episode (O'Regan and Loveluck 2019). It is possible that the presence of wood from mature oak trees possibly sourced from well-established dense woodland in the wood charcoal and wood assemblage from Sheffield Castle is evidence of this woodland clearance in the early medieval period.

The predominance of oak in the wood and wood charcoal assemblage from medieval contexts at Sheffield Castle, as well as the presence of oak charcoal with narrow annual growth rings, is consistent with charcoal assemblages from other medieval sites in Yorkshire. Charcoal assemblages from 12<sup>th</sup> – 15<sup>th</sup> century deposits at Sandal Castle near Wakefield (Smith, Hooper and Bartley 1983) are also dominated by oak and include oak charcoal fragments with narrow annual growth rings from early 12<sup>th</sup> century deposits. Charcoal from a probable early 13<sup>th</sup> century lead working site at Howden Clough, Bradfield (Gale 1999) is again dominated by oak, with narrow rings on most fragments, and charcoal from 13<sup>th</sup> – 14<sup>th</sup> century deposits at Pontefract Castle (Bastow 2002) is also most frequently of oak.

The presence of other tree taxa in the medieval contexts at Sheffield Castle, such as ash and hazel, as well as underwood or scrub taxa such as holly, birch and hawthorn/apple/pear/whitebeams is also consistent with charcoal assemblages from other medieval sites in Yorkshire. Hazel and holly are present present in the 12 - 14<sup>th</sup> century deposits from Sandal Castle, and a greater range of taxa are present in 15<sup>th</sup> century deposits including birch, hawthorn/apple/pear/whitebeams and poplar/willow. Birch, hazel, hawthorn/apple/pear/whitebeams and cherry/blackthorn are present at the 13<sup>th</sup> century lead working site at Howden Clough, and charcoal from 13<sup>th</sup> – 14<sup>th</sup> century deposits at Pontefract Castle includes ash, hawthorn/apple/pear/whitebeams, hazel, alder and box/holly.

#### *Site environment and living conditions*

The waterlogged plant macrofossils from a series of organic deposits in Trench 6 and Trench 3 include seeds from plants growing at the site as well as seeds from other sources such as the dumping of settlement waste. Seeds of annual weeds, along with plants of waste or rough ground, grassland taxa and seeds of plants commonly associated with damp soils may provide evidence for generally damp nutrient rich, disturbed, muddy soil conditions within the castle grounds, typical of urban occupation deposits from medieval sites.

Waterlogged plant macrofossils from 13<sup>th</sup> – 15<sup>th</sup> century demolition/destruction layers 3057 and 3079 in Trench 3 include taxa indicative of short trampled grassland such as hairy buttercup and greater plantain as well as red goosefoot, which indicate areas of bare nutrient-rich mud. Sample 3008 from layer 3056 which overlays destruction deposits 3057 and 3079 produced an assemblage which includes seeds



of elder and alder along with seeds of bugle and downy woundwort, which are plants of woodland, hedgerows and shady environments. The presence of these taxa suggests a shaded environment in this area, possibly with some growth of scrub, during the deposition of layer 3056.

The seeds of scrub plants such as brambles and elder are also frequently present in the waterlogged plant macrofossil assemblage from other samples in Trench 3 as well as in samples from Trench 6. This may indicate scrub growing at the site, although the seeds of these plants may also have been a component of cess as they were often found in the castle samples in conjunction with other edible fruit seeds such as raspberry and wild strawberry. Other plant seeds present in the waterlogged plant macrofossil assemblage may have originated in dumped material rather than plants growing *in situ*. These include seeds from grassland taxa typical of pasture or meadows, which may indicate hay or dung, as well as seeds of rushes and sedges, which may indicate roofing, flooring or bedding material. No other plant macrofossils indicative of hay or roofing/flooring/bedding were found in the assemblage, however, so it is also possible that these seeds were from plants growing at the site.

Several sites at York have produced rich assemblages of waterlogged plant remains dating to the medieval period, although most have not been fully analysed and published. Plant remains from 12<sup>th</sup> and 13<sup>th</sup> century pits and layers at 7-9 Aldwark, York (Tomlinson, 1989) and from 13<sup>th</sup> – 15<sup>th</sup> century pits at the Bedern, York (Hall *et al* 1993a, 1993b and 1993c), have, however, been fully analysed and produced similar assemblages to those from Sheffield Castle, including abundant taxa indicating waste ground and nutrient-rich disturbed soil, arable weeds, and some taxa indicative of damp soil, as well as food plants. Assessment reports on waterlogged plant material from deposits dated to the 11<sup>th</sup> – 12<sup>th</sup> century at Feasegate (Carrott *et al* 1998c), and 12<sup>th</sup> – 13<sup>th</sup> century deposits at St Saviourgate, York (Carrott *et al* 1998b) provide similar evidence for damp, nutrient rich disturbed soils, along with some evidence for the presence of dumped material in the form of food remains.

### Conclusions

Taken together, the charred and waterlogged plant macrofossils, wood charcoal from Sheffield Castle provides evidence for the transport to the site of a range of products and the utilisation of a variety of habitat types within the surrounding landscape. Crops including oat, barley, bread/rye wheat and rye were apparently grown on local acidic, sandy soils, with rye perhaps selected as a crop well suited to such soil types. Grassland plants may also have been brought to site as fodder or grazed *in situ* and deposited in animal dung. Damp soils around nearby watercourses such as the river Don may have been utilised for the collection of plants such as rushes and sedges for use as flooring, roofing or bedding material. Wood from different environments (alder and possibly willow growing on damp soils, and oak potentially from well-established oak woodland) was collected for use as fuel and in construction. Wood from other trees such as ash, elm and field maple, and underwood or scrub taxa such as hazel, birch, holly, hawthorn/pear/apple/whitebeams and blackthorn, were also used as fuel.

The plant macrofossil, wood and charcoal assemblages also provide evidence for activities carried out at the castle, and for the environment and living conditions within the castle. The environment within the castle apparently included damp, muddy, disturbed and nutrient enriched soils, supporting a diverse community of annual weeds, more established perennial vegetation and plants of wet soils. The assemblages also provide evidence for the disposal of waste from various sources within the castle grounds, including material from domestic hearths, hazelnut processing and wood working, and possibly cess deposits, animal fodder/dung and/or roofing/flooring material.

This analysis has demonstrated the potential for the preservation of both charred and waterlogged plant macrofossils and wood at the site of Sheffield Castle. Published archaeobotanical data from urban medieval sites in the region of Sheffield Castle is sparse, so the evidence from this site represents an important addition to our knowledge of plant use and living conditions at a site of this type.

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## Appendices

### Appendix 1: Wood charcoal and wood identification

#### Wood charcoal

Sample 1009, layer 1076

Fragment No.	Fragment Size	Taxon	Ring curvature <sup>e</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
1	>4mm	<i>Corylus avellana</i>	2		1	1		
2	>4mm	<i>Corylus avellana</i>	1					
3	>4mm	<i>Ilex aquifolium</i>						
4	>4mm	<i>Corylus avellana</i>	1		1	1		
5	>4mm	<i>Corylus avellana</i>			1			
6	>4mm	<i>Acer campestre</i>						
7	>4mm	<i>Quercus</i> sp.	1nr	1				
8	>4mm	<i>Quercus</i> sp.		1		1		1
9	>4mm	<i>Ilex aquifolium</i>						
10	>4mm	<i>Corylus avellana</i>	1		1			1
11	>4mm	<i>Ilex aquifolium</i>						
12	>4mm	<i>Quercus</i> sp.		1		1		
13	>4mm	<i>Corylus avellana</i>				1		



14	>4mm	<i>Ilex aquifolium</i>						
15	>4mm	<i>Acer campestre</i>						
16	>4mm	Pomoideae	1			1		
17	>4mm	<i>Fraxinus excelsior</i>	1nr	1		1		1
18	>4mm	<i>Quercus</i> sp.	1nr	1				
19	>4mm	<i>Ilex aquifolium</i>				1		
20	>4mm	<i>Acer campestre</i>						
21	>4mm	<i>Fraxinus excelsior</i>				1		
22	>4mm	<i>Corylus avellana</i>			1			
23	>4mm	<i>Corylus avellana</i>						
24	>4mm	<i>Quercus</i> sp.		1				2
25	>4mm	<i>Quercus</i> sp.	1nr	1				
26	2-4mm	<i>Quercus</i> sp.		1				
27	2-4mm	<i>Acer campestre</i>						
28	2-4mm	<i>Corylus avellana</i>						
29	2-4mm	<i>Fraxinus excelsior</i>		1				
30	2-4mm	<i>Quercus</i> sp.		1				2
31	2-4mm	<i>Fraxinus excelsior</i>						
32	2-4mm	<i>Quercus</i> sp.		1				
33	2-4mm	Indeterminate						
34	2-4mm	<i>Fraxinus excelsior</i>		1		1		
35	2-4mm	<i>Fraxinus excelsior</i>						
36	2-4mm	<i>Betula</i> sp.						
37	2-4mm	<i>Quercus</i> sp.		1				
38	2-4mm	<i>Quercus</i> sp.		1		1		
39	2-4mm	<i>Corylus avellana</i>						
40	2-4mm	<i>Quercus</i> sp.	1nr	1				
41	2-4mm	<i>Corylus avellana</i>						
42	2-4mm	<i>Quercus</i> sp.						
43	2-4mm	<i>Corylus avellana</i>						
44	2-4mm	<i>Quercus</i> sp.		1		1		
45	2-4mm	<i>Ilex aquifolium</i>						
46	2-4mm	<i>Quercus</i> sp.		1		1		
47	2-4mm	<i>Fraxinus excelsior</i>						
48	2-4mm	<i>Corylus avellana</i>						
49	2-4mm	Pomoideae						
50	2-4mm	<i>Corylus avellana</i>						

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1mm wide). <sup>b</sup>1 = yes.

<sup>c</sup>1 = low brilliance; 2 = strong brilliance; 3 = total fusion

### Sample 1003, layer 1057

Fragment No.	Fragment Size	Taxon	Ring curvature <sup>a</sup>	Tylose <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
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1	>4mm	<i>Quercus</i> sp.	1nr	1				
2	>4mm	<i>Quercus</i> sp.	1	1				
3	>4mm	<i>Quercus</i> sp.	1	1				
4	>4mm	<i>Quercus</i> sp.	1	1				
5	>4mm	<i>Quercus</i> sp.	1nr	1		1		
6	>4mm	Pomoideae						
7	>4mm	<i>Quercus</i> sp.	1	1				
8	>4mm	<i>Quercus</i> sp.	1	1				
9	>4mm	<i>Quercus</i> sp.	1	1				
10	>4mm	<i>Quercus</i> sp.	1	1				
11	>4mm	<i>Acer campestre</i>						
12	>4mm	<i>Quercus</i> sp.		1				
13	>4mm	<i>Quercus</i> sp.	1nr					
14	>4mm	<i>Quercus</i> sp.	1nr	1		1		
15	>4mm	<i>Quercus</i> sp.	1nr	1				
16	>4mm	<i>Quercus</i> sp.	1nr	1				
17	>4mm	<i>Quercus</i> sp.	1nr	1				
18	>4mm	<i>Quercus</i> sp.	1nr	1				
19	>4mm	<i>Quercus</i> sp.	1nr	1				
20	>4mm	<i>Quercus</i> sp.	1nr	1				
21	>4mm	<i>Quercus</i> sp.		1				
22	>4mm	<i>Quercus</i> sp.	1	1				
23	>4mm	<i>Quercus</i> sp.	1	1		1		
24	>4mm	Pomoideae						
25	>4mm	<i>Quercus</i> sp.	1	1				
26	2-4mm	<i>Quercus</i> sp.	1nr	1				
27	2-4mm	<i>Quercus</i> sp.		1				
28	2-4mm	<i>Quercus</i> sp.	1nr	1				
29	2-4mm	<i>Quercus</i> sp.		1				
30	2-4mm	<i>Quercus</i> sp.		1				
31	2-4mm	<i>Quercus</i> sp.		1				
32	2-4mm	<i>Quercus</i> sp.		1				
33	2-4mm	<i>Quercus</i> sp.		1				
34	2-4mm	<i>Quercus</i> sp.		1				
35	2-4mm	<i>Quercus</i> sp.		1				
36	2-4mm	<i>Quercus</i> sp.						
37	2-4mm	<i>Quercus</i> sp.		1				
38	2-4mm	<i>Quercus</i> sp.						
39	2-4mm	<i>Quercus</i> sp.		1				
40	2-4mm	<i>Quercus</i> sp.						
41	2-4mm	<i>Quercus</i> sp.		1				
42	2-4mm	Pomoideae						
43	2-4mm	Pomoideae						
44	2-4mm	<i>Acer campestre</i>						
45	2-4mm	<i>Quercus</i> sp.						
46	2-4mm	<i>Quercus</i> sp.						



47	2-4mm	<i>Quercus</i> sp.	1nr	1			
48	2-4mm	<i>Quercus</i> sp.		1			
49	2-4mm	<i>Quercus</i> sp.					
50	2-4mm	<i>Quercus</i> sp.		1			

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1mm wide). <sup>b</sup>1 = yes.

<sup>c</sup>1 = low brilliance; 2 = strong brilliance; 3 = total fusion

Sample 6004, layer 6047

Fragment No.	Fragment Size	Taxon	Ring curvature <sup>e</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
1	>4mm	<i>Quercus</i> sp.	1nr	1		1		
2	>4mm	<i>Quercus</i> sp.	1	1				
3	>4mm	<i>Quercus</i> sp.						
4	>4mm	<i>Corylus avellana</i>	2		1			
5	>4mm	<i>Quercus</i> sp.	1	1				
6	>4mm	<i>Quercus</i> sp.		1				
7	>4mm	<i>Corylus avellana</i>	2					
8	>4mm	<i>Quercus</i> sp.	1	1				
9	>4mm	<i>Quercus</i> sp.	1	1		1		
10	>4mm	<i>Quercus</i> sp.	1	1		1		
11	>4mm	<i>Corylus avellana</i>			1	1		
12	>4mm	<i>Fraxinus excelsior</i>						
13	>4mm	<i>Quercus</i> sp.		1				
14	>4mm	<i>Quercus</i> sp.		1				
15	>4mm	<i>Corylus avellana</i>	3					
16	>4mm	<i>Quercus</i> sp.						
17	>4mm	<i>Quercus</i> sp.	1nr	1				
18	>4mm	<i>Quercus</i> sp.	1nr	1		1		
19	>4mm	<i>Alnus glutinosa</i>						
20	>4mm	<i>Alnus glutinosa</i>				1		
21	>4mm	<i>Quercus</i> sp.	1nr	1				
22	>4mm	<i>Quercus</i> sp.	1nr	1				
23	>4mm	<i>Betula</i> sp.	3					
24	>4mm	<i>Quercus</i> sp.		1				
25	>4mm	<i>Corylus avellana</i>	3					
26	2-4mm	<i>Quercus</i> sp.		1				
27	2-4mm	<i>Quercus</i> sp.	1nr	1		1		
28	2-4mm	<i>Alnus glutinosa</i>						
29	2-4mm	<i>Quercus</i> sp.		1				
30	2-4mm	<i>Corylus avellana</i>						
31	2-4mm	<i>Quercus</i> sp.		1				
32	2-4mm	<i>Quercus</i> sp.						
33	2-4mm	<i>Quercus</i> sp.		1				
34	2-4mm	<i>Quercus</i> sp.						
35	2-4mm	<i>Quercus</i> sp.						



36	2-4mm	<i>Quercus</i> sp.		1				
37	2-4mm	<i>Quercus</i> sp.		1				
38	2-4mm	<i>Quercus</i> sp.		1				
39	2-4mm	<i>Quercus</i> sp.						
40	2-4mm	<i>Quercus</i> sp.		1				
41	2-4mm	<i>Quercus</i> sp.						
42	2-4mm	<i>Quercus</i> sp.		1				
43	2-4mm	<i>Quercus</i> sp.		1				
44	2-4mm	<i>Corylus avellana</i>	3					
45	2-4mm	<i>Quercus</i> sp.		1				
46	2-4mm	<i>Quercus</i> sp.		1				
47	2-4mm	<i>Quercus</i> sp.		1				
48	2-4mm	<i>Alnus glutinosa</i>						
49	2-4mm	<i>Quercus</i> sp.		1				
50	2-4mm	<i>Alnus glutinosa</i>						

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1mm wide). <sup>b</sup>1 = yes.

<sup>c</sup>1 = low brilliance; 2 = strong brilliance; 3 = total fusion

Sample 6005, charcoal lens 6049

Fragment No.	Fragment Size	Taxon	Ring curvature <sup>e</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
1	>4mm	<i>Corylus avellana</i>	1		1			
2	>4mm	<i>Alnus glutinosa</i>						
3	>4mm	<i>Quercus</i> sp.	1	1				
4	>4mm	<i>Quercus</i> sp.	1	1				
5	>4mm	<i>Alnus glutinosa</i>	2					
6	>4mm	<i>Quercus</i> sp.		1				
7	>4mm	<i>Quercus</i> sp.	1nr	1				
8	>4mm	<i>Quercus</i> sp.						
9	>4mm	<i>Quercus</i> sp.		1				
10	>4mm	<i>Quercus</i> sp.	3					
11	>4mm	<i>Alnus glutinosa</i>						
12	>4mm	<i>Corylus avellana</i>	2					
13	>4mm	<i>Quercus</i> sp.	1nr	1				
14	>4mm	<i>Quercus</i> sp.	1	1				
15	>4mm	<i>Quercus</i> sp.		1				
16	>4mm	<i>Quercus</i> sp.		1				
17	>4mm	<i>Quercus</i> sp.	1nr	1				
18	>4mm	<i>Corylus avellana</i>						
19	>4mm	<i>Quercus</i> sp.		1				
20	>4mm	<i>Quercus</i> sp.						
21	>4mm	<i>Quercus</i> sp.		1				
22	>4mm	<i>Quercus</i> sp.		1				
23	>4mm	<i>Quercus</i> sp.						
24	>4mm	<i>Quercus</i> sp.		1				
25	>4mm	<i>Quercus</i> sp.		1				2





26	2-4mm	<i>Corylus avellana</i>	3					
27	2-4mm	<i>Alnus glutinosa</i>						
28	2-4mm	<i>Alnus glutinosa</i>						
29	2-4mm	<i>Quercus</i> sp.		1				
30	2-4mm	<i>Quercus</i> sp.						
31	2-4mm	<i>Quercus</i> sp.		1				
32	2-4mm	<i>Corylus avellana</i>	3					
33	2-4mm	<i>Quercus</i> sp.						
34	2-4mm	<i>Quercus</i> sp.						
35	2-4mm	<i>Quercus</i> sp.		1				
36	2-4mm	<i>Quercus</i> sp.		1				
37	2-4mm	<i>Alnus glutinosa</i>						
38	2-4mm	<i>Quercus</i> sp.	1nr	1				
39	2-4mm	<i>Quercus</i> sp.						
40	2-4mm	<i>Quercus</i> sp.		1				
41	2-4mm	<i>Quercus</i> sp.		1				
42	2-4mm	<i>Quercus</i> sp.	1nr	1				
43	2-4mm	<i>Alnus glutinosa</i>						
44	2-4mm	<i>Quercus</i> sp.		1				
45	2-4mm	<i>Alnus glutinosa</i>			1			
46	2-4mm	<i>Quercus</i> sp.						
47	2-4mm	<i>Alnus glutinosa</i>						
48	2-4mm	<i>Quercus</i> sp.						
49	2-4mm	<i>Alnus glutinosa</i>				1		
50	2-4mm	<i>Quercus</i> sp.						

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1mm wide). <sup>b</sup>1 = yes. <sup>c</sup>1 = low brilliance; 2 = strong brilliance; 3 = total fusion

Sample 5001, layer 5039

Fragment No.	Fragment Size	Taxon	Ring curvature <sup>e</sup>	Tylose <sup>s</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
1	>4mm	<i>Quercus</i> sp.	1nr	1				
2	>4mm	<i>Quercus</i> sp.	1nr	1				
3	>4mm	<i>Quercus</i> sp.	1nr					
4	>4mm	<i>Quercus</i> sp.	1nr	1				2
5	>4mm	<i>Quercus</i> sp.		1		1		
6	>4mm	<i>Quercus</i> sp.	1nr	1				
7	>4mm	<i>Quercus</i> sp.		1				
8	>4mm	<i>Quercus</i> sp.	1					
9	>4mm	<i>Quercus</i> sp.	1					
10	>4mm	<i>Quercus</i> sp.	1nr	1				
11	>4mm	<i>Quercus</i> sp.	1	1				
12	>4mm	<i>Quercus</i> sp.						
13	>4mm	<i>Quercus</i> sp.	1nr	1				2
14	>4mm	<i>Quercus</i> sp.	1nr	1				
15	>4mm	<i>Quercus</i> sp.	1nr	1				
16	>4mm	<i>Quercus</i> sp.		1				



17	>4mm	<i>Quercus</i> sp.		1				2
18	>4mm	<i>Quercus</i> sp.	1nr	1				2
19	>4mm	<i>Quercus</i> sp.	1nr	1				
20	>4mm	<i>Quercus</i> sp.	2					
21	>4mm	<i>Quercus</i> sp.		1				
22	>4mm	<i>Quercus</i> sp.		1				
23	>4mm	<i>Quercus</i> sp.	1nr	1				
24	>4mm	<i>Quercus</i> sp.	1nr	1				
25	>4mm	<i>Quercus</i> sp.	1nr					
26	2-4mm	<i>Corylus avellana</i>						
27	2-4mm	<i>Quercus</i> sp.	1nr	1				2
28	2-4mm	<i>Quercus</i> sp.	1nr	1				
29	2-4mm	<i>Quercus</i> sp.		1				
30	2-4mm	<i>Quercus</i> sp.	1nr	1				
31	2-4mm	<i>Prunus cf. spinosa</i>	1					
32	2-4mm	<i>Quercus</i> sp.	1nr	1				
33	2-4mm	<i>Quercus</i> sp.		1				
34	2-4mm	<i>Quercus</i> sp.		1				
35	2-4mm	<i>Quercus</i> sp.		1				
36	2-4mm	<i>Quercus</i> sp.		1				1
37	2-4mm	<i>Quercus</i> sp.	1nr	1				2
38	2-4mm	<i>Quercus</i> sp.	1nr	1				
39	2-4mm	<i>Quercus</i> sp.		1				
40	2-4mm	<i>Quercus</i> sp.		1				
41	2-4mm	<i>Quercus</i> sp.		1				
42	2-4mm	<i>Quercus</i> sp.		1				
43	2-4mm	<i>Quercus</i> sp.	1	1				
44	2-4mm	<i>Quercus</i> sp.						
45	2-4mm	<i>Quercus</i> sp.	1	1				
46	2-4mm	<i>Quercus</i> sp.	1nr	1				
47	2-4mm	<i>Quercus</i> sp.		1				
48	2-4mm	<i>Quercus</i> sp.		1				
49	2-4mm	<i>Quercus</i> sp.		1				
50	2-4mm	<i>Corylus avellana</i>						

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1mm wide). <sup>b</sup>1 = yes.

<sup>c</sup>1 = low brilliance; 2 = strong brilliance; 3 = total fusion

Sample 3003, layer 3062

Fragment No.	Fragment Size	Taxon	Ring curvature <sup>e</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
1	>4mm	<i>Ulmus</i> sp.	1					
2	>4mm	<i>Ilex aquifolium</i>						
3	>4mm	<i>Corylus avellana</i>	1			1		
4	>4mm	<i>Quercus</i> sp.	1nr	1				
5	>4mm	<i>Ulmus</i> sp.	1					
6	>4mm	<i>Corylus avellana</i>	2					



7	>4mm	<i>Corylus avellana</i>						
8	>4mm	<i>Corylus avellana</i>	2					
9	>4mm	<i>Corylus avellana</i>	2		1			
10	>4mm	<i>Fraxinus excelsior</i>						
11	>4mm	<i>Fraxinus excelsior</i>						
12	>4mm	<i>Fraxinus excelsior</i>	1nr	1		1		
13	>4mm	<i>Fraxinus excelsior</i>	1nr	1		1		
14	>4mm	<i>Ulmus sp.</i>	1					
15	>4mm	<i>Corylus avellana</i>	1			1		1
16	>4mm	<i>Quercus sp.</i>	1nr	1		1		
17	>4mm	<i>Quercus sp.</i>	1nr	1		1		
18	>4mm	<i>Quercus sp.</i>		1				
19	>4mm	<i>Quercus sp.</i>		1				
20	>4mm	<i>Fraxinus excelsior</i>	1nr			1		
21	>4mm	<i>Corylus avellana</i>						
22	>4mm	<i>Quercus sp.</i>	1nr	1				
23	>4mm	Pomoideae						
24	>4mm	Pomoideae						
25	>4mm	<i>Ulmus sp.</i>						
26	2-4mm	<i>Populus / Salix</i>						
27	2-4mm	<i>Quercus sp.</i>		1				
28	2-4mm	<i>Populus / Salix</i>						
29	2-4mm	<i>Quercus sp.</i>		1				
30	2-4mm	<i>Populus / Salix</i>				1		
31	2-4mm	<i>Quercus sp.</i>		1				
32	2-4mm	<i>Quercus sp.</i>	1nr	1				
33	2-4mm	<i>Quercus sp.</i>	1nr	1				
34	2-4mm	<i>Populus / Salix</i>						
35	2-4mm	<i>Quercus sp.</i>	1nr	1				
36	2-4mm	<i>Alnus glutinosa</i>						
37	2-4mm	<i>Quercus sp.</i>		1				
38	2-4mm	<i>Quercus sp.</i>		1				
39	2-4mm	<i>Quercus sp.</i>	1nr	1				
40	2-4mm	<i>Quercus sp.</i>		1				
41	2-4mm	<i>Fraxinus excelsior</i>						
42	2-4mm	<i>Fraxinus excelsior</i>	1nr	1		1		
43	2-4mm	<i>Populus / Salix</i>						
44	2-4mm	<i>Fraxinus excelsior</i>	1nr	1				
45	2-4mm	<i>Fraxinus excelsior</i>		1				
46	2-4mm	<i>Quercus sp.</i>		1				
47	2-4mm	<i>Fraxinus excelsior</i>		1				



48	2-4mm	<i>Fraxinus excelsior</i>					
49	2-4mm	<i>Fraxinus excelsior</i>					
50	2-4mm	<i>Populus / Salix</i>					

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1mm wide). <sup>b</sup>1 = yes.  
<sup>c</sup>1 = low brilliance; 2 = strong brilliance; 3 = total fusion

Sample 3008, layer 3056

Fragment No.	Fragment Size	Taxon	Ring curvature <sup>e</sup> <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
1	>4mm	<i>Quercus</i> sp.	1nr	1		1		
2	>4mm	<i>Quercus</i> sp.		1		1		
3	>4mm	<i>Quercus</i> sp.	1nr	1				
4	>4mm	<i>Quercus</i> sp.	1nr	1				
5	>4mm	<i>Quercus</i> sp.	1nr	1				
6	>4mm	<i>Quercus</i> sp.	1	1				
7	>4mm	<i>Quercus</i> sp.	1	1		1		
8	>4mm	<i>Quercus</i> sp.	1nr	1				
9	>4mm	<i>Corylus avellana</i>						
10	>4mm	<i>Quercus</i> sp.	1	1				
11	>4mm	<i>Quercus</i> sp.	1	1				
12	>4mm	<i>Corylus avellana</i>						
13	>4mm	<i>Quercus</i> sp.	1nr	1				
14	>4mm	<i>Quercus</i> sp.	1nr	1				
15	>4mm	<i>Quercus</i> sp.	1nr	1				
16	>4mm	<i>Quercus</i> sp.	1	1				
17	>4mm	<i>Quercus</i> sp.	1	1		1		
18	>4mm	<i>Quercus</i> sp.		1				
19	>4mm	<i>Quercus</i> sp.		1				
20	>4mm	<i>Quercus</i> sp.	1nr	1		1		
21	>4mm	<i>Quercus</i> sp.		1				
22	>4mm	<i>Quercus</i> sp.		1		1		
23	>4mm	<i>Quercus</i> sp.	1nr	1				
24	>4mm	<i>Quercus</i> sp.	1nr	1				
25	>4mm	<i>Quercus</i> sp.	1nr	1		1		
26	2-4mm	<i>Quercus</i> sp.		1				
27	2-4mm	<i>Corylus avellana</i>						
28	2-4mm	<i>Quercus</i> sp.		1		1		
29	2-4mm	<i>Quercus</i> sp.		1				
30	2-4mm	<i>Corylus avellana</i>						
31	2-4mm	<i>Quercus</i> sp.		1				
32	2-4mm	<i>Quercus</i> sp.		1				
33	2-4mm	<i>Quercus</i> sp.		1				
34	2-4mm	<i>Corylus avellana</i>						
35	2-4mm	<i>Quercus</i> sp.		1				
36	2-4mm	<i>Quercus</i> sp.		1				



37	2-4mm	<i>Quercus</i> sp.		1				
38	2-4mm	Pomoideae						
39	2-4mm	<i>Quercus</i> sp.		1				
40	2-4mm	<i>Quercus</i> sp.		1				
41	2-4mm	<i>Quercus</i> sp.		1				
42	2-4mm	<i>Corylus avellana</i>						
43	2-4mm	<i>Quercus</i> sp.						
44	2-4mm	<i>Quercus</i> sp.		1				
45	2-4mm	<i>Quercus</i> sp.		1				
46	2-4mm	<i>Quercus</i> sp.		1				
47	2-4mm	<i>Quercus</i> sp.		1				
48	2-4mm	<i>Quercus</i> sp.		1				
49	2-4mm	<i>Quercus</i> sp.		1				
50	2-4mm	<i>Quercus</i> sp.						

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1mm wide). <sup>b</sup>1 = yes.  
<sup>c</sup>1 = low brilliance; 2 = strong brilliance; 3 = total fusion

Sample 3009, layer 3057

Fragment No.	Fragment Size	Taxon	Ring curvature <sup>e</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
1	>4mm	<i>Quercus</i> sp.		1				
2	>4mm	<i>Quercus</i> sp.				1		
3	>4mm	<i>Quercus</i> sp.		1				
4	>4mm	Indeterminate						
5	>4mm	<i>Quercus</i> sp.	1nr	1				
6	>4mm	<i>Quercus</i> sp.	1nr					
7	>4mm	<i>Corylus avellana</i>						
8	>4mm	Indeterminate						
9	>4mm	<i>Quercus</i> sp.		1				
10	>4mm	<i>Quercus</i> sp.						
11	>4mm	<i>Quercus</i> sp.		1				
12	>4mm	Indeterminate						
13	>4mm	Indeterminate						
14	>4mm	<i>Quercus</i> sp.				1		
15	>4mm	Indeterminate						
16	2-4mm	<i>Quercus</i> sp.		1				
17	2-4mm	<i>Quercus</i> sp.		1				
18	2-4mm	<i>Quercus</i> sp.		1				
19	2-4mm	<i>Quercus</i> sp.		1				
20	2-4mm	<i>Quercus</i> sp.		1				
21	2-4mm	Indeterminate						
22	2-4mm	<i>Quercus</i> sp.						
23	2-4mm	<i>Quercus</i> sp.		1				
24	2-4mm	<i>Quercus</i> sp.						
25	2-4mm	<i>Quercus</i> sp.		1				
26	2-4mm	<i>Quercus</i> sp.		1				
27	2-4mm	<i>Corylus avellana</i>						



28	2-4mm	<i>Quercus</i> sp.		1				
29	2-4mm	<i>Quercus</i> sp.		1		1		
30	2-4mm	<i>Quercus</i> sp.	1nr	1				2
31	2-4mm	<i>Quercus</i> sp.						
32	2-4mm	<i>Quercus</i> sp.		1				
33	2-4mm	<i>Quercus</i> sp.						
34	2-4mm	<i>Quercus</i> sp.		1				2
35	2-4mm	<i>Quercus</i> sp.		1				
36	2-4mm	<i>Quercus</i> sp.	1nr	1				
37	2-4mm	<i>Quercus</i> sp.		1				
38	2-4mm	Indeterminate						
39	2-4mm	<i>Quercus</i> sp.						
40	2-4mm	<i>Quercus</i> sp.				1		
41	2-4mm	<i>Quercus</i> sp.						
42	2-4mm	<i>Quercus</i> sp.						2
43	2-4mm	Indeterminate						
44	2-4mm	<i>Quercus</i> sp.						
45	2-4mm	<i>Quercus</i> sp.						
46	2-4mm	Indeterminate						
47	2-4mm	<i>Quercus</i> sp.		1				
48	2-4mm	Indeterminate						
49	2-4mm	<i>Quercus</i> sp.		1				
50	2-4mm	<i>Quercus</i> sp.						

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1mm wide). <sup>b</sup>1 = yes.

<sup>c</sup>1 = low brilliance; 2 = strong brilliance; 3 = total fusion

### Sample 1000, layer 1018

Fragment No.	Fragment Size	Taxon	Ring curvature <sup>e</sup>	Tylose <sup>s</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Vitrification <sup>c</sup>
1	>4mm	<i>Quercus</i> sp.	2	1				
2	>4mm	<i>Quercus</i> sp.	3nr			1		
3	>4mm	<i>Quercus</i> sp.	2nr			1		
4	>4mm	<i>Quercus</i> sp.	2nr			1		
5	>4mm	<i>Quercus</i> sp.	2nr					
6	>4mm	<i>Quercus</i> sp.	2nr					
7	>4mm	<i>Quercus</i> sp.	2nr					
8	>4mm	<i>Quercus</i> sp.	2nr			1		
9	>4mm	<i>Quercus</i> sp.	2nr			1		
10	>4mm	<i>Quercus</i> sp.	2nr			1		
11	>4mm	<i>Quercus</i> sp.	1nr	1				
12	>4mm	<i>Quercus</i> sp.	2nr			1		
13	>4mm	<i>Quercus</i> sp.	2nr					
14	>4mm	<i>Quercus</i> sp.	2nr			1		
15	>4mm	<i>Quercus</i> sp.	3nr					
16	>4mm	<i>Quercus</i> sp.	3nr			1		
17	>4mm	<i>Prunus</i> cf. <i>spinosa</i>	3					
18	>4mm	<i>Quercus</i> sp.	2nr			1		



19	>4mm	<i>Quercus</i> sp.	3nr				1	
20	>4mm	<i>Quercus</i> sp.	2nr			1		
21	>4mm	<i>Quercus</i> sp.	3nr					
22	>4mm	<i>Populus</i> spp. / <i>Salix</i> spp.						
23	>4mm	<i>Quercus</i> sp.	1nr			1		
24	>4mm	Pomoideae	3					
25	>4mm	<i>Quercus</i> sp.	3nr					
26	2-4mm	<i>Quercus</i> sp.						
27	2-4mm	<i>Quercus</i> sp.	3nr					
28	2-4mm	<i>Quercus</i> sp.						
29	2-4mm	<i>Betula</i> sp.						
30	2-4mm	<i>Quercus</i> sp.	3nr					
31	2-4mm	Coniferous indet.						
32	2-4mm	<i>Quercus</i> sp.				1		
33	2-4mm	<i>Quercus</i> sp.						
34	2-4mm	<i>Quercus</i> sp.						
35	2-4mm	<i>Quercus</i> sp.						
36	2-4mm	<i>Quercus</i> sp.						
37	2-4mm	<i>Quercus</i> sp.						
38	2-4mm	<i>Betula</i> sp.						
39	2-4mm	<i>Acer campestre</i>						
40	2-4mm	<i>Quercus</i> sp.						
41	2-4mm	<i>Quercus</i> sp.						
42	2-4mm	<i>Alnus glutinosa</i>						
43	2-4mm	<i>Corylus avellana</i>						
44	2-4mm	<i>Quercus</i> sp.						
45	2-4mm	<i>Quercus</i> sp.						
46	2-4mm	<i>Quercus</i> sp.						
47	2-4mm	<i>Acer campestre</i>						
48	2-4mm	<i>Quercus</i> sp.						
49	2-4mm	<i>Quercus</i> sp.						
50	2-4mm	<i>Quercus</i> sp.						

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1mm wide). <sup>b</sup>1 = yes.  
<sup>c</sup>1 = low brilliance; 2 = strong brilliance; 3 = total fusion

## Wood

Sample 6009, pit fill 6060

Fragment No.	Fragment Size	Taxon	Ring curvature <sup>e</sup> <sub>a</sub>	Tyloses <sup>b</sup> <sub>s</sub>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Bark <sup>b</sup>
1	>4mm	<i>Quercus</i> sp.	1nr	1				
2	>4mm	<i>Quercus</i> sp.	1	1				
3	>4mm	<i>Alnus glutinosa</i>						
4	>4mm	<i>Quercus</i> sp.	1	1				
5	>4mm	<i>Quercus</i> sp.	1	1				
6	>4mm	<i>Quercus</i> sp.	1	1				



7	>4mm	<i>Quercus</i> sp.	1	1				
8	>4mm	<i>Quercus</i> sp.	1	1				
9	>4mm	<i>Quercus</i> sp.		1				
10	>4mm	<i>Quercus</i> sp.		1				
11	>4mm	Indeterminate						
12	>4mm	<i>Quercus</i> sp.		1				
13	>4mm	<i>Quercus</i> sp.		1				
14	>4mm	<i>Quercus</i> sp.	1	1				
15	>4mm	<i>Quercus</i> sp.	1	1				
16	>4mm	<i>Quercus</i> sp.		1				
17	>4mm	Indeterminate						
18	>4mm	<i>Quercus</i> sp.	1	1				
19	>4mm	Indeterminate						
20	>4mm	<i>Alnus glutinosa</i>						
21	>4mm	<i>Quercus</i> sp.						
22	>4mm	<i>Quercus</i> sp.						
23	>4mm	<i>Quercus</i> sp.		1				
24	>4mm	<i>Quercus</i> sp.						
25	>4mm	<i>Quercus</i> sp.						
26	>4mm	<i>Quercus</i> sp.		1				
27	>4mm	<i>Quercus</i> sp.	1nr	1				
28	>4mm	<i>Fraxinus excelsior</i>						
29	>4mm	<i>Quercus</i> sp.		1				
30	>4mm	<i>Quercus</i> sp.						
31	>4mm	<i>Quercus</i> sp.						
32	>4mm	<i>Quercus</i> sp.		1				
33	>4mm	<i>Quercus</i> sp.	1nr	1				
34	>4mm	<i>Quercus</i> sp.		1				
35	>4mm	<i>Quercus</i> sp.		1				
36	>4mm	<i>Quercus</i> sp.	1					
37	>4mm	<i>Quercus</i> sp.		1				
38	>4mm	<i>Alnus glutinosa</i>						
39	>4mm	<i>Quercus</i> sp.		1				
40	>4mm	<i>Fraxinus excelsior</i>						
41	>4mm	<i>Quercus</i> sp.						
42	>4mm	Indeterminate						
43	>4mm	<i>Quercus</i> sp.		1				
44	>4mm	<i>Fraxinus excelsior</i>						
45	>4mm	<i>Quercus</i> sp.		1				
46	>4mm	<i>Quercus</i> sp.						
47	>4mm	<i>Quercus</i> sp.						
48	>4mm	<i>Quercus</i> sp.	1nr	1				
49	>4mm	<i>Quercus</i> sp.						
50	>4mm	<i>Quercus</i> sp.						

<sup>a1</sup> = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1mm wide). <sup>b1</sup> = yes.





Sample 6011, pit fill 6072

Fragment No.	Fragment Size	Taxon	Ring curvature <sup>e</sup> <sub>a</sub>	Tyloses <sup>b</sup> <sub>s</sub>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Bark <sup>b</sup>
1	>4mm	<i>Quercus</i> sp.	1nr	1				
2	>4mm	<i>Quercus</i> sp.	1					
3	>4mm	<i>Quercus</i> sp.						
4	>4mm	<i>Quercus</i> sp.						
5	>4mm	<i>Quercus</i> sp.						
6	>4mm	<i>Quercus</i> sp.						
7	>4mm	<i>Quercus</i> sp.	1					
8	>4mm	<i>Quercus</i> sp.		1				
9	>4mm	<i>Quercus</i> sp.	1nr	1				
10	>4mm	<i>Quercus</i> sp.						
11	>4mm	<i>Quercus</i> sp.	1nr	1				
12	>4mm	<i>Quercus</i> sp.	1nr	1				
13	>4mm	<i>Quercus</i> sp.	1nr	1				
14	>4mm	<i>Quercus</i> sp.	3					
15	>4mm	<i>Alnus glutinosa</i>						
16	>4mm	<i>Fraxinus excelsior</i>						
17	>4mm	<i>Quercus</i> sp.	1nr	1				
18	>4mm	<i>Quercus</i> sp.						
19	>4mm	<i>Quercus</i> sp.	1nr	1				
20	>4mm	Indeterminate						
21	>4mm	<i>Quercus</i> sp.						
22	>4mm	<i>Quercus</i> sp.	1nr	1				
23	>4mm	<i>Quercus</i> sp.						
24	>4mm	<i>Quercus</i> sp.	1nr	1				
25	>4mm	<i>Quercus</i> sp.	1nr	1				
26	2-4mm	<i>Quercus</i> sp.						
27	2-4mm	<i>Fraxinus excelsior</i>						
28	2-4mm	<i>Quercus</i> sp.	1nr	1				
29	2-4mm	Indeterminate						
30	2-4mm	<i>Alnus glutinosa</i>						
31	2-4mm	<i>Quercus</i> sp.						
32	2-4mm	<i>Quercus</i> sp.						
33	2-4mm	<i>Quercus</i> sp.		1				
34	2-4mm	<i>Quercus</i> sp.						
35	2-4mm	<i>Quercus</i> sp.						
36	2-4mm	<i>Quercus</i> sp.						
37	2-4mm	<i>Quercus</i> sp.	3					
38	2-4mm	<i>Fraxinus excelsior</i>						
39	2-4mm	<i>Quercus</i> sp.						
40	2-4mm	<i>Quercus</i> sp.						



41	2-4mm	<i>Quercus</i> sp.						
42	2-4mm	<i>Quercus</i> sp.	1nr	1				
43	2-4mm	<i>Quercus</i> sp.		1				
44	2-4mm	<i>Quercus</i> sp.		1				
45	2-4mm	<i>Quercus</i> sp.						
46	2-4mm	<i>Quercus</i> sp.	1nr	1				
47	2-4mm	<i>Quercus</i> sp.	1nr	1				
48	2-4mm	<i>Quercus</i> sp.		1				
49	2-4mm	<i>Quercus</i> sp.						
50	2-4mm	<i>Quercus</i> sp.						

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1mm wide). <sup>b</sup>1 = yes.

### Sample 6006, layer 6055

Fragment No.	Fragment Size	Taxon	Ring curvature <sup>e</sup> <sup>a</sup>	Tyloses <sup>b</sup>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Bark <sup>b</sup>
1	>4mm	<i>Quercus</i> sp.	1nr	1				
2	>4mm	<i>Quercus</i> sp.	1	1				
3	>4mm	<i>Quercus</i> sp.	1					
4	>4mm	<i>Quercus</i> sp.	1					
5	>4mm	<i>Quercus</i> sp.	1	1				
6	>4mm	<i>Corylus avellana</i>						
7	>4mm	<i>Quercus</i> sp.		1				
8	>4mm	Pomoideae						
9	>4mm	<i>Quercus</i> sp.						
10	>4mm	Pomoideae						
11	>4mm	<i>Corylus avellana</i>						
12	>4mm	<i>Quercus</i> sp.						
13	>4mm	<i>Quercus</i> sp.						
14	>4mm	<i>Quercus</i> sp.						
15	>4mm	<i>Quercus</i> sp.						
16	>4mm	<i>Quercus</i> sp.						
17	>4mm	<i>Quercus</i> sp.						
18	>4mm	Indeterminate						
19	>4mm	<i>Quercus</i> sp.						
20	>4mm	Pomoideae						
21	>4mm	<i>Quercus</i> sp.						
22	>4mm	<i>Corylus avellana</i>						
23	>4mm	<i>Quercus</i> sp.						
24	>4mm	<i>Quercus</i> sp.						
25	>4mm	<i>Quercus</i> sp.	1nr	1				
26	>4mm	<i>Quercus</i> sp.						
27	>4mm	<i>Quercus</i> sp.						
28	>4mm	<i>Quercus</i> sp.		1				
29	>4mm	Pomoideae						
30	>4mm	Indeterminate						



31	>4mm	<i>Quercus</i> sp.						
32	>4mm	<i>Quercus</i> sp.						
33	>4mm	<i>Quercus</i> sp.						
34	>4mm	<i>Quercus</i> sp.						
35	>4mm	<i>Quercus</i> sp.		1				
36	>4mm	<i>Quercus</i> sp.						
37	>4mm	<i>Quercus</i> sp.		1				
38	>4mm	<i>Quercus</i> sp.		1				
39	>4mm	<i>Quercus</i> sp.						
40	>4mm	<i>Quercus</i> sp.		1				
41	>4mm	<i>Quercus</i> sp.						
42	>4mm	<i>Quercus</i> sp.						
43	>4mm	Pomoideae						
44	>4mm	<i>Quercus</i> sp.						
45	>4mm	<i>Quercus</i> sp.						
46	>4mm	<i>Quercus</i> sp.						
47	>4mm	<i>Quercus</i> sp.						
48	>4mm	Pomoideae	3					
49	>4mm	Indeterminate						
50	>4mm	<i>Quercus</i> sp.						

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1mm wide). <sup>b</sup>1 = yes.

### Sample 3009, layer 3057

Fragment No.	Fragment Size	Taxon	Ring curvature <sup>e</sup> <sub>a</sub>	Tylose <sup>s</sup> <sub>b</sub>	Reaction wood <sup>b</sup>	Fungal hyphae <sup>b</sup>	Pith <sup>b</sup>	Bark <sup>b</sup>
1	>4mm	<i>Quercus</i> sp.		1				1
2	>4mm	<i>Corylus avellana</i>						
3	>4mm	<i>Quercus</i> sp.	1nr	1				
4	>4mm	<i>Corylus avellana</i>						
5	>4mm	<i>Quercus</i> sp.	1nr	1				
6	>4mm	<i>Quercus</i> sp.	1	1				1
7	>4mm	<i>Quercus</i> sp.		1				
8	>4mm	<i>Quercus</i> sp.	1	1				
9	>4mm	<i>Quercus</i> sp.	1nr	1				
10	>4mm	<i>Quercus</i> sp.						1
11	>4mm	<i>Alnus glutinosa</i>						
12	>4mm	<i>Quercus</i> sp.		1				
13	>4mm	<i>Quercus</i> sp.	1	1				
14	>4mm	<i>Quercus</i> sp.	1	1				
15	>4mm	<i>Quercus</i> sp.						1
16	>4mm	<i>Quercus</i> sp.	1nr	1				
17	>4mm	Indeterminate						
18	>4mm	<i>Quercus</i> sp.		1				
19	>4mm	<i>Quercus</i> sp.	1nr	1				
20	>4mm	<i>Quercus</i> sp.	1	1				



21	>4mm	<i>Quercus</i> sp.						
22	>4mm	<i>Quercus</i> sp.	1nr	1				
23	>4mm	<i>Quercus</i> sp.	3					
24	>4mm	<i>Corylus avellana</i>						
25	>4mm	<i>Quercus</i> sp.		1				
26	>4mm	<i>Quercus</i> sp.	1nr	1				
27	>4mm	<i>Quercus</i> sp.	1nr	1				
28	>4mm	<i>Quercus</i> sp.	3				1	
29	>4mm	Indeterminate						
30	>4mm	Pomoideae						
31	>4mm	<i>Corylus avellana</i>	3					
32	>4mm	<i>Quercus</i> sp.	1nr	1				
33	>4mm	<i>Quercus</i> sp.		1				
34	>4mm	<i>Quercus</i> sp.	1nr	1				
35	>4mm	<i>Quercus</i> sp.	1nr	1				
36	>4mm	<i>Corylus avellana</i>						
37	>4mm	<i>Quercus</i> sp.		1				
38	>4mm	<i>Quercus</i> sp.						
39	>4mm	<i>Quercus</i> sp.						
40	>4mm	<i>Quercus</i> sp.	1nr	1				
41	>4mm	<i>Quercus</i> sp.						
42	>4mm	<i>Corylus avellana</i>	3					
43	>4mm	<i>Quercus</i> sp.	1nr	1				
44	>4mm	<i>Corylus avellana</i>						
45	>4mm	<i>Quercus</i> sp.						
46	>4mm	Pomoideae						
47	>4mm	<i>Quercus</i> sp.	3					
48	>4mm	<i>Quercus</i> sp.	1					
49	>4mm	<i>Quercus</i> sp.		1				
50	>4mm	<i>Quercus</i> sp.	1nr	1				

<sup>a</sup>1 = low curve rings; 2 = intermediate curved rings; 3 = strong curve rings. nr = narrow rings (<1mm wide). <sup>b</sup>1 = yes.

## Sheffield Castle, Sheffield (201540) – Assessment of plant macrofossils, wood charcoal and wood from borehole and monolith samples

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### Introduction

A borehole survey was implemented during the archaeological evaluation at the site of Sheffield Castle, Sheffield, South Yorkshire (NGR: 435805, 387684) in 2018 by Wessex Archaeology. A monolith sample was also taken from the castle ditch section in Trench 10. Three samples from Borehole 1 and Monolith sample 10002 from Trench 10 were processed for waterlogged plant macrofossils and wood. The samples were then assessed in order to determine the concentration, diversity, state of preservation and suitability for AMS dating, of any palaeoenvironmental material present. A further aim of this assessment is to evaluate the potential of any palaeoenvironmental material present in the samples to aid in an interpretation of the sampled contexts and gain an understanding of the economy of the site or the local environment.

### Methodology

The samples were processed by the washover method for the recovery of plant remains preserved by anoxic waterlogging, broadly following the techniques outlined in Kenward *et al* (1980). The samples were disaggregated in water, before being processed by gently washing material through a stack of sieves of mesh sizes 2mm, 1mm, 500µm and 250µm. Material from each size fraction was stored in distilled water in sealable plastic bags and kept refrigerated, in accordance with Historic England guidelines for the curation of waterlogged macroscopic and invertebrate remains (Robinson 2008).

The samples were assessed in accordance with Historic England guidelines for environmental archaeology assessments (Campbell *et al* 2011). A preliminary assessment of the samples was made by scanning using a stereo-binocular microscope (x10 - x65) and recording the abundance of the main classes of material present. The small quantity of plant seeds found in the samples were identified and quantified in full. Preliminary identifications of plant material were carried out by comparison with material in the reference collections at the Department of Archaeology, University of Sheffield and various reference works (e.g. Cappers *et al*, 2006). Plant nomenclature follows Stace (2019). The composition of the Borehole 1 samples is recorded in Table 1 and the composition of the Monolith sample 10002 is recorded in Table 2. The seed, in the broadest sense, of the plant is always referred to in the tables, unless stated otherwise.

### Preservation

Uncharred seeds and wood were found in samples from Borehole 1, which may be ancient material preserved by anoxic waterlogging although it is not possible to determine with confidence whether this is the case. The seeds are well preserved but the wood fragments are poorly preserved, being highly fragmented and with a spongy texture. Wood charcoal fragments were also found in the samples from Borehole 1 and in Monolith sample 10002. A fragment of hazel nutshell preserved by charring was found in Monolith sample 10002. The wood charcoal fragments and charred hazel nutshell are well preserved.

### Results

#### Borehole 1

A small quantity of uncharred seeds and wood fragments was found in the sample from a depth of 1-1.77m in Borehole 1. The uncharred seeds present include those of nettle (*Urtica dioica*) and hemlock (*Conium maculatum*) which are plants commonly associated with nutrient-rich, disturbed soils. Docks (*Rumex* spp.), which include several species commonly associated with waste and rough ground, as well as species of other habitats, are also represented, as are seeds of meadow/creeping/bulbous buttercups (*Ranunculus bulbosus* /*acris/repens*), which are plants of grassy habitats. Seeds of blackberry (*Rubus fruticosus* agg.) and elder (*Sambucus nigra*), plants that produce edible fruits, are represented, and a small quantity of wood fragments and wood charcoal fragments greater than 2mm in size in cross section are also present.

The Borehole 1 sample from a depth of 1.77- 3.25m produced a very small quantity of uncharred seeds consisting of blackberry, elder and dock. A moderately large assemblage of

over fifty wood fragments greater than 2mm in size in cross section was also found in this sample, along with some wood charcoal.

The Borehole 1 sample from a depth of 3.25 – 4.20m produced only herbaceous plant roots/stems and a small quantity of wood charcoal fragments greater than 2mm in cross section.

*Monolith sample 10002*

The monolith sample from the castle ditch fill produced a relatively rich assemblage of just under fifty wood charcoal fragments over 2mm in cross section along with one fragment of charred hazel nutshell (*Corylus avellana*).

**Discussion**

The uncharred seeds, which were found at depths of 1-1.77m and 1.77-3.25m in Borehole 1, may represent material preserved by anoxic waterlogging. The presence of wood fragments in these samples provides support for this interpretation, although it cannot be ascertained with confidence whether this is intrusive modern material or ancient material preserved by anoxic waterlogging. The plant taxa present in these samples are indicative of nutrient-rich, disturbed soils, grassland and some possible scrub vegetation, although the seeds from scrub plants, elder and blackberry, may be from fruits collected as food rather than plants growing at the site. The assemblage is similar to that represented in samples of uncharred plant macrofossils, which are also likely to have been preserved by anoxic waterlogging, from contexts dating to the medieval period in Trench 3 and Trench 6.

The presence of charred hazel nutshell and wood charcoal in Monolith sample 10002, along with wood charcoal fragments in samples from Borehole 1, are likely to indicate dumping of domestic hearth waste. Charred and uncharred hazel nutshell is present in other samples from the castle site, and wood charcoal fragments are ubiquitous.

**Recommendations**

No further analysis of the uncharred plant seeds from Borehole 1 at depths of 1-1.77m and 1.77-3.25m is recommended, as the small quantity of seeds found have been fully quantified during assessment.

No further analysis of the wood fragments from Borehole 1 at depths of 1-1.77m and 1.77-3.25m is recommended, as the fragments are too small and poorly preserved to be suitable for identification.

No further analysis of the wood charcoal assemblage from Borehole 1 and in Monolith sample 10002 is recommended as the assemblage is too small to provide a representative sample.

No material suitable for AMS radiocarbon dating was found in the samples.

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**Appendix 1 - Tables**

Table 1 - Borehole 1

	<b>Borehole number</b>	<b>1</b>	<b>1</b>	<b>1</b>
	Depth	1-1.77m	1.77-3.25m	3.25-4.20m
	Sample volume (litres)	1	1	1
Taxon	Common name			
<i>Ranunculus bulbosus</i>	bulbous/ meadow/	14		



<i>/acris/repens</i>	creeping buttercup			
<i>Rubus fruticosus</i> agg.	blackberry	7	4	
<i>Urtica dioica</i> L.	common nettle	21		
<i>Viola</i> sp.	violet	1		
<i>Rumex</i> spp.	docks	2	1	
<i>Conium maculatum</i> L.	hemlock	1		
<i>Sambucus nigra</i> L.	elder	1	3	
Herbaceous plant roots / stems				25
>2mm wood fragments		3	54	
>2mm wood charcoal fragments		6	14	3

Table 2 - Monolith sample 10002

	Sample number	10002
	Trench	10
	Context type	Castle ditch fill
	Sample volume (litres)	1
Taxon	Common name	
<i>Corylus avellana</i> L. 2-4mm nutshell fragments	hazel	1 (ch)
>2mm wood charcoal fragments		41

ch= charred



*Matthew Law*



Assessment of Molluscs

# **SHEFFIELD CASTLE, SHEFFIELD**

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On behalf of Wessex Archaeology

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By Matt Law PhD ACIfA

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L~P:ARCHÆOLOGY

Assessment of Molluscs

# SHEFFIELD CASTLE, SHEFFIELD

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Client: Wessex Archaeology

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Author: M Law

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Doc Ref: LP2488E-EAR-v3.1

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Site Code: 200540

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Date: January 20

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**L-P: ARCHAEOLOGY**

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1. Introduction and Methods
2. Results and Discussion
3. Statement of Potential and Recommendations

# TABLE OF TABLES

Table I – Estimated abundance of molluscan shell

# 1. Introduction and Methods

1.1. Mollusc shells from the flot of one sample taken during excavations at Sheffield Castle, Sheffield, West Yorkshire, were presented for analysis.

1.2. The sample was taken from a 14<sup>th</sup>–early 15<sup>th</sup> century lower moat fill, context (9011).

1.3. The sample had been processed using a modified Siraf-style flotation tank by Wessex Archaeology, and the flot sorted and assessed by Ellen Simmons, University of Sheffield.

1.4. The shell assemblage was scanned under a low power binocular microscope at 20x magnification.

1.5. Information on land snail ecology is derived from Evans (1972), Kerney and Cameron (1979), Kerney (1999) and Davies (2008). Nomenclature follows Anderson (2008).

1.6. As an aid to interpretation, taxa were arranged into groups according to their ecological preferences, following those of Evans (1972). These are:

1a. Oxychilidae. ‘Glass snails’, taxonomically related species of shaded places, represented here by *Aegopinella nitidula*, and *Vitrea contracta*.

1b. *Carychium tridentatum*. A widespread shade-demanding species.

1c. *Discus rotundatus*. A common species of shaded habitats.

1d. Other shade-loving species. Represented here by *Lauria cylindracea*, and *Merdigera obscura*.

3. Intermediate/ catholic. Molluscs with a broad range of ecological tolerances. Represented here by *Cepaea* sp., *Cochlicopa cf. lubrica*, and *Trochulus hispidus*.

4a. Commonly open country. Snails associated with open habitats such as short grassland. Represented here by *Vallonia cf. excentrica*.

1.7. The use of ecological groups, although useful for broad interpretation, can mask fine details, so consideration of the ecology of individual species is also taken into account.

## 2. Results and Discussion

- 2.1. Counts of snail shells within the sample are presented in TABLE 1. Snail shells were well-preserved, with a range of juvenile and adult shells present in the assemblage.
- 2.2. The snail assemblage is entirely terrestrial in nature, and dominated by taxa that reflect locally shaded conditions. The dominant species is *Discus rotundatus*, which is common in most moist and shaded habitats, such as in leaf litter, and among stones in waste ground, often occurring in very high numbers. Its dominance here suggests an overgrown environment within the moat.
- 2.3. *Vitrea contracta*, although grouped as a woodland species, is associated with relatively dry habitats. It is commonly found in scree and collapsed wall debris as well as within leaf litter.
- 2.4. *Aegopinella nitidula* is found in ground litter and at the base of walls, and may often be found in habitats that are disturbed by humans.
- 2.5. *Lauria cylindracea*, a Group 1d species, is a species of shaded habitats, but is also commonly found on walls (EVANS 1972: 151).
- 2.6. Although *Vallonia cf. excentrica* is a species of open habitats, it may be found under stones and in scrub habitats.

Taxon	Ecological Group	Count
<i>Aegopinella nitidula</i> (Draparnaud, 1805)	1a	32
<i>Vitrea contracta</i> (Westerlund, 1871)	1a	54
<i>Carychium cf.</i> <i>tridentatum</i> (Risso, 1826)	1b	42
<i>Discus rotundatus</i> (Müller, 1774)	1c	109
<i>Lauria cylindracea</i> (da Costa, 1778)	1d	2
<i>Merdigera obscura</i> (Müller, 1774)	1d	4
<i>Cepaea</i> sp.	3	1
<i>Cochlicopa cf.</i>	3	14

<i>lubrica</i> (Müller, 1774)		
<i>Trochulus hispidus</i> (Linnaeus, 1758)	3	4
<i>Vallonia cf.</i> <i>excentrica</i> Sterki, 1893	4a	1
Snail eggs		3
Number of taxa		10
Number of shells		261

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*Table 1 – Snails from context 9011*



### 3. Conclusions

- 3.1. The shell assemblage broadly reflects a shaded terrestrial environment. There is no indication that the moat held water in this location at the time that the sediment was accumulating. A likely environmental setting is an overgrown, scrubby habitat with stones and some open patches and abundant ground litter. This would tend to suggest that the sediment sampled was accumulating during a period of rather more relaxed management of the castle moat.
- 3.2. The relatively high number of shells and moderate diversity of species within the sample suggests that this was a stable environment over a period of several decades (allowing more species to become established) and that rates of sedimentation were slow (allowing more shells to become incorporated into the sample).

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David Smith

## The Insect remains from Sheffield Castle (201540)

**David Smith**

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Dear David,

Thank you again for the Sheffield Castle beetles report delivered last week.

My colleagues at Sheffield University have identified that the contextual information is slightly awry in your report. Unfortunately this has led you to consider Sample 3009/ Context 3057 and Sample 6011/ Context 6072 together. These are different categories of deposit unrelated in space and chronology. Would you please be able to separate your description of these two samples? I attach your report with the contextual information corrected as tracked changes. We have also been able to refine the chronology of some of the samples. Updated contextual information is repeated below.

- Sample 3009 (3057) - demolition/destruction layer (13th C)
- Sample 3013 (3079) - demolition/destruction layer (13th C)
- Sample 6009 (6060) - pit fill (late-11<sup>th</sup>/12<sup>th</sup> century) – sample not available for analysis
- Sample 6011 (6072) - pit fill (late-11<sup>th</sup>/12<sup>th</sup> century)
- Sample 6006 (6055) – ground layer (medieval, sealed 6060 and 6072)

As ever, this is needed yesterday.

Many thanks,

### UNIVERSITY OF BIRMINGHAM ENVIRONMENTAL ARCHAEOLOGY SERVICES REPORT NUMBER 306

#### INTRODUCTION

This report presents the results of an analysis of the insect remains from four samples collected during excavations at Sheffield Castle (Site Code 201540). Originally 5 one litre sub-samples were assessed for their insect remains by Kim Vickers who recommended further analysis. Unfortunately, sample 6009/ context 6060 could not be located when this full analysis commenced. Two samples of material (sample 3013/ context 3075 and sample 3013/ context 3079) are dated to the 13th century and come from demolition layers. Two samples are approximately late-11th/12th century in date, one (sample 6011/ context 6072) is from a pit fill and one (Sample 6006/ context 6055) is from the ground layer sealing pit 6072. The sample details and descriptions are provided in Table 1.

It was hoped that analysis of these insect remains would help to indicate the nature of the fills of the pits and features sampled, and to elucidate the living conditions and/or deposit history at Sheffield Castle. It also was hoped that these samples could be compared with the insect

faunas that have been recovered from deposits of similar age in York (Kenward and Hall 1995) and London (Smith 2012) UK.

### **SAMPLE PROCESSING AND ANALYSIS**

The sediment from these samples was processed using the standard method of paraffin flotation as outlined in Kenward *et al.* (1980) at the University of Birmingham. The insect remains were sorted from the flots at x10 magnification, stored in ethanol and then 'laid out' for identification. The material that had already been assessed by Kim Vickers was also 'laid out' and examined at the same time.

The Coleoptera (beetles) present in both the whole earth samples and the one litre sub-samples already sorted by Kim Vickers were identified by direct comparison to the Gorham and Girling Collections of British Coleoptera at magnifications between x7 – x45, but the two sets of insect material are scored separately. The taxa of insects recovered for each sample and/or sub-sample are presented in Table 2, where the minimum numbers of individual for both sets of material have been recorded. The nomenclature for the Coleoptera (beetles) follows that of Lucht (1987).

Where applicable each species of Coleoptera has been assigned to one, or more, ecological grouping and these are indicated in the second column of Table 2. These groupings are derived from the preliminary classifications outlined by Kenward (1978). The classification used here replicates that used in Kenward and Hall (1995). The groupings, themselves, are described at the end of Table 2. The various proportions of these ecological groups have been calculated and are expressed as percentages of the total Coleoptera present in the faunas; the relative proportions of ecological groups are shown in Table 3 and in Figure 1. Not all taxa have a coding and some taxa occur in more than one ecological group. As a result, percentages do not always equal 100%.

Some of the Coleoptera have been assigned codes based upon their extent of synanthropy (dependence on human settlement) and these are indicated in the third column of Table 2. These codes are based on those used by Kenward (1997) and in Smith *et al.* (2020). The synanthropic groupings are described at the end of Table 2. The relative proportions of these synanthropic groupings, expressed as a percentage of the total fauna, are presented in Table 3 and Figure 2.

The furthest right-hand column of Table 2 lists the host plants associated with the various phytophage (plant eating) species of beetles. This information comes mainly from Koch (1992) and the plant nomenclature used follows that of Stace (2010).

The dipterous (fly) pupae were identified using the drawings in K.G.V. Smith (1973, 1989) and, where possible, by direct comparison to modern specimens identified by Peter Skidmore. The various taxa of flies recovered from these samples are presented in Table 1. The taxonomy used follows that of K.G.V. Smith (1989) for the Diptera.

## NATURE OF THE INSECT FAUNAS RECOVERED

The majority of the insect remains recovered from Sheffield Castle are beetles (Coleoptera) with a very small numbers of ants (Formicoidea) and flies (Diptera). The lack of fly puparia is surprising since most urban deposits are dominated by fly puparia. This may suggest that this material became incorporated in the archaeological record relatively quickly, after it was deposited, rather than reaching a very advanced state of decay in the open.

### Sample 3013/ Context 3079

The insect fauna from this 13th century demolition layer was relatively small (30 individuals). It is dominated by a range of taxa that are fairly typical of decaying organic materials found around archaeological settlements; such as, hay, bedding, flooring materials and/or settlement waste. The high proportions of species associated with ecological group 'rt' (decaying organic matter), which accounts for 46% of the fauna recovered, suggest that the material within this deposit had begun to decay. Typical beetles recovered from this kind of rotting material include: the *Cercyon* spp., *Coprophilus striatulus*, *Oxytelus rugosus*, *Oxytelus nitidulus* and *Rhizophagus parallellocollis* (Hansen 1987; Lott 2009). There also are limited indications that rotting wood or timber was present in this material. Both *Cercyon* species and *Trichonyx sulcicollis* are associated with rotting bark and dead timbers from hardwood trees (Koch 1992). The impression gained is that this demolition deposit contained a range of settlement waste and material, which had begun to rot or breakdown.

**Sample 3009/ Context 3057** This sample produced moderately large insect faunas that suggests it contained a range of settlement waste and materials. Again, the fauna is dominated by a range of beetles that are normally associated with mildly decaying material, which could be typically described as 'settlement waste'. This is indicated by the proportions of the 'rt' (decaying organic matter) ecological group recovered which accounts for 36% of the faunas recovered. Typical beetles found archaeologically within this kind of material include: the hydrophilid *Cercyon* spp., and the 'rove beetles' (*Omalium rivulare*, *O. excavatum*, *Coprophilus striatulus*, *Oxytelus rugosus*, *O. nitidulus*, and *Platystethus arenarius*).

A number of beetle species recovered in these samples suggest that drier material, for example, straw, hay, bedding or thatch, may have been incorporated into these deposits. Taxa associated with drier materials include beetles such as *Cryptophagus* spp., *Atomaria* spp., *Enicmus minutus* and *Corticaria* spp. These are all members of the 'rd' (drier organic matter) ecological community, which accounts for 7.5% and 5.5% of the faunas recovered in these two samples.

There are some indicators for the presence of structural timbers and wood. The former is indicated by the recovery of the 'woodworm' (*Anobium punctatum*), the 'powder post beetle' (*Lyctus linearis*) and the 'barrel beetle' (*Phloeophagus lignarius*). A range of scolytid 'shot borer beetles' were also recovered which indicate the presence of structural timbers, such as oak or beech (i.e. *Scolytus intricatus*, *Dryocoetes villosus* and *Xyleborus dryographus*) (Kock 1992).

Several beetles recovered are associated with plants that typically grow in rough ground. For example, *Cidnorhynchus quadrimaculatus* is associated with stinging nettle (*Urtica dioica* L.) and *Sitona* spp. with clover (*Trifolium* spp.). Sample 3009 also produced the only indicator for stored grain recovered from this site. This was the 'rust red flour beetle' (*Laemophloeus ferrugineus*) which is commonly associated with decayed grain and other stored products (Smith and Kenward 2013).

### Sample 6011/ Context 6072

Sample 6011 produced a moderately large insect fauna which indicate the presence of a range of settlement waste. The fauna is dominated by a range of beetles that are normally associated with mildly decaying settlement waste. This is indicated by the proportions of the 'rt' (decaying organic matter). 38% of the fauna is from the 'rt' ecological grouping which normally lives in a range of mildly decaying organic material. Included in this group are the hydrophilid *Megasternum boletophagum* and the 'rove beetles' (*Micropeplus staphylinoides*, *Phyllodrepa floralis*, *Coprophilus striatulus*, *Oxytelus rugosus*, *O. sculpturatus*, *O. nitidulus*, *O. tetracarinatus*, *Platystethus cornutus*, *P. nodifrons*, *Gyrophypnus* spp., *Xantholinus* spp., *Neobisnus* and *Philonthus* spp.). The small staphylinid (*Platystethus arenarius*) and the 'dung beetles' (*Aphodius* spp.) are usually associated with animal dung and stock raising, but these species are thought to also breed in wet and loosely structured urban waste in the archaeological record (Kenward *et al.* 2004).

Drier material, such as hay, may have been incorporated into these deposits. This is indicated by beetles such as *Atomaria* spp., *Corticaria* spp. and *Mycetea hirta* which account for 5% of the fauna recovered.

As with sample 3009 the presence of nearby weedy/ rough ground is also indicated. This is suggested by the ground beetles recovered such as, *Clivina fossor*, *Trechoblemus micros*

and *Harpalus rufipes* all of which are all common in yards, gardens and open areas near settlement (Luff 2007). Similarly, rough ground is indicated by *Brachypterus urticae* which occurs on stinging nettle (*Urtica dioica* L.).

### Sample 6006/ Context 6055

This context produced a relatively large fauna of beetles (197 individuals) which is dominated by species that are either directly synanthropic (synanthropic groupings sf, st, ss combined = 34 %) or are part of Kenwards 'house fauna' (synanthropic group 'h' = 14.7%).

In addition to many synanthropic fauna, like previous samples this fauna includes taxa that are associated with decaying settlement waste. Ecological group 'rt', which is associated with rather decayed organic material, accounts for 32% of the total fauna. This group is composed of many of the same species that occurred in Samples 3009 and 6011, but with the addition of taxa such as Ptiliidae, *Clambus* spp, *Hister* spp. and *Monotoma* spp. There is some evidence for the presence of drier organic material. This is indicated by the presence of a range of lathridiids and Cryptophagid 'mould beetles', but also by the presence of *Typhaea stercorea*, which seems to be associated particularly with this type of drier organic material. This last group of taxa, along with the woodworm (*Anobium punctatum*) and the spider beetle (*Ptinus fur*) are all part of Kenward's house fauna, which clearly attests to the origin of this material. A limited number of beetles are associated again with rough or waste ground. For example *Ceutorhynchus contratus* is associated with poppies (PAPAVERACEAE) and mignonettes (RESEDACEAE) and *Gymetron* spp. with plantain (*Plantago* spp.). Similarly, the scolytid (*Phloeophthorus rhododactylus*) is associated with broom (*Cytisus* spp.) or gorse (*Ulex europaeus* L.). The 'ground beetles' recovered, such as *Clivina fossor*, *Trechoblemus micros* the *Bembidion* spp., *Patrobus* spp. and *Pterostichus diligens* are also associated with this type of landscape.

## DISCUSSION

On the basis of the insect remains recovered, it seems that this range of features from Sheffield Castle all contained a mixture of settlement waste and material, and probably represent dumping. Unfortunately, it is not possible to be more specific about the nature of this material. Sometimes with urban or high status settlement deposits, we are able to use the insects to assign very specific interpretations. There are a set of 'indicator groups' of beetles and flies that can be used to identify tanning (Hall and Kenward 2011), craft production (Hall and Kenward 2003), cesspits (Smith 2013), house floors (Carrott and Kenward 2001), stabling waste (Kenward and Hall 1997) and roofing thatch (Smith *et al.* 1999), but none of these are strongly evident at Sheffield Castle.



Many Medieval and Post-Medieval sites share a similar history of mixed deposition and back filling. This was often the case at 9th – 11th century Coppergate, York (Kenward and Hall 1995), Medieval Beverly, Yorkshire (Hall and Kenward 1980), Guildhall London (Smith and Morris 2008) and early modern Birmingham (Smith 2009).

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**Table 1. Context, feature, phase and archaeological descriptions for the samples from Sheffield Castle**

Sample number	Context number	Description and contents	Date
3013	3079	demolition/destruction layer	13 <sup>th</sup> century
3009	<b>3057</b>	demolition/destruction layer	13th century
6011	6072	pit fill	late-11th/12th century
6006	6055	ground layer	Medieval, sealed deposit 6072



Table 2. The insect remains from Sheffield Castle (Taxonomy follows Lucht 1987)

	Eco codes	Syn codes					Plant associations for phytophages (taken from Koch 1992)
<b>Sample number</b>			3013 3079	3009 3057	6011 6072	6006 6055	
<b>1</b> <i>CONTEXT NUMBER</i>							
<b>2</b> <i>WEIGHT KG.</i>			10.5	7	8	8	
<b>3</b> <i>VOLUME LT</i>			11	10	6	8	
<b>4</b>							
<b>COLEOPTERA</b>							
<b>Carabidae</b>							
<i>Clivina fossor</i> (L.)	oa		-	-	1	5	
<i>T. quadristriatus</i> ( Schrk )/ <i>T. obtusus</i> Er.	oa		-	-	1	-	
<i>Trechoblemus micros</i> (Hbst.)	oa		-	-	1	3	
<i>Bembidion</i> spp.	oa		1	-	1	12	
<i>Patrobus</i> sp.	oa		-	-	-	2	
<i>Harpalus rufipes</i> (Geer)	oa		-	-	2	-	
<i>Pterostichus diligens</i> (Sturm)	oa		-	-	-	3	
<i>Pterostichus melanarius</i> (Ill.)	oa		-	1	-	-	
<i>Platynus obscurus</i> (Herbst.)	oa		-	-	-	1	
<i>Dromius</i> spp.	oa		-	-	-	1	
<b>Dytiscidae</b>							
<i>Hydroporus</i> spp.	oa-w		-	-	-	-	
<b>4.1 Hydraenidae</b>							
<i>Hydraena</i> spp.	oa-w		-	1	-	2	
<i>Helophorus grandis</i> (Ill.)	oa-w		-	-	-	1	
<i>Helophorus</i> spp.	oa-w		-	1	-	1	
<b>Hydrophilidae</b>							
<i>Coelostoma orbiculare</i> (F.)	oa-w		-	-	-	1	
<i>Cercyon analis</i> (Payk.)	rt	sf	-	-	-	5	
<i>Cercyon</i> spp.	rt		-	2	-	-	
<i>Megasternum boletophagum</i> (Marsh.)	rt		-	-	1	5	
<i>Cryptopleurum minutum</i> (F.)	rf	st	-	-	-	2	
<b>Histeridae</b>							
Histeridae Gen and spp. indet.			-	-	-	1	
<b>Clamidae</b>							
<i>Clambus</i> spp.			-	-	1	2	
<b>Catopidae</b>							
<i>Catops</i> spp.			-	-	1	-	
<b>Ptiliidae</b>							
Ptiliidae Genus & spp. indet.	rt		-	-	1	4	
<i>Acrotrichis</i> spp.	rt		-	-	-	2	
<b>Staphylinidae</b>							
<i>Micropeplus staphylinoides</i> (Marsh.)	rt		-	-	1	4	
<i>Metopsia gallica</i> (Koch)			-	-	-	1	



<i>Phyllodrepa floralis</i> (Payk.)	rt		-	-	1	-
<i>Omalius rivulare</i> (Payk.)	rt	sf	-	1	-	-
<i>O. caesum</i> Grav.	rt	st	-	-	-	2
<i>O. excavatum</i> Steph.	rt	sf	-	1	-	-
<i>Omalius</i> spp.	rt		-	1	2	-
<i>Xylodromus concinnus</i> (Marsh.)	rt-h	st	-	1	-	4
<i>Lesteva</i> spp.	oa-d		-	-	2	2
<i>Coprophilus striatulus</i> (F.)	rt	st	1	2	-	2
<i>Trogophloeus bilineatus</i> (Steph.)	rt	sf	-	1	-	2
<i>Trogophloeus ?corticinus</i> (Grav.)	rt		1	-	-	-
<i>Trogophloeus</i> spp.			-	-	-	2
<i>Oxytelus rugosus</i> (F.)	rt		4	5	3	6
<i>Oxytelus sculpturatus</i> Grav.	rt	sf	1	-	2	-
<i>Oxytelus nitidulus</i> Grav.	rt-d		6	3	16	9
<i>Oxytelus tetracarinatus</i> (Block)	rt		-	-	1	-
<i>Platystethus arenarius</i> (Fourc.)	rf		-	1	1	15
<i>Platystethus cornutus</i> (Grav.)	oa-d		-	-	1	-
<i>Platystethus nodifrons</i> (Man.)	oa-d		-	-	10	-
<i>Stilicus orbiculatus</i> (Payk.)			-	-	-	3
<i>Stenus</i> spp.			1	2	4	6
<i>Lathrobium</i> spp.	oa	st	-	1	-	2
<i>Gyrophypnus fracticornis</i> (Müll.)	rt	st	-	-	1	3
<i>Xantholinus</i> spp.			-	-	1	4
<i>Neobisnius</i> spp.	rt		-	-	3	3
<i>Philonthus</i> spp.			1	1	3	4
<i>Quedius</i> spp.			-	-	-	3
<i>Philonthus</i> spp.			-	-	-	1
<i>Tachinus rufipes</i> (Geer.)		st	1	-	-	2
<i>Tachinus</i> spp.		sf	-	2	-	-
<i>Bolitobius</i> spp.	rt		-	-	-	1
<i>Falagria</i> spp.	rt		-	1	-	-
Aleocharinidae Genus & spp. Indet.			5	4	8	11
<b>Pselaphidae</b>						
<i>Trichonyx sulcicollis</i> (Reichb.)			1	-	-	1
<i>Trissemus impressus</i> (Panz.)			-	-	1	-
<b>Elateridae</b>						
<i>Agroties</i> spp.	oa		-	-	1	-
<b>Byturidae</b>						
<i>Byturus tomentosus</i> (Geer)	oa		-	1	-	-Normally associated with <i>Rubus</i> spp. (brambles etc.)
<b>Nitidulidae</b>						
<i>Brachypterus urticae</i> (F.)	oa-p		-	-	1	2 <i>Urtica dioica</i> L. (stinging nettle)
<b>Rhizophagidae</b>						
<i>Rhizophagus parallellocollis</i> Gyll.	rt	sf	1	-	1	-
<b>Cucujidae</b>						
<i>Monotoma</i> spp.	rt	sf	-	-	-	2
<i>Laemophloeus ferrugineus</i> (Steph.)	g	ss	-	1	-	-
<b>Cryptophagidae</b>						
<i>Cryptophagus</i> spp.	rd-h	sf	-	2	-	7
<i>Atomaria</i> spp.	rd-h	st	-	1	3	4
<b>Lathridiidae</b>						
<i>Enicmus minutus</i> (Group)	rd-h	st	1	1	-	3
<i>Enicmus transversus</i> (Ol.)	rd		1	-	-	-
<i>Cartodere ruficollis</i> (Marsh.)	rd	sf	-	-	-	1
<i>Corticaria/ corticarina</i> spp.	rt	sf	-	1	2	9
<b>Mycetophagidae</b>						
<i>Typhaea stercorea</i> (L.)	rd	ss	-	-	-	2



<b>Colydiidae</b>							
<i>Cerylon</i> sp.	l			1	-	-	-
<b>Endomychidae</b>							
<i>Mycetaea hirta</i> (Marsh.)	rd-h	ss		-	-	2	5
<b>Lyctidae</b>							
<i>Lyctus linearis</i> (Goeze)	l-h	sf		-	1	-	-
<b>Anobiidae</b>							
<i>Anobium punctatum</i> (Geer)	l-h	sf		-	1	3	6
<b>Ptinidae</b>							
<i>Ptinus fur</i> (L.)	rd-h	sf		-	-	-	1
<b>Scarabaeidae</b>							
<i>Aphodius sphaecelatus</i> (Panz.) or <i>A. prodromus</i> (Brahm)	oa-rf			-	1	1	-
<i>Aphodius ?lapponum</i> Gyll.	oa-rf			-	-	1	-
<i>Aphodius fimetarius</i> (L.)	oa-rf			1	-	-	-
<i>Aphodius</i> spp.	oa-rf			-	-	-	1
<b>Chrysomelidae</b>							
<i>Phyllotreta</i> spp.	oa			-	1	2	1
<i>Chaetocnema concinna</i> (Marsh.)	oa			-	2	1	2
<b>Bruchidae</b>							
<i>Bruchus pisorum</i> (L.)	oa-pu			-	-	-	1
<b>Scolytidae</b>							
<i>Scolytus intricatus</i> (Ratz.)	oa-l			-	1	-	-
<i>Phloeophthorus rhododactylus</i> (Marsh.)	oa-l			-	-	-	1 Often on <i>Cytisus</i> species (Brooms) or <i>Ulex europaeus</i> L. (gorse)
<i>Dryocoetes villosus</i> (F.)	oa-l			1	2	-	- Usually <i>Quercus</i> (oak) but also <i>Fagus</i> (beech)
<i>Xyleborus dryographus</i> (Ratz.)	oa-l			-	1	-	- Usually <i>Quercus</i> (oak) but also <i>Fagus</i> (beech)
<b>Curculionidae</b>							
<i>Apion</i> spp.	oa-p			-	-	-	1
<i>Sitona</i> spp.	oa			-	1	-	-
<i>Leiosoma deflexum</i> (Panz.)	oa-ws			-	1	-	- <i>Caltha palustris</i> L. (Marsh marigold)
<i>Phloeophagus lignarius</i> (Marsh.)	l			-	1	-	-
<i>Ceutorhynchus ?contractus</i> (Marsh.)	oa-p			-	-	-	1 Usually associated with RESEDACEAE (Mignonette Family) and PAPAVERACEAE (Poppy Family)
<i>Cidnorhinus quadrimaculatus</i> (L.)	oa-p			-	1	-	2 <i>Urtica dioica</i> L. (stinging nettle)
<i>Rhinoncus</i> spp.	oa-p			1	-	-	- Usually on <i>Polygonum</i> (knotgrass)
<i>Gymnetron</i> spp.				-	-	-	1
<b>DIPTERA</b>							
SUBORDER CYCLORRHAPHA							
Family, genus & spp. indet.							
				-	-	1	-
<b>Drosophilidae</b>							
<i>Drosophila</i> sp.				2	-	-	-
<b>Calliphoridae</b>							
<i>Calliphora</i> spp.				-	-	-	1
<b>HYMENOPTERA</b>							
Formicoidea Family Genus and spp. indet.							
				-	7	1	1

**Ecological coding** (Kenward and Hall 1995)

oa - Species which will not breed in human housing.

w- aquatic species.

c- species associated with salt water and coastal areas

d- species associated with damp watersides and river banks.

rd- species primarily associated with drier organic matter.

rf - species primarily associated with foul organic matter often dung.



rt - insects associated with decaying organic matter, but not belonging to either the rd or rf groups.  
g- species associated with grain.  
l - species associated with timber.  
p – phytophage species often associated with waste areas or grassland and pasture  
pu – species associated with pulses (peas and beans)  
h - members of the 'house fauna' this is a very arbitrary group based on archaeological associations (Hall and Kenward 1990).

**Synanthropic coding** (Kenward 1997)

sf - facultative synanthropes - common in 'natural' habitats but clearly favoured by artificial ones.  
st - typically synanthropes - particularly favoured by artificial habitats but believed to be able to survive in nature in the long term.  
ss - strong synanthropes - essentially dependant on human activity for survival.  
h- species thought to be particularly associated with human occupation (Kenward and Hall 1995).

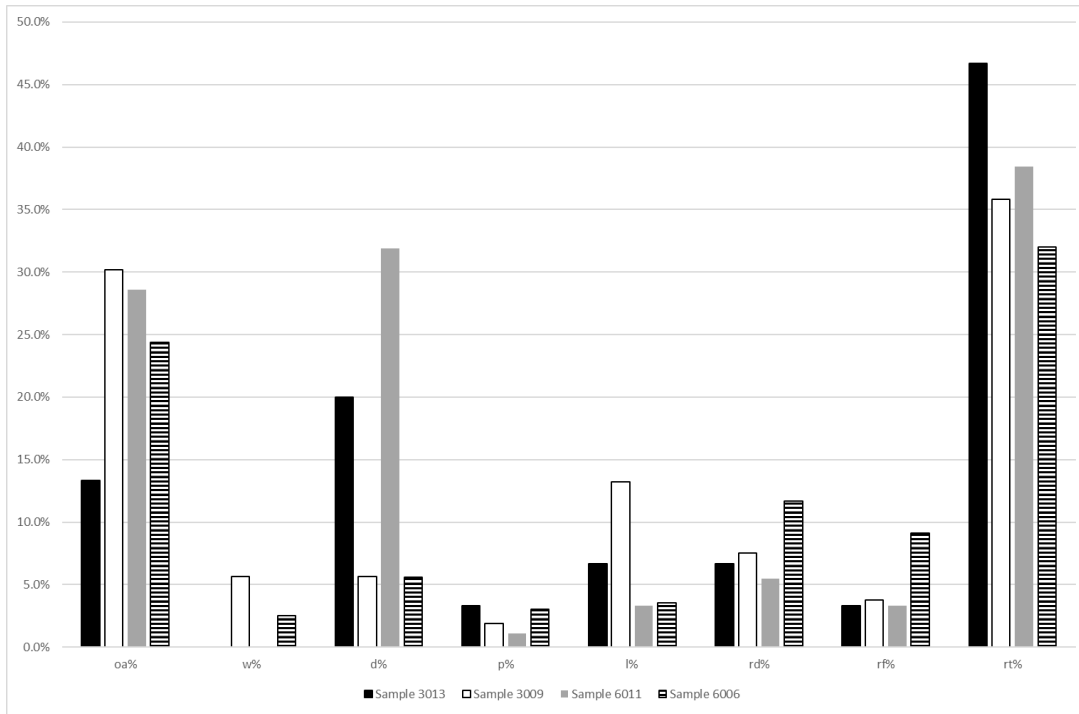


**Table 3: The relative proportions of ecological and synanthropic groups for the insect remains from Sheffield Castle (see bottom of Table 2 for the key to abbreviations for ecological groups)**

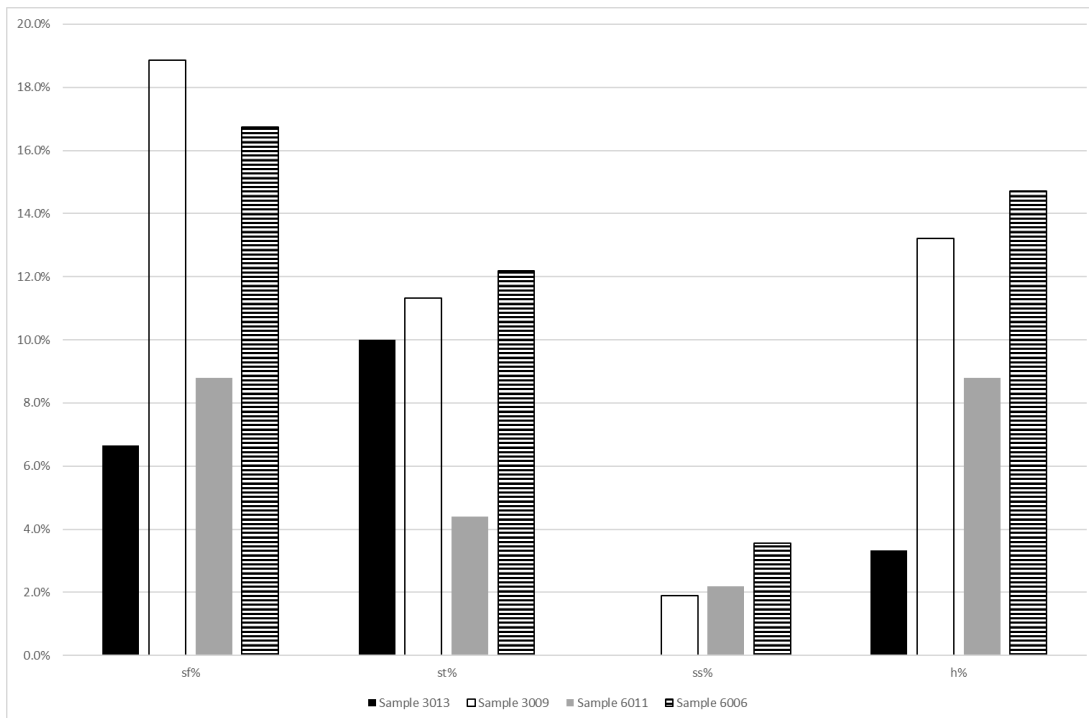
	3013	3009	6011	6006
<b>total number individuals</b>	30	53	91	197
<b>Total number of taxa</b>	18	37	39	61
oa%	13.3%	30.2%	28.6%	24.4%
w%	0.0%	5.7%	0.0%	2.5%
d%	20.0%	5.7%	31.9%	5.6%
p%	3.3%	1.9%	1.1%	3.0%
l%	6.7%	13.2%	3.3%	3.6%
rd%	6.7%	7.5%	5.5%	11.7%
rf%	3.3%	3.8%	3.3%	9.1%
rt%	46.7%	35.8%	38.5%	32.0%
sf%	6.7%	18.9%	8.8%	16.8%
st%	10.0%	11.3%	4.4%	12.2%
ss%	0.0%	1.9%	2.2%	3.6%
h%	3.3%	13.2%	8.8%	14.7%



**Figure 1: The relative proportions of ecological groups for the insect remains from Sheffield Castle (see bottom of Table 2 for the key to abbreviations for ecological groups)**



**Figure 2: The relative proportions of synanthropic groups for the insect remains from Sheffield Castle (see bottom of Table 2 for the key to abbreviations for synanthropic groups)**





*Mark Bateman*

**Abstract:** Optically stimulated luminescence (OSL) dating was applied to coarse quartz grains extracted from a samples taken from the Sheffield Castle site, Sheffield UK. The sample responded ok to OSL measurement. Replicate measurements of the sample showed poor reproducibility with skewed De data and high overdispersion. This is assumed to insufficient bleaching at deposition or post-depositional disturbance. The final minimum age was  $2.03 \pm 0.25$  ka. Samples were also collected for portable luminescence measurements from a number of contexts whose age was known in order to determine the age of other contexts with no chronological control. pOSL data appears to be reasonably internally consistent. pOSL data from Trench 2 above the OSL sample indicates the addition of much later sediments at this locality during the 13<sup>th</sup> and 11<sup>th</sup> centuries fitting with other units on site. This is the first use of pOSL in this way and the approach looks promising for use in other similar settings where there is good chronological control on some units/contexts but not others.

## Full OSL dating

### 1. Introduction

A sample from the Sheffield Castle site, Sheffield UK was submitted for luminescence dating by Dr Milica Rajic (Wessex Archaeology). The sample was assumed not to have been exposed to sunlight during sampling or transportation. All luminescence work was carried out at the Sheffield Luminescence Laboratory (SLL). Upon arrival at SLL, the sample was allocated a Sheffield lab number (Table 1), which is used throughout this report. This report provides a brief summary of the procedures employed and results obtained for this sample.

**Table 1.** *Sample descriptive data.*

Lab No.	Field Reference	Latitude (° N)	Longitude (° W)	Altitude (m)	Sampling Depth (m below present-day surface)
Shfd18119	Castle 1, Trench 2	53°23'	1°27'	56	0.7

In order to derive an optically stimulated luminescence (OSL) age both the palaeodose (De - the amount of absorbed dose since the sample was buried) and the dose rate (the estimated radiation flux for the sedimentary bodies) have to be determined. Bateman (2019) gives a detailed explanation of both these parameters. To calculate an age, the palaeodose (expressed in Grays) is divided by the annual dose rate (Grays/yr). An inherent assumption in the age calculation is that the sediment was fully reset or 'bleached' by exposure to sunlight during the last transport event or whilst *in situ* prior to burial and that no post-depositional sediment disturbance has occurred.

As part of this investigation, efforts have been taken to establish if the sediment was bleached prior to burial or disturbed by, for example, bioturbation by measuring 24 replicates of the sample. As the OSL signal measured at the single aliquot

level is an average of ~2000 grains, the true distribution of De values may be masked. Measurements therefore used a smaller aliquot size of approx. 800 grains to mitigate this. Further measurements at the single grain level would have to be made to check if this is an issue or not.

## 2. Dose Rate Analysis

Naturally occurring potassium (K), thorium (Th), uranium (U) are the main contributors of dose to sedimentary quartz.. The concentrations of these elements were determined by inductively coupled plasma mass spectrometry (ICP) at SGS laboratories Ontario Canada (Table 2). Elemental concentrations were converted to alpha and beta dose rates using data from Adamiec and Aitken (1998), Marsh *et al.* (2002), and Aitken (1998). A field measurement using an EG&G gamma spectrometer was collected and the resultant gamma dose rate used. Calculations took into account attenuation factors relating to sediment grain sizes used, density and palaeomoisture (Table 2). Attenuation of dose by moisture used present-day values with a  $\pm 5\%$  error to incorporate fluctuations through time (Table 2).

**Table 2.** Summary of dosimetry related data.

Lab Code	U (PPM)	Th (PPM)	K (%)	D <sub>cosmic</sub> <sup>+</sup> ( $\mu\text{Gy/a}^{-1}$ )	Moisture (%)	Gamma Dose rate* ( $\mu\text{Gy/a}^{-1}$ )	Dose rate <sup>†</sup> ( $\mu\text{Gy/a}^{-1}$ )
Shfd18119	3.04	11.3	2.3	193 $\pm$ 10	8	1445 $\pm$ 72	4702 $\pm$ 240

\* Cosmic dose is calculated as a linear decay curve at depths below 50 cm. Above this depth, errors in calculation may lead to an underestimation of the cosmic dose contribution.

\* measured on site using a field gamma spectrometer

† Total dose is attenuated for grain size, density and moisture.

The contribution to dose rates from cosmic sources was calculated using the expression published in Prescott and Hutton (1994; Table 2). The Prescott and Hutton (1994) algorithm was used to calculate the cosmogenic derived dose rate. The dose rates calculated are based on analyses of the sediment sampled at the present day. This assumption is only valid if no movement and/or re-precipitation of the four key elements has taken place since sediment burial and the adjacent sediments to those sampled had similar dose rates. Further analysis would have to be undertaken to establish whether radioactive disequilibrium is present in the dose rate.

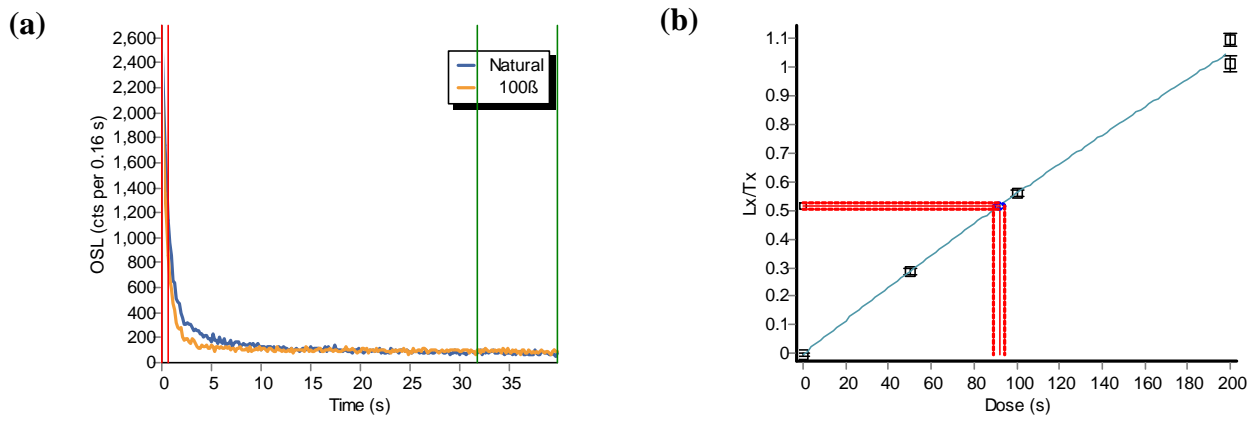


Figure 1 Examples of small aliquot OSL data for sample Shfd18119: (a) OSL decay of naturally acquired signal; (b) SAR growth curve. The red lines in (a) indicate the integration limits for signal measurement, and the green lines background measurement once the signal has been zeroed. In (b) the luminescence response (Lx) to a series of known doses is normalised by test dose response (Tx) and plotted against dose. The red line represents interpolation of the natural dose ( $D_e$ );

### 3. Palaeodose Determination

The sample was prepared under subdued red lighting following the procedure to extract and clean quartz outlined in Bateman and Catt (1996). Material for dating was taken from prepared quartz isolated to a size range of 90-180  $\mu\text{m}$ . The sample underwent measurement using a Risø DA-15 luminescence reader with radiation doses administered using a calibrated  $^{90}\text{strontium}$  beta source. Grains were mounted as a 5 mm diameter monolayer on 9.6 mm diameter stainless still disks using silkospray. Stimulation was with blue/green LEDs and luminescence detection was through a Hoya U-340 filter. The sample was analysed using the single aliquot regenerative (SAR) approach (Murray & Wintle, 2000; Murray & Wintle, 2003), in which an interpolative growth curve is constructed using data derived from repeated measurements of a single aliquot which has been given various laboratory irradiations (Figure 1a and 1b). Five regeneration points were used to characterise growth curves, with the first regeneration point being identical to the last in order to check if sensitivity changes caused by repeated measurement of the same grains are correctly monitored and corrected for by the SAR protocol (known as the “recycling ratio”). The most appropriate preheat temperature for the sample was selected using a dose recovery preheat plateau test (Figure 2). This resulted in selection of preheat temperatures of 160 °C for 10 seconds which was applied to prior to each OSL measurement to remove unstable signal generated by laboratory irradiation.  $D_e$  values from individual aliquots were only accepted if they exhibited an OSL signal measurable above background, good growth with dose, recycling values within  $\pm 10\%$  of unity, and the error on the test dose used within the SAR protocol was less than 20%. The sample possessed ok luminescence characteristics with a rapid decay of OSL with stimulation and OSL signals dominated by a fast component (e.g. Fig. 1a). Within the SAR protocol results which grew well with laboratory dose (e.g. Fig. 1b).

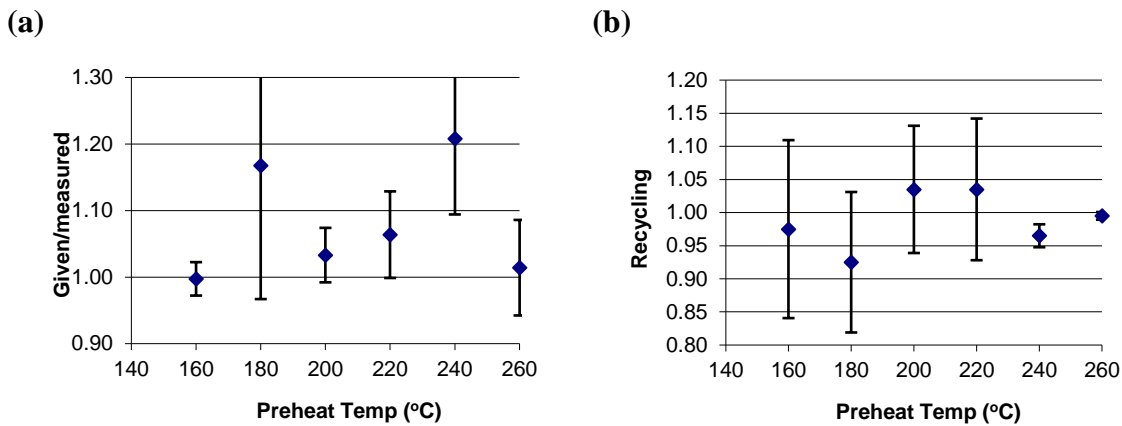


Figure 2. Results of different preheat temperatures in recovering a ~20 Gy beta radiation dose from sample Shfd18119 (a) Given to recovered dose ratio at different preheat temperatures. (b) recycling ratio (ratio between the first and last dose point) at the different preheat temperatures. Data points in both plots are the averages of three measurements performed for each preheat temperature.

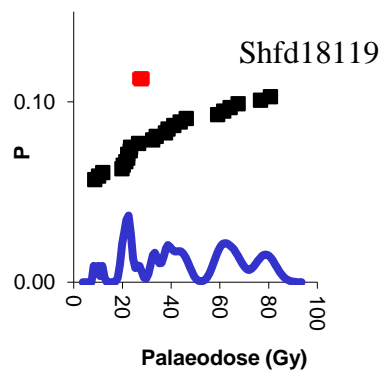


Figure 3.  $D_e$  distribution plots for the sample. Blue line is combined probability density for all grains. Black points are results from individual grains. Note dose is scaled as appropriate for data.

**Table 3.** Summary of palaeodose data and age for Sheffield Castle

Lab Code	Field Ref.	Depth (m)	$D_e$ (Gy)	Overdispersion (%)	Dose rate ( $\mu\text{Gy/a}^{-1}$ )	Age (ka)
Shfd18119	Castle 1, Trench 2	0.7	$9.43 \pm 1.04$	61	$4702 \pm 240$	<b><math>2.01 \pm 0.24</math></b>

#### 4. Sedimentary bleaching behaviour and sample saturation

The effects of incomplete bleaching of the sediment during the last period of transport or exposure *in situ* can be profound. Typically, poorly bleached sediments retain a significant level of residual signal from previous phases of sedimentary cycling, leading to inherent inaccuracies in the calculation of a palaeodose value. By plotting the replicate  $D_e$  data for the sample as a probability density function (Figure 3) some assessment of whether older or younger material has been included in the sample measurements can be made. In principle a well-bleached sample that has not been subjected to post-depositional disturbance should have replicate  $D_e$  data which is normally distributed and highly reproducible (see Bateman *et al.*, 2003, Figure 3; Bateman *et al.*, 2007a). Where post-depositional disturbance or incomplete bleaching prior to sample burial has occurred skewing of this distribution may occur and/or replicate reproducibility may be lower (Bateman *et al.*, 2007a; Bateman *et al.*, 2007b). In the case of poorly bleached material skewing should be evident with

a high De tail (e.g. Olley *et al.*, 2004). High De tails may also be indicative of saturated samples and interpolation of the De values from the upper, low gradient part of the growth curve (Murray & Funder, 2003).

As Figure 3 demonstrates (see also Appendix 1), the De replicate distributions of this sample is not normally distributed (even after outliers are removed) and has high levels of De replicate scatter (OD <20%; values given in Table 3). This data shows indications that of either partial bleaching or post-depositional disturbance. To mitigate the effects of including older or not fully reset signals in the final De values for age calculation purposes the data was analysed using the Minimum Age Model (MAM) of Galbraith and Green (1990).

## 5. Age Calculation

The age is quoted in years from the present day (2019) and is presented with a one sigma confidence interval which incorporate systematic uncertainties with the dosimetry data, uncertainties with the palaeo moisture content and errors associated with the De determination. Table 3 shows the final OSL age estimate of  $2.01 \pm 0.24$  ka. Aliquot-specific data for the sample is included in Appendix 1. Data shows that the sample had low reproducibility in terms of its palaeodose and therefore ages may over-estimate true burial age.

## Portable luminescence report

Portable OSL (pOSL) was carried out on a series of samples collected in light tight containers (Table 4). These samples fell into two sub-groups. One group where the age was relatively well constrained by context or artefacts. One group where the age was unknown. Under controlled red lighting, all samples had any light exposed material removed and were dried at 30 °C. No other sample preparation was undertaken. It is assumed that both the mineralogy and level of light exposure prior to burial of all samples and the back ground radioactivity to all samples was broadly similar. If these assumptions are valid then the magnitude of the pOSL signal should reflect antiquity. Each sample was measured on a SUERC portable luminescence reader for 1 min using IR light stimulation and 1 min using Blue light stimulation (See Bateman *et al.* 2015 for details on measurement). The signal from the IR measurements is derived from feldspar minerals in sediments whilst the blue measurement signal is from both quartz and feldspar minerals. A correction procedure was therefore employed on the blue light data to compensate for any changes in the ratio of feldspar:quartz.

Based on the pOSL it became apparent that both 10073 and 5041 either had undergone light exposure during sampling or these samples were much younger than assigned in the context (Table 4). Both had a very similar pOSL signal so are apparently of similar age/level of bleaching. Using other known ages these samples might be as young as 18/19<sup>th</sup> Century (Figure 4; Table 5). Samples from 3070, 3058 and 1079 all had similar pOSL signals and are taken to be of 13/14<sup>th</sup> century age (Table 5). Sample 3071 had a higher pOSL signal and is taken either not to have had the OSL signal reset prior to burial or to be older (Table 4). Again using other known age samples sample 3071 might be as old as 8<sup>th</sup> century.

In terms of the unknown age samples the different units identified in trench 2 appeared conformable to the pOSL data (Figure 5). Assuming all samples were exposed to sufficient light prior to burial to reset the OSL signal fully, it would appear from using the above known age samples that the uppermost unit in trench 2 is similar in age to samples from 3070, 3058 and 1079 and therefore is probably 13/14<sup>th</sup> century (Figure 4; Table 6). The middle unit is older and maybe as old as 11<sup>th</sup> century and the basal unit even older still maybe as old as 6<sup>th</sup> century (Figure 4; Table 6). Sample from

would appear younger than 3070, 3058 and 1079 and is estimated to be 15<sup>th</sup> century in age (Figure 4; Table 6). Sample 6066 appears of similar age to the uppermost unit in Trench 2 estimated as 13<sup>th</sup> century (Figure 4; Trench 2).

**Table 4:** pOSL samples collected from the Sheffield Castle site and where known their age.

1	Context	Known date of context	Basis of established dating	Number and type of sample(s)
1	1079	older than or equal to 13th–15th century	Stratigraphically precedes deposit 1057 containing 13th–15th century pottery	3 pOSL samples
2	2048 + 2051	Unknown		8 pOSL samples
2	2061	Unknown		1 pOSL sample
3	3058	13th century	Context contained 13th century pottery	1 pOSL sample
3	3070	older than or equal to 13th century	Stratigraphically precedes deposit 3058 containing 13th century pottery	1 pOSL sample
3	3071	older than or equal to 13th century	Stratigraphically precedes deposit 3058 containing 13th century pottery	1 pOSL sample
5	5041	13th century	Context contained 13th century pottery	3 pOSL samples
6	6066	Unknown, probably medieval?		2 pOSL samples
10	10073	older than or equal to 13th–15th century	Stratigraphically precedes deposit 10071 containing 13th–15th century pottery	3 pOSL samples

**Table 5:** pOSL data from the Sheffield castle site of known age samples. Shown are corrected OSL signal, ages (\*or adjusted ages; in years from 2019) and OSL signal accumulation rate. Age adjustment was undertaken to get the OSL accumulation rate similar to other samples (original rate shown in parenthesis).

Sample	OSL (cts)	Age (yr)	OSL accumulation rate (cts/yr)
5041	415 ± 38	225*	1.85 (0.64)
3071	2391 ± 87	1300	1.84
3070	1204 ± 63	650	1.85
3058	1438 ± 66	750	1.92
1079	1243 ± 59	650	1.91
10073	312 ± 35	175*	1.78 (0.48)



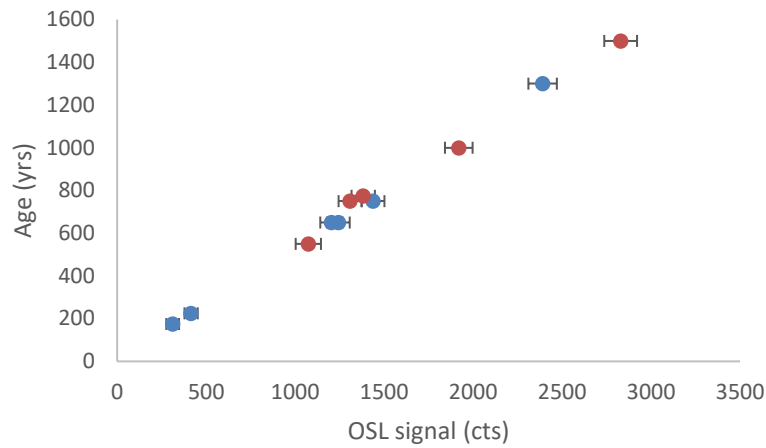


Figure 4: pOSL(corrected for variable IRSL) plotted against age. For blue points age was determined from site context and artefacts with the exceptions of 10073 and 5041 which appeared younger than had been designated and 3071 which appeared to be older. For these three points age was assigned assuming a similar OSL cts per year to the known age samples. Points in red are the samples of unknown age which are also plotted assuming a similar OSL cts per year to the known age sample.

Table 6: pOSL data from the Sheffield castle site of unknown age samples. Shown are corrected OSL signal, estimated ages (in years from 2019) and OSL signal accumulation rate . Age estimation was based on OSL signal accumulation rates calculated from known age samples as shown in Table 2.

Sample	OSL (cts)	Age (yr)	OSL accumulation rate (cts/yr)
2061	1074 ± 71	550	1.95
Trench 2, 14-15	2829 ± 80	1500	1.89
Trench 2, 10a-12a	1920 ± 78	1000	1.92
Trench 2, 6a-9a	1309 ± 65	750	1.75
6066	1383 ± 66	775	1.78

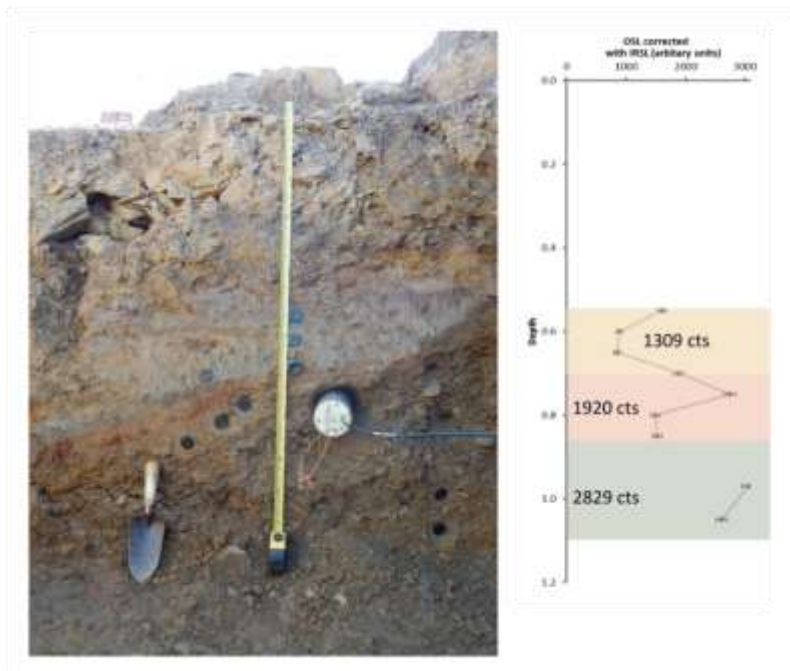


Figure 5: Profile sampled for pOSL from trench 2 contexts 2048 and 2051 and the resultant pOSL data. pOSL data colour coded based on the identified units found in the profile. pOSL samples 6a-9a are from the beige coloured unit, samples 10-12a from the salmon coloured unit and 14-15 from the grey coloured unit. Also shown is the mean OSL cts within each unit.

## Conclusions

The OSL age sample was not well reset at burial or has been disturbed giving an age of  $2.01 \pm 0.24$  ka (~1<sup>st</sup> Century) but despite statistical methods (MAM) to mitigate this, this age may still be an over-estimation. pOSL samples from the same context in Trench 2 also show this unit to be pre-medieval and maybe 6<sup>th</sup> Century. The OSL and pOSL data is therefore broadly conformable. pOSL data appears to be reasonably internally consistent. pOSL data from Trench 2 may indicate the addition of much later sediments at this locality during the 13<sup>th</sup> and 11<sup>th</sup> centuries fitting with other units on site.

This is the first use of pOSL in this way and the approach looks promising for use in other similar settings where there is good chronological control on some units/contexts but not others.

Prof Mark D. Bateman

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# Appendix 1

## OSL data and plots for the Sheffield Castle site

Sample specific data including:-

- list of De values derived from individual aliquots
- calculated means based on a range of statistical models
- histogram plot of distribution of De within a sample
- probability density plot (curve) with ranked De data (black points) and probability mean (uppermost red point).

Field Code: Castle 1  
 Lab Code: Shfd18119  
 Aliquot Size: small

Site: Sheffield castle

Aliquot	Palaeodose (Gy)	error
1	58.982	1.643
2	80.726	2.264
3	41.076	1.125
4	61.529	1.606
5	22.184	0.587
6	38.670	0.961
7	8.552	0.214
8	76.651	2.426
9	26.631	0.922
10	10.175	0.239
11	22.188	0.650
12	64.151	1.822
13	23.228	0.599
14	19.789	0.699
15	11.871	0.338
16	23.261	0.621
17	37.658	1.089
18	20.234	0.514
19	32.398	0.824
20	43.675	1.225
21	67.389	1.793
22	21.398	0.549
23	46.213	1.542
24	33.791	0.875

	De (Gy)	error
Minimum	8.55	0.21
Maximum	80.73	2.26
N	24	

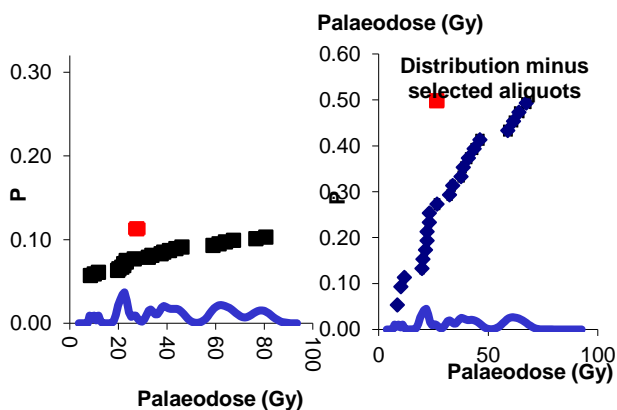
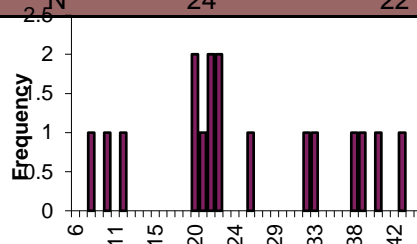
Unweighted		
	All Data	Minus Outliers
Mean (Gy)	37.18	33.41
SD	21.18	17.66
SE	4.32	3.60
N	24	22

Weighted		
	All Data	Minus Outliers
Mean (Gy)	16.70	16.40
SD	11.56	10.76
SE	2.36	2.29
N	24	22

Probability		
	All Data	Minus Outliers
Mean (Gy)	27.58	26.55
SD	15.01	13.28
SE	3.06	2.83
N	24	22

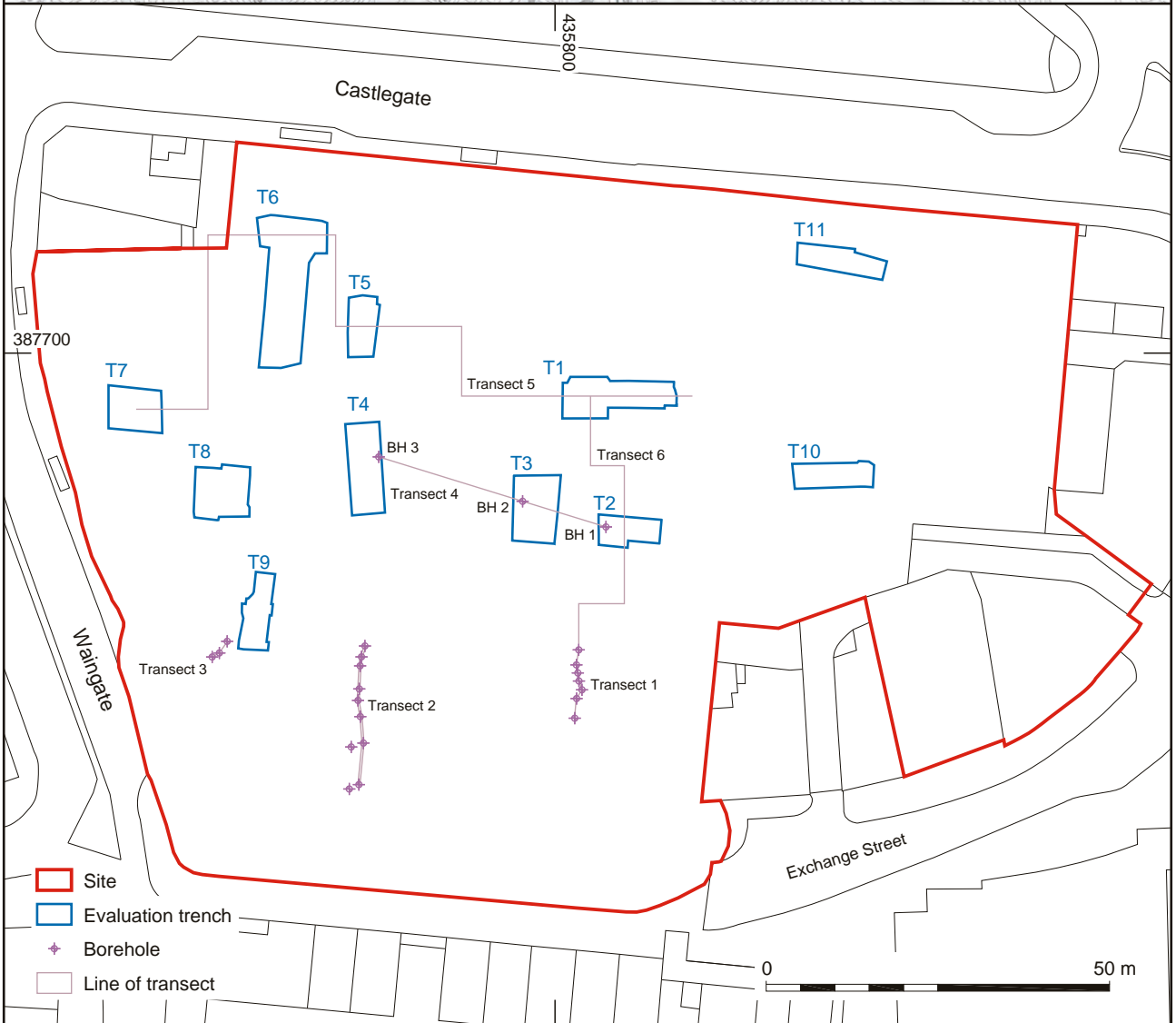
Central Age Model		
	All Data	Minus Outliers
Mean (Gy)	31.34	28.82
SD	3.91	3.49
OD (all data)	61.03%	56.77%
N	24	22

De Distribution		
	All Data	Minus Outliers
Skewness	0.51	-0.08
Kurtosis	-0.63	-0.65
Median	33.09	29.51
Sorting	0.55	0.45



MAM 9.43 1.04





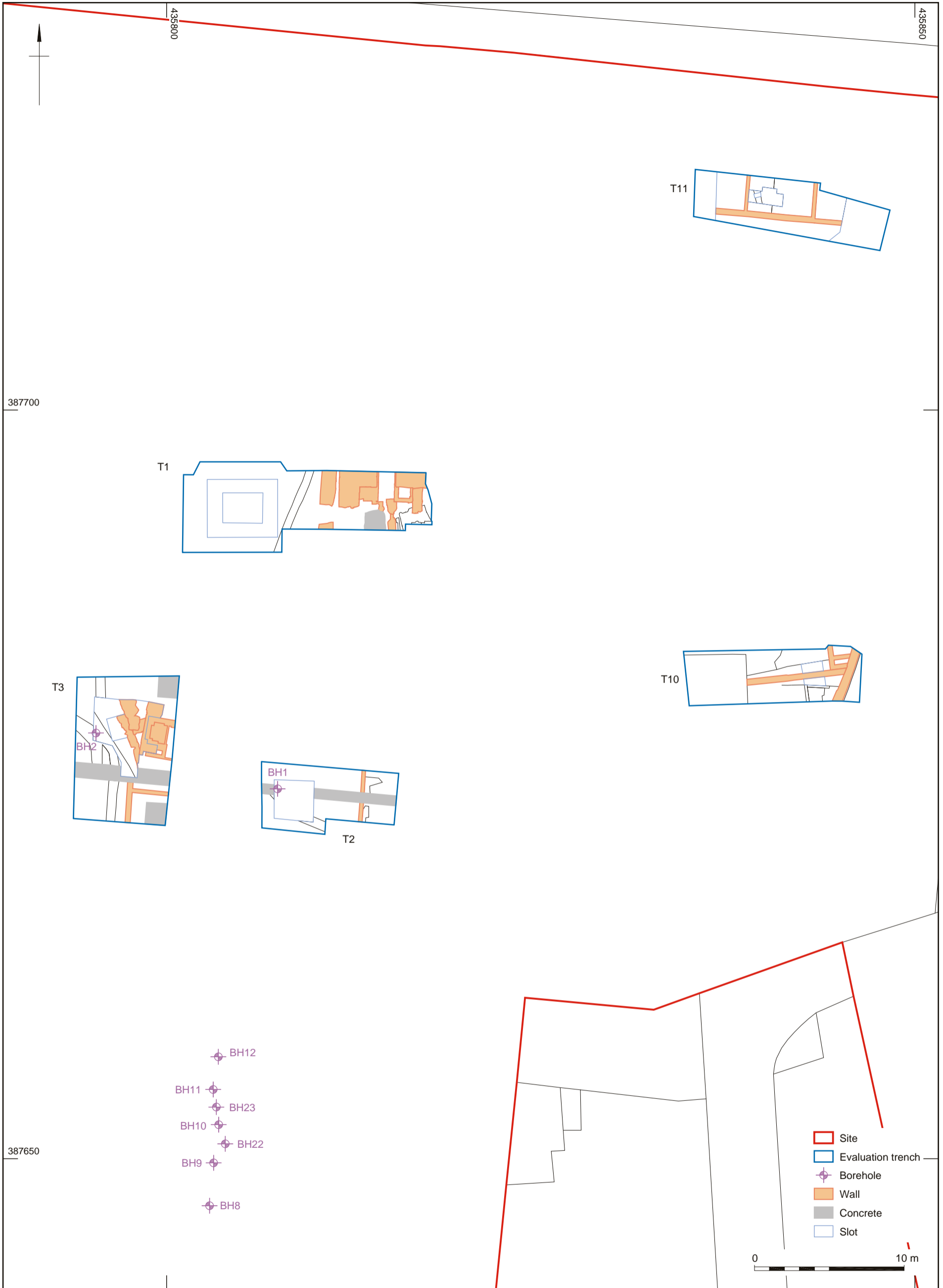
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Site location

Figure 1



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Overview plan – part 1

Figure 2

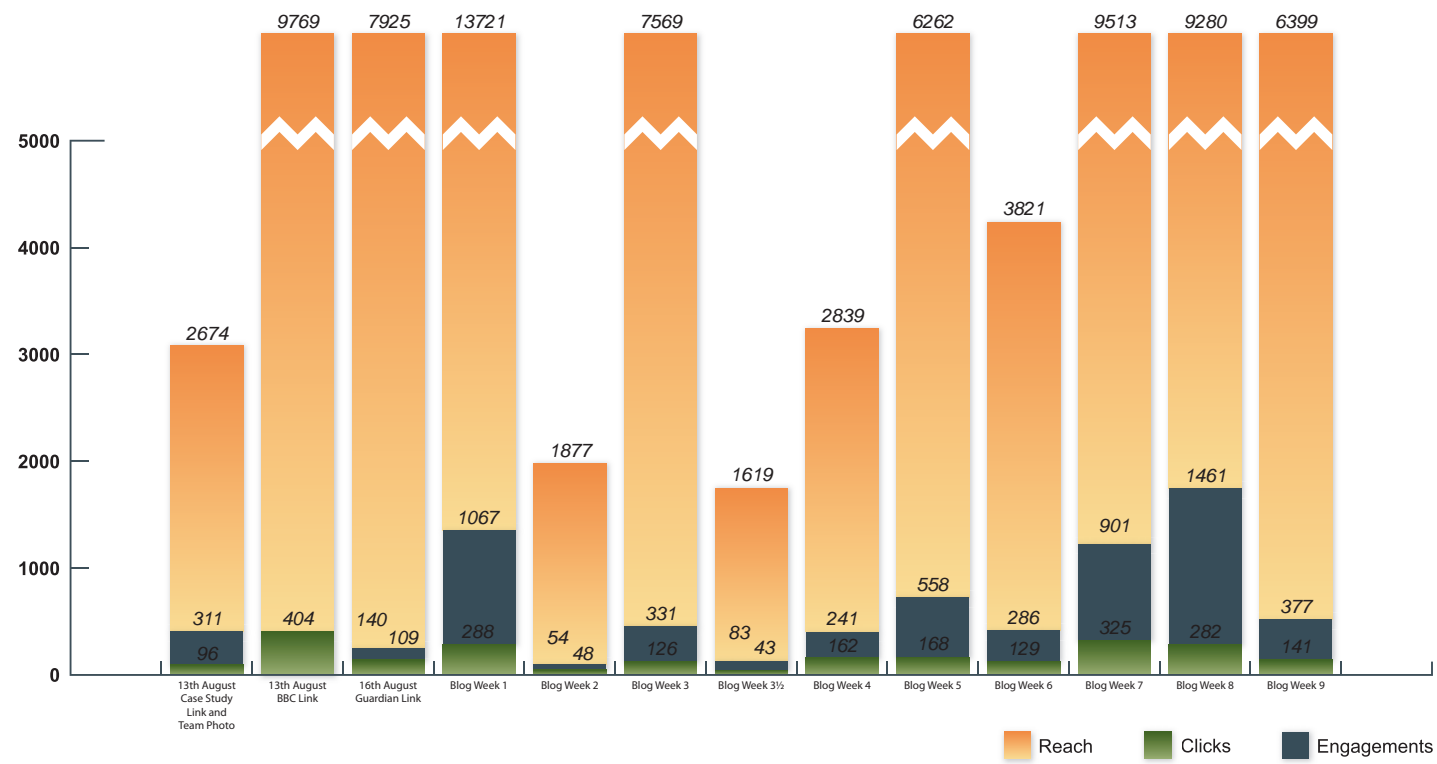


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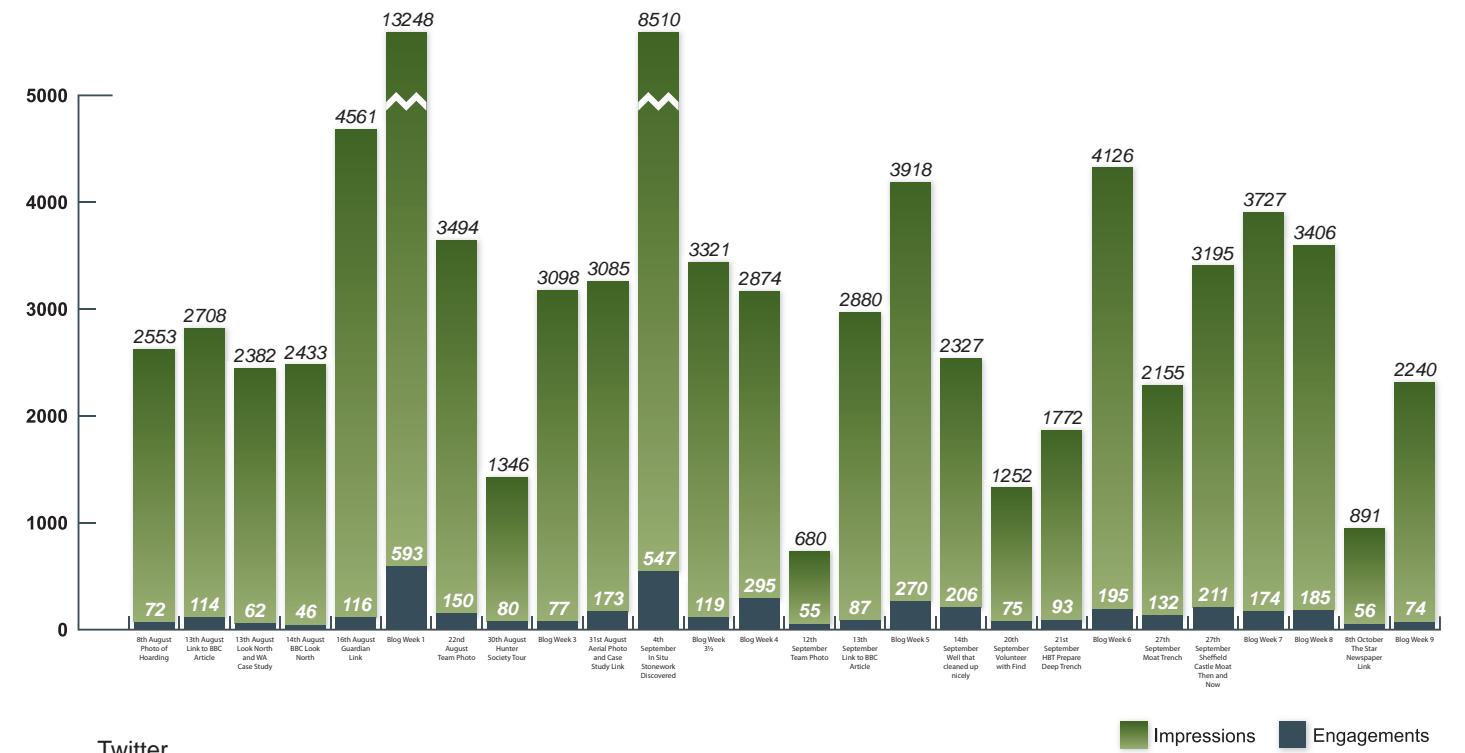
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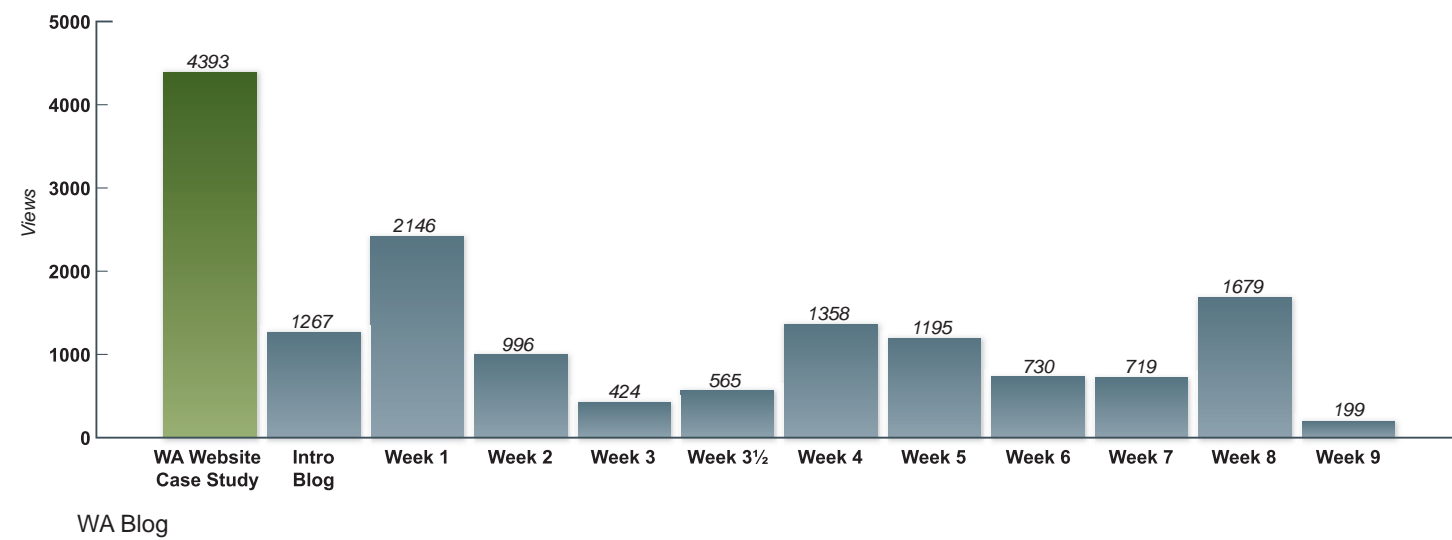




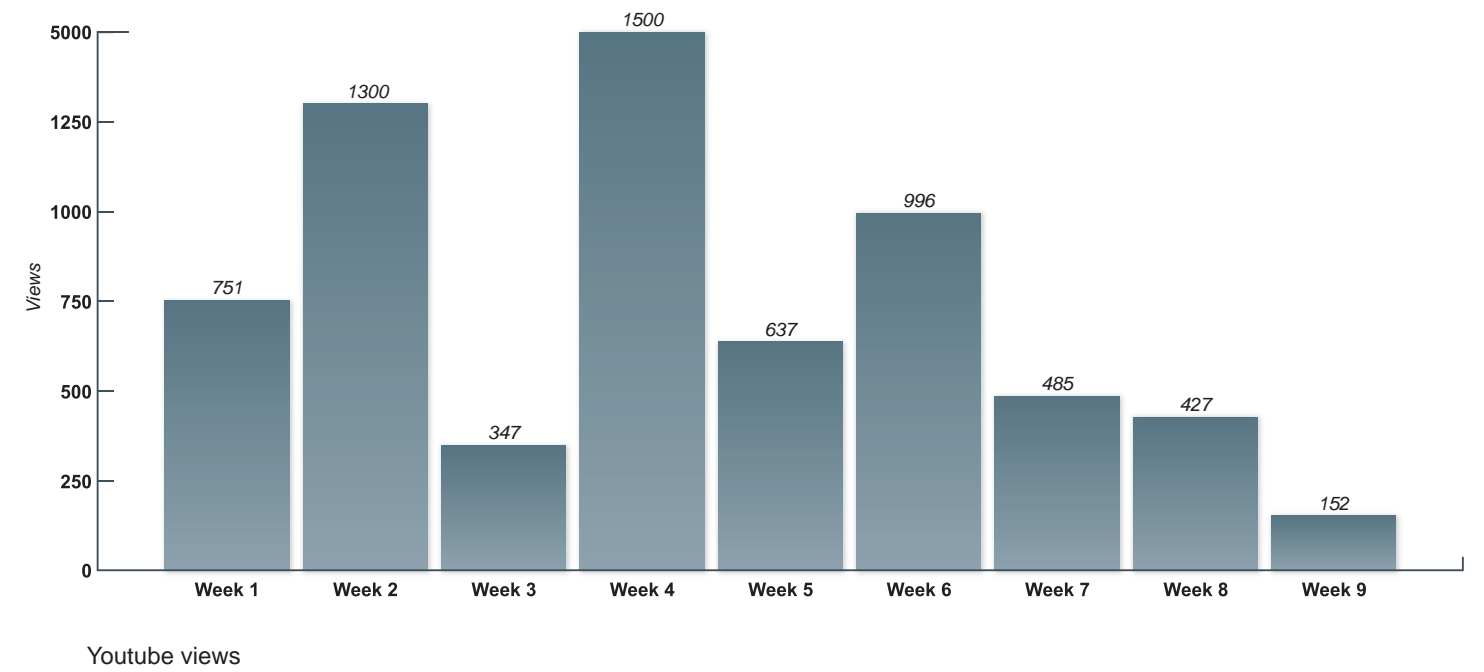
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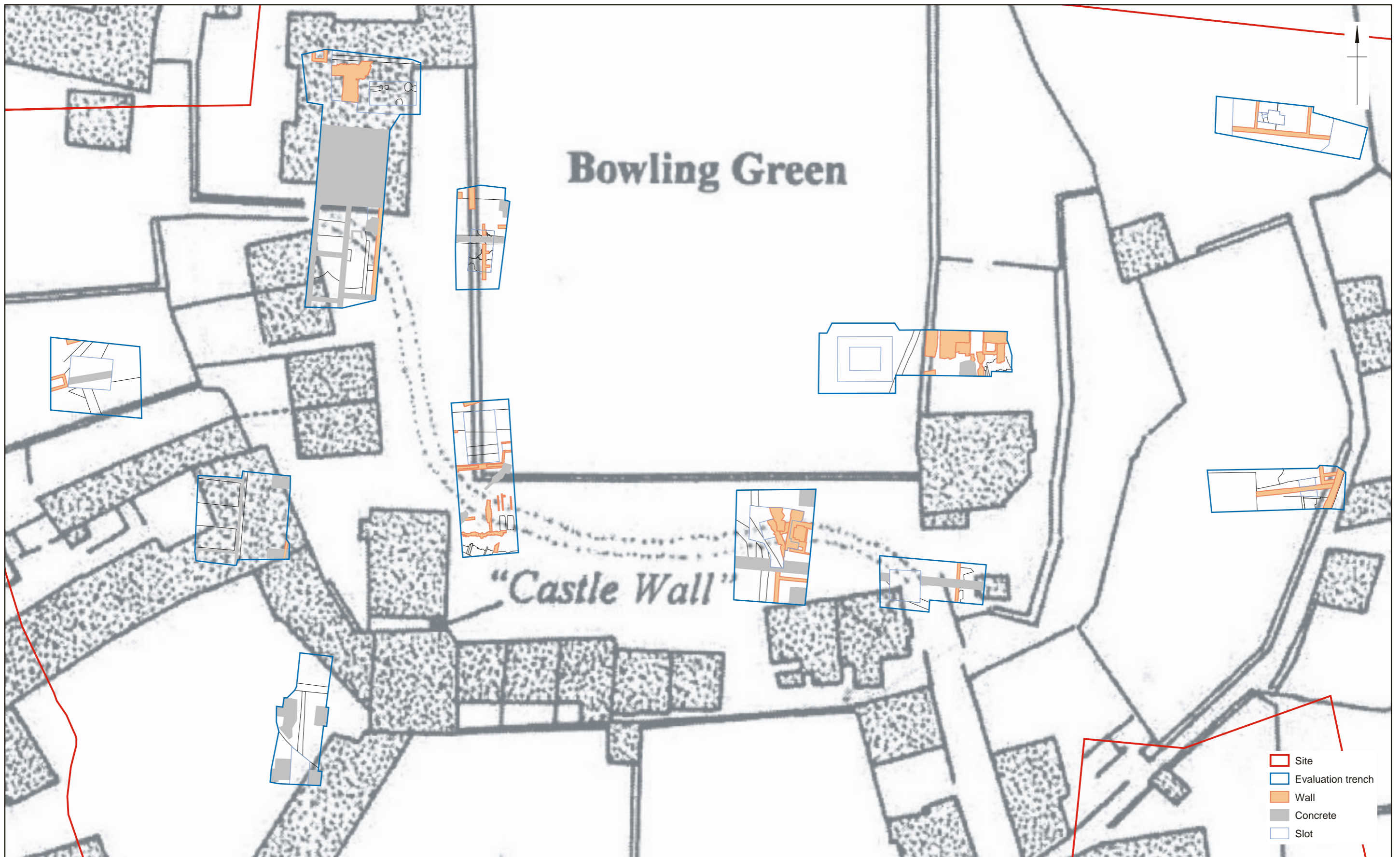
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Outreach statistics

Figure 4



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Site plan superimposed on composite map c.1760 (Belford 1998)

Figure 5

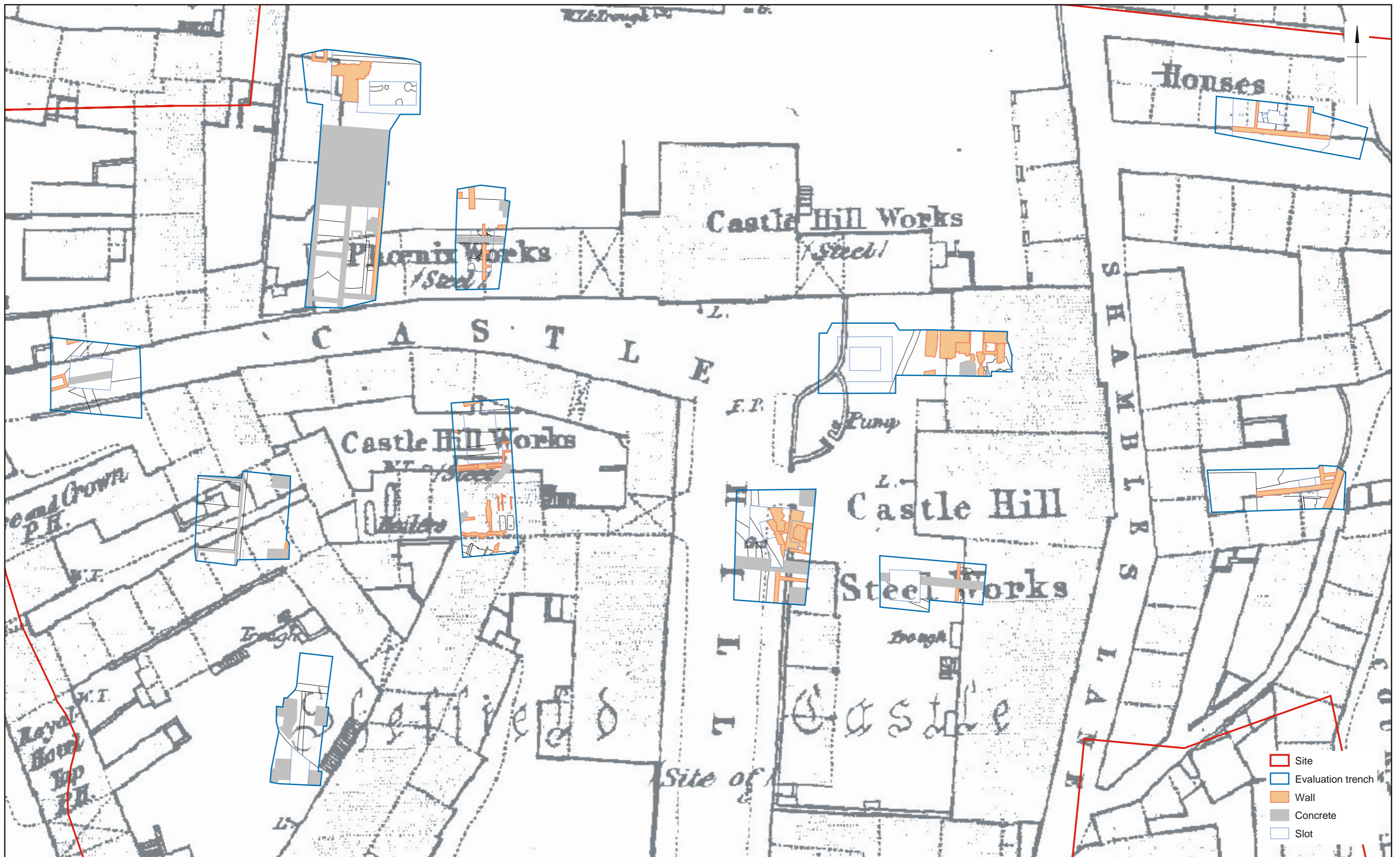


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Site plan superimposed on composite map c.1800 (Belford 1998)

Figure 6



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Site plan superimposed on Ordnance Survey map of 1853

Figure 7



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Site plan superimposed on Ordnance Survey map of 1892

Figure 8



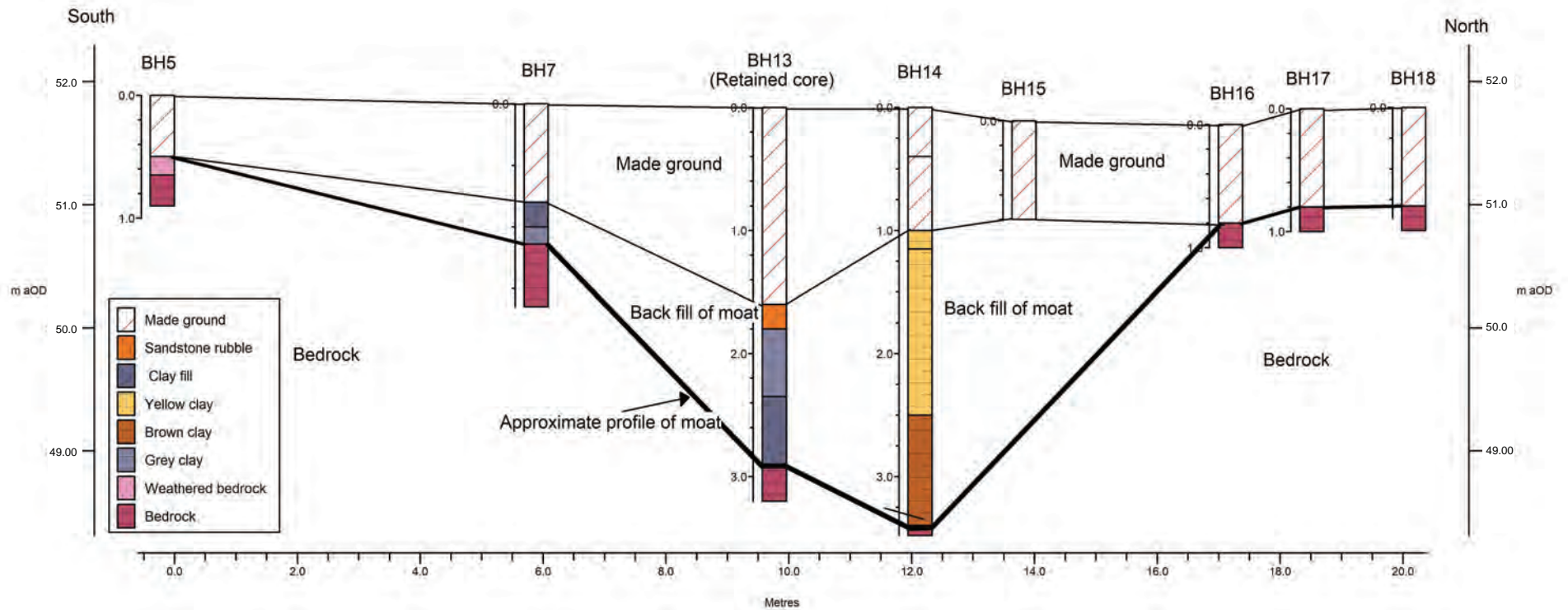
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Site plan superimposed on Goad Fire Insurance plan of 1896

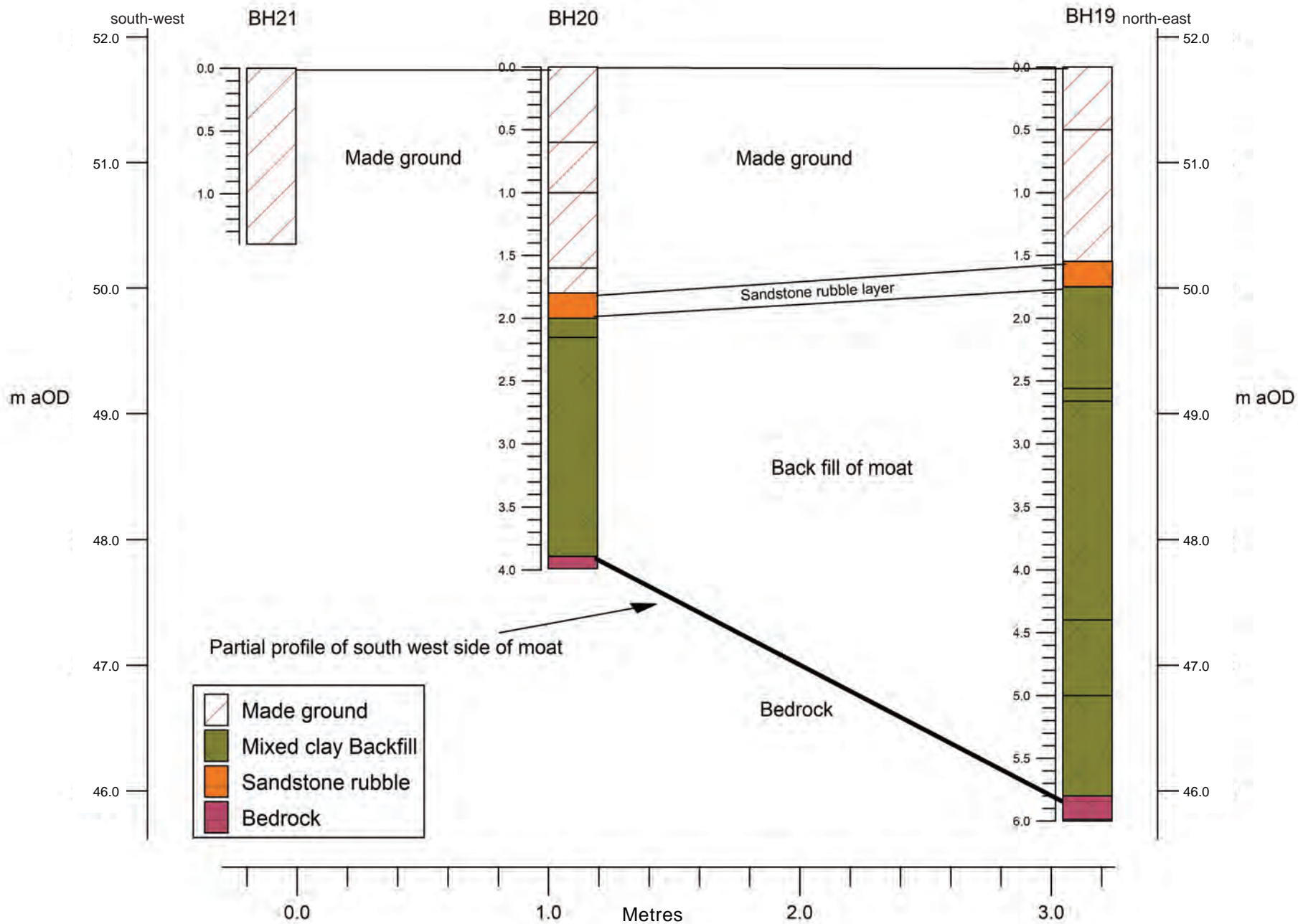
Figure 9




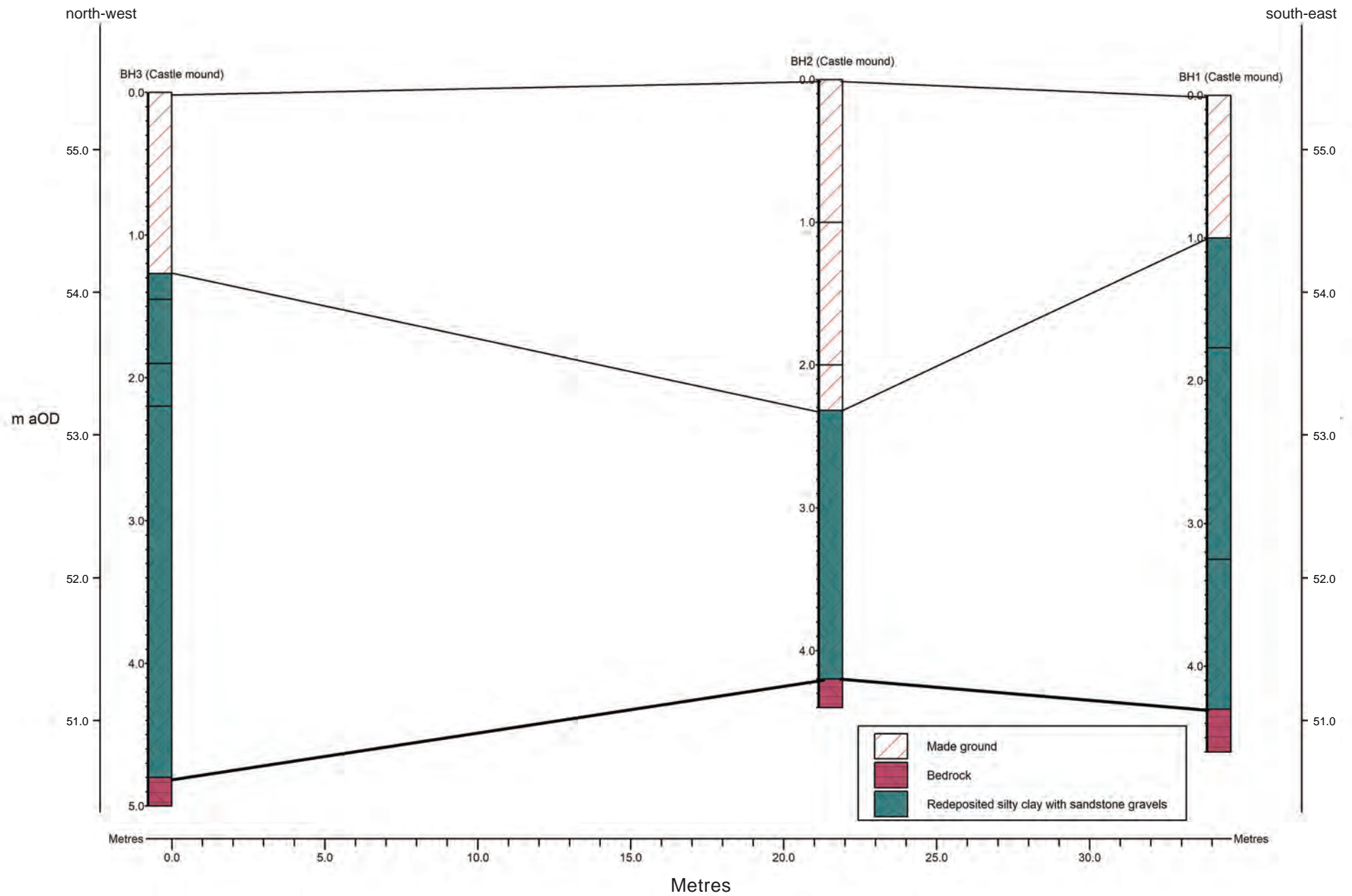



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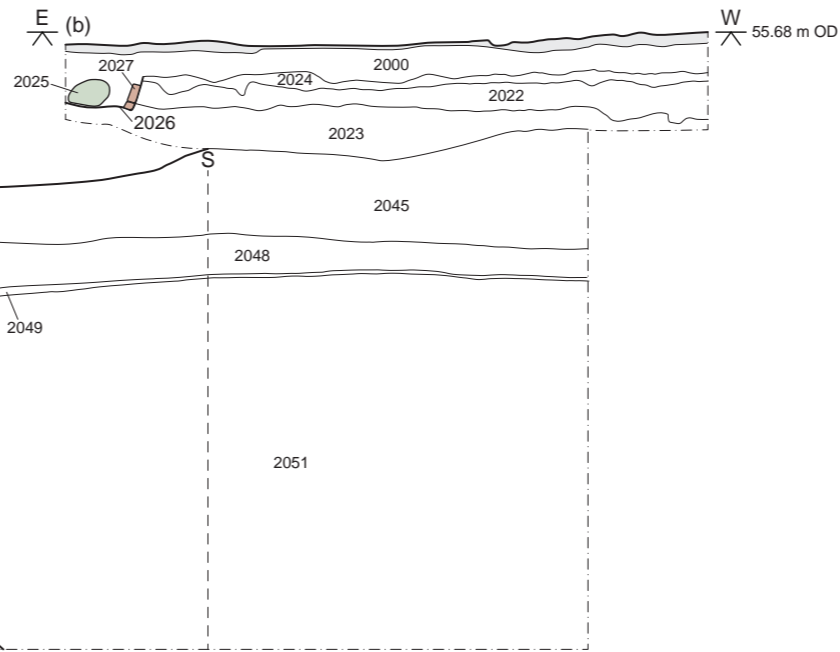
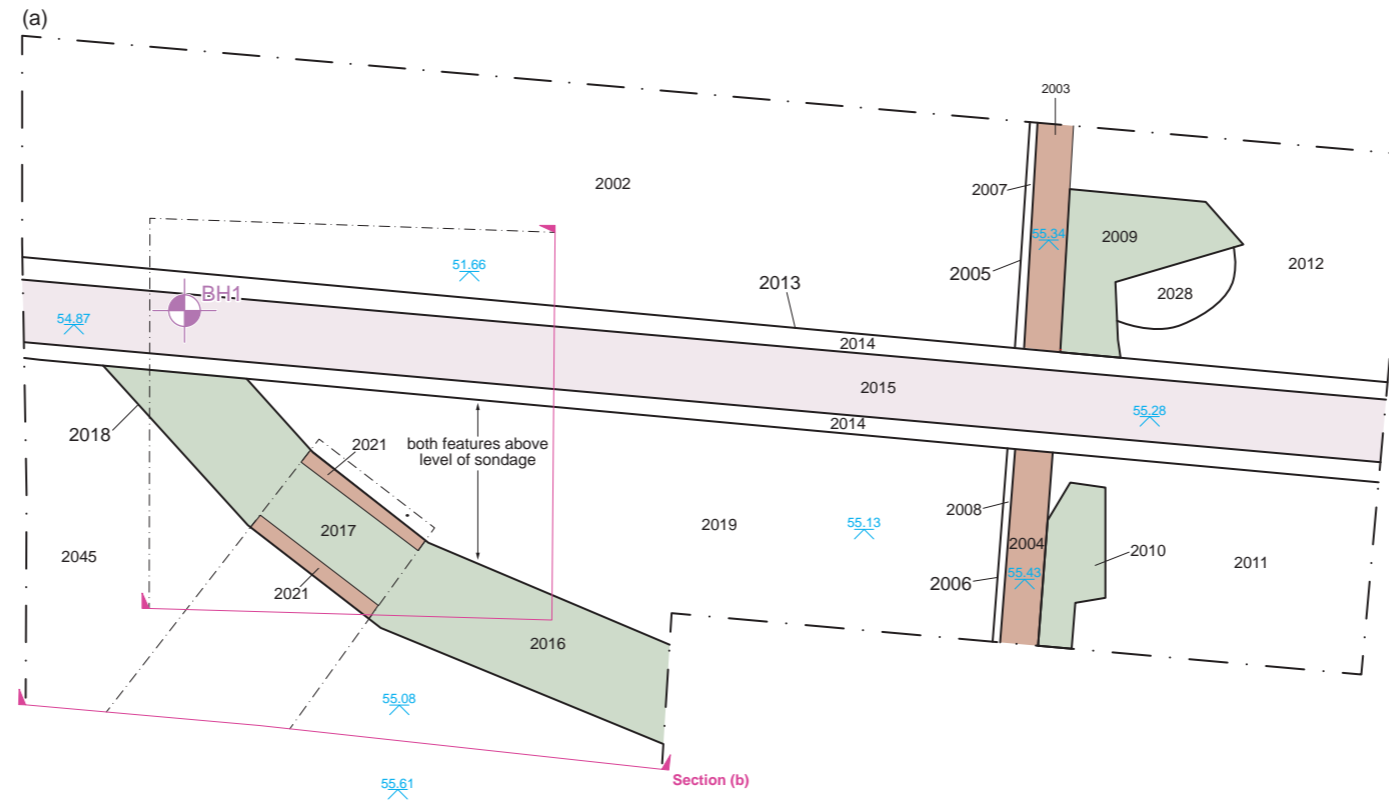


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Borehole transect 4

Figure 13





- Brick
- Stone
- Concrete
- Borehole




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Trench 2 plan (a) and composite section (b)

Figure 15

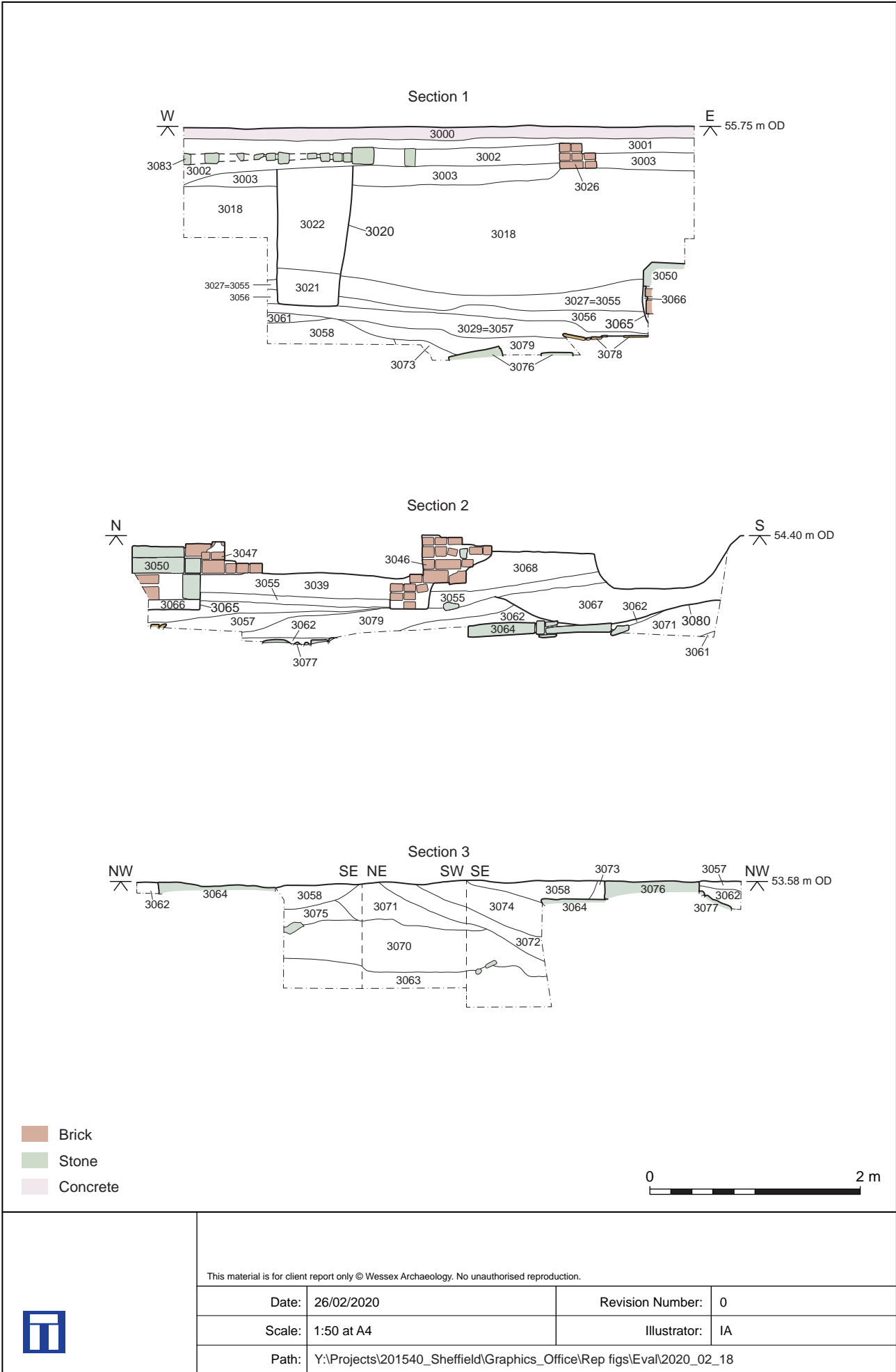


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Trench 3 plan (a) and plan of lower level (b)

Figure 16

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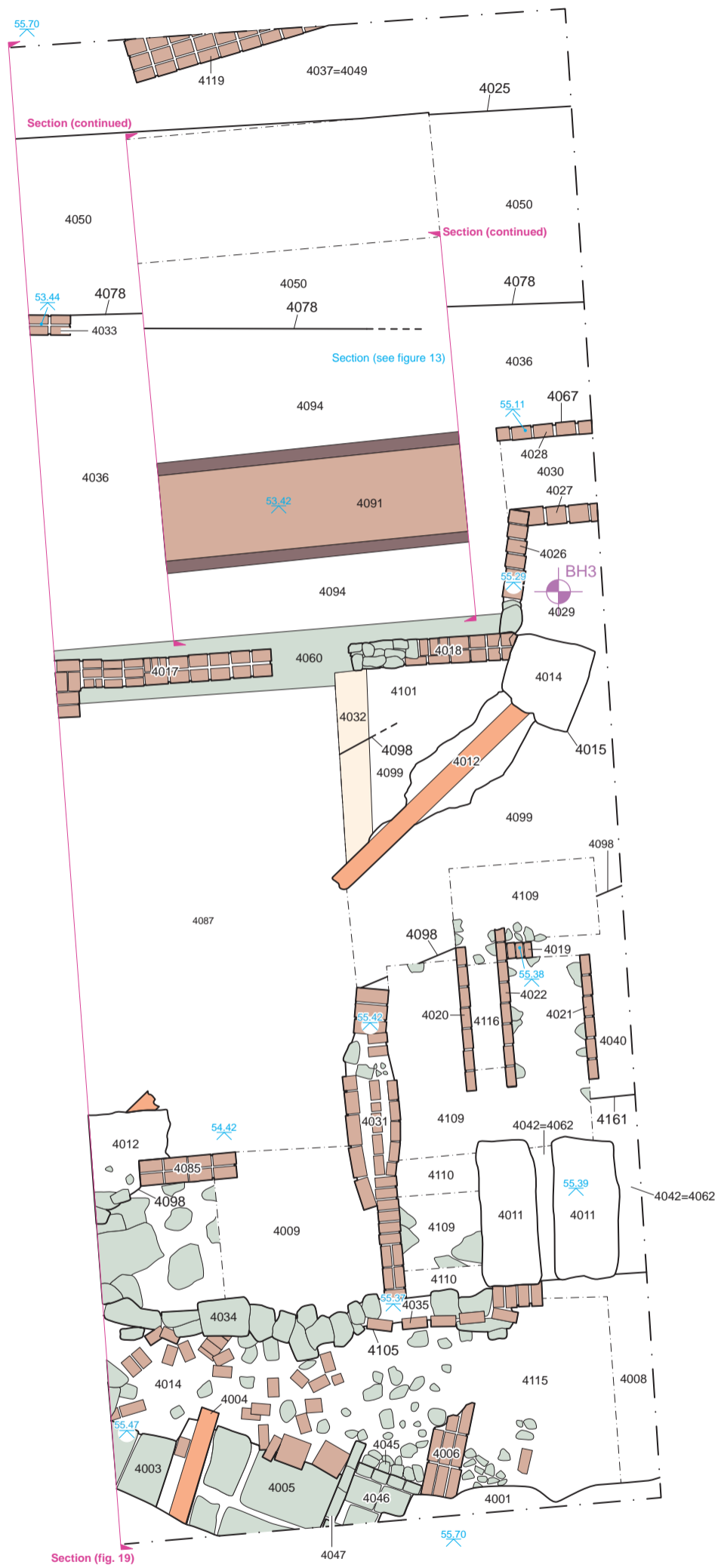
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Trench 3 sections

Figure 17



- Brick
- Fire brick
- Ceramic drain
- Stone
- Mortar
- Borehole



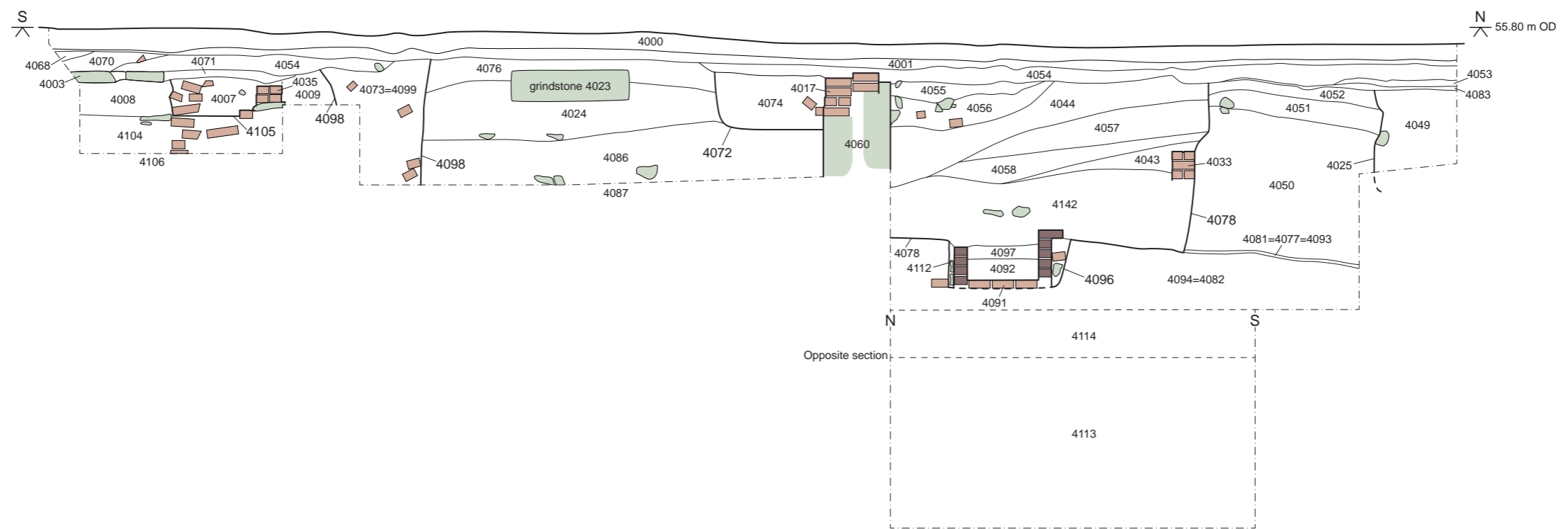
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Trench 4 plan

Figure 18



- Brick
- Fire brick
- Ceramic drain
- Stone
- Mortar
- Borehole



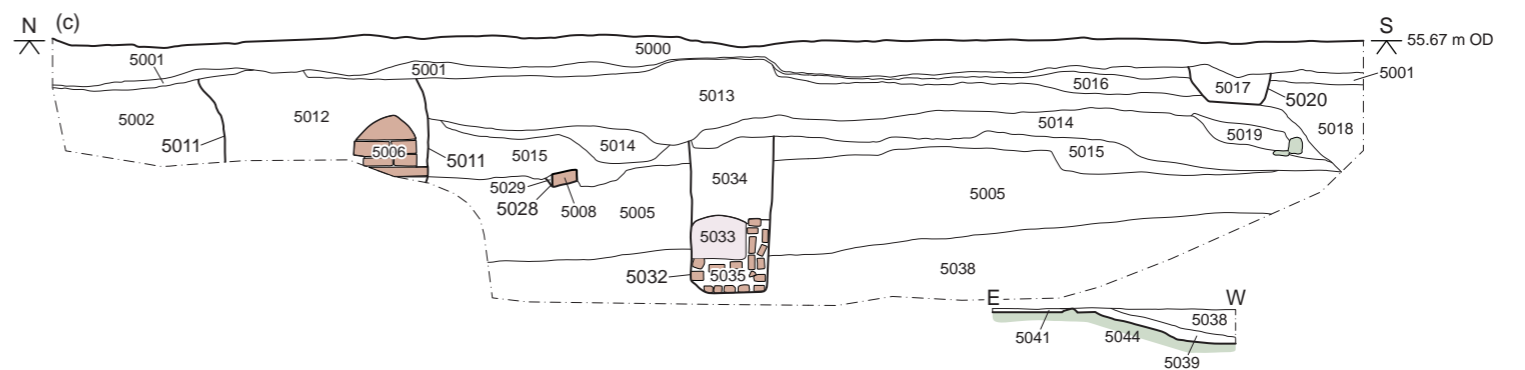
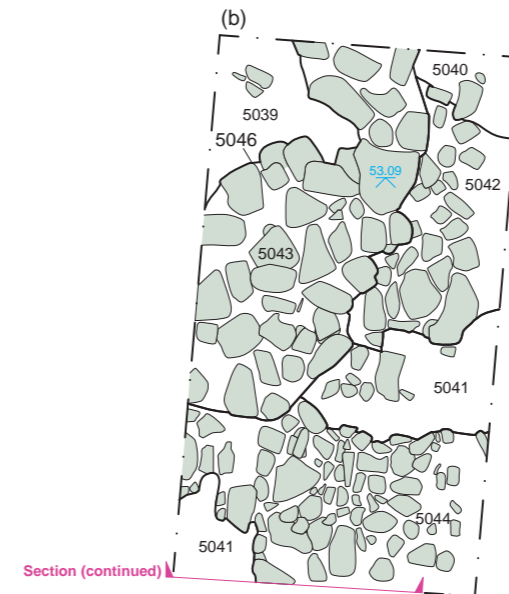
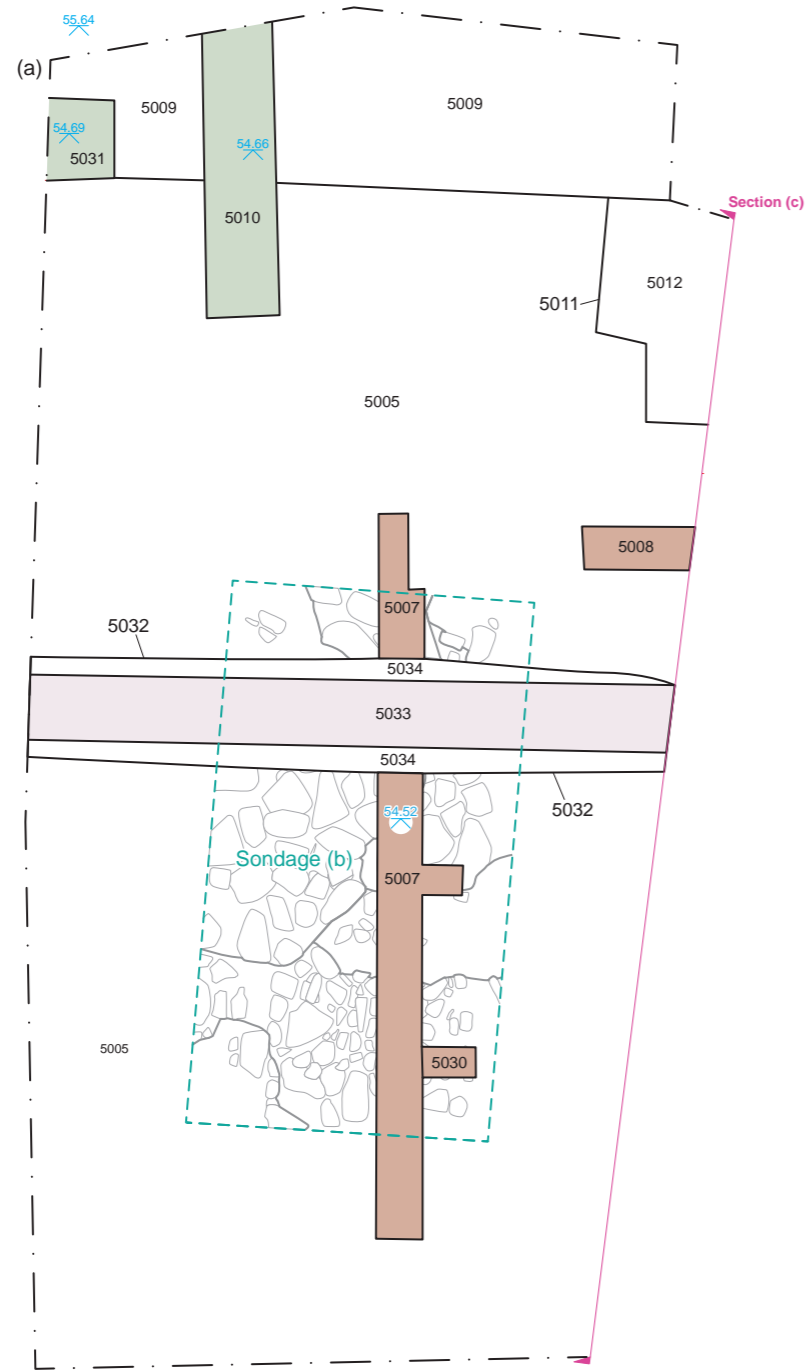
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Trench 4 composite section

Figure 19





- Brick
- Stone
- Concrete

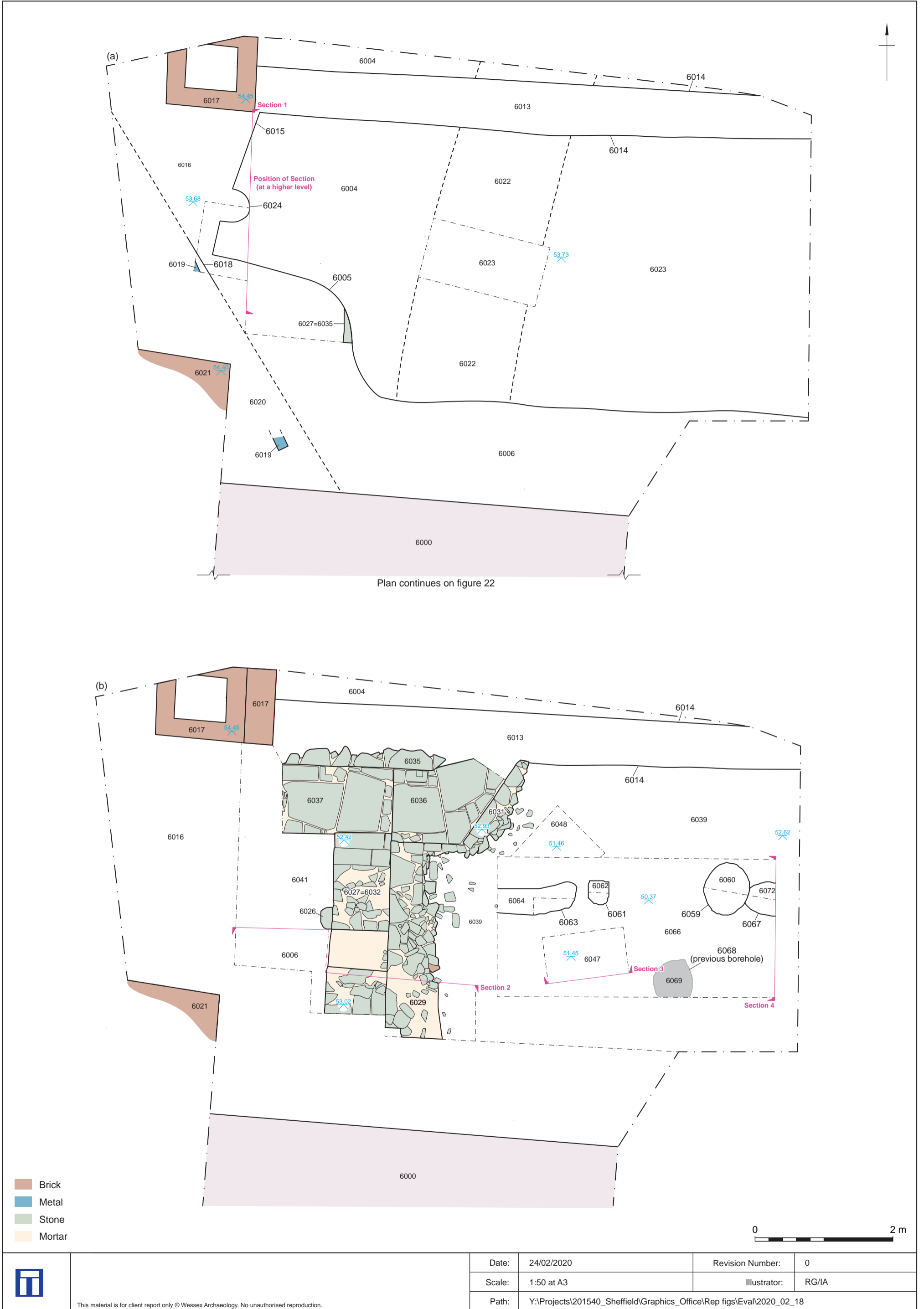


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Trench 5 plan (a), plan of lower level (b) and composite section (c)

Figure 20

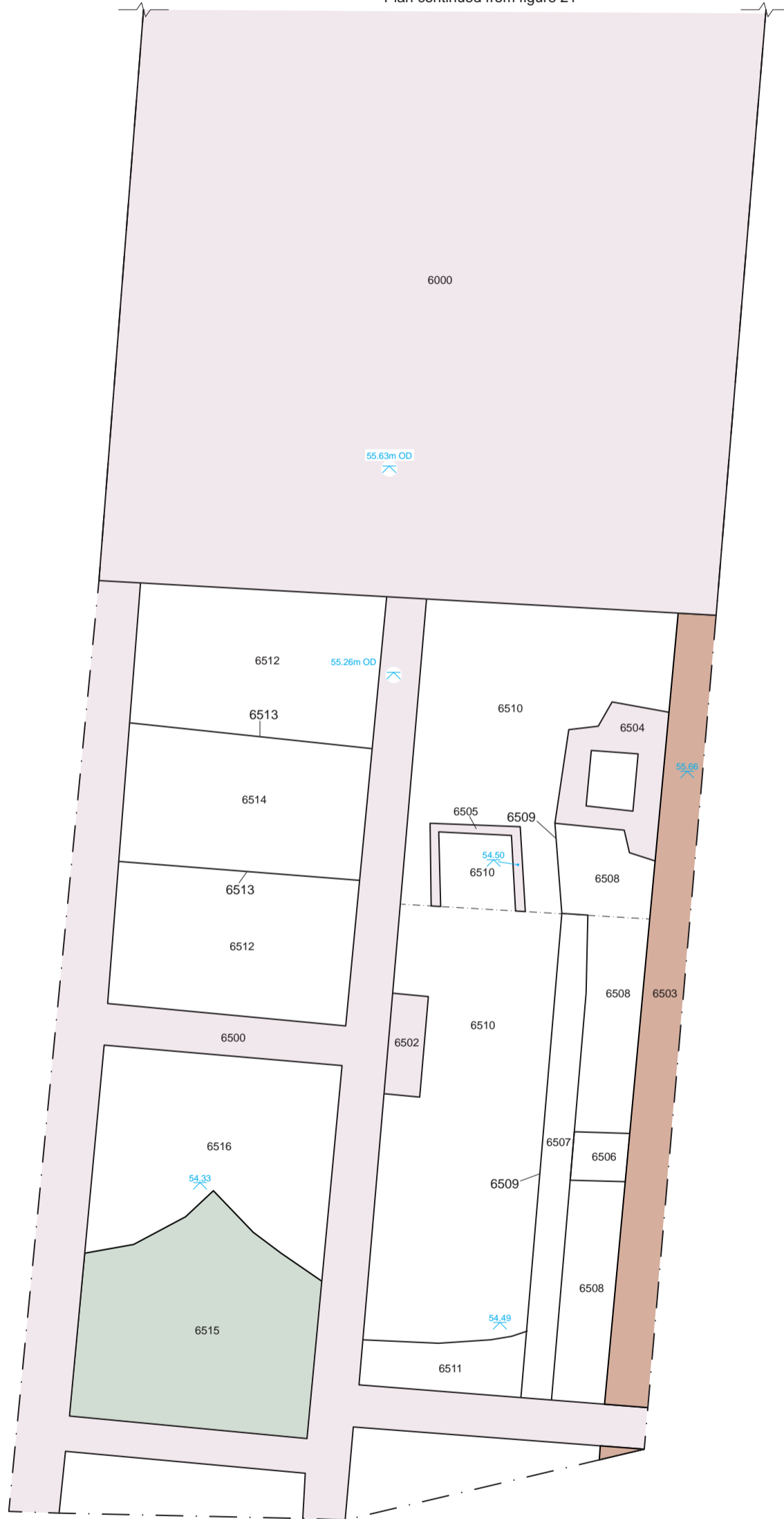


Trench 6A plan of upper (a) and lower (b) levels

Figure 21



Plan continued from figure 21

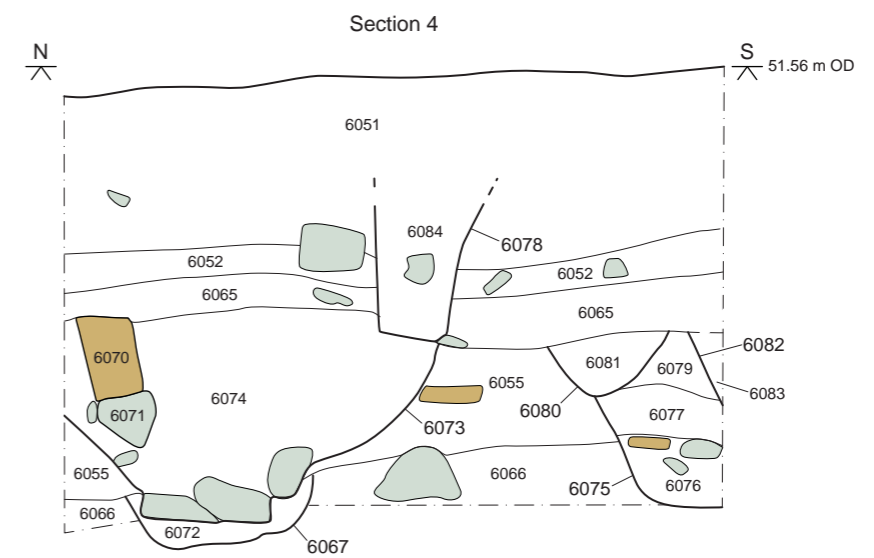
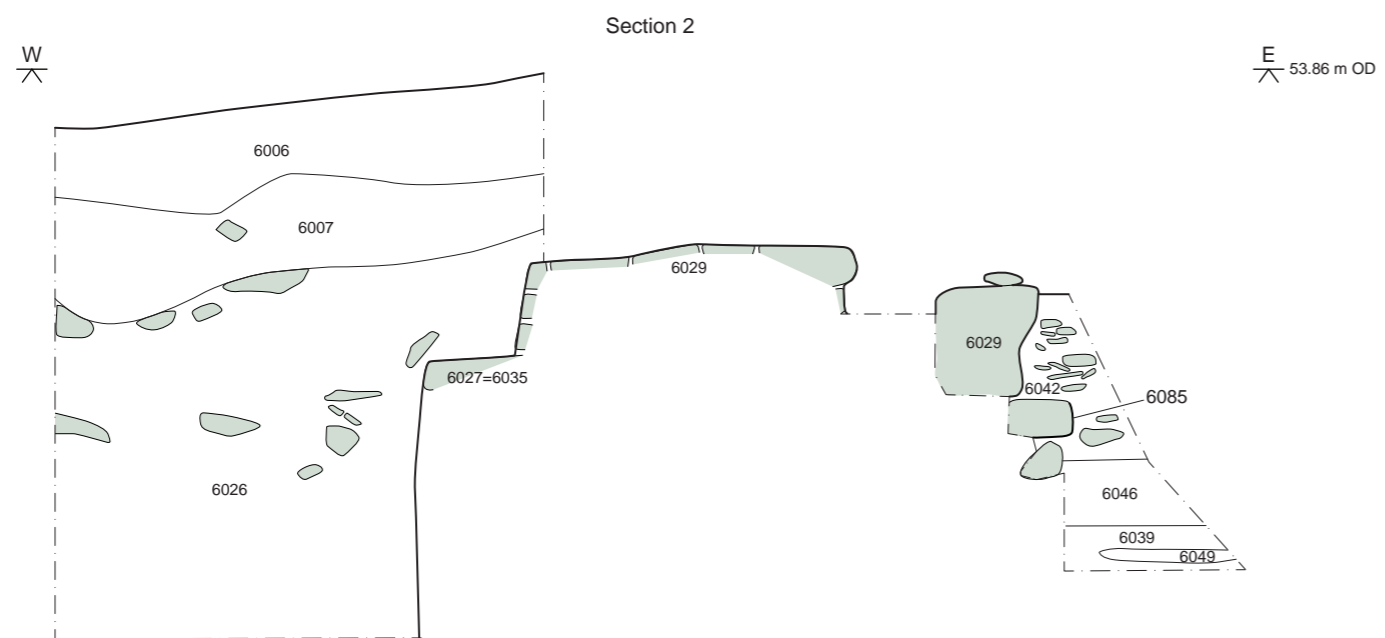
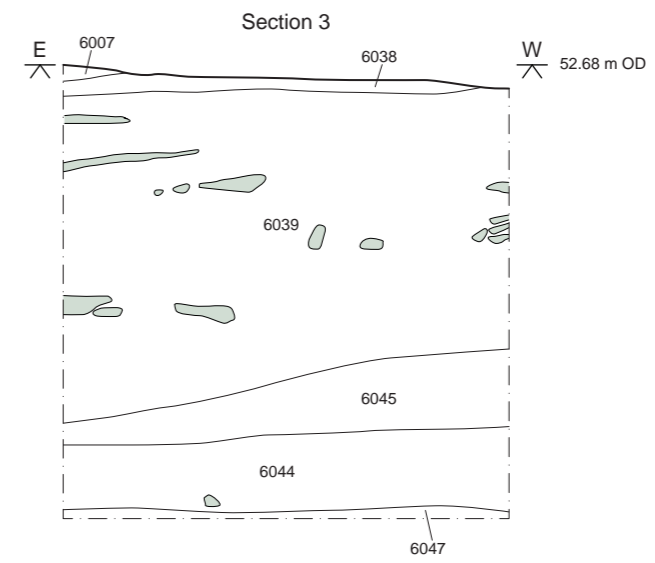
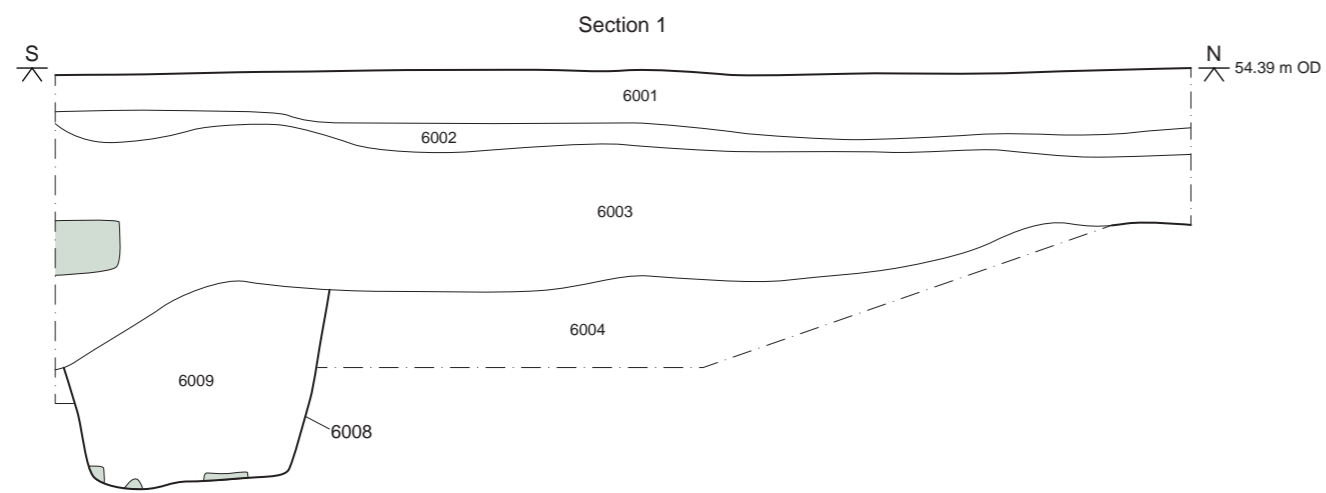


- Brick
- Stone
- Concrete



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Stone  
Wood

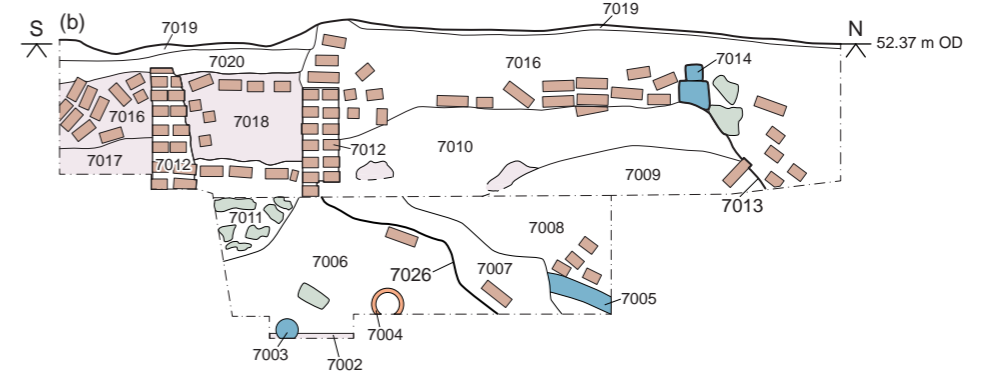
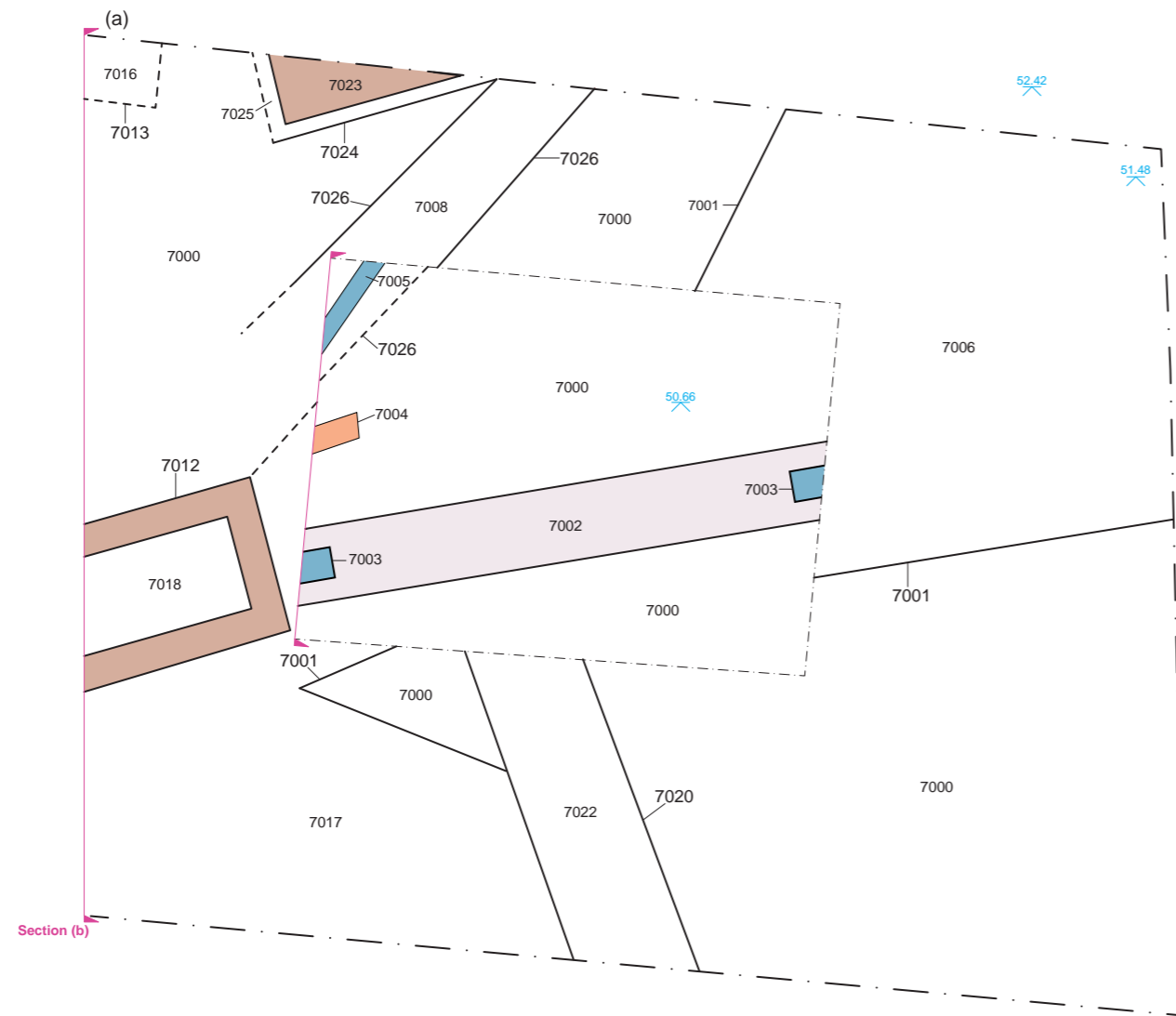


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Trench 6A sections

Figure 23



-  Brick
-  Stone
-  Concrete
-  Metal
-  Ceramic pipe

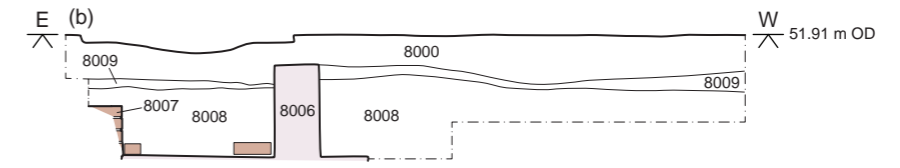
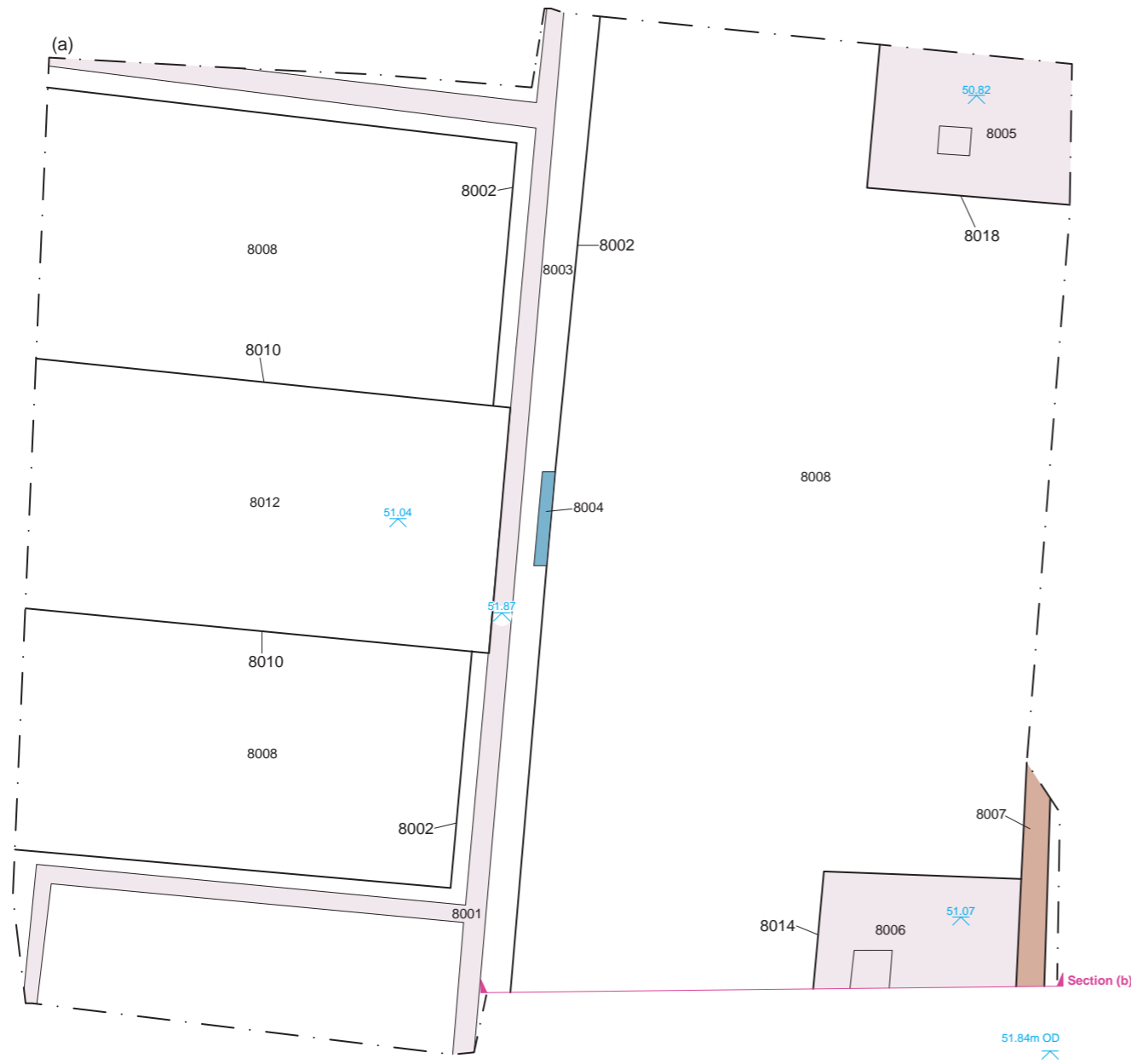


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Trench 7 plan (a) and composite section (b)

Figure 24



- Brick
- Concrete
- Metal

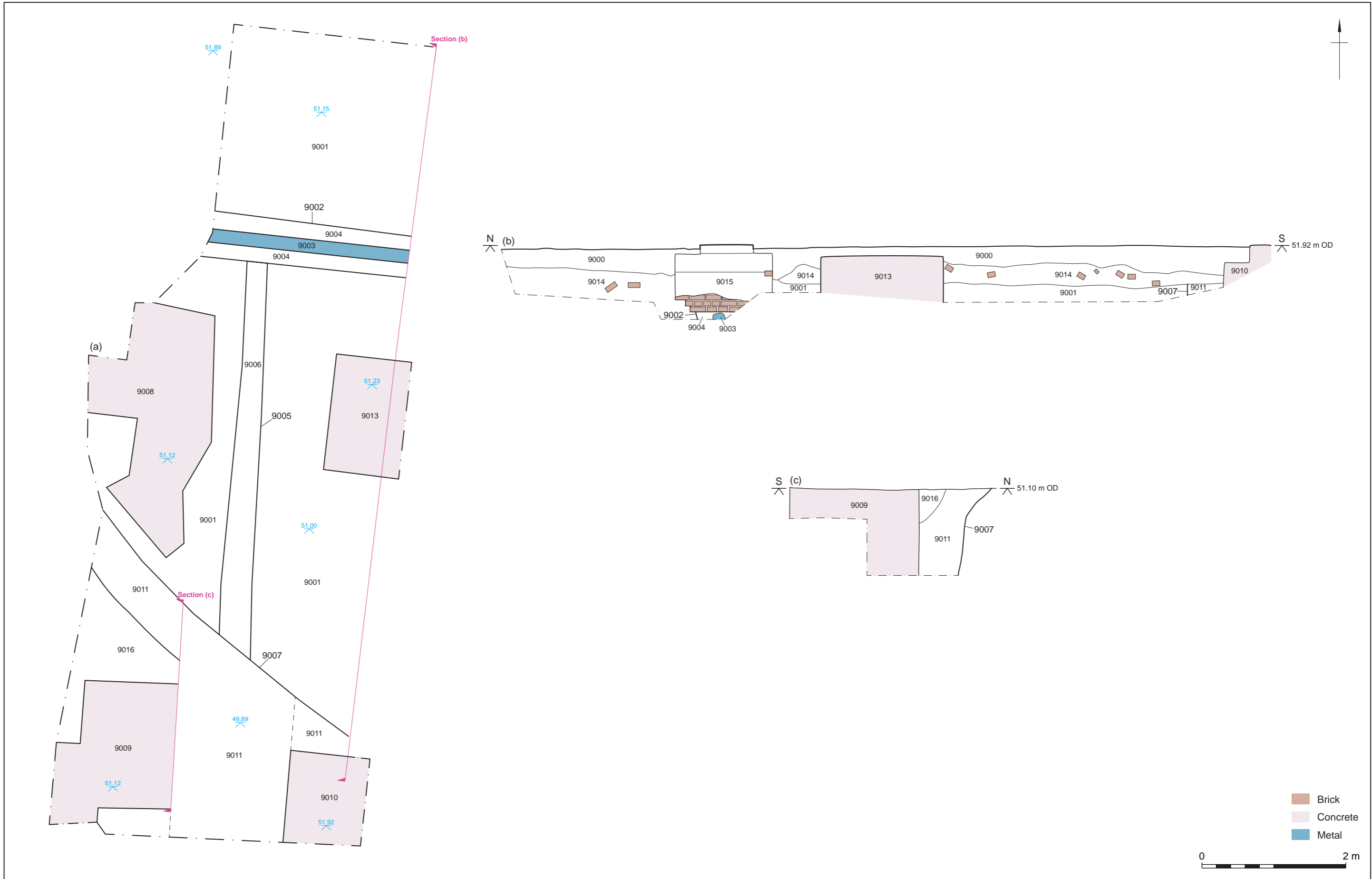



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Trench 8 plan (a) and section (b)

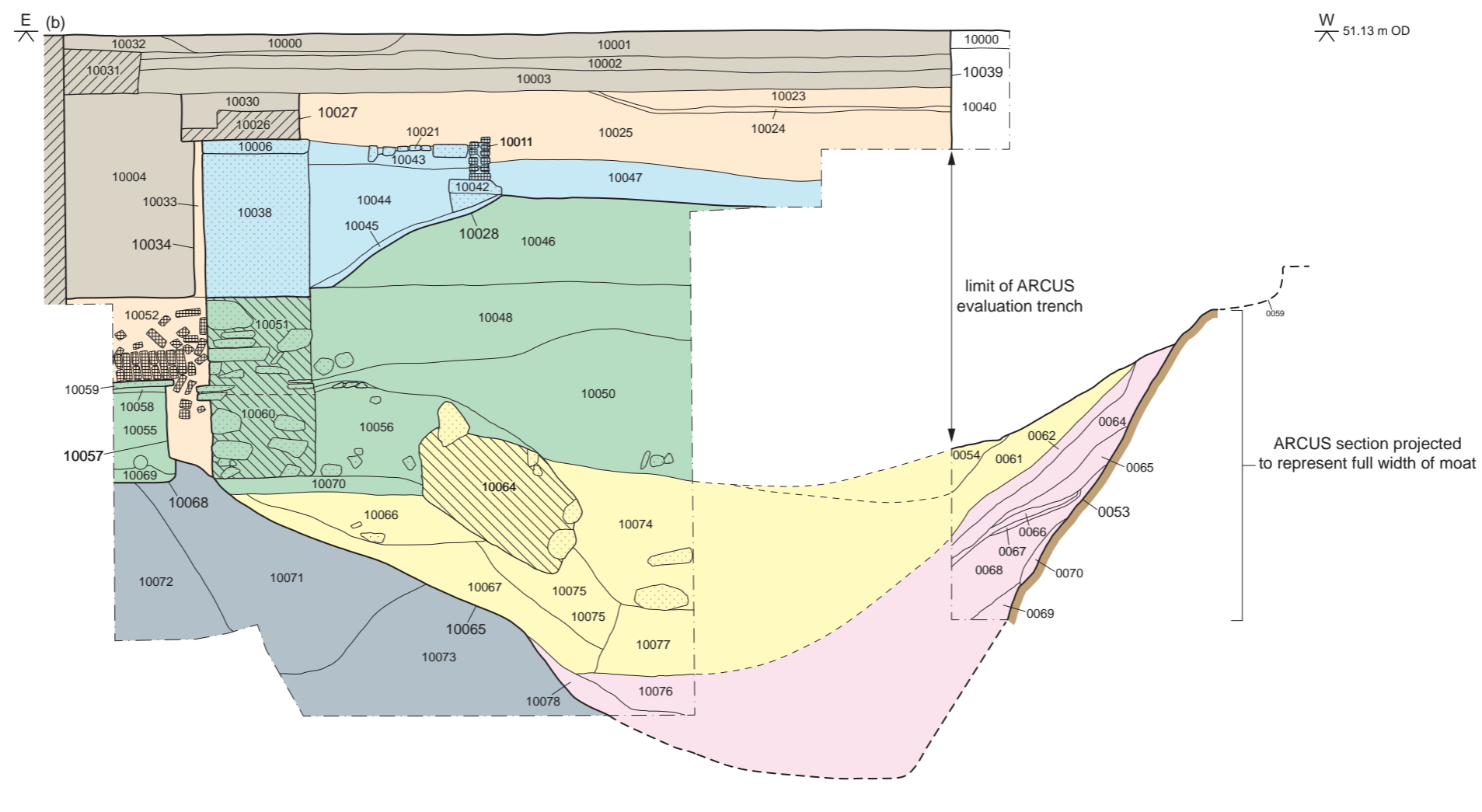
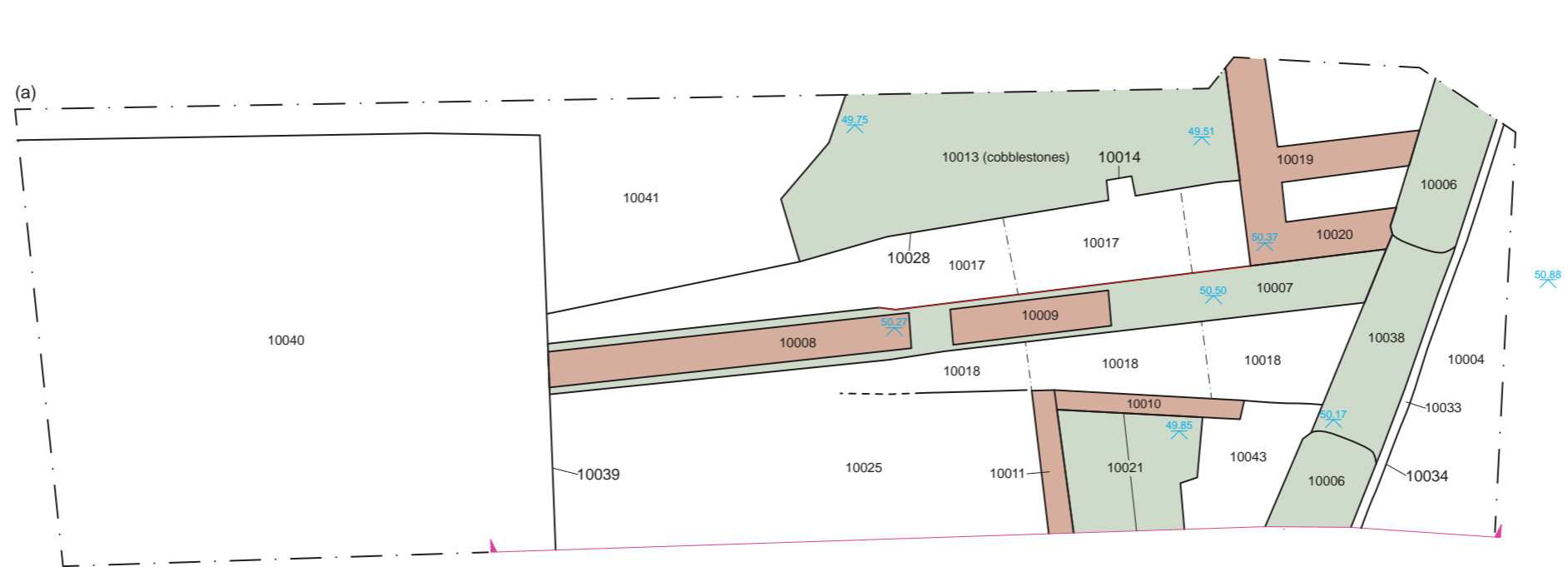
Figure 25



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Trench 9 plan (a) and sections (b, c)

Figure 26



- Plan Key**
- Brick
  - Stone
- Section Key**
- Stone
  - Brick
  - Brick
  - Concrete
  - 20th C. markets
  - 19th C. slaughterhouses
  - 18th C. landscaping
  - 17th C. Civil War
  - 13th C. moat fills
  - 13th C. moat bank
  - Natural geology

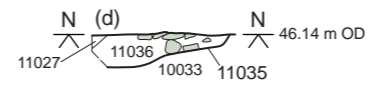
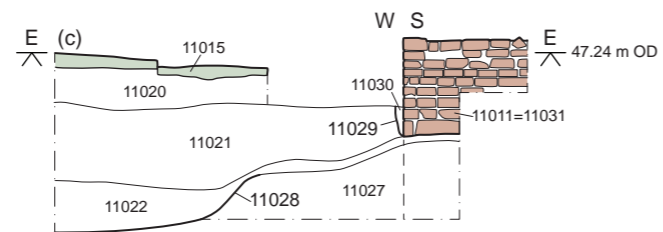
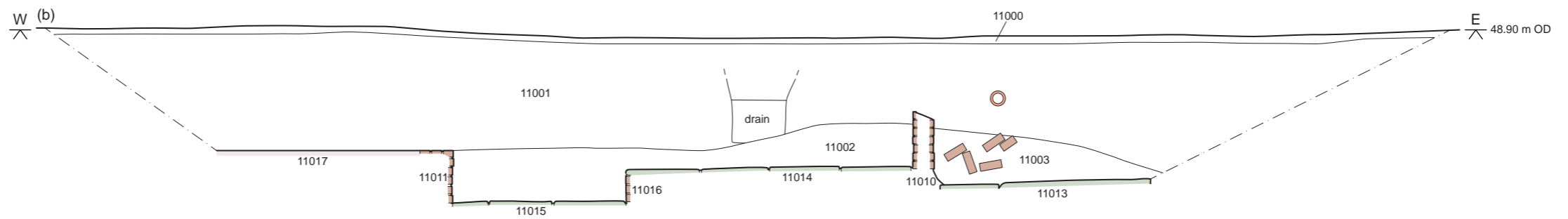
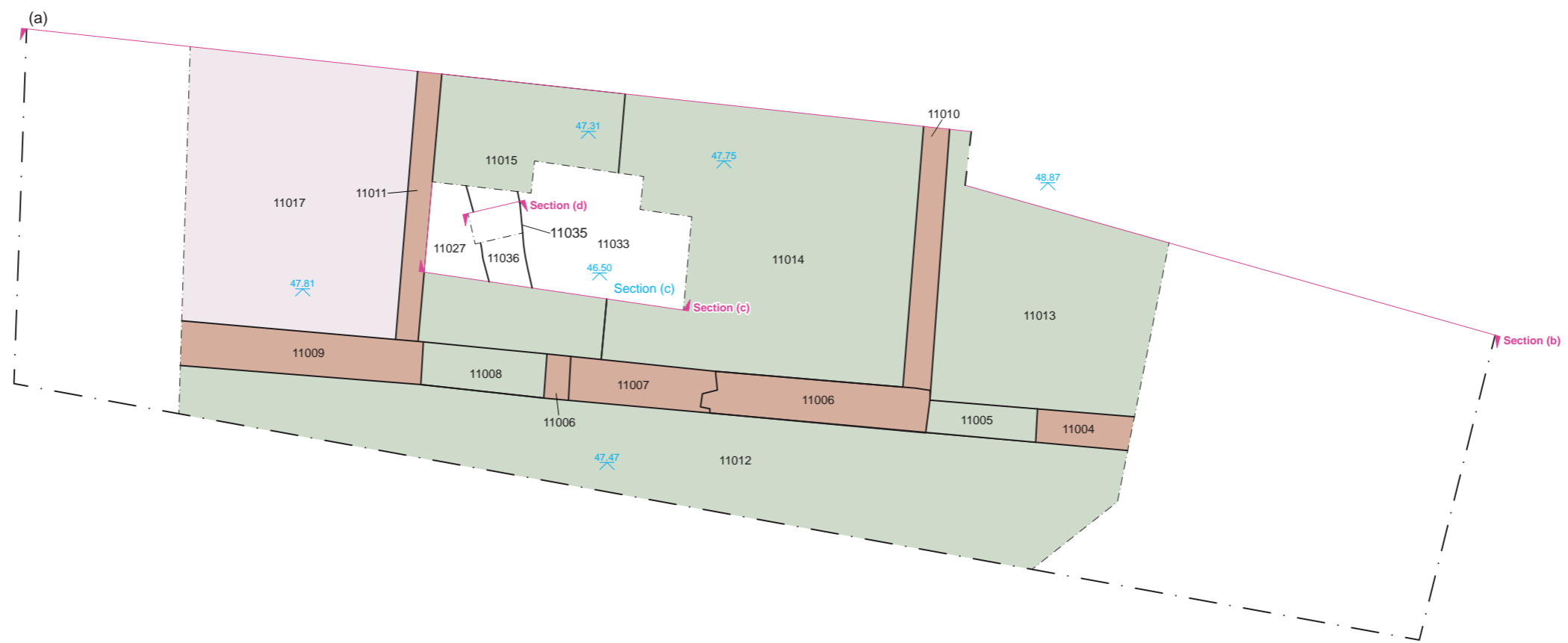
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Trench 10 plan (a) and composite section (b)

Figure 27





- Brick
- Concrete
- Stone

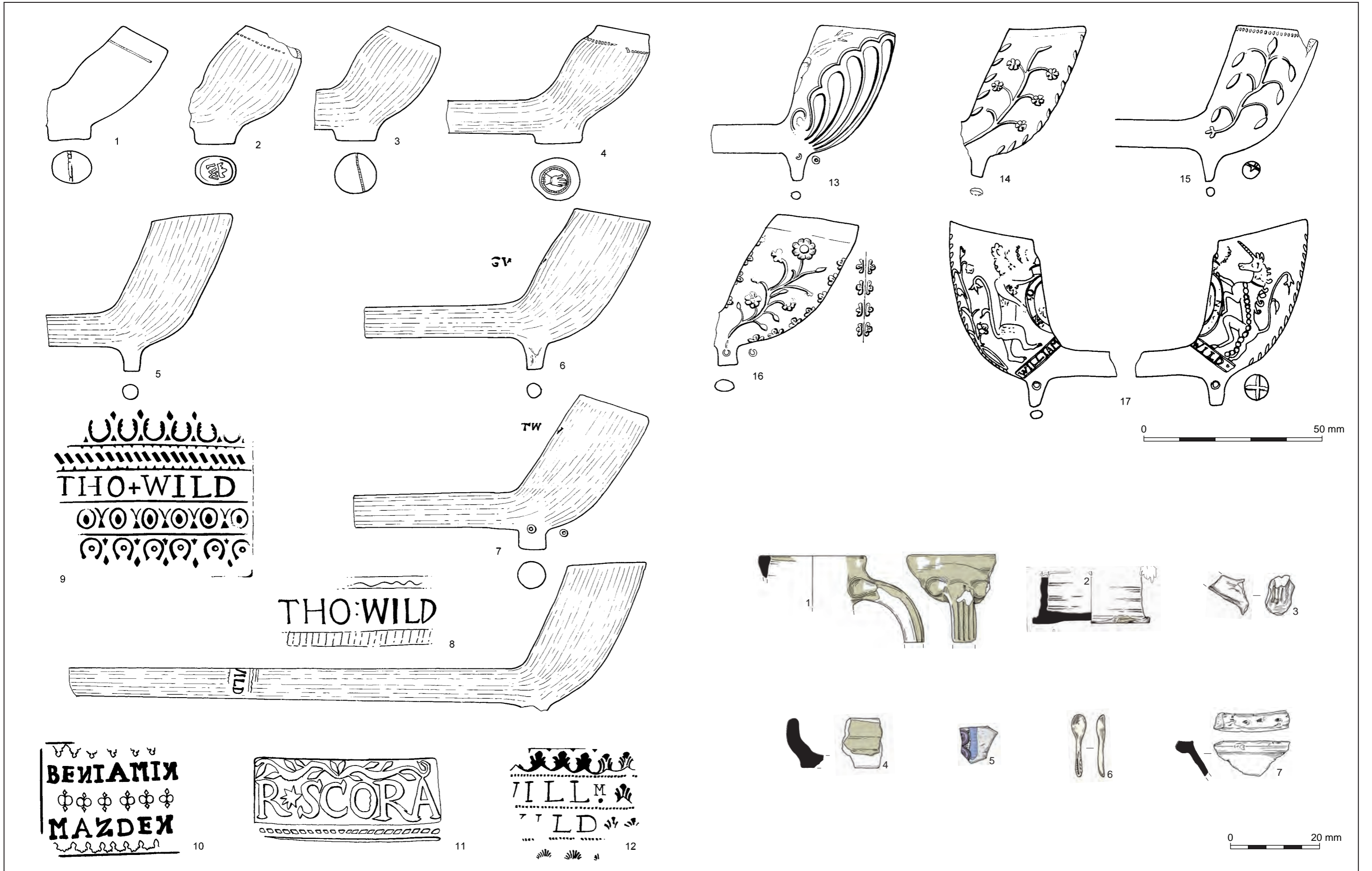


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Trench 11 plan (a) and sections (b-d)

Figure 28

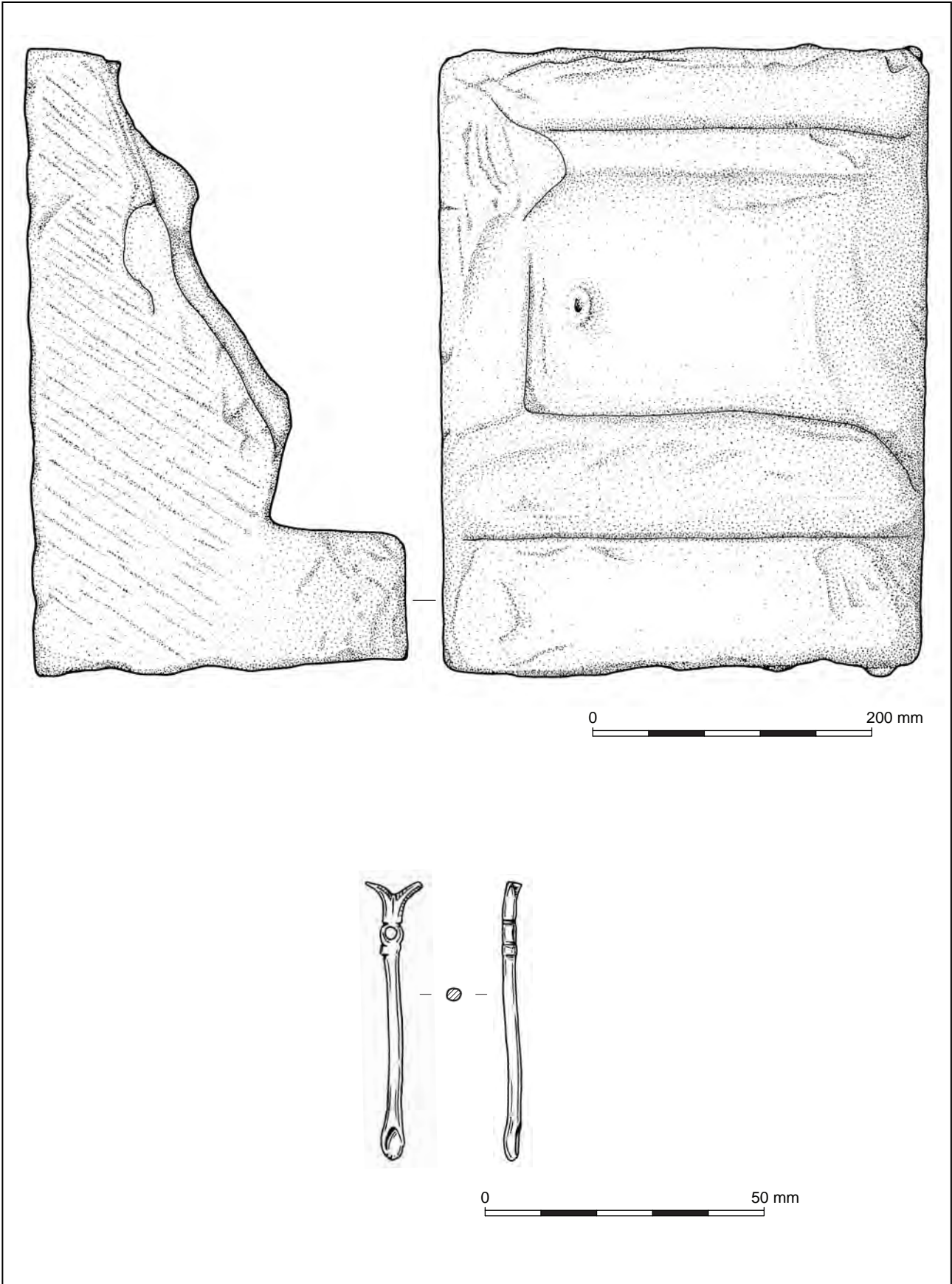



Clay pipe illustrations by Susie White  
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Date:	20/03/2020	Revision Number:	0
Scale:	Clay pipes 1:1 (stamps 2:1), pottery 1:4 at A3	Illustrator:	IA
Path:	Y:\Projects\201540_Sheffield\Graphics_Office\Rep figs\Eval\2020_02_18		

Clay pipes and pottery (colours are a representation of different coloured glazes)

Figure 29



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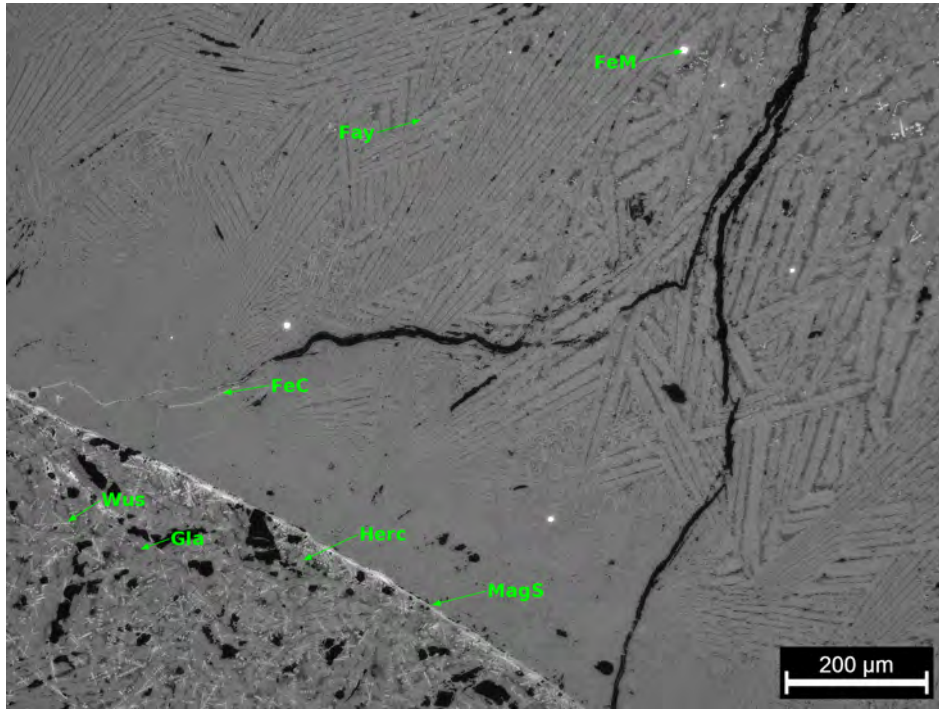


Fig 31.1: Micrograph of WS-001 showing flow boundary and phase discontinuities. Phases include chained and feathery fayalite of variable size (Fay); dendritic wüstite (Wus), glass (Gla), hercynite (Herc), iron prills (FeM), magnetite (MagS), and an iron corrosion product (FeC)

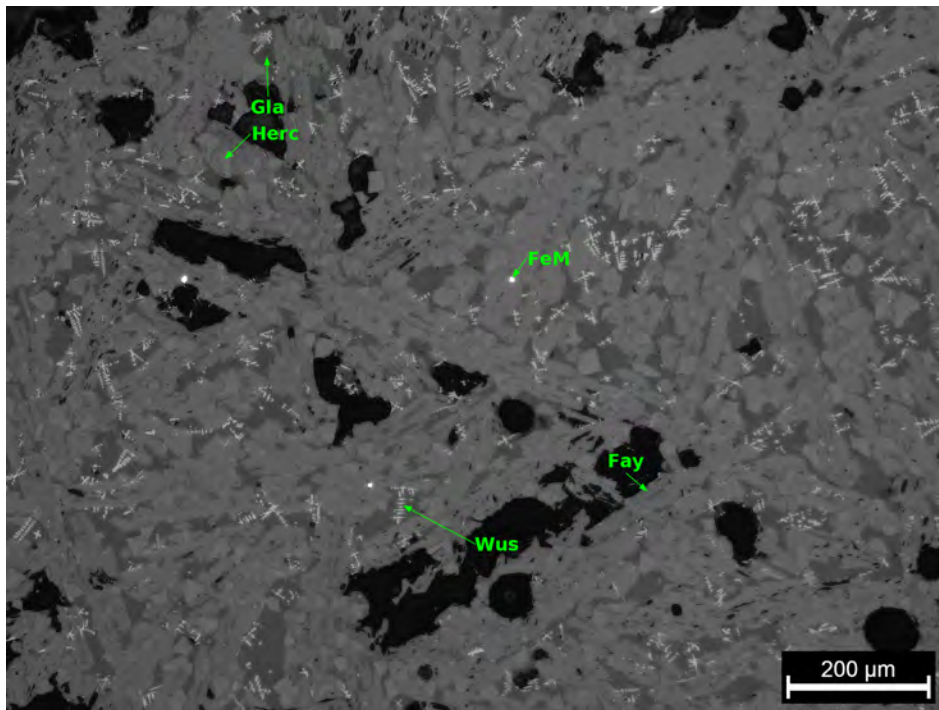



Fig. 31.2: Micrograph of WS-001 showing skeletal fayalite (Fay); dendritic wüstite (Wus), glass (Gla), hercynite (Herc), and iron prills (FeM)

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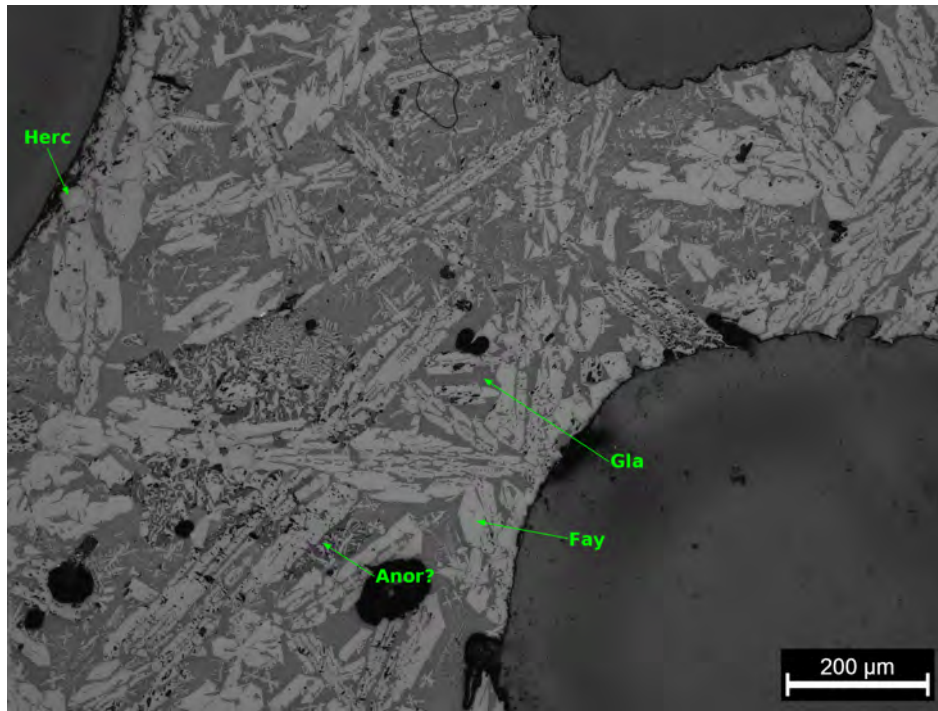


Fig. 32.1: Micrograph of WS-002 showing skeletal fayalite (Fay), glass (Gla), hercynite (Herc), and a dark gray phase associated with myrmekitic olivine that may be anorthite (Anor?). Note the presence of large vesicles

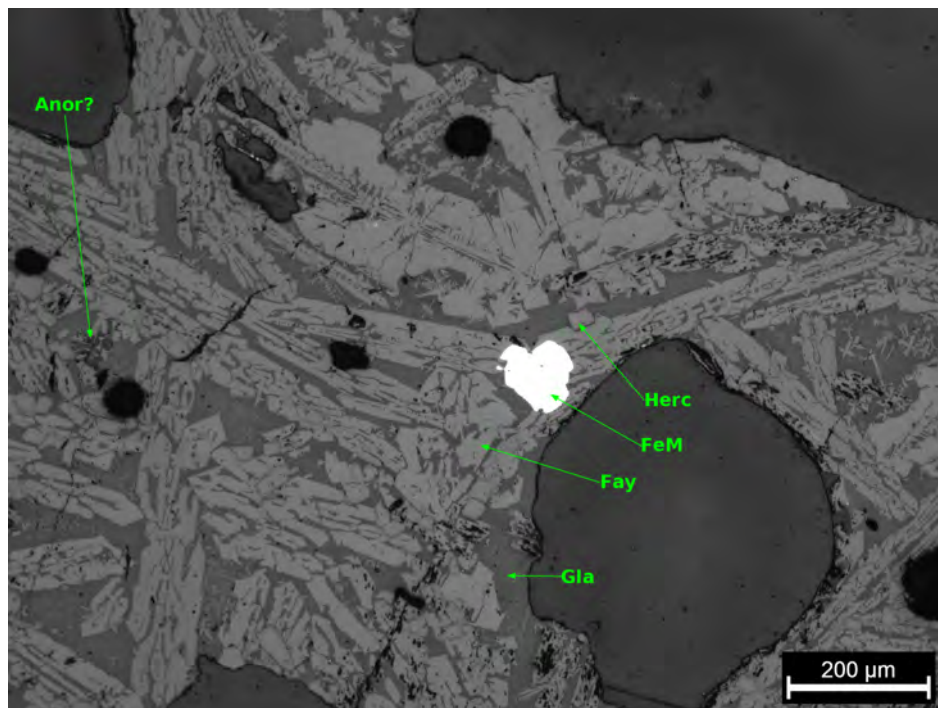

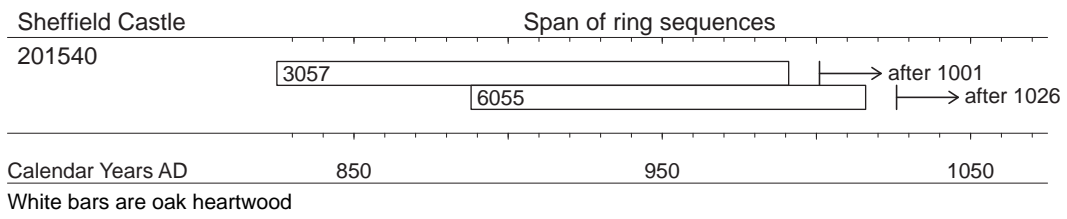



Fig. 32.2: Micrograph of WS-002 showing skeletal, chained, and sieve fayalite (Fay), glass (Gla), hercynite (Herc), iron metal (FeM) and a dark grey phase associated with myrmekitic olivine that may be anorthite (Anor?). Note the presence of large vesicles

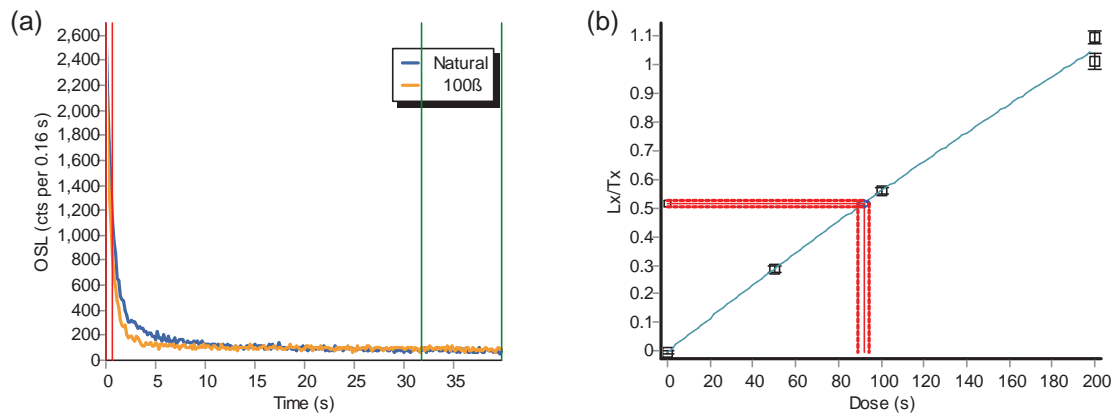
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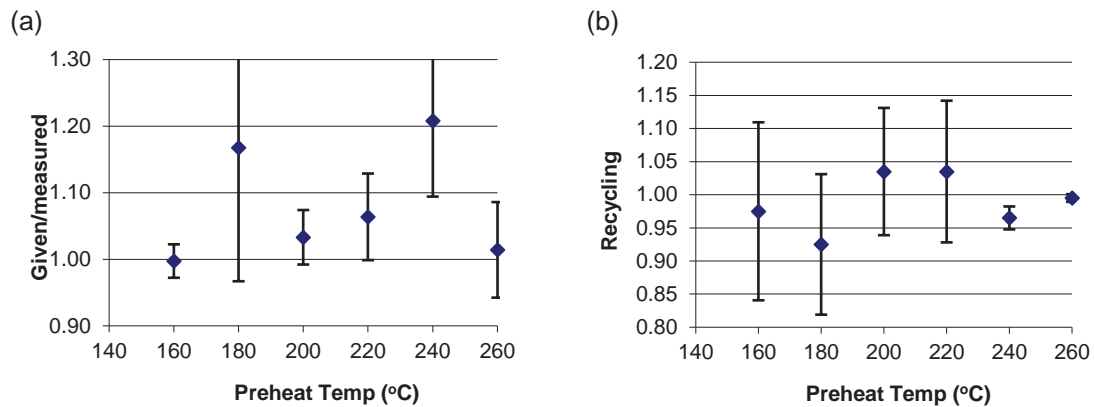
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	Path:	Y:\Projects\201540_Sheffield\Graphics_Office\Rep figs\Eval\2020_02_18		

Bar diagram showing the calendar positions of the two dated samples. The interpreted tpq dates are also shown

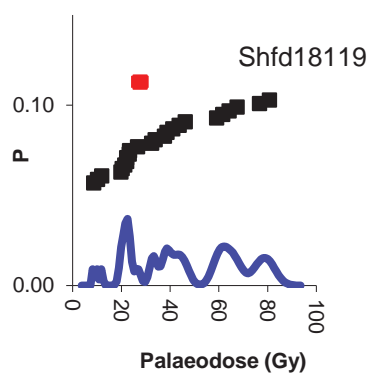
Figure 33



Part 34.1 – Examples of small aliquot for sample Shfd18119: (a) OSL decay of naturally acquired signal; (b) SAR growth curve. The red lines in (a) indicate the integration limits for signal measurement, and the green lines background measure once the signal has been zeroed. In (b) the luminescence response ( $L_x$ ) to a series of known doses is normalised by test dose response ( $T_x$ ) and plotted against dose. The red line represents interpolation of the natural dose ( $D_e$ ).



Part 34.2 – Results of different preheat temperatures in recovering a ~20 Gy beta radiation dose from sample Shfd18119 (a) Given to recovered dose ratio at different preheat temperatures. (b) recycling ratio (ratio between the first and last dose point) at the different preheat temperatures. Data points in both plots are the averages of three performed for each preheat temperature.



Part 34.3 –  $D_e$  distribution plots for the sample. Blue line is combined probability density for all grains. Black points are results from individual grains. Note dose is scaled as appropriate for data.



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Field Code: Castle 1  
 Lab Code: Shfd18119  
 Aliquot Size: small

Site: Sheffield castle

Aliquot	Palaeodose (Gy)	error
1	58.982	1.643
2	80.726	2.264
3	41.076	1.125
4	61.529	1.606
5	22.184	0.587
6	38.670	0.961
7	8.552	0.214
8	76.651	2.426
9	26.631	0.922
10	10.175	0.239
11	22.188	0.650
12	64.151	1.822
13	23.228	0.599
14	19.789	0.699
15	11.871	0.338
16	23.261	0.621
17	37.658	1.089
18	20.234	0.514
19	32.398	0.824
20	43.675	1.225
21	67.389	1.793
22	21.398	0.549
23	46.213	1.542
24	33.791	0.875

	De (Gy)	error
Minimum	8.55	0.21
Maximum	80.73	2.26
N	24	

Unweighted		
	All Data	Minus Outliers
Mean (Gy)	37.18	33.41
SD	21.18	17.66
SE	4.32	3.60
N	24	22

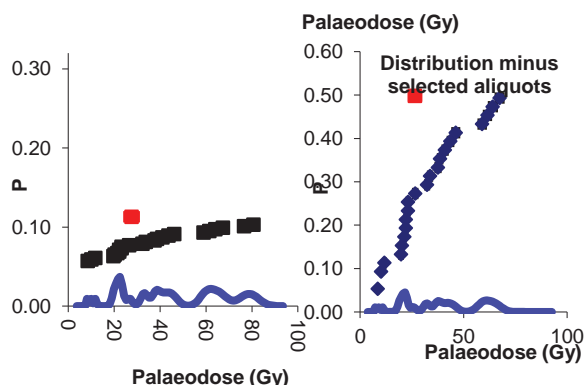
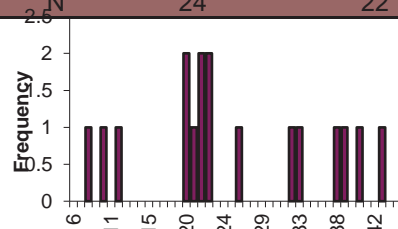
Weighted		
	All Data	Minus Outliers
Mean (Gy)	16.70	16.40
SD	11.56	10.76
SE	2.36	2.29
N	24	22


Probability		
	All Data	Minus Outliers
Mean (Gy)	27.58	26.55
SD	15.01	13.28
SE	3.06	2.83
N	24	22

Central Age Model		
	All Data	Minus Outliers
Mean (Gy)	31.34	28.82
SD	3.91	3.49
OD (all data)	61.03%	56.77%
N	24	22

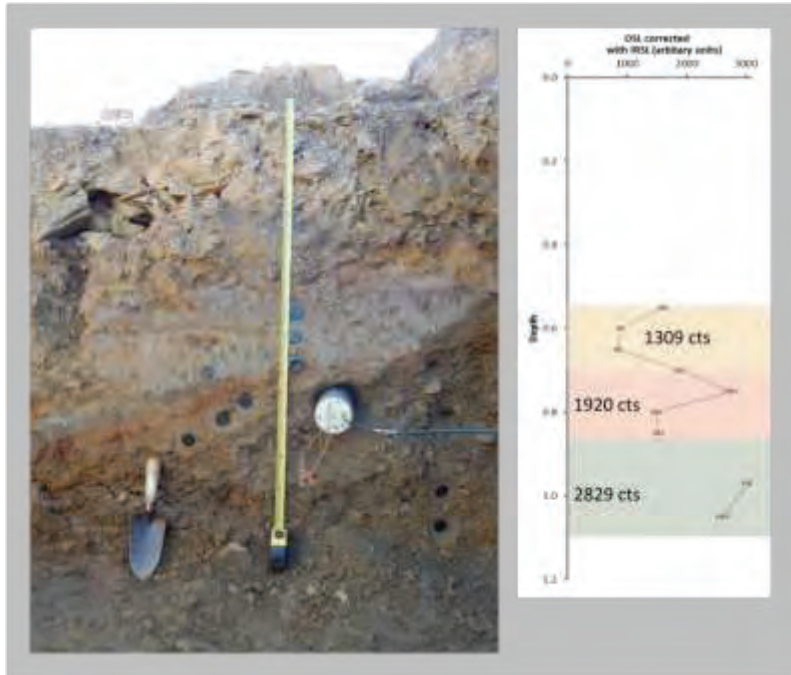
De Distribution	All Data	Minus Outliers
Skewness	0.51	-0.08
Kurtosis	-0.63	-0.65
Median	33.09	29.51
Sorting	0.55	0.45

MAM 9.43 1.04

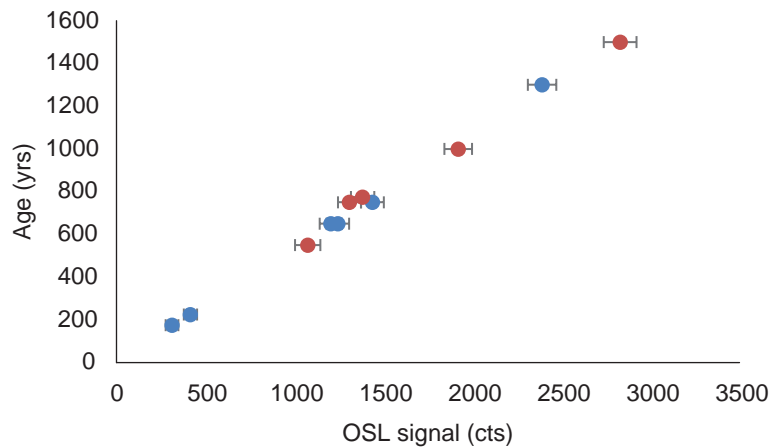


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Part 36.1 – Profile sampled for pOSL from trench 2 contexts 2048 and 2051 and the resultant pOSL data. pOSL data colour coded based on the identified units found in the profile. pOSL samples 6a-9a are from the beige coloured unit, samples 10-12a from the salmon coloured unit and 14-15 from the grey coloured unit. Also shown is the mean OSL cts within each unit.



Part 36.2 – 48 pOSL(corrected for variable IRSL) plotted against age. For blue points age was determined from site context and artefacts with the exceptions of 10073 and 5041 which appeared younger than had been designated and 3071 which appeared to be older. For these three points age was assigned assuming a similar OSL cts per year to the known age samples. Points in red are the samples of unknown age which are also plotted assuming a similar OSL cts per year to the known age sample.



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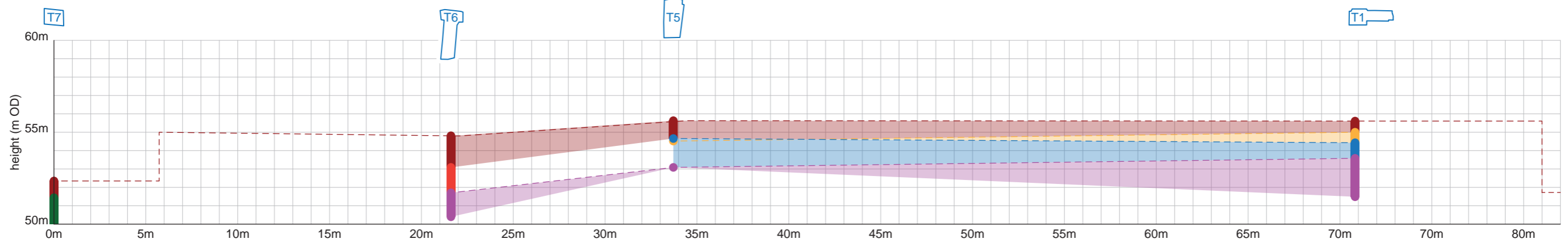


Fig. 37.1: Transect 5 – trenches 1, 5, 6 and 7

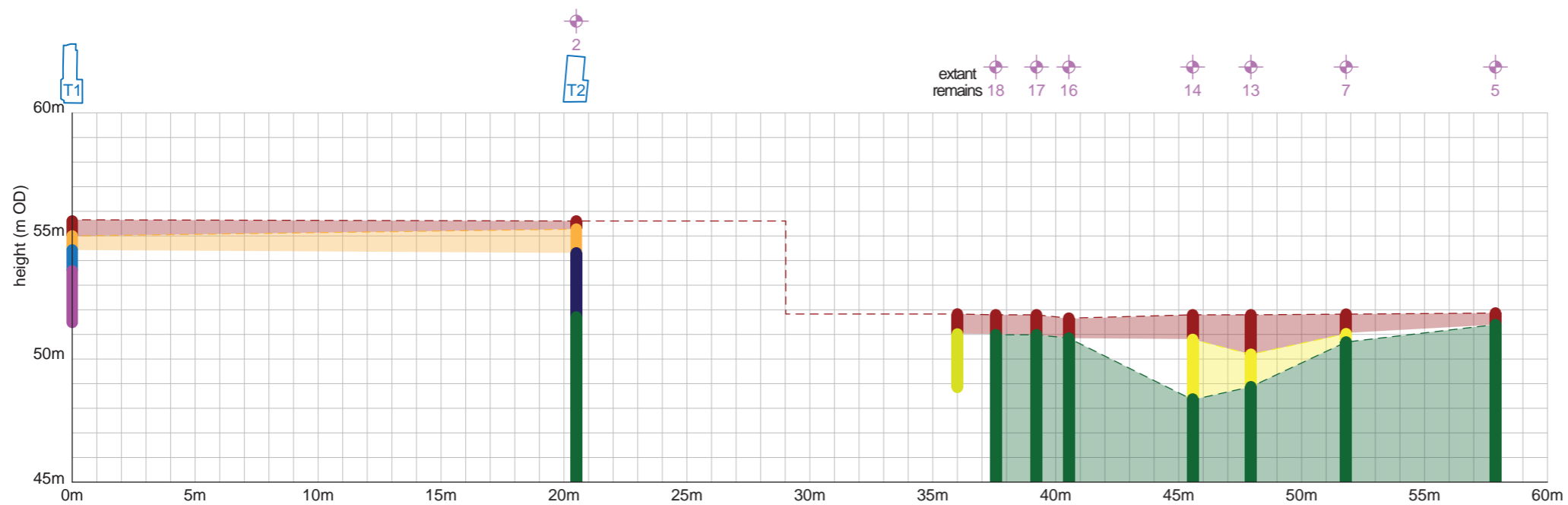


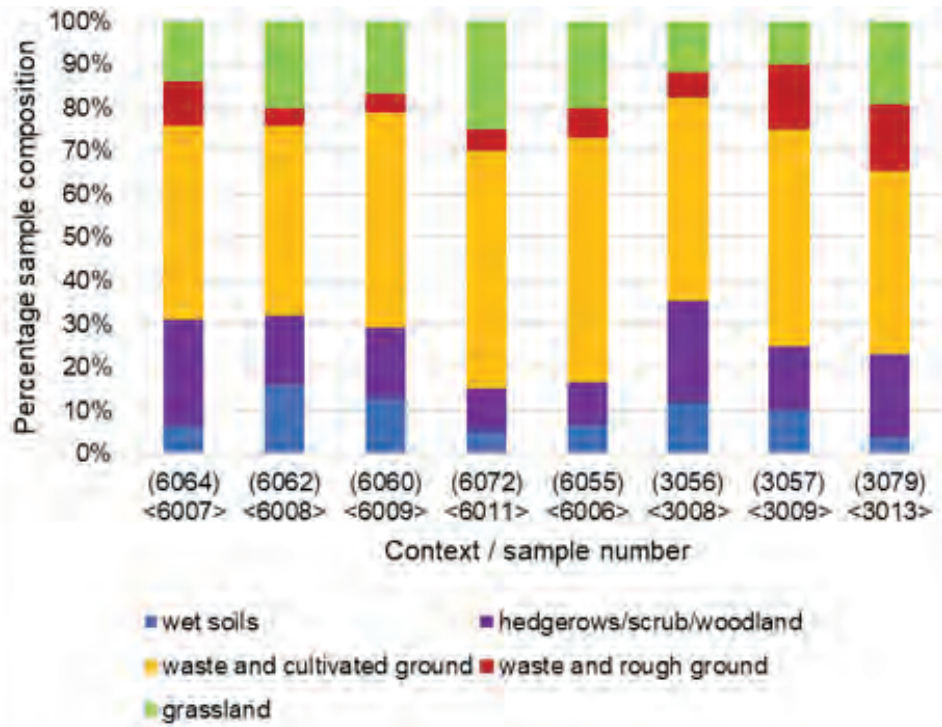
Fig. 37.2: Transect 6 – trenches 1, 2 and borehole transect 2

- Modern
- 19th C.
- 18th C.
- Moat backfill
- Castle gatehouse
- 13th – 14th C.
- 11th – 13th C. 'early castle'
- Motte
- Bedrock



Representative transects – data is interpretative, do not rely on interpolated points  
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Percentage composition of waterlogged plant taxa by habitat type

Figure 38

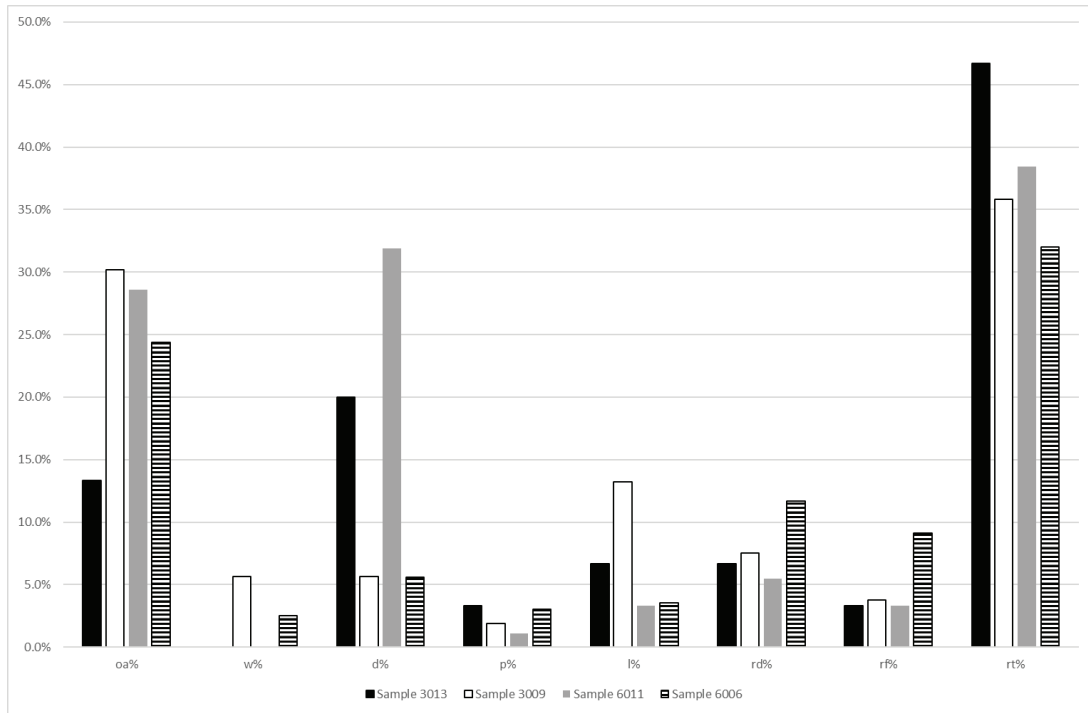


Fig. 39.1: The relative proportions of ecological groups for the insect remains from Sheffield Castle (see Appendix for the key to abbreviations for ecological groups)

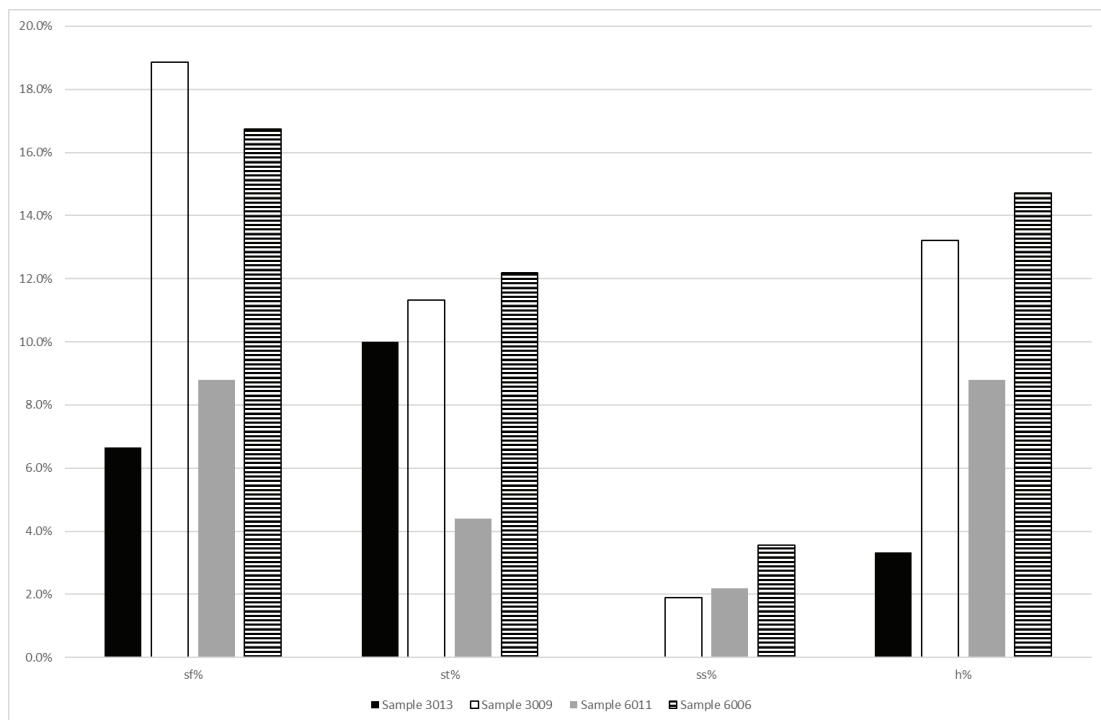


Fig. 39.2: The relative proportions of synanthropic groups for the insect remains from Sheffield Castle (see Appendix for the key to abbreviations for synanthropic groups)



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Plate 1: Working conditions in box shoring and west-facing section of trench 1 showing medieval layers and surfaces



Plate 2: Surface 1075 partially exposed from west


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Plate 3: Slag layer 1073 (bottom right) overlain by 1072 and 1061. The stones visible in plan were probably disturbed from surface 1075. Shot from west



Plate 4: Pit 1052 cuts through medieval strata 1062, 1048 and 1049. Pit is sealed by 18th-century layer 1006. View from south


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Plate 5: Surface 1033 from north-west with overlying deposits 1040, 1041 and cementation furnace wall 1036 (left)



Plate 6: Wall 1055 (centre) with cementation furnace wall 1020 (rear, with scale) and drain 1008 (foreground) from east-north-east. Demolition material 1019 is visible to the left and right of the intervention


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Plate 7: Drain cut 1008, capping 1010 etc. from west with bowling green demolition 1019 and cementation furnace structures in background



Plate 8: Sandstone structure 1035 (below scale) overlies deposits 1007 and 1043 overlying surface 1033 from north


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Plate 9: Overview of cementation furnace structures after initial cleaning from east



Plate 10: Cementation furnace ash pit access (walls 1022 and 1023 and arch 1029) from north


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Plate 11: Detail of constriction/arch 1029 from north



Plate 12: Initial excavation of cementation furnace with floor 1024 in situ (behind scale) and showing demolition fill 1013 from south


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Plate 13: Trench 2 sondage from west showing possible natural 2053 and uncleaned motte deposits



Plate 14: Cleaned upper part of same sondage as plate 13 from west


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Plate 15: Dirty clay 2019 (foreground) steelworks wall 2008 and surface fragment 2010 (rear) from west



Plate 16: Stone drain (cut 2018; right) and 20th-century concrete drain 2015 (beneath scales) from north-west


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Plate 17: Hand-dug sondage with earthwork deposits 3063, 3070, 3071, 3072 and 3074 from east-north-east



Plate 18: Stone foundation 3064/3076 from south


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Plate 19: Detail of stone foundation 3064/3076 fully cleaned from south with 3077 visible in bottom right. Dark organic destruction deposits 3079, 3057 overlie the structure and are in turn overlain by landscaping deposits 3056 etc. (see text)



Plate 20: Working shot: Ashley Tuck and volunteers including Michael Clarke take monolith sample 3010 from south


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Plate 21: Sandstone foundation 3064/3076, destruction and landscaping deposits and 19th-century weighbridge foundations from west. Sandstone block 3050 visible on left



Plate 22: Oblique overview of 19th-century structures in trench 3 from south-east


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Plate 23: Iron door lintel 3042 seen at edge of excavation from south



Plate 24: Communication with trench 3 weighbridge at cellar level from north


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Plate 25: Trench 3 weighbridge from east showing stone corner foundations 3049, 3085 and other details



Plate 26: 19th-century drains 3004–3012 running roughly left to right below scale, truncated by 20th-century drain 3014 running away from camera. Bituminous cobblestones 3019 above scale. Shot from west


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Plate 27: South-facing section of trench 3 showing sets 3083 (top left) and cut 3020 (left hand side of lower step, extends up to base of sets)



Plate 28: Oblique shot of sondage through yellow clay 4113. The remnants of flue 4091 are visible below right end of scale. From north-west


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Plate 29: West-facing section showing probably 19th-century pre-construction levelling layers 4087, 4100 and 4086. Construction cut 4102 on left of shot



Plate 30: Oblique shot from north-east showing flue 4091 in cut 4096 and demolition cut 4078. Later wall 4033 (see text) can be seen on upper terrace on the right of the shot


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Plate 31: Survival of probably 19th-century deposits 4050, 4051 and 4052 (centre of shot) truncated to south (left) by demolition cut 4078 and to north (right) by drain cut 4025. Shot from east



Plate 32: Brick line shaft 4020 and 4022 (right), machine base 4011 (a later insertion, front center) and walls in south of trench 4. View from east


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Plate 33: Sandstone foundation 4060 and brick wall 4017 from south



Plate 34: Structures 4028 (foreground) and 4027 (under scale) from north


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Plate 35: East-facing section with 4086, 4024, 4076, 4072, 4074 etc.



Plate 36: Wall 4006 on different alignment to most of the structures in trench 4. View from south-east. North-west end of 4006 truncated by cut 4105


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Plate 37: Plan view of cobblestone surface of early castle 5042, 5043 and 5044. West at top of shot

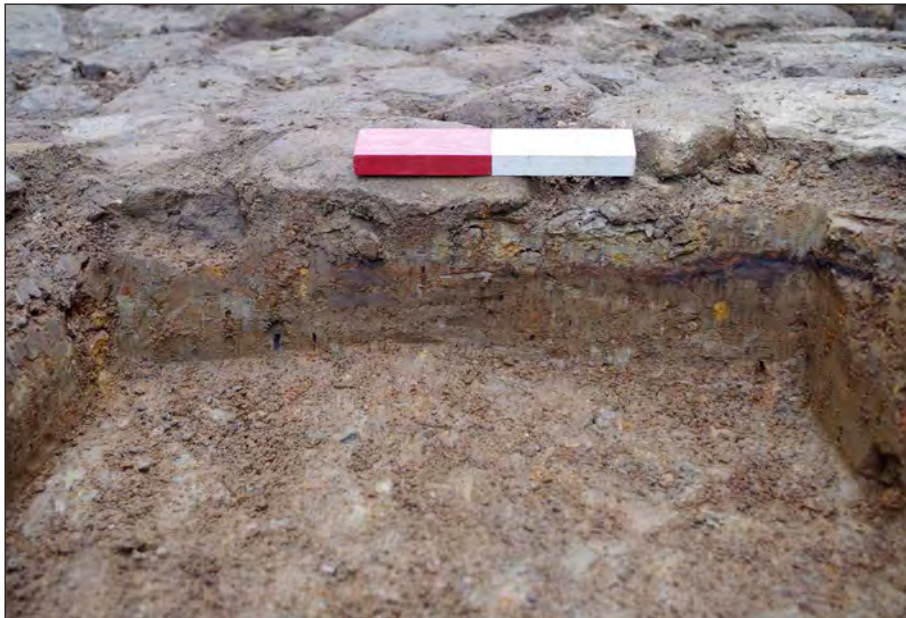


Plate 38: Bedding layer 5041 below cobblestone surface 5042 from south


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Plate 39: Copper toilet item from deposit 5040 associated with cobblestone surface 5042 etc.



Plate 40: Working shot showing excavation conditions and relationship between medieval surface 5042 etc. (base of excavation) and bowling green wall 5010 (visible on left between green props). View from south


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Plate 41: Sandstone bowling green wall 5010, bedding layer 5009 and flagstone with iron grate 5031. View from west



Plate 42: Oblique overview of steelworks walls (5007 etc.) in trench 5 from south-west

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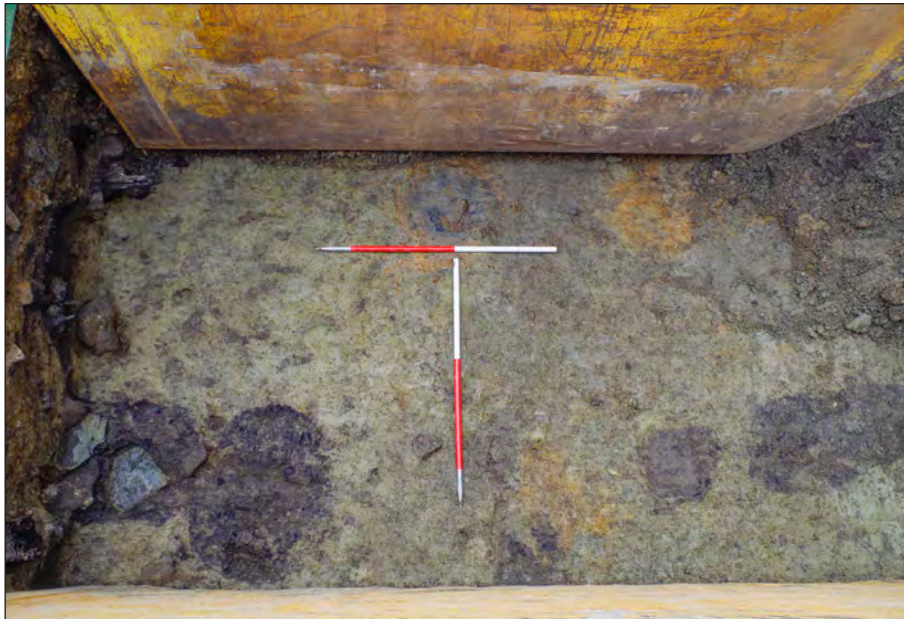


Plate 43: Plan view of earliest cut features observed in trench 6 (6059, 6061, 6063 and 6067). Disturbance above scales is a modern borehole. South at top of shot

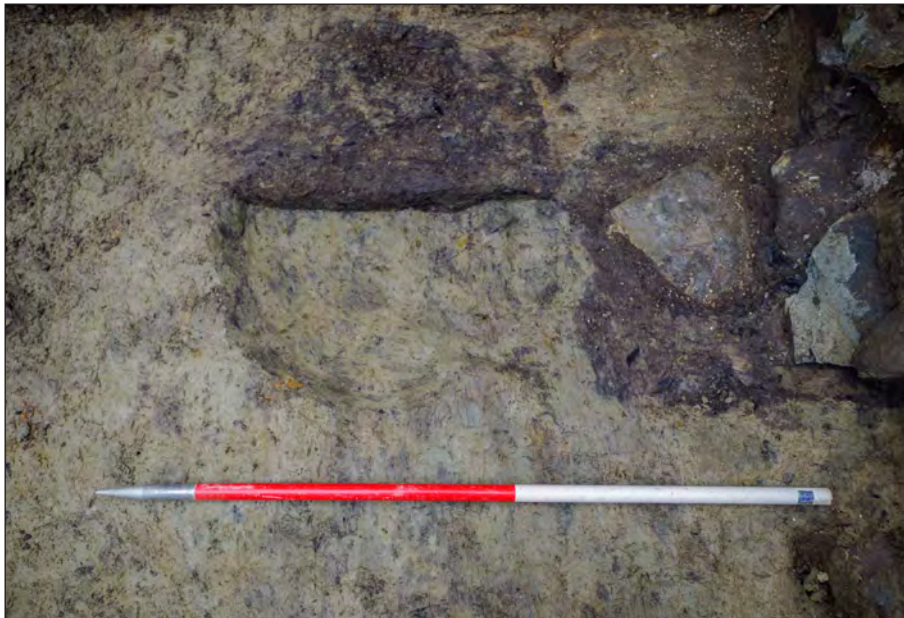


Plate 44: Pit 6059 half-sectioned from south


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Plate 45: West-facing section in base of trench 6. Cut features 6059 and 6067 are visible in plan at base of section. Section shows pits 6073 and 6075 (from the second sub-phase), pits 6080 and 6082 (third sub-phase) and 6078 (fifth sub-phase)



Plate 46: Detail of in-situ post base 6070 (from west)


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Plate 47: Alternate (cf. Pl. 44) west-facing section near base of trench 6 obtained earlier in excavation campaign. Showing pits 6057 (fourth sub-phase) and 6078 (fifth sub-phase)



Plate 48: Oblique overview of castle structures 6029 etc. from north-west


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Plate 49: Rubble core at rear of castle retaining wall 6029 etc. from east



Plate 50: Detail of staircase 6032 and rendered keeping hole (mid-right) from west


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Plate 51: Detail of passageway and surfaces 6037 and 6036 from east-south-east



Plate 52: Example of 20th-century deposits (eg 6004), drain cuts (eg 6024) and brick surface (6003) forming upper strata of trench 6 from north


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Plate 53: Overview of east side of southern part of trench 6 ('trench 6B') disturbed to over 4 m BGL by 20th-century construction. View from north



Plate 54: Overview of trench 7 showing bedrock and modern drains from east


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Plate 55: Detail of early 20th-century wall 7023 from south



Plate 56: Overview of trench 8 showing bedrock and modern concrete structures from east-north-east


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Plate 57: Overview of trench 9 from south. Moat cut 9007 is visible in the foreground



Plate 58: Section of moat cut 9007 re-photographed under damp conditions post-excavation from east


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Plate 59: Trench 10 excavation conditions. Excavation has proceeded to the maximum extent of the arm of the mechanical excavator. The deposits in the base comprise moat bank deposits 10073, 10071 and 10072. Shot from north-west



Plate 60: North-facing section of base of trench 10 showing moat bank 10073 etc. and moat fills 10076 and 10078. The boundary of the moat lies beneath the centre of the scale


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Plate 61: North-facing section of trench 10 showing slighting deposits 10074, 10075 and 10067 with tumble 10064 (white/lime mortar) sat in top. Also moat bank deposits 10071 and 10072 (left)



Plate 62: North-facing section of trench 10 showing moat bank 10071 (left, not removed) cut by drain 10068 (left). Slighting deposit 10066 is above the white end of the scale. A thin band of bedding material (10070) separates this from the base of wall 10060 (above the point of the scale). The yellow deposit to the right of the wall is 18th-century levelling 10056


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Plate 63: North-facing section of trench 10 showing flagstone surface 10059, demolition cut 10057 and collapsed brick wall in demolition material 10052



Plate 64: Uncleaned north-facing section of trench 10 showing wall 10038/10051 etc.


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Plate 65: Wall 30038 capped by flags 10006 runs away from camera. Wall 30035, flags 10007 and brick wall 10008/10009 runs away to right. View from north-east



Plate 66: Surfaces 10013 (left) and 10012/10021 (right) divided by wall 10007/10008/10009/10035. Brick structures 10019 and 10020 visible rear left. View from west


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Plate 67: Sloping deposits 11033 (right, base), 11036 and 11027 (left, top) from south-east



Plate 68: Elevation of wall 11010 built on sandstone foundation 11032 from west


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Plate 69: Overview of trench 11 slaughterhouses from east



Plate 70: Overview of trench 11 slaughterhouses from west showing concrete floor repair 11017 (foreground), the fall of floor 11015 (under scales) and black ash mortar repair 11007 (right of scales)


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Plate 71: Slag specimen WS-001



Plate 72: Slag specimen WS-002



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Plate 73: Timber from context 6055 with face lap and peg hole

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