# The Origins and Development of the Verwood-Type Pottery Industry

Volume 1 of 2

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A thesis submitted in partial fulfilment of the requirements of Bournemouth University for the degree of Doctor of Philosophy

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# Copyright Statement

# Abstract

Multiple researchers have attempted to develop an understanding of pottery production along the east Dorset and west Hampshire border; these studies have predominantly focused on manufacture of post-medieval date. Despite this, little has been achieved in determining any medieval origins, or the organisation of pottery production in the early post-medieval period. This study readdresses this issue; firstly, by establishing that pottery production was occurring here at a date prior to AD1600 and, secondly, by examining the nature of the industry at that time - while also exploring its subsequent development. This study employs a staged and integrated methodology of macroscopic, microscopic and chemical analyses via pXRF, supplemented by field examinations of postulated pre-1600 production sites, to clarify the origins of Dorset's most prolific post-medieval coarseware industry - commonly known as the Verwood-type pottery industry. This study charts the development of the industry, both spatially and chronologically, at the site and product level; the results show that the Verwood-type pottery industry originates from a small-scale medieval industry producing coarsewares at several locations across east Dorset. These enterprises formed part of a wider ceramic tradition, exhibiting an extended history with shared manufacturing methods, vessel forms and styles - known collectively as Wessex Coarsewares. This modest industry continued until the 17-18th centuries, when growth is evidenced by rapid expansion, fuelled by a balance of specialisation and standardisation, and reinforced through a form of rural industrialisation, a robust raw material network and effective methods of distribution; all tempered by strong traditions and community ties. These conditions were pivotal driving forces, allowing Verwood-type pottery to become ubiquitous across central southern England during the mid to late post-medieval period. This study considerably enhances current understanding of the late medieval and post-medieval pottery produced on the east Dorset and west Hampshire border, identifying late medieval/early post-medieval pottery production in the Horton and East Worth areas using thin section petrography and chemical analysis via pXRF. This study shows future research in the area should seek to maximise archaeological site investigations in the Cranborne, Horton, Alderholt and Verwood parishes. Additionally, where identified, samples from these newly discovered early pottery production sites should be incorporated in further chemical analyses, followed by thin section petrography.

Key Words/Search Terms:

Archaeology, Pottery, Materials Analysis, pXRF, Medieval, Post-medieval

*To Penny;*

*mentor, fellow ‘potaholic’ and much missed friend,*

*who set me on this course.*

# Acknowledgements

I am deeply indebted to Penny Copland-Griffiths, without whom this thesis would not have been possible. Words cannot express my gratitude to Penny for the assistance with funding, the provision of knowledge and support throughout the duration of this study; you are sorely missed. I would also like to thank my supervisory team at Bournemouth University, comprising Professor Mark Brisbane, Dr Derek Pitman and Paul Cheetham, for advice, editing and synonyms for utilise. Thanks are also due to the initial review team, comprising Professor Kate Welham and Dr Andrew Brown, who helped focus my research into a streamlined format and rationalised my aims, while providing advice on general layout and arrangement of the thesis. Advice on statistics was sought from both John Beavis and Steve Smith of Bournemouth University; you both taught me that statistics were nothing to fear.

The support of Madeleine Faith was invaluable in proofreading, along with the encouragement of Dr Julian Richards, plus help with the organisation, collection and correlation of thousands of measurements on over a ton of Verwood-type pottery; the latter of which would not have been possible without the collaboration of the 'Tuesday Night Pottery Scrubbers', comprising: Sue Richards, Alan and Lindsey Dedden, Rosemary Hart, Gisela Pauley, Julie Smith, Imogen Bittner, Vivienne Hammond - and any others I might have missed, your help was invaluable.

The wisdom and advice of Tony Light and David Algar was absolutely vital, especially David's knowledge of the location of various items in Salisbury Museum. I am particularly grateful to the museum stores teams of Dorset County Museum, the Museum of East Dorset, Salisbury and South Wiltshire Museum, Poole Museum, Southampton City Museum and the Hampshire Cultural Trust.

The help of Alan and Lindsey Dedden during fieldwork, especially the excavation at Horton, was indispensable, with special thanks to Julie Smith, Gisela Pauley, Ronald Carter, Robert Leach, Graham Zebedee and members of the Warminster U3A group, along with any others I might have missed, for their assistance in this endeavor. I am thankful to the Wrixon family, whose permission to undertake the work was greatly appreciated, with additional thanks to all those who gave permissions for fieldwork, including the Goulds of Alderholt, the Chivertons of Crendell and the Palmers of Fordingbridge.

Finally, I would like to extend my sincere thanks to the Hampshire, Wiltshire and Dorset Historic Environment Teams, embedded within planning departments of the relevant councils, who allowed access to the mountain of grey literature held by these institutions. Your kindness and patience was greatly appreciated, as I spent days in your departments trawling through reports for relevant sites and information.

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## Author’s Declaration

I confirm that the work presented here is my own.

Geophysical survey results of the Horton (HOR2), Dorset, pottery production site were previously presented as part of my undergraduate dissertation (Carter 2008).

Daniel Matthew Carter

## Data Statement

Data generated during the creation of this thesis such as any geophysical data employed in Chapter 4 and the bulk chemical analysis data collected via pXRF supporting chapter 5 of this study will be made openly available from Bournemouth Online Research Data Repository (BORDaR), available from https://bordar.bournemouth.ac.uk/

# COVID-19 Impact Statement

This thesis was undertaken on a part-time basis between the years 2016-2023. Early in 2020, the SARS-CoV-2 coronavirus (COVID-19) was identified in the UK. To contain the spread of the virus, a series of lockdowns - the first in March 2020, the second in October 2020 and the third in January 2021 - led to restriction on people's movement, thus temporary closures of various institutions and curatorial organisations.

The closure of the university campus from late March 2020 meant that I could not continue to create thin section petrography samples in the laboratory, and I was unable to continue collecting chemical analysis data using the pXRF during those lockdowns. Additionally, face to face meetings and teaching was suspended, leading to limited contact between supervisors for guidance from support staff such as advice regarding statistical analysis.

The restriction of movement and extended closure of curatorial organisations - such as history centres and museums, especially storage areas - meant that access to pottery samples and visits to curated excavated assemblages and stored historic documentary sources – excluding those held online - were temporarily unattainable. While it was possible to shift the focus to writing and shaping the thesis, instead of collecting data, the records upon which the thesis would be built were still awaiting collection. As a result, portions of chapters were written earlier than planned, and then halted until sufficient data could be collected. Furthermore, the collection of clay samples was prevented due to the restricted movement during lockdowns.

Subsequently, this led to less time available towards the end of my registration period for updating sections that had already been completed, as this time was occupied with the collection of data, which was originally aimed to be undertaken earlier but was delayed due to lockdowns.

It is considered likely that without this unprecedented disruption, sample gathering would have progressed as initially planned, and chemical analysis data gathering could have been completed within a 6-9 month continuous period. However, due to COVID-19 and the resultant lockdowns, data collection had to be undertaken intermittently over a three year period. This led to a substantial amount of drift evident in the collected pXRF data, needing the application of a direct offset to standardise the data.

It is acknowledged that the aforementioned limitations collectively led to substantial alterations from the initial plan for the thesis, and had an impact on the way the thesis was constructed.

# Abbreviations

## *In Text*

DCM – Dorset County Museum, Dorchester

DFA – Discriminant function analysis

DHC – Dorset History Centre

DHER – Dorset Historic Environment Record

HER – Historic Environment Record

HHER – Hampshire Historic Environment Record

HH – Hatfield House, Hertfordshire

MED – Museum of East Dorset, Wimborne Minster

MPRG – Medieval (and later) Pottery Research Group

OS – Ordnance Survey

PCA – Principal Component Analysis

SOUHER –Southampton City Historic Environment Record

WHER – Wiltshire Historic Environment Record

## *Pottery Fabric Abbreviations*

DWCW – Developed Wessex Coarseware

DWW – Dorset Whiteware

DWWPM – Dorset Whiteware (Post-Medieval)

EVER – Early Verwood-Type Pottery

LAVC – Laverstock Coarseware

LAVF – Laverstock Fineware

LOPS – Local Pink Sandy Ware

LMWFSW – Late Medieval Well-Fired Sandy Ware

MVER – Manganese-Laced Lead Glazed Verwood-Type Pottery

SHRW – South Hampshire Redware

SOUCW – Southampton Coarseware

SOUFSW – Southampton Fine/White Ware

VER – Verwood-Type Pottery

VERE – Verwood-Type (16-17th century coarse variant) Pottery

WCW – Wessex Coarseware

WDSW – West Dorset Sandy Ware

WDSWPM – West Dorset Sandy Ware (Post-Medieval)

# 1. Introduction

Dorset's most prolific post-medieval coarseware industry is commonly known as the Verwood-type pottery industry, its products becoming ubiquitous across central southern England during the mid to late post-medieval period. This study explores the themes of production and distribution within the Verwood-type pottery industry. In particular, the origins of this ceramic tradition in the late medieval period will be examined by employing samples from the growing wealth of late medieval and early post-medieval pottery sherds that have been, or have potential to be, attributed to the east Dorset/west Hampshire border as a place of origin. The current state of knowledge suggests that this ceramic industry appears from AD1600, while a growing wealth of evidence suggests that there is a likely predecessor to this industry, much earlier than this, hidden within two medieval southern British ceramic categories. These comprise ware types often termed Wessex Coarsewares (e.g. Jarvis 1983; Horsey 1992) and Late Medieval Sandy Wares (Brown 2002) or Transitional Sandy Wares (Jervis 2011a), with the inferred date of production being the chief discriminator. This study aims to elucidate the nature of this, utilising macroscopic and microscopic examinations alongside non-destructive bulk chemical analysis via pXRF, to confirm the presence of pottery production on the east Dorset/west Hampshire border during the late medieval and early post-medieval periods. Furthermore, the study explores the factors associated with the creation and exchange of this ware type, and how this has contributed towards the dominance of Verwood-type pottery in central southern England during the post-medieval period. Alongside this, the investigation examines how this ware type has changed over the post-medieval period, guided by material recovered from both production and consumption sites across central southern England (Fig. 1). The study has both local and regional importance, as examinations into the production and distribution of medieval and post-medieval coarseware ceramics are rarely undertaken at a regional level.

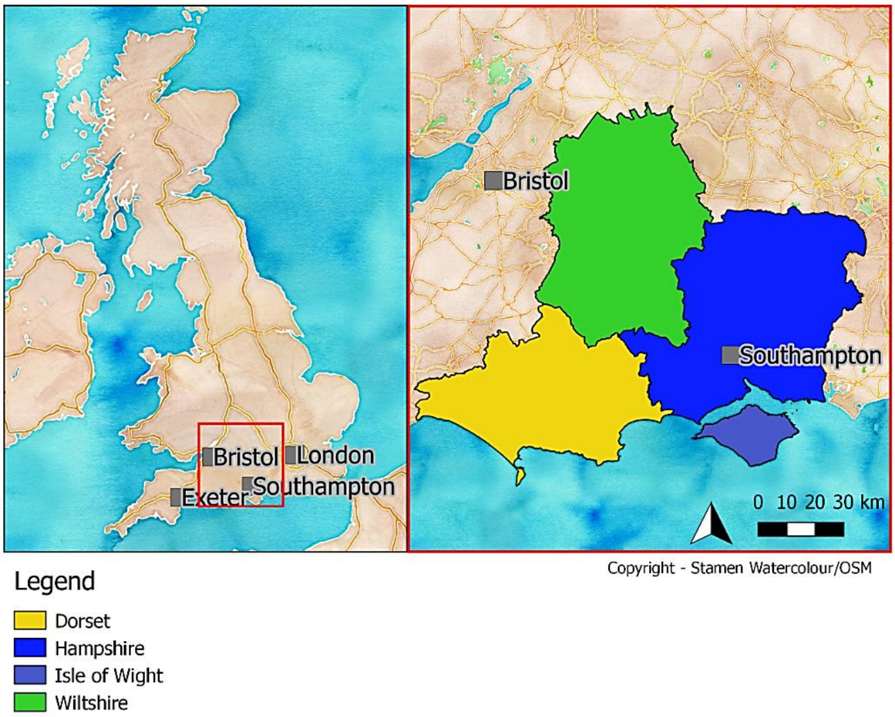

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**Fig. 1: Counties forming the study area of central southern England (Contains map tiles by Stamen Design, under CC by 3.0)**

The east Dorset and west Hampshire border has an extended history of pottery production, with the first indications of highly organised manufacture being the appearance of New Forest wares of Romano-British date, which comprise both coarse and fineware vessels (Sumner 1927; Fulford 2000). While there is little indication for a continuation of production beyond the late Romano-British period into the early medieval period, there is growing evidence for medieval production (*i.e.* that dating from AD1066 - 1600); this forms the antecedent of Dorset's most prolific post-medieval pottery industry; Verwood-type pottery.

### 1.1.1. What is Verwood-Type Pottery?

Verwood-type pottery is an earthenware; a category of ceramics fired at relatively low temperatures - between 900–1100° (Rice 2015, p.5). This type of pottery is commonly found within post-medieval to early modern deposits across central southern England. The ware was manufactured at numerous sites across east Dorset and west Hampshire (Fig. 2) within free-standing, purpose-built structures, or kilns, constructed of brick from the 17th century onwards (Copland-Griffiths and Butterworth 1991).

The firing conditions within these kilns have a tendency to create an oxygen-rich, oxidising atmosphere, leading to pale-buff coloured fabrics, or clay compositions, being the norm for this industry (Plate 1). It is this colouring and fabric that allows Verwood-type pottery to be readily identified within assemblages of central southern England, comprising various post-medieval ware types.

**Plate 1: A Selection of Verwood-type vessels held by the former Verwood Historical Society. Photo courtesy of P.Reeks**

Verwood-type pottery was known to be made from the 1600s up until the closure of the final production centre in 1952, at Crossroads, Verwood (Draper and Copland-Griffiths 2002, pp.74-82). Due to this, Crossroads is often seen as the 'type-site' for the industry, being the site that most hypotheses on past Verwood-type pottery production is based, while other production sites in the industry are ignored (*e.g.* McGarva 2000). This is due to the numerous sources of evidence, such as documents, interviews and photos relating directly to this site and the methods used there (Algar *et al.* 1987). Draper (2002, p.39) notes:

> *"…it is Crossroads which dominates our knowledge of how the kilns worked, because it survived so late and because many of the surviving Crossroads workers and their relatives were interviewed..."*

Although this ware type is often referred to as Verwood pottery, at least 36 production sites are thought to have existed from 1600 until the 20th century (Fig. 2); a gazetteer of postulated production sites is presented in Appendix I. These occur across a vast area of east Dorset and west Hampshire; hence the term Verwood-type pottery is more accurate.

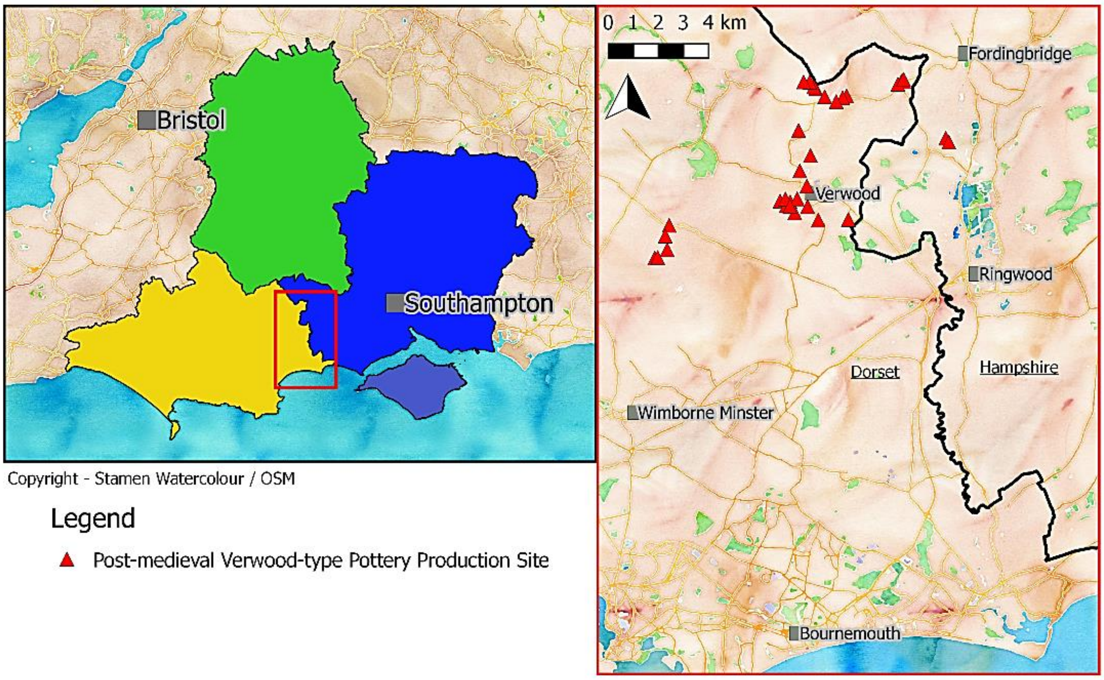


**Fig. 2: Location of Verwood-type production sites. The details of these sites can be found within Appendix I (Contains map tiles by Stamen Design, under CC by 3.0)**

### *1.1.2. The Impetus for the Study*

The Verwood-type pottery industry not only establishes itself as a major competitor in the ceramic markets of central southern England during the post-medieval period, but often occurs in pottery assemblages recovered from archaeological investigations in urban centres of this date, such as Poole (Horsey 1992), Wareham and Corfe Castle (Draper and Papworth 1997), Wimborne Minster (Coe and Hawkes 1991), Shaftesbury (Draper 1988, and Valentin and Robinson 2001), Salisbury (Mepham 2016), Warminster (Smith 1997), Fordingbridge (Mepham 2003), and Southampton (Brown 2002) to name but a few across the region. The reasons for the rise to dominance of Verwood-type pottery remain unclear, despite such a barrage of investigations (Sims 1969; Young 1979; Algar *et al.* 1979; Draper and Copland-Griffiths 2002).

While this pottery type is distributed widely across the South, and much is known of the middle to late post-medieval production of this industry, there is little historic and physical archaeological evidence for pottery production in the same area prior to the 1600s. This is inconsistent with the growing number of sherds datable to the medieval period that exist, which other archaeological ceramic specialists have attributed to this region (*e.g.* Mepham 2000; 2003; 2016; and Brown 2002). Furthermore, numerous archaeological investigations have identified similar medieval ware types in urban centres within the counties of Hampshire, Wiltshire and Dorset. These comprise Fordingbridge (Mepham 2003, p.15), Wimborne Minster (Coe and Hawkes 1991), Shaftesbury (Robinson *et al.* 2016), Salisbury (Mepham 2000, p.35), Southampton (Brown 2002, p.16), Christchurch (Jarvis 1983) and Poole (Horsey 1992); the latter two reports termed this ware type Wessex black and red wares. In addition, documentary sources reinforce the potential for pottery production in east Dorset dating back to the 14th century, with references becoming more numerous in the 16th century (Algar *et al.* 1987, p.21 – detailed in table 1). One of the problems that have prevented archaeological ceramic specialists confirming medieval pottery production in east Dorset and west Hampshire is that the dominant pottery fabrics recovered from south Dorset, across west

Hampshire and on up to south Wiltshire, is all quartz-rich, and thus sit within a group of similar wares which dominate ceramic assemblages across a geographical band from south Dorset to south Wiltshire and west Hampshire (Spoerry 1989 – Ware type C1). Currently, it can be evidenced that the medieval pottery kilns of Laverstock, Wiltshire (Musty *et al.* 1969) and Wareham, Dorset (Milward 2017) can be shown to be producing wares of similar composition, making it difficult to identify any early Verwood-type pottery of medieval or early post-medieval date. Mepham (2018, pp.25-6) has noted that the ceramic sequence for Salisbury is currently poorly defined, especially for the later medieval period, and that any absence of wares of this date may partly be due to a lack of recognition rather than a real absence of such material. This situation is mirrored in other urban centres in the region such as that of Wareham, Dorchester, Wimborne and Poole. As a result of this, it is clear that macroscopic examinations and explorations of vessel typologies alone will not resolve the situation.

## *1.2. Aims and Objectives*

The aim of this study is to confirm that pottery production was taking place on the east Dorset and west Hampshire border during the late medieval and early post-medieval transitional period. Once confirmed, this pottery - and its production - will be characterised, and its development charted into the post-medieval period. These observations can be used to elucidate the nature of medieval, and later, pottery production in this area, and are critical in improving current understanding of the former ceramic distribution network of central southern England.

To address this, the following project objectives have been proposed to:

- confirm the postulated origins of certain samples of late medieval/early post-medieval pottery fabric types which have been assigned a potential east Dorset origin.

- detail, critique, and re-assess the evidence used to support past arguments for the production of such wares.

- construct a vessel type series and examine how certain vessel types have changed over time. This will enable any specialisation within the products of the post-medieval Verwood-type pottery industry (c. AD1600-1850) to be to confirmed, and increase the practicality of other researchers to use Verwood pottery as a more precise dating tool.

- critically examine the influencing factors, concerning both production and distribution, that have contributed towards the products of the post-medieval Verwood-type pottery industry becoming one of the most prominent ware types in southern England. To achieve this, the distribution of Verwood-type pottery needs to be spatially defined across the study region; the role of both coastal and overland trade requires examination.

## 1.3. Research Questions

The subsequent research questions have been adopted in-line with the project aims:

1) What is the nature and extent of the evidence for a late medieval/early post-medieval pottery industry in east Dorset, and can its existence be validated along with a localised geographical location?

2) How does Verwood-type pottery change both spatially and chronologically during the post-medieval period?

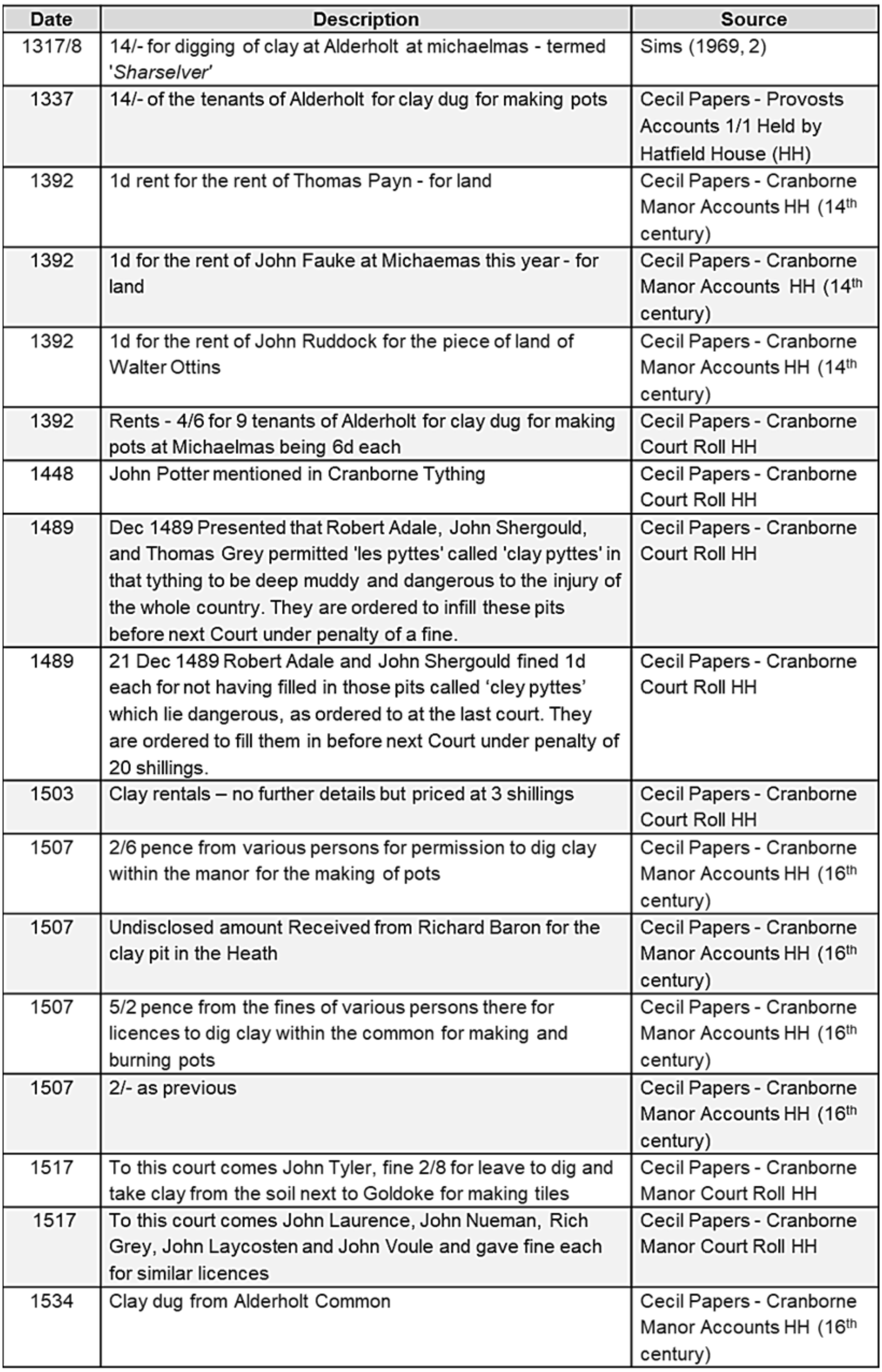
3) What factors contributed towards Verwood-type pottery dominating the ceramic market of central southern England?

## 1.4. Scope

### 1.4.1. Chronological Range of the Study

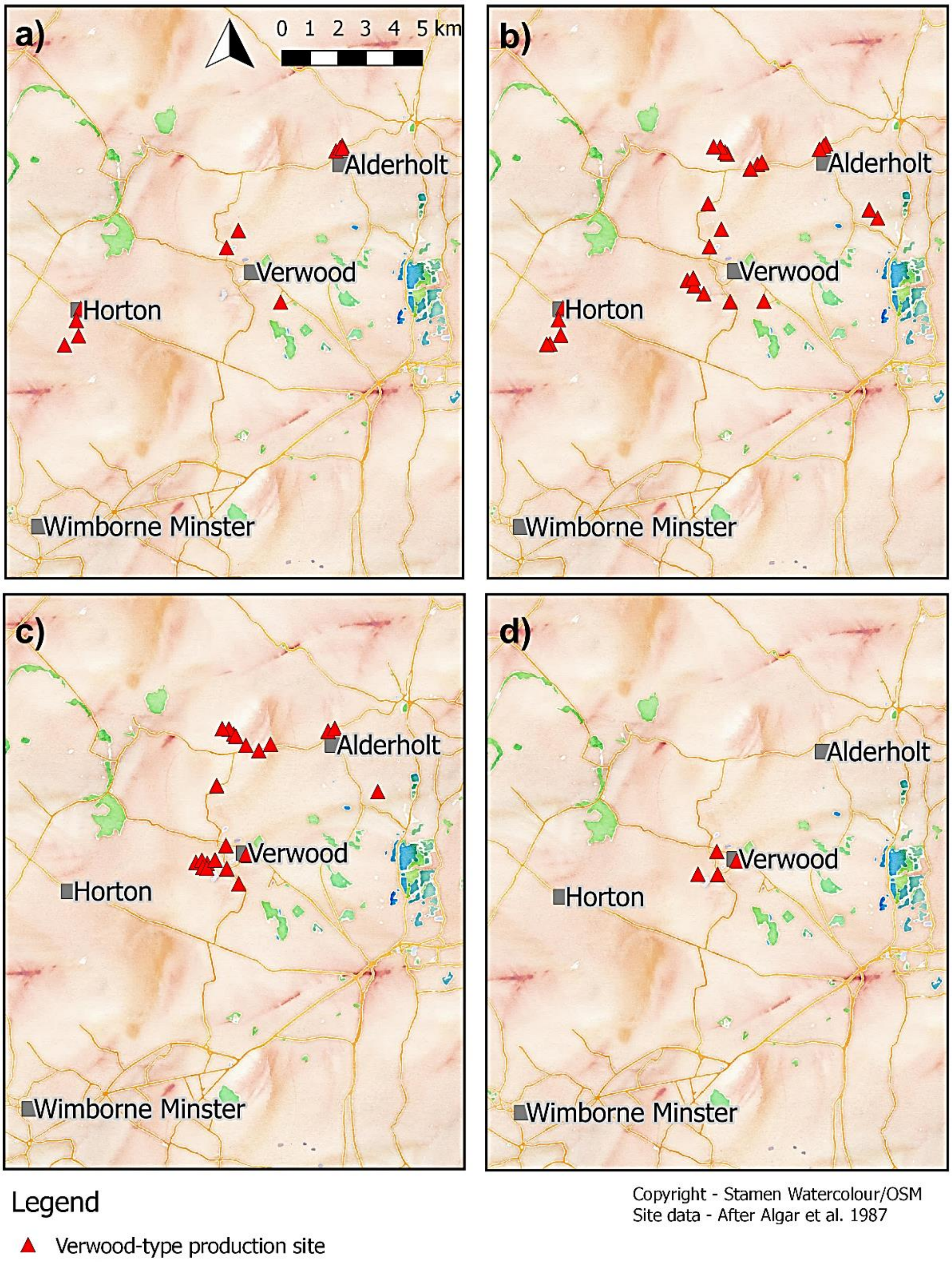
The period of study spans the late medieval period into the late post-medieval period, comprising the dates AD1300-1850. This date range has been chosen as a start date in the 14th century corresponds with the first known documentary evidence for medieval pottery production in the east Dorset area (Table 1), and allows for the inclusion of two excavated medieval production centres making visually similar coarsewares which lie just beyond the east Dorset area, at Laverstock, Wiltshire (Musty *et al*. 1969), to the north, and Wareham, Dorset (Milward 2017), to the south. Both these sites can be shown to be producing coarsewares within the date range under study. It is recognised that the study does not include those sherds that have potential to originate from this area prior to this date (*i.e.* pre-AD1300), as it is felt that the late medieval production should be confirmed before casting the net wider; in essence working from the known towards the unknown.

## Table 1: List of Historic Documentary Evidence Related to Potting for Alderholt (pre-AD1600 only)



| Date | Description | Source |
|---|---|---|
| 1317/8 | 14/- for digging of clay at Alderholt at michaelmas - termed '*Sharselver*' | Sims (1969, 2) |
| 1337 | 14/- of the tenants of Alderholt for clay dug for making pots | Cecil Papers - Provosts Accounts 1/1 Held by Hatfield House (HH) |
| 1392 | 1d rent for the rent of Thomas Payn - for land | Cecil Papers - Cranborne Manor Accounts HH (14th century) |
| 1392 | 1d for the rent of John Fauke at Michaemas this year - for land | Cecil Papers - Cranborne Manor Accounts HH (14th century) |
| 1392 | 1d for the rent of John Ruddock for the piece of land of Walter Ottins | Cecil Papers - Cranborne Manor Accounts HH (14th century) |
| 1392 | Rents - 4/6 for 9 tenants of Alderholt for clay dug for making pots at Michaelmas being 6d each | Cecil Papers - Cranborne Court Roll HH |
| 1448 | John Potter mentioned in Cranborne Tything | Cecil Papers - Cranborne Court Roll HH |
| 1489 | Dec 1489 Presented that Robert Adale, John Shergould, and Thomas Grey permitted 'les pyttes' called 'clay pyttes' in that tything to be deep muddy and dangerous to the injury of the whole country. They are ordered to infill these pits before next Court under penalty of a fine. | Cecil Papers - Cranborne Court Roll HH |
| 1489 | 21 Dec 1489 Robert Adale and John Shergould fined 1d each for not having filled in those pits called 'cley pyttes' which lie dangerous, as ordered to at the last court. They are ordered to fill them in before next Court under penalty of 20 shillings. | Cecil Papers - Cranborne Court Roll HH |
| 1503 | Clay rentals – no further details but priced at 3 shillings | Cecil Papers - Cranborne Court Roll HH |
| 1507 | 2/6 pence from various persons for permission to dig clay within the manor for the making of pots | Cecil Papers - Cranborne Manor Accounts HH (16th century) |
| 1507 | Undisclosed amount Received from Richard Baron for the clay pit in the Heath | Cecil Papers - Cranborne Manor Accounts HH (16th century) |
| 1507 | 5/2 pence from the fines of various persons there for licences to dig clay within the common for making and burning pots | Cecil Papers - Cranborne Manor Accounts HH (16th century) |
| 1507 | 2/- as previous | Cecil Papers - Cranborne Manor Accounts HH (16th century) |
| 1517 | To this court comes John Tyler, fine 2/8 for leave to dig and take clay from the soil next to Goldoke for making tiles | Cecil Papers - Cranborne Manor Court Roll HH |
| 1517 | To this court comes John Laurence, John Nueman, Rich Grey, John Laycosten and John Voule and gave fine each for similar licences | Cecil Papers - Cranborne Manor Court Roll HH |
| 1534 | Clay dug from Alderholt Common | Cecil Papers - Cranborne Manor Accounts HH (16th century) |

The cut-off point of the date range (AD1850) has been chosen as this represents the start of the decline in the number of Verwood-type pottery production sites, and therefore in the operational output of the industry (Draper and Copland-Griffiths 2002, 55). This is shown spatially in Fig. 3a-d and in a timeline of production activity, shown in Fig. 4; both created from Appendix I.



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Site data - After Algar et al. 1987

**Fig. 3: Verwood-type sites by period: a) 1600s. b) 1700s c) 1800s and d) 1900s. The details of these sites can be found within Appendix I (Contains map tiles by Stamen Design, under CC by 3.0)**

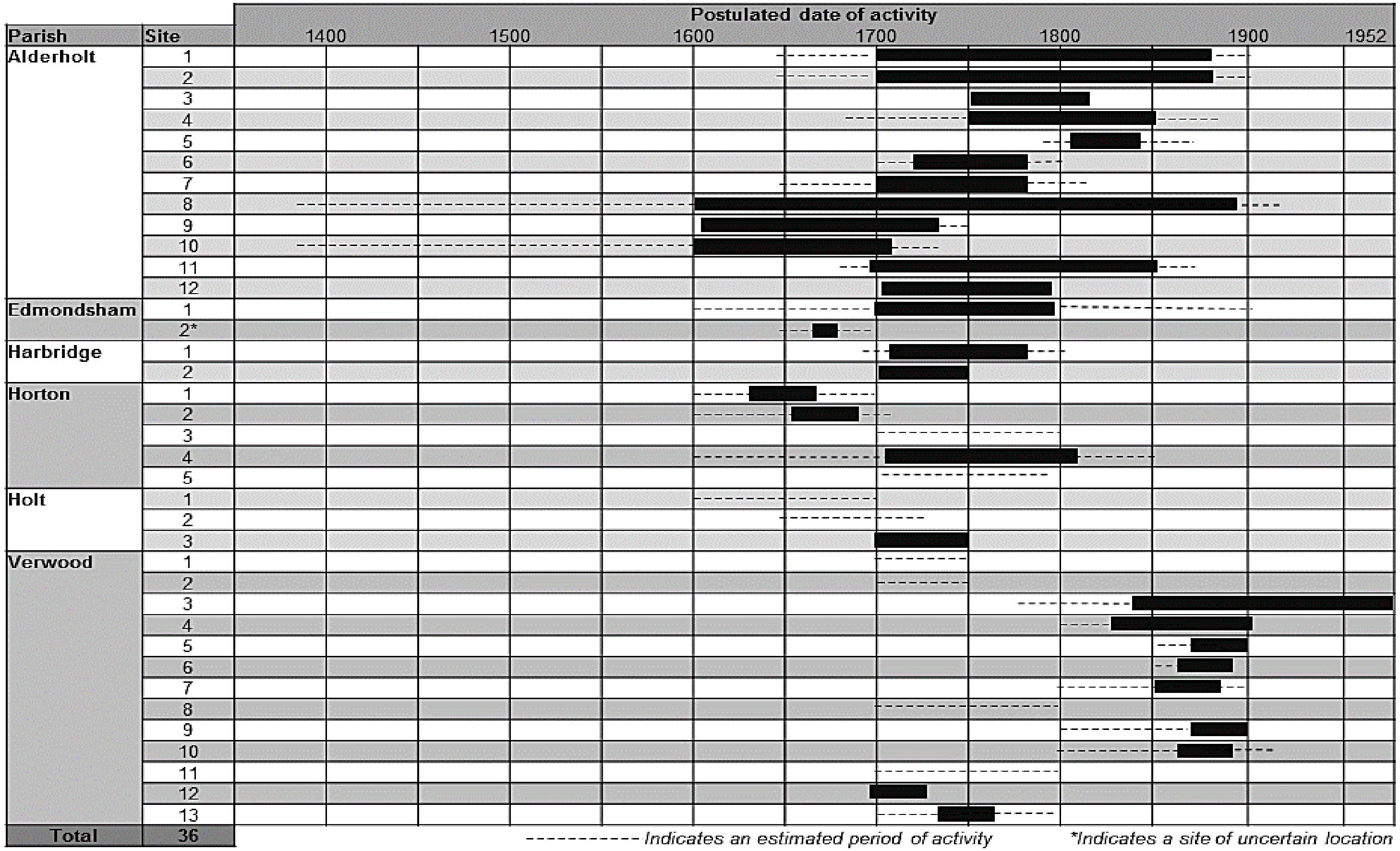
Date Range of Postulated and Known Verwood-type Production Sites (After Algar *et al*. 1987)

Fig. 4: Active date ranges of Verwood-type pottery sites

The proposed date range of AD1300-1850 allows for the maximum number of relevant production sites to be utilised as part of the study, allowing for a full critical examination of the available evidence (Fig. 5).

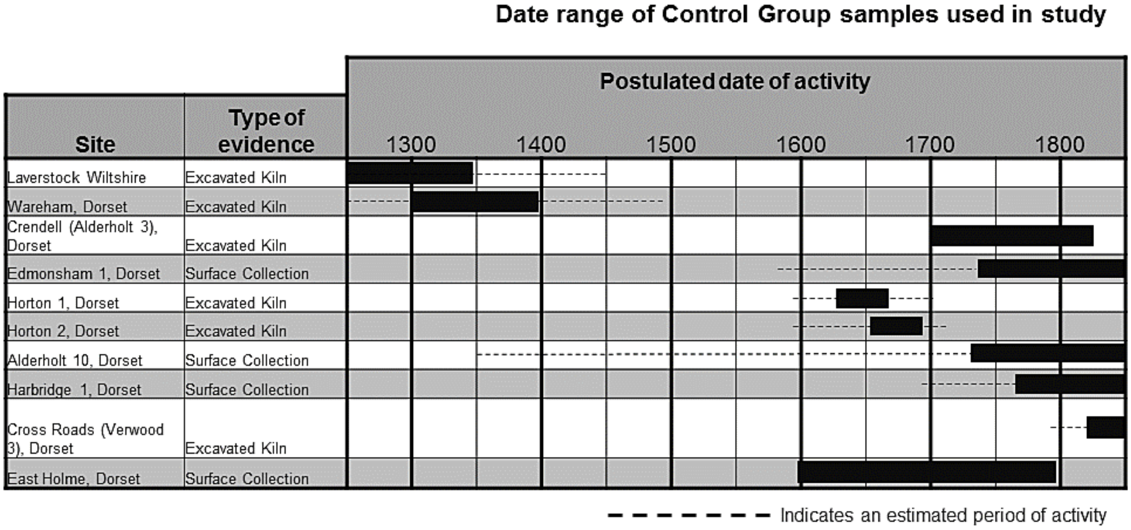

Fig. 5: Postulated date ranges of activity of kilns under study

It is also noteworthy that the aforementioned sites lie geographically close to each other and sit on, or near to, geologically similar deposits (Fig. 6). This reinforces the likelihood that the products created by these centres are expected to display a degree of similarity, despite the differences in chronology.

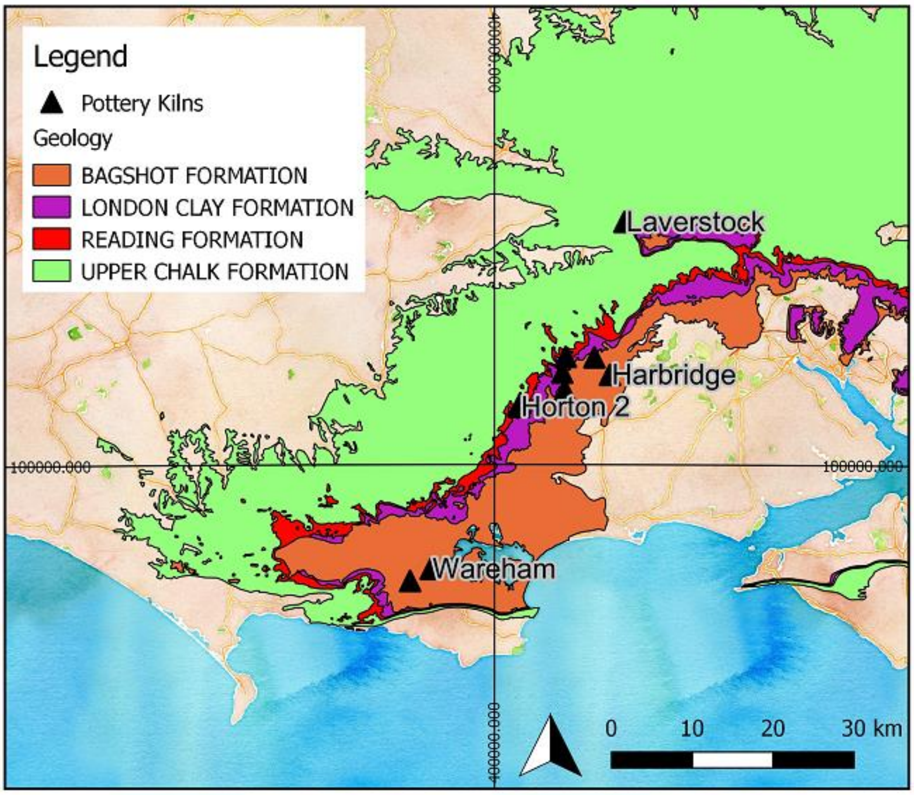

Fig. 6: Location of kilns under study - outlined in Figure 5 - with underlying geology; (Contains map tiles by Stamen Design, under CC by 3.0; geological data from Edina Digimap service 2016)

### *1.5. The Geographic Study Area*

This study involves two tiers of investigation. The larger of these comprises examination of past archaeological investigations over numerous counties across central southern England; for the purposes of this study, this is defined as the counties of Dorset, Hampshire and Wiltshire (Fig. 7). This tier was created to chart the potential distribution of Verwood-type pottery, and is employed to explore the ceramic exchange network of this region. These counties have been chosen to gain an insight into circulation networks via which the pottery was distributed across the South, as the potential production sites lie close to where all three counties intersect.

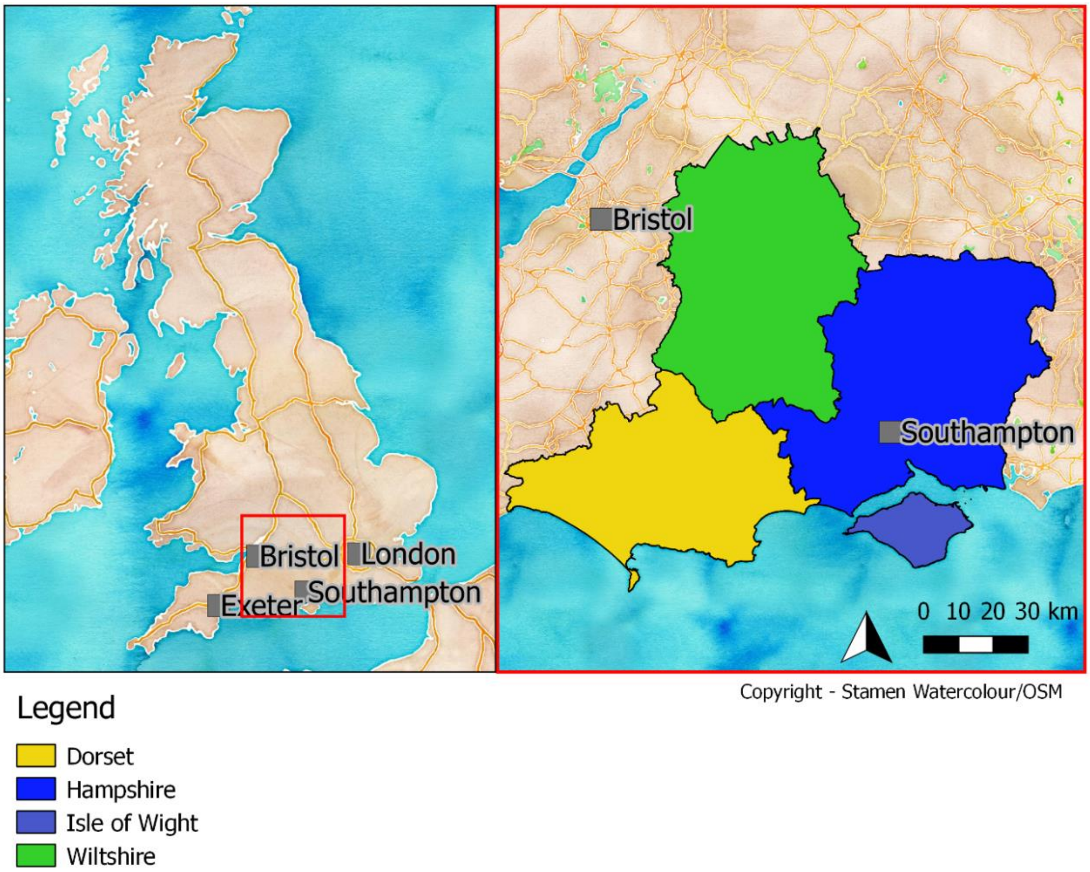

**Fig. 7: Location of the geographic study area forming central southern England (Contains map tiles by Stamen Design, under CC by 3.0)**

The smaller of the two tiers is that undertaken at the parish level; this tier of investigation is used to examine the evidence for past pottery production at a local level in east Dorset and west Hampshire. Parishes comprise simple ready-made geographical units within which to present the available and collected evidence in a manageable way. The study area comprises 22 parishes within east Dorset and west Hampshire (Table 2); 16 in the county of Dorset, and six within the county of Hampshire – collectively comprising an area of some 340km$^2$ (Fig. 8). A search of these was conducted to identify potential sites of medieval pottery production (AD1066-1600), and the results of this are outlined in a desk-based assessment which has been synthesised as part of combined literature and available archaeological data review.

**Table 2: Parishes Comprising the Study Area**

| Parish | County |
|---|---|
| Alderholt | Dorset |
| Chalbury | Dorset |
| Colehill | Dorset |
| Cranborne | Dorset |
| Damerham | Hampshire |
| Edmondsham | Dorset |
| Ellingham, Harbridge and Ibsley | Hampshire |
| Fordingbridge | Hampshire |
| Gussage All Saints | Dorset |
| Hinton (Parva and Martell) | Dorset |
| Holt | Dorset |
| Horton | Dorset |
| Hyde | Hampshire |
| Pamphill | Dorset |
| Ringwood | Hampshire |
| Sandleheath | Hampshire |
| St Leonards and St Ives | Dorset |
| West Moors | Dorset |
| Wimborne Minster | Dorset |
| Wimborne St Giles | Dorset |
| Woodlands | Dorset |
| Verwood | Dorset |

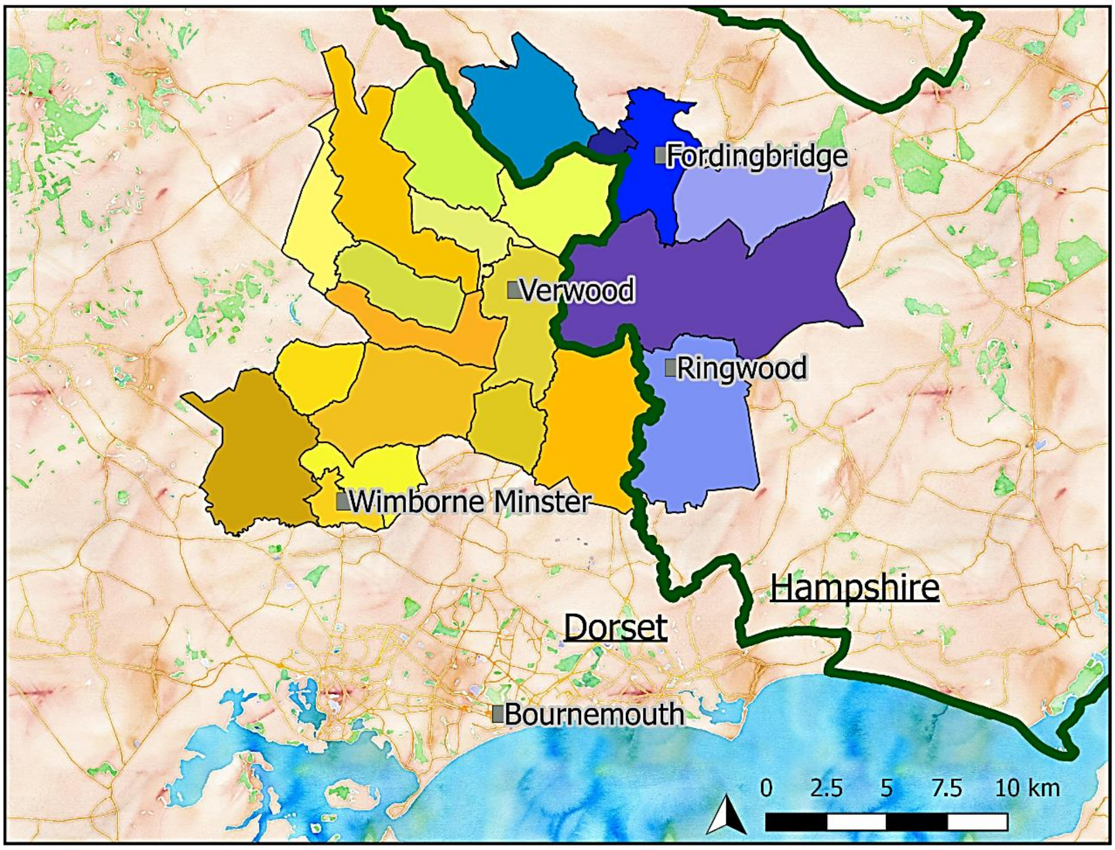

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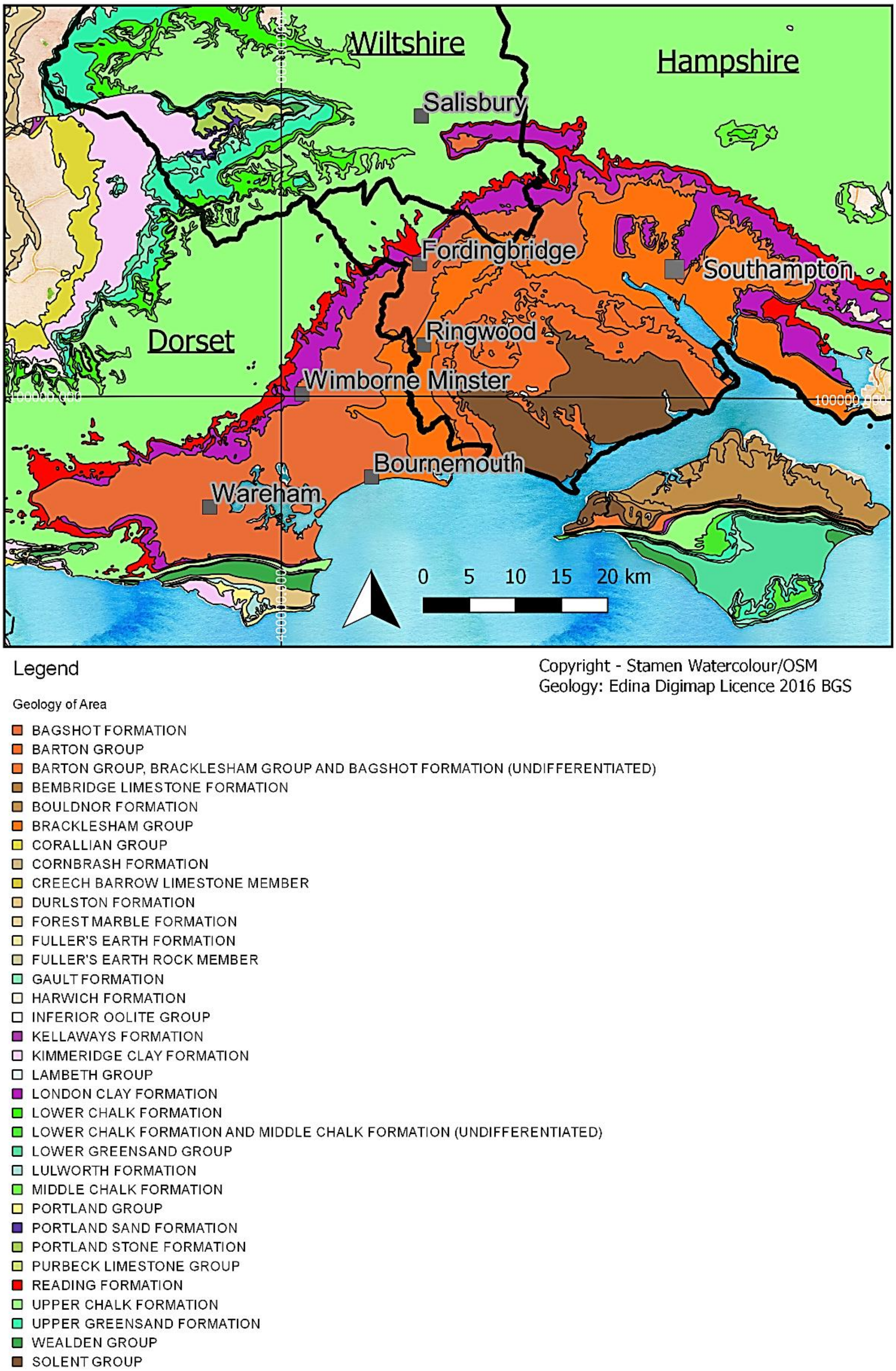
Fig. 8: Parishes examined for medieval pottery production evidence. (Contains map tiles by Stamen Design, under CC by 3.0)

### *1.6. Character of the Parishes of East Dorset and West Hampshire*

In terms of land use, it is the presence of the acidic soils overlying the clays and sands in this region which have aided the establishment of extensive tracts of heathland - likely formed as a result of Bronze Age woodland clearance (Haskins 2003, pp.10-12). This, in turn, has influenced human interactions with the landscape in the area. The land use on the heathlands is markedly differently from that on the adjacent chalk. The agricultural processes undertaken between the two contrast distinctly, as the poor acid soils of the heath are unsuitable for arable farming, leading to pastoral activities being the norm (Bettey 1987, p.19). Agriculture on heathlands has often been supplemented by additional sources of income, such as turf, peat and furze cutting, along with the digging of clay and ceramic production. Such situations are mirrored in south Dorset and areas of the New Forest across numerous time periods (Sumner 1927; Bettey 1987; Cox and Hearne 1991; Fulford 2000).

The nature of former settlement patterns on the east Dorset heathland comprised various discrete communities or isolated farmsteads associated with small networks of fields; these fields are of an irregular character and few traces of these survive (RCHME 1975, p.1). This is thought to reflect the piecemeal reclamation of the heath; such a system of landscape interaction appears to be repeated across the study area, and is also mirrored on the southern Dorset heaths (Taylor 1970, p.64). The nature of settlement in the area appears to continue in this way, steadily extending deeper into the heathland; this is a process that has accelerated into more recent years to provide us with the contemporary landscape.

The geology of the area is dominated by the presence of chalk to the west, with clays, sands and gravels to the east. Bands of sinuous clays run on an approximate north east – south west course, extending from Downton, Wiltshire to Lytchett Matravers, Dorset (Fig. 9). Of these, two hold significance; firstly, clays, sands and gravels of the Reading Formation – this is a sedimentary bedrock formed between 66 and 56 million years ago, during the Palaeogene period, and overlies the chalk (UKRI 2018). Secondly, London clay; a conglomeration of clays, silts and sands – this sedimentary deposit was formed between 56 and 47 million years ago (UKRI 2018). The London clay extends north-east from the study area, up towards Salisbury, skirting to the north of Southampton, and continuing south east to Waterlooville. To the south, the area is dominated by mixed clays, sands and silts of the Bagshot, Barton and Bracklesham formations.



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Geology: Edina Digimap Licence 2016 BGS

**Fig. 9: Geology of east Dorset, south Wiltshire, and west Hampshire**

# 2. Literature Review

## *2.1. The Significance of the Study*

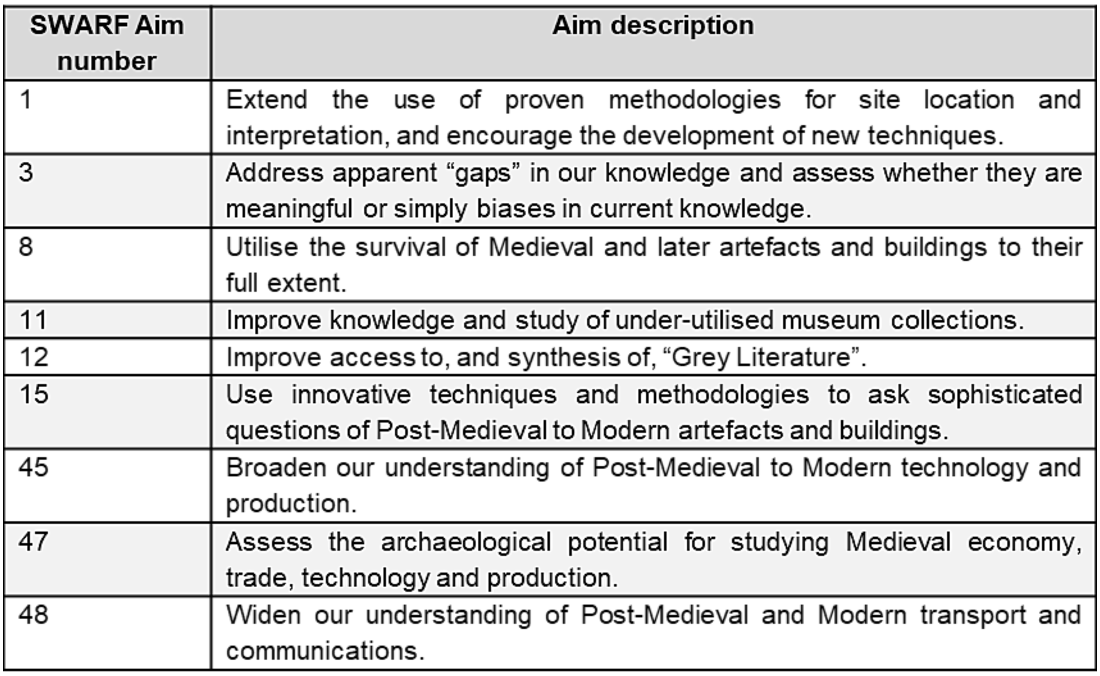
This research project addresses the themes of production and distribution in east Dorset and west Hampshire during the medieval and post-medieval periods. Production and distribution have formed key aspects of medieval (*e.g.* Jope 1947; Dunning 1952; Musty *et al.* 1969), and post-medieval, ceramic studies (*e.g*. Brears 1967; Farley 1979; Coleman-Smith and Pearson 1988) for an extended period of time. Renfrew (1977, pp.71-2) has successfully argued that the two should be considered simultaneously. The work of both Streeten (1985) for south-east England, and Vince's (1977) Malverian study, have shown that such an approach for medieval and post-medieval ceramics can provide a more complete picture within the region under study. Furthermore, the role of distribution and consumption of coarsewares during both the post-medieval and medieval periods has been somewhat neglected. In the past, the view has often been skewed towards the distribution of finewares, which has been the subject of thorough study (*e.g.* Barton 1975; Hurst 1974; 1991; Hurst *et al.* 1978). For wares datable to the post-medieval period, the distribution of such ceramics appears to have been particularly ignored, unless there is an aspect of international trade to be explored (*e.g.* Temple 2004; Coleman-Smith *et al.* 2005; Gutiérrez 2007; Pope *et al.* 2008). The work of Dunning and Fox (1951), Vince (1977), Streeten (1985) and Coleman-Smith and Pearson (1988) form a minority of past examples whereby the production and distribution of coarsewares belonging to a particular medieval or post-medieval pottery industry have been plotted, and explained, within the same study. This research will form a contemporary example which can be used towards re-addressing the aforementioned imbalance, and will highlight that the study of medieval and post-medieval Coarsewares, along with explorations into their distributions, can be both fruitful and of benefit to the wider archaeological community.

To fully explore the origins and development of the Verwood-type pottery industry, it will be necessary to explore the current state of knowledge regarding such production across the east Dorset/west Hampshire border. This includes not only a study of published written evidence, but also an examination of the current state of the known archaeology in this area. Only in this way can one gain the critical understanding required to fully outline the arguments for late medieval/early post-medieval pottery production taking place in east Dorset and west Hampshire. Using this, it will be possible to ascertain the quality of the evidence associated with the existing hypotheses for the presence of such production, and then confirm their validity.

## *2.2. Regional Frameworks and a Resource Under Threat*

The aims and research questions that guide this study address numerous regional research questions. Firstly, the Medieval and later Pottery Research Group's (MPRG) *A Research Framework for Post-Roman Ceramic Studies in Britain* (Irving 2011) notes that there is a need for a dated type series on Verwood-type pottery (Aim SC2), along with the need for more synthesis and further research on medieval wares from Dorset (SC4). Secondly, numerous aims set out in the *South West Archaeological Research Agenda* (SWARF), a resource assessment and research agenda for the archaeology of South West England (Webster 2007), are met by this thesis; these are outlined in Table 3.

**Table 3: SWARF Research Aims Relevant to this Study**



| SWARF Aim number | Aim description |
|---|---|
| 1 | Extend the use of proven methodologies for site location and interpretation, and encourage the development of new techniques. |
| 3 | Address apparent “gaps” in our knowledge and assess whether they are meaningful or simply biases in current knowledge. |
| 8 | Utilise the survival of Medieval and later artefacts and buildings to their full extent. |
| 11 | Improve knowledge and study of under-utilised museum collections. |
| 12 | Improve access to, and synthesis of, “Grey Literature”. |
| 15 | Use innovative techniques and methodologies to ask sophisticated questions of Post-Medieval to Modern artefacts and buildings. |
| 45 | Broaden our understanding of Post-Medieval to Modern technology and production. |
| 47 | Assess the archaeological potential for studying Medieval economy, trade, technology and production. |
| 48 | Widen our understanding of Post-Medieval and Modern transport and communications. |

Furthermore, in January 1996, Wessex Archaeology was commissioned by Dorset County Council to plan a series of management surveys on the current state of the east Dorset potteries. The document noted that

> *“Given the current threat from continued development to the core area of the post-medieval pottery industry, the time is ripe for an assessment of the known post-medieval sites and a systematic search for their medieval antecedents. This information, once collected, will be a valuable tool for local planning authorities in the process of the protection and management of the archaeological resource”’* (Wessex Archaeology 1996, p.4).

The proposed surveys never took place. Since then, the pressure on the archaeological resource has increased. Here, threats include agricultural land use, urban expansion, utilities expansion and replacement, plus intensive use as a recreational destination. Thus far, it can be shown that 24 out of a potential 36 Verwood-type pottery production sites have experienced damage over time (Fig. 10), while only eight archaeological mitigation works prior to 2016 (comprising of either watching brief or excavation) could be identified in response to the potential damage. In particular, the growth of towns in east Dorset and west Hampshire, such as Verwood and Alderholt, due to the prevalence of new housing for commuters to the large conurbations of Bournemouth and Southampton, have increased exponentially in recent years. In summary, this archaeological resource needs to be better understood to be preserved for the future before more is lost.

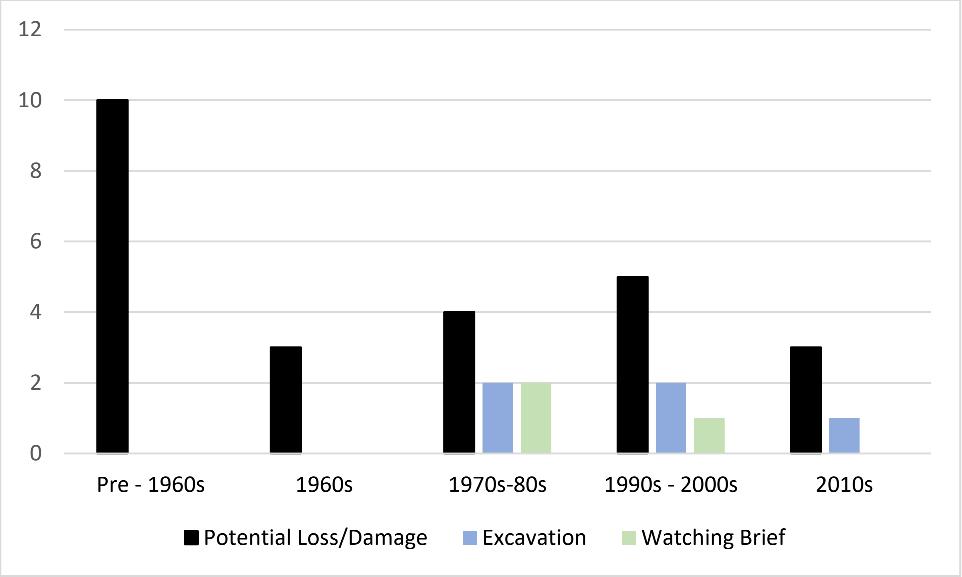


**Fig. 10: Verwood pottery sites potentially damaged by development and agricultural activity etc. (pre-2016)**

### *2.3. Past Research into the Verwood-Type Pottery Industry*

Ceramic artists were the first to spark interest into the Verwood-type potteries. Shortly following the closure of the Crossroads pottery, Verwood, T.P. Kendrick writing in 1959, outlines the operation of the pottery after production ceased. This makes his work a valuable primary source. However, Kendrick focused heavily on reminiscing over the loss of the industry, but consequently describes the kiln apparatus in detail prior to demolition, and considers numerous aspects of production. In contrast, a more historical and thorough approach to the entire industry is presented by another with an artistic background, Sims (1969), who outlined numerous production sites alongside a detailed history of those who worked them. This study charted potential production locations and put forward possible early sites. In addition, Sims outlined various medieval and later documentary references to potting and materials extraction. Algar *et al.* (1979) and Young (1979) built upon Sims' work, and while both of these were published at a similar time – and address similar themes - they approach the subject in different ways. Algar *et al.* (1979) provides a detailed and systematic outline of the industry, approaching the study at the parish level, discussing the documentary evidence for each production site, and a brief product type series; a chief characteristic of Algar *et al.* (1979) is the presentation of additional medieval documentary evidence. Whereas Young's (1979) approach employed archaeological test pitting on production sites and presents known vessel types with an emphasis on rim styles; his use of classification is something that has not been repeated since for Verwood-type pottery. In terms of the use of chemical analysis of products of the industry, this has already been attempted with some success using Atomic Absorption Spectroscopy (AAS). Using this, Purkis (1991, p.56) has shown that out of four post-medieval Verwood-type production sites, only two could be chemically distinguished. Purkis' work was guided in part by the work of Paul Spoerry (1989), whose work on the potential production of medieval pottery sites is invaluable in terms of our current understanding of Dorset pottery production; his work will be examined in detail at later junctures. Spoerry's work attempted to link medieval pottery products of uncertain origin to known post-medieval centres. This approach has not since been repeated within southern central England, and could be beneficial in exploring the origins of the Verwood-type pottery industry.

An updated version of Algar *et al.* (1987) outlined many of the works undertaken by the Verwood and District Potteries Trust (VDPT) - a group of individuals who worked to protect the known production sites, while increasing the state of knowledge of the industry. This organisation undertook numerous fieldwork projects to better understand the industry; the bulk of these are not published. This group collected a significant amount of evidence, such as an excavation of the earliest Verwood-type pottery production site: the 17th century kiln at Horton, Dorset (Copland-Griffiths and Butterworth 1991). Investigations such as this continued, although again, few are published; in response to this many are briefly mentioned by Draper and Copland-Griffiths (2002). This publication brings the then current state of information up to date. It covers every aspect of the industry, outlining production, products, and examines the surrounding region, along with additional heathland industries such as hurdle and basket making. This is quite appropriate, as potteries stand as one part of a complex interconnected network of heathland industries, with participants most likely fulfilling numerous roles from raw material and fuel procurement, to the forming and transportation of vessels. This is best exemplified by Draper (2002, p.37), who notes:

> *"The potters worked with the woodland men because the kilns needed the wood for firing, and they shared distribution with the broom-makers. Many of the woodland workers also dug clay for the potters…"*

This could make any charting of the development of the industry problematic in terms of tracing amounts of those employed, due to the roles of the various actors within the various scenes forming the full production performance.

In summary, past research, undertaken mostly at the local level, was initially very promising with themes such as origin hypotheses, general vessel typologies and manufacture being examined, but sadly not explored again until being assembled and summarised by Draper and Copland-Griffiths (2002). However, this source was far too broad to focus on improving knowledge of any one of the aforementioned subjects; this is very much a consolidation of information over an advancement. Thus, the stage is set for a focused archaeological study elucidating the nature of the origins of the industry, specialisation, plus the factors that led to growth of this industry.

### 2.4. The Current State of Knowledge for the Verwood-Type Pottery Industry

To fully understand the nature of the origins and subsequent development of the Verwood-type pottery industry, it is first necessary to understand the current state of information to the fullest extent. This required an in-depth examination of not only the published material relating to the industry and the region, which is relatively scant in relation to other ceramic related topics, but also the unpublished, and those held by museum services such as Museum of East Dorset (MED), Wimborne Minster. To satisfy this, a gazetteer of known sites and a desk-based assessment was undertaken, which are included within this thesis as appendix I and II, but may be summarised here.

The gazetteer of sites highlighted that our current understanding of Verwood-type pottery production, while detailed and of high quality in places, is based upon data of mixed quality. Out of 36 potential production sites, five sites are based solely upon sherd concentrations (Fig. 11). These sherd concentrations can derive from other kilns rather than being associated directly with a kiln on that site. Four of the 36 have been excavated, meaning that these can act as confirmed and well understood examples. However, only one of these has been published in detail (Horton – Copland-Griffiths and Butterworth 1991) while others are either summarised in larger publications (Black Hills, Verwood in Draper and Copland-Griffiths 2002), or have not yet been published (*e.g.* Crossroads, Verwood and Crendell, Alderholt). Furthermore, three sites have been subjected to in-depth watching briefs and field evaluations, one of which has not yet been published to any degree. Two are based solely on mentions in historical documents that cannot be corroborated by physical evidence nor located in detail. Yet the situation is not entirely unfavourable, as for over half of sites there is relatively detailed information and locations are reasonably precise due to sites being identified on historic mapping. Furthermore, two sites are protected as scheduled monuments, both of which possess elements of original standing buildings, allowing studies to be made in terms of the use of space on a Verwood-type production site.

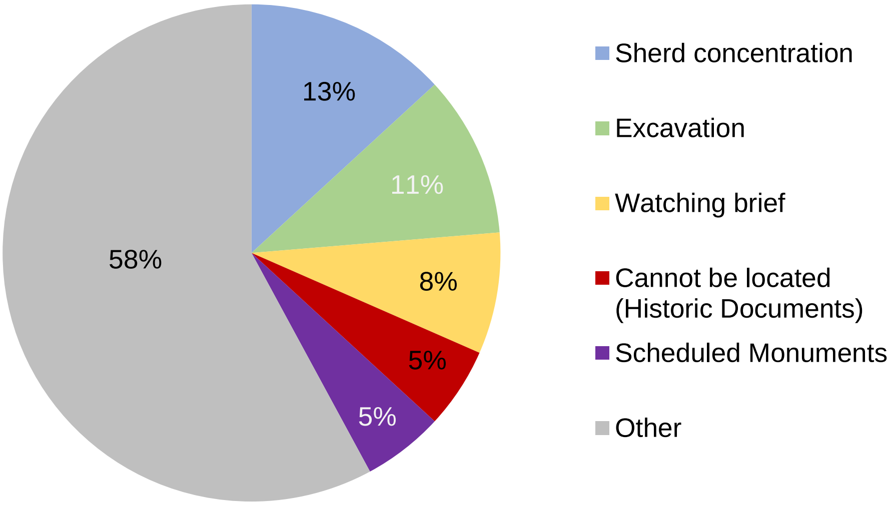


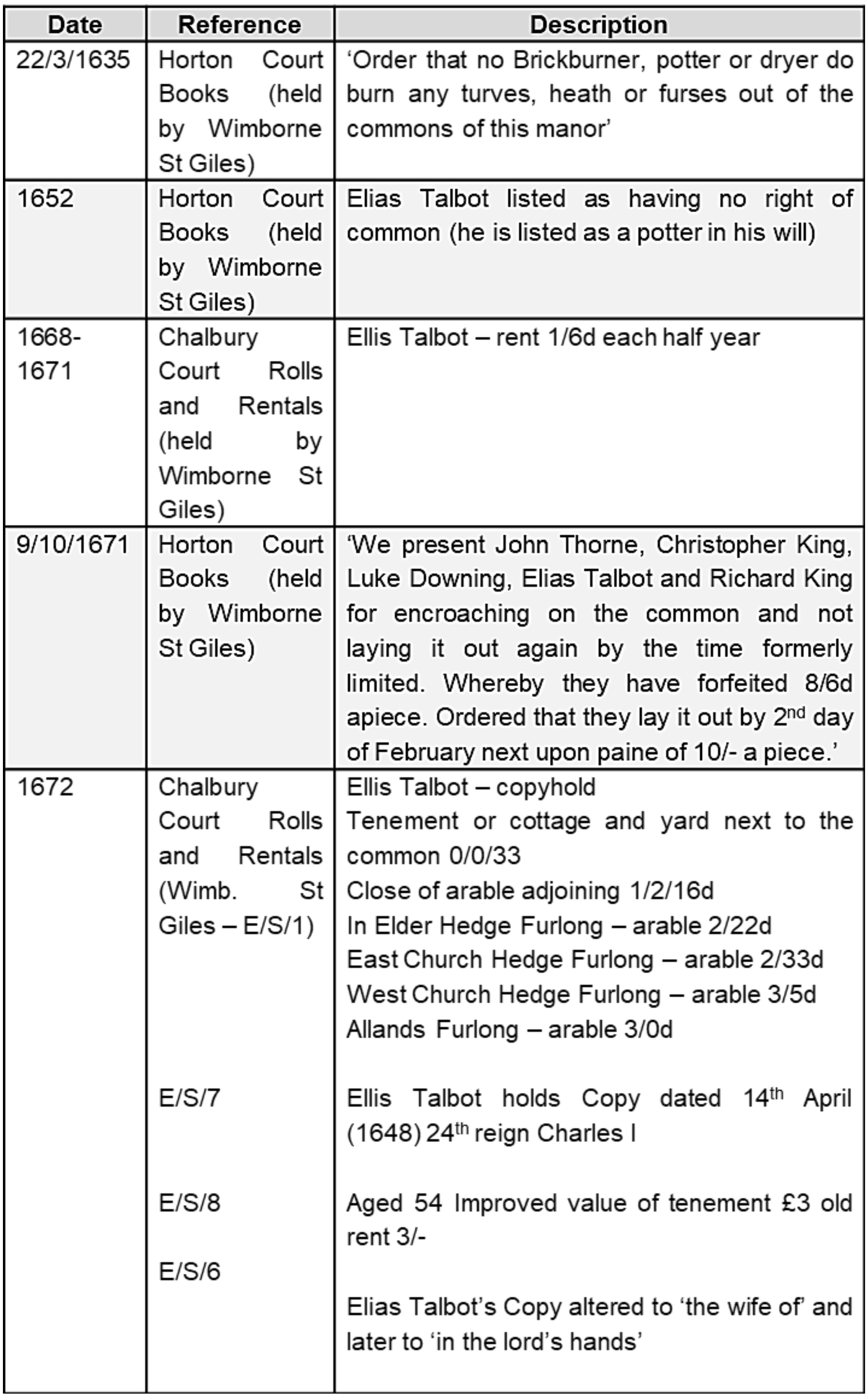
**Fig. 11: Origin of data for the known Verwood-type pottery production sites. Those sites comprising “Other” were revealed through a combination of historic documentary evidence that allows site location to be established, historic map evidence, and visible topographic evidence**

The desk-based assessment (Appendix II) covered selected parishes within east Dorset and west Hampshire that already possessed known evidence for pottery production; these were bolstered by the inclusion of the parishes that share a border with them. This comprised the parishes outlined in Table 2, and shown graphically in Fig.8; (both in Chapter 1).

The evidence for the nature of settlement during the medieval period onwards for the area suggests that the population was relatively small, thinly spread, and occupied discrete farmsteads. These became more nucleated and increased in size over time. The economy was largely of an agricultural nature, occurring alongside other industries, such as pottery production, which became increasingly prevalent into the late post-medieval period. The area contained expansive tracts of woodland, evidenced by numerous deer parks, and the level of woodland in the area can be shown to have been expansive from at least the time of the Domesday Survey in AD1086 (Darby and Welldon-Finn 1967). Furthermore, the settlement pattern of scattered settlements linked by sinuous trackways and lanes, and isolated cottages and farmsteads with their small irregular fields, is indicative of a slow extension of habitation accompanied by gradual clearance of both forest and waste or common ground (RCHME 1975, p.1). A large number of enclosures from the common are noted throughout historic documents, especially at Alderholt and are best evidenced on Norden’s Terrier dated 1605; here “pitts of potters clay” can be witnessed (extract presented in Fig. 13). The strongest evidence for medieval and early post-medieval pottery production can be attributed to the parishes of Alderholt, Horton and Verwood. The historical documentary evidence for Alderholt has already been outlined in detail, however that for Horton comprises a much sparser collection, beginning in 1635; much later than that for Alderholt, but still of importance (Table 4). For the Verwood area, the place name evidence for Potterne farm suggests that a farmstead here dates back to the 13th century (Fagerston 1978).

In summary, the parishes within the region that have the most promising and earliest evidence attached to them comprise Alderholt, Horton and Verwood. These areas should be seen as a priority for further examination. Perhaps unsurprisingly, it is Alderholt, Cranborne, Horton and Verwood in Dorset, plus Damerham, Hampshire, that are the most prolific for pottery production in the post-medieval period in the area.

**Table 4: Historic Documents Linked to Pottery Production for Horton Parish**



| Date | Reference | Description |
|---|---|---|
| 22/3/1635 | Horton Court Books (held by Wimborne St Giles) | ‘Order that no Brickburner, potter or dryer do burn any turves, heath or furses out of the commons of this manor’ |
| 1652 | Horton Court Books (held by Wimborne St Giles) | Elias Talbot listed as having no right of common (he is listed as a potter in his will) |
| 1668-1671 | Chalbury Court Rolls and Rentals (held by Wimborne St Giles) | Ellis Talbot – rent 1/6d each half year |
| 9/10/1671 | Horton Court Books (held by Wimborne St Giles) | ‘We present John Thorne, Christopher King, Luke Downing, Elias Talbot and Richard King for encroaching on the common and not laying it out again by the time formerly limited. Whereby they have forfeited 8/6d apiece. Ordered that they lay it out by 2nd day of February next upon paine of 10/- a piece.’ |
| 1672 | Chalbury Court Rolls and Rentals (Wimb. St Giles – E/S/1) | Ellis Talbot – copyhold<br>Tenement or cottage and yard next to the common 0/0/33<br>Close of arable adjoining 1/2/16d<br>In Elder Hedge Furlong – arable 2/22d<br>East Church Hedge Furlong – arable 2/33d<br>West Church Hedge Furlong – arable 3/5d<br>Allands Furlong – arable 3/0d |
| | E/S/7 | Ellis Talbot holds Copy dated 14th April (1648) 24th reign Charles I |
| | E/S/8 | Aged 54 Improved value of tenement £3 old rent 3/- |
| | E/S/6 | Elias Talbot’s Copy altered to ‘the wife of’ and later to ‘in the lord’s hands’ |

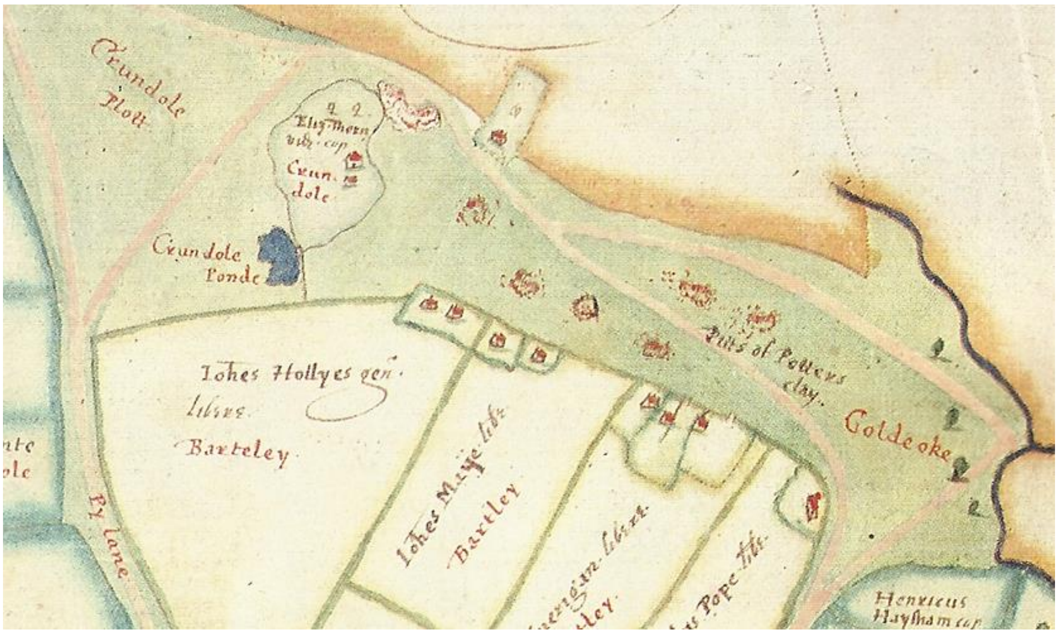


**Fig. 12: Extract of Norden Terrier dated 1605 for Crendell, Alderholt; showing enclosures out of the common; (taken from Algar *et al.* 1987 Front Cover). Courtesy of the Marquess of Salisbury.**

### *2.5. Past Research in Medieval and Post-medieval Pottery Studies for Central Southern England*

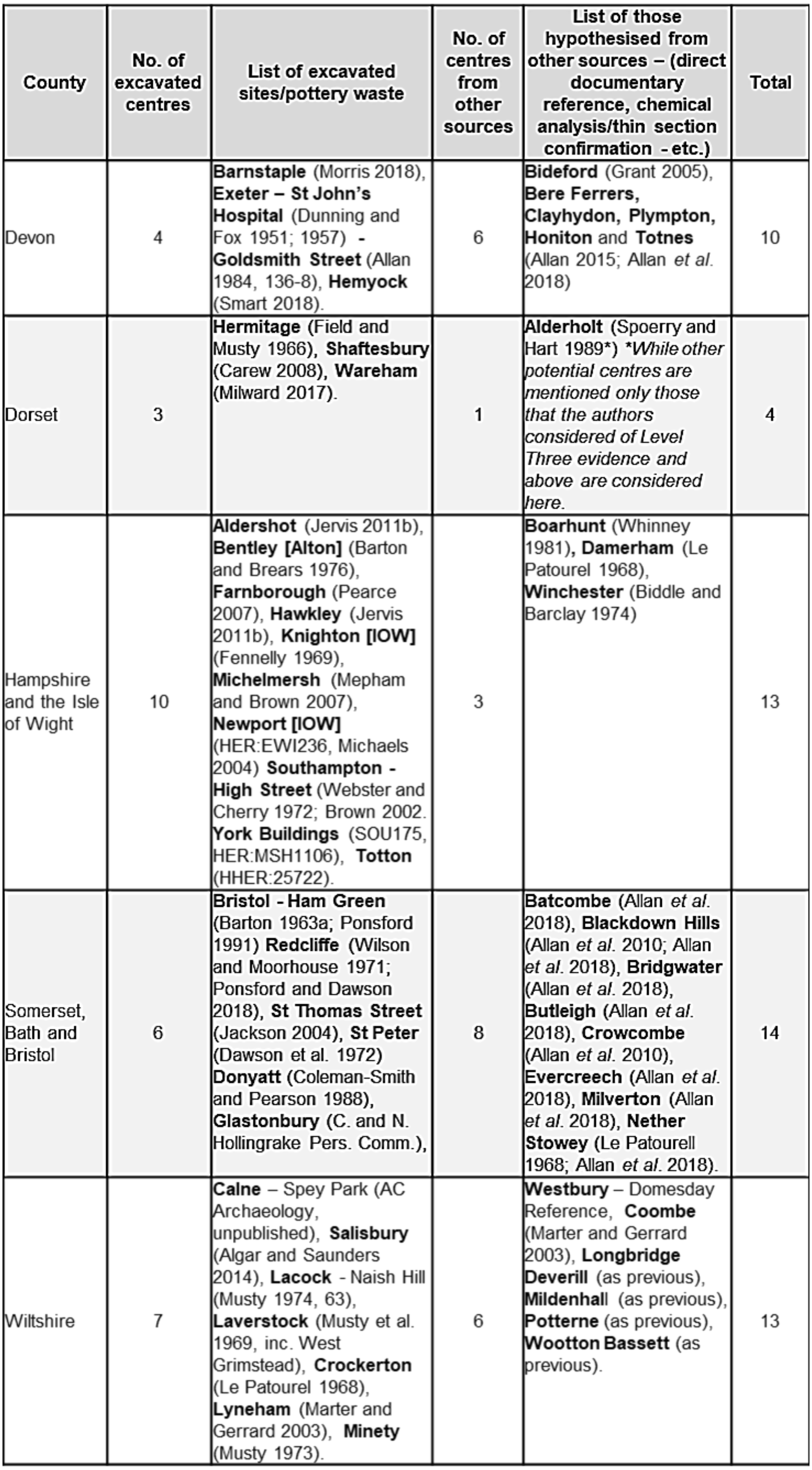
Although medieval and later pottery is one of the most commonly found artefacts known to be recovered from archaeological sites, as a discipline within archaeology it is relatively young. While the origins date back to antiquarian examinations in the 19th century (*e.g.* Chaffers 1850), the true pioneer of medieval pottery studies in southern Britain was Gerald Dunning, working from the late 1930s onwards; his work on a ware type known as ‘scratch-wares’ hold particular relevance to this study (Dunning 1952). Additional works of note include H.E. Jean Le Patourel (1968), whose examination of historic documents mentioning medieval pottery is an invaluable resource that not only outlines elements relating to geographically neighbouring industries, such as Crockerton and Laverstock, but also outlines a possible 13th century reference for pottery production in the study area at Damerham, Hampshire (Le Patourel 1968, p.9). This information lists 30 Acres (a virgate) held by an individual in the 13th century with the family name ‘Poter’, which is considered an unreliable indicator for ceramic manufacture (Copland-Griffiths pers comm). One contemporary of Le Patourel was John Musty, who completed a thorough typology on medieval kilns (Musty 1974). This holds relevance as it includes kilns identified at both Crockerton and Laverstock, Wiltshire (Algar and Saunders 2016; Musty *et al.* 1969).

The bulk of medieval pottery knowledge in Dorset, up until the late 1980s, was based upon examinations of wares excavated in urban centres such as Dorchester (Draper and Chaplin 1982); Wimborne Minster in the east (Field 1973), with the thirteenth century pottery kiln at Hermitage (Field and Musty 1966) and Sherborne Castle in the west (Harrison and Williams 1980); finally, investigations at Wareham provided information for south Dorset (Hinton and Hodges 1977). The latter two studies were rare at the time, employing scientific methodologies. In later years such approaches became more commonplace (*e.g.* Horsey 1992), yet not universal. Further examinations of both medieval and post-medieval coarsewares in south-east Dorset were undertaken as part of two summaries of late 20th century urban excavations, one in Poole (Horsey 1992) and secondly in Christchurch (Jarvis 1983). Later, examinations of medieval pottery assemblages from two tenements in Christchurch (Jervis 2011a) has helped aid future research regarding the pottery assemblages of this area, applying modern terminology and cross referencing with fabrics from assemblages in Hampshire, providing a more robust examination.

The fabric descriptions presented in volumes such as these have proved invaluable to those working on medieval and later Coarsewares in Dorset, especially for some of the older volumes where detailed descriptions were a relatively new phenomenon (Mellor 1994, p.5).

The first thorough examination of medieval and later pottery production evidence undertaken Dorset-wide was that of Spoerry and Hart (1989). It was noted that Dorset was particularly lacking in terms of this – possessing only the aforementioned Hermitage kiln. This contrasted with a wealth of coarseware sherds being recovered from domestic sites across the county. This was considered especially curious due to the relative abundance of production evidence identified in neighbouring counties (Spoerry 1990, p.1). This situation persists today, even following the recent discovery of a second medieval pottery kiln at Wareham (Milward 2017). Table 5 outlines the known medieval production areas and sites for the counties bordering Dorset, along with Bristol.

**Table 5: Outline of Known and Postulated Medieval/early Post-Medieval Pottery Production Evidence from Selected Counties of Southern and South West England**



| County | No. of excavated centres | List of excavated sites/pottery waste | No. of centres from other sources | List of those hypothesised from other sources – (direct documentary reference, chemical analysis/thin section confirmation - etc.) | Total |
|---|---|---|---|---|---|
| Devon | 4 | **Barnstaple** (Morris 2018), **Exeter – St John's Hospital** (Dunning and Fox 1951; 1957) **- Goldsmith Street** (Allan 1984, 136-8), **Hemyock** (Smart 2018). | 6 | **Bideford** (Grant 2005), **Bere Ferrers, Clayhydon, Plympton, Honiton** and **Totnes** (Allan 2015; Allan *et al.* 2018) | 10 |
| Dorset | 3 | **Hermitage** (Field and Musty 1966), **Shaftesbury** (Carew 2008), **Wareham** (Milward 2017). | 1 | **Alderholt** (Spoerry and Hart 1989*) **While other potential centres are mentioned only those that the authors considered of Level Three evidence and above are considered here.* | 4 |
| Hampshire and the Isle of Wight | 10 | **Aldershot** (Jervis 2011b), **Bentley [Alton]** (Barton and Brears 1976), **Farnborough** (Pearce 2007), **Hawkley** (Jervis 2011b), **Knighton [IOW]** (Fennelly 1969), **Michelmersh** (Mepham and Brown 2007), **Newport [IOW]** (HER:EWI236, Michaels 2004) **Southampton - High Street** (Webster and Cherry 1972; Brown 2002. **York Buildings** (SOU175, HER:MSH1106), **Totton** (HHER:25722). | 3 | **Boarhunt** (Whinney 1981), **Damerham** (Le Patourel 1968), **Winchester** (Biddle and Barclay 1974) | 13 |
| Somerset, Bath and Bristol | 6 | **Bristol - Ham Green** (Barton 1963a; Ponsford 1991) **Redcliffe** (Wilson and Moorhouse 1971; Ponsford and Dawson 2018), **St Thomas Street** (Jackson 2004), **St Peter** (Dawson et al. 1972) **Donyatt** (Coleman-Smith and Pearson 1988), **Glastonbury** (C. and N. Hollingrake Pers. Comm.), | 8 | **Batcombe** (Allan *et al.* 2018), **Blackdown Hills** (Allan *et al.* 2010; Allan *et al.* 2018), **Bridgwater** (Allan *et al.* 2018), **Butleigh** (Allan *et al.* 2018), **Crowcombe** (Allan *et al.* 2010), **Evercreech** (Allan *et al.* 2018), **Milverton** (Allan *et al.* 2018), **Nether Stowey** (Le Patourell 1968; Allan *et al.* 2018). | 14 |
| Wiltshire | 7 | **Calne** – Spey Park (AC Archaeology, unpublished), **Salisbury** (Algar and Saunders 2014), **Lacock** - Naish Hill (Musty 1974, 63), **Laverstock** (Musty et al. 1969, inc. West Grimstead), **Crockerton** (Le Patourel 1968), **Lyneham** (Marter and Gerrard 2003), **Minety** (Musty 1973). | 6 | **Westbury** – Domesday Reference, **Coombe** (Marter and Gerrard 2003), **Longbridge Deverill** (as previous), **Mildenhall** (as previous), **Potterne** (as previous), **Wootton Bassett** (as previous). | 13 |

Spoerry (1989) undertook to resolve the lack of coarseware production sites by examining sherds from numerous domestic assemblages and comparing them using chemical analysis via AAS. He first grouped Dorset coarseware types by inclusions and charted the occurrence across the county (Fig. 13). Following this he compared the chemical results of sherds from domestic assemblages to known, and postulated, medieval production sites. Where possible, postulated sites were represented with known post-medieval substitutes, *e.g.* Alderholt (east Dorset) and East Holme (Poole Harbour). His work drew many conclusions, and it is only those relating to the eastern part of the county that have relevance here. For east Dorset, west Hampshire and south Wiltshire, the vast majority of sites possessed an occurrence of over 50% of his ware type C1; a quartz rich and largely homogenous pottery fabric; commonly termed Wessex Coarseware. In addition, his results showed that single 'ware groups' comprised the products of several potential sources, some of which he was able to link to his known sources group of production sites such as Laverstock (Spoerry 1989, p.45). From this, he was able to comment on ceramic distribution across the region. It is a testament to the quality and systematic nature of his work that it is still referenced in reports of more recent times (Mellor 2005). However, chemical analysis technology alongside the use of other techniques, and our understanding of Dorset ceramics, have all advanced since the 1980s.

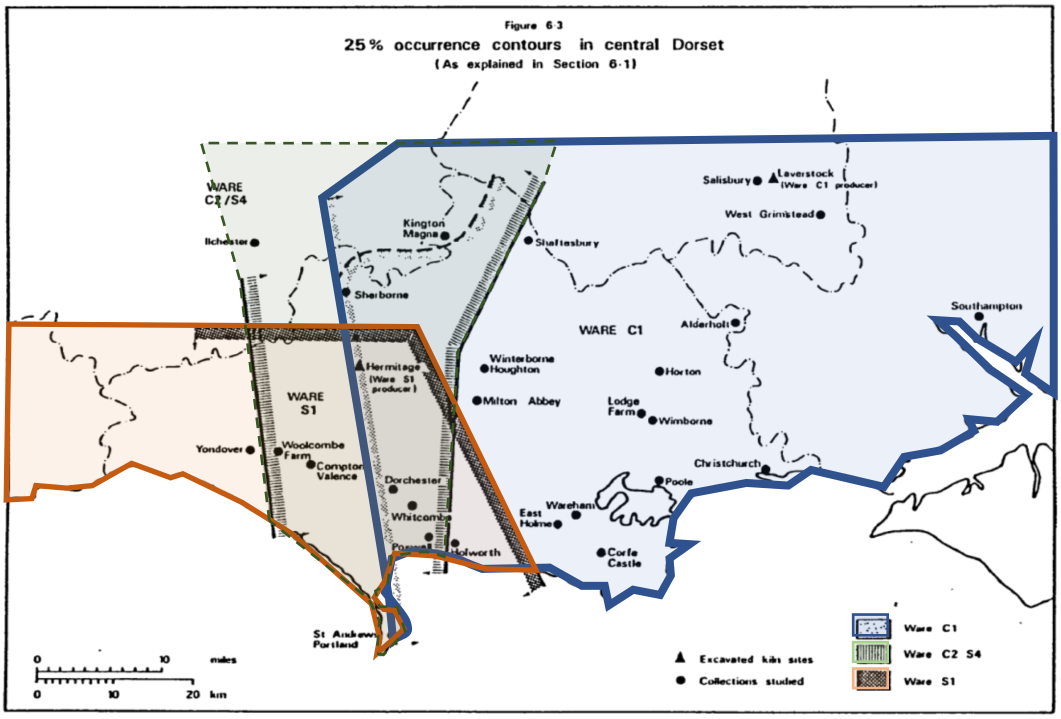


**Fig. 13: Geographic occurrence of over 25% within a given assemblage of Spoerry's medieval ware types (after Spoerry 1989, Fig. 6.3; these comprise C1 (coarse quartz), S1 (sand) and C2/S4 (flint and sand)**

Thus far, no study has addressed medieval and post-medieval coarseware production across the regions of both Dorset and Hampshire in detail via thin section analysis. In contrast, any petrological examinations within the region have been confined to heavy mineral analysis at the site level, *e.g.* Sherborne Castle (Harrison and Williams 1980), Wareham (Williams in Hinton and Hodges 1977). More recently, samples of Wessex Coarseware were examined in isolation at Wimborne Minster (Quinn in Orczewski 2018). Geographically, the nearest comprehensive study of similar wares over extended time periods was undertaken for the Malvern area (Vince 1977). Such studies have prompted Moorhouse (1983, p.150) to state that further strides in medieval pottery knowledge can best be made at a local level.

### *2.6. Relevant Theoretical Frameworks*

Following an examination of published evidence, it is clear that the uptake of theoretical frameworks in medieval archaeology has been piecemeal, with some actively refuting its ability to be useful towards interpreting archaeological phenomena (Rahtz 1983). Rahtz was not alone in this position, with corroborating viewpoints from medieval archaeologists being outlined by Gerrard (2003) and Gilchrist (2009). This position is mirrored with regard to the use of theoretical frameworks for late medieval archaeology (McClain 2012, p.131). Such a situation is in contrast to the utilisation of scientific methods over the last 40 years (*c.f.* Hughes and Evans 2000).

Most studies of medieval and later artefacts have been approached from the direction of provenance and dating. Davey (1988, p.4) has noted that only three papers on ceramics out of a total of 78 involved theoretical concepts. However, during the 1990s there was a drive to explore theory-based approaches in medieval and later archaeology by Cumberpatch and Blinkhorn (1997). Cumberpatch (1997) has explored how medieval individuals may have interacted with and experienced objects. This approach has a strong phenomenological basis and explores the role that artefacts perform, discussing elements such as colour and texture. This draws heavily on the post-processual approach of ‘reading’ artefacts as a type of text, whilst seeing the object as a part of a preserved record of social discourse possessing meanings and undertones not overtly obvious to the archaeologist (Gerrard 2003, p.223). Ideas such as the use of colour on ceramic vessels and religious significance have been explored by Gutiérrez (2000) along with the symbolism of vessels and their appearance in the home (Gaimster 1997a). Davey (1988, p.11) put forward numerous theoretical avenues in the exploration of medieval ceramics, and highlighted areas of future application, which have since been drawn upon to push forward the utilisation of theoretical frameworks when examining medieval and later ceramics, and their ability to aid in the understanding of past society; most notably, the work of Jervis (2014).

One of the lesser known uses of theoretical frameworks within the sphere of medieval archaeology relates to the theory of ‘habitus’ (Bourdieu 1977; 1992). This involves the role that mental patterning plays upon actions undertaken by individuals in everyday life. These actions are often unconscious and the result of ingrained traditions resultant from repetition; this has been considered in terms of the colours and textures of medieval pottery from Yorkshire (Dunkley and Cumberpatch 1996). This theoretical framework may have particular benefit when approaching classifications, the study of surface treatments, and compositional studies, yet its uptake has been relatively sparse. In contrast, the application of theoretical frameworks in pottery manufacture has largely been restricted to the early Anglo-Saxon period (Blinkhorn 1997). In this study, the ‘habitus’ has been used to explain the active choice in refusing to adopt technological improvements such as wheel throwing. Instead there are signs that a conscious choice was made to retain the hand-built manufacture of vessels, along with fabric recipes, brought over from the Germanic homeland as part of an Anglo-Saxon cultural package (Blinkhorn 1997, p.123). Habitus has also been beneficial in understanding technological style alongside social boundaries (*e.g.* Sackett 1990; Gosselain 1992; Stark *et al.* 1995; Eckert 2008). Sackett (1990) argued that style, stemming from a particular way of creating objects, was far from being solely a functional variation. Instead, these differences can display a form of identity resolution, displaying information regarding individual kin groups, settlements or clans. This was identified by Gosselain (2000) who showed that certain African populations have particular ways of producing pottery and specific materials for treating the surfaces of pots via rouletting – a continuous impressed or rolled method of treating a clay surface. This was supported through the distribution of African languages in the areas Gosselain (2000, Fig. 3) was examining. In this way, habitus reflected different identities through varying production practices. In contrast, relatively little work has been undertaken in exploring the role of habitus in encouraging standardisation and a basic form of both industrialising and hastening the pottery production process; a handful of examples include comments by Murphy (2017, p.105) and studies by Roux (2015; 2016). The use of habitus in this way will be considered a useful device for explaining the role of development of a rural potting industry into producing wares at a more prolific rate, as is the case for the Verwood-type potteries. The rate of production and dispersal network are considered a key aspect of the development of this rural industry.

The study of prehistoric ceramic production diverges somewhat from the study of later ceramics, in that it has been readily open to accepting theoretical frameworks to help explain archaeological phenomena. In particular, the use of ethnographic data has been relatively prolific (Costin 2000). Ethnoarchaeology has been defined as "…*the utility of insights into past behaviour derived from observations of* [the] *contemporary*…" (Kramer 1979, p.1). This use of ethnographic examples was a theme of 'New Archaeology', as outlined by Binford (1962); and expanded by the pioneer of post-processualism, Ian Hodder (1982). Ethnography has been shown to present an effective way to understand past ceramic production, from raw material extraction to production and firing procedures to social aspects, which are not easily identifiable from material culture alone (Arnold 1985; 1991; 1998; Kramer 1985), but has somewhat fallen out of favour in the modern archaeological world. This is due, at least in part, to the expectations that human reactions to stimuli are generally uniform, however if so, why does cultural variability exist across the world? (Cazzella 2013). Arnold's (1985) work based on Browman's (1976) '*Exploitation Territory Threshold'*, drew upon ethnographic examples of pottery production. This examined the distance between a potter's raw materials and workshop, but made assumptions on potters using the nearest available clays. This assumption is certainly not appropriate for describing all raw material relationships (Bishop *et al*. 1982). Instead, this should be seen as a 'model of best fit*'* and used to aid understanding, over supplying a definitive answer. Furthermore, as the Verwood-type pottery industry survived into the 20th century, the industry was working within a timeframe where photography, film and journalism were becoming more widespread in use. This allows the later Verwood potteries, especially Crossroads, to be used as a form of ethnographic evidence, as much evidence was gathered and preserved by the VDPT. As such, this evidence can be employed, where appropriate to aid in the interpretation of the archaeological record.

In this way, the use of a range of theoretical frameworks can be deployed to help explain the distribution networks, raw material procurement strategies and production processes that have enabled this rural workshop based industry to become a prolific provider of earthenware pottery for southern central England.

When approaching post-medieval artefact studies, a delicate balance has long existed between the art-historical view and that of simply summarising post-medieval ceramics from excavated assemblages (Draper 2001, p.5). The number of reports detailing coarsewares recovered from 18-19th century deposits are few and far between; the work of Jo Draper was instrumental in combating this trend for Dorset (*e.g.* 1988; Draper and Papworth 1997). This stands in contrast to pre-18th century fineware pottery studies (*e.g.* Allan 1994; Blackmore 1994; Hurst 2000; Hurst and Gaimster 2005), and has seen significant attention, in part to further its use as a dating tool. Fineware is often held in similar regard to clay tobacco pipes in providing relatively precise dating (Crossley 1990, p.243), very much contrasting with that of post-medieval coarseware pottery such as Verwood-type. This situation is mirrored by those who collect post-medieval pottery (*c.f.* Brears 1971; 1974), who have "always admired the everyday ceramic productions of distant countries while entirely neglecting those of their own" (Brears 1974, p.9).

Historically, it has been shown that archaeological ceramic specialists have employed three core methods: visual classification, thin section petrography and chemical analysis. These themes have been extensively outlined since the 1950s onwards, with key texts such as Shepard (1956), Peacock (1967; 1970; 1977), Orton *et al.* (1993), Freestone (1995), and Rice (2015) showing that these approaches have enabled ceramic studies to form an essential and vital component in increasing understanding of the archaeological record as a whole. However, the study of medieval and post-medieval coarsewares, such as the Verwood-type pottery industry, has lagged behind. Within the bulk of the aforementioned sources, it is the use of initial visual arrangement, microscopic thin section petrology, often accompanied by chemical analysis, or a combination of, which occur repeatedly, and have been shown to generate acceptable results due to their importance in elucidating past technological choice (Tite 2016, p.7). To illuminate the nature of the origins and subsequent development of Verwood-type pottery, it is clear that an approach which employs aspects of each core method, within a multi-disciplinary study with a tiered approach, is required.

# 3. Methodology

It has been shown that the most effective studies of past pottery production - predominantly undertaken in southern England - comprise those employing comprehensive and multi-disciplinary approaches to large-scale regional geographic areas (*e.g.* Vince 1977; Streeten 1985 and Spoerry 1989). The methodologies devoted to approaching the many research questions for this thesis have tackled the issues in a similar vein, applying a suite of methods from within the archaeological toolbox.

Initially, a desk-based assessment was used to augment the published literature, which was relatively sparse in nature, with the main body of relevant information being present within a limited number of sources.

## *3.1. Desk-Based Assessment*

To understand the nature of the origins, and subsequent development, of the Verwood-type pottery industry, it is first necessary to identify the current state of available information; this was achieved through desk-based assessment (DBA – Appendix II), which is summarised in Chapter 2. The DBA examined the evidence for, and significance of, a number of known pottery production areas within east Dorset and west Hampshire, with the aim of highlighting avenues for investigation. This composition concentrated on the medieval and early post-medieval (Tudor into the Stuart) periods, up to c.AD1650. However, later evidence has been outlined, where appropriate, to highlight the importance of given areas.

This method is routinely used in both research and commercially-driven archaeological projects (English Heritage 2013; Historic England 2015, p.11), and is used to hypothesise - as far as is reasonably possible - the date, significance, character and extent of all known archaeological data within a given search area. Ergo, the DBA was undertaken in line with current industry guidance (CIFA 2020a), and draws upon the following datasets:

- A search of the historic environment record (HER) for the parishes in the study area. This data is held by the respective HER services embedded within the corresponding county councils.

- Any available airborne light detection and ranging (LiDAR) data collected and held by the Environment Agency. LiDAR is recognised as a useful tool in archaeological survey (Crutchley 2012). Raw data files were accessed from https://environment.data.gov.uk/ds/survey, and visualisations were generated using the Relief Visualisation Toolbox (RVT) created by Dr Klemen Zakšek and Professor Krištof Oštir, aided/assisted by Peter Pehani and Klemen Čotar. The following models were formed for each location relevant to the study: analytical hillshade, mulit-directional hillshade, slope gradient positive and negative openness (Štular *et al.* 2012), simple local relief model (Hesse 2010) and, finally, a sky-view factor (Kokali *et al*. 2011). Site visits were made were possible to confirm the nature of the anomalies highlighted within the LiDAR dataset.

- Data held by Historic England on scheduled monuments and listed buildings.

- Historic documentary sources and maps held at locations such as the Dorset History Centre, Dorchester and the Hampshire Record Office, Winchester.

- Historic mapping held under Ordnance Survey licence by Edina Digimap Services.

The desk-based assessment also included examinations of various ‘grey literature reports’, held by the Dorset, Wiltshire, Hampshire and Isle of Wight HER teams for references to pottery production within the study area. Grey literature reports are often used in support of planning applications, scheduled monument consents or form part of an environmental statement (Darvill and Gerrard 1994, p.157).

Following the completion of the DBA, multiple arguments were constructed, or discovered, within the published literature for sites and areas, which had high potential for medieval and early post-medieval pottery manufacture within the study area. These were subsequently targeted for further investigation via field-based methods.

## *3.2. Field-Based Methods*

### *3.2.1. Geophysical Survey*

Where sites of potential late medieval/early post-medieval pottery production were identified in the DBA, a series of archaeological geophysical surveys were implemented – where permissions allowed - to confirm the presence or absence of such physical evidence.

Geophysical survey is regularly employed on both known and potential archaeological sites, and has been in common usage since the 1980s (Gaffney *et al.* 1991). Darvill *et al.* (1995, p.33) has shown that the most applied methods during 1982-91, were magnetometry and earth resistance; both of which were used to investigate sites of interest. The former, a passive method, measures local variations in the Earth’s magnetic field, alongside thermoremanent magnetism associated with iron-containing, heat-affected features. For ceramic kilns, these might appear as the classic ‘double peak’ when plotted (Gaffney and Gater 2003, p.156; Fig. 14), or a single peak should the ware chamber floor remain intact (Clark 2006, p.75). Where possible, this will be supplemented by an additional, active method which measures magnetic properties, known as magnetic susceptibility. This determines the magnitude of magnetism temporarily induced in a given sample when placed in a magnetic field (Gaffney and Gater 2003, p.32).

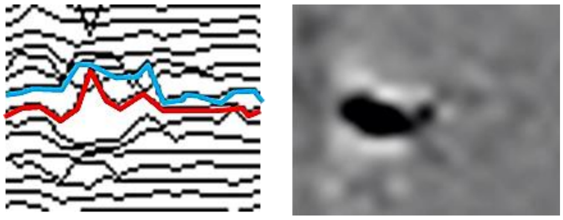


**Fig. 14: A double peak magnetic response from the Verwood-type pottery kiln at Horton, Dorset (HOR2 in Appendix I), taken from Carter (2008, Fig. 4.14). XY trace (left – with double peak traces shown in blue and red) with associated greyscale (right – not to scale)**

The final method used in archaeological geophysical survey here is that of earth resistance. This method is largely reliant on the levels of moisture in the ground. Both archaeological and geological phenomena can affect the dispersal of such moisture; it is the degree of dampness present in the ground that enables the breakdown of compounds and elements into ions, which conduct electricity (Clark 2006, p.27). A small electric charge can be passed through the soil, and travel via these ions. The ‘ability’ of a given volume of earth, inclusive of any archaeological buried remains, to conduct the electricity can be measured across an area. Differences between measurements of the earth resistance can be plotted to interpret the nature of buried archaeological remains, in addition to geological phenomena (Schimdt 2013, p.24).

When these methods are combined, the results obtained should prove sufficient in confirming the presence of any potential remains of former high-temperature industry (Clark 2006, p.126).

In past years, the use of geophysical survey on medieval and later sites has not been commonplace in England (Aspinall *et al.* 1994); however, the number of such published surveys has increased in more recent years, evidenced in part by surveys on gardens and buildings becoming more routine (*e.g.* Briggs 1999; Parkyn 2010).

Few examples exist presenting the use of geophysical survey in the search for, and examination of, medieval and post-medieval pottery production. One example comprises Addyman *et al.* (1972) where a fluxgate magnetometer was used to identify two kiln-like anomalies at Michelmersh, Hampshire. One was excavated and proved to be a late Anglo-Saxon pottery kiln (Addyman *et al.* 1972, p.127). Additionally, Clark (Coleman-Smith and Pearson 1988, p.45) who used a similar method to locate five medieval and post-medieval pottery production sites and waste dumps at Donyatt, Somerset; although there are no visualisations of either datasets, numeric values are outlined for kiln structures as a guide at Donyatt. One further example comprises the work of Edwards (2014), who used magnetometry to locate and explore two known late medieval to early post-medieval Wealden glass furnaces – one at Glasshouse Lane, Kidford, West Sussex, and the other at Imbhams Farm, Haselmere in Surrey. The lack of reporting of this site type is inconsistent with the fact that high-temperature industries, such as ceramic production, usually present high responses in archaeological magnetic surveys, thus this method is advised for such searches by Historic England (2015, p.7). To date, only two production sites for the Verwood-type industry have been subjected to geophysical survey; these comprise Alderholt (Cottrell *et al.* 1988), and Horton (Carter *et al.* 2016).

### *3.2.2. Excavation*

For pottery manufacture that may date to the late medieval – early post-medieval periods, small-scale excavation was considered to ground-truth supporting evidence suggested via geophysical survey, along with any evidence of unknown date. This was only completed for one site at Horton, which is discussed in Chapter 4. The excavation was undertaken in-line with current standards (CIFA 2020b). In this respect, the site investigation comprised a strip, map and record operation. Due to the refusal of various landowners to allow access to relevant potential sites, the number of sites that were submitted to field examinations is highly limited; the results of these are presented in Chapter 4 (section 4.3).

## ***3.3. Provenance Studies***

Subsequently, an additional method of locating areas of medieval and post-medieval production was sought to bolster the robusticity of the study. This comprised the application of laboratory-based methods employing provenance studies, allowing observations recorded via macroscopic, microscopic and chemical analysis to be used to examine questions relating to both provenance and production; these methods allow the collection of locational data in terms of where, and if, any pre-1600s Verwood-type pottery sites were producing wares.

Provenance studies form a key aspect in archaeological materials science. This concept is fundamental in understanding the development, and confirming the nature of, pottery production along the east Dorset/west Hampshire border. Provenance has been defined by Pollard and Heron (2008, p.100) as a "geographical origin of the raw materials used"; here, the raw material is clay, and the product is pottery. Arnold's (1985) Exploitation Threshold Model has illustrated that the raw materials used to produce pottery are drawn largely from the local area, leading to the hypothesis that potteries which lie reasonably far apart would be expected to be drawing on different clays. It is assumed that these dissimilar clays possess variances that can be readily identified. These differences might be as simple as colour, texture, or the presence or absence of inclusions. However, these may also be invisible to the naked eye, comprising differing amounts of chemical elements. Through examining these differences, it is hoped that the provenance of an object can be ascertained.

Pollard *et al.* (2007) have outlined that any resolution of provenance requires that the item, or items, under study possess a chemical fingerprint that is unique to a particular geographical source. This requires that the analytical techniques chosen for a given examination must be capable of distinguishing between different sources, and that post-depositional alteration "should be negligible, or at least predictable*"* (Pollard *et al.* 2007, p.15). Thus, in the sample being examined, it is necessary for the chemical fingerprint of a given raw material to be present, and survive to a measurable degree. This is required for provenance to be determined with any accuracy and enables "discrimination between competing potential sources" (Wilson and Pollard 2001, p.508). For ceramics, as with certain other materials, there is the added complication of chemical changes that take place during production. Pollard and Heron (2008, p.9) state:

> *"…in the case of synthetic materials such as ceramics, metals and glass, production may bring about significant changes in the composition of the finished artefact with respect to the composition of the raw materials."*

This further complicates the identification of ceramic products to their geographical place of origin.

These aspects and requirements are addressed as part of the '*Provenience Postulate*', as termed by Weigand *et al.* (1977). This involves the identification of an artefact's source or, where this is not possible, the grouping of distinct artefacts of unknown source. Using this postulate, a close examination of provenance and production technology should allow for an elucidation of the nature of any medieval and post-medieval pottery production on the east Dorset border.

The areas for effective application of archaeological materials science have been previously identified by Tite (1991). Those relevant to this study are that of provenance and production technology. In terms of the provenance of archaeological materials, the aim of applied analytical chemistry has been to identify and measure the major, minor and trace elements comprising a given sample. There is potential for chemical differences in the raw materials for pottery from distinct sources, as the geochemistry of a geological deposit is dependant "on the parent rock-type, the degree of chemical weathering and the nature of the transport mechanism involved" (Pollard and Heron 2008, p.125).

Clays derive from weathered igneous and metamorphic rocks and comprise deposits with substantial variation. Where those clays remain in contact with the rock from which they derived, they are termed 'primary or residual' (Hamer and Hamer 1977, p.4). Examples of these include china clays, certain fireclays, and bentonites. They contain elements of the more stable minerals from the parent material, *e.g*. feldspar, mica and quartz, and often show a stratigraphic transition from the clay near the ground surface to only partly altered rock lying above the original parent material (Shepard 1956, p.11). Those that have been carried from their origin and re-deposited by water or erosion are termed ‘secondary or sedimentary’ clays (Hamer and Hamer 1977, p.5). These contain a great deal of variability as they differ depending on the parent source, the conditions of deposition, and the degree of intermixing with other materials during transit; examples of these include kaolin, certain fireclays, and ball clays, and are formed via glacial, marine, alluvial, and fluvial processes (Shepard 1956, pp.11-2). The Reading (Lambeth group) and London sedimentary clays (Thames group) of east Dorset/west Hampshire are examples of river/estuarine and marine clays respectively, which reveal gradual difference from coarse to fine components coupled with changes in colour (UKRI 2018). It has been noted that “sedimentary clays rarely show uniformity over a wide area” (Hamer and Hamer 1977, p.5), meaning geographical differences in clay properties should aid in defining provenance.

In basic terms, the assumed concept of provenance is that the chemical composition of the fired ceramic is indicative of the chemical composition of the raw clay, along with any added inclusions or temper. Pollard and Heron (2008, p.100) state the numerous variables that must be considered when examining the provenance of ceramics:

- *“The natural variability of the clay beds themselves;*
- *selection and mixing of clays from different sources to give the correct colour and working properties;*
- *levigation and/or processing of the raw clay to remove unwanted material and give the desired texture;*
- *addition of temper (non-clay tiller), usually to modify the thermal properties of the body;*
- *the firing cycle itself, which might affect the composition via the volatility of some components;*
- *the possibility of post-depositional chemical alteration of the fabric.”*

In summary, the identification of the provenance of ceramics can be troublesome, and is not as straightforward as examining other materials, such as stone (*e.g.* Pollard *et al.* 1991; Kewley 2016). However, despite the issues, Wilson and Pollard (2001, p.514) state that the provenance of ceramics “remain[s] an outstanding success story, in spite of the inherent complications of the production cycle”. Nonetheless, such a degree of uncertainty in examining fired clay-based products has led to many investigators using a control group, or a material that acts as a link, between the raw clay and a product ready for consumption. This often takes the form of artefacts recovered from a known production site; for ceramics, this usually comprises kiln wasters or failures (Pollard and Heron 2008, p.100). However, such a situation is not without risk, as McCarthy and Brooks (1988, p.46) state:

> *“…wasted pottery found on a production site cannot be taken as reflecting the proportions of different pottery types made there, furthermore, on sites with a number of kilns, waste could well be dumped into disused kilns; finding pottery within a kiln is no guarantee that it was fired there.”*

Despite this, Spoerry (1989) and Purkis (1991) both employed Verwood-type wasters in their analytical studies, with some success, to explore the provenance of certain Dorset fabrics of medieval and post-medieval pottery a method which will be mirrored in this study. This shows that regardless of the risks of using wasters, the results can be of sufficient quality to answer the research questions.

Additionally, the consumption of clays within a given area is known to change over time (Orton and Hughes 2013, p.169). This can lead to differing chemical analysis results for the same group of products from the same production site. This should be accounted for if the number of samples is large enough to encompass enough of the active date range of a production site, yet when the products being created change little over time, it is near impossible to ensure this. Instead, several researchers have chosen to employ clay samples from a region to aid in elucidating the provenance of certain pottery fabrics (*e.g.* Bartlett *et al.* 2000), which will also be considered here.

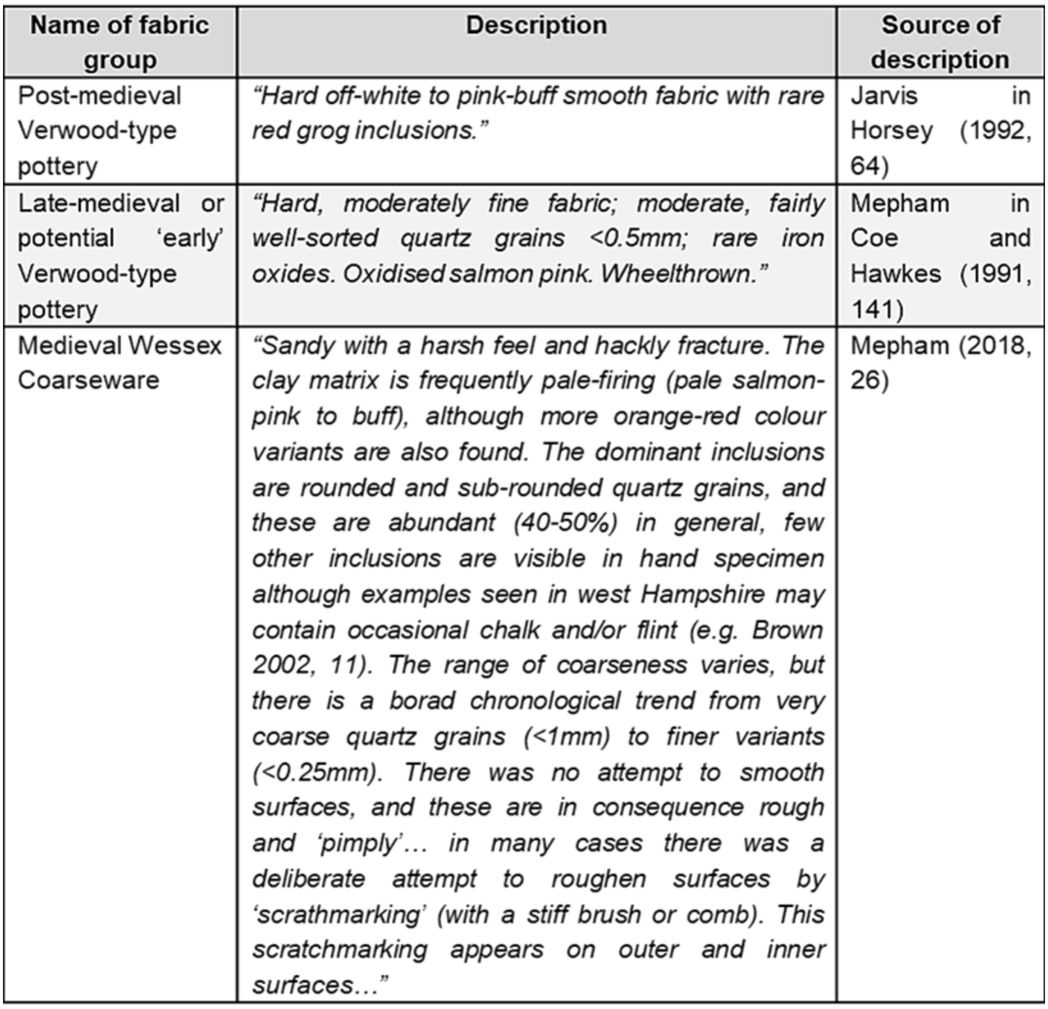
## *3.4. Laboratory-Based Methods*

Recovered pottery sherds contain an enormous amount of information regarding their consumers and makers; in this study, it is the latter who hold the most interest. To understand them, their methods and choices, one must attempt to decipher as much information as possible from the remains of the artefacts that they created. Many ways of doing this have been proposed by an extensive range of researchers (*e.g*. Shepard 1956; Peacock 1967; 1968; Orton *et al.* 1993; Freestone 1995; and Rice 2015).

### *3.4.1. The Importance of a Staged Approach*

Rice (2015) has highlighted the need for a staged approach, beginning with the characterisation of pottery sherds and ending with chemical analysis. This is mirrored by Jones *et al.* (2002, p.67), who applied an artefact analysis model comprising a staged approach of macroscopic observations, followed by the microscopic, with further clarification in microstructural composition. Cumulatively, this aids in the clarification of that noted in the previous step, interconnecting each stage with a greater degree of understanding revealed in each progression. Initially, this process involves simple observation by eye, examining aspects such as composition, colour and texture. By grouping pottery sherds into fabric groups via the presence, or absence, of particular geological inclusions, ware types may be assigned, and a potential source or provenance suggested. Usually, a sherd can be ascribed to a particular provenance, or broad general ware group, with little to no technological input required (*e.g.* Peacock 1977). This characterisation should also include an examination of the firing conditions each sherd was subjected to, along with the scrutinisation of vessel style and any surface treatments. Any study of ceramics should begin at this level (*e.g.* Barclay *et al.* 2016*)*, as it does here. Using these aspects, any potential ‘early’ Verwood-type pottery can be identified. Table 6, below, outlines a macroscopic fabric description for post-medieval Verwood-type pottery, potential late-medieval Verwood-type pottery and Wessex Coarsewares; a fabric group of medieval pottery with potential to contain sherds manufactured along the east Dorset/west Hampshire border.

**Table 6: Selected Published Fabric Descriptions of Relevant Wares**



| Name of fabric group | Description | Source of description |
|---|---|---|
| Post-medieval Verwood-type pottery | *"Hard off-white to pink-buff smooth fabric with rare red grog inclusions."* | Jarvis in Horsey (1992, 64) |
| Late-medieval or potential 'early' Verwood-type pottery | *"Hard, moderately fine fabric; moderate, fairly well-sorted quartz grains <0.5mm; rare iron oxides. Oxidised salmon pink. Wheelthrown."* | Mepham in Coe and Hawkes (1991, 141) |
| Medieval Wessex Coarseware | *"Sandy with a harsh feel and hackly fracture. The clay matrix is frequently pale-firing (pale salmon-pink to buff), although more orange-red colour variants are also found. The dominant inclusions are rounded and sub-rounded quartz grains, and these are abundant (40-50%) in general, few other inclusions are visible in hand specimen although examples seen in west Hampshire may contain occasional chalk and/or flint (e.g. Brown 2002, 11). The range of coarseness varies, but there is a borad chronological trend from very coarse quartz grains (<1mm) to finer variants (<0.25mm). There was no attempt to smooth surfaces, and these are in consequence rough and 'pimply'… in many cases there was a deliberate attempt to roughen surfaces by 'scrathmarking' (with a stiff brush or comb). This scratchmarking appears on outer and inner surfaces…"* | Mepham (2018, 26) |

The macroscopic descriptions and comparisons highlighted in Table 6 only elucidate matters so far, with similarities in the compositions of ware types being based upon the size and nature of components visible by eye; sadly, this level of study has been the norm for most post-medieval coarseware investigations (*e.g.* Gooder 1984; Price 2005; Cumberpatch 2006). At the basic level, this characterisation has proved useful in bringing the current state of information on the Verwood-type potteries to its existing level, but the contribution of new knowledge and confirmation of existing hypotheses requires new studies to move beyond the level of descriptive comparison. Current approaches to archaeological ceramics routinely employ both chemical and petrographic (thin section) analyses, especially when exploring aspects such as provenance and manufacturing (*e.g.* Maritan *et al.* 2009; White 2012; Travé Allepuz *et al.* 2015; Jones 2017). A detailed level of study of the clay-rich material from which past ceramics are constructed has been referred to as "ceramic compositional analysis" by Quinn (2013, p.1). While this concept can be subdivided into geochemical and mineralogical examinations, both share similar goals and theoretical assumptions, thus they are largely complimentary and will be treated as such in this study. Here, a total of 50 sherds from different sources will be studied, using a control group of sherds recovered from a known source or postulated production site. According to Arnold's (1985, p.49 - Fig. 2.5) Exploitation Threshold Model, clay and temper sources utilised by a range of ethnographic potters are usually sourced within 6km of the place of production or workshop; thus, where possible, the sites selected for chemical analysis should be several kilometres apart, to achieve greater clarity in identifying potential chemical difference.

Beyond the macro level of investigations lies the microscopic. In the first instance, any microscopic examinations include the confirmation of certain inclusions using relatively low-level magnification optical microscopy (x10–40 magnification). Used alone, this is largely complementary of the macroscopic characterisation of fabric groups, which usually forms a routine aspect in discerning general fabric groups. In contrast, a more in-depth examination comprises thin section petrography examinations and heavy mineral analysis. These focus predominately on the mineral and rock fragments which occur within an archaeological ceramic sample, visible under a geological polarising light microscope in thin section. This can provide very detailed information about the clay sourced to make a ceramic (*e.g.* Ixer and Vince 2009), including alterations to said clay, methods used in forming and the occurrence of any additives or 'temper' to the clay (*e.g.* Maritain *et al.* 2009; Jorge 2009), to name but a few (*c.f.* Quinn 2013).

### *3.4.2. Thin Section Petrography*

This technique was initially developed for use by those studying earth sciences, and involves taking a sample, grinding it flat and subsequently mounting it to a glass slide. This is followed by additional abrasion until the specimen is 30 microns thick (0.03mm); at this thickness, light is able to pass through most minerals, and quartz - a commonly occurring mineral - can be easily identified, presenting in first order birefringence under crossed polarising light (Mackenzie and Adams 1994, p.22). The slide is then observed through a polarising light microscope, allowing observations to be made. Thin sections are studied with a polarising light, or geological microscope, as this method requires two types of light. Firstly, plane polarised light (PPL); a light source similar to regular transmitted light; and secondly, crossed polars (XP). In XP, the light is polarised in two directions, both of which pass through the mineral specimens that comprise the thin section sample. The interference of the two light waves produces optical effects, which are used in identification (Mackenzie and Adams 1994).

This technique is used for ceramics, amongst other materials, as this medium contains elements of rocks and minerals often used in provenance (Peacock 1968; Freestone 1991; Vince 2005). In more recent years, its use for examining technology has also become increasingly common, as outlined by Whitbread (1995) and, later, Quinn (2009; 2013). Additionally, Middleton and Freestone (1991) have shown the examination of technology is most informative when petrography is used alongside ethnographic and historical records of production. The Verwood-type pottery industry is one such fortunate case where enough historical and visual material relating to production exists. When combined, the two can elucidate, or corroborate, certain observations. Hughes and Evans (2000, p.87) illustrate that there have been effective results from the combined use of both thin section and chemical analysis, as supported by Tite (1999). This vast range of successful applications has led to the proposal that this complementary suite of methods be used here.

One problem with the ware types of the region, and the time period being studied, is that inclusions are dominated by the presence of quartz; such a situation is mirrored in later medieval ceramics across much of the country (Vince 2005, p.221). This is unsurprising, as quartz forms one of the five silicate mineral groups forming 95% of the Earth's crust (Putnis 1992). To overcome this problem, voids, clay-paste matrix, and inclusions visible in thin section can be examined quantitatively, via measuring variables such as roundness, size, frequency and orientation (Middleton *et al.* 1985; Thér 2016). Whitbread (1986) has evidenced a detailed analysis of discrete differences of inclusions to be successful within macroscopically similar Corinthian Amphorae wares.

Few petrography studies have concentrated on post-medieval wares, despite the likelihood that silt-sized particles - present in fine grained post-medieval ceramics - can provide sufficient diagnostic potential to aid provenance (Vince 2001). The combined use of thin section analysis and chemical studies has proven effective in discerning differences between Bristol/Staffordshire-type slipwares (White 2012), and in exploring production at the Harlow potteries (Davey *et al.* 2009). This “Integrated Methodology” - as termed by Tite (1999, p.182) - can be beneficial towards deducing the nature of technological choices regarding both raw materials and manufacturing processes. Numerous studies have supported such an approach to the study of the manufacture of ceramics (*e.g.* Pearce 2007; Belfiore *et al.* 2007; Day *et al.* 1999; Mommsen 2004).

Additional petrographic techniques have been used to examine ancient pottery, such as heavy mineral analysis. This is particularly suited to identifying and quantifying heavy minerals that exist within sediments, and is particularly suited to sands (Peacock 1967). The method involves crushing the sample to powder, which is then floated in a liquid with a specific gravity of 2.9. This allows the heavier minerals to sink within the solution, while the lighter particulates - such as clay minerals and quartz - float to the top. The resultant sediment can then be examined under a geological microscope, and compared with published material and geological data to determine a limited potential area of raw material extraction. However, difficulties arise when considering fabrics that have been tempered by sand, as it can be problematic to identify whether the heavy minerals derived from the added sand, or the clay. This has proved successful for Greek pottery (Williams 1981), however this contained reasonably distinctive volcanic mineral fragments. Pottery of the Dorset, Hampshire and Wiltshire area is unlikely to contain a vast range of distinct heavy minerals, excluding those of tourmaline, muscovite and garnet, as noted by Williams for wares studied in samples recovered from Wareham (Hinton and Hodges 1977, pp.60-61).

The final step within the multi-tiered approach for this study comprises chemical investigations. These can provide both a qualitative identification and quantitative data on the elements that constitute a given ceramic sample. A range of methods exist, thus the type of apparatus and method to be used must be carefully considered.

### *3.4.3. Selection of an Appropriate Chemical Analysis Method*

Those choosing to study archaeological ceramics have a broad range of methods available to them, especially where provenance forms a major aspect of the research question. Methods commonly used for chemical analysis, within an archaeological context, comprise instrumental neutron activation analysis (INAA), atomic absorption spectrophotometry (AAS), inductively-coupled plasma spectroscopy (ICPS) and X-ray based techniques, including diffraction and fluorescence (XRD and XRF).

INAA is often the preferred method, as it is highly sensitive, providing quantities of certain elements to the parts per billion (Pollard and Heron 2008, p.8; Speakman *et al.* 2011). This method possesses the ability to identify a broad suite of elements, including those that occur in small quantities, commonly termed ‘trace elements’. Such elements have been shown to be particularly useful in determining, and defining, different production locations within visually homogenous fabric groups (*e.g.* Santos *et al.* 2006). This has particular comparative importance, as the Verwood-type potteries are, visually, a homogenous fabric group – despite at least 36 potential production locations of manufacture having been identified.

INAA requires exposing a sample to a neutron field within a nuclear reactor to 'activate' radioactive isotopes from elements present within the sample. A detector is then used to identify those which comprise the sample, based upon the amount, and level of, gamma-ray emissions (Minc and Sterba 2016). While the technique has an extended history of use in the bulk chemical analysis of ceramics (*e.g.* Sayer *et al.* 1957; Arnold *et al*. 1991; Bartlett *et al.* 2000), it is not widely available; nor is it conducive to measuring a large number of samples, due to cost restrictions and the need to destroy the sherd by crushing it into powder (Minc and Sterba 2016, p.437).

In contrast, AAS is widely available and a relatively low-cost technique; again, the sample is destroyed as part of the analysis, and requires a large amount of sample preparation. For AAS, samples must be in a liquid form (*i.e.* dissolved) and then atomised so that their characteristic wavelengths can be emitted and recorded. Following this, during excitation, electrons within the various atomic elements move up one energy level in their respective atoms as those atoms absorb a specific energy. As the atom returns to its original energy state, a photon is emitted with a wavelength characteristic to that particular element; this is measured by a detector (Pollard and Heron 2008, p.25). One further restriction is that for most instrumentation, the method is not a bulk chemical analysis technique, *i.e.* the technique can only measure one element at a time, thus restricting the range of elements measured and exacerbating the time taken to re-test for a larger range of elements. While relatively successful when used by Spoerry (1989) and Purkis (1991) for both medieval and post-medieval ceramics of the region in question, the restriction of elements is too great for this method to be used here. Also, the powdering of the samples causes a large amount of preparation time, and museum services are unlikely to grant permission for the destruction of large numbers of curated artefacts.

ICP methods usually employ a mass spectrometer (MS), allowing for bulk chemical analysis within the same test window. ICP-MS measures ions detached by a suite of strong magnets. This involves the ionisation of samples by preparing them as an aerosol, which is then passed through superheated plasma, stripping the electrons from atoms (Golitko and Dussubieux 2016). While ICP-MS is relatively widespread in terms of availability, the requirement for complete digestion, or breakdown, of the ceramic sample requires a strong acid (usually hydrofluoric, rather than the more commonly available hydrochloric). Due to this, effective ICP analysis of powdered ceramics can be difficult to source, with very few UK-based centres offering this facility. However, an additional benefit is that testing is relatively low cost in comparison to INAA. Alternate methods, such as inductively coupled plasma optical emission spectroscopy (ICP-OES), have also been shown to complement ICP-MS when compared to both INAA and X-ray based techniques (Tsolakidou and Kilikoglou 2002).

Finally, X-ray based methods have proven effective in terms of the chemical and mineral analysis of ceramics. These methods have an extended history of successful usage (Brindley and Brown 1980), especially for the application of X-Ray Diffraction (XRD). Both Weymouth's (1973) study of American prehistoric pottery and Epossi Ntah *et al.*'s (2017) comprehensive characterisation of West African pottery comprise notable examples of the successful implementation of this method in ceramic provenance.

XRD employs beams of electromagnetic radiation, which scatter, or 'diffract', in certain angles and directions depending on the type and composition of the atoms forming various crystal lattices within the sample (Heimann 2016, p.330). This can be used to establish provenance based upon mineral composition, while simultaneously providing an estimation of firing temperature of a ceramic sample (Hiemann and Franklin 1979; Maggetti and

Rossmanith 1981). However, some researchers have noted that this should be confirmed via additional techniques, such as optical microscopy and thermal analysis, alongside thermal expansion tests (Tite 1969). Santacreu (2014) notes that the method is particularly reliable, although powdered samples are required, and the number of research centres that possess an XRD are limited. A major drawback of this method is the requirement for powdered samples, which – despite limiting issues such as crystal size creating a bias within collected data - causes the destruction of each sample sherd.

In contrast, portable X-Ray Fluorescence (pXRF) can provide bulk chemical analysis to an acceptable degree of accuracy and precision (Forster *et al*. 2011), without the need for detrimental preparation of samples. In this regard, the choice of this method for the study was largely pragmatic, with the factors of low-cost sample preparation and a rapid speed of analysis being of primary significance in its selection. However, Forster *et al.* (2011) has shown that surface treatments, the shape of the sample, and any surface alteration or surface material build-up can wildly affect the results.

Furthermore, pXRF was chosen as it secures an acceptable balance between all aforementioned aspects, and possesses acceptable detection limits for a wide range of elements; this all occurs during one scan, as part of a bulk chemical analysis (Pollard and Heron 2008, pp.34-45; Speakman *et al*. 2011). The non-destructive nature of this method was also a deciding factor in the choice, and should be favourable to museum services that tend to favour access to pottery samples for non-destructive over destructive analysis methods. The use of pXRF in archaeological science has been shown to be successful (e.g. Goren *et al.* 2011; Wolff *et al*. 2014; McCormick and Wells 2014; Adlington and Freestone 2017), and reasonably accurate when compared against other methods (Speakman *et al.* 2011). Although a moderately new technique, pXRF has seen increasing use within archaeology over recent years (Johnson 2014, p.563). Despite this, few studies have focused on the use of pXRF for examining post-medieval ceramics; one such example is that by Davey *et al.* (2013), who examined iron-glazed wares from the Midlands.

This method involves temporarily irradiating a sample with primary X-rays, which displaces electrons from the inner orbits of the atoms comprising the sample. These are then replaced by electrons from the outer levels. The resultant discharged fluorescent X-rays occur in wavelengths that correspond to the parent element, which can be both identified and measured by a detector in the device (Artioli 2010; pp.34-7). Additionally, this method provides quantitative data in standardised units of measurement (ppm), allowing for use in statistical inquiries (Rice 2015, p.250). This method can also be used to examine the surfaces of the sample; this is particularly relevant for medieval and later pottery, where the presence of slips and glazes as surface treatments is prolific.

### *3.4.4. Choosing a Sampling Strategy*

It is unfeasible to examine the entire population or all potential specimens, thus a small group, or sample, of sherds are used. Overall, it is almost impossible to calculate the entire population of products created by a kiln, although attempts have been made for certain industries (Lyne and Jeffries 1979), and orders of magnitude suggested - as at medieval Novgorod, Russia (Orton 2012). These examples aside, any estimates on total vessels created by a given kiln or industry generally comprise educated guesswork.

One of the fundamental principles in statistical theory is that a certain sample of something is representative of, or part of, a given population (Neyman 1934). The inability to examine the entire population is particularly relevant for post-medieval ceramic production sites, as they have been known to produce vast amounts of waste material and an often-incalculable number of potential finished products (Haslam 1975, p.166; Copland Griffiths and Butterworth 1991, p.72).

Furthermore, as numerous chemical changes occur during the firing cycle at both mineral and chemical level (Tite 1999, p.189; Rice 2015, p.377), an assemblage that contained vast amounts of hard or low fired ‘wasters’ could be chemically different from another recovered from the same site – despite both the wasters and the usable products being made from the same materials (Rice 2015). To negate this, the chosen samples are required to be representative exhibiting well-fired examples, and avoiding under or over fired specimens, where possible.

The sample frame comprises pottery assemblages held by museums and other curatorial bodies such as commercial archaeological organisations, usually derived from excavations, plus individuals who hold artefacts from investigations on various Verwood-type production sites. Many of these groups derive from surface collection, rather than from securely stratified deposits. The potential for a level of uncertain provenance for these samples against, compared stratified ones, is recognised as significant.

Previous studies employing pXRF prove that samples need to be clean of residues and, where possible, surface treatments (Forster *et al.* 2011). To counter this, all samples were washed in deionised water prior to being presented for analysis, as outlined by Hall (2016, 346).

These fundamentals allow well-provenanced examples to be related to those recovered from consumption sites, which are usually not poorly or over-fired. The sampling will be relatively stratified, in that numerous fabric groups from a production site will be examined to match them to sherds recovered from consumption sites. For example, both Wareham, Dorset, and Laverstock, Wiltshire, comprise medieval pottery production sites which produced wares in a coarse and fineware variant.

### *3.4.5. Initial Testing and Building a Chemical Analysis Methodology*

To ascertain the most effective and efficient way to examine the material and the proposed methods, a series of pilot studies were undertaken. Firstly, single readings were taken for three Verwood-type samples using a Niton XL3t GOLDD+ pXRF, using the mining setting. This setting comprises four filters (main, light, heavy and high), which can qualify and quantify a suite of 28 elements (Table 7).

**Table 7: List of Elements Measured by Niton XL3t pXRF**

| No. | Chemical Symbol | Element | Atomic Weight | Chemical Family |
|---|---|---|---|---|
| 1 | Al | Aluminium | 13 | Post-transitional Metal |
| 2 | As | Arsenic | 33 | Metalloid |
| 3 | Ba | Barium | 56 | Alkali Earth Metal |
| 4 | Bi | Bismuth | 83 | Post-transitional Metal |
| 5 | Ca | Calcium | 20 | Alkali Earth Metal |
| 6 | Cl | Chlorine | 17 | Halogen |
| 7 | Co | Cobalt | 27 | Transition Metal |
| 8 | Cr | Chromium | 24 | Transition Metal |
| 9 | Cu | Copper | 29 | Transition Metal |
| 10 | Fe | Iron | 26 | Transition Metal |
| 11 | K | Potassium | 19 | Alkali Metal |
| 12 | Nb | Niobium | 41 | Transition Metal |
| 13 | Ni | Nickel | 28 | Transition Metal |
| 14 | Mg | Magnesium | 12 | Alkali Earth Metal |
| 15 | Mn | Manganese | 25 | Transition Metal |
| 16 | P | Phosphorus | 15 | Non-metal |
| 17 | Pb | Lead | 82 | Post-transitional Metal |
| 18 | Rb | Rubidium | 37 | Alkali Metal |
| 19 | S | Sulphur | 16 | Non-metal |
| 20 | Sb | Antimony | 51 | Metalloid |
| 21 | Si | Silica | 14 | Metalloid |
| 22 | Sn | Tin | 50 | Post-transitional Metal |
| 23 | Sr | Strontium | 38 | Alkali Earth Metal |
| 24 | Ti | Titanium | 81 | Transition Metal |
| 25 | V | Vanadium | 23 | Transition Metal |
| 26 | W | Tungsten | 74 | Transition Metal |
| 27 | Zr | Zirconium | 40 | Transition Metal |
| 28 | Zn | Zinc | 30 | Transition Metal |

The three sherds comprise one from Crendell (ALD3), one from Crossroads, (VER3) and an additional Verwood-type sherd of unknown provenance, recovered from a consumption site in Kington Magna, Dorset (KM1). Each sherd was sampled once on the following:

- a broken edge;
- a glazed surface;
- a freshly made break;
- a surface where the glaze was removed using silicon carbide 600-grit and deionised water until the glaze was no longer visible (prepared surface);
- a powdered sample created using a granite hand mortar.

Each sample was measured for 30 seconds on each filter using the mining setting on a Niton XL3t GOLDD+ pXRF. This confirmed the feasibility of pXRF as a technique to successfully characterise the chemical composition of each sherd. The results of these are presented in Tables 8a-c, and show that an existing break regularly provides the median values - or close to - for numerous elements for two of the three sherds. The median value is sought after here, as the many surfaces examined had potential for post-depositional change, and either remained or were previously glazed (in the case of the prepared surface). These samples were subsequently entirely powdered and retained for use as standards, or samples of, corroborated chemical composition for later comparison and verification. The high arsenic, sulphur and lead values for each of the external surface scans reveals that glaze has leached deeply into the body fabric of the sherd, or that the X-ray beam passes easily through the entire thickness of the sample, and measures glazed - or glaze vapour covered - surfaces that remain intact on the other side of each sherd; scanning the exterior surface meant each sherd had to be lying flat. This shows that the thickness of the sample is extremely important, thus the choice for using an existing break is preferable, as such a situation allows the X-ray beam to pass deep into the core of the sample.

# Table 8a-c: Initial Testing for Sample Locations on Sherds via pXRF Bulk Chemical Analysis (ppm)

| Site | Sample Type | Nb | Sr | Zr | Rb | Fe | Mg | Al | Si | P | S | Cl | K | Ca | Ti | V | Cr | Mn | Co | Ni | Cu | Zn | As | Se | Mo | Pd | Ag | Cd | Sn | Sb | Ba | W | Au | Pb | Bi |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alderholt | External Surface | 11.5 | 39.8 | 136.6 | 35.7 | 7545.1 | 32754.8 | 41695.5 | 137468.9 | 3242.6 | 79475.7 | 1447.1 | 3550.5 | 2817.0 | 1775.8 | 62.4 | 65.4 | 481.4 | 42.4 | 25.5 | 88.1 | 41.2 | 4423.4 | <LOD | <LOD | <LOD | 78.5 | <LOD | <LOD | <LOD | 514.4 | 402.7 | <LOD | 24069.1 | <LOD |
| Alderholt | Fresh Break | 19.7 | 59.8 | 239.2 | 43.1 | 14085.3 | <LOD | 79926.1 | 263609.6 | 849.3 | 1315.7 | <LOD | 6759.1 | 1420.2 | 4925.2 | 160.4 | 110.2 | <LOD | <LOD | <LOD | 73.5 | 18.9 | <LOD | <LOD | <LOD | <LOD | 53.6 | <LOD | 20.2 | <LOD | 409.6 | <LOD | <LOD | 2573.3 | 16.9 |
| Alderholt | Existing Break | 17.9 | 60.3 | 217.6 | 41.5 | 14463.6 | <LOD | 63895.6 | 230664.1 | 1408.4 | 6661.2 | <LOD | 6517.4 | 2427.2 | 4598.9 | 194.3 | 120.1 | 106.7 | <LOD | <LOD | 68.6 | 36.6 | 121.5 | <LOD | <LOD | <LOD | 47.3 | <LOD | <LOD | <LOD | 391.0 | <LOD | <LOD | 5387.2 | 24.3 |
| Alderholt | Prepared Surface | 11.6 | 44.3 | 178.6 | 37.0 | 9070.1 | 24217.5 | 40349.4 | 142567.1 | 3285.4 | 66751.2 | 1480.4 | 3299.2 | 1807.7 | 2157.4 | 248.6 | 70.2 | 134.3 | <LOD | <LOD | 55.9 | 20.3 | 3175.5 | <LOD | <LOD | <LOD | 49.1 | <LOD | <LOD | <LOD | 364.4 | 279.5 | <LOD | 17108.8 | <LOD |
| Alderholt | Powdered Sample | 18.9 | 68.4 | 219.2 | 41.9 | 15191.8 | <LOD | 36805.4 | 163244.7 | 2565.8 | 1713.8 | <LOD | 6495.3 | 10716.7 | 4695.5 | 209.5 | 151.5 | <LOD | <LOD | <LOD | 75.6 | 19.1 | <LOD | <LOD | <LOD | <LOD | <LOD | <LOD | <LOD | <LOD | 240.6 | <LOD | <LOD | 4299.3 | 14.6 |
| Alderholt | Median | 17.9 | 59.8 | 217.6 | 41.5 | 14085.3 | N/A | 41695.5 | 163244.7 | 2565.8 | 6661.2 | N/A | 6495.3 | 2427.2 | 4598.9 | 194.3 | 110.2 | N/A | N/A | N/A | 73.5 | 20.3 | 3175.5 | N/A | N/A | N/A | 51.4 | N/A | 20.2 | N/A | 391.0 | 341.1 | N/A | 5387.2 | 16.9 |
| Alderholt | Mean | 16.3 | 55.4 | 201.4 | 40.1 | 12406.8 | 28486.2 | 50727.9 | 183466.5 | 2319.6 | 27096.5 | 1463.8 | 5519.4 | 3602.7 | 3791.9 | 178.3 | 104.6 | 240.8 | 42.4 | 25.5 | 72.5 | 26.1 | 2724.0 | N/A | N/A | N/A | 56.0 | N/A | 20.2 | N/A | 385.2 | 341.1 | N/A | 9804.1 | 18.2 |

| Site | Sample Type | Nb | Sr | Zr | Rb | Fe | Mg | Al | Si | P | S | Cl | K | Ca | Ti | V | Cr | Mn | Co | Ni | Cu | Zn | As | Se | Mo | Pd | Ag | Cd | Sn | Sb | Ba | W | Au | Pb | Bi |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kington Magna - Unknown Origin | External Surface | 16.2 | 106.3 | 256.4 | 41.4 | 14830.7 | 17756.6 | 56290.3 | 176453.2 | 4272.3 | 58518.6 | 922.7 | 6463.4 | 3357.9 | 3423.3 | 142.2 | 115.5 | <LOD | <LOD | <LOD | 69.2 | 37.2 | 1169.7 | <LOD | <LOD | <LOD | 26.6 | <LOD | <LOD | <LOD | 281.9 | 128.6 | <LOD | 4533.6 | <LOD |
| Kington Magna - Unknown Origin | Fresh Break | 19.4 | 96.4 | 257.1 | 46.2 | 17893.7 | <LOD | 59583.9 | 212065.5 | 1918.1 | <LOD | <LOD | 6478.3 | 2349.9 | 4214.5 | 161.7 | 132.4 | <LOD | <LOD | <LOD | 64.7 | 24.3 | 138.0 | <LOD | <LOD | <LOD | <LOD | <LOD | <LOD | <LOD | 303.3 | <LOD | <LOD | 980.7 | 15.5 |
| Kington Magna - Unknown Origin | Existing Break | 15.9 | 95.6 | 259.9 | 41.4 | 16525.5 | 9702.1 | 58853.8 | 205410.9 | 4573.3 | 8789.7 | 273.8 | 6782.4 | 4781.2 | 3890.6 | 185.6 | 117.2 | <LOD | <LOD | <LOD | 52.1 | 46.9 | 209.0 | <LOD | <LOD | <LOD | 16.3 | <LOD | <LOD | <LOD | 296.0 | <LOD | <LOD | 1184.9 | 14.6 |
| Kington Magna - Unknown Origin | Prepared Surface | 16.5 | 89.8 | 278.1 | 40.5 | 16160.7 | <LOD | 87778.6 | 254918.4 | 3138.5 | 1334.3 | 148.5 | 7056.4 | 3968.9 | 4634.2 | 218.3 | 121.2 | <LOD | <LOD | <LOD | 60.6 | 24.4 | 56.3 | <LOD | <LOD | <LOD | <LOD | <LOD | <LOD | <LOD | 258.4 | <LOD | <LOD | 799.3 | 17.6 |
| Kington Magna - Unknown Origin | Powdered Sample | 17.2 | 109.1 | 246.6 | 42.1 | 17268.9 | <LOD | 31062.4 | 138117.6 | 4217.2 | 343.5 | <LOD | 6563.8 | 27355.5 | 4376.3 | 182.7 | 157.7 | <LOD | <LOD | <LOD | 106.7 | 24.2 | <LOD | <LOD | <LOD | <LOD | <LOD | <LOD | <LOD | <LOD | 145.5 | <LOD | <LOD | 395.5 | 15.9 |
| Kington Magna - Unknown Origin | Median | 16.5 | 96.4 | 257.1 | 41.4 | 16525.5 | N/A | 58853.8 | 205410.9 | 4217.2 | 5062.0 | 273.8 | 6563.8 | 3968.9 | 4214.5 | 182.7 | 121.2 | N/A | N/A | N/A | 64.7 | 24.4 | 173.5 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 281.9 | N/A | N/A | 980.7 | 15.7 |
| Kington Magna - Unknown Origin | Mean | 17.1 | 99.4 | 259.6 | 42.3 | 16535.9 | 13729.3 | 58713.8 | 197393.1 | 3623.9 | 17246.5 | 448.3 | 6668.9 | 8362.7 | 4107.8 | 178.1 | 128.8 | N/A | N/A | N/A | 70.6 | 31.4 | 393.2 | N/A | N/A | N/A | 21.4 | N/A | N/A | N/A | 257.0 | 128.6 | N/A | 1578.8 | 15.9 |

| Site | Sample Type | Nb | Sr | Zr | Rb | Fe | Mg | Al | Si | P | S | Cl | K | Ca | Ti | V | Cr | Mn | Co | Ni | Cu | Zn | As | Se | Mo | Pd | Ag | Cd | Sn | Sb | Ba | W | Au | Pb | Bi |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Verwood | External Surface | 19.7 | 107.4 | 224.0 | 53.8 | 19425.8 | 25460.6 | 69406.3 | 188015.8 | 2656.1 | 61256.3 | 1001.7 | 5181.3 | 983.5 | 3871.4 | 234.6 | 116.6 | <LOD | <LOD | <LOD | 90.6 | 24.4 | 1387.0 | <LOD | <LOD | <LOD | <LOD | <LOD | 17.3 | <LOD | 275.2 | 122.6 | <LOD | 5098.4 | <LOD |
| Verwood | Fresh Break | 22.4 | 116.6 | 220.6 | 57.7 | 25724.7 | <LOD | 96384.6 | 261162.4 | 850.9 | <LOD | <LOD | 7953.7 | 1295.1 | 5509.5 | 234.5 | 165.9 | <LOD | <LOD | <LOD | 65.4 | 25.6 | 66.7 | <LOD | <LOD | <LOD | <LOD | <LOD | 24.5 | <LOD | 292.8 | <LOD | <LOD | 945.4 | 19.0 |
| Verwood | Existing Break | 20.0 | 105.3 | 220.5 | 53.2 | 18295.0 | <LOD | 32381.7 | 246084.5 | <LOD | <LOD | <LOD | 5629.4 | 2630.0 | 4490.3 | 231.5 | 164.1 | <LOD | <LOD | <LOD | 69.4 | 23.5 | 8.0 | <LOD | <LOD | <LOD | <LOD | <LOD | 15.5 | <LOD | 254.6 | <LOD | <LOD | 650.0 | 15.3 |
| Verwood | Prepared Surface | 21.0 | 112.2 | 224.3 | 56.0 | 23610.2 | 5741.7 | 85642.0 | 273547.6 | 983.2 | 1475.6 | 238.4 | 7823.8 | 2470.2 | 5573.3 | 233.5 | 183.4 | <LOD | <LOD | <LOD | 69.8 | 27.5 | 10.7 | <LOD | <LOD | <LOD | <LOD | <LOD | 20.5 | <LOD | 278.1 | <LOD | <LOD | 199.5 | 15.1 |
| Verwood | Powdered Sample | 20.5 | 127.0 | 202.5 | 53.4 | 23471.2 | <LOD | 34198.8 | 139597.7 | 3056.7 | 562.4 | <LOD | 6537.0 | 30409.6 | 4655.7 | 226.7 | 162.0 | <LOD | <LOD | <LOD | 120.4 | 25.8 | <LOD | <LOD | <LOD | <LOD | <LOD | <LOD | <LOD | <LOD | 170.2 | <LOD | <LOD | 689.2 | 12.8 |
| Verwood | Median | 20.5 | 112.2 | 220.6 | 53.8 | 23471.2 | N/A | 69406.3 | 246084.5 | 1819.7 | 1475.6 | N/A | 6537.0 | 2470.2 | 4655.7 | 233.5 | 164.1 | N/A | N/A | N/A | 69.8 | 25.6 | 38.7 | N/A | N/A | N/A | N/A | N/A | 18.9 | N/A | 275.2 | N/A | N/A | 689.2 | 15.2 |
| Verwood | Mean | 20.7 | 113.7 | 218.4 | 54.8 | 22105.4 | 15601.1 | 63602.7 | 221681.6 | 1886.7 | 21098.1 | 620.0 | 6625.0 | 7557.7 | 4820.0 | 232.2 | 158.4 | N/A | N/A | N/A | 83.1 | 25.4 | 368.1 | N/A | N/A | N/A | N/A | N/A | 19.4 | N/A | 254.2 | 122.6 | N/A | 1516.5 | 15.5 |

**<LOD equates to values below the limits of detection*

The Niton XL3t has numerous settings that can be used to collect chemical data from a sample. It was decided that the Mining Cu/Zn setting was most appropriate to analyse ceramic samples. For the GOLDD+ model, this setting employs four filters. Each filter detects a certain range of elements based upon atomic mass. For example, aluminium (Al) has an atomic mass of 13, thus it is measured using the light filter, while lead (Pb) - with an atomic mass of 82 - is analysed in the main filter.

The use of all filters allows a greater range of elements to be detected and quantified. These filters can be applied for varying timescales, which can impact upon the results collected for certain elements. Further initial testing was undertaken to maximise the efficiency of workflow by selecting an acceptable analysis time for each filter; such examination enables an appropriate quality of the collected results to be weighed against the time expended in collecting the chemical data. Several scans of the same VER3 sample, at the same location, were subjected to filter irradiation times ranging from 30 to 120 seconds. As these comprise times for each filter, this encompassed a full irradiation time of four times the filter duration, *i.e.* 120 seconds total for 30 seconds per filter, and 480 seconds for 120 seconds per filter. The results (Table 9; Fig. 15) highlighted that the longer a sample is irradiated under a given filter, the lower the potential error. However, the testing suggested that 30 seconds per filter should be sufficient to be employed for a pilot test, as this could be increased should the low testing time not be considered adequate. The effectiveness of this would be determined by examining the statistical variance between the different known groups upon the completion of a pilot study.

### *3.4.6. Use of Standards*

Almost all methods of chemical analysis require a series of standards to confirm the accuracy of readings taken during examinations. The pXRF also has internal instrument calibrations embedded within each setting employed, however in order to corroborate the results obtained through those calibrations ‘Certified Reference Materials’ (CRMs) should be employed. CRMs contain constituents that have been measured by numerous analyses (Pollard *et al.* 2007, p.307) and as a result tend to have limited availability, are expensive, and rarely does a single CRM contain all the elements required (Holmqvist 2016, p.367). As a result, the use of ‘Internal Standards’ (IS) have been employed alongside a well-known CRM (Till-4 from New Brunswick, Canada), to provide an acceptable alternative where required (Speakman *et al.* 2011, p.3484). Within this study, the IS used were those examined in the initial methodology testing, and comprised three Verwood-type samples (ALD3; VER3; KM1); these powered samples were measured at the start of each set of analyses. This enabled any ‘drift’ from the optimum conditions to be charted and accounted for, as the measurements of values are known to deviate over extended periods of examination (Johnson 2014; Hall 2016). The IS were sent for examination at Durham University, using ICP-MS and ICP-OES to corroborate the quality of the pXRF results. The results of the ICP-MS and ICP-OES can be found along with the values for TILL4 in Appendix III.

## Table 9: Data Collected as part of Initial Filter Times Testing using Niton XL3t GOLDD+ pXRF for Verwood Site 3 Sample (all ppm)

| | Relevant filter on mining setting of Niton Xl3t pXRF and element analysed | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Main | Main | Main | Main | Main | Main | Main | Main | Main | Main | Main | Main | Main | Main | Main | Main |
| **Time per filter** | **As** | **Au** | **Bi** | **Co** | **Cu** | **Fe** | **Mn** | **Mo** | **Nb** | **Ni** | **Pb** | **Rb** | **Se** | **Sr** | **Zn** | **Zr** |
| 30 Seconds | <LOD | <LOD | 14.58 | <LOD | 60.76 | 18289.77 | <LOD | <LOD | 19.18 | <LOD | 565.10 | 51.24 | <LOD | 99.54 | 20.41 | 200.85 |
| 60 Seconds | <LOD | <LOD | 11.49 | <LOD | 50.39 | 17632.93 | <LOD | <LOD | 19.42 | <LOD | 1621.76 | 50.44 | <LOD | 96.95 | 21.43 | 195.24 |
| 90 Seconds | <LOD | <LOD | 13.14 | <LOD | 59.94 | 17618.65 | <LOD | <LOD | 18.78 | <LOD | 1588.69 | 50.44 | <LOD | 97.00 | 20.63 | 194.56 |
| 120 Seconds | 2.25 | 2.43 | 13.20 | 4.07 | 58.60 | 17661.80 | 2.44 | 1.82 | 18.02 | 2.44 | 1583.58 | 50.43 | 2.49 | 97.56 | 20.54 | 193.82 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Median** | 2.25 | 2.43 | 13.17 | 4.07 | 59.27 | 17647.37 | 2.44 | 1.82 | 18.98 | 2.44 | 1586.14 | 50.44 | 2.49 | 97.28 | 20.59 | 194.90 |
| **Mean** | 2.25 | 2.43 | 13.10 | 4.07 | 57.42 | 17800.79 | 2.44 | 1.82 | 18.85 | 2.44 | 1339.78 | 50.64 | 2.49 | 97.76 | 20.75 | 196.12 |

| | Recorded error values for each reading per element | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Time per filter** | **As Error** | **Au Error** | **Bi Error** | **Co Error** | **Cu Error** | **Fe Error** | **Mn Error** | **Mo Error** | **Nb Error** | **Ni Error** | **Pb Error** | **Rb Error** | **Se Error** | **Sr Error** | **Zn Error** | **Zr Error** |
| 30 Seconds | 17.25 | 6.95 | 5.66 | 61.67 | 14.25 | 206.13 | 73.75 | 1.25 | 1.68 | 25.82 | 15.31 | 1.67 | 1.74 | 2.68 | 6.96 | 4.19 |
| 60 Seconds | 15.38 | 5.44 | 5.25 | 42.73 | 9.83 | 142.15 | 41.10 | 1.37 | 1.19 | 18.46 | 18.65 | 1.18 | 1.32 | 1.89 | 4.92 | 2.94 |
| 90 Seconds | 12.42 | 4.27 | 4.28 | 34.90 | 8.15 | 116.31 | 49.86 | 1.00 | 1.00 | 14.77 | 15.09 | 1.00 | 1.00 | 1.54 | 4.01 | 2.40 |
| 120 Seconds | 10.23 | 4.11 | 4.15 | 25.54 | 7.69 | 115.83 | 48.42 | 1.00 | 1.00 | 13.52 | 14.86 | 1.00 | 1.45 | 1.15 | 3.94 | 2.25 |

| | Relevant filter on mining setting of Niton Xl3t pXRF and element analysed | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | High | High | High | High | High | High | High | Light | Light | Light | Light | Light | Low /Light | Low /Light | Low /Light | Low | Low | Low |
| **Time per filter** | **Ag** | **Ba** | **Cd** | **Pd** | **Sb** | **Sn** | **W** | **Al** | **Cl** | **Mg** | **P** | **Si** | **Ca** | **K** | **S** | **Cr** | **Ti** | **V** |
| 30 Seconds | <LOD | <LOD | <LOD | <LOD | <LOD | <LOD | <LOD | 15603.00 | <LOD | <LOD | <LOD | 95876.70 | 2771.03 | 5800.80 | 3333.52 | 130.83 | 4483.65 | 272.78 |
| 60 Seconds | 29.21 | 332.32 | <LOD | <LOD | <LOD | 18.54 | <LOD | 16080.83 | <LOD | <LOD | <LOD | 97219.18 | 2682.86 | 5745.86 | 3509.28 | 138.00 | 4421.17 | 244.37 |
| 90 Seconds | 30.55 | 308.97 | <LOD | <LOD | <LOD | 19.03 | <LOD | 16798.42 | 299.99 | <LOD | <LOD | 51202.16 | 2630.97 | 5678.11 | 4445.39 | 137.84 | 4326.07 | 228.66 |
| 120 Seconds | 28.45 | 395.92 | <LOD | <LOD | <LOD | 18.56 | 3.42 | 16133.64 | 301.09 | <LOD | 232.73 | 69269.44 | 3590.29 | 6826.24 | 3966.93 | 255.99 | 4268.98 | 242.14 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Median** | 29.21 | 332.32 | N/A | N/A | N/A | 18.56 | N/A | 16107.24 | N/A | N/A | N/A | 82573.07 | 2726.95 | 5773.33 | 3738.11 | 137.92 | 4373.62 | 243.26 |
| **Mean** | 29.40 | 345.74 | N/A | N/A | N/A | 18.71 | 3.42 | 16153.97 | 300.54 | N/A | 232.73 | 78391.87 | 2918.79 | 6012.75 | 3813.78 | 165.67 | 4374.97 | 246.99 |

| | Recorded error values for each reading per element | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Time per filter** | **Ag Error** | **Ba Error** | **Cd Error** | **Pd Error** | **Sb Error** | **Sn Error** | **W Error** | **Al Error** | **Cl Error** | **Mg Error** | **P Error** | **Si Error** | **Ca Error** | **K Error** | **S Error** | **Cr Error** | **Ti Error** | **V Error** |
| 30 Seconds | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 36.99 | 300.48 | 14.48 | 421.20 | 76.40 | 686.18 | 193.33 | 140.53 | 67.85 | 22.03 | 68.17 | 38.04 |
| 60 Seconds | 20.86 | 28.65 | 3.54 | 1.68 | 10.12 | 10.31 | 27.25 | 296.19 | 14.50 | 438.33 | 76.68 | 582.82 | 137.60 | 99.86 | 67.56 | 15.38 | 48.34 | 26.84 |
| 90 Seconds | 21.82 | 23.15 | 2.74 | 1.24 | 5.82 | 12.10 | 21.95 | 118.84 | 10.33 | 228.35 | 76.50 | 251.79 | 109.99 | 80.14 | 42.98 | 12.42 | 38.73 | 21.50 |
| 120 Seconds | 20.32 | 27.00 | 2.53 | 1.65 | 4.16 | 8.17 | 11.42 | 216.67 | 14.81 | 285.95 | 72.72 | 186.71 | 105.86 | 75.21 | 44.87 | 13.86 | 18.87 | 21.48 |

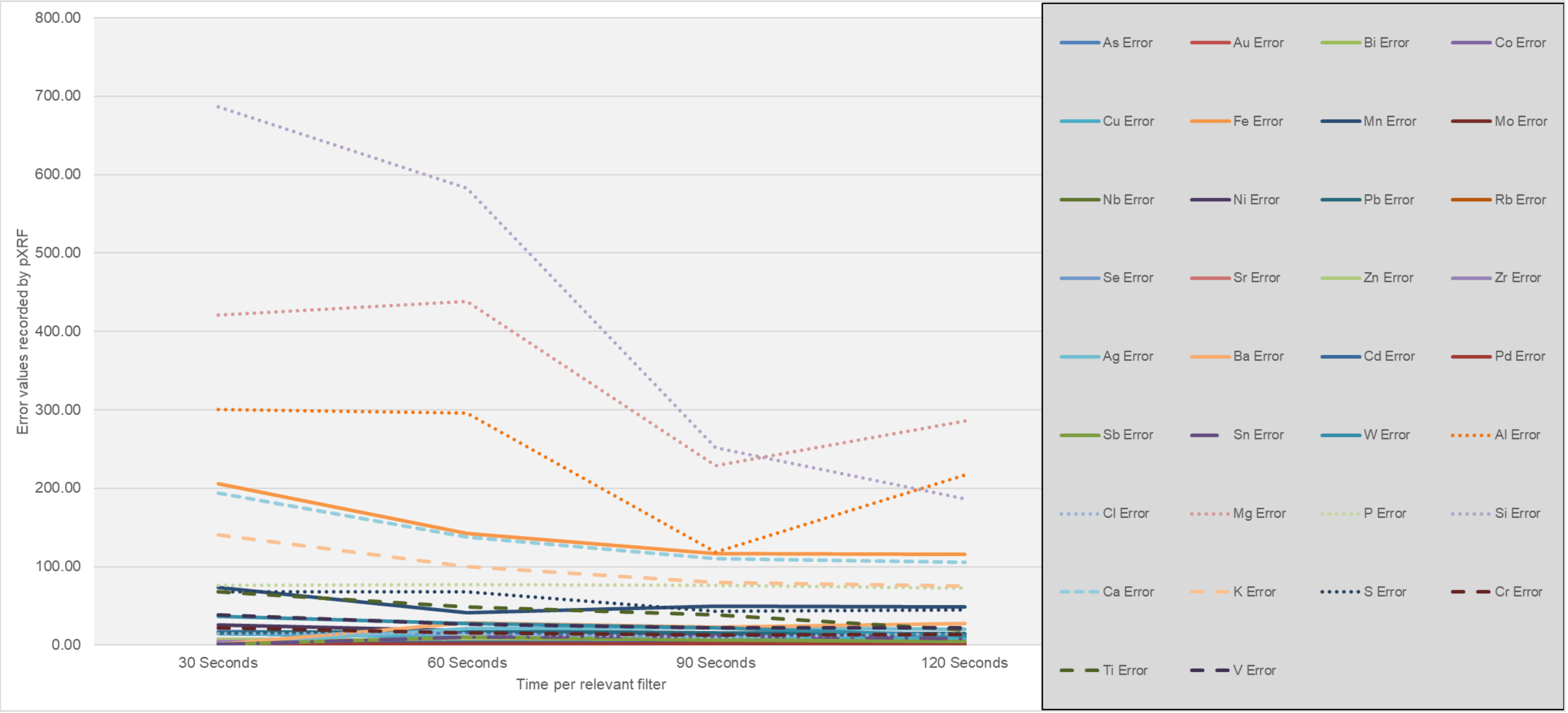
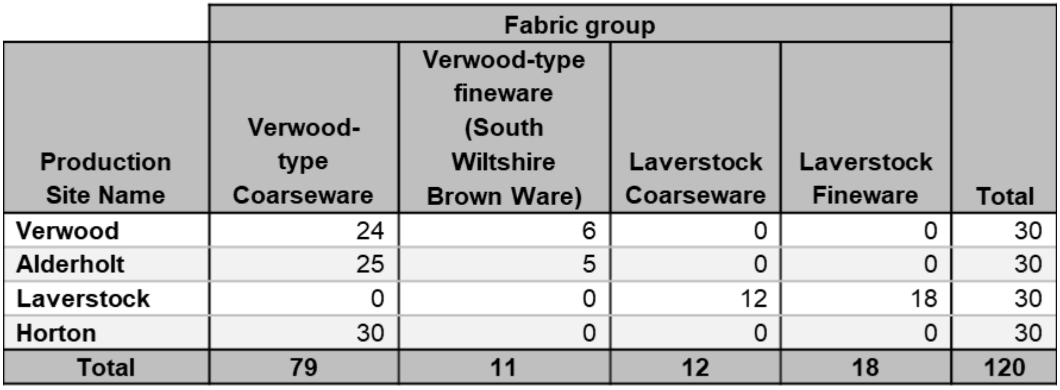


**Fig. 15: Error values recorded by Niton pXRF per element by filter with increasing time of measurement (in Table 9); solid line = main filter, dotted = light, dashed = low, dot-dash = high**

### 3.5. Pilot Study

Following the initial testing, a pilot study examined four different fabric groups from four separate production centres within the study region (Table 10). This was undertaken to establish if the methodology was sensitive enough to detect any variation present between the groups using bulk chemical analysis via pXRF; 120 samples were employed in total. The four production sites analysed for the pilot study lie within discrete areas along the Dorset – Hampshire border, with Laverstock lying within southern Wiltshire; all lie close to, and are thought to be employing, clays of the Reading and/or London beds. The material from Laverstock is of medieval date, while that from Horton is 17th century date, Alderholt of 18-19th century date, and Verwood of 19-20th century date. All sherds were assigned to a fabric group based upon macroscopic observations (Table 10).

**Table 10: Quantification of Samples by Fabric and Site for Pilot Study**



|  | Fabric group |  |  |  |  |
|---|---|---|---|---|---|
| **Production Site Name** | **Verwood-type Coarseware** | **Verwood-type fineware (South Wiltshire Brown Ware)** | **Laverstock Coarseware** | **Laverstock Fineware** | **Total** |
| **Verwood** | 24 | 6 | 0 | 0 | 30 |
| **Alderholt** | 25 | 5 | 0 | 0 | 30 |
| **Laverstock** | 0 | 0 | 12 | 18 | 30 |
| **Horton** | 30 | 0 | 0 | 0 | 30 |
| **Total** | **79** | **11** | **12** | **18** | **120** |

Once cleaned in deionised water, each sample was presented for analysis, and analysed using a Niton XL3t GOLDD+ pXRF on the mining setting; each filter was active for 30 seconds, with each sample being analysed once.

Due to the non-parametric nature of the collected data in the pilot study - evidenced by high kurtosis and skew for the distribution of most variables grouped by site - along with the poor results from Shapiro-Wilkes Tests of Normality undertaken on the data, a non-parametric type test was chosen to examine potential differences between site groups (Appendix IV). The data can be ranked by parts per million (ppm), allowing the use of a Kruskal-Wallis H-Test (H-test). This multivariate test calculates a value for the probability of difference occurring between the medians, or mean ranks, of independent variables for two or more different groups. For this study, the variables comprise an element grouped by site of origin; this was undertaken for all samples. Any values lying ‘below limits of detection’ were treated as ‘missing variables’ and were excluded from the tests.

The hypotheses for this comprised:

Null hypothesis ($H_0$):
There will be no difference between the ranked values for a given variable from the various site groups; they are homogenous.

Alternate hypothesis ($H_1$):
There will be difference between the ranked values for a given variable from the various site groups; there will be heterogeneity.

## Table 11: Results of Multivariate H-test for pXRF Pilot Analysis

| | Al | As | Ba | Bi | Ca | Cl | Co | Cr | Cu | Fe | K |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Kruskal-Wallis H Value | 19.337 | 9.220 | 31.564 | 33.564 | 70.608 | 10.273 | 1.875 | 8.907 | 4.632 | 35.838 | 27.284 |
| df | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 |
| P Value | 0.000233 | 0.026505 | 0.000001 | 0.000000 | 0.000000 | 0.016384 | 0.391606 | 0.030555 | 0.200834 | 0.000000 | 0.000005 |
| Result | Reject null in favour of alternate hypothesis | Reject null in favour of alternate hypothesis | Reject null in favour of alternate hypothesis | Reject null in favour of alternate hypothesis | Reject null in favour of alternate hypothesis | Reject null in favour of alternate hypothesis | Fail to reject null hypothesis | Reject null in favour of alternate hypothesis | Fail to reject null hypothesis | Reject null in favour of alternate hypothesis | Reject null in favour of alternate hypothesis |

| | Mg | Mn | Nb | Ni | P | Pb | Rb | S | Sb | Si | Sn |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Kruskal-Wallis H Value | 3.525 | 6.182 | 26.321 | 3.571 | 8.679 | 12.056 | 34.345 | 5.824 | 1.000 | 8.256 | 2.603 |
| df | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 1 | 3 | 3 |
| P Value | 0.317493 | 0.103086 | 0.000008 | 0.167677 | 0.033873 | 0.007193 | 0.000000 | 0.120496 | 0.317311 | 0.041008 | 0.457012 |
| Result | Fail to reject null hypothesis | Fail to reject null hypothesis | Reject null in favour of alternate hypothesis | Fail to reject null hypothesis | Reject null in favour of alternate hypothesis | Reject null in favour of alternate hypothesis | Reject null in favour of alternate hypothesis | Fail to reject null hypothesis | Fail to reject null hypothesis | Reject null in favour of alternate hypothesis | Fail to reject null hypothesis |

| | Sr | W | Zn | Zr | V | Ti |
|---|---|---|---|---|---|---|
| Kruskal-Wallis H Value | 9.309 | 7.334 | 19.557 | 9.222 | 5.843 | 7.459 |
| df | 3 | 3 | 3 | 3 | 3 | 3 |
| P Value | 0.025453 | 0.061978 | 0.000210 | 0.026485 | 0.119494 | 0.058622 |
| Result | Reject null in favour of alternate hypothesis | Fail to reject null hypothesis | Reject null in favour of alternate hypothesis | Reject null in favour of alternate hypothesis | Fail to reject null hypothesis | Fail to reject null hypothesis |

All at an
Alpha level
of 0.05

The results of the test (Table 11) revealed a degree of difference apparent between the variables by site, specifically for barium, niobium, zirconium, strontium, rubidium, bismuth, arsenic, lead, zinc, iron, chromium, calcium, potassium, aluminium, phosphorus, silica and chlorine. The differences were significant enough to reject the null hypothesis in favour of the alternate hypothesis, with an alpha level of 0.05. However, the results for antimony, tin, tungsten, copper, nickel, cobalt, manganese, vanadium, titanium, sulphur and magnesium suggest there is no significant difference, thus we must favour the null hypothesis: *i.e.* these variables are homogenous between site group, and so similar may be said for the elemental concentrations of the clays employed in the measured samples.

Nonetheless, the results of the H-test will only define if significant variability is present; it does not identify where that variability lies, thus we cannot ascertain if Alderholt is different to Laverstock, or if all groups are different from each other for a given element. To clarify this, a Mann-Whitney U-Test (U-test) was applied. The following variables were included in the U-test: aluminium, barium, calcium, chromium, iron, lead, niobium, phosphorus, potassium, silica, strontium, rubidium, zinc and zirconium, as each showed significant difference in the H-test. Although arsenic, bismuth and chlorine revealed significant differences in the H-test, these variables were not submitted for the U-test; less than half the samples from certain sites did not return measurable results (results being lower than limits of detection), thus any significant results may not accurately reflect that from a given site.

Six U-tests were run for each variable (Table 12). The same hypothesis as outlined for the H-test was re-used.

**Table 12: Number and Order of U-tests for pXRF Pilot Analysis**

| Test number for a given variable | Group 1 | Group 2 |
|---|---|---|
| 1 | Verwood | Alderholt |
| 2 | Verwood | Laverstock |
| 3 | Verwood | Horton |
| 4 | Alderholt | Laverstock |
| 5 | Alderholt | Horton |
| 6 | Laverstock | Horton |

Due to the amount of tests per variable, the probability of making a type I error - rejecting a true null hypothesis - is increased; therefore a ‘Bonferroni Adjustment’ was applied, providing a new alpha level of 0.01. This was formed by dividing the original alpha level (0.05) by the number of tests for each variable (six in number); the result was then rounded up to two decimal places (0.0083 to 0.01). Lowering the alpha level increases the likelihood of making a type II error - failing to reject a false null hypothesis. Since the aim of the analyses is to confirm variance between sites, this was considered acceptable. Distributions of the variables for these elements were not considered similar between site groups - as assessed by visual inspection (Appendix IV) - therefore the mean ranks from the tests should be regarded over the median values.

The results reveal that there is significant difference between variables by location for aluminium, barium, calcium, iron, potassium, rubidium, zirconium and zinc; this is summarised by site in Tables 13-26, and includes a Biserial Effect Size or Correlation (Cureton 1956). An effect size provides a quantitative value, expressed as a percentage, for the degree of the measured phenomenon; the equation for this is as follows, utilising the value of ‘U’ and the numbers of observations per group as ‘n’:

$$1 - \frac{2\,\mathrm{U}}{n_1 n_2}$$

### Table 13 (below): Significant Difference between Sites for Aluminium with Effect Size for Fabric Samples

| **Al** | Verwood | Alderholt | Laverstock | Horton |
|---|---|---|---|---|
| Verwood | X | N/A | 58% | N/A |
| Alderholt | No | X | 52% | 9% |
| Laverstock | Yes | Yes | X | 51% |
| Horton | No | Yes | Yes | X |

### Table 14: Significant Difference between Sites for Barium with Effect Size for Fabric Samples

| **Ba** | Verwood | Alderholt | Laverstock | Horton |
|---|---|---|---|---|
| Verwood | X | 41% | N/A | 75% |
| Alderholt | Yes | X | N/A | N/A |
| Laverstock | No | No | X | 68% |
| Horton | Yes | No | Yes | X |

**Key**

| | |
|---|---|
| Rank biserial effect size | 0% |
| Significant Difference at 0.01 Alpha Level? | Yes / No |

### Table 15: Significant Difference between Sites for Calcium with Effect Size for Fabric Samples

| **Ca** | Verwood | Alderholt | Laverstock | Horton |
|---|---|---|---|---|
| Verwood | X | 61% | 99% | N/A |
| Alderholt | Yes | X | 98% | N/A |
| Laverstock | Yes | Yes | X | 98% |
| Horton | No | No | Yes | X |

### Table 16: Significant Difference between Sites for Chromium with Effect Size for Fabric Samples

| **Cr** | Verwood | Alderholt | Laverstock | Horton |
|---|---|---|---|---|
| Verwood | X | N/A | 42% | N/A |
| Alderholt | No | X | N/A | N/A |
| Laverstock | Yes | No | X | N/A |
| Horton | No | No | No | X |

### Table 17: Significant Difference between Sites for Iron with Effect Size for Fabric Samples

| **Fe** | Verwood | Alderholt | Laverstock | Horton |
|---|---|---|---|---|
| Verwood | X | N/A | 57% | 44% |
| Alderholt | No | X | 47% | 45% |
| Laverstock | Yes | Yes | X | 83% |
| Horton | Yes | Yes | Yes | X |

### Table 18: Significant Difference between Sites for Potassium with Effect Size for Fabric Samples

| **K** | Verwood | Alderholt | Laverstock | Horton |
|---|---|---|---|---|
| Verwood | X | N/A | N/A | 64% |
| Alderholt | No | X | N/A | 61% |
| Laverstock | No | No | X | 46% |
| Horton | Yes | Yes | Yes | X |

### Table 19: Significant Difference between Sites for Niobium with Effect Size for Fabric Samples

| **Nb** | Verwood | Alderholt | Laverstock | Horton |
|---|---|---|---|---|
| Verwood | X | 72% | 73% | 52% |
| Alderholt | Yes | X | N/A | N/A |
| Laverstock | Yes | No | X | N/A |
| Horton | Yes | No | No | X |

### Table 20: Significant Difference between Sites for Phosphorus with Effect Size for Fabric Samples

| **P** | Verwood | Alderholt | Laverstock | Horton |
|---|---|---|---|---|
| Verwood | X | N/A | N/A | N/A |
| Alderholt | No | X | N/A | N/A |
| Laverstock | No | No | X | N/A |
| Horton | No | No | No | X |

### Table 21: Significant Difference between Sites for Lead with Effect Size for Fabric Samples

| **Pb** | Verwood | Alderholt | Laverstock | Horton |
|---|---|---|---|---|
| Verwood | X | N/A | N/A | N/A |
| Alderholt | No | X | 50% | N/A |
| Laverstock | No | Yes | X | N/A |
| Horton | No | No | No | X |

### Table 22: Significant Difference between Sites for Rubidium with Effect Size for Fabric Samples

| **Rb** | Verwood | Alderholt | Laverstock | Horton |
|---|---|---|---|---|
| Verwood | X | N/A | N/A | 57% |
| Alderholt | No | X | N/A | 29% |
| Laverstock | No | No | X | 80% |
| Horton | Yes | Yes | Yes | X |

### Table 23: Significant Difference between Sites for Silica with Effect Size for Fabric Samples

| **Si** | Verwood | Alderholt | Laverstock | Horton |
|---|---|---|---|---|
| Verwood | X | N/A | N/A | N/A |
| Alderholt | No | X | N/A | N/A |
| Laverstock | No | No | X | N/A |
| Horton | No | No | No | X |

**Table 24: Significant Difference between Sites for Strontium with Effect Size for Fabric Samples**

| **Sr** | Verwood | Alderholt | Laverstock | Horton |
|---|---|---|---|---|
| Verwood | X | N/A | N/A | 47% |
| Alderholt | No | X | N/A | N/A |
| Laverstock | No | No | X | N/A |
| Horton | Yes | No | No | X |

**Table 25: Significant Difference between Sites for Zinc with Effect Size for Fabric Samples**

| **Zn** | Verwood | Alderholt | Laverstock | Horton |
|---|---|---|---|---|
| Verwood | X | N/A | 42% | N/A |
| Alderholt | No | X | N/A | 47% |
| Laverstock | Yes | No | X | 59% |
| Horton | No | Yes | Yes | X |

**Table 26: Significant Difference between Sites for Zirconium with Effect Size for Fabric Samples**

| **Zr** | Verwood | Alderholt | Laverstock | Horton |
|---|---|---|---|---|
| Verwood | X | N/A | N/A | N/A |
| Alderholt | No | X | N/A | N/A |
| Laverstock | No | No | X | N/A |
| Horton | No | No | No | X |

Tables 13-26 show that no single element provides a clear separation between all production sites, thus a bulk chemical analysis - the consideration of multiple elements - is the correct way of identifying elemental compositional variation between these different production centres. Iron is the best discriminant by site, having effect sizes of over 40% for five different tests. Horton differs from others in terms of barium, rubidium, zinc, iron and potassium; for these, all differences are shown to have an effect size of over 25%. Laverstock varies from other sites, with calcium presenting a 99% effect size against Verwood, and 98% against Alderholt and Horton; aluminium also holds promise, possessing an effect size of upwards of 50%. Verwood samples evidence variation in terms of the presence of niobium, possessing effect sizes of up to 73% when compared with Laverstock, which decreases to 52% against Horton samples. Chromium, phosphorus and silica can be shown to display no significant difference at an alpha level of 0.01; however, difference was evident at the 0.05 alpha level. The ‘ability’ of each element to affect the difference between sites in the pilot study data can be ranked, as in Table 27. This shows that the five elements which appear to be influencing the difference between the pilot study data are iron – potentially present in both clay and sand - calcium, aluminium - most likely derived from the clays - barium and potassium.

**Table 27: Elements Ranked by Effect Size Based on U-Test Results**

| Elements discriminant 'ability' by rank | Element Symbol | Element Name- | Effect present in number of tests | Effect Size Range |
|---|---|---|---|---|
| 1 | Fe | Iron | 5 | 44-83% |
| 2 | Ca | Calcium | 4 | 61-99% |
| 3 | Al | Aluminium | 4 | 9-58% |
| 4 | Ba | Barium | 3 | 41-75% |
| 5 | K | Potassium | 3 | 46-64% |
| 6 | Nb | Niobium | 3 | 52-73% |
| 7 | Zn | Zinc | 3 | 42-59% |
| 8 | Cr | Chromium | 1 | 42% |
| 9 | Pb | Lead | 1 | 50% |
| 10 | Sr | Strontium | 1 | 47% |
| 11 | P | Phosphorus | 0 | 0% |
| 12 | Si | Silica | 0 | 0% |
| 13 | Zr | Zirconium | 0 | 0% |

The statistical analyses have identified the degree of mathematical difference between the elemental composition of products from four kiln sites sampled for the pilot test. Furthermore, an effect size for each variable has been produced. While these elements can be shown to discriminate between production sites, it is recognised that those with a significant effect size can be influenced by post-depositional change. This is outlined in detail in Chapter 4 (section 4.7), where the results of the pilot study are evaluated against the potential for post depositional change.

These initial observations were vital in refining the chemical analysis used to address the research questions.

### *3.5.1. Chosen Methodology for Chemical Analysis*

While chemical difference can be recognised at the level used for the pilot study – using a single analysis for each of the 30 sherds, with each filter lasting for 30 seconds - it was recognised that the quality of the results could be improved upon, thus achieving greater clarity between known ceramic source groups. Increased definition would prove advantageous when it comes to comparing samples from unknown or uncertain sources to those of known origin using pXRF for chemical analysis. To accomplish this, the number of samples was increased to 50 for each production site forming the control group, thus providing a broader range of the elemental compositional variability present within the group; the aim being to achieve greater clarity when comparing ware types from consumption sites and identifying potential provenance for those samples. This can be augmented by the addition of clay samples secured from potential clays thought to be extracted for pottery production across the study region. This was particularly effective in examining provenance and raw material examinations of pottery from an excavated kiln at San Giusto, Lucera (Gliozzo *et al.* 2005), and Torksey, Lincolnshire (Perry 2016), along with examinations of variability and provenance of Minoan pottery (Hein *et al.* 2004). Once recovered, all raw clay samples were individually lightly levigated in distilled water, using a small bucket with large coarse components being removed by hand (<50mm in size). Subsequently, the clays were formed into small rectangular blocks within a wooden mould to ensure the size of each was 3x1.5x1.5cm. This was done to fill the sample window of the pXRF and to meet similar dimensions of the selected pottery samples. These blocks were fired simultaneously, using an electric kiln rising to a temperature of 1000ºC over a 24-hour firing schedule, with a 100ºC/hr heating ratio. This temperature is considered the uppermost limits of certain firings for Verwood-type pottery (Algar *et al.* 1987, p.16), and is be confirmed by visual inspection of the pottery in that only well fired examples do not display the highly vitrified surfaces seen in stonewares, which are fired to temperatures exceeding 1000ºC. Orton Cone 06 was used during firing to ensure the required temperature was reached.

Furthermore, the sampling time for each filter using the pXRF was increased to 60 seconds with the intention of increasing the potential accuracy of the readings, thus aligning the method with Goren *et al*.'s (2012) highly successful study on ceramic cuneiform tablets. The increased analysis time is considered to provide a more effective means of providing sherd characterisation at the chemical level. Sadly, this level of detail is rarely provided within published research articles on studies employing pXRF as a method for examining the chemical composition of archaeological ceramics (*e.g.* Davey *et al.* 2013; Forster *et al.* 2011). Additionally, ensuring that sherds share similar characteristics - being a minimum of 0.5cm wide and over 3cm in length (depth in Plate 2-4), which is imperative, with the aim being to guarantee that there is sufficient depth of sample to be measured, which has previously caused issues (Johnson 2014, p.563). All samples are to be washed in deionised water, and left to dry for seven days to limit the effect of differential moisture content affecting the results of given samples, prior to being presented for analysis; this ensures the cleanliness of all measured surfaces. Furthermore, three measurements will be taken at different points along an existing break, rather than one single scan as in the pilot study; subsequently, the median value would be taken, as suggested by Holmqvist (2016, pp.366-7), to successfully characterise a given sherd. It is hoped that this will limit any outliers in the dataset created by scanning the sherd only once, with the result being augmented by the presence of an excessive, or low, reading for a given element, which might be skewed by a large inclusion. Each sample was placed in a lead lined test stand to comply with health and safety requirements (Plates 2-4).

**Plates 2 to 4: Niton XL3t GOLDD+ in test stand, with samples ready for analysis (Author's Own).**

# 4. The Origins of Verwood-Type Pottery

The methodology highlights that the decision regarding the selection of samples is crucial to any study examining provenance. The use of a control group - a collection constructed from sherds that may be geographically tied to postulated and ideally proven pottery production sites and used for comparison - is of key importance in identifying potential provenance of a given sample. To select appropriate examples, it is necessary to outline the existing evidence for a late medieval or early post-medieval east Dorset pottery industry in order to successfully determine those most relevant.

The identification of potential 'early' Verwood-type pottery – of 14-16th century date - is not a new phenomenon. The work of three archaeological ceramic researchers has been pivotal in identifying its occurrence across southern Britain. The first of these is Dr Andy Russel, who has highlighted the existence of a 16-17th century component to Verwood-type pottery production, identifiable within the Southampton pottery assemblage (Platt and Coleman-Smith 1975). Dr Russel has witnessed this in Southampton's hinterland (*e.g.* Romsey - Russel and McDonald 2012; Verwood – Garner 2016).

The second researcher, Lorraine Mepham, has noted a potential 15-16th century Verwood product in the Salisbury area; termed 'early Verwood' (Mepham 2000; 2016). The third comprises Duncan Brown (2002, p.16), whose work on the medieval and late medieval pottery of Southampton suggested that east Dorset medieval pottery production is reflected in one ware type - Dorset Quartz-rich Sandy ware (DOQS). This ware group appears to have two sub-variants - a slip decorated one, known as Dorset Red Painted ware (Plate 5), and one scratchmarked - both occurring alongside vessels in similar fabrics displaying no surface treatment. Brown (2002, p.16) suggests the source for DOQS to be located on the western side of the New Forest on the Dorset Hampshire border. Elsewhere, this ware has been noted as Wessex Coarseware (*e.g.* Christchurch - Jarvis 1983, and Romsey - Jervis 2012). Further associations between this ware group and Verwood-type pottery are implied through the interchangeable usage of both terms for post-medieval east Dorset wares in Poole (*e.g.* "Wessex coarsewares: Verwood-type" – Barton *et al.*1992).

A robust visual description of the Wessex Coarseware fabric type is provided by Mepham (2018, p.17), who succinctly notes that:

> *"The main characteristic of this coarseware tradition is the use of a quartz-rich fabric, often pale firing in oxidised examples, in which few other inclusions are macroscopically visible."*

**Plate 5: A sherd of Dorset Red Painted ware, from Wimborne All Hallows, Dorset (Author's Own)**

**Plate 6: Scratchmarked Wessex Coarseware jars/cookpots from the Laverstock kiln assemblage (Author's Own)**

### *4.1. Wessex Coarseware*

The homogenous nature of Wessex Coarseware - defined by the predominant presence of quartz inclusions - is ubiquitous across the region; this has limited the ability of investigators to attribute it to specific production centres. Further elucidation would allow an increased understanding of the development of the origins of the Verwood pottery industry, which is significant in understanding the late medieval ceramic market of central southern Britain.

The term 'Wessex Coarseware' was coined by Thomson, Barton and Jarvis (1983, pp.53-5), in reference to a fabric that encompasses an extensive time period; from the Saxo-Norman period to at least the 14th century. These individuals are the first to suggest that the Verwood area is one of the many locations where these vessels were manufactured; this ware has been identified within 10-11th century deposits at Old Sarum (Stone and Charlton 1935) and nearby Wilton (De'Athe 2012). The concentration of Wessex Coarsewares lies across east Dorset and western Hampshire, while its occurrence extends eastwards to Basingstoke (Jervis 2011a). Conversely, the distribution of Spoerry's (1989) ware type C1, which corresponds with Wessex Coarseware, covers a similar extension west. The centre of this distribution spans southern Wiltshire, moving south through the western fringe of the New Forest and east Dorset, and continuing south towards Poole Harbour. Spoerry (1989, p.14) suggested that these wares have at least three sources; Laverstock (Wiltshire), Poole (Dorset), and Southampton (Hampshire), with additional production centres assumed likely by other researchers, including Jervis (2011a, p.138). Currently, only two production centres, Laverstock (Musty *et al.* 1969) and Wareham (Milward 2017), can be conclusively proved to be producing coarseware fabrics matching Wessex Coarsewares.

### *4.1.1. Laverstock*

The excavation at Laverstock was undertaken between 1958-63; this identified 15 pits, eight kilns and three buildings (Fig. 16). The kilns ranged in size from four to seven metres, with the majority possessing opposing fireboxes correlating with Musty's (1974) Type 2a kiln typology. The local marl has been suggested as unlikely to be suitable for the creation of Laverstock pottery; instead, the nearby source of Reading clay at Alderbury and the Clarendon ridge (c.2km to the southeast) is considered more likely, with the inclusion of London clay also suggested in certain vessels (Musty *et al.* 1969, p.85). The excavations at Laverstock revealed that unglazed coarseware cooking pots and bowls, some scratchmarked, were created alongside glazed jars, pipkins, cauldrons, skillets, bowls and dishes, which were fired within the same kilns as fineware glazed jugs, money boxes and lamps. Fine- and coarse-ware variants were the two fabric types predominantly produced at this location, with apparent differences between the two, evidenced both on the production site itself, and on nearby consumption sites (*e.g.* Mepham 2005). The finewares have been referred to as E420 and E421, and E422a, E422b, E422c by Wessex Archaeology, dependant on the size and nature of the quartz inclusions, which relate to technical development. Indeed, it has been noted that the "division is somewhat arbitrary, but could have chronological implications" (Mepham 2001, p.89).

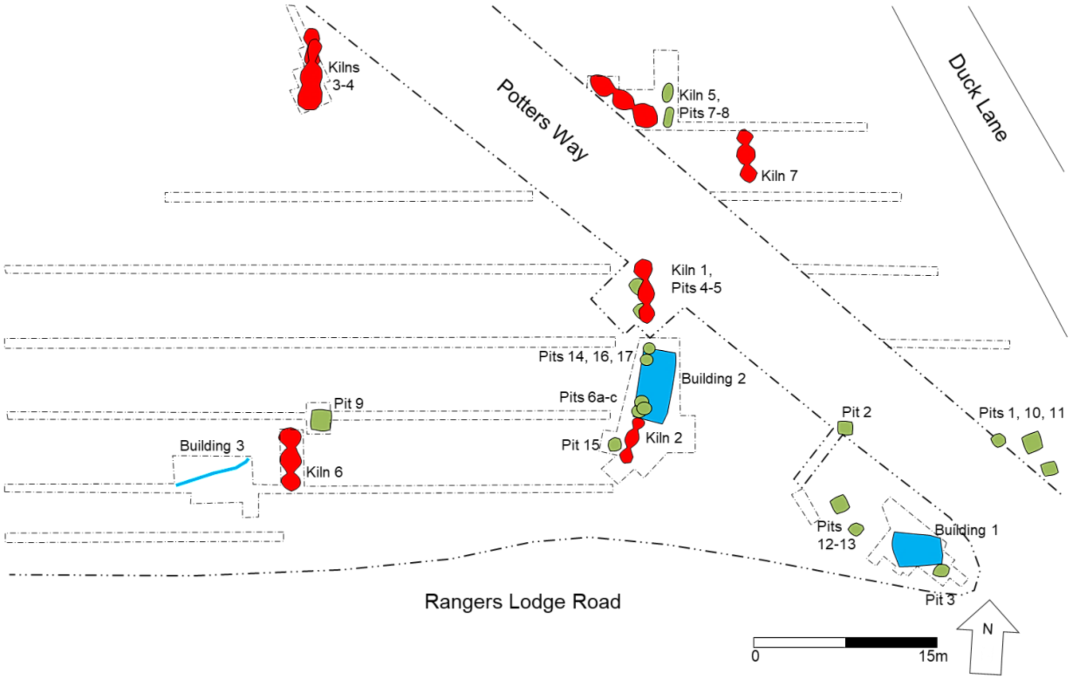
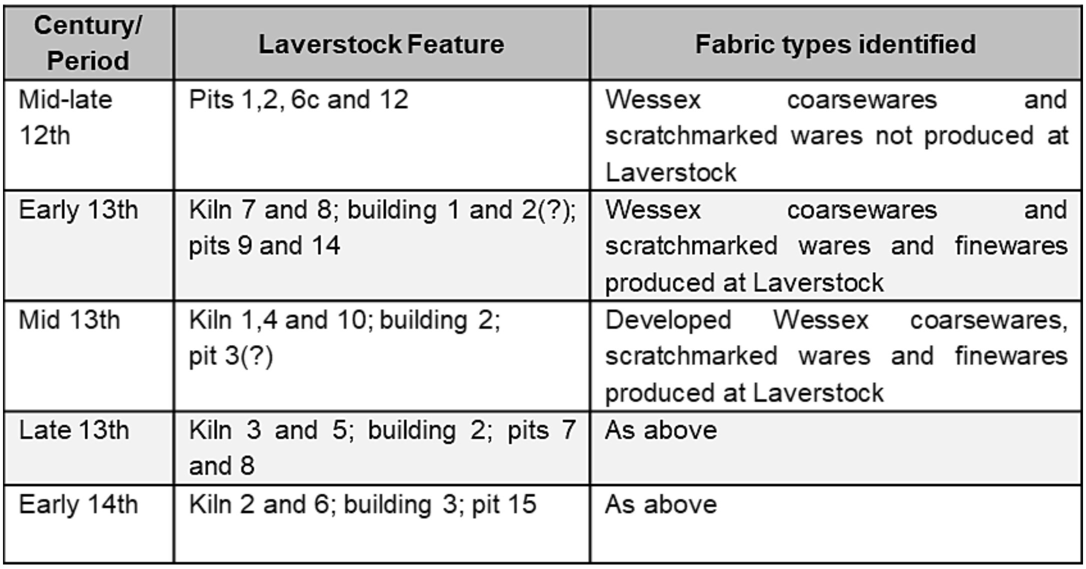


**Fig. 16: Plan of the Laverstock site (re-drawn from Musty *et al.* 1969, Fig. 2). Kilns shown in red, pits in green and buildings in blue**

Laverstock pottery, especially the fineware jugs/pitchers, appear to be particularly sought after and were considered a desirable commodity. Le Patourel (1968, p.120) notes that large orders were transported between 1267 and 1270. In 1270, the transportation of 1000 Laverstock pitchers 20 miles to Winchester, likely for the royal household, was priced at 25s (Le Patourel 1968, p.120).

Four of the kilns at Laverstock could be dated archaeomagnetically to AD1230-75. The dating of this site has since been revised, with the latter being adhered to (Table 28).

**Table 28: Timeline and Phasing for Laverstock Pottery Production Site (after Musty *et al.* in Saunders 2001, pp.138-9)**



| Century/ Period | Laverstock Feature | Fabric types identified |
|---|---|---|
| Mid-late 12th | Pits 1,2, 6c and 12 | Wessex coarsewares and scratchmarked wares not produced at Laverstock |
| Early 13th | Kiln 7 and 8; building 1 and 2(?); pits 9 and 14 | Wessex coarsewares and scratchmarked wares and finewares produced at Laverstock |
| Mid 13th | Kiln 1,4 and 10; building 2; pit 3(?) | Developed Wessex coarsewares, scratchmarked wares and finewares produced at Laverstock |
| Late 13th | Kiln 3 and 5; building 2; pits 7 and 8 | As above |
| Early 14th | Kiln 2 and 6; building 3; pit 15 | As above |

This revised chronology highlights an existing problem in the ceramic sequence for the region. Mepham (2018, p.25) notes:

> *"…the ceramic sequence from the 13th century onwards, at least in the Salisbury area, remains imperfectly understood, and a review of the kiln material is urgently required in order to address this…It is only when regional wares… appear in Salisbury from the mid-14th century onwards, that possible local products of the period can be dated by association."*

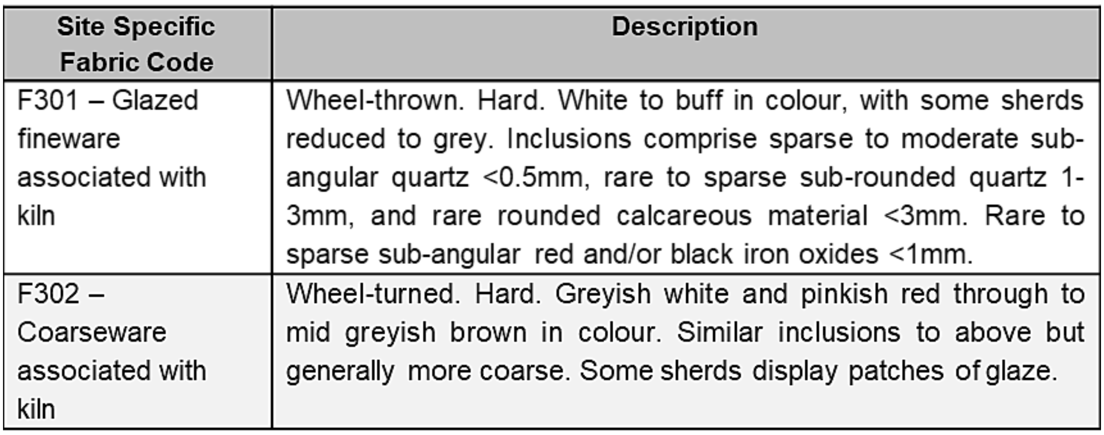
Similarly, this applies to the assemblage recovered from Poole (Horsey 1992). Here, the presence of imported finewares was used to corroborate the postulated dates of deposits, thus the coarsewares recovered (*e,g,* Pit F61 on site PM9). This level of uncertainty is mirrored in the medieval to early post-medieval ceramic sequences of other urban centres in the region, including Wimborne, Dorchester and Wareham.

### *4.1.2. Wareham*

The second production site known to be producing this type of quartz-rich pottery lies in Wareham, Dorset. This site was identified in 2015 during the monitoring of groundworks for retirement homes (Milward 2017). The site lies within the Anglo-Saxon walled town, between West Street and Pound Lane. Here, part of a pottery kiln was identified on the northeast side of the infilled castle ditch, and was recorded as Structure 3 (Milward 2017, p.100). Structure 3 continued into the baulk section, extending beyond the limit of excavation, thus approximately half of the feature occurred within the excavated area. The feature was over three metres in length and approximately one metre in width; following disuse, the heathstone and clay structure was infilled with pottery waste (wasters) and demolition material. The material in the kiln is likely to derive from either the kiln that was infilled, or an adjacent one as it is unlikely pottery waste would travel far. Either way, the infilling material certainly post-dates the creation of the kiln and such a concentration of wasters within a kiln leads to the hypothesis that they are associated with each other (McCarthy and Brooks 1988, p.46).

The pottery was initially examined by Paul Blinkhorn, who identified two fabrics associated with the kiln; this mirrors Laverstock, where there was coarse- and fine-ware production (Table 29).

**Table 29: Descriptions of Fabrics Associated with Wareham Kiln (after Blinkhorn 2019)**



| Site Specific Fabric Code | Description |
|---|---|
| F301 – Glazed fineware associated with kiln | Wheel-thrown. Hard. White to buff in colour, with some sherds reduced to grey. Inclusions comprise sparse to moderate sub-angular quartz <0.5mm, rare to sparse sub-rounded quartz 1-3mm, and rare rounded calcareous material <3mm. Rare to sparse sub-angular red and/or black iron oxides <1mm. |
| F302 – Coarseware associated with kiln | Wheel-turned. Hard. Greyish white and pinkish red through to mid greyish brown in colour. Similar inclusions to above but generally more coarse. Some sherds display patches of glaze. |

Therefore, Wareham can be shown to be one of many centres producing both a fineware, Dorset Whiteware and a coarseware – Dorset Quartz-rich Sandy ware, as termed by Brown (2002, pp.16-17), or Wessex Coarseware.

In summary, it may be said that fineware production, as it is currently understood, across the study area appears to be limited to the two urban centres of Wareham and Salisbury (Mepham 2018, p.24), with an uncertain origin for Dorset Red Painted wares. The creation of coarsewares however, remains poorly understood and ill-defined. The situation is summarised in Table 30, with visual examples of each presented in plates 7-14.

### Table 30: Summary of Pre-17th Century Pottery Ware Groups Outlined in this Chapter

| Fabric group name | Date (cent. AD) | Fabric Description | Associated with/similar to | Known production sites | Distribution |
|---|---|---|---|---|---|
| Wessex Coarsewares (WCW)/ Developed Wessex Coarsewares (DWCW) | 11-14th | Handmade, wheelturned, and some wheelthrown (probably has chronological implications), well-sorted, coarse through to fine sub-angular to rounded quartz, occasionally with iron oxide inclusions. Colours range from black to buff-pink. A developed Wessex coarseware variant is apparent which is similar to the standard, but contains medium to fine quartz – probably a refinement. | Laverstock coarseware, scratchwares, developed scratchwares, developed Wessex coarsewares, Dorset quartz-rich sandy ware. Wessex established pottery type fabrics no. E422a-c. | Laverstock (Musty et al. 1969)<br>Wareham (Milward 2017) | Ubiquitous across Wessex. |
| Dorset Red-Painted ware (DRPW) | 12-13th? | Handmade with some wheelturned examples, well-sorted, medium to fine grained sub-angular to rounded quartz, occasionally with iron oxide inclusions. Usually pink, buff or grey with near vertical lines of mid-red to brown stripes running down the vessels. | Subgroup of Wessex Coarsewares – and possibly a fineware variant. | None with certainty – Christchurch/Poole assumed (Jervis 2011a, Fig. 3A). | Poole Harbour, east Dorset, Shaftesbury, Gillingham, west Hampshire, Southampton (Jervis 2011a, Fig. 3A). |
| Laverstock Fineware (LAVF) | 13-14th | Few handmade examples, generally either wheelturned or wheelthrown. Fine sandy fabric, dominated by sub-angular to rounded quartz, occasionally with iron oxide inclusions. Colours range from black to buff-pink. | Wessex established pottery type fabrics no. E420a-b, E421a-c. Fineware of Salisbury area creation. Associated with sites in Salisbury and Clarendon area. | Laverstock, Salisbury (Algar and Saunders 2014), Clarendon (Mepham In Prep) | Widespread across much of southern Britain - see Mepham (2018). |
| Dorset Whiteware (DWW) | 13-14th | Usually wheelturned or wheelthrown. Well-sorted fine quartz. Usually white to pink in colour. | Fineware created in Poole Harbour area. Recorded at Poole as Fabrics 4 and 5 (Horsey 1992; Watkins 1994), at Southampton as Dorset Whiteware. | Wareham | Widespread across much of southern Britain especially extending along the coast (Jervis 2011a, Fig. 3C). |
| Early Verwood (EVER) | 15-16th | Wheelthrown. Medium to fine grained sub-angular to sub-rounded quartz, very rarely with angular flint. Often exhibiting a pitted glaze. Pink, buff, mid-red to grey. | Visually similar to certain Transitional Sandy ware examples and Laverstock fineware. | Either east Dorset or Salisbury area | See Chapter 10 |
| Verwood-type 16/17th variant (VERE) | 16-17th | Wheelthrown, medium to fine grained sub-angular to sub-rounded quartz, occasional iron oxides, rarely with small angular flint. Mid-red to pink in colour, relatively soft and poorly fired. Glaze is often yellow to clear, occasionally poorly vitrified. | Early Variant of the standard Verwood pottery fabric. | Assumed east Dorset | See Chapter 10 |

Plate 7: Laverstock Fineware from Wilton (Sample WIL5; Author's Own)

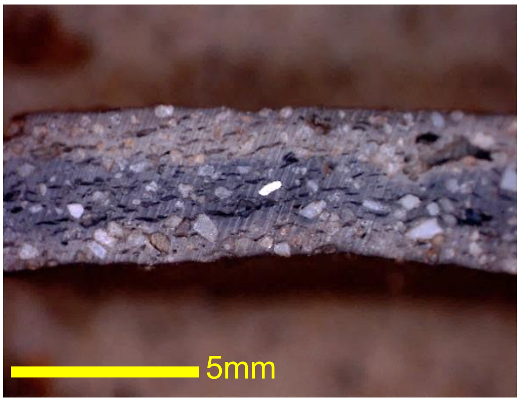


Plate 8: Wessex Coarseware from Wareham (Sample PLC30; Author's Own)

Plate 9: Dorset Whiteware from Wareham (Sample PLF9; Author's

Plate 10: Developed Wessex Coarseware from Wimborne (Sample WIM1; Author's Own)

Plate 11: Dorset Red Painted Ware from Shaftesbury (Sample SHA5; Author's Own)

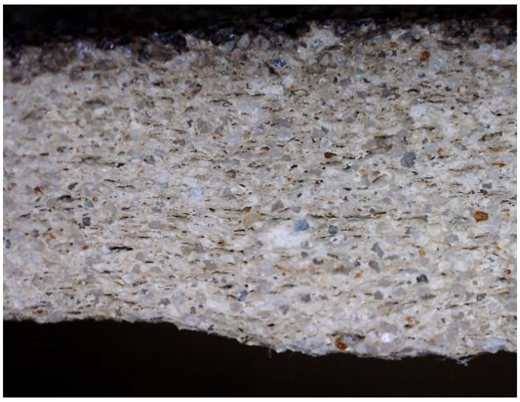


Plate 12: Early Verwood from Fordingbridge (Sample FOR1; Author's Own)

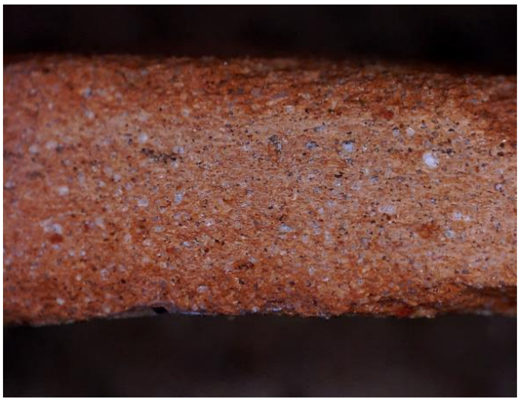


Plate 13: Verwood-type (early variant) from Gillingham (Sample GIL8; Author's Own)

Plate 14: Verwood-type from Crossroads, Verwood (Sample VER3-6; Author's Own)

## 4.2. *The Implications of Previous Chemical Analyses on Defining an Early Verwood-Type Pottery Industry*

Macroscopic examinations and explorations of vessel typologies alone have not elucidated matters. This was recognised by Spoerry (1989), who attempted to define potential production centres within the several fabric groups recovered across Dorset, including the Wessex Coarseware group (his fabric C1). Instead, chemical analysis was used via a control group constructed using wasters from known production sites (*e.g.* Laverstock), along with 15 post-medieval Verwood-type sherds from Horton Kiln 2, 15 from Alderholt Kiln 10 (Algar *et al.* 1987) and 15 from East Holme - a postulated location for south Dorset post-medieval pottery production (Terry 1988). Additionally, 17 samples from medieval pottery production waste from Southampton were also included (SOU105 - Webster and Cherry 1972). These were compared to C1 samples from consumption sites in Poole, Wimborne, Wareham and Christchurch, Dorset and Southampton, Hampshire.

Spoerry (1989) utilised AAS (Chapter 3) to measure the concentrations of four elements - iron (Fe), magnesium (Mg), nickel (Ni) and aluminium (Al). These were selected following a pilot study examining concentrations of 11 elements, with potassium, titanium and the four selected elements highlighted as the most effective discriminators between Hermitage and Laverstock pottery. Spoerry's analysis of Wessex Coarseware showed that Southampton, Poole and Laverstock samples could be discerned using a discriminant function analysis (Spoerry 1989, Fig. 5.89; Fig. 17).

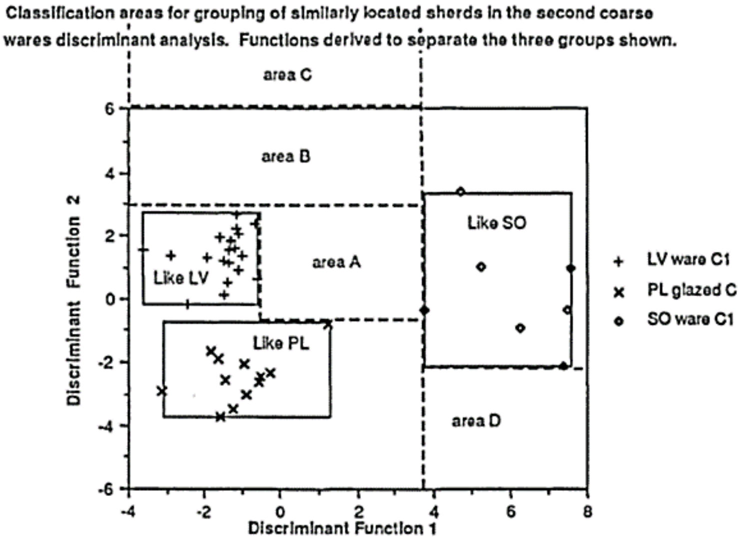

Classification areas for grouping of similarly located sherds in the second coarse wares discriminant analysis. Functions derived to separate the three groups shown.

**Fig. 17: Spoerry's (1989) Fig. 5.89 showing groupings based on the chemical analysis of certain C1 examples using his Discriminant Function Analysis functions 1 and 2 (LV-Laverstock, PL-Poole, SO-Southampton)**

In contrast, a group comprising East Holme, Alderholt and Laverstock coarseware cannot be differentiated. Fig. 18 highlights that it may be difficult to chemically define any medieval and post-medieval sources to either a Laverstock or Alderholt provenance, thus defining the origins of the Verwood-type pottery industry in this way could prove very difficult.

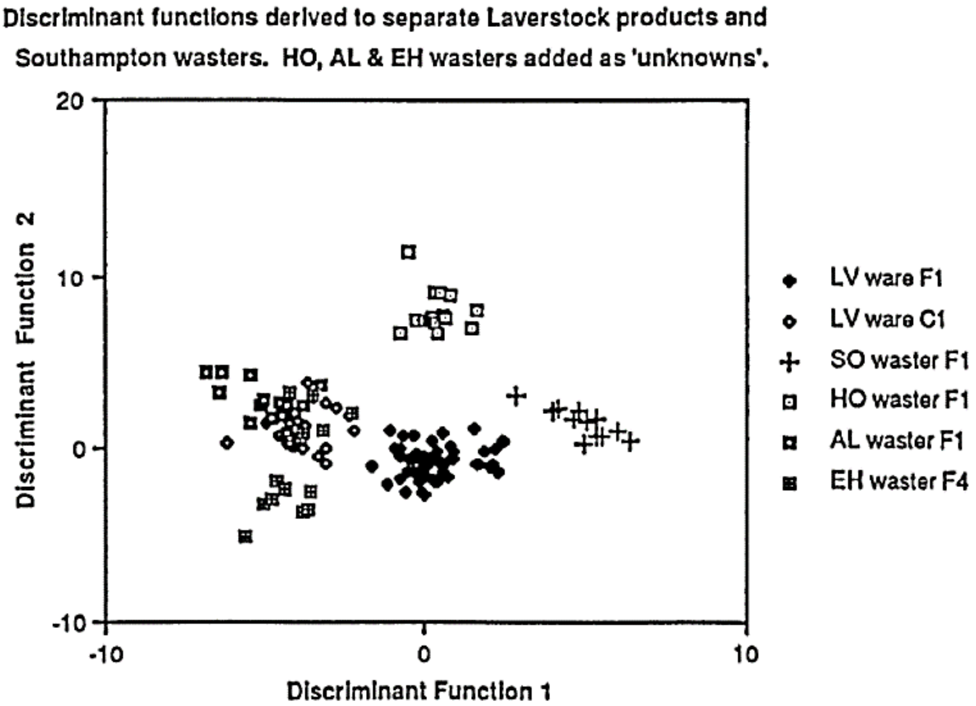


**Fig. 18: Discriminant Function Analysis plot of functions 1 and 2 taken from Spoerry (1989, Fig.5.88) showing that medieval Laverstock coarseware (LV C1) shares a chemical fingerprint with post-medieval Verwood-type pottery wasters from Alderholt (AL), and similar wares from East Holme (EH). Laverstock finewares (LV F1), Verwood-type from Horton (HO) and Southampton finewares (SO) can be shown to be chemically distinct**

To ensure the chemical analysis correctly addresses the origins of the Verwood-type pottery industry, the sample selection will be guided by current evidence, which first needs to be reviewed.

## *4.3. Past Arguments for 14-16th Century Pottery Production within the Study Area*

### *4.3.1. Alderholt*

One initial argument proposed for the earliest date of pottery production, or areas producing early Verwood-type pottery, was by Sims (1969, p.2). He stated that the Cranborne Provosts Accounts (Cecil Papers held by HH) list an illegible sum of money for clay digging at Alderholt in 1317-18. However, there is no mention as to purpose, thus this cannot be irrefutably proven to relate to pottery production, as clay is used for tile and cob building manufacture, or brick manufacture, although less likely at this date. The clearest evidence related to pottery production is that proposed by Algar *et al.* (1979, p.20), who state that for 1337: “the tenants of Alderholt are listed as having paid 14 shillings for the digging of clay to make pots”; this provides a plausible explanation for the previous reference to clay digging. An earlier reference supplied by Le Patourel (1968, p.123) pertaining to Damerham, dated 1260, has been disregarded as being of insufficient quality, as this relates to a personal name. Le Patourel (1968, p.117) notes that by the 13th century in certain areas, surnames are no longer an adequate indication for working potters.

Due to the 1337 reference, it has been suggested that sites ALD8 and ALD10 (Fig. 19), which lie on the northern side of Alderholt, an area historically considered to be common land (A. Light pers comm), have potential to date from the 1400s (Algar *et al.* 1987, p.21). Both were enclosed prior to 1605 as the land plots appear on the Norden Terrier (Fig. 20) and have large scatters of post-medieval wasters associated with them. ALD8 - part of Salisbury Arms Farm - has already experienced substantial damage, although a watching brief was undertaken here in the 1980s, during the construction of a barn, with recording undertaken by the VDPT (ALD8 - Chapter 9). The results have never been published, with records deposited with MED (awaiting accession number). This watching brief both confirmed the presence of a kiln within the mound adjacent to the new barn, but also recovered Verwood-type pottery from stratified contexts, which were used for analysis.

Currently, dense woodland covers the location within the heart of the former enclosed space of both the barn and the Salisbury Arms Farmhouse, allowing little space to undertake any field survey here. However, ALD10 was being re-developed in 2016-17 and permission was gained from the landowner, to examine the land surrounding the potential pottery production site.

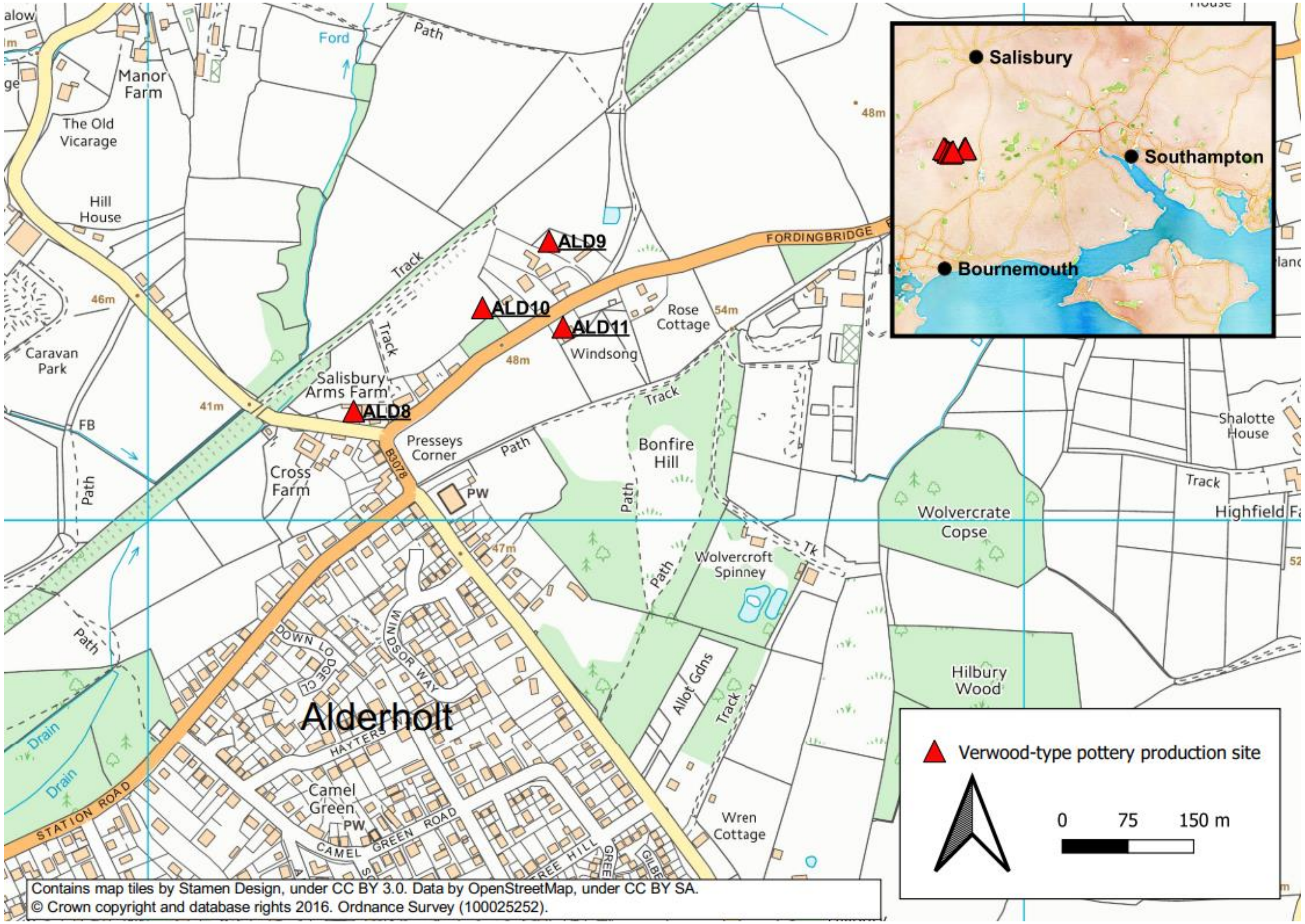


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**Fig. 19: Location of Verwood-type pottery production sites in Alderholt**

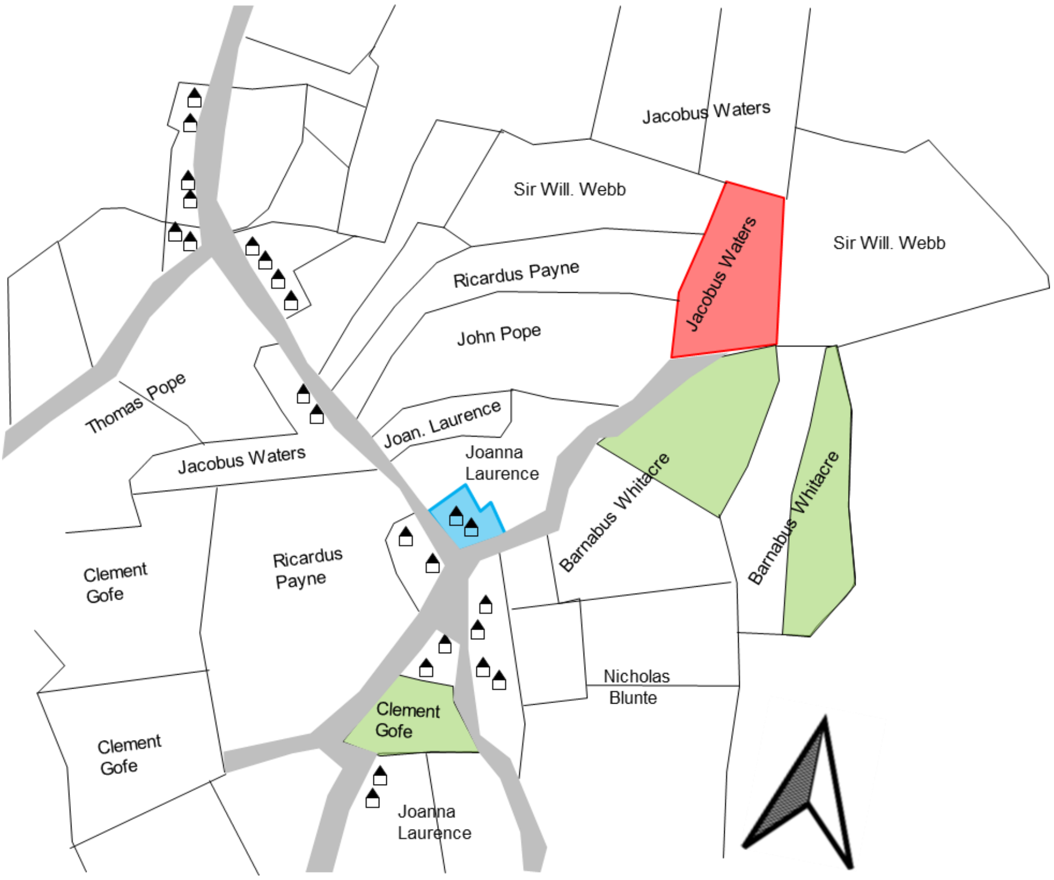

**Fig. 20: Re-drawn from an extract of a photocopy of Norden's Cranborne Map dated 1605; blue denotes position of ALD8; red area denotes approximate position of ALD9 and 10, green denotes woodland as shown on map as shown in Fig. 18 (Photocopy held by MED in Copland-Griffiths collection)**

Initially, a magnetic susceptibility survey (Fig. 21) was undertaken to gain an understanding of the nature of the magnetism across the area; this suggested enhanced magnetism stemming from past human interaction was most prolific in the south-eastern corner of the area. Magnetometry was undertaken to determine whether the magnetism related to any identifiable archaeological features (Fig. 22). This survey confirmed the enhanced magnetism could be tied to potential archaeological features, whilst presenting numerous magnetic anomalies which show the nature of the enclosure and potential archaeological features lying within it; these are outlined in detail within the relevant geophysical survey report (Appendix V). Collectively, these anomalies suggest that wasters (present on the surface) were spread over a formerly enclosed area. Additional anomalies have limited potential to relate to a former structure with an associated potential hearth. To aid interpretation of the magnetometry, an earth resistance survey was completed (Fig. 23); the results largely support the magnetometry. While no clear potential kiln anomaly was identified, there are additional areas in the vicinity that were not able to be surveyed, which may prove to be the location of the kiln associated with the ALD10 pottery waste. Historical documentation indicates that ALD11, lying adjacent to ALD10, was in use from the 18th century; there is no indication to discount an earlier date of construction and use, presenting an additional hypothesis for the origin of the wasters identified at ALD10, which may actually derive from ALD11. To further complicate matters, the waste could derive from an additional kiln at ALD9, lying some 150m to the northeast. Historical documentation provides a degree of certainty for a start date of production, as the site was enclosed in 1602 by John Attwater, with the first mention of potting being undertaken relating to his son Thomas from the 1620s (Algar *et al.* 1987, pp.22-3).

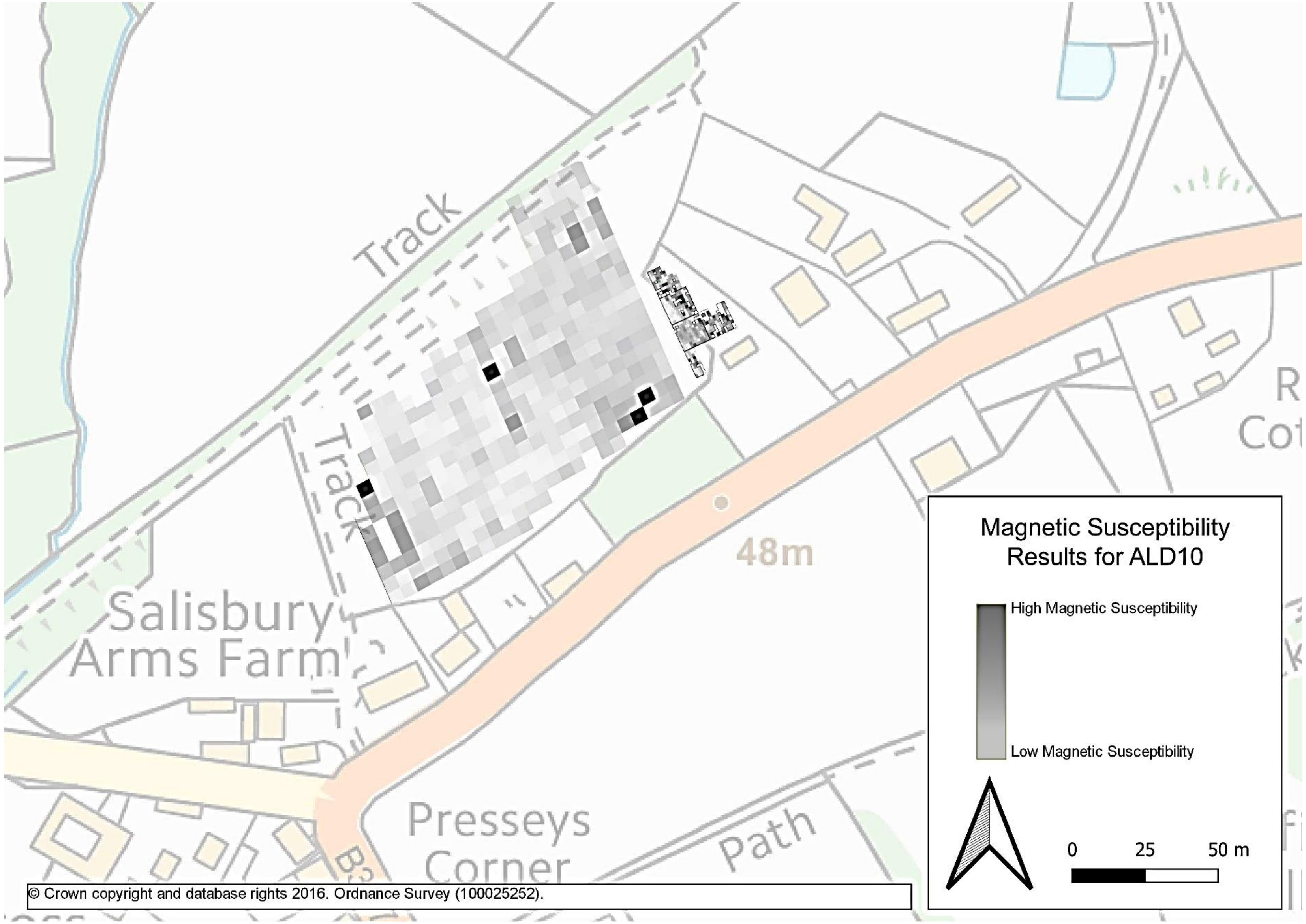

Fig. 21: Magnetic susceptibility results for ALD10

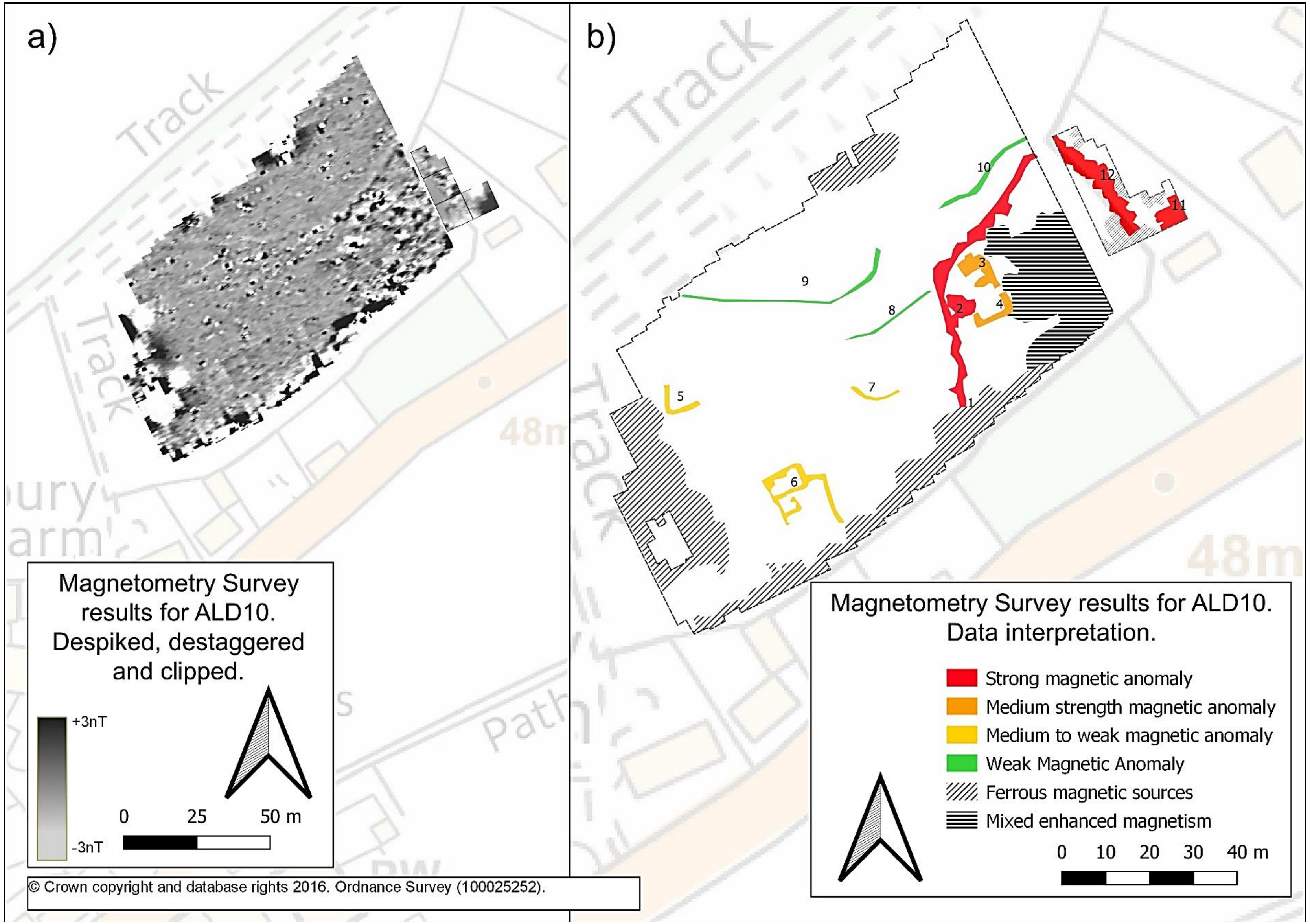

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Fig. 22: Results of magnetometry survey for ALD10

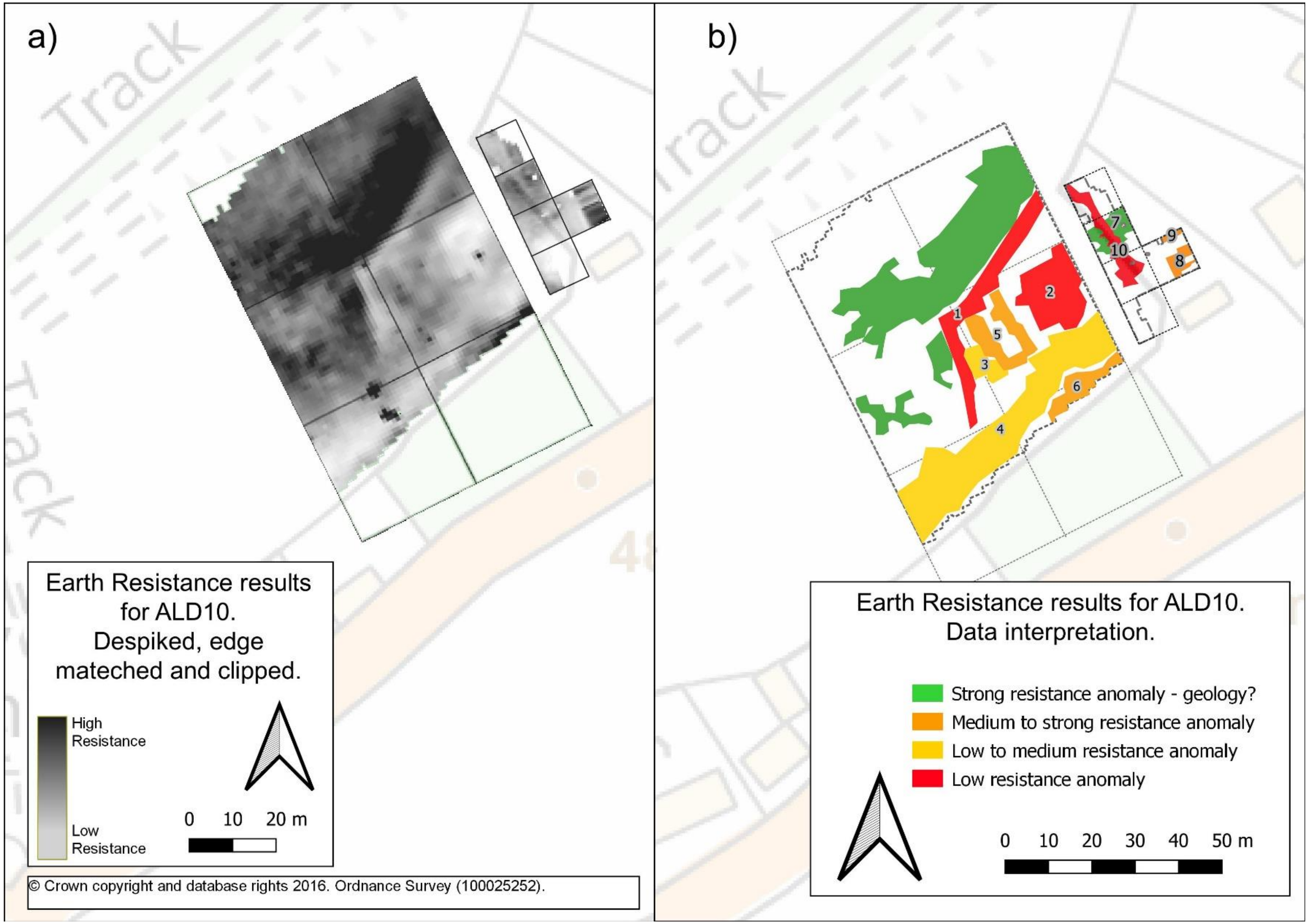

Fig. 23: Results of earth resistance survey for ALD10

The issue of having multiple kiln sites in close proximity - all producing pottery exhibiting limited change over the period 1600-1800 (Chapter 7) - results in a high degree of uncertainty relating to early post-medieval pottery production on the northeast fringe of Alderholt. Consequently, identifying early post-medieval production sites here is particularly difficult.

### *4.3.2. Crendell*

Additional arguments concern the village of Crendell, within the parish of Alderholt. The place name can be linked with historic ceramic manufacture as the old English word '*crundell'* refers to quarrying (Mills 2008, p.35). The Norden Terrier, reveals that in 1605 the area is termed '*Crundole*'. The presence of good potting clays means that the area would be used for clay extraction until the early 20th century; in total, a period of over 400 years of material extraction has taken place here. This is corroborated by Algar *et al.* (1987, p.23) drawing on historical documentation that states "…*by 1500, clay was being carried by horse and cart from Crendell Common…".*

Sims (1969, p.23) thoroughly outlined an argument for early post-medieval potting here. It could be surmised that production extended further back into the late medieval period. The argument centres on the Norden Terrier, which provides the earliest indication of potters clay extraction with "*pitts of potters clay"* being displayed on the common, and two tenements shown with two buildings, rather than one, as is the case for most tenements (Fig. 24); although the possibility that one of these buildings represents a workshop or drying shed cannot be readily confirmed. Access for geophysical survey was applied for at these locations, but was denied. The north-eastern-most plot (Fig. 24 – blue) especially holds high potential as the site is held by an Eliza Thorn; the 'Thorne' family have an extended history of potting, with individuals such as James Thorne later being active within the industry during the 19th century.

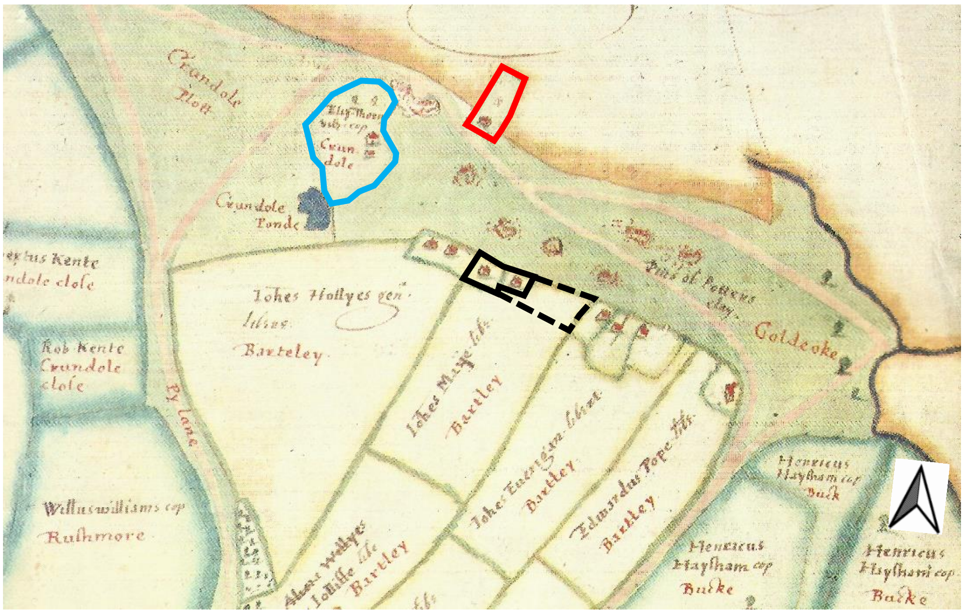

**Fig. 24: Extract of the Norden Terrier (1605), showing Crendell (taken from the cover of Algar *et al.* 1987); showing Eliza Thorn's tenement – blue, and an assortment from the common - red**

Furthermore, the size of "*Crundole Ponde*" is comparable with another potential clay pit lying in the northern extent of Eliza Thorn's enclosure. Additional sites of interest lie to the northeast, where a small tenement has been enclosed from the common (Fig. 24 – red). The only area where geophysical survey was permissible, and permission granted, lies to the east of Pond Farm (Fig. 24 – black; survey area in dashed black). Pond Farm itself was a later pottery production site, (ALD4 in Appendix I), known to have been in operation from the 18th century until the early 19th, under the Fry family. The site is likely to be out of use by the creation of the 1840 tithe map, as it is not mentioned; the site is labelled “Old Pottery Kiln” on the 1888-9 OS map. This area was selected for survey, to confirm the nature of the clay extraction and the layout of certain buildings noted by Norden. Additionally, Pond Farm’s eponymous pond probably formed an old clay extraction pit.

Various geophysical techniques were applied to this site, comprising a magnetic susceptibility survey (Fig. 25), followed by magnetometry (Fig. 26) and finally earth resistance. However, the survey provided little additional information as standing water and very saturated ground conditions limited the available survey area, which compromised definition of any archaeological deposits. The full report (Appendix VI) highlights the occurrence of two structures (Fig. 26 labelled 5 and 8), which suggests that historically, the entire frontage onto the common was inhabited; however, a lack of features of high magnetism suggests that no kilns are present within the survey area. Numerous pit-like anomalies (Fig. 26 labelled 10) with relatively high magnetism were noted within the northern extent of the dataset. This corroborates Norden, revealing that clay extraction was extensive. These pits are likely backfilled with ceramic waste, which explains their high magnetic values. Such a process has been witnessed on other Verwood type pottery production sites (*e.g.* Crossroads and East Worth, Verwood).

Further south, an argument was constructed following a geophysical survey of a known 17th century Verwood-type pottery kiln at Horton (HOR2, Fig. 27; Carter *et al.* 2016). Here, a magnetometry survey revealed a small anomaly, near the known pottery kiln, which produced a ‘kiln-like’ response (Fig. 28 labelled 1); the shape of this was examined using an earth resistance survey (Fig. 29). The site was selected for limited excavation, which revealed that the unexpected kiln anomaly corresponded with a truncated tile kiln. This is no surprise, as brick kilns and other potential tile kilns were identified in a past rescue excavation in the 1980s by the VDPT; the locations of these (Fig. 28 labelled 3) and a further example (Fig. 28 labelled 4) were rediscovered using geophysical surveys. Historical documentation shows that the tile kilns were in operation from at least the 1590s (Table 4 - Chapter 2); which is supported by the excavated evidence. The excavation of the tile kiln recovered datable evidence in the form of stylistically datable clay pipe bowls from the uppermost deposits, revealing that the feature had gone out of use after post-1660s. The construction cut for the tile kiln disturbed infilled late medieval features (containing pottery of 13-14th century date). A lack of post-medieval pottery witnessed within the lower deposits of the kiln suggests that the nearby 17th century pottery kiln may not have been in operation during the active lifetime of the tile kiln, and that the tile kiln may have been partially robbed to build said pottery kiln. This kiln was subsequently backfilled as part of the alteration of the site for pottery manufacture, indicating that pottery production at HOR2 begins in the mid to late 17th century, not the late medieval period, as previously hypothesised (Carter *et al.* 2016).

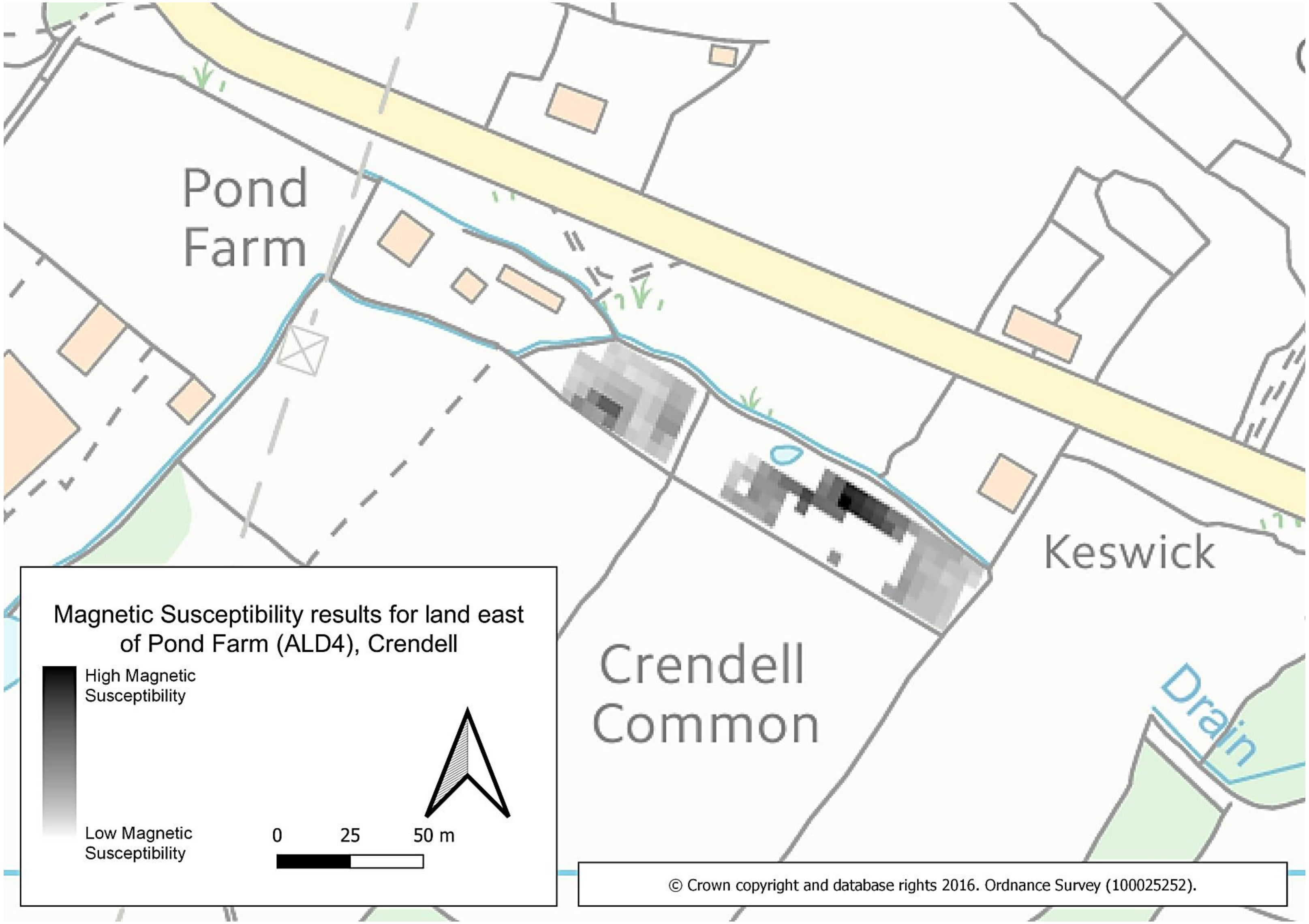

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**Fig. 25: Magnetic susceptibility results for site adjacent to Pond Farm (ALD4)**

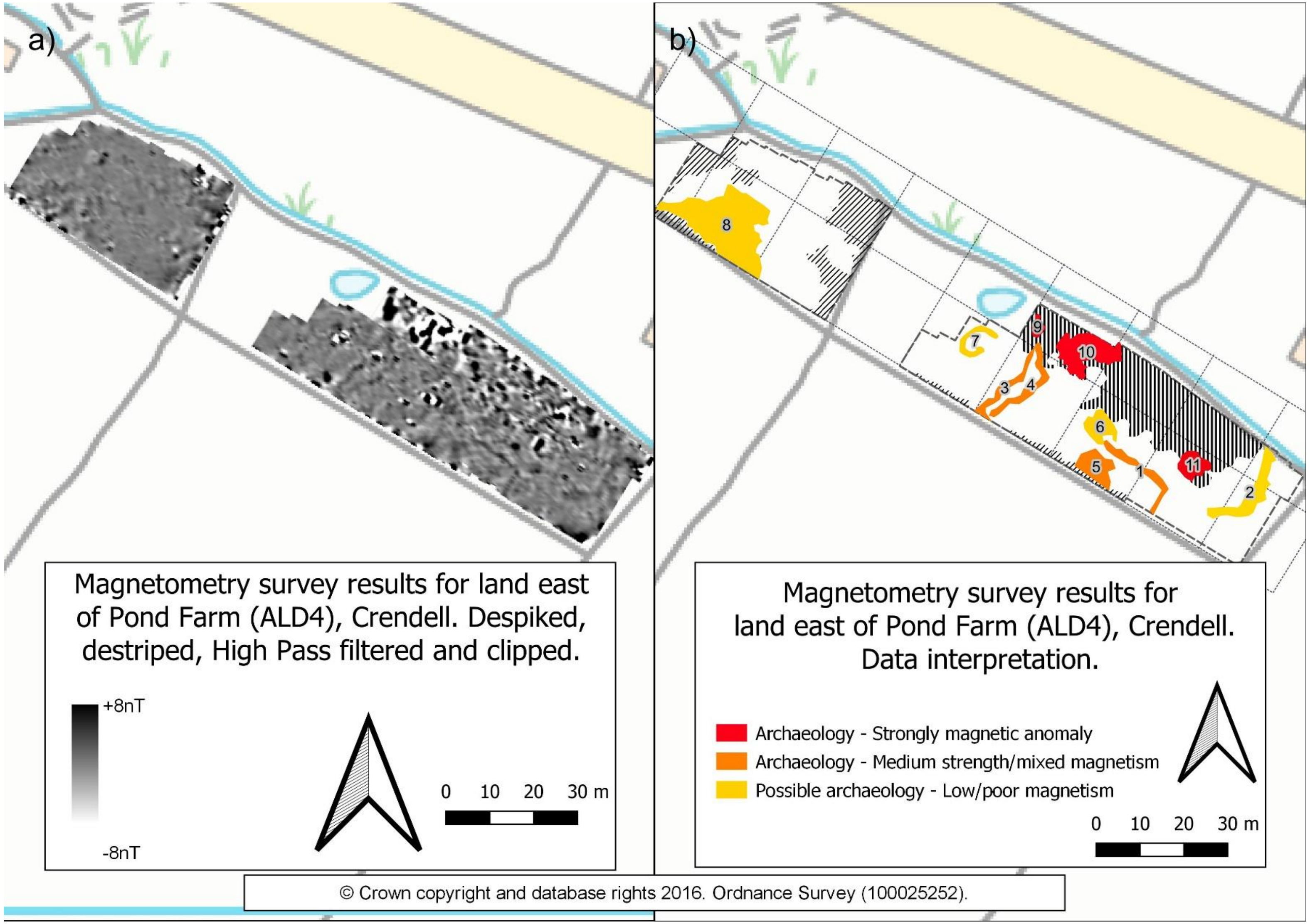

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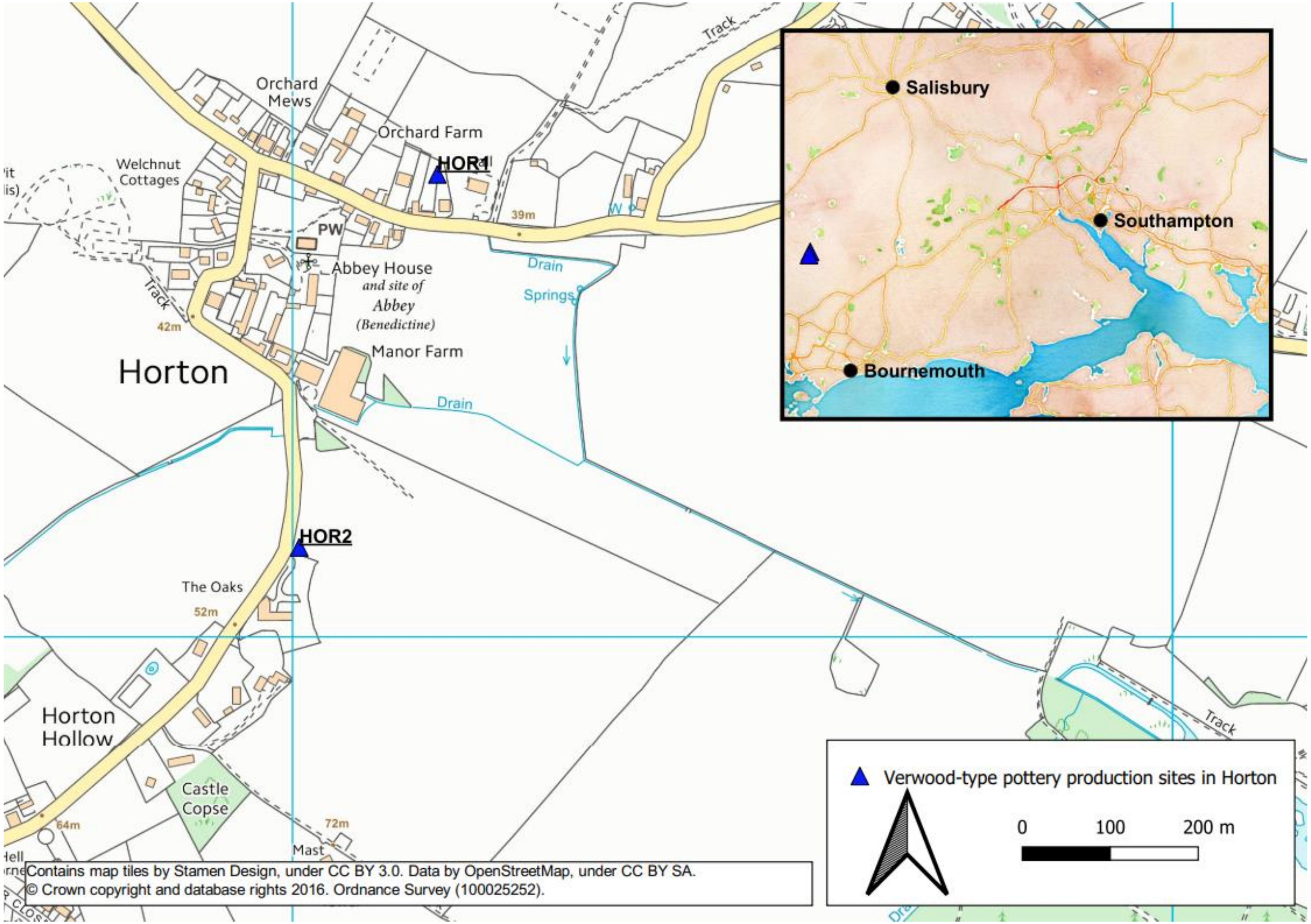
**Fig. 26: Magnetometry results for site adjacent to Pond Farm (ALD4)**



Contains map tiles by Stamen Design, under CC BY 3.0. Data by OpenStreetMap, under CC BY SA.
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Fig. 27: Location of Verwood-type pottery production sites in Horton

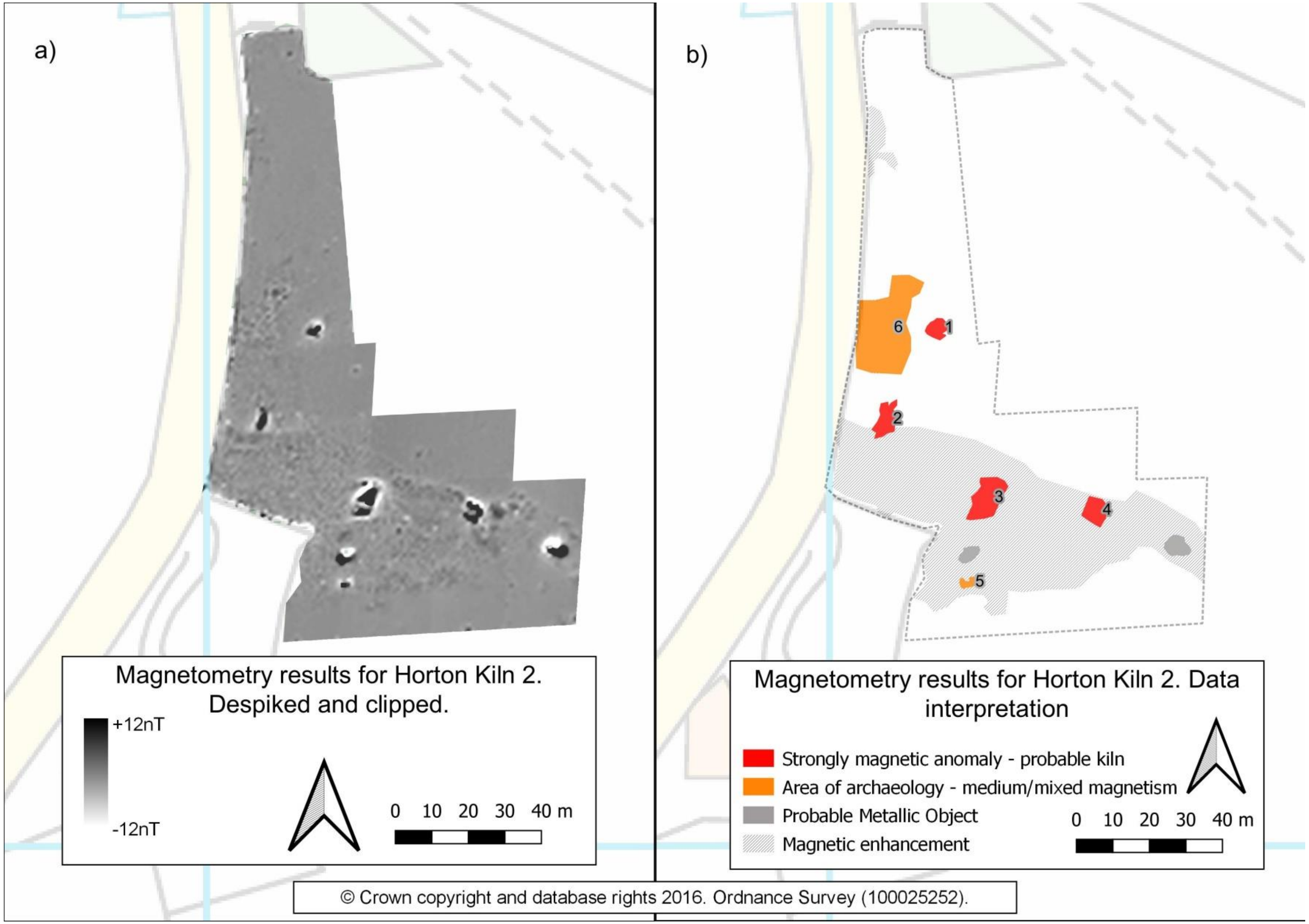

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**Fig. 28: Magnetometry results for HOR2 (Carter *et al.* 2016)**

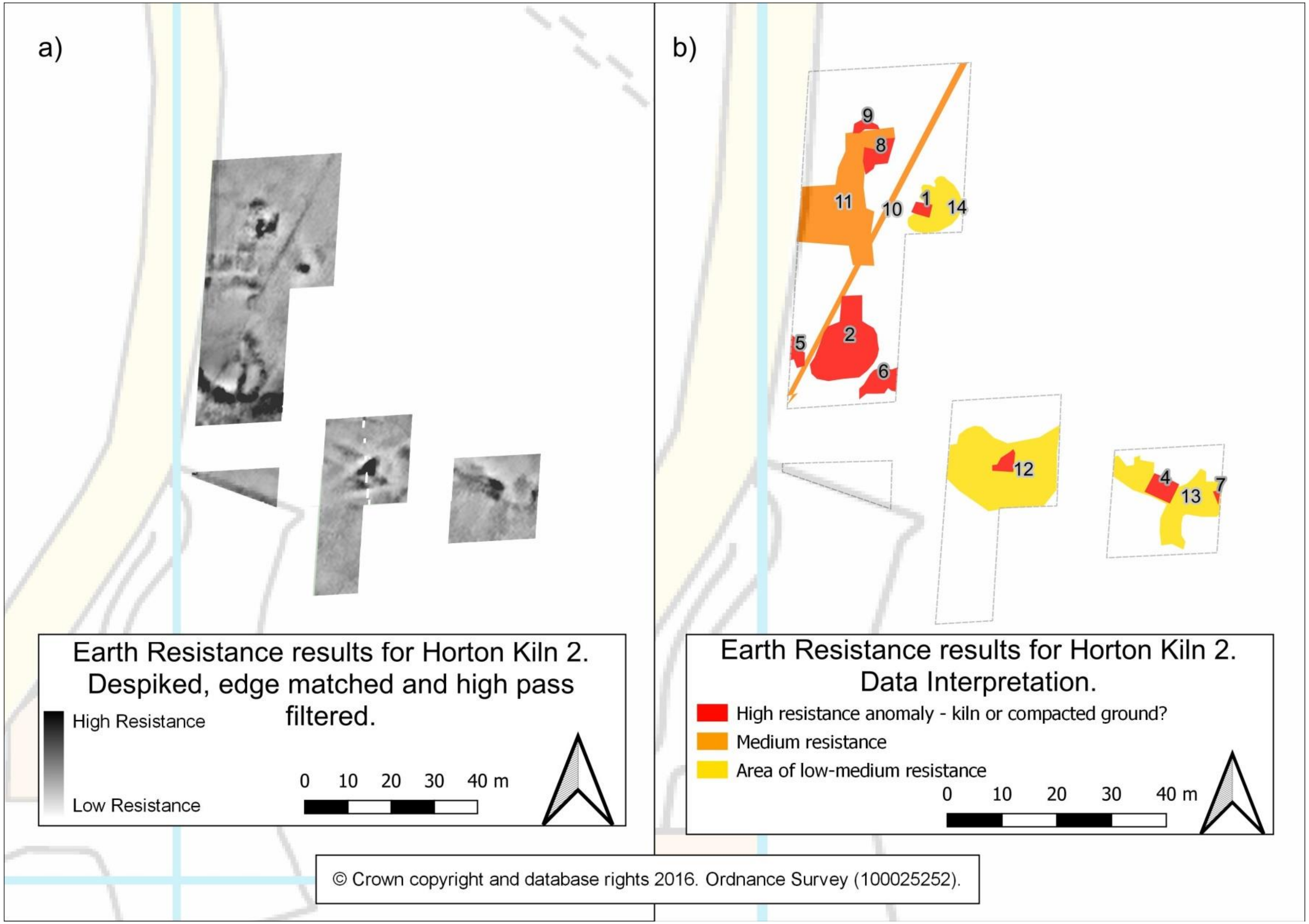


**Fig. 29: Earth resistance results for HOR2 (Carter *et al.* 2016)**

Further unconfirmed hypotheses remain to be examined, including potential early place names for Potterne Farm, Verwood, Crockerton Hill near Boveridge, and numerous tithe map references in the Alderholt area (Sims 1969, p.2; Draper and Copland-Griffiths 2002, p.31-2). Attempts to undertake investigations on these sites have proved difficult, due to unidentified landowners, landowners comprised of various bodies, or known landowners declining access for investigation.

In summary, it is evident that production in the 17th century occurs simultaneously in numerous locations across east Dorset. While there is no evidence to counter the hypothesis that such a situation was not the case in preceding years, there is currently no evidence to corroborate it either. Due to the lack of widespread permissions granted for site survey, and the failure of fieldwork to locate and validate the existence of early post-medieval/late medieval pottery production sites at locations where permissions were granted, it was decided to examine the known products that might be ascribed to the beginnings of the Verwood-type pottery industry in an attempt to narrow a location of production. This may confirm the medieval Alderholt production evidence, while potentially ascertaining if other areas within the study area, *i.e.* Horton or Verwood, were also producing at this time.

### *4.4. Selecting Relevant Samples*

When examining provenance, the samples examined define the results achieved. The use of an appropriate control group is of key importance in identifying potential provenance. This study employs three groups of samples, all of which will be analysed using a three-tiered macroscopic, microscopic (thin section petrography) and chemical analysis (pXRF) suite of methods. These groups comprise:

1. Clay samples recovered from locations that have been either proven from historical documentation or have been hypothesised by other researchers.

2. Samples recovered from known or postulated kiln sites from south Dorset, through east Dorset and west Hampshire and north to southern Wiltshire. The samples comprise pottery of late medieval to post medieval date.

3. The final group comprises pottery recovered from consumption sites; those of unknown origin.

The use of clays from hypothesised sources has been repeatedly proven to provide greater precision in locating areas of past pottery production (*e.g*. Bartlett *et al.* 2000; Wood 2011; Jones 2017), thus has been used here. Equally, the use of samples from known sources has provided acceptable results, and forms the backbone of studies comparing pottery of uncertain provenance to the control group (*e.g*. Spoerry 1989; Blackmore and Pearce 2010; White 2012; Davey *et al.* 2013). Spoerry’s (1989) analysis of medieval ware types within Dorset has revealed that Wessex Coarsewares (C1) covered a vast area, forming a dominant fabric type on sites of this date along a swathe from Dorset to Wiltshire and Hampshire. To explore the presence of late medieval/early post-medieval pottery production in east Dorset, it is necessary to undertake analyses of samples of unknown origin from consumption sites, which appear to be of the same, or similar, fabric type, and compare them to clays and pottery of known origin.

### *4.5. Clays Sampled*

Firstly, the nature of the clays along the east Dorset – west Hampshire border must be outlined in greater detail. The clay deposits here are tertiary, constituting some of the oldest clay deposits in southern England. They comprise the Reading and London clays; the former of which lies above the chalk, and is overlaid by the latter. These deposits extend in a thin band from the Frome valley in southern Dorset through east Dorset, skirting into southern Wiltshire before continuing into Hampshire and Sussex. Immediately east and south of this clay band lies the Barton, Brackelsham and Bagshot beds, comprising mixed stratigraphy of clays, sands and gravels. Across the region, these deposits have been incised by alluvial sediments and river gravels. The Reading beds have previously been considered the source of the raw clays for Verwood-type pottery (Algar *et al.* 1987; Copland-Griffiths 1998; Draper and Copland-Griffiths 2002), as is corroborated by the Crendell clay extraction evidence, with the Reading clays considered as the source for Laverstock (Musty *et al.* 1969). In south Dorset, around Poole and Wareham, the raw clays for pottery manufacture are potentially drawn from the mixed Barton and Bracklesham beds, which include white firing ‘pipe’ clays furnishing the Dorset Whiteware tradition. In summary, there is limited geological difference along a northeast-southwest axis through the region (Fig. 30).

The following locations along said transect were selected for sampling, ordered south to north (Fig. 30):

1. Broadstone clay; recovered from the Trigon area, immediately west of Wareham, Dorset.
2. West Park Farm clay; recovered from an area immediately north of the former settlement of ‘The Leaze’ in King Street, Wimborne Minster, Dorset.
3. London clay; Horton, Dorset; north of Horton Tower.
4. Reading clay; Horton, Dorset; south of Horton village.
5. Broadstone clay; Recreation Ground, Verwood, Dorset.
6. London clay; Old Claygrounds, southwest of Crendell, near Alderholt, Dorset.
7. London clay; Crendell, near Alderholt, Dorset.
8. Reading clay; Pond Farm, Crendell, near Alderholt, Dorset.
9. Alluvium/Head deposits, overlying chalk; Petersfinger Farm, south of Laverstock, near Salisbury, Wiltshire.
10. London clay; West of Farley, near Salisbury, Wiltshire.
11. Reading clay; West of Farley, near Salisbury, Wiltshire.

A similar procedure, examining the potential clays employed by potters was undertaken in the area surrounding Torksey, Lincolnshire, a known area of Anglo-Scandinavian pottery production of 9th century date (Perry 2016). Here, five different clays were sampled, fired and examined via thin section petrography and scanning electron microscopy to examine production methods and identify the clays and temper employed. These methods showed that previous observations of production methods at Torksey were largely based on assumptions and that locally sandy clays were favoured for production.

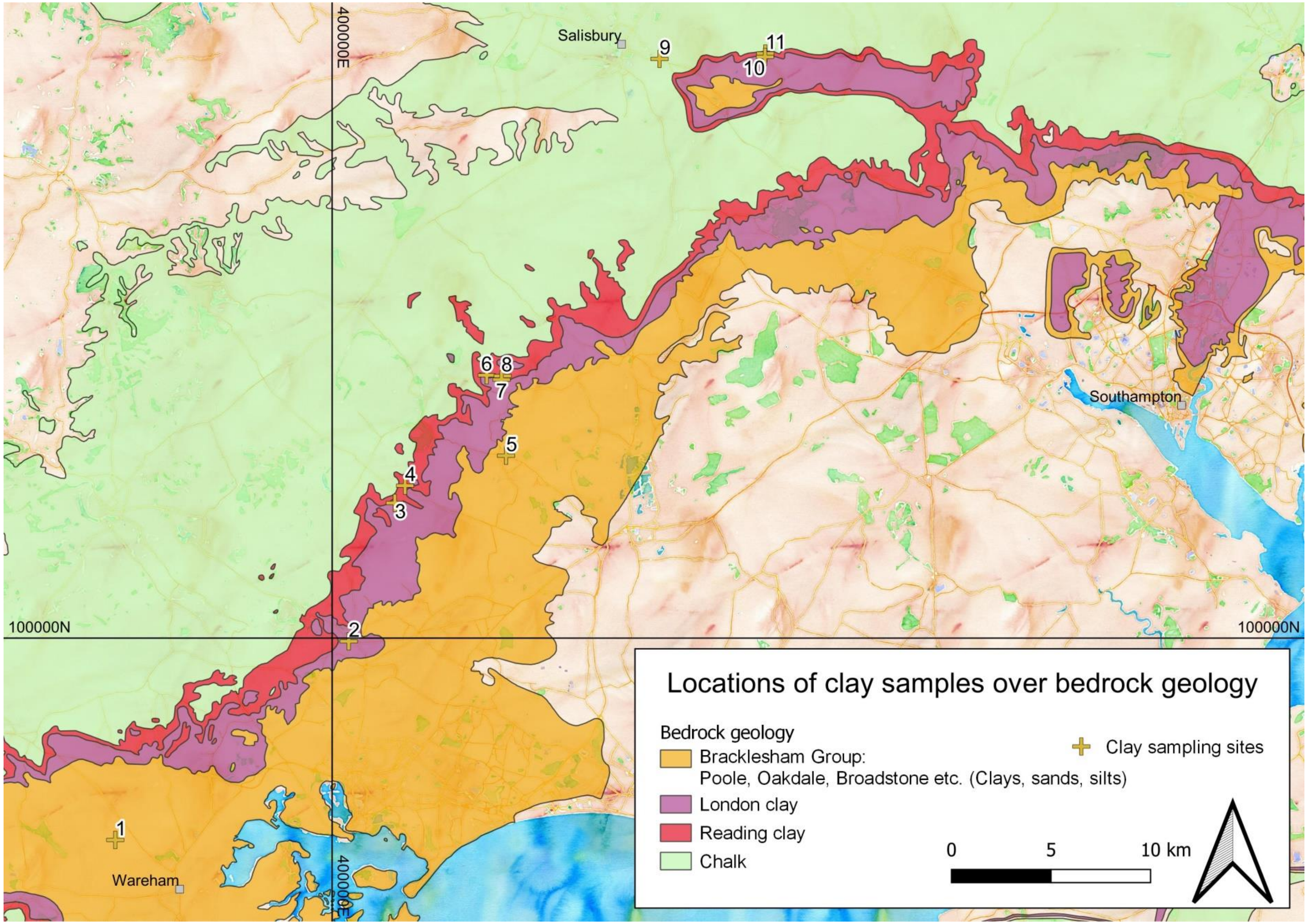


Fig. 30: Locations of clays sampled

The clay source for the Wareham kiln (Milward 2017) has never been identified, however a range of clays lie within the area, with the Broadstone clay at Trigon readily accessible. The area has a known history for gravel and sand extraction (1888-9 OS Map), with clays occurring alongside them. The West Park Farm alluvial clays at Wimborne were sampled to cover a perceived gap between the Broadstone clay sampled in the south, and the London-Reading samples in the north. As medieval pottery production occurred in the Wareham and Salisbury areas, it was considered probable that the urban centre of Wimborne had its own pottery production industry drawing on local clays, which could be addressed by sampling the alluvial clays there. The clays lying within the Verwood area, comprising Broadstone clay, were sampled to confirm whether these were used in addition to the Reading and London beds. Sample locations for those clays comprise Horton and Crendell. Farley was also included, which is as close as permissions would allow to sample Reading and London clays near Laverstock. One sample from nearby Petersfinger was also chosen, to examine the potential for the alluvial deposits lying immediately south of Laverstock being employed in production.

In terms of clay extraction evidence, it is indisputable that the historical record of activity improved as time progressed. This has allowed for a number of raw material extraction points to be pinpointed and sampled, allowing direct comparisons to be drawn between the products of a given kiln and its parent clay in a raw state (*e.g.* Crendell).

The exact locations of certain raw material extraction remain uncertain, especially for medieval pottery production, *e.g.* Wareham and Laverstock; thus, it is necessary to supplement clay samples by sourcing samples from pottery production waste. But how reliable can these samples be?

### *4.6. How Representative are Production Waste Products?*

The vast majority of ceramics that lie within the bounds of a given production site are likely to be ceramic waste, or failures often termed wasters. Pots may fail for an array of reasons, including imperfect forming, incomplete drying - leading to spalling and bloating - or spalling and cracking due to a lack of removal of large coarse components during preparation; under and over firing may also cause sagging and warping of vessels (Fraser 2005). Faults relating to glazing add an additional range of potential problems, including crazing, and lack of, or over, vitrification (Fraser 2005).

For most Roman and later British pottery production, the occurrence of wasters is abundant across a given production site. On Verwood-type sites, some waste is re-used as a form of insulation around the kiln (Chapter 9), or as spacers to separate glazed sherds (Plate 15). Often, only a single seemingly ‘normal’ sherd from a failed vessel is recovered, with no obvious explanation as to why the vessel has failed and been discarded. It may be that the fabric comprising the pot is somehow ‘wrong’, or different from that of successful vessels. Based upon the vast body of past research using such items for provenance, it is considered that the method is worth the risk; however a degree of caution should be employed when selecting such material.

**Plate 15: A Verwood-type waster, re-used as a spacer. Note the glaze over the broken edge and the kiln scar from another smaller vessel, probably a mug/cup (Author's Own)**

Additional issues include material recovered from field walking - as many Verwood-type samples collected by the VDPT were - having potential to derive from several different firings, thus uncertainty as to whether these were created in the early or later part of a given kiln production lifetime. This could lead to a range of different fabric types, as clay sources vary over time – either due to new clay pits being opened as others become exhausted, or innovation and refinement leading to a decision to change fabric recipes. Additionally, material occurring on one site has potential to be subjected to tertiary deposition and dumping from others, with material being transported for use as hard-core not unknown. As a result, the selected samples represent only a snapshot of the products created on a pottery production site.

### *4.7. Potential Post-Depositional Change in Ceramics*

While ceramics lie buried, following discard and prior to discovery, physical changes can occur. The degree to which these changes transpire varies based upon factors including environment, the stability of the ceramic and time. Changes to the mineralogical and chemical nature of the ceramic can affect the results of investigations on provenance, innovation and use. In particular, calcium and phosphate move readily into ceramic bodies from the surrounding environment (Freestone 2001, p.615).

In ceramics, the degree of porosity is considered key to the extent of potential weathering; the greater the permeability, the greater the potential for alteration and degradation, thus low fired earthenware is more likely to be affected in comparison to stoneware and porcelain, where the body is less porous (Freestone 2001, p.620). Consequently, low fired samples should be avoided where possible, as outlined in Chapter 3.

Groundwater and waterlogging are an additional aspect to consider. When left in wet conditions, low fired ceramic will slowly rehydrate - eventually returning to its clay state (Kingery 1974; Vandiver 1992). One example of this is the known impact of soil pH acidity on the hardness of low fired prehistoric ceramic. Allen (1991) evidenced that sherds recovered from acidic conditions were softer than those recovered from neutral, or moderately alkaline, environments.

Freeth (1967) has shown that while calcium easily leaves pottery, deposits of manganese and iron can readily accrue on surfaces. The leaching of calcareous inclusions within calcium rich ceramic fabrics is a common occurrence within archaeological deposits that are relatively acidic. This leaching leaves distinctive voids within the fabric - whether from shell, chalk or limestone (Freestone 2001) - which can often be readily identified visually, especially when viewing a sample in thin section. Conversely, calcareous deposits can build up within extant voids which can be examined in thin section; this is often referred to as secondary calcification (Quinn 2013, p.99). Prag *et al.* (1974) also corroborates the ease of movement of calcium carbonate, with deposition on archaeological ceramics common within calcareous environments.

Although already mentioned, phosphates are able to move freely into ceramic fabrics (Dunnell and Hunt 1990; Freestone *et al.* 1985). Other similar elements include manganese, strontium and barium (Picon 1991; Walter and Besnus 1989). Furthermore, Sayre *et al.* (1971) stated that amounts of alkali metals within ceramics can be affected by leaching, although the effects were not quantified. Additional research by de Paepe (1979) has revealed that transitional metals can be absorbed when found in relation to nearby metallurgical activity. Ordinarily, this is not a problem for pottery production sites, however the vitrification - or lack thereof - with glazing materials provides a pathway for additional elements to enter the pottery fabric.

British post-medieval earthenware and medieval finewares are commonly lead glazed; Verwood-type pottery is no exception. This type of surface treatment has its own range of interactions, both with the clay body that it covers, and with the surrounding environment in which it is held. Freestone (2001, p.623) notes that compositional changes in glazes can include contaminants such as phosphates, barium, manganese and sodium, thus highlighting that the chemical composition of the glaze can alter in certain burial conditions.

In summary, one should be cautious about employing calcium, phosphorous, barium, manganese, sodium, potassium, iron, lead and arsenic in determining provenance for British medieval and post-medieval ceramics. Amounts of these may differ, despite deriving from the same source. Bias due to post-depositional change can be inferred for these elements by plotting how well samples from the same collection unit cluster together, and whether the distribution of the data for each element is ‘normally’ distributed. The nature of the buried geology and soil pH of a site should also be considered when examining provenance (Spoerry 1989, p.133).

### 4.8. Post-Depositional Change in Samples in Relation to the Results of the Pilot Study

The aforementioned has shown that there are a significant number of elements that can either accrue or be depleted when ceramics are deposited within the ground. This degree of post-depositional change is dependent on a range of factors, as previously outlined. The measurements taken with a pXRF can provide information regarding a vast variety of elements (Table 7 – Chapter 3), and many of these have been shown to have potential for post-depositional change. This leads to the question of whether the pXRF and methodology is robust enough to be able to discriminate between sources, especially when artefacts have been recovered from differing conditions on various sites of use, hereafter, termed consumption sites. These variables range from soil pH to geology, in addition to changes occurring through use which may have irrevocably altered the elemental composition of the pottery. This may result in samples differing in chemical composition despite being from the same source, preventing any similarity or discrimination being identified.

The results of the pilot study suggest that the pXRF can provide data from sherds recovered from pottery production centres along the Dorset-Hampshire-Wiltshire border area, which display enough chemical difference to be discerned from one another (Chapter 3). The results outlined in Table 27 (Chapter 3) show that chemical difference is displayed in specific elements compared to others.

Iron comprises the element with the largest effect size (44-83% from Table 27), thus most likely to contribute to successful discrimination between sources, as it did for the five sites employed in the in pilot study; this is despite its prevalence for accretion during burial. Calcium has also been shown to be a relatively free mover between soils and archaeological ceramics. Again, the pilot study showed that calcium is the second most important element in discerning discrimination along the Dorset/Hampshire/Wiltshire border, with the largest effect size of all the elements measured (ranging from 61-99%, Table 27). The work of Freeth (1967) has shown that both of these elements can be substantially altered due to post-depositional change. To balance the ability of these elements to discriminate and the nature of both to transition between soils and ceramics – especially calcium – the role that they play within discrimination should be limited. This can be achieved by choosing a multivariate statistical method whereby the effect size of certain elements can be identified and quantified *e.g.* Principal Component Analysis or Discriminant Function Analysis, two methods where differing factors/functions can be influenced to different degrees by certain variables (see Chapter 5).

Other elements noted previously as having significant capacity for altering concentrations within buried ceramics due to post-depositional change include manganese, phosphorus, rubidium and strontium. The pilot study showed that all these have minimal to zero role in discerning discrimination in the sites employed. Finally, barium and potassium have been shown to have a reasonable capacity to transition between soils and ceramic, or vice versa. This has relevance as barium was shown to have the fourth largest effect size (41-75% for three sites in the study, Table 27), closely followed by potassium, which had the fifth largest effect in discerning discrimination between those sites in the pilot study (46-64% for three sites). Again, this is considered to be acceptable, provided that the role these elements play can be identified and quantified from within the linear correlations that drive each factor/function. This provides an effect size of sorts, showing that these elements form but one of many aspects to be considering when deciding upon group membership, thus discerning discrimination between provenanced and unprovenanced groups.

While the potential for post-depositional change can be shown to be prominent in certain samples that could be included in the study - *i.e.* those from chalk geology consumption sites - that does not mean that those elements should be completely discounted, or that the tests should not be undertaken. This is especially important when the employment of a sufficiently robust statistical method can be deployed to tease out the mechanism by which group discrimination has been discerned.

### *4.9. Samples of Known Provenance from Production Sites – the Control Group*

To examine the potential for pottery being created at a late medieval/early post-medieval production site in east Dorset, relevant samples of uncertain provenance must be compared to similar ones from known and relevant locations. Due to this, it is necessary to explore various production centres along the same geographical transect, spanning some 50km where the aforementioned clays occur - some of which have likely been exploited for past pottery production (Fig. 31); temporally, the selected sites span some 550 years of production (Fig. 32).

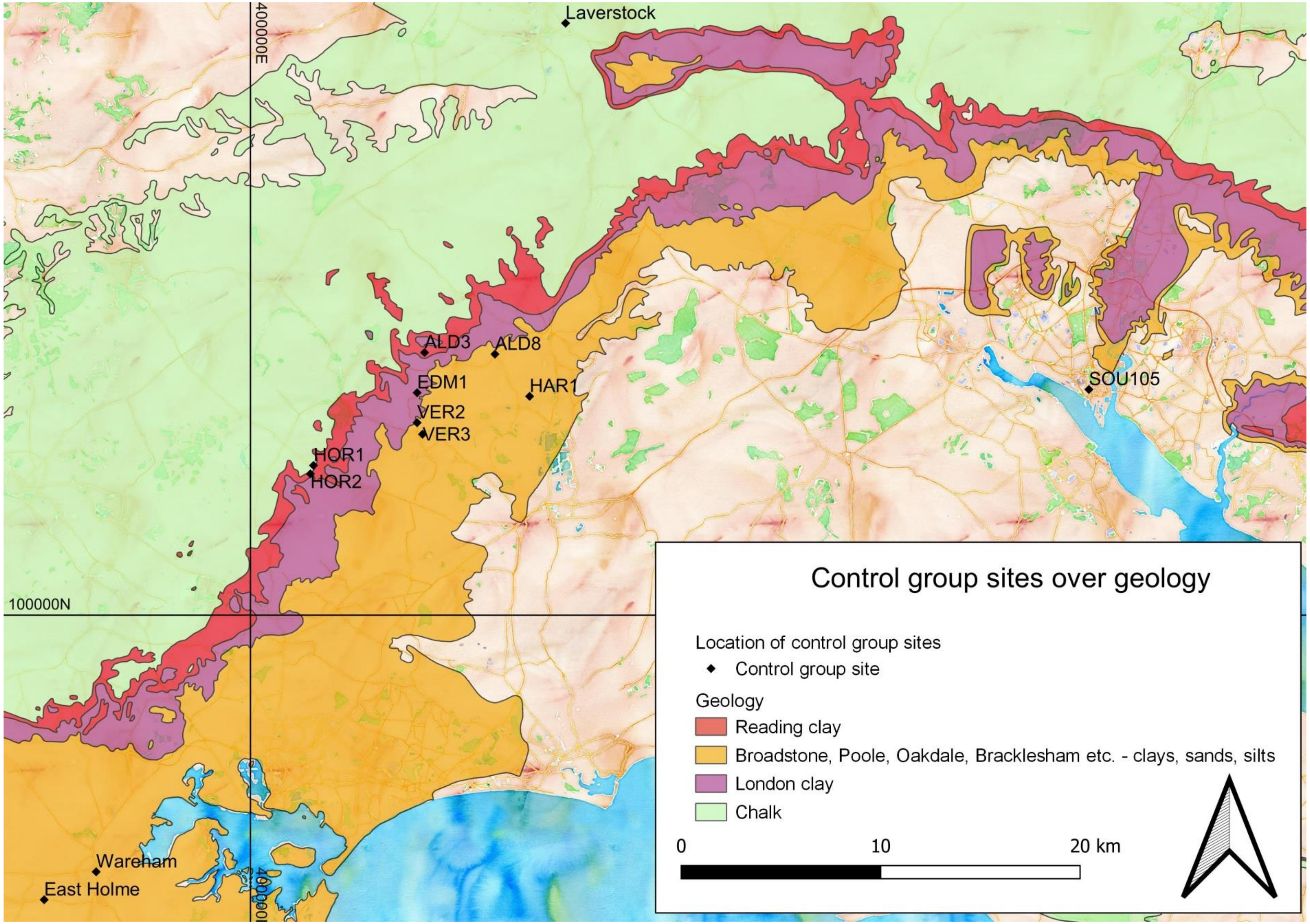
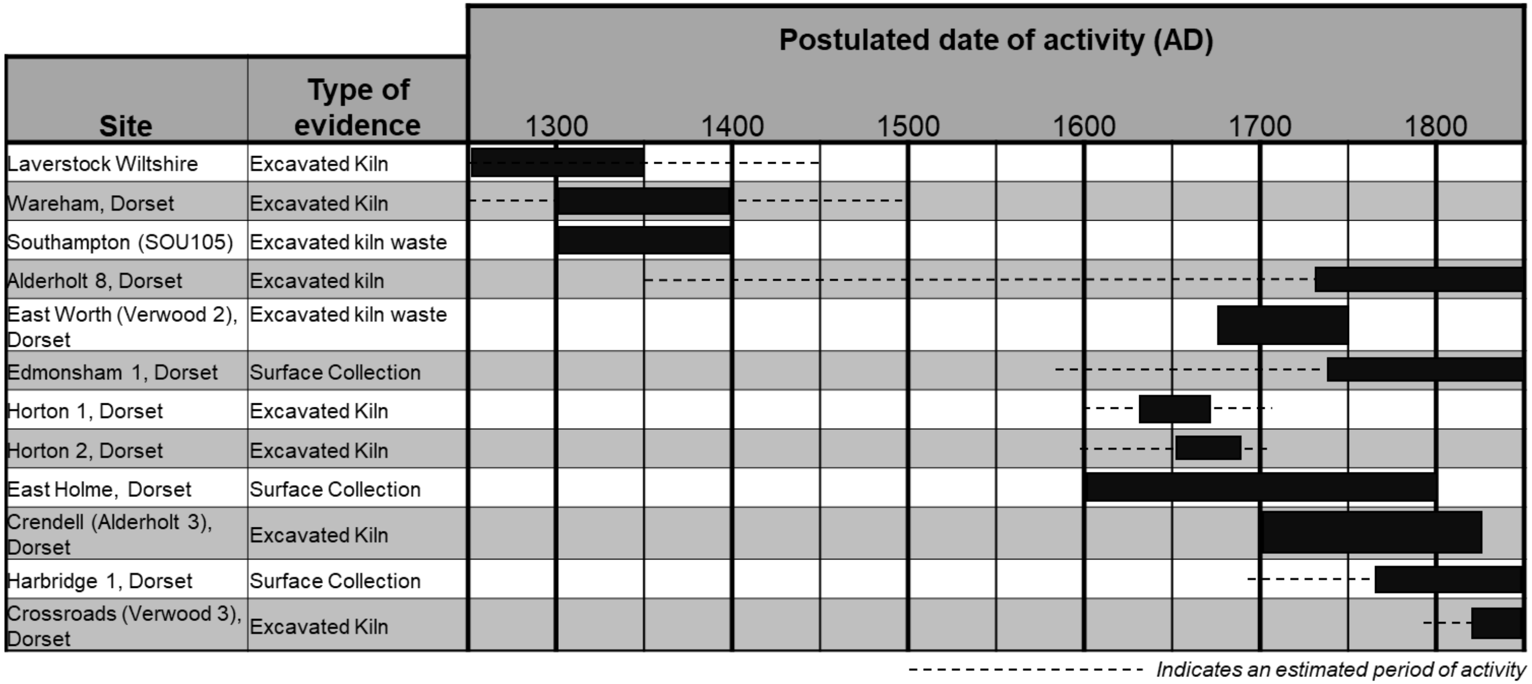


**Fig. 31: Location of known provenanced sites forming control group**



| Site | Type of evidence |
|---|---|
| Laverstock Wiltshire | Excavated Kiln |
| Wareham, Dorset | Excavated Kiln |
| Southampton (SOU105) | Excavated kiln waste |
| Alderholt 8, Dorset | Excavated kiln |
| East Worth (Verwood 2), Dorset | Excavated kiln waste |
| Edmonsham 1, Dorset | Surface Collection |
| Horton 1, Dorset | Excavated Kiln |
| Horton 2, Dorset | Excavated Kiln |
| East Holme, Dorset | Surface Collection |
| Crendell (Alderholt 3), Dorset | Excavated Kiln |
| Harbridge 1, Dorset | Surface Collection |
| Crossroads (Verwood 3), Dorset | Excavated Kiln |

Fig. 32: Timeline of sites forming control group with dates of operation

### *4.9.1. Medieval Samples in the Control Group*

The nature of medieval pottery production at both Laverstock and Wareham has already been outlined, and these comprise the earliest sherds within the control group. The sherds taken from Laverstock were recovered from deposits within kilns 2 and 6, building 3, and pit 15. Sherds from this site are not stored by context, but by feature; this allows targeted selection of the latest phase of activity on the site based on the re-evaluation (Table 29).

Another potential site of pottery production lies within Southampton. The only wasters secured for analysis from here were those outlined in a summary compiled by Webster and Cherry (1972). Here, at site SOU105 - located off the High Street - a pit (context 145) containing 13-14th century pottery wasters was discovered. The material comprises largely glazed jug/pitchers, with additional forms which, assumed by the presence of certain base sherds, includes cookpots/jars and bowls. This material was later re-evaluated and discussed in context with reference to consumption assemblages within Southampton by Brown (2002), who terms this ware group: Southampton Whiteware. Several aspects of these jug/pitcher forms share similarities with examples from the Laverstock production centre, with comparable forms, fabrics and surface treatments being noted (Brown 2002, p.120). With this in mind, there is potential, despite the distance involved – a journey of some 33km, that the clays for production could have derived from the Laverstock area. If confirmed, this would be highly irregular in comparison to other known pottery production centres, forming an extreme for Arnold's (1985, Fig. 2.5) Exploitable Threshold Model for ceramic production clay harvesting, which shows that of 111 sites sampled, less than 5% draw clays from over 30km. If proven, this would reinforce the regionally prized nature of pottery from the Laverstock area. Due to the uncertain nature of this Southampton Whiteware group, just 21 samples were chosen, as only those shown to be obvious wasters from the SOU105 assemblage were selected for the analysis.

Samples from the medieval kiln at Wareham derived from the fills of the kiln, structure 3. An additional site, located in south Dorset, was included to explore a post-medieval source of wares in this area, to ascertain whether they matched any potential late Wessex Coarsewares or early Verwood-type pottery; this is the postulated production site at East Holme. Furthermore, due to the occurrence of similar inclusions, material from East Holme could be confused with post-medieval Verwood-type pottery and vice versa, with firing colour generally being the main discriminator.

### *4.9.2. Post-Medieval South Dorset Samples in the Control Group*

East Holme is located approximately 3km west of Wareham. Fields immediately to the south of the village contained large amounts of pottery waste recovered by Donald Young and John Beavis in 1974-5; the results of this fieldwork were published by Terry (1988). The site lies on Broadstone sand, comprising undifferentiated sands, clays and gravels; however, the site is surrounded by Creekmoor clay, which may also be a potential source of raw material. Historical documentation notes a William Dover was potting in 1701 in East Holme (Terry 1988, p.39), and the area is noted as arable land called Potter's Field in the tithe award of 1841, indicating that any pottery production had ceased prior to this. At least four sherds comprise recognisable wasters occurring in a white fabric. Sherds also appear in a red to pale-pink quartz-rich fabric; these were treated as a separate fabric and sampled as part of the analysis. Other unusual sherds include a single 'brown glazed sherd' in the white fabric mentioned in the publication, but could not be located within the archive held by DCM. Further oddities include an undefined number of sherds that were slip treated. In terms of recognisable forms, Fig. 33 illustrates that jugs/jars and bowls/dishes predominate - a common aspect of post-medieval pottery production assemblages.

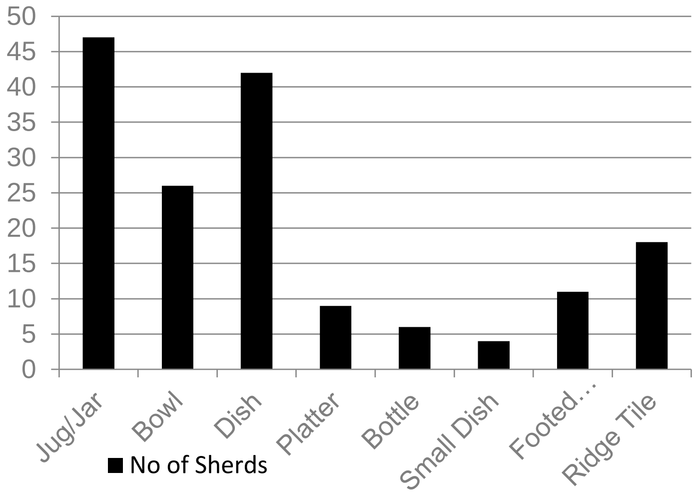


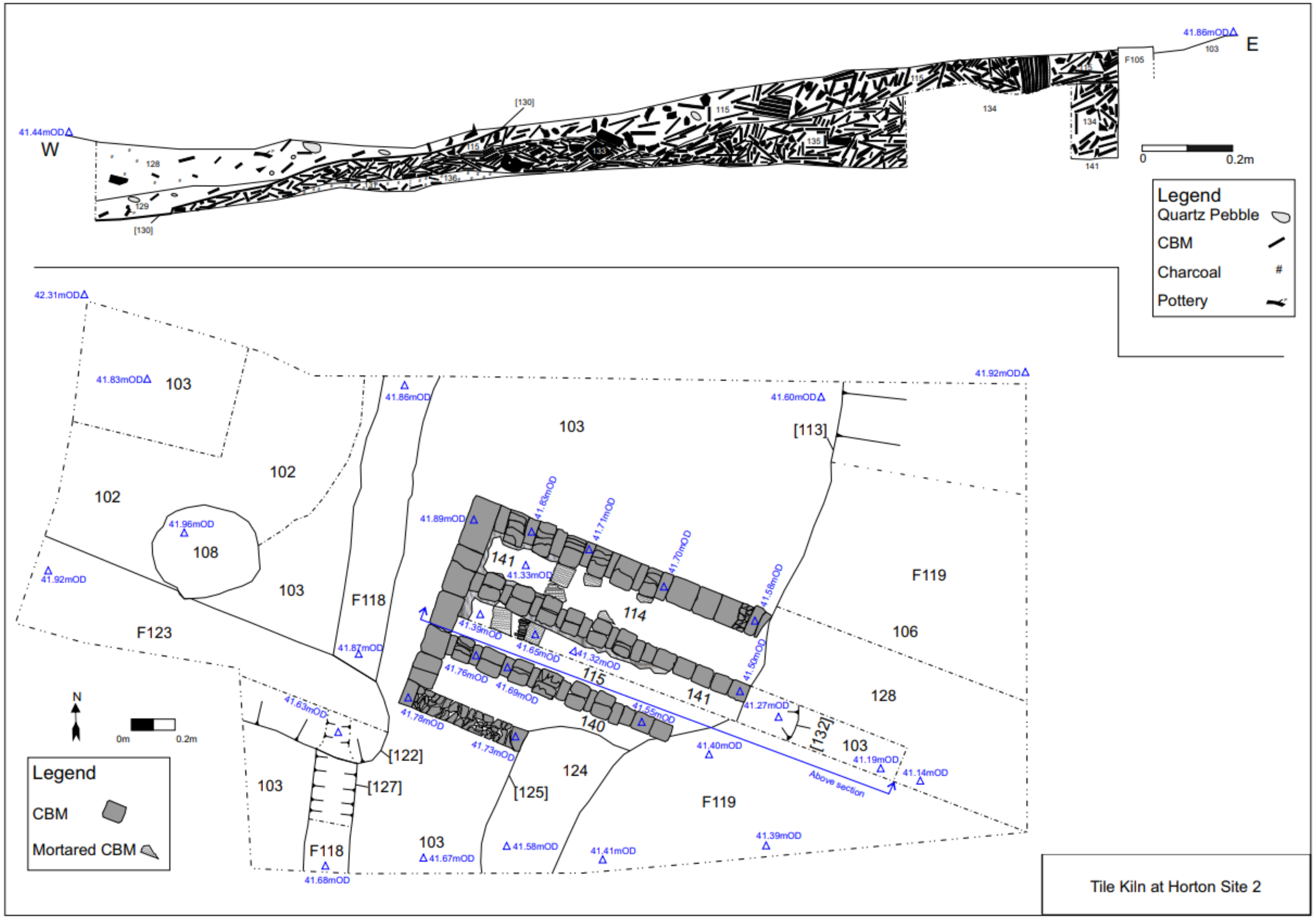
**Fig. 33: Quantification of identifiable sherds recovered from East Holme (re-drawn from Terry 1988, Fig. 6)**

The description of the white fabric from East Holme has been outlined as wheel thrown, hard fired, with occasional sub rounded quartz (<2mm in size), rare iron oxides, and rare voids (Terry 1988, p.41). The red fabric is similar in terms of inclusions, although pink to light red in colour and generally softer; this description appears identical to certain Verwood-type examples.

### *4.9.3. Post-Medieval Verwood-Type Samples in the Control Group*

Eight Verwood-type pottery sites were sampled as part of the analyses. These lie across an area measuring roughly 6 x 8km. The southernmost comprises HOR2 (Algar *et al.* 1987, pp.26-28). Currently, this site lies under pasture, and is located immediately south of the village of Horton, situated on a geological boundary between the Reading and London clay beds. The site has previously been considered to hold potential for early Verwood pottery production (Carter *et al.* 2016). Pottery samples were recovered during the excavation of an early post-medieval tile kiln, discovered via aforementioned geophysical surveys (Figs. 34 and 35). The tile kiln had been buried under deposits (114, 115 and 140) containing waste tiles, clay tobacco pipe, and pottery waste; this is associated with an adjacent pottery kiln, lying within 20m from the excavated area. The stoke pit of the tile kiln had been cut by an expansive, broad, and shallow feature containing pottery waste (F119 – Figs. 34 and 35). The style of the clay tobacco pipe bowls found here suggest a date of post-1650 for both the accumulation of the deposit and the end of production for the tile kiln, as the pottery occurs alongside said pipes; this date is provided as a known beginning of the pottery kiln.

One further site at Horton lies within the village. This was excavated in two phases (Copland-Griffiths 1990; Copland-Griffiths and Butterworth 1991) and comprises HOR1. While the historical documentary evidence suggests production here ranges from the 17th to early 18th century, the products from the excavation were considered mid-17th century (Copland-Griffiths and Butterworth 1991, p.32). The first excavation recovered a range of vessels which are quantified in Fig. 36. Similar to East Holme, bowls, dishes and deep bowls (pancheons) dominate the group, followed by jars, jugs and commode liners.



Figs. 34 (section) and 35 (plan) of tile kiln excavation near HOR2

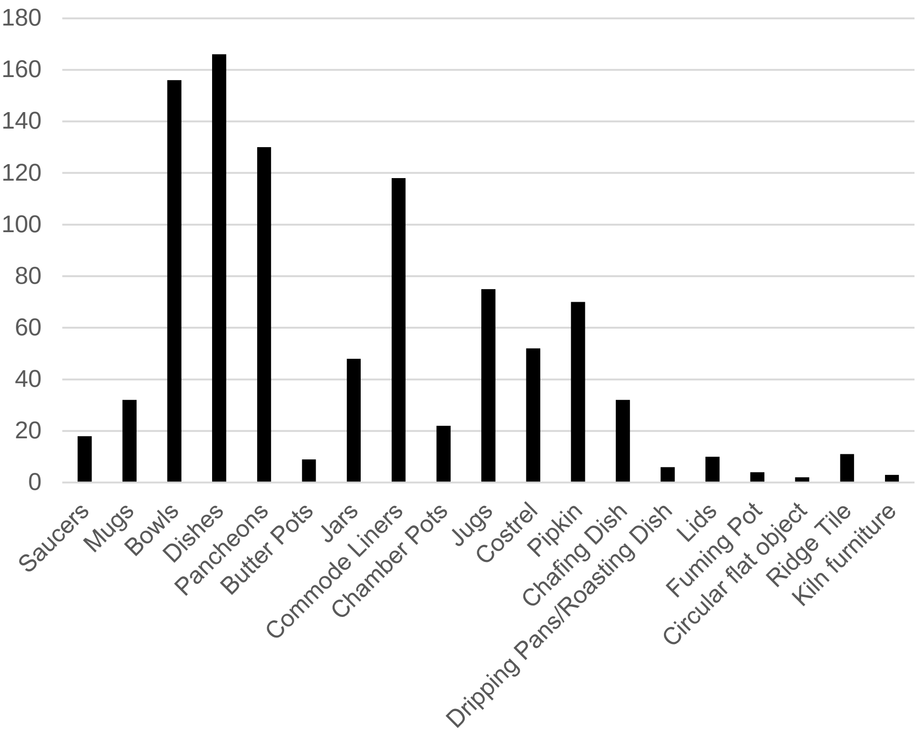


**Fig. 36: Number and type of vessels recovered during the first excavation at HOR1 (after Copland-Griffiths 1990, Fig. 9)**

The village of Verwood lies 6km southwest of Horton (Fig. 31). The last production site known to be in operation here is that of Crossroads, which is now occupied by a complex of commercial buildings and the Potter's Wheel car park. The site was excavated in two phases; the car park in 2000, and the subsequent commercial complex in 2007. Both phases were undertaken by AC archaeology Ltd (forthcoming). Crossroads continued to operate into living memory (closing in 1952), thus it has been repeatedly studied (Kendrick 1959; Sims 1969; Young 1979; Algar *et al.* 1979; 1987; McGarva 2000). Consequently, it is considered the 'type site' for the industry, and frames the bulk of the hypotheses of current Verwood-type pottery knowledge (*e.g.* Draper and Copland-Griffiths 2002). While at least twelve other production sites were operating within the Verwood area (Appendix I), this site has been chosen due to its high profile and the fact that sherds have been recovered from stratified contexts. While the date of the site's demise is known, a start date of production remains a conundrum. The site was occupied by Robert Shearing, and used as a pottery from 1847; as shown in the Cranborne parish tithe map, when the site comprised a cottage, garden and pottery. Crossroads lies on Broadstone clay, comprising undifferentiated clays and sands. Pottery samples from contexts containing manganese-laced lead glazed wares (Chapter 8) were deemed to be of pre-19th century production (AC archaeology Ltd. forthcoming), thus were sampled for the analyses.

Harbridge is a small dispersed village lying in Hampshire, 4km northeast of Verwood. Here, there are two postulated Verwood-type pottery production sites (Algar *et al.* 1987, pp.28-9). These represent the only known Verwood-type establishments in the county. Both sites have been dated to the 18th century, however HAR1 was selected for analysis, as the knowledge surrounding it is far broader compared with that of HAR2. The site lies on Parkstone sands and is currently occupied by a large house and gardens. The sherds used for this study were collected by the VDPT from a surface scatter here in the 1980s. Historical documentary evidence suggests the site was in operation from at least 1726, when a Thomas Sutton was working the kiln. The site is subsequently worked by William Hart and is thought to be out of operation by the 1830s (Algar *et al.* 1987, pp.28-9).

Edmondsham forms the western fringe of the east Dorset potteries. While the village lies 3km northwest of Verwood, the pottery at Gotham Farm was located to the east of the village centre (Fig. 31). Two postulated production sites lie within the parish; one - Toft Hill - cannot be located; the second - Gotham Farm - lies on London clay. Gotham Farm has never been archaeologically investigated, despite the site being occupied by both gardens and pasture fields. Algar *et al*. (1987, p.29) state that Thomas Lawrence was potting here in 1700 eventually succeeded by Lawrence Lawrence. There is an apparent cessation in the records until, Esau Bailey is shown to be occupying the site in the 1861 census; Esau had previously been working in Verwood prior to Edmondsham. Sherds were recovered here from the edge of an open drainage ditch cut through the field in the 1980s by the VDPT. Select sherds were taken and examined as part of this series of analyses.

Continuing north, the next site comprises ALD8, which has already been outlined. The sherds employed here were recovered during archaeological investigations during the construction of a barn that encroached into the kiln mound. The investigations comprised the recording of the section of the damaged kiln mound (Chapter 9). Sherds considered to be of 18th century date were recovered from the mound material (context 2) and have been sampled. The underlying geology comprises Broadstone sand.

Within the parish of Alderholt, a further site lies at Crendell, where ALD3 is one of the few sites to have sherds recovered from stratified contexts (Fig. 31). The site was excavated in 1975 by members who would later form the VDPT, although the sherds were only given initial cursory examinations and the work was never published. The village has already been outlined for raw material extraction, and the site in question lies to the immediate north of this area. The excavation was thoroughly recorded and the material retained allowing the pottery, from which samples were taken from stratigraphically secure contexts, to be re-examined between 2016-8 as part of this thesis. The geology of Crendell comprises Reading clay.

The final Verwood-type site included in the control group is that of East Worth – a hamlet lying on the northwest fringe of Verwood. In 2019, AC archaeology Ltd. undertook an archaeological investigation prior to the construction of a residential development adjacent to said farm (Carter 2021b). A Verwood-type kiln site has been postulated at this location following work by Algar *et al.* (1979, p.35), and this was corroborated by two watching briefs; the first during the creation of a pathway at the Old Granary in 1983, and the second during the creation of a garage in 1994, which revealed a dump of oil jars (Copland-Griffiths 1996, p.141). The 2019 excavation discovered additional evidence for post-medieval pottery manufacture in the form of pottery waste, dumped kiln bricks, and extensive clay and sand extraction pits (Carter 2021b). The recovered pottery waste has been sampled, with examples from contexts 508 and 509 - the fills of a pit of pottery waste lying next to a pit containing post-medieval kiln bricks.

### *4.9.4. West Dorset Samples in the Control Group*

To provide context for unprovenanced samples with potential to relate to the wider area, two west Dorset production sites were also included. The medieval example comprises an excavated site at Hermitage (Field and Musty 1966). Samples used in these analyses were recovered from contexts C1 and C2, which surrounded the kiln (Field and Musty 1966, p.165).

The site has been dated to the thirteenth century, based upon stylistic grounds of various pottery forms present; however, visual examination of the material by the author shows wheel-thrown foot-ring based jugs/pitchers and jars, with wheelthrown bunghole cisterns suggesting an extension of production into the 15th century. This material is in dire need of review to further understand the site.

The Holnest samples were recovered from a surface collection on a visit by Penny Copland-Griffiths in the 1980s. Holnest lies some 9km south of Sherborne. The area is a known site of post-medieval pottery production, as outlined by Spoerry and Hart (1989), with pottery dated stylistically to the 17th century (Kent 2017), and production likely to continue into the 18th century.

Table 31 outlines the samples taken for the analyses, illustrating that a selection of relevant fabrics deriving from pertinent locations have been chosen.

## Table 31: Samples Forming the Control Group

| Site name | County | Date (century AD) | Underlying geology | Number of sherds sampled in thin section | Number of sherds sampled with pXRF | Fabric group |
|---|---|---|---|---|---|---|
| Laverstock | Wiltshire | 13-14th | Newhaven Chalk | 5 of each fabric | 50 of each fabric | Wessex coarseware and developed variant, Laverstock fineware |
| Wareham | Dorset | 13-14th | Broadstone sand | 5 of each fabric | 50 of each fabric | Wessex coarseware and developed variant, Poole Harbour fineware |
| East Holme | Dorset | 17-18th | Bracklesham and Barton sands, silts, clays | 5 of each fabric | 50 of each fabric | East Holme whiteware, East Holme redware |
| Horton (HOR1) | Dorset | 17-18th | Portsdown chalk | 5 | 50 | Verwood-type pottery |
| Brickplace Copse (HOR2) | Dorset | 17-18th | Reading clay | 5 | 50 | Verwood-type pottery |
| Crossroads (VER3) | Dorset | 18? – 20th | Bracklesham and Barton sands, silts, clays | 5 | 50 | Verwood-type pottery |
| Harbridge (HAR1) | Hampshire | 18-19th | Bracklesham and Barton sands, silts, clays | 5 | 50 | Verwood-type pottery |
| Hermitage (HER) | Dorset | 13-15th | Oxford clay | None | 50 | West Dorset sandy ware |
| Holnest (HST) | Dorset | 17-18th | Oxford clay | 5 | 50 | West Dorset sandy ware (Post-medieval) |
| Edmondsham (EDM1) | Dorset | 18-19th | Boundary of London clay/ Bracklesham and Barton sands, silts, clays | 5 | 50 | Verwood-type pottery |
| Alderholt (ALD8) | Dorset | 17-19th | Bracklesham and Barton sands, silts, clays | 5 | 50 | Verwood-type pottery |
| Crendell (ALD3) | Dorset | 18-19th | Reading clay | 5 | 50 | Verwood-type pottery |
| East Worth (VER2) | Dorset | 17-18th | Boundary of London clay/ Bracklesham and Barton sands, silts, clays | 5 | 50 | Verwood-type pottery |
| Southampton (SOU105) | Hampshire | 13-14th | The site lies on Earnley clay, sand and silts. But the clays are considered to potentially derive from the Laverstock area. | None | 21 | Southampton Fineware |
|  |  |  |  | **75** | **821** |  |

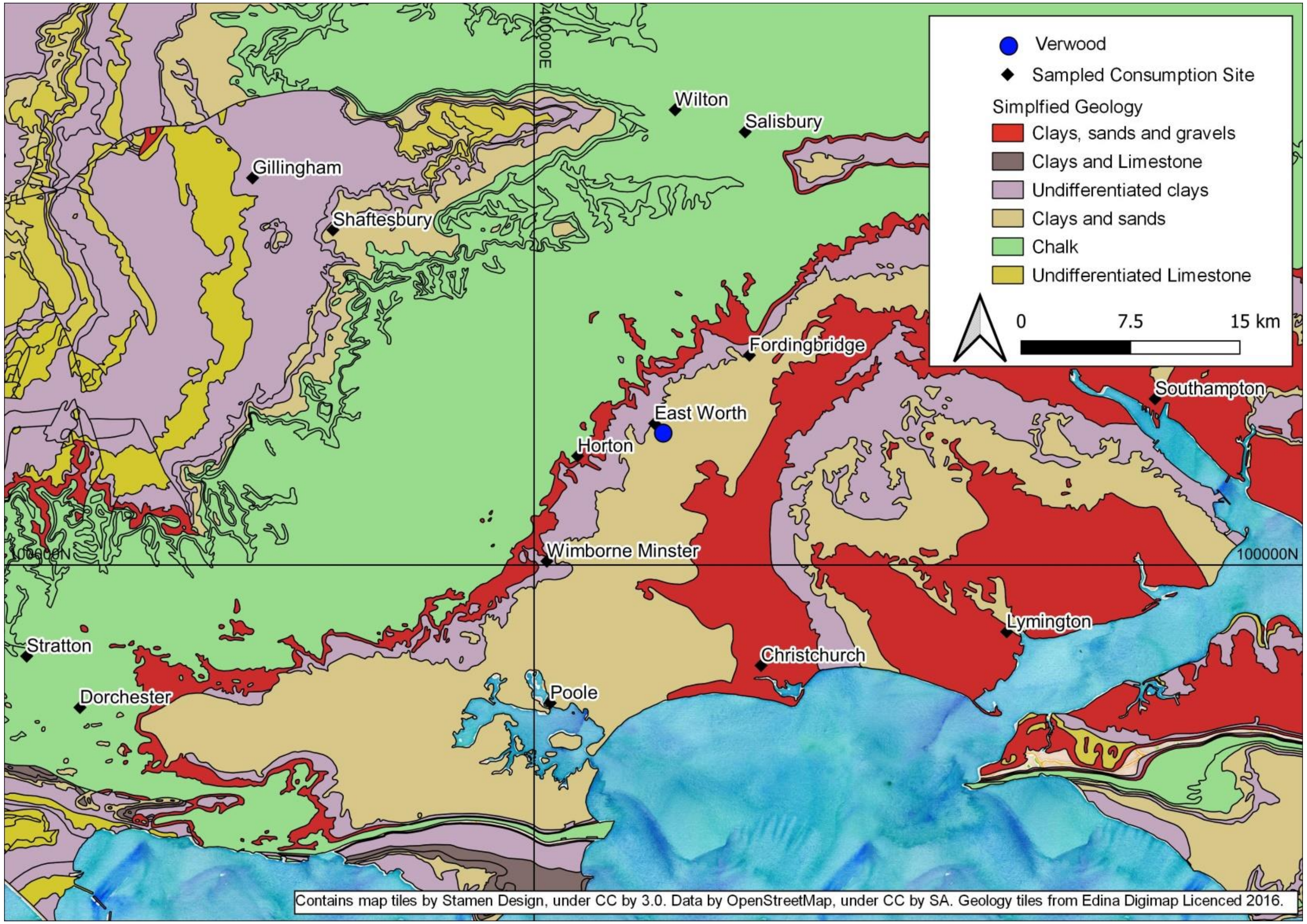
## *4.10. Samples of Unknown Provenance from Consumption Sites*

In total, 15 archaeological sites were considered for selection within an area comprising Dorset, Hampshire and Wiltshire, with those selected being perceived as representative of assemblages across this region. Generally, these include a market town - with an outlying lesser settlement - which is considered to lie in the hinterland of said market, *e.g.* Dorchester and Stratton, Salisbury and Wilton. This system of hinterland and zonal markets is outlined in Chapter 10, and has been widely accepted as the basis for models on medieval regional ceramic economies. The distribution of these sites is displayed geographically in Fig. 37, and listed in Tables 31-2. The reason for their selection is that they have relevant pottery sherds for sampling associated with them and the majority form published examples, which are well known within the local archaeological community operating within those respective areas. This representative sample has been chosen as it is unfeasible to sample every archaeological site within the region. In this way, it is believed that the occurrence, and potential distribution, of any Verwood-type pottery precursor could be identified and characterised.

If the region sampled for consumption sites is viewed as a clock face, with the Verwood area at the centre, Wilton and Salisbury would comprise the 12 and 1 o'clock positions (Fig. 37).

### *4.10.1. Wiltshire Consumption Sites*

The medieval settlement of Salisbury was established as a new, planned town in the 13th century. Currie and Rushton (2005, p.213) state that by the middle of the 14th century, the town was the tenth largest provincial town in England, and held an important position as a regional centre. The settlement is laid out on a well-planned grid pattern - termed chequers - which dates from the town's medieval inception (*e.g.* RCHME 1977; Harding 2016); the vestiges of this system form the basis for the layout of the modern city. Finds from excavations at Ivy/Brown Street by Wessex Archaeology (Rawlings 2000) were chosen to represent the past ceramic market of the town. Sherds were taken from contexts 232, 240, 591, 880 and 925. These have been dated to the 13–15th centuries, with contexts 591 and 925 deriving from pit 590 and 926, both being of 15-16th century date. A number of these were identified as being early Verwood products.



Contains map tiles by Stamen Design, under CC by 3.0. Data by OpenStreetMap, under CC by SA. Geology tiles from Edina Digimap Licenced 2016.

Fig. 37: Locations of consumption sites from which unprovenanced pottery samples are drawn, with underlying geology

Table 32: Samples of Uncertain Provenance

| Site | County | Geology | Total Thin Section Samples | Total pXRF Samples |
|---|---|---|---|---|
| Christchurch | Dorset | Branksome sand underneath river terrace deposits | 5 | 12 |
| Dorchester | Dorset | Portsdown chalk | 0 | 8 |
| East Worth | Dorset | Boundary between London clay and Broadstone sand | 6 | 10 |
| Fordingbridge | Hampshire | London clay | 3 | 12 |
| Gillingham | Dorset | Kimmeridge clay | 4 | 11 |
| Horton | Hampshire | Boundary between London and Reading clay | 2 | 10 |
| Lymington | Hampshire | Headon beds And Osborne beds – clays, silts and sands | 3 | 8 |
| Poole | Dorset | Poole Formation sands and Oakdale clays - underneath river terrace and tidal deposits | 6 | 12 |
| Salisbury | Wiltshire | Newhaven chalk | 6 | 12 |
| Shaftesbury | Dorset | Boyne Hollow chert and sandstone | 4 | 14 |
| Southampton | Hampshire | Ernley and Wittering Formations – clays, silts and sands | 3 | 14 |
| Stratton | Dorset | Seaford chalk | 3 | 12 |
| Wilton | Wiltshire | Seaford chalk | 5 | 8 |
| Wimborne | Dorset | West Park Farm clays | 6 | 9 |
|  |  | **Total** | **56** | **152** |

Spoerry's (1989) analysis of comparable material demonstrated identifiable distinctions within pottery fabric groups of medieval and post-medieval date, with assemblages recovered from consumption sites in the same region being examined here. He revealed that difference was identifiable from exploring as few as ten sherds from a site at Lodge Farm, and 15 sherds from both West Grimstead and Whitcombe (Spoerry 1989, Table 2.6). Therefore, comparable amounts have been examined here with successful results. It is hypothesised that the high number of samples from each production site, (between 21–50 per site or fabric) comprising the control group, provides a broad and robust range with which to compare the smaller number of samples of uncertain provenance, to confirm whether they derive from the east Dorset/west Hampshire border.

Wilton lies approximately 4km to the west of Salisbury, forming a settlement within the hinterland of its larger neighbour – as it would have during the later medieval period. Wessex Archaeology excavated at South Street in 1995 (Andrews *et al*. 2000), which was chosen as a site to sample for analysis. Similar to the Salisbury site, the majority of the features could be dated to the medieval period, with two sherds identified as early Verwood by Mepham (2000, pp.191-202). These were residual, being recovered from contexts possessing a potential 17-18th century date (contexts 203 and 250).

### *4.10.2. Hampshire Consumption Sites*

The town of Fordingbridge, Hampshire, lies on the northern fringe of the Verwood area. Limited archaeological investigations have been undertaken within the bounds of the medieval settlement, and only a handful have produced stratified archaeological features with datable pottery (Harding and Light 2003, p.132). Fordingbridge has Saxon origins and is listed in Domesday as a settlement at a ford possessing two mills. The community held markets from the 13th century onwards, thus is considered a regional centre for east Dorset/west Hampshire (Page 1911, pp.567-8). The town saw growth in the 16th century; this was much reduced by the 17-18th centuries, although it retained its position as a market town and industrial hub for the district (Light and Ponting 1994). This occurred at a time when Cranborne experienced economic decline (Penn 1980). A series of evaluation trenches and a subsequent excavation, were undertaken on the site of the former Albany Hotel by Wessex Archaeology in 1997. The investigations identified four phases of activity, with extensive evidence for habitation from the 13-14th centuries, and use of the area in the 17-18th century as a tannery. Four contexts were sampled; these comprise context 1101 within ditch F1038 - of 16-18th century date - context 1197 in F1198, and context 1210 – both dated to 13-14th centuries - with a context forming part of an oval hearth F1348 - dated 13-14th century also included.

Southampton lies approximately 20km to the east of the Verwood area and forms the major coastal port of trade in the region. Southampton has been the focus of archaeological interest for over a century (Oxley 1986, p.11), as investigations intensified following redevelopment following the Second World War. This provided opportunities to examine the development of the medieval core of the settlement, which has its origins in the Middle Saxon trading centre of Hamwic (Platt and Coleman-Smith 1975; Birbeck *et al*. 2005). Following the mid-1970s, there was significant growth in archaeological research projects in the old town, with the bulk undertaken by commercial archaeological bodies and the city's own archaeological unit. Each project is given a unique SOU code, with SOU25, 29, 105, 110, 122, 123, 124, 125 and 128 the subject of a thorough investigation of the well-stratified post-Norman conquest pottery assemblages (Brown 2002). This amalgamation of sites allowed relationships through time and space, along with the interactions between differing ceramic types within the city to be explored. Brown (2002) showed that the medieval and later ceramic market for Southampton comprised local, regional and international imported sources, establishing Southampton as one of the most researched and well-understood groups of pottery in southern Britain. This situation provides a robust springboard for other researchers to further our understanding of mid-Saxon and later ceramics, and the human interactions transpiring between the two (*e.g.* Jervis 2011c). Samples identified by Brown (2002) were employed in this series of analyses, and derive from sites SOU25, 29, 110, 122, 123, 124, 125, 128 (Fig. 38).

The settlement of Lymington lies within the extended hinterland of Southampton. This centre formed a marketplace and minor port between the 13-16th centuries. Settlement here was recorded as '*Lentune*' in the Domesday survey of 1086, and a borough charter was granted in 1216, which highlights the growing prosperity of the settlement, with its salt production and harbour. However, by the 17th century the market and harbour were much in decline (Cottam 2016, p.6). An evaluation of the former bus depot in the town centre comprises one of the few archaeological investigations to have been undertaken within the historic core of the town (Clark 2017). Here, three trenches were excavated ahead of proposed re-development of the area. Trench 2 was of particular interest, with 53 sherds of pottery recovered. Sherds from contexts 204, 205 and 206 were sampled (Fig. 39). These were associated with a single linear feature, F207. The pottery was shown to be of late medieval/early post-medieval date, with the fabrics - as described by Firth (2017, pp.6-7) – being visually consistent with those recovered from Christchurch (Davies 1983; Jarvis 1983; Jervis 2011a), which form part of the Wessex Coarseware tradition.

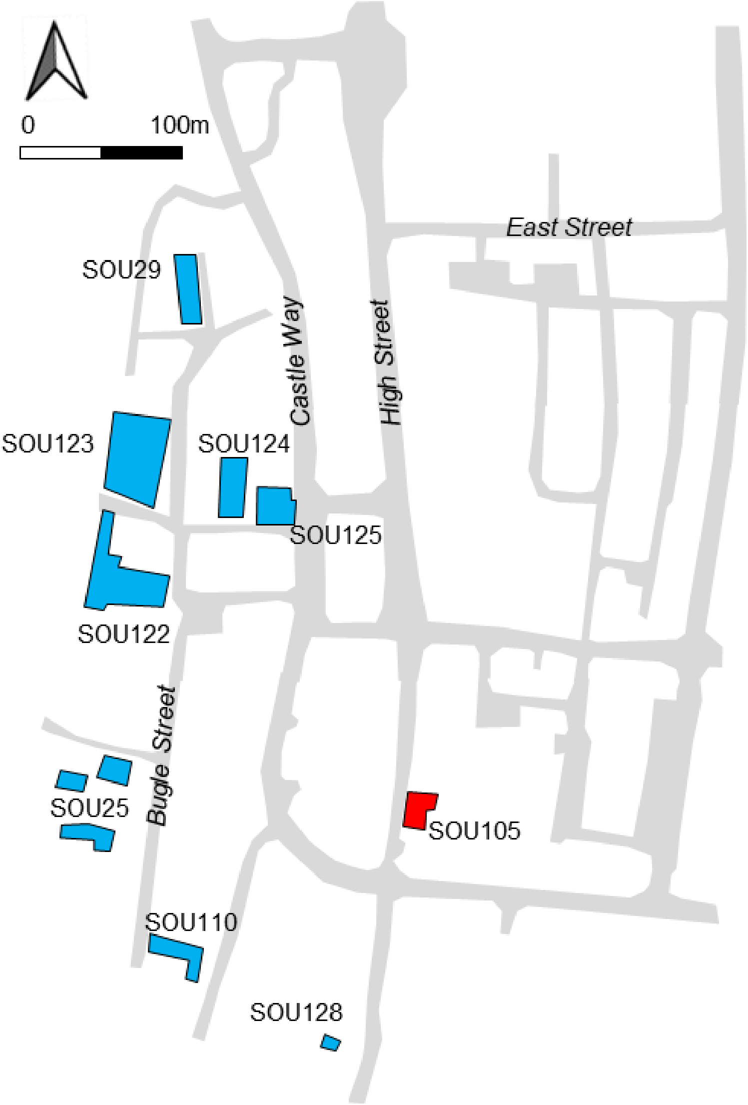


**Fig. 38: Locations of sites with pottery assemblages examined by Brown (re-drawn from Brown 2002, Fig. 47) in Southampton city centre; shows location of SOU105 (red) and sampled consumption sites in blue**

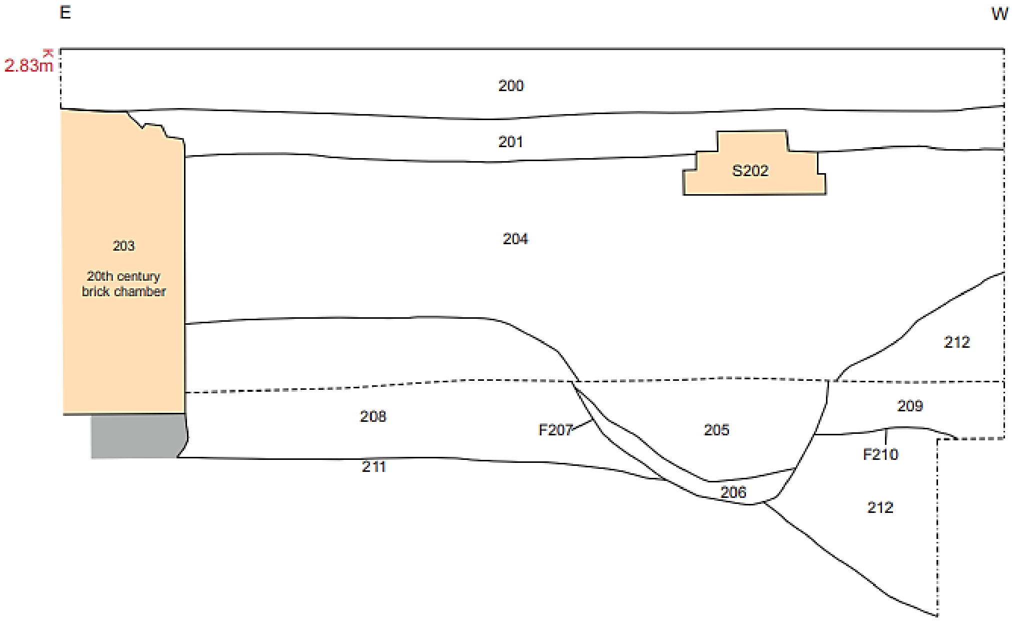


**Fig. 39: Section of trench 2, showing deposits 204, 205 and 206, at Lymington (taken from Clark 2017, Fig. 2b)**

### *4.10.3. Dorset Consumption Sites*

The harbours of Poole and Christchurch lie south of the Verwood area (Fig. 37). The former has been an extremely prosperous commercial hub, with a focus on maritime commerce for an extended period of time (Pitman *et al.* 2020). For the purposes of this study, it is the growing prosperity of the town from the 14th century that is of relevance. By the 15th century, the town was one of the largest on the south coast; its prosperity continued into the 17th century onwards due to the Newfoundland and Atlantic trade (Beamish *et al*. 1976, 1988; Andrews 2010), thus establishing it as a “considerable port and most populous in the county” of Dorset (Pigot and Co. 1830). Sherds were selected from a single site lying within the old town of Poole, published in Horsey (1992) as site PM9 in Thames Street. Here, a medieval building was identified with a postulated date for construction of c.AD1300; a date hypothesised due to an apparent association with the adjacent town cellars (Horsey 1992, pp.25-7). While the excavation revealed 10-12th century deposits, the aforementioned building went out of use during the 15th century, with subsequent various phases of re-development on the street frontage dated between 16-18th centuries, thus certain deposits from the site fit the date range for this study. Consequently, sherds from deposits 3 and 4 of 13-14th century date were selected for study, alongside those from deposit 10 and F35 (robber trench of wall 38) of 15/16th century date.

Many excavations have been undertaken within Christchurch, which has known Anglo-Saxon origins (Keen 1984) and is one of the burhs listed in the Burghal Hidage (Hill 1969). Christchurch is best known for its status as an ecclesiastical centre, with The Priory lying within the southern extent of the medieval town, but subsequent economical development of the town during the medieval period is well attested (Druitt 1934; Dyson 1955; Penn 1980, pp.38-9). The pottery recovered from urban domestic contexts was selected over that of an assemblage from The Priory, as the pottery recovered from the latter has a “much higher proportion of imported wares than the town” (Jarvis 1983, p.21). The Dolphin Development was selected as an example to represent Christchurch, situated on the corner of Wick and Church Street, published as site X11 by Jarvis (1983, pp.37-42). The excavation was undertaken in 1974/5 and initially comprised a trial excavation revealing 19th century deposits. These were removed by machine until the natural subsoil was reached along with those archaeological features cut deep enough to have survived; the pottery recovered from two such pits were sampled for analysis. The first comprises F82 - a pit containing pottery of 13-14th century date - with the second being pit F14, found in the watching brief phase, which was dated to the 15th century (Jarvis 1983, pp.38-9).

Numerous inland historic market centres lie close to Verwood and Alderholt, with the most noteworthy, Wimborne Minster, positioned southwest of Verwood. Wimborne has both Anglo-Saxon origins and a medieval ecclesiastical importance, having housed a monastery prior to AD705. By Domesday, the town is likely a minor market (Penn 1980, p.124), with substantial extension evident from the presence of the Leaze area on the south side of the town (Field 1973). Lay Subsidy Rolls dated 1332 suggest the town is relatively prosperous (Mills 1971), and despite decline evident in the late 14th century when the Leaze is abandoned (Field 1973), the hearth tax records show recovery by the 17th century (Meekings 1951). The samples chosen for analysis were selected from excavations undertaken by Wessex Archaeology in the High Street (W398 in Coe and Hawkes 1991), with sherds taken from well 63 and pits 39 and 42; these range in date from high medieval to early post-medieval.

Sherds of 13-14th century date were recovered from the excavation of the early post-medieval tile kiln north of Horton Tower, near HOR2, Dorset. This excavation has previously been outlined; however, two features were shown to contain only sherds of 13-14th century date alongside small amounts of animal bone, thus were considered part of domestic waste deposited into gullies. Sherds from contexts 102 and 116 were selected for analysis; the fabric of which corresponds with the Wessex Coarseware tradition, exhibiting inclusions comprising solely of quartz. Horton lies within the hinterland of Wimborne Minster - within 8km - thus represents a rural example of the sites potentially supplied from there.

Unfortunately medieval sherds from the site at Penny's Farm, Cranborne, identified by Mepham (Bellamy 2001) as probable Laverstock products, and therefore part of the Wessex Coarseware tradition, could not be located in the MED stores at the time of the analyses, thus were excluded.

The county town of Dorset, Dorchester, was also examined for assemblages containing pottery of potential east Dorset origin in the late medieval period. Dorchester has an extended history of being a regional capital, which stems from its Roman origins, with its role providing administration, economic and judicial services to the county continuing into the modern day. The town – positioned almost central to Dorset, where east meets west - provides an especially important location in relation to the Dorset ceramics market for the medieval and later periods. Both portions of the county have flourishing pottery production centres, and Dorchester is where interactions between the two can be best observed. The town's economic importance is attested by a market being recorded as taking place during the reign of Athelstan - AD925-39 - which continued into modern times (Penn 1980, p.60-1). The most well-known excavation, undertaken between 1981-83, forms that of Greyhound Yard, located in the core of the town (Woodward *et al.* 1993). Here, a large area, now occupied by shops fronting onto South Street and the Waitrose superstore, was excavated. Features of relevant date were examined for potential east Dorset products and fabrics which could be described as quartz-rich wares, yet relatively few examples were found.

The latter is corroborated by the fact that of those illustrated from pit 34 and well 204 (the 15th century part of the assemblage) almost all are West Dorset Sandy wares. This is unsurprising, as Spoerry's (1989, Fig. 6.3) C1 distribution is limited to just beyond Dorchester, with the thirteenth century West Dorset Sandy ware production centre at Hermitage located much closer (17km) than the nearest known source of Wessex Coarsewares (Wareham - 23km; Laverstock – 62km). In terms of sherds used in these analyses, samples were recovered from deposit 461, dated 14-15th century, in pit 36. Relevant pottery could not be found in the well 204 sub-group. Wessex Courseware sherds of 13-14th century date - evidenced by wheel turned rim forms - were sampled from deposit 2096 in shaft 1219.

Stratton is a historic village which has witnessed relatively little archaeological investigation, which lies within the hinterland of Dorchester, yet does not share the expected concentrations of pottery fabric types witnessed within the Greyhound Yard material. Excavations at the Old Manor House (Maw 2015) recovered large amounts of medieval and later pottery. The majority comprises Poole Harbour wares and an array of Wessex Coarsewares in large numbers, contrary to observations regarding the Greyhound Yard assemblage. For the post-medieval period, the assemblage is dominated by the presence of Verwood-type pottery products; this mirrors the nearby urban centre of Dorchester (Chapter 10). The site was selected for analysis based upon the nature of the recovered pottery fabrics, to ascertain if any items had a potential east Dorset provenance. Sherds were sampled from a range of fabrics deriving from different contexts ranging in date from the 12-16th century.

The northernmost market town within the county of Dorset is the historic settlement of Shaftesbury; lying approximately 20km to the northwest of the Verwood area. Similarly for many Dorset towns, Shaftesbury has Anglo-Saxon origins, which are evidenced by its listing in the Burghal Hidage (Hill 1969), and the foundation of a nunnery in AD877 (RCHME 1972, p.57). The Domesday entry reveals that the population is relatively large, second only to Wareham (Penn 1980, p.85). Numerous grants to the town in the 13th century show that Shaftesbury held fairs and had a prosperous market (Hutchins 1873, p.18). This prosperity is echoed in the 1332 Lay Subsidy Roll (Mills 1971, p.56), and appears to continue into the 15th century; the dissolution of the abbey coincides with a downturn in the fortunes of most Dorset towns - bar Poole - into the 18th century; however, the 17th century Hearth tax records show that the town remained relatively large in size (Meekings, 1951). Recent archaeological surveys and investigations have been undertaken in the town as part of a community-based project led by Dr Julian Richards, the aim of which was to understand the nature of the medieval abbey and its environs. To achieve this, a series of test pits were excavated across the town, specifically targeting the postulated area of the burh and the vicinity of the abbey (Richards *et al.* 2022). Following initial inspection, the pottery assemblages recovered from the test pit excavations show that test pits 6 and 16 have distinct stratigraphy, as suggested by relatively tight chronology in the sherds recovered from different deposits. Sherds in Wessex Coarseware fabric, along with potential uncertain finewares and early Verwood products, were selected from those trial pits.

Located within 6km to the northwest of Shaftesbury lies the modern urban centre of Gillingham. This area has a poorly understood past, having not been subjected to the same degree of intensive archaeological research as its neighbour, Shaftesbury. Domesday outlines that there were seven manors in the parish, one of which was a royal demesne (Penn 1980, p.68). The largest archaeological investigations, lying close to the centre of the medieval core of Gillingham, comprise those undertaken in the Chantry Fields area (Heaton 1992; Cox 1993; Valentin and Robinson 2002). Earthworks noted in the area by the RCHME (Heaton 1993, Fig. 2-3) show extensive medieval earthworks deriving from habitation, quarrying and the creation of field boundaries. The wider area was previously heavily forested, and large tracts of land were occupied by a Royal Forest from at least the early 13th century (Heaton 1993, p.97). The area has witnessed extensive modern growth, largely as a commuter town, with subsequent commercial developments providing numerous occasions for archaeological investigations, although relatively few within the core of the town.

The Gillingham Chantry Fields series of excavations were avoided for analysis due to several issues apparent in the project archives; these included modern intrusion into post-medieval contexts (Heaton 1992, p.117), no thorough analysis of the post-medieval pottery (Cox 1993, p.132), and certain elements containing very few sherds of late medieval to early post-medieval date (Valentin and Robinson 2002, p.42). Instead, a recently excavated site was examined and used due to the high numbers of late medieval and early post-medieval pottery recovered. The site lies on the southeast outskirts of Gillingham, adjacent to Park Farm and likely represents either an assartment from the nearby Ham Common or former forest, or an earlier building related to nearby Higher Ham Farm, now occupied by a Sydenhams Tool Centre. The pottery was recovered from a single dwelling with associated features, excavated by AC archaeology Ltd (In Prep) between 2020-1.

The final excavation which recovered material relevant to these analyses was that of East Worth. This site has already been outlined as one of the control group, but pottery ranging in date from the 12-16th century was also recovered here (Carter 2021b). Various clay and sand extraction pits, plus ditches, were excavated; these contained pottery, fired clay and burnt stone. There were no readily identifiable wasters within this assemblage; however, a small selection of vessels displayed signs of being potentially functional pottery waste *i.e.* spalling limited to the exterior, kiln scars and partial glaze covering only part of broken edges, which suggests the infilling of cracks rather than glaze pouring over the edge of a completely broken sherd. Features sampled include pit F113 - dated to the 14-15th century - plus pits F502 and F443, both datable to the early post-medieval period.

The notion of certain sites playing minor roles to larger nearby urban centres is a generalisation, and it is accepted that the roles performed by certain urban centres is more nuanced than the oversimplification proposed here to explain the distribution of certain sites selected for analyses. For example, the relationships between coastal ports during the late medieval/early post-medieval period is particularly complex – as exemplified by the relationship between Southampton and Lymington. Southampton is often perceived as the principle port of import and export for both the Winchester and Salisbury regions (Hicks 2015), yet Lymington also provided this service - as evidenced in 1434, when a Salisbury merchant complained over the detention of his ship the Marie of Lymington (Page 1911), and in 1325, when the men of Southampton formally lodged a complaint with the Crown that Lymington was encroaching on the customs from the French Wine trade (Page 1911). Similarly, crude generalisations about inland markets, whose various hinterlands must have had vastly overlapping zones of economic influence, which assume that the nearest marketplace supplied every good required by a given local population, including pottery, was almost certainly not the case. However, the simplification is proposed as one way to explain potential pathways for the movement of pottery to a given rural area in the late medieval/early post-medieval periods.

The range of sites selected for analysis is relevant to the subject of east Dorset pottery production and distribution. The collection is geographically broad across the area in question, and chronologically restricted to the late medieval to early post-medieval periods.

# 5. Analysis of Results

In Chapter 3, the importance of a staged approach to pottery analysis addressing provenance was presented. Following this, in Chapter 4, the selection of appropriate samples was proposed, and the results of said samples will be outlined here. Thin section samples were examined in line with the proposed methodology, with the detailed fabric analysis for each sample outlined in Appendix VII. The methodology for the chemical analysis is outlined in Chapter 3.

## *5.1. Visual Analysis of Samples from Clay Sources*

Using basic fabric analysis, the fired clay block samples from locations outlined in Chapter 4 exhibit visual difference between locations sampled. For the Trigon (Wareham) sample, the clay matrix appears visually and texturally similar to East Holme whitewares, and visually comparable to medieval Wareham whitewares from the Pound Lane kiln. The east Dorset clay samples show little variation, bar the West Park Farm sample from Wimborne; this is considered a poor clay source for pottery, being heavily friable post-firing. The south Wiltshire clay samples display a great degree of difference. Those from Farley prove to be iron-rich, based on the dark red firing colour in an oxidising atmosphere, with the Petersfinger sample closely representing the mid-reddish yellow oxidised firing colour often witnessed in Laverstock finewares. However, the Petersfinger clay sample does appear to be coarser than the finewares in question.

In conclusion, all samples plausibly relate visually to the nearby historic pottery production centres for which they were chosen to represent, bar those from Wimborne and Farley. The former is considered unlikely to have been a source for any pottery manufacture at all, and the latter, though suitable for potting, bears limited visual resemblance to Laverstock wares.

## *5.2. Thin Section Petrographic Analysis of Samples from Clay Sources*

The petrographic thin section samples of the clays reveal the differences witnessed at a basic level in greater detail (Fig. 40a-c). The Trigon sample is distinct from all others in terms of matrix colour and the fine fraction of inclusions comprising the most abundant aspect of the clay, which is mirrored only in the East Worth sample.

The two clay samples from Horton – one of London, the other of Reading - are remarkably different. The latter has less frequent, and smaller, inclusions than the former, which is coarser. This is mirrored in the Crendell samples of London and Reading clay. The London clay sample from Old Claygrounds, Crendell, closely resembles its counterpart sample recovered from nearby, but exhibits more matrix than inclusions – probably a feature of natural variation. The Crendell Reading clay sample is relatively fine grained, which may explain why the clay was so sought after (Chapter 4). The Horton clays can be discriminated from their Crendell counterparts due to increased frequency of ferruginous inclusions, but otherwise are similar.

The Verwood Broadstone clay differs vastly from East Worth, being a well-stratified clayey sand rather than a workable clay. The Verwood Broadstone clay sample can be distinguished from other east Dorset samples, being much coarser and including rare glauconite and muscovite.

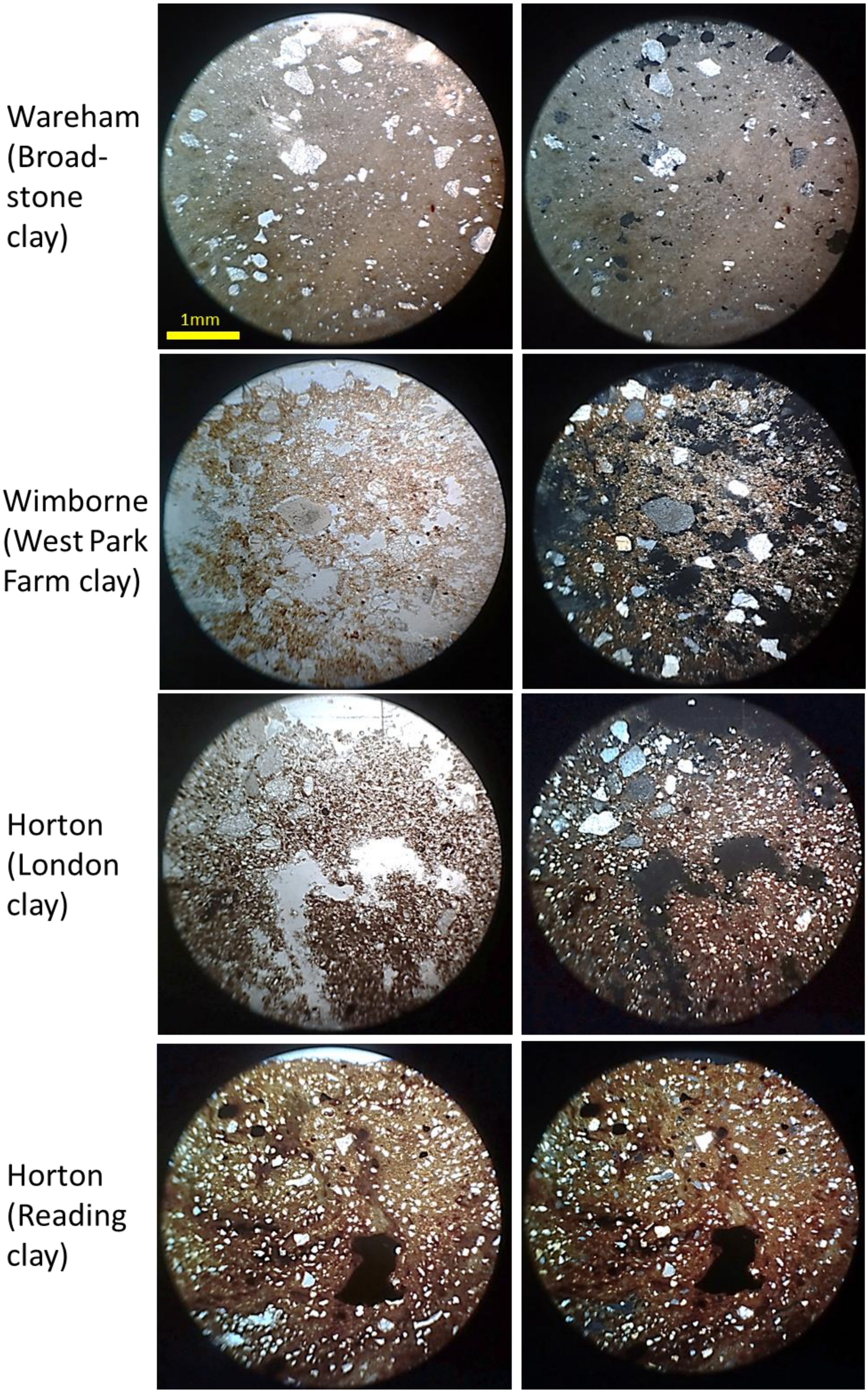


**Fig. 40a: Photomicrograph of petrographic thin section samples of relevant clays; left: Plane Polarising Light (PPL); right: Crossed Polarised Light (XP); all same scale**

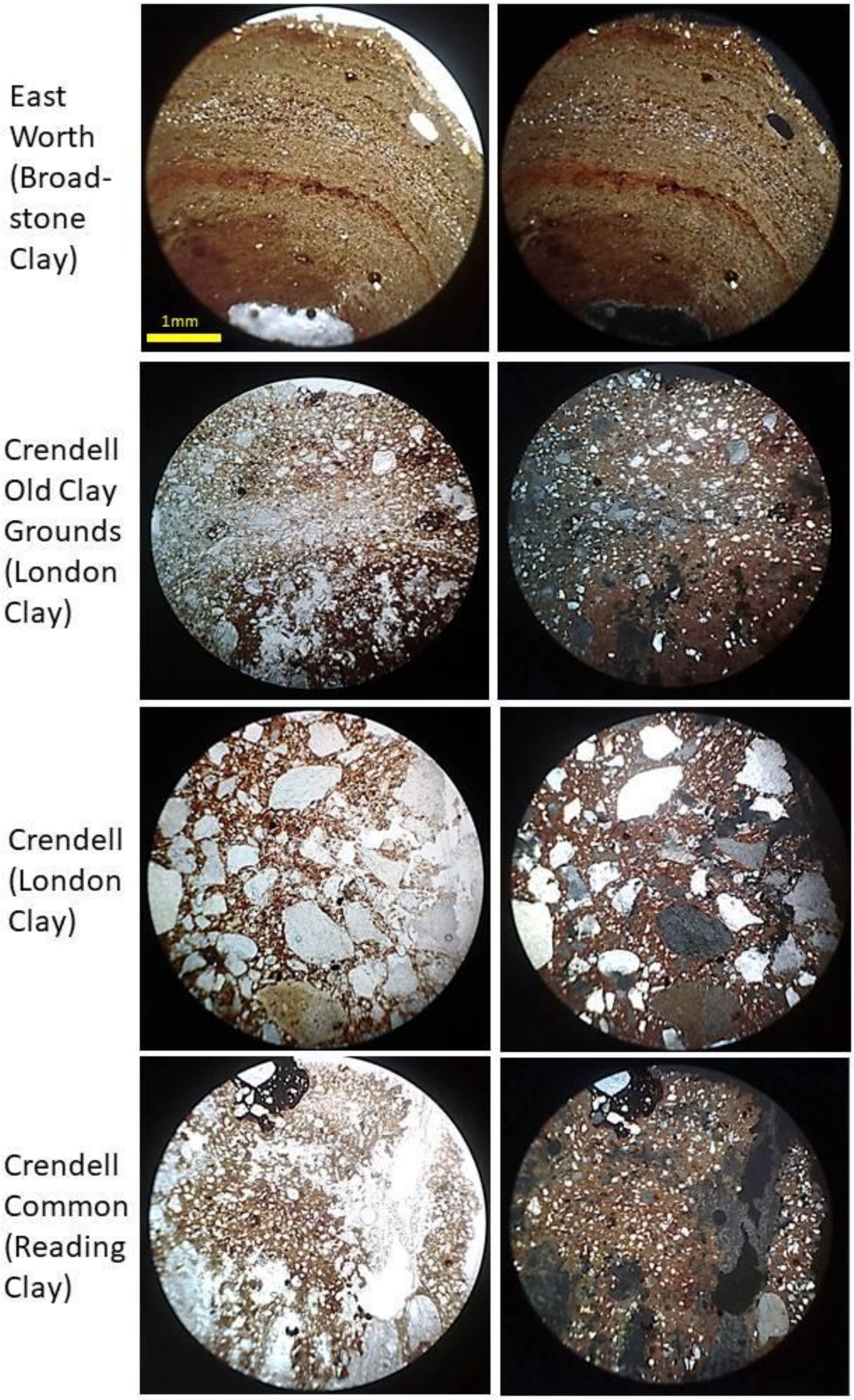


**Fig. 40b: Photomicrograph of petrographic thin section samples of relevant clays; left: PPL; right: XP; all same scale**

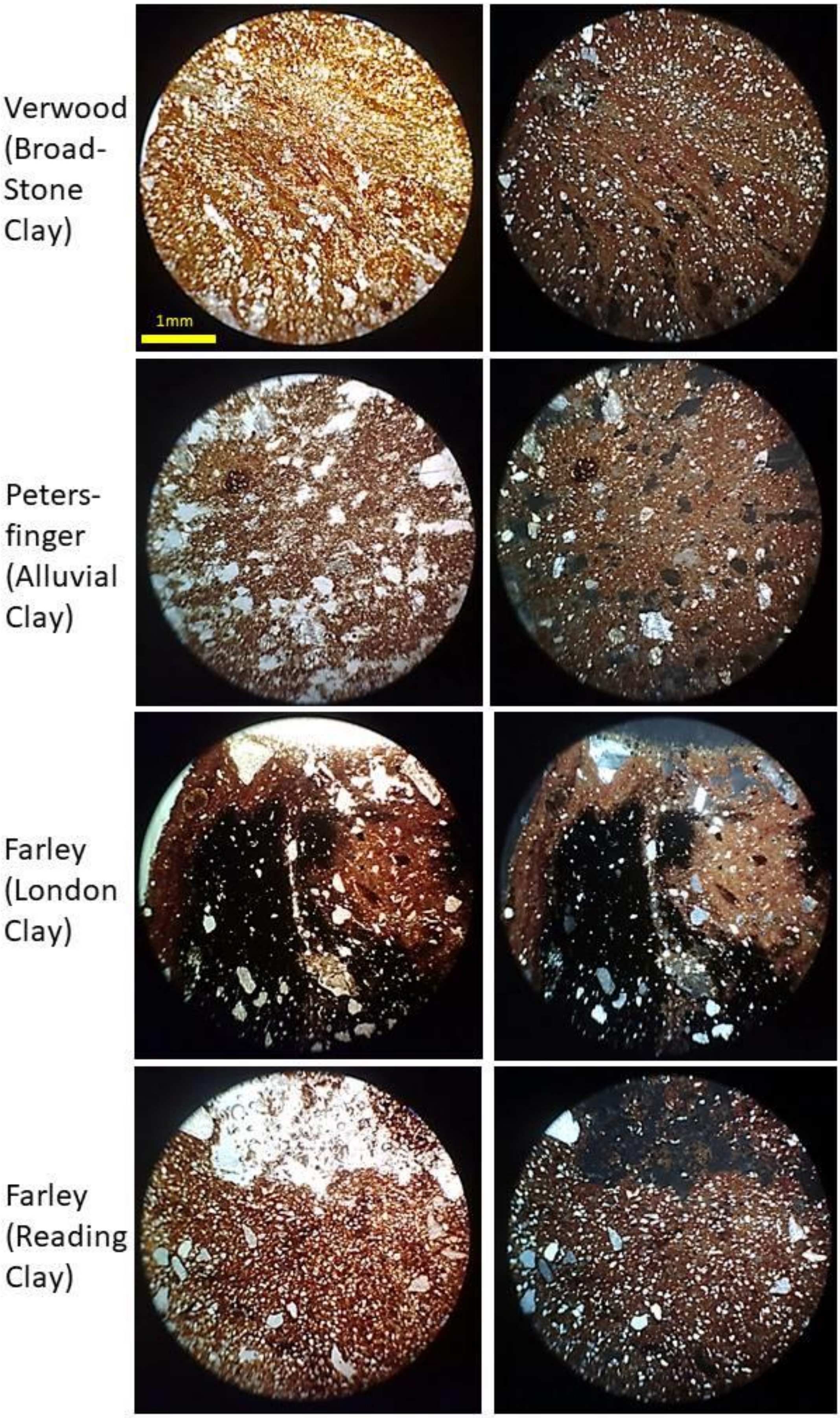


**Fig. 40c: Photomicrograph of petrographic thin section samples of relevant clays; left: PPL; right: XP; all same scale**

The presence of muscovite in the Verwood samples is comparable with that from both Farley (Reading and London clays) and Petersfinger (alluvial clay). The iron-rich nature of the Farley samples allows immediate visual discrimination, but the Petersfinger samples bear a close resemblance to those from Verwood, although with less textural features – likely due to its mixed alluvial nature.

In summary, London and Reading clays in the east Dorset area are discernibly different, with Horton being instantly recognisable. The Verwood sample resembles those from Petersfinger, with a less mixed matrix, while the Farley, East Worth, and Trigon samples are notably unique.

## *5.3. Chemical Analysis Results by pXRF*

### *5.3.1. Raw Data*

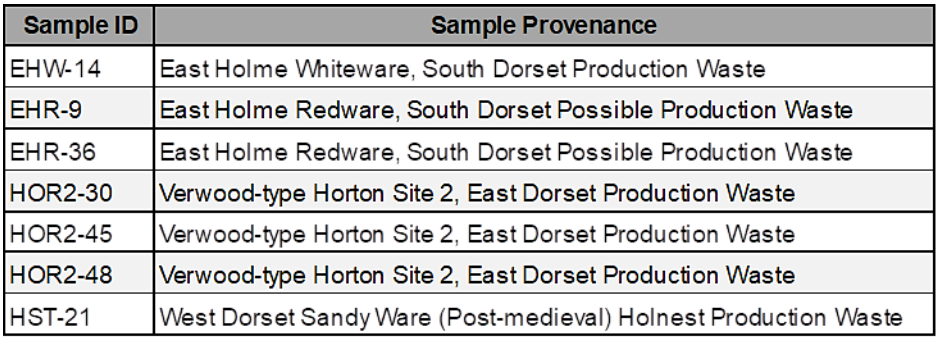
Initial evaluation of the collected chemical data using pXRF reveals that certain elements measurable by the equipment are unsuitable for use, due to the rigorous statistical analysis of the type required to successfully assign provenance between known and unknown groups of samples. Table 7 (Chapter 3) displayed the range of elements able to be collected by a Niton XL3t GOLDD+ pXRF. Firstly, despite taking three measurements per sample, not all of these consistently provide results for the elements listed. Often, the equipment deduced the concentration of certain elements to be below the limit of detection (<LOD), thus providing no measurement for that given variable or element; this means that they could not be used for meaningful statistical analyses, as there is no numerical value to be compared. Secondly, only a limited number of said elements possessed accredited concentrations in the certified reference material (CRM – Chapter 3) and the internal standards to which the collected results must adhere to ensure the measured data from samples could be corroborated. Table 33 shows the elements that the pXRF equipment measured, but could not be employed in the subsequent statistical analysis.

### Table 33: Reasons for Exclusion of Certain Elements from the Statistical Analysis of the Results

| Chemical Symbol for Element | Element Name | Reason for not being included in statistical analysis | Results from pilot study |
|---|---|---|---|
| Ag | Silver | Not measured in standards.<br>Returned limited results for unprovenanced group. | Provides no significant discrimination. |
| As | Arsenic | Rarely returned measurement across all groups.<br>Observations suggest the concentration is often dependant on amount of glaze used and leached into fabric. | Provides significant discrimination. |
| Au | Gold | Rarely returned measurement across all groups.<br>Returned limited results for unprovenanced group. | Provides no significant discrimination. |
| Bi | Bismuth | Returned limited results for unprovenanced and control group. | Provides no significant discrimination. |
| Cd | Cadmium | Not measured in standards. Rarely returns measurement across all sample groups. | Provides no significant discrimination. |
| Cl | Chlorine | Not measured in standards. Limited results for unprovenanced group. | Provides significant discrimination. |
| Co | Cobalt | Rarely returned measurement across all groups.<br>Limited results for unprovenanced group | Provides no significant discrimination. |
| Cu | Copper | Rarely returned measurement across all groups.<br>Limited results for unprovenanced group. | Provides no significant discrimination. |
| Mg | Magnesium | Not measured in standards.<br>Rarely returned measurement across all groups.<br>Limited results for unprovenanced group. | Provides no significant discrimination. |
| Mn | Manganese | Rarely returned measurement across all groups.<br>Limited results for unprovenanced group. | Provides no significant discrimination. |
| Mo | Molybdenum | Rarely returned measurement across all groups.<br>Limited results for unprovenanced group. | Provides no significant discrimination. |
| Ni | Nickel | Rarely returned measurement across all groups.<br>Limited results for unprovenanced group. | Provides no significant discrimination. |
| P | Phosphorus | Low levels of precision when accuracy compared to measured standard (see Table 36).<br>Rarely returned measurement across certain control groups.<br>Limited results for unprovenanced group. | Provides significant discrimination. |
| Pb | Lead | Rarely returned measurement across all groups.<br>Often dependant on amount of glaze used and leached into fabric. This is more prolific over chronological time within samples, adding a chronological bias to samples for this element. | Provides significant discrimination. |
| Pd | Paladium | Not measured in standards.<br>Rarely returned measurement across all groups.<br>Limited results for unprovenanced group. | Provides no significant discrimination. |
| S | Sulphur | Low levels of precision when accuracy compared to measured standard (see Table 36).<br>Rarely returned measurement across all groups.<br>Observations suggest the concentration is often dependant on amount of glaze used and leached into fabric. | Provides no significant discrimination. |
| Sb | Antimony | Not measured in standards.<br>Rarely returned measurement across all groups.<br>Limited results for unprovenanced group. | Provides no significant discrimination. |
| Se | Selenium | Not measured in standards.<br>Rarely returned measurement across all groups.<br>Limited results for unprovenanced group. | Provides no significant discrimination. |
| Sn | Tin | Not measured in standards.<br>Rarely returned measurement across all groups.<br>Limited results for unprovenanced group. | Provides no significant discrimination. |
| W | Tungsten | Rarely returned measurement across certain control groups.<br>Limited results for unprovenanced group. | Provides no significant discrimination. |

Results for calcium were particularly problematic; seven samples, from a total of 986 presented for chemical analysis, returned values for calcium that were below levels of detection (<LOD). Normally, this would discount the use of this element for statistical analysis, for the reasons outlined above. However, as the seven samples all occur in the control group, the decision was made to substitute the missing value with the relevant group median. This decision was not taken lightly, but it was determined that as calcium was evidenced to be a primary driver in discrimination between samples in the pilot study, it could not be removed entirely without risking a lack of discernible discrimination (Chapter 3, Table 27). The pilot study showed that calcium was the second most important element for determining discrimination between four sites relevant to the study area, having an effect size of between 61-99% for four out of six statistical tests. In short, this element was too important to discount, and the replacement of the relevant group median was limited to four groups in the known control portion of the study. Furthermore, this affected a minimal number of samples in the study - accounting for only 0.7%. Table 34 shows the samples and groups that this group median was applied to. Excluding these samples from the statistical analysis is considered to have overly limited the Horton (HOR2) control group by removing 13 remaining variables - a total of 41 values. This is of particular concern, as outliers in the data may have to be removed further in the analysis to enable the use of certain statistical analyses.

**Table 34: Samples with Values Returning <LOD for Calcium, then Substituted with Group Median**



| Sample ID | Sample Provenance |
|---|---|
| EHW-14 | East Holme Whiteware, South Dorset Production Waste |
| EHR-9 | East Holme Redware, South Dorset Possible Production Waste |
| EHR-36 | East Holme Redware, South Dorset Possible Production Waste |
| HOR2-30 | Verwood-type Horton Site 2, East Dorset Production Waste |
| HOR2-45 | Verwood-type Horton Site 2, East Dorset Production Waste |
| HOR2-48 | Verwood-type Horton Site 2, East Dorset Production Waste |
| HST-21 | West Dorset Sandy Ware (Post-medieval) Holnest Production Waste |

With the retention of calcium as a variable for the statistical analysis, the total number of elements used comprise 14, including Al (aluminium), Ba (barium), Ca (calcium), Cr (chromium), Fe (iron), K (potassium), Nb (niobium), Rb (rubidium), Si (silicon), Sr (strontium), Ti (titanium), V (vanadium), Zn (zinc) and Zr (zirconium).

The requirement for a CRM was readily apparent due to the lengthy nature of this study, as data collection was undertaken over a three-year period (four, including the pilot study). During this time, the equipment underwent regular calibration; this tended to add to the ‘drift’ of results over time. The drift of measurements recorded using a pXRF over a long period of time can substantially alter the findings of a project (Holmquist 2016). To limit this, batches of results were continuously related back to the same CRM, which was measured every 30 samples in line with the methodology (Chapter 3). By tracking the difference quantified between measured CRM values - in this case Till-4 - for a given element, and the published values of the CRM, it is possible to calculate the relative accuracy of the pXRF. As the published internationally recognised values of the CRM were measured using different equipment and a different method (for Till-4, this was ICP-AES and ICP-MS) they will never be completely identical, but should be within an acceptable range. The calculated accuracy range for elements measured with the pXRF, in comparison to the measured CRM Till-4, is presented in Table 35 and a high difference between higher and lower range values shows that there is a large degree of drift, with the contrary being the case for low difference. The measurements collected from samples were constantly related back to the CRM in the aforementioned batches, occasionally leading to certain values returning results in negative numbers. These resulted from the low level of accuracy for certain elements, but would ensure internal consistence despite significant drift (*e.g.* sulphur (S) - Table 36). This was caused by drawing a direct off-set from the published value for a given variable in the CRM, and the value measured by the pXRF. This was chosen over a linear regression, employing every CRM measurement over the length of the study (*e.g.* Holmqvist 2016, pp.336-7), as there were concerns that the 114 measurements of the CRM over several years would absorb the aforementioned drift, thus potentially reduce the likelihood of defining similarity between groups of known and unknown pottery. A direct off-set ensures that the data is internally consistent and provides a robust method of combating drift, especially when the time taken to collect the data is as long as it is here; this allows chemical difference to be identified between pottery from different origins, and similar groups to be successfully identified across a large number of samples. The amended data - in line with the CRM - was submitted for statistical analysis.

Accuracy was calculated using the following formula:

$$\frac{(\text{measured value} - \text{certified value})}{\text{certified value}} \text{ X } 100\%$$

**Table 35: Calculated Relative Accuracies for pXRF Analyses in this Study, using Till-4 CRM**

| | Accuracy | | |
|---|---|---|---|
| **Element** | **Min** | **Max** | **Median** |
| **Rb** | -57% | -55% | -56% |
| **Nb** | -1% | 15% | 6% |
| **Sr** | -27% | -24% | -26% |
| **Zr** | -23% | -13% | -20% |
| **Fe** | -5% | -3% | -4% |
| **Al** | -41% | -24% | -31% |
| **Si** | -28% | -17% | -21% |
| **P** | 64% | 121% | 94% |
| **K** | -33% | -27% | -31% |
| **S** | 64% | 143% | 96% |
| **Ca** | -60% | -51% | -54% |
| **Ti** | -37% | -28% | -32% |
| **V** | 68% | 147% | 104% |
| **Cr** | 63% | 135% | 98% |
| **Zn** | -26% | -4% | -15% |
| **Ba** | 1% | 15% | 6% |
| **Bi** | 41% | 64% | 51% |

**Minus accuracy will give a measurement below that of the measured standard*

For the 14 elements proposed for use in statistical analyses, many of the variables showed high degrees of kurtosis and skewness (*e.g.* collectively, Cr has a kurtosis of 194.304 and a skewness of 9.579 – Appendix VIII). Two tests of normality were run on the data; a Kolmogorov-Smirnov (KS) and a Shapiro-Wilkes (SW) test (Appendix VIII). For these, the null hypothesis is that the data follow a normal distribution. The results for all groups failed to reject the null hypothesis, suggesting that all groups - bar the results for zirconium - were normally distributed. Outliers were also noted, as shown in Table 36.

Table 36: Outliers in Raw Data Before and After Transformation

| Data | | Transformed Data |
|---|---|---|
| **Element** | **Cases** | **Cases** |
| **Ba** | 1, 2, 985, 986 | 1,2 |
| **Zn** | 371, 722, 975, 618, 802, 147 | 371, 618, 802, 147 |
| **Cr** | 473, 287 | 287, 473 |
| **V** | 250, 162, 764, 715, 965, 388, 579, 555, 630, 615, 156 | 162, 715, 764, 338, 154, 4 |
| **Ti** | 835, 714, 1, 834, 956 | 849 |
| **Ca** | 67, 297, 61, 405, 658, 420, 66 | 67, 320, 883, 331, 338 |
| **K** | 973, 318, 53, 886 | 109, 9 |
| **Si** | 973, 471, 270, 309, 954, | 973 |
| **Al** | 973 | 973 |
| **Fe** | 824 | 973 |
| **Zr** | 668, 58, 60, 973 | 973 |
| **Sr** | 371, 794, 986, 900, 765, 722, 980, 973 | 973, 371 |
| **Nb** | 973, 714 | 973 |
| **Rb** | 961, 109, 289, 9, 100, 78, 257 | 109, 289 |

### *5.3.2. The Data Transformed into Logarithms to Base 10 with Added Constant*

Due to the lack of normal distribution of zirconium, and the large numbers of outliers, it was decided to use a transform into logarithms to base 10 (log10) to compress the data, thereby reducing skewness and kurtosis - which have already been highlighted as high for certain variables. It was hoped that this would also reduce the number of outliers. Due to certain variables containing numerical negative values - a product of the aforementioned direct off-set CRM amendment to the measured values to achieve the corroborated raw data - a standard log10 transform will not return an appropriate value. To counter this, a constant of 40 was added to all variables prior to applying the transform to ensure that the log10 could be applied. This value was chosen as sample EDM1-23 returned a value of -37.2 for zinc after being amended in line with the measured CRM.

The application of the log10 transform reduced skewness and kurtosis (Appendix IX), whilst successfully reducing the amount of outliers (Table 36). Due to six occurrences of the East Worth clay sample (case no. 936) being an outlier for multiple variables, the sample was removed from the statistical analyses. This is considered acceptable as, being an outlier for so many variables, it is unlikely to match with any other samples. Following this, tests of normality also failed to reject the null hypothesis, suggesting all variables were now normally distributed (Appendix IX).

### 5.3.3. Discriminant Function Analysis of Log10 Data

The aim of a Discriminant Function Analysis (DFA) is to reduce a large set of variables into a smaller set of more understandable factors; this is achieved by employing linear modelling (Field 2018, p.779). Any correlations between pairs of variables can be tabulated, and common variances identified - whether positive (*i.e.* both increase at a certain rate) or negative (*i.e.* both decrease at a certain rate). Correlations between these variances are explained “using the smallest amount of explanatory constructs” (Field 2018, p.780); this allows difference and commonality to be plotted based on illustrative relationships, which are termed functions or factors in a Principal Component Analysis (PCA). It is known that the sample groups derive from different sources, thus a DFA - rather than PCA - has been employed. A PCA uses similar multivariate linear modelling to explain total variance in sample groups, rather than common variance between groups.

Furthermore, when using the Statistical Package for Social Scientists (SPSS v.28), a DFA can be used to produce a probability score for the likelihood of a given case, or sample, being assigned to a particular group – using the aforementioned functions. This allows determination as to whether the prediction should be accepted, thus is the test required to meet the research question.

DFA has certain assumptions of the data to achieve more reliable results. The first assumption - that the data are parametric with normally distributed variables and limited outliers - has already been met. Secondly, there must be homogeneity of variance, *i.e.* do like variances exist between independent groups? The results of a Levene’s test fails to reject the null hypothesis; this suggests that, when grouped by site, the variables being compared all have equal population variances (Levene 1960; Appendix IX).

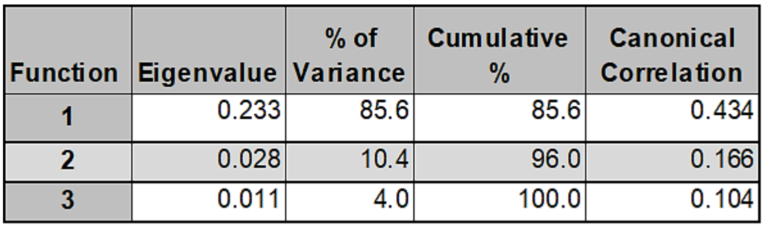
One further assumption is that limited multicollinearity exists between variables. For example, when two or more variables are highly correlated with each other, they have an association and do not show independent information between groups. This can be ascertained using a variance inflation factor (VIF). The VIF for all variables is shown in Appendix IX, which reveals that when site is the dependant variable, only titanium has a high VIF score (+5), although it is not considered high enough to inhibit its use for a DFA.

When all these conditions are considered, all 14 aforementioned variables are deemed appropriate to include in a DFA. Three DFA tests were run in SPSS in relation to the research question. The first analysed the clay sources, to understand the differences between clay groups and to ascertain if any pottery samples could be linked directly to samples from known geographical locations (bar East Worth).

## 5.4. Statistical Analysis 1 (DFA): Chemical Analysis by pXRF of Samples from Clay Sources

The first DFA used three of 14 available variables, comprising vanadium, zirconium and niobium. The analysis attempted to assign cases to the clay samples, however the resultant eigenvalues for the DFA, outlined in Table 37, are considered too low to reliably explain the variance between samples; only three of the 14 variables passed the Wilk’s Lambda (with f being <3.84). An eigenvalue is a numerical scalar expression associated with a set of linear calculations from within a matrix of calculations. The higher the value, the more effective the correlations at defining difference.

**Table 37: Eigenvalues for Discriminant Function Analysis 1**



| Function | Eigenvalue | % of Variance | Cumulative % | Canonical Correlation |
|---|---|---|---|---|
| 1 | 0.233 | 85.6 | 85.6 | 0.434 |
| 2 | 0.028 | 10.4 | 96.0 | 0.166 |
| 3 | 0.011 | 4.0 | 100.0 | 0.104 |

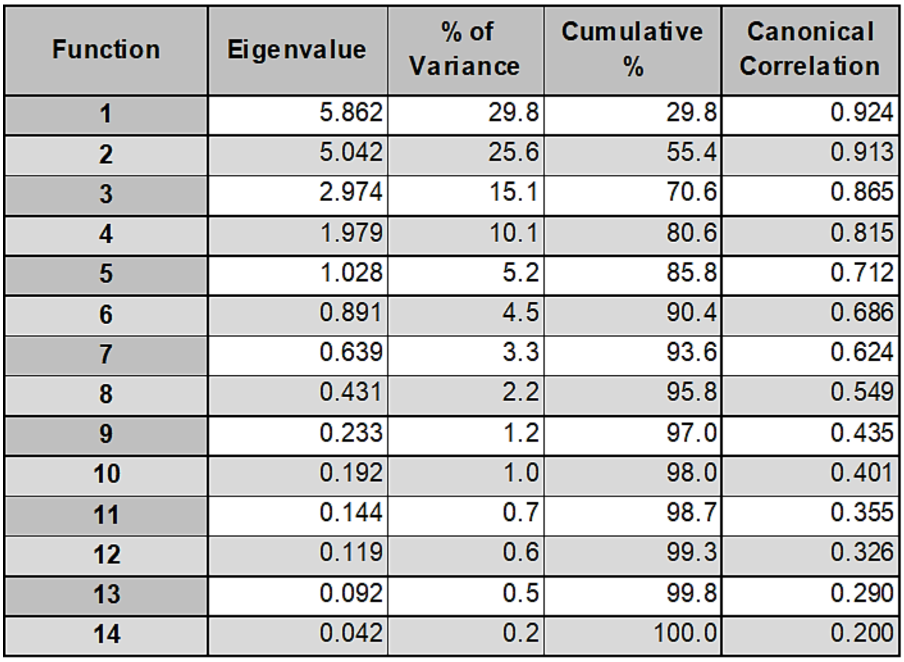
The canonical correlations for the first eigenvalue represent an effect size of sorts, revealing that none of these functions pass an acceptable limit of 0.5; this is despite 96% of the variance being explained with functions 1 and 2.

The decision was made to undertake a second DFA, grouping samples by collection unit (site) into 39 distinct groups; all 985 cases were included in the analysis.

### *5.5. Statistical Analysis 2 (DFA): Chemical Analysis by pXRF of Samples from Clay Sources*

The second DFA used all 14 variables in the analysis, with the first five functions having acceptable eigenvalues out of the 14 created.

**Table 38: Eigenvalues for Discriminant Function Analysis 2**



| Function | Eigenvalue | % of Variance | Cumulative % | Canonical Correlation |
|---|---|---|---|---|
| 1 | 5.862 | 29.8 | 29.8 | 0.924 |
| 2 | 5.042 | 25.6 | 55.4 | 0.913 |
| 3 | 2.974 | 15.1 | 70.6 | 0.865 |
| 4 | 1.979 | 10.1 | 80.6 | 0.815 |
| 5 | 1.028 | 5.2 | 85.8 | 0.712 |
| 6 | 0.891 | 4.5 | 90.4 | 0.686 |
| 7 | 0.639 | 3.3 | 93.6 | 0.624 |
| 8 | 0.431 | 2.2 | 95.8 | 0.549 |
| 9 | 0.233 | 1.2 | 97.0 | 0.435 |
| 10 | 0.192 | 1.0 | 98.0 | 0.401 |
| 11 | 0.144 | 0.7 | 98.7 | 0.355 |
| 12 | 0.119 | 0.6 | 99.3 | 0.326 |
| 13 | 0.092 | 0.5 | 99.8 | 0.290 |
| 14 | 0.042 | 0.2 | 100.0 | 0.200 |

Canonical correlation shows relatively high effect scores for the first seven functions; however, the Wilks' Lambda statistic (Appendix VIII) suggests that the majority of the difference is explained in the first four. This is corroborated by the cumulative variance and eigenvalues in Table 38, suggesting that the first four functions are most useful in explaining variance, thus in predicting group membership to known pottery production sites.

Through plotting the results of functions 1 and 2 from the second DFA test, it is possible to visually present the differences and similarities between the clay sites sampled (excluding East Worth).

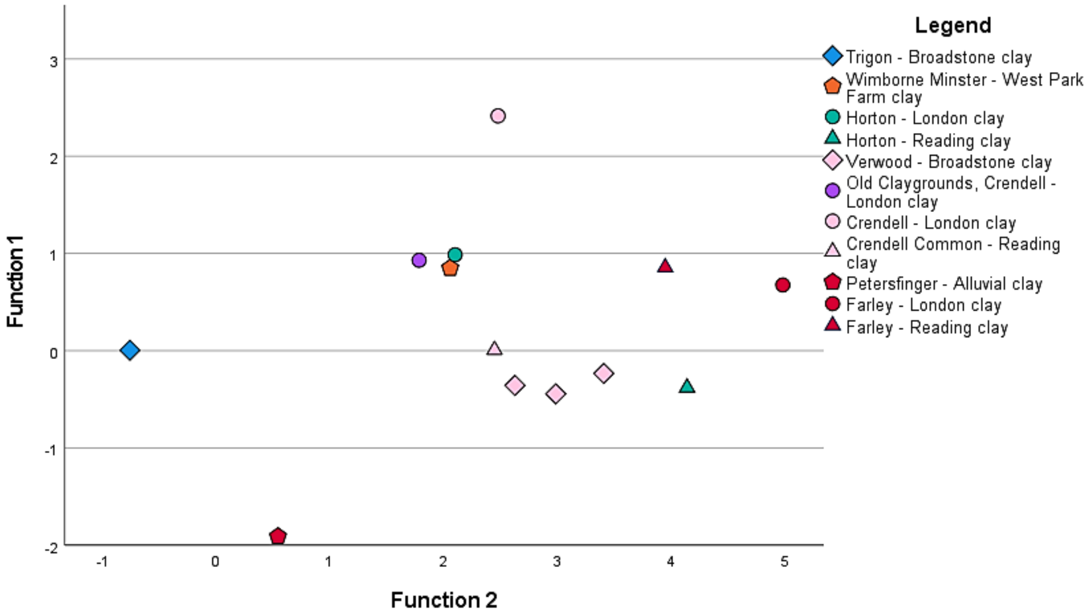


**Fig. 41: Plot of Discriminant scores from functions 1 and 2 for DFA 2 – clay samples only**

Fig. 41 shows significant variation between clay samples, despite these being from the same geological group (*e.g.* Broadstone clay shown with a diamond, Reading clay with a triangle). Additionally, the geographical difference between east Dorset (pink and purple), south Dorset (blue), and south Wiltshire samples (red) is reflected chemically.

An exploration as to what is driving these function scores is expressed in Table 39.

**Table 39: Standardised Canonical Discriminant Function Coefficients for All Functions in DFA 2**

| | Function | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| **RbLG10** | 0.284 | 0.115 | -0.841 | 0.859 | 0.387 | -0.438 | 0.007 | -0.460 | 0.115 | 0.081 | -0.133 | -0.412 | 0.238 | -0.034 |
| **NbLG10** | -0.087 | 0.034 | 0.307 | -0.540 | -0.151 | -0.680 | -0.344 | 1.043 | -0.625 | -0.324 | -0.962 | 0.002 | -0.025 | 0.196 |
| **SrLG10** | -0.171 | -0.136 | 0.056 | -0.045 | 0.797 | 0.259 | 0.081 | 0.454 | -0.222 | 0.161 | 0.285 | 0.072 | -0.339 | -0.029 |
| **ZrLG10** | -0.321 | -0.034 | 0.115 | 0.586 | 0.084 | 0.516 | -0.323 | -0.126 | 0.080 | 0.379 | -0.200 | 0.608 | -0.258 | 0.017 |
| **FeLG10** | -0.089 | 0.606 | 0.510 | 0.144 | 0.285 | 0.100 | 0.500 | -0.249 | -0.567 | -0.131 | -0.024 | -0.056 | 0.422 | 0.209 |
| **AlLG10** | -0.570 | -0.928 | -0.084 | -0.151 | -0.285 | 0.370 | 0.758 | 0.041 | 0.014 | -0.194 | -0.519 | 0.395 | 0.091 | 0.832 |
| **SiLG10** | 0.418 | 0.687 | 0.288 | -0.077 | 0.394 | -0.216 | -0.930 | 0.081 | 0.822 | -0.118 | 0.203 | -0.432 | 0.151 | 0.034 |
| **KLG10** | 0.241 | 0.452 | -0.175 | -0.751 | -0.480 | 0.672 | -0.017 | 0.188 | -0.270 | -0.103 | 0.214 | 0.354 | -0.183 | 0.220 |
| **CaLG10** | 0.881 | -0.230 | 0.204 | 0.308 | -0.227 | 0.054 | 0.105 | 0.105 | 0.179 | -0.019 | 0.144 | 0.088 | 0.173 | 0.257 |
| **TiLG10** | 0.093 | -0.083 | -0.147 | 0.586 | -0.358 | 0.445 | 0.243 | -0.571 | -0.181 | 0.657 | 1.344 | -0.843 | 0.248 | -0.241 |
| **VLG10** | -0.161 | -0.022 | -0.059 | -0.081 | 0.058 | -0.527 | -0.164 | 0.092 | 0.134 | 0.127 | 0.520 | 0.659 | 0.326 | 0.078 |
| **CrLG10** | 0.062 | 0.125 | -0.159 | 0.186 | -0.242 | -0.340 | 0.072 | 0.399 | 0.667 | -0.381 | -0.101 | 0.014 | -0.915 | -0.253 |
| **ZnLG10** | -0.006 | 0.162 | 0.017 | -0.203 | -0.047 | -0.250 | 0.099 | 0.012 | 0.339 | 0.869 | -0.341 | -0.103 | 0.055 | 0.087 |
| **BaLG10** | -0.254 | -0.045 | 0.103 | 0.207 | -0.192 | 0.393 | 0.029 | 0.431 | 0.386 | -0.096 | -0.006 | -0.175 | 0.530 | -0.524 |

Here, calcium (CaLG10) can be shown to have a high coefficient for function 1; this suggests that a sample with a high function 1 score could be driven by a high value in the calcium variable. Furthermore, aluminium and silicon - the most predominant chemical components in most clays - have highly negative coefficients, leading to a lower score in this function. Iron also has an above moderate effect on the scores calculated for function 2; this data supports the pilot study, which highlighted both iron and calcium as primary drivers of discrimination in pottery from the Hampshire/Dorset border. However, it could be argued that the coefficient of calcium (with a value of 0.881) in function 1 is overly affecting the scores. When calcium and iron are plotted against each other for all cases, calcium is shown to be most prolific in Laverstock samples. This clarifies that while its affect size is large, it is not abundantly present across most samples, thus limitation is necessary to enable greater scrutiny in discrimination of all sample groups (Fig. 42). This can be achieved by plotting functions 2 and 3 (Fig. 43), where the coefficient values of calcium are -0.230 and 0.204 respectively. Moving to function 4, a rise in the coefficient of certain trace elements (*e.g.* Ti with a coefficient of 0.586 and K with -0.751) is evident; this may be beneficial in determining provenance when the pottery is plotted in comparison to known groups.

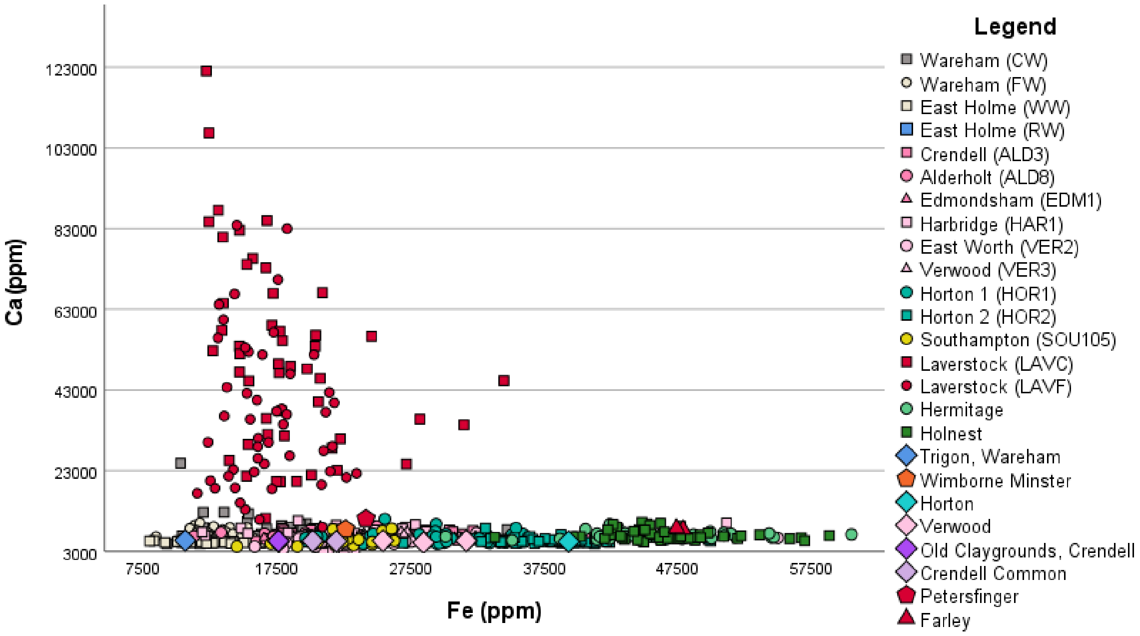


**Fig. 42: Plot of results for calcium and iron for clay samples and known pottery control group**

In summary, it seems most effective to visually illustrate difference within the clays and control group by plotting functions 2 and 3 (Fig. 43).

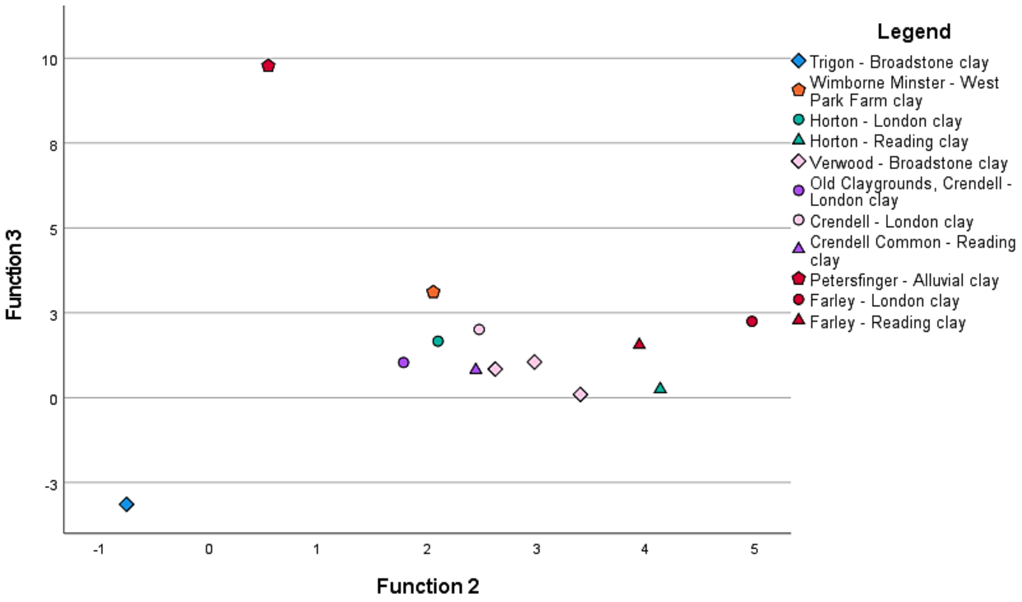


**Fig. 43: Plot of Discriminant scores for functions 2 and 3 in DFA 2; showing only clay samples**

These scores reveal that the clays from the east Dorset area loosely cluster together, with south Wiltshire and south Dorset areas lying on the fringes. In part, this is driven by the concentrations of iron (shown in Fig. 44), which incorrectly suggests a link between Farley clay and samples of West Dorset origin.

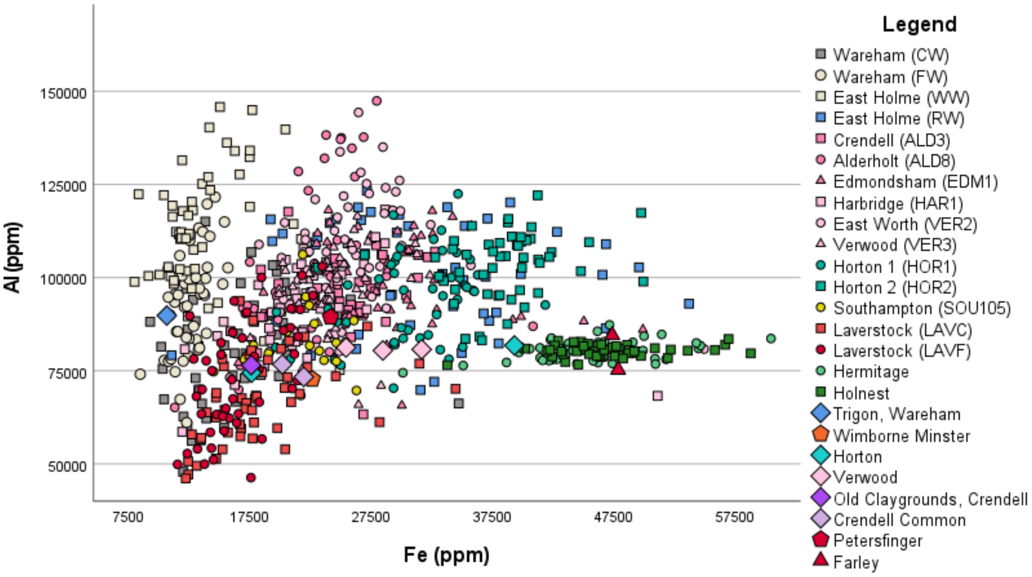


**Fig. 44: Plot of aluminium and iron results for clay samples and known pottery control group**

## 5.6. Visual Analysis of Samples from Control Group of Pottery Samples

Elements of the control group could be discriminated by the naked eye, based upon visual and textural differences between fabric groups. In the post-medieval component, this comprised East Holme whiteware, with its distinctive white firing fabric. However, pale examples of Verwood-type pottery could easily be misattributed to this group, as has undoubtedly occurred in the past. For the East Holme redwares, certain samples appear identical to - and potentially are - Verwood-type pottery. To confirm this, thus hopefully resolve any uncertainty, a proportion of these were put forward for thin section analysis.

The Verwood-type group is harder to discriminate between. Using the naked eye, it is possible to differentiate between examples from Horton and certain Edmondsham samples, with all remaining sites grouped together due to a lack of visible discriminates. Certain Edmondsham samples appear to occur in a paler, pastel coloured fabric, possessing a soapier texture in comparison to other examples - but this is not consistent throughout the group. Horton examples are discernible from other examples due to a high content of iron-rich inclusions (Plate 16a-c).

In the medieval component, Dorset Whiteware samples were considered suitably different from Laverstock fineware examples, with the former being paler, or light pink, in colour, and generally less coarse. Wessex Coarseware examples could not be definitively discriminated visually.

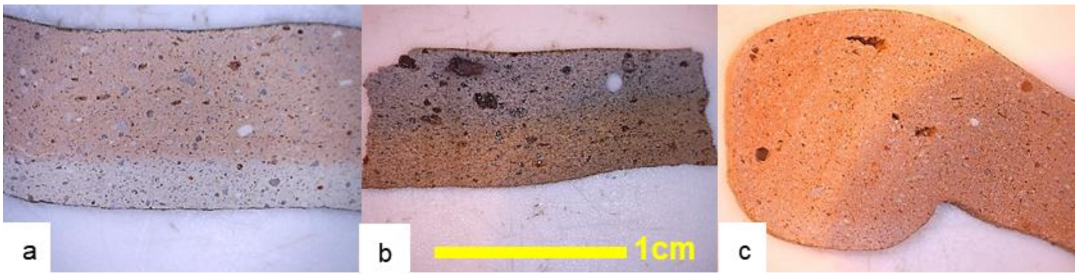


**Plate 16a-c: Shows cut sections through pottery samples from Verwood-type sites – all at the same scale; a -Crossroads VER3; b - Horton HOR1; c - Crendell ALD3 (All Author's Own)**

## 5.7. Thin Section Petrographic Analysis of Samples from Control Group

The results are summarised here, with detailed fabric analysis located in Appendix VII. The Verwood-type samples can be categorised into three sub-groups which correlate with different production areas:

1. Horton;

2a. Verwood and East Worth;

2b. Harbridge and Alderholt;

3. Edmondsham.

The Horton fabrics are defined by dominant iron inclusions, with common iron-rich argillaceous features, rare glauconite and, very rarely, muscovite. The Verwood and Harbridge-Alderholt groups are similar, but discernible from Horton due to the reduced frequency of ferruginous inclusions. The Harbridge-Alderholt group can often be discerned from the Verwood-East Worth group based on the reduced size of the quartz inclusions in the fine fraction. However, this is not consistent, hence its placement within the same numerical group. The Edmonsham sub-group can be identified by the presence of common argillaceous features; less ferruginous inclusions than Horton, but more than Verwood-Harbridge-Alderholt. Cumulatively, this is visible in Fig. 44, with similar sub-groups 2a and 2b separated only by the size of inclusions in the fine fraction.

East Holme represents the other post-medieval control group. The whitewares are generally discernible from Verwood samples; again, this is substantially driven by fabric colour, but is corroborated by fewer inclusions – excluding quartz – thus increased matrix. The redwares comprise a mixed group of various sources; some are Verwood-type (of sub-groups 1 and 2b), while others do not correspond to any sampled sources. This suggests that they are either non-local, or local but derive from a clay source not sampled here (*e.g.* EHR-17).

Photomicrographs of chosen representative samples from each group are displayed in Fig. 45a-c. Provenance assignment of thin section petrography samples from the control group sites are listed in Table 40.

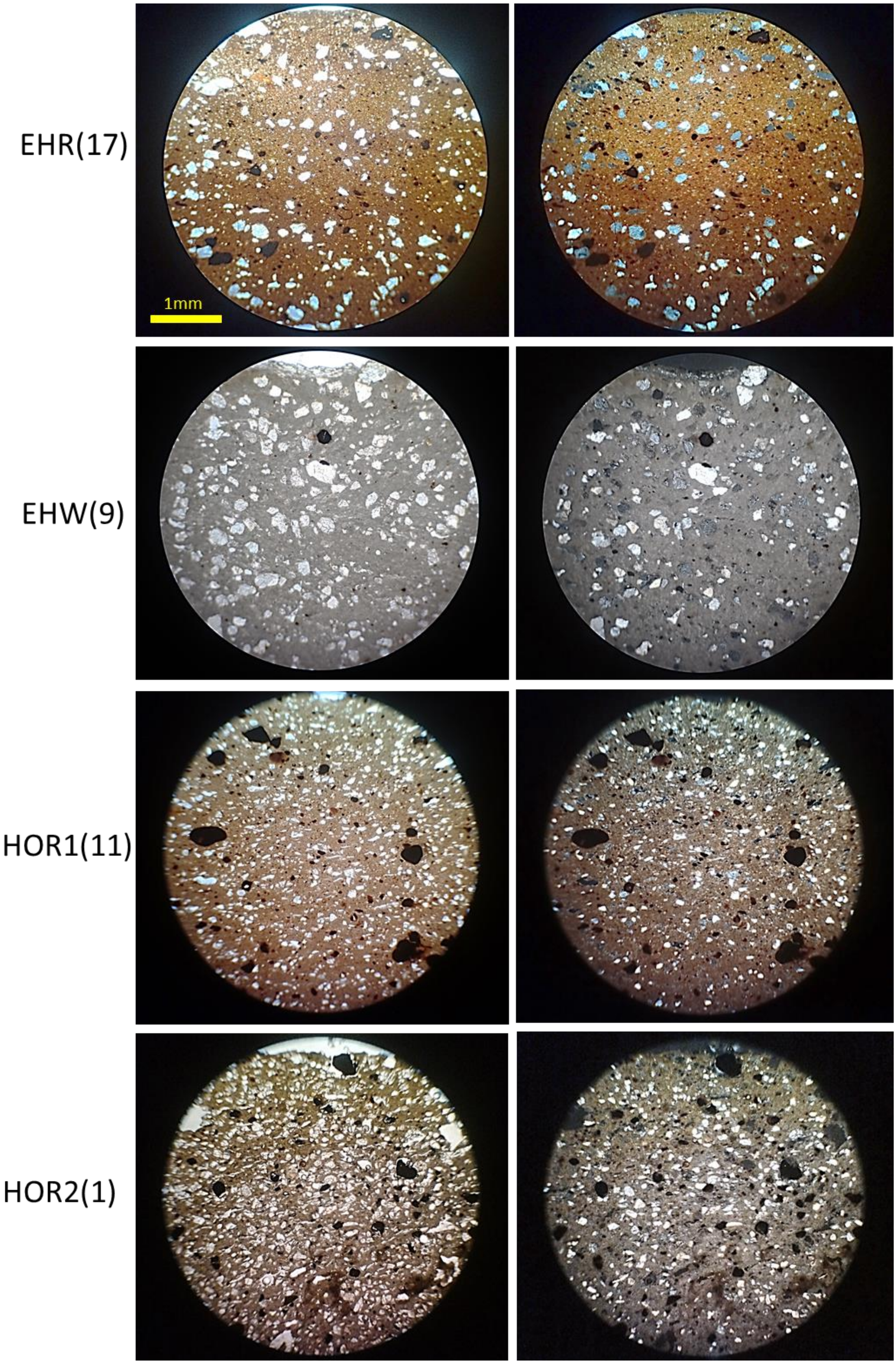


**Fig. 45a: Photomicrographs of petrographic thin section samples of post-medieval control group samples with sample ID; left: PPL; right: XP; all same scale**

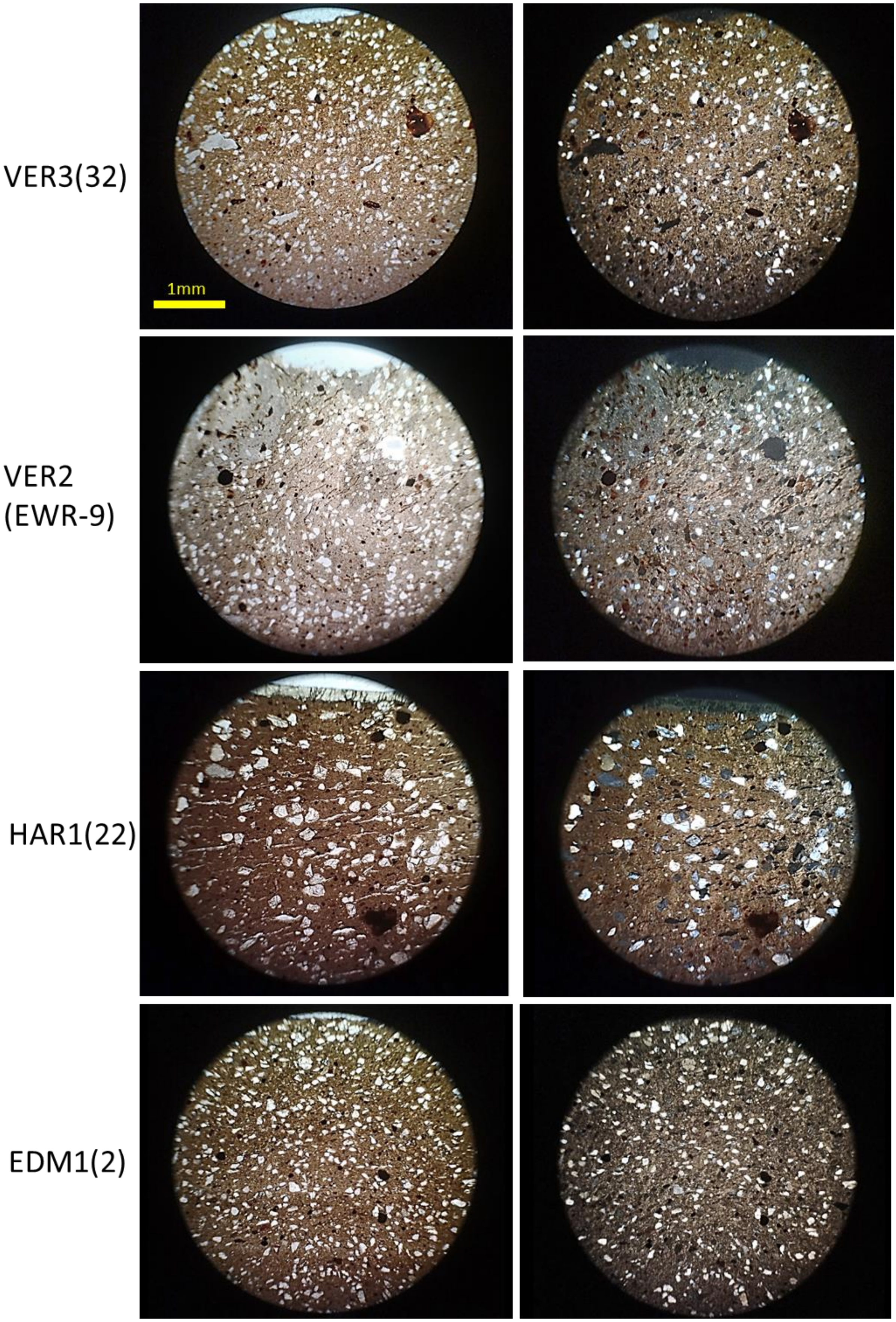


Fig. 45b: Photomicrographs of petrographic thin section samples of post-medieval control group samples; left PPL; right: XP; all same scale

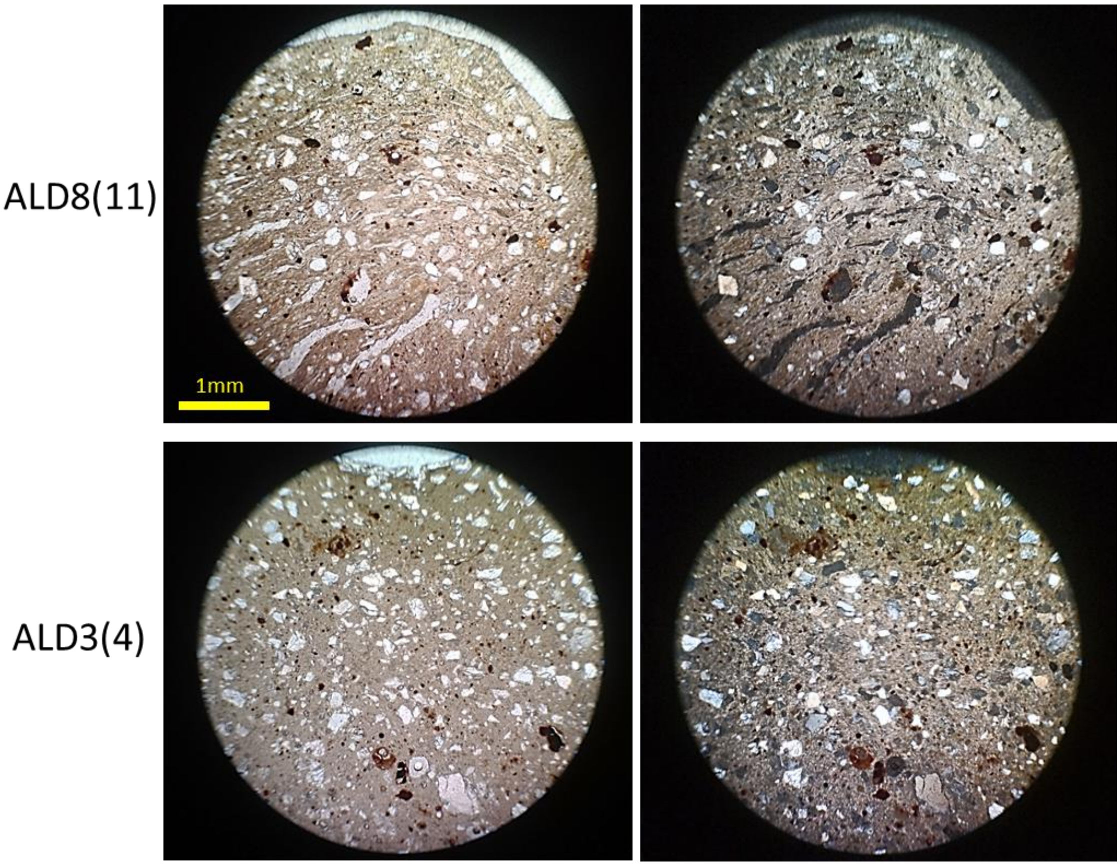


**Fig. 45c: Photomicrographs of petrographic thin section samples of post-medieval control group samples; left PPL; right: XP; all same scale**

Difference between the post-medieval and medieval control groups is readily apparent, evidenced by larger inclusions, their quantity, and number of voids. These can mainly be related to either clay preparation or manufacturing methods, in addition to the source of clay itself, and must be considered as major factors in fabric regulation when examining pottery provenance (*c.f.* Vince 1977, p.261). One driving factor in fabric change between the medieval and post-medieval periods is the introduction of the wheel, and the subsequent expansion and development (McCarthy and Brooks 1988). This is reflected in the fabrics of the study area, exemplified by the technological change to those with smaller inclusion size, which can be wheel thrown with ease (*e.g.* Transitional Sandy ware – Brown 2002).

Difference in the medieval finewares within the control group was identifiable at the visual level, and is increasingly apparent at the microscopic level (Fig. 46); this is generally evidenced by a decreased amount of inclusions alongside a pale white clay matrix for Wareham wares, in comparison to Laverstock. For coarsewares, there is clear difference at the microscopic level between the Wareham and Laverstock samples; for the former, the quartz generally appears to be of a larger size and is less frequent. This is readily apparent across all five samples and could form a useful discriminator; unfortunately though, it is not a rapid discriminator, as repeated comparisons between the two groups were required. Furthermore, as Mepham (2001) hypothesised, the reduction in quartz inclusion size may stem from a technological change undertaken over time, or could be an arbitrary and incidental change. Sadly, colour of firing overlaps greatly between the two known sources, thus cannot be used as a successful discriminator.

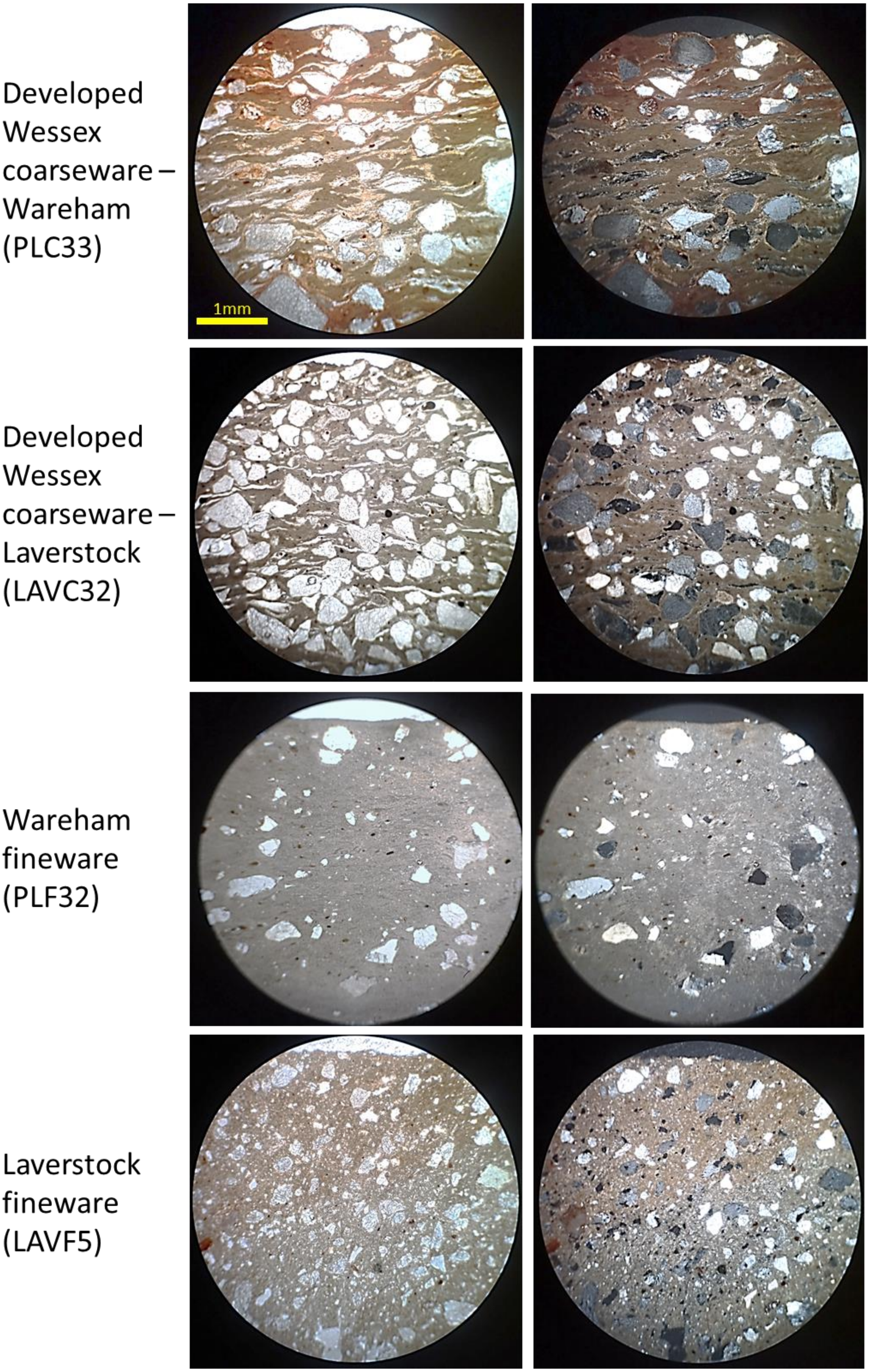


**Fig. 46: Photomicrographs of petrographic thin section samples of medieval control group samples with sample ID numbers; left: PPL; right: XP; all same scale**

## Table 40: List of Thin Section Petrography Samples from Control Group

| Site | Sample | Basic Fabric Assignment | Thin Section Fabric Assignment |
|---|---|---|---|
| Crendell (ALD3) | ALD3-8 | Verwood-type (Undefined) | Verwood-type (Harbridge and Alderholt sub-group 2b) |
| Crendell (ALD3) | ALD3-4 | Verwood-type (Undefined) | Verwood-type (Harbridge and Alderholt sub-group 2b) |
| Crendell (ALD3) | ALD3-34 | Verwood-type (Undefined) | Verwood-type (Harbridge and Alderholt sub-group 2b) |
| Crendell (ALD3) | ALD3-42 | Verwood-type (Undefined) | Verwood-type (Harbridge and Alderholt sub-group 2b) |
| Crendell (ALD3) | ALD3-45 | Verwood-type (Undefined) | Verwood-type (Harbridge and Alderholt sub-group 2b) |
| Alderholt (ALD8) | ALD8-3 | Verwood-type (Undefined) | Verwood-type (Harbridge and Alderholt sub-group 2b) |
| Alderholt (ALD8) | ALD8-11 | Verwood-type (Undefined) | Verwood-type (Harbridge and Alderholt sub-group 2b) |
| Alderholt (ALD8) | ALD8-18 | Verwood-type (Undefined) | Verwood-type (Harbridge and Alderholt sub-group 2b) |
| Alderholt (ALD8) | ALD8-19 | Verwood-type (Undefined) | Verwood-type (Harbridge and Alderholt sub-group 2b) |
| Alderholt (ALD8) | ALD8-33 | Verwood-type (Undefined) | Verwood-type (Harbridge and Alderholt sub-group 2b) |
| Edmondsham (EDM1) | EDM1-1 | Verwood-type (Undefined) | Verwood-type (Edmondsham sub-group 3) |
| Edmondsham (EDM1) | EDM1-2 | Verwood-type (Undefined) | Verwood-type (Edmondsham sub-group 3) |
| Edmondsham (EDM1) | EDM1-5 | Verwood-type (Undefined) | Verwood-type (Edmondsham sub-group 3) |
| Edmondsham (EDM1) | EDM1-8 | Verwood-type (Undefined) | Verwood-type (Edmondsham sub-group 3) |
| Edmondsham (EDM1) | EDM1-13 | Verwood-type (Undefined) | Verwood-type (Edmondsham sub-group 3) |
| East Holme (RW) | EHR14 | Uncertain Redware | Uncertain Redware |
| East Holme (RW) | EHR17 | Uncertain Redware | Uncertain Redware |
| East Holme (RW) | EHR20 | Verwood-type? | Verwood-type (Harbridge and Alderholt sub-group 2b) |
| East Holme (RW) | EHR21 | Verwood-type? | Verwood-type (Horton sub-group 1) |
| East Holme (RW) | EHR49 | Uncertain Redware | Uncertain Redware |
| East Holme (WW) | EHW3 | Dorset Whiteware - Post-medieval (DWWPM) | DWWPM |
| East Holme (WW) | EHW4 | DWWPM | DWWPM |
| East Holme (WW) | EHW9 | DWWPM | DWWPM |
| East Holme (WW) | EHW14 | DWWPM | DWWPM |
| East Holme (WW) | EHW50 | DWWPM | DWWPM |
| East Worth (VER2) | EWR2 | Verwood-type (Undefined) | Verwood-type (Verwood/East Worth sub-group 2a) |
| East Worth (VER2) | EWR6 | Verwood-type (Undefined) | Verwood-type (Verwood/East Worth sub-group 2a) |
| East Worth (VER2) | EWR7 | Verwood-type (Undefined) | Verwood-type (Verwood/East Worth sub-group 2a) |
| East Worth (VER2) | EWR9 | Verwood-type (Undefined) | Verwood-type (Verwood/East Worth sub-group 2a) |
| East Worth (VER2) | EWR12 | Verwood-type (Undefined) | Verwood-type (Verwood/East Worth sub-group 2a) |
| Harbridge (HAR1) | HAR1-8 | Verwood-type (Undefined) | Verwood-type (Harbridge and Alderholt sub-group 2b) |
| Harbridge (HAR1) | HAR1-9 | Verwood-type (Undefined) | Verwood-type (Harbridge and Alderholt sub-group 2b) |
| Harbridge (HAR1) | HAR1-22 | Verwood-type (Undefined) | Verwood-type (Harbridge and Alderholt sub-group 2b) |
| Harbridge (HAR1) | HAR1-30 | Verwood-type (Undefined) | Verwood-type (Harbridge and Alderholt sub-group 2b) |
| Harbridge (HAR1) | HAR1-37 | Verwood-type (Undefined) | Verwood-type (Harbridge and Alderholt sub-group 2b) |
| Horton 1 (HOR1) | HOR1-2 | Verwood-type (Horton) | Verwood-type (Horton sub-group 1) |
| Horton 1 (HOR1) | HOR1-10 | Verwood-type (Horton) | Verwood-type (Horton sub-group 1) |
| Horton 1 (HOR1) | HOR1-11 | Verwood-type (Horton) | Verwood-type (Horton sub-group 1) |
| Horton 1 (HOR1) | HOR1-13 | Verwood-type (Horton) | Verwood-type (Horton sub-group 1) |
| Horton 1 (HOR1) | HOR1-19 | Verwood-type (Horton) | Verwood-type (Horton sub-group 1) |
| Horton 2 (HOR2) | HOR2-1 | Verwood-type (Horton) | Verwood-type (Horton sub-group 1) |
| Horton 2 (HOR2) | HOR2-2 | Verwood-type (Horton) | Verwood-type (Horton sub-group 1) |
| Horton 2 (HOR2) | HOR2-6 | Verwood-type (Horton) | Verwood-type (Horton sub-group 1) |
| Horton 2 (HOR2) | HOR2-18 | Verwood-type (Horton) | Verwood-type (Horton sub-group 1) |
| Horton 2 (HOR2) | HOR2-45 | Verwood-type (Horton) | Verwood-type (Horton sub-group 1) |
| Laverstock (LAVC) | LAVC1 | Laverstock Coarseware (LAVC) | DWCW |
| Laverstock (LAVC) | LAVC11 | LAVC | DWCW |
| Laverstock (LAVC) | LAVC22 | LAVC | DWCW |
| Laverstock (LAVC) | LAVC24 | LAVC | DWCW |
| Laverstock (LAVC) | LAVC30 | LAVC | DWCW |
| Laverstock (LAVF) | LAVF5 | Laverstock Fineware (LAVF) | LAVF |
| Laverstock (LAVF) | LAVF9 | LAVF | LAVF |
| Laverstock (LAVF) | LAVF13 | LAVF | LAVF |
| Laverstock (LAVF) | LAVF18 | LAVF | LAVF |
| Laverstock (LAVF) | LAVF20 | LAVF | LAVF |
| Wareham (CW) | PLC5 | Wareham Coarseware (WARC) | Developed Wessex Coarseware (DWCW) |
| Wareham (CW) | PLC25 | WARC | DWCW |
| Wareham (CW) | PLC26 | WARC | DWCW |
| Wareham (CW) | PLC30 | WARC | DWCW |
| Wareham (CW) | PLC33 | WARC | DWCW |
| Wareham (FW) | PLF9 | Dorset Whiteware (DWW) | DWW |
| Wareham (FW) | PLF21 | DWW | DWW |
| Wareham (FW) | PLF32 | DWW | DWW |
| Wareham (FW) | PLF37 | DWW | DWW |
| Wareham (FW) | PLF44 | DWW | DWW |
| Verwood (VER3) | VER3-4 | Verwood-type (Undefined) | Verwood-type (Verwood/East Worth sub-group 2a) |
| Verwood (VER3) | VER3-16 | Verwood-type (Undefined) | Verwood-type (Verwood/East Worth sub-group 2a) |
| Verwood (VER3) | VER3-21 | Verwood-type (Undefined) | Verwood-type (Verwood/East Worth sub-group 2a) |
| Verwood (VER3) | VER3-32 | Verwood-type (Undefined) | Verwood-type (Verwood/East Worth sub-group 2a) |
| Verwood (VER3) | VER3-37 | Verwood-type (Undefined) | Verwood-type (Verwood/East Worth sub-group 2a) |

## 5.8. *Statistical Analysis 2 (DFA): Chemical Analysis by pXRF of Samples from Control Group*

Returning to the second DFA, the plotting of functions 1 and 2 illustrates well-defined discrimination for medieval pottery samples from the control group (Fig. 47). There is less well-defined discrimination between post-medieval samples for those functions (Fig. 48).

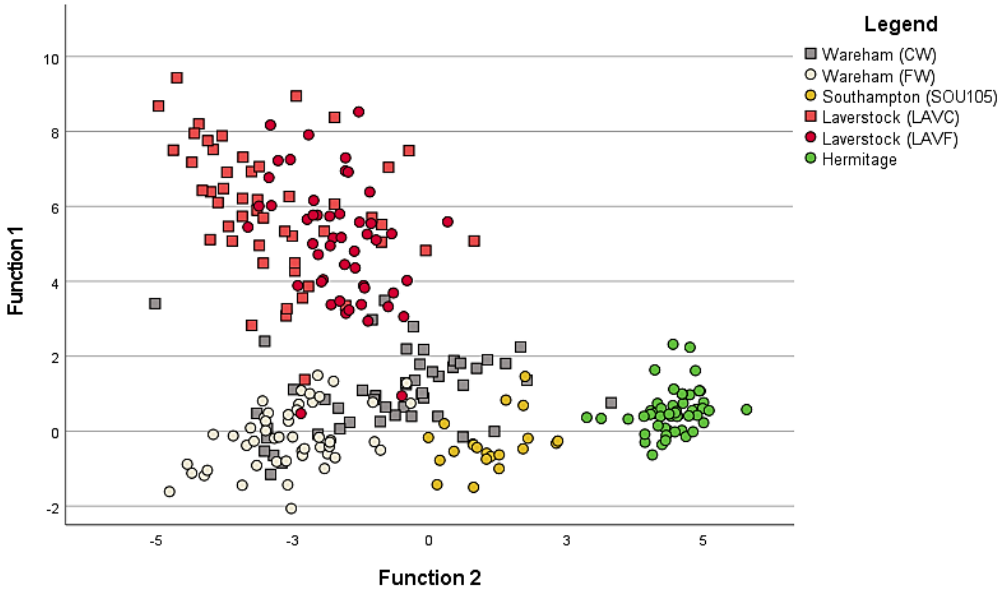


**Fig. 47: Plot of Discriminant scores from functions 1 and 2 for medieval pottery samples in control group (DFA 2)**

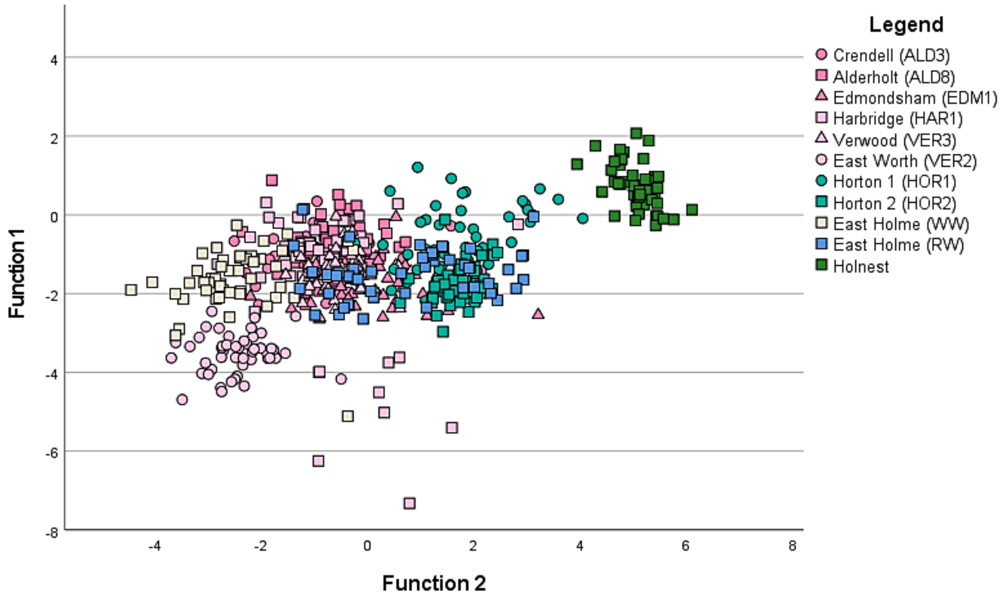


**Fig. 48: Plot of Discriminant scores from functions 1 and 2 for post-medieval pottery samples in control group (DFA 2)**

When plotted for both medieval and post-medieval control group samples (Figs. 49 and 50), functions 2 and 3 show improved discrimination between groups from different sources with improved division between East Worth and Horton in comparison to other Verwood-type samples. Functions 1, 2 and 3 have placed East Holme redwares in close relation to Verwood-type wares, suggesting that these may have been assigned incorrectly as a consistent separate source within the control group, as previously mentioned.

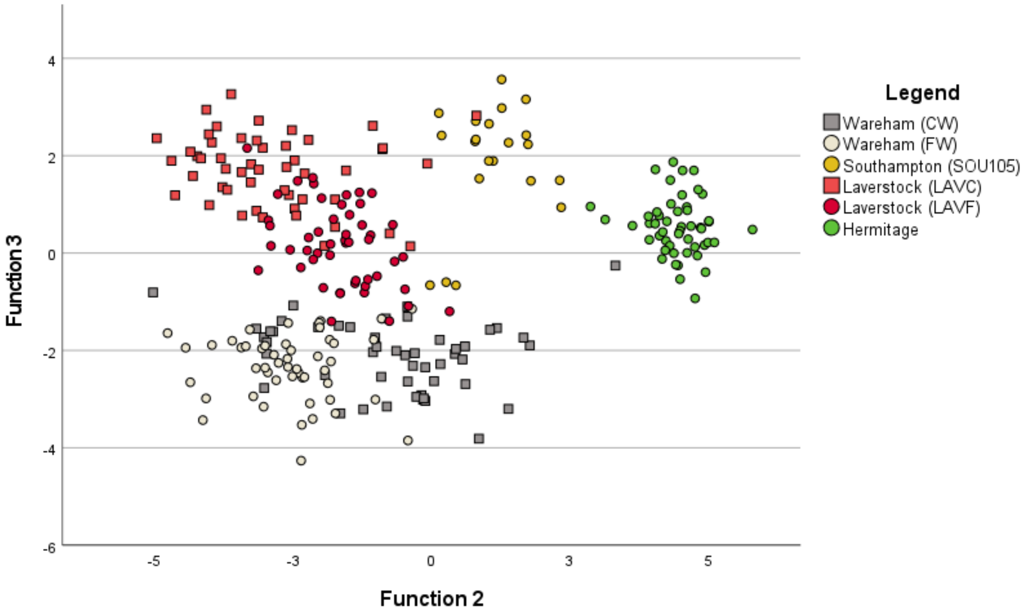


**Fig. 49: Plot of discriminant scores from functions 2 and 3 for medieval pottery samples in control group (DFA 2)**

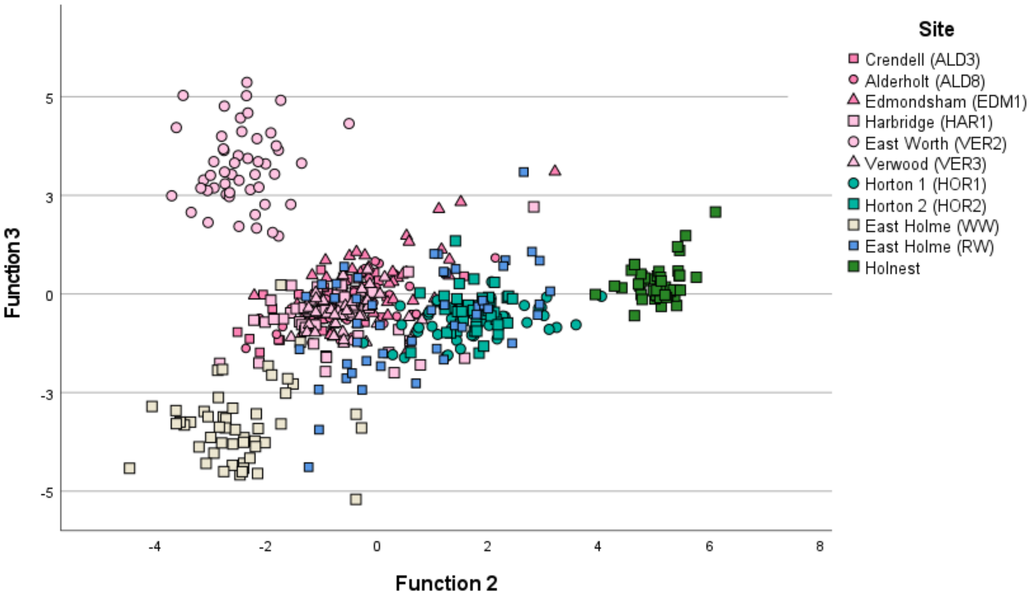


**Fig. 50: Plot of discriminant scores from functions 2 and 3 for post-medieval pottery samples in control group (DFA 2)**

Cumulatively, there is acceptable definition between separate groups when using functions 1, 2 and 3, with functions 2 and 3 being the most favourable option. However, when function 1 is not plotted and the medieval and post-medieval control groups are combined, there is reduced definition between Laverstock finewares and Verwood-type post-medieval pottery (Figs. 51 and 52). This is of major concern to the research question, as Laverstock is arguably the most likely candidate - other than the Verwood area - for the early Verwood fabric group, and likely results from the reduced effect of calcium in the discrimination - as witnessed in the coefficient score for function 1 (Table 39). This shows that from the 14 variables used in this analysis, calcium is a strong discriminator between Laverstock fineware and certain Verwood-type samples, as the two are chemically and often visibly similar. Conversely, Laverstock fineware can be discriminated from East Worth and Horton area samples using functions 2 and 3.

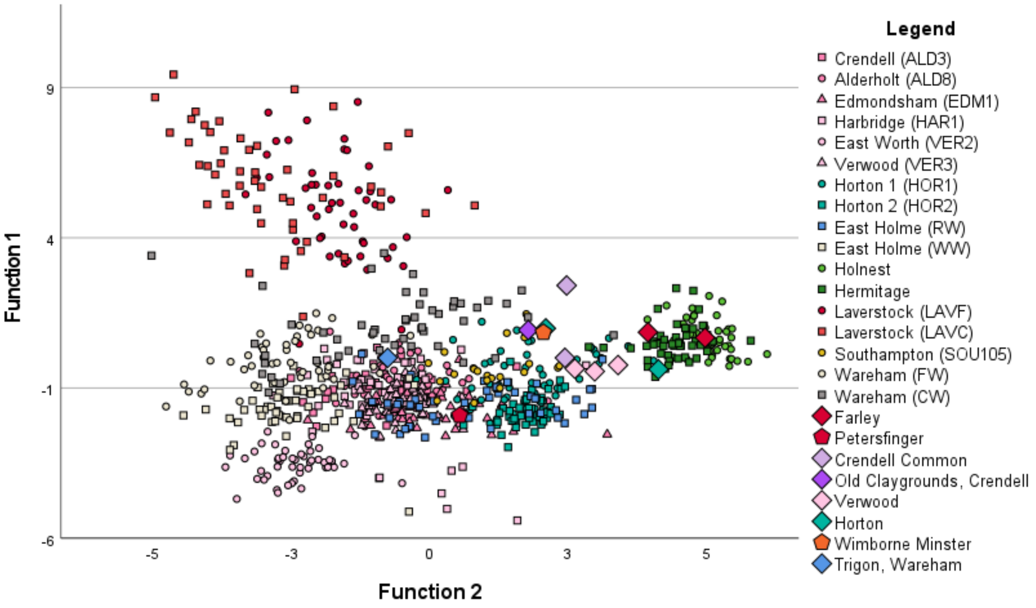


**Fig. 51: Plot of discriminant scores from functions 1 and 2 for DFA 2, showing control group and sampled clays; note Verwood-type sites bar East Worth, cluster together**

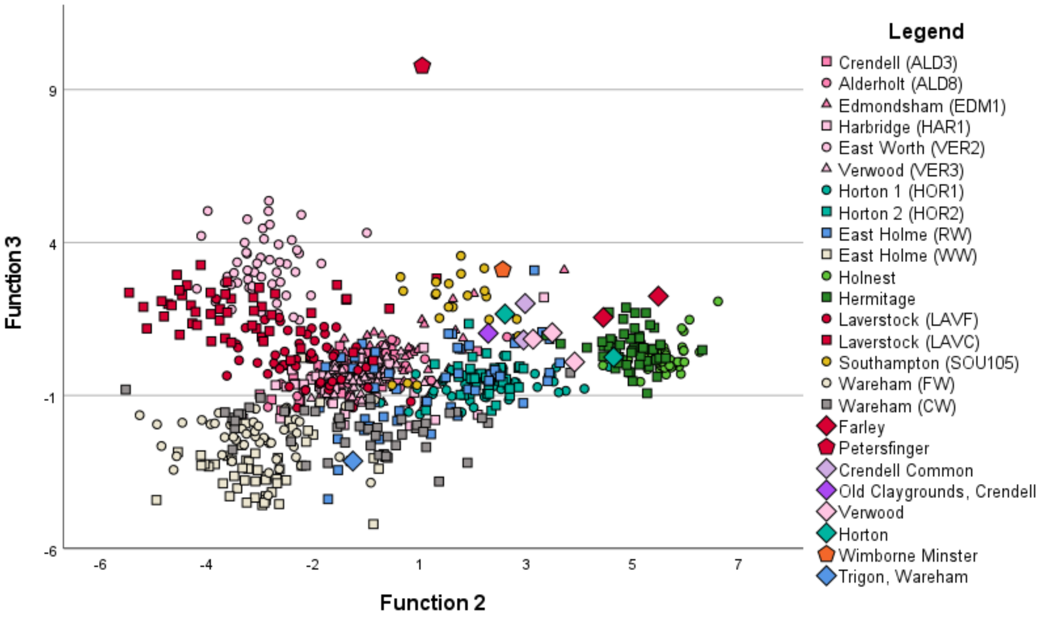


**Fig. 52: Plot of discriminant scores from functions 2 and 3 for DFA 2, showing control group and sampled clays; note Verwood-type sites, bar East Worth cluster together**

The plot for functions 3 and 4 displays reduced discrimination between groups, however links can be drawn between production sites and sampled clays (Fig. 53). This is likely due to a reduced effect of concentrations of aluminium and silicon, as evidenced in the coefficients for functions 3 and 4; the major building blocks of clays. Functions 3 and 4 lessen the impact these elements have on the discrimination, bringing trace elements such as rubidium, niobium, titanium, zinc and barium to the fore (Table 39).

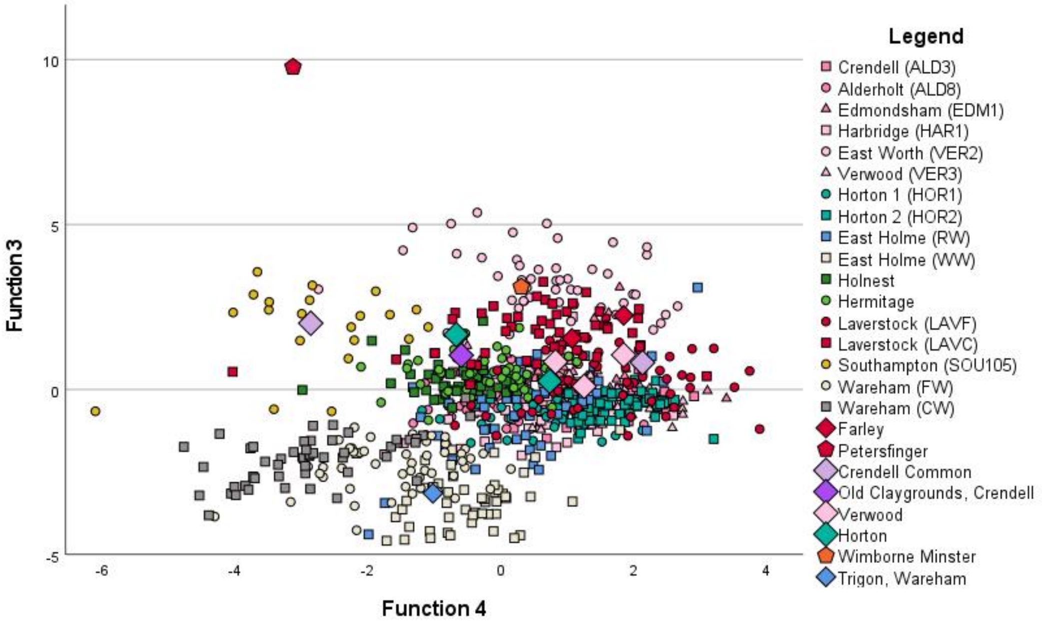


**Fig. 53: Plot of discriminate scores for functions 3 and 4 for DFA 2, showing control group and sampled clays**

While the discrimination between different known pottery groups is reduced for functions 3 and 4, there is improved correspondence of sampled clays to certain relevant known pottery groups. This is most marked in the Trigon sample, plotting centrally with post-medieval East

Holme whiteware and similar to medieval Wareham fineware (Fig. 53). Wareham coarseware shows less similarity to the Trigon sample, suggesting alteration – possibly through tempering. The plot of calcium and iron reinforces this hypothesis (Fig. 42). Similar may be said for the Verwood Broadstone clay, Crendell Reading clay, and Horton Reading clay samples for the pottery from their respective areas; again, when this is coupled with the similarity shown in the plot of calcium and iron, there is adequate evidence to suggest that the respective Reading clay samples relate to Horton and certain Verwood-type provenanced pottery, albeit skewed in functions 1 and 2. The skew could be explained by the addition or alteration via adding temper, which explain increased difference between calcium and iron in functions 1 and 2, as previously outlined. The similarity between Farley samples and Laverstock area samples, plus Crendell clays and Southampton samples, should be discounted, as they do not match in the iron and calcium plot; this shows they belong to different sources (Fig. 42). Crendell and Horton sourced London clays have less in common with Verwood-type samples, suggesting that this clay type shares little commonality with pottery samples in the control group; similar may be said for Petersfinger alluvial clay and those of the Laverstock fine and coarsewares.

Southampton whiteware samples appear to be chemically distinct from Laverstock fineware samples - as illustrated across all functions - sharing more similarity with Verwood-type samples. Finally, Holnest and Hermitage appear to share a similar clay source, which is unsurprising given their close geographic proximity to each other.

In summary, discrimination is best achieved when functions 1, 2 and 3 of analysis 2 are used. Increased discrimination between the provenanced pottery groups in this study is accomplished when functions 1, 2 and 3 are plotted - either in combination (Fig. 54) or separately - to achieve an acceptable separation between all groups. There is a clear lack of distinction between most Verwood-type sites and south Dorset samples, although plots for functions 1 and 2 show a degree of discrimination between groups. However, improved discrimination between ceramics from different sources results in a lack of discrimination between medieval Laverstock fineware and Verwood-type post-medieval coarseware; a distinction of vital importance to answering the research questions.

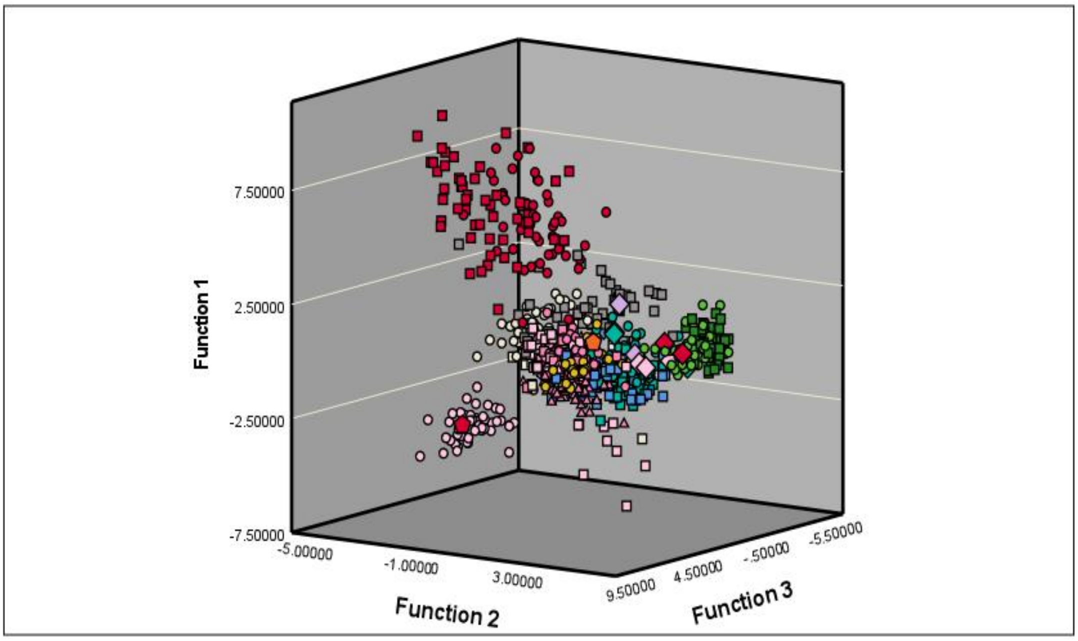


**Fig. 54: 3D plot of functions 1, 2 and 3 for DFA 2**

One problem highlighted by statistical analysis 2 is the misallocation of East Holme redware as a control group, as was raised during the visual analysis and thin section petrography. The DFA shows the extent of this through a prediction of group membership.

To achieve this, the discriminant function analysis constructs a predictive model of group membership using discriminant functions. These functions are constructed from linear arrangements from predictor variables (in this case, the ppm of 14 different elements) providing the best discrimination between groups. Unknown samples can then be assigned to a group based on the values of the series of linear variates (Field 2018, pp.765-6).

Table 41 outlines those cases where samples from the provenanced control group have been predicted (with percentage probability) as belonging to a group in which they were not initially placed. A degree of misallocation is to be expected in the DFA, as only 69% of original groups, and 64% of cross-validated grouped cases, were correctly classified.

## Table 41: Samples of Known Provenance Assigned to a Different Group through Predicted Group Membership in DFA 2; (percentages equate to probability of group membership)

| Control Group Site | Prediction to Group | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Unprovenanced Site | Total per control group |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Crendell (ALD3) | | | Alderholt (ALD8) | | | Edmondsham (EDM1) | | | Harbridge (HAR1) | | | Verwood (VER3) | | | Horton 1 (HOR1) | | | Horton 2 (HOR2) | | | East Holme Redware (RW) | | | East Holme Whiteware (WW) | | | Hermitage | | | Holnest | | | Laverstock Fineware (LAVF) | | | Farley Reading clay | | | Trigon Broadstone clay | | | Wareham Coarseware | | | Wareham Fineware | | | | |
| | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C | A | B | C | | |
| **East Holme (RW)** | | | 2 | | | | | 1 | 3 | | 1 | | | | 1 | | 2 | | | 5 | | | | | 3 | | | | | | | | | | | | 1 | | | | | | | | | | 1 | | **3** | **23** |
| **East Holme (WW)** | | | | | | | | 1 | | | 1 | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | | | 4 | | | | | | 1 | 1 | | **2** | **11** |
| **East Worth (VER2)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **6** | **6** |
| **Edmondsham (EDM1)** | | 1 | 4 | | | | | | | | | 2 | | | 5 | | | | 1 | | | | 2 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | **1** | **21** |
| **Harbridge (HAR1)** | | | 11 | | 1 | 4 | | 1 | 1 | | | | | 2 | 7 | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **3** | **31** |
| **Hermitage** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 6 | 7 | | | | | 1 | 3 | | | | | | | | | | | **1** | **18** |
| **Holnest** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 3 | | | | | | | | | | | | | | | | | | | | **0** | **3** |
| **Horton 1 (HOR1)** | | | | | | | | | | | | | | | | | | | | 5 | 1 | | | 3 | | | | | | | | | | | | | | 1 | | | | | | | | | | | **4** | **14** |
| **Horton 2 (HOR2)** | | | | | | | | | | | | | | | | 1 | 4 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **0** | **6** |
| **Laverstock (LAVC)** | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 3 | 4 | | | | | | | | | | | | | | **3** | **9** |
| **Laverstock (LAVF)** | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1 | **5** | **7** |
| **Verwood (VER3)** | | 1 | 5 | | | 1 | | | 4 | | 1 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **0** | **18** |
| **Wareham (CW)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1 | | 1 | | | | | | | | | | | | 8 | 2 | | **3** | **15** |
| **Wareham (FW)** | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 1 | | | | | | | | | | | | | | | | | 1 | | | | | | **2** | **5** |
| **Totals by quality** | 0 | 2 | 24 | 0 | 1 | 5 | 0 | 3 | 8 | 0 | 3 | 8 | 0 | 2 | 13 | 1 | 6 | 2 | 1 | 10 | 1 | 1 | 2 | 6 | 4 | 1 | 0 | 0 | 3 | 0 | 6 | 8 | 0 | 4 | 4 | 0 | 2 | 4 | 0 | 4 | 0 | 0 | 1 | 0 | 0 | 9 | 4 | 1 | **33** | **187** |
| **Totals by predicted group** | **26** | | | **6** | | | **11** | | | **11** | | | **15** | | | **9** | | | **12** | | | **9** | | | **5** | | | **3** | | | **14** | | | **8** | | | **6** | | | **4** | | | **1** | | | **14** | | | | |

*A=>80%, B=79-50%, C=<49%*

The accuracy of the DFA can be tested using Table 41, by examining the predicted group memberships for known samples. For example, it is considered unlikely that one of the Horton 1 samples derives from the Farley area due to the distance involved in moving clays. However, it is probable that similar clay sources were used for Laverstock fine- and coarse-wares – as shown in the function plots; separately the Wareham fine- and coarse-ware groups, which highlight that certain samples have changed between assigned fabric groups from the same production site. Similarly for the two Horton sites, plus Hermitage and Holnest samples. For the medieval groups previously mentioned, there is an additional possibility that they have been misattributed as coarse/finewares from the relevant sites during the visual analysis process by the author. The attribution of certain East Holme whitewares to Trigon clay samples is also acceptable given the previously outlined evidence, and shows a strong association between product and hypothesised raw material. The mixed Verwood-samples show that the discrimination between non-Horton Verwood-type sources is problematic, as was highlighted in the scatter plots. Furthermore, the prediction of 23 samples of East Holme redwares into nine different groups represents a variety not seen in any other group based on the predicted membership; this reinforces the need to reassign this group as unprovenanced and undertake more statistical analysis.

### *5.9. Visual Analysis of Samples of Uncertain Provenance*

For the most part, the initial attribution of fabric types as contained in the relevant archaeological publication and summary reports was used. This was visually confirmed during the initial visual assessment when selecting relevant pottery samples. As a result of this analysis, elements from two sites - Lymington and Poole - were re-assigned to new fabric groups. Both had been previously described as Wessex Coarseware, or like Wessex Coarseware; however, it was felt that they best fit with the fabric descriptions of other ware groups. Table 42 outlines the attribution of unprovenanced samples to fabric groups for this study via basic fabric analysis.

# Table 42: Unprovenanced Samples by Visually Assigned Fabric Group

| | **Site** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Fabric Type** | **Christchurch (X11)** | **Dorchester (W67)** | **East Worth (ACW1295)** | **Fordingbridge (W4076)** | **Gillingham (ACW1250)** | **Horton (HOR2-18)** | **Lymington (ACW1012)** | **Poole (PM9)** | **Salisbury (W7924)** | **Shaftesbury (SAVED19)** | **Southampton (SOU)** | **Stratton (STN)** | **Wilton (W9625)** | **Wimborne Minster (W398)** | **Total by fabric** |
| Developed Wessex Coarseware (DWCW) | 4 | 3 | 3 | 3 | 2 | 4 | | 4 | 1 | 3 | 3 | 4 | 1 | 3 | *38* |
| Dorset Red Painted Ware (DRPW) | | | | | | | | 2 | | 1 | | 2 | | | *5* |
| Dorset Whiteware (DWW) | | | | | 1 | | | | | | 2 | 3 | | | *6* |
| Early Verwood (EVER) | 7 | | 2 | 7 | 2 | | 1 | 6 | 7 | 6 | | 2 | 3 | 2 | *45* |
| Late Medieval Well-fired Sandy ware (LMWFSW) | | | | | | | 5 | | | | 4 | | | | *9* |
| Laverstock Fineware (LAVF) | | | | | | | | | | | 1 | | | | *1* |
| Local Pink Sandy ware (LOPS) | | | | | | | | | | | 1 | | | | *1* |
| South Hampshire Redware (SHRW) | | | | | | | 1 | | | | | | | | *1* |
| Southampton Coarse Sandy ware (SOUCSW) | | | | | | | | | | | 1 | | | | *1* |
| Southampton Fine/whiteware (SOUFSW) | | | | | | | | | | | 2 | | | | *2* |
| Uncertain but similar to DRPW | | | 1 | | | | | | | | | | | | *1* |
| Uncertain LAVF or EVER | | | | 1 | | | 1 | | 2 | 2 | | 1 | 1 | 1 | *9* |
| Verwood-type - early variant (VERE) | | | 3 | 1 | 6 | | | | 2 | 1 | | | 1 | | *14* |
| WCW with flint | | 2 | | | | | | | | | | | | | *2* |
| Wessex Coarseware (WCW) | 1 | | 1 | | | 6 | | | | 1 | | | 2 | 3 | *14* |
| West Dorset Sandy ware (WDSW) | | 3 | | | | | | | | | | | | 1 | *4* |
| **Total by site** | **12** | **8** | **10** | **12** | **11** | **10** | **8** | **12** | **12** | **14** | **14** | **12** | **8** | **10** | ***152*** |

### *5.10. Thin Section Petrographic Analysis of Samples of Uncertain Provenance*

Examination of the thin section samples suggest that they fall into 14 fabrics (Table 43). Of the 56 samples examined, only 19 reveal similarity to the Verwood-type control group samples, with 16 of these considered early products of an east Dorset pottery industry, and share similarity with those subsets previously proposed for the control group. Those samples that partially resemble Laverstock but could not be conclusively discerned from Verwood were not included (Uncertain LAVF or EVER). Thus, a total of 16 thin section samples can be assigned to Verwood-type sub-groups:

1. Early Verwood (EVER) or Verwood [early variant] (VERE) resembling Post-Medieval Verwood-type pottery from Horton (see section 5.7);

2a. EVER resembling Post-Medieval Verwood-type pottery from Verwood (see section 5.7);

Uncertain EVER or SHRW - these resemble group 2a of Verwood origin, but with increased fine fraction as seen in the SHRW examples.

While group 1 can be readily ascertained, group 2 can be broken down into two subsets (2a and the uncertain EVER or SHRW group). The latter sub-group remains uncertain, as certain SHRW samples appear similar in comparison in thin section under the microscope to certain provenanced Verwood area samples (group 2a). Most notably there are two differences between Verwood and SHRW; firstly, matrix colour, which is often dependant on firing atmosphere and iron content, and secondly, the greater percentage of quartz in the fine fraction for SHRW, which has poor consistency across all samples. This may have been clarified through including a greater number of samples of SHRW, which in itself raises difficulties due to currently no clear production site to tie them to, and from which to draw provenance samples. Table 43 notes the change in attribution from the visual examinations to the microscopic examinations.

Thus, the examination of the thin section samples has partially elucidated the potential for late medieval/early post-medieval pottery production for the east Dorset/west Hampshire border, but these examinations require confirmation. This can be achieved via chemical analysis.

## Table 43: Thin Section Petrography Sample Fabric Assignments with Basic Fabric Analysis Assignments (abbreviations as in Table 33; probable VER samples in bold)

| Site (Site Code from excavator) | Sample ID | Visually Assigned Fabric Attribution | Assigned Fabric Attirbution Following Analysis via Thin |
|---|---|---|---|
| Christchurch, Dorset (X11) | X1 | Developed Wessex Coarseware (DWCW) | WCW |
| Christchurch, Dorset (X11) | X4 | Early Verwood (EVER) | DWCW |
| **Christchurch, Dorset (X11)** | **X5** | **Early Verwood (EVER)** | **EVER - Probably Verwood (similar to sub-group 2a)** |
| **Christchurch, Dorset (X11)** | **X7** | **Early Verwood (EVER)** | **EVER - Probably Verwood (similar to sub-group 2a)** |
| Christchurch, Dorset (X11) | X10 | Developed Wessex Coarseware (DWCW) | SHRW |
| East Worth, Dorset (ACW1295) | EWO1 | Wessex Coarseware (WCW) | WCW |
| East Worth, Dorset (ACW1295) | EWO3 | Developed Wessex Coarseware (DWCW) | DWCW |
| East Worth, Dorset (ACW1295) | EWO5 | (DRPW) | DRPW |
| East Worth, Dorset (ACW1295) | EWO6 | Early Verwood (EVER) | DWCW |
| East Worth, Dorset (ACW1295) | EWO8 | Early Verwood (EVER) | SHRW |
| **Fordingbridge, Hants (W4075)** | **FOR1** | **Early Verwood (EVER)** | **EVER - Probably Verwood (similar to sub-group 2a)** |
| Fordingbridge, Hants (W4075) | FOR3 | Developed Wessex Coarseware (DWCW) | DWCW |
| **Fordingbridge, Hants (W4075)** | **FOR7** | **Early Verwood (EVER)** | **EVER - Probably Horton (similar to sub-group 1)** |
| **Gillingham, Dorset (ACW1250)** | **GIL2** | **Developed Wessex Coarseware (DWCW)** | **EVER - Probably Horton (similar to sub-group 1)** |
| Gillingham, Dorset (ACW1250) | GIL5 | Early Verwood (EVER) | WCW |
| **Gillingham, Dorset (ACW1250)** | **GIL8** | **Verwood-type [early variant] (VERE)** | **VERE - Probably Horton (similar to sub-group 1)** |
| **Gillingham, Dorset (ACW1250)** | **GIL9** | **Verwood-type [early variant] (VERE)** | **VERE - Probably Verwood (similar to sub-group 2a)** |
| Horton, Dorset (HOR-18) | H2WCW1 | Wessex Coarseware (WCW) | WCW |
| Horton, Dorset (HOR-18) | H2WCW4 | Wessex Coarseware (WCW) | WCW |
| **Lymington ,Hants (ACW1012)** | **LYM1** | **Early Verwood (EVER)** | **Uncertain EVER or SHRW - (similar to VER sub-group 2a, but with increased fine fraction)** |
| Lymington, Hants (ACW1012) | LYM2 | South Hampshire Redware (SHRW) | SHRW |
| Lymington, Hants (ACW1012) | LYM3 | Late Medieval Well-Fired Sandy Ware (LMWFSW) | SHRW |
| **Poole, Dorset (PM9)** | **POO1** | **Early Verwood (EVER)** | **EVER - Probably Horton (similar to sub-group 1)** |
| Poole, Dorset (PM9) | POO3 | Developed Wessex Coarseware (DWCW) | WCW |
| Poole, Dorset (PM9) | POO5 | Early Verwood (EVER) | North French Import? |
| **Poole, Dorset (PM9)** | **POO6** | **Early Verwood (EVER)** | **Uncertain EVER or SHRW - (similar to sub-group 2a, but with increased fine fraction)** |
| **Poole, Dorset (PM9)** | **POO7** | **Early Verwood (EVER)** | **EVER - Probably Horton (similar to sub-group 1)** |
| **Poole, Dorset (PM9)** | **POO12** | **Early Verwood (EVER)** | **EVER - Probably Horton (similar to sub-group 1)** |
| **Salisbury, Wilts (W7924)** | **SAL1** | **Early Verwood (EVER)** | **EVER - Probably Horton (similar to sub-group 1)** |
| **Salisbury, Wilts (W7924)** | **SAL7** | **Early Verwood (EVER)** | **Uncertain LAVF or EVER** |
| Salisbury, Wilts (W7924) | SAL8 | Developed Wessex Coarseware (DWCW) | DWCW |
| Salisbury, Wilts (W7924) | SAL9 | Early Verwood (EVER) | SHRW |
| **Salisbury, Wilts (W7924)** | **SAL10** | **Early Verwood (EVER)** | **Uncertain LAVF or EVER** |
| **Salisbury, Wilts (W7924)** | **SAL12** | **Early Verwood (EVER)** | **Uncertain LAVF or EVER** |
| Shaftesbury, Dorset (SAVED19) | SHA2 | Developed Wessex Coarseware (DWCW) | DWCW |
| **Shaftesbury, Dorset (SAVED19)** | **SHA3** | **Early Verwood (EVER)** | **EVER - Probably Horton (similar to sub-group 1)** |
| Shaftesbury, Dorset (SAVED19) | SHA5 | Dorset Red Painted Ware (DRPW) | DRPW |
| **Shaftesbury, Dorset (SAVED19)** | **SHA14** | **Early Verwood (EVER)** | **EVER - Probably Verwood (similar to sub-group 2a)** |
| Southampton, Hants | SOU7 | Late Medieval Well-Fired Sandy Ware (LMWFSW) | SHRW |
| Southampton, Hants | SOU8 | Southampton Whiteware (SOUWW) | Dorset Whiteware (DWW) |
| Southampton, Hants | SOU11 | Developed Wessex Coarseware (DWCW) | DWCW |
| Stratton, Dorset | STN1 | Dorset Red Painted Ware (DRPW) | DWCW |
| Stratton, Dorset | STN2 | Developed Wessex Coarseware (DWCW) | SHRW |
| Stratton, Dorset | STN9 | Developed Wessex Coarseware (DWCW) | DWCW |
| Wilton, Wilts (W9525) | WIL1 | Wessex Coarseware (WCW) | WCW |
| Wilton, Wilts (W9525) | WIL2 | Wessex Coarseware (WCW) | WCW |
| Wilton, Wilts (W9525) | WIL3 | Developed Wessex Coarseware (DWCW) | DWCW |
| Wilton, Wilts (W9525) | WIL4 | Early Verwood (EVER) | DWCW |
| Wilton, Wilts (W9525) | WIL5 | Verwood (EVER) | LAVF |
| Wimborne, Dorset (W398) | WIM1 | Developed Wessex Coarseware (DWCW) | WCW |
| Wimborne, Dorset (W398) | WIM2 | Developed Wessex Coarseware (DWCW) | WCW |
| Wimborne, Dorset (W398) | WIM3 | Wessex Coarseware (WCW) | SHRW |
| Wimborne, Dorset (W398) | WIM4 | Verwood (EVER) | SOUWW |
| Wimborne, Dorset (W398) | WIM5 | West Dorset Sandy Ware (WDSW) | WDSW |
| **Wimborne, Dorset (W398)** | **WIM6** | **Early Verwood (EVER)** | **EVER - Probably Horton (similar to sub-group 1)** |
| Wimborne, Dorset (W398) | WIM8 | Wessex Coarseware (WCW) | WCW |

**Table 44: Thin Section Petrographic Samples Attributed to East Dorset/West Hampshire Production and Initial Fabric Assessment**

| | | **Visual Fabric Attribution** | | | | |
|---|---|---|---|---|---|---|
| | | Wessex Coarseware (DWCW) | Early Verwood (EVER) | Laverstock Fineware (LAVF) or Early Verwood | Verwood-type [early variant] (VERE) | Thin Section Fabric |
| **Thin Section Fabric Attribution** | EVER - Probably Horton (similar to sub-group 1) | 1 | 7 | | | 8 |
| | EVER - Probably Verwood (similar to sub-group 2a) | | 4 | | | 4 |
| | Uncertain EVER or SHRW - (similar to sub-group 2a, but with increased fine fraction) | | 2 | | | 2 |
| | Uncertain LAVF or EVER | | 2 | 1 | | 3 |
| | VERE - Probably Horton (similar to sub-group 1) | | | | 1 | 1 |
| | VERE - Probably Verwood (similar to sub-group 2a) | | | | 1 | 1 |
| | *Attributions* | *1* | *15* | *1* | *2* | *19* |

## *5.11. Statistical Analysis 2 (DFA): Chemical Analysis by pXRF of Samples of Uncertain Provenance*

Discriminant functions 1, 2 and 3 proved most effective at distinguishing provenance in the control group. The discrimination between samples was strong enough to show that the East Holme redwares comprised mixed sources from sites of differing provenance. Furthermore, the group predictions for unprovenanced sites for analysis 2 highlights that many samples match with their own group. This reveals that results collected using the pXRF are clearly sensitive to post-depositional change; unsurprising, as the method comprises readings taken through a historically broken surface – a façade subjected to numerous taphonomic processes. This is illustrated by assemblages of unprovenanced samples recovered from the same collection unit matching together when grouped by site, despite being assigned different fabrics (Table 45). Of the 75 examples, eight can be attributed to provenanced control groups, with three examples relating to Verwood-type samples from the Stratton and Wimborne assemblages, but all with poor prediction percentages (Table 46). Additionally, a further Stratton sample has been attributed to the uncertain East Holme redware group. The function by group centroid helps explain why these groups have been placed together (Table 47), as different functions - constructed using the relationships between different elements - have drawn the groups together by collection unit (site).

# Table 45: Sample Frequency of Visually Assigned Fabric Group by Collection Unit (site)

| | | Assigned Visual Fabric Group | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site | Type of Site | Clay Sample | Developed Wessex Coarseware (DWCW) | Dorset Red Painted Ware (DRPW) | Dorset Whiteware: Post-medieval (DWWPM) | Dorset Whiteware (DWW) | Early Verwood (EVER) | Late Medieval Well-fired Sandy ware (LMWFSW) | Laverstock Coarseware (LAVC) | Laverstock Fineware (LAVF) | Local Pink Sandy ware (LOPS) | South Hampshire Redware (SHRW) | Southampton Coarse Sandy ware (SOUCSW) | Southampton Fine/whiteware (SOUFSW) | Uncertain but similar to DRPW | Uncertain LAVF or EVER | Uncertain Redware | Verwood-type (VER 17-20thC) | Verwood-type: early variant (VERE 16-17thC) | Wareham Coarseware (WARC) | Wessex Coarseware with flint | Wessex Coarseware (WCW) | West Dorset Sandy ware (WDSW) | West Dorset Sandy ware: Post-medieval (WDSWPM) | Total by site |
| Crendell Common | Clay | 2 | | | | | | | | | | | | | | | | | | | | | | | **2** |
| Farley | Clay | 2 | | | | | | | | | | | | | | | | | | | | | | | **2** |
| Horton | Clay | 2 | | | | | | | | | | | | | | | | | | | | | | | **2** |
| Old Claygrounds, Crendell | Clay | 1 | | | | | | | | | | | | | | | | | | | | | | | **1** |
| Petersfinger | Clay | 1 | | | | | | | | | | | | | | | | | | | | | | | **1** |
| Trigon, Wareham | Clay | 1 | | | | | | | | | | | | | | | | | | | | | | | **1** |
| Verwood | Clay | 3 | | | | | | | | | | | | | | | | | | | | | | | **3** |
| Wimborne Minster | Clay | 1 | | | | | | | | | | | | | | | | | | | | | | | **1** |
| Alderholt (ALD8) | Known/Control | | | | | | | | | | | | | | | | | 50 | | | | | | | **50** |
| Crendell (ALD3) | Known/Control | | | | | | | | | | | | | | | | | 50 | | | | | | | **50** |
| East Holme (DWWPM) | Known/Control | | | | 50 | | | | | | | | | | | | | | | | | | | | **50** |
| East Worth (VER2) | Known/Control | | | | | | | | | | | | | | | | | 50 | | | | | | | **50** |
| Edmondsham (EDM1) | Known/Control | | | | | | | | | | | | | | | | | 50 | | | | | | | **50** |
| Harbridge (HAR1) | Known/Control | | | | | | | | | | | | | | | | | 50 | | | | | | | **50** |
| Hermitage (HER) | Known/Control | | | | | | | | | | | | | | | | | | | | | | 50 | | **50** |
| Holnest (HST) | Known/Control | | | | | | | | | | | | | | | | | | | | | | | 50 | **50** |
| Horton 1 (HOR1) | Known/Control | | | | | | | | | | | | | | | | | 49 | | | | | | | **49** |
| Horton 2 (HOR2) | Known/Control | | | | | | | | | | | | | | | | | 50 | | | | | | | **50** |
| Laverstock (LAVC) | Known/Control | | | | | | | | 50 | | | | | | | | | | | | | | | | **50** |
| Laverstock (LAVF) | Known/Control | | | | | | | | | 50 | | | | | | | | | | | | | | | **50** |
| Southampton (SOU105) | Known/Control | | | | | | | | | | | | | 21 | | | | | | | | | | | **21** |
| Verwood (VER3) | Known/Control | | | | | | | | | | | | | | | | | 50 | | | | | | | **50** |
| Wareham (WARC) | Known/Control | | | | | | | | | | | | | | | | | | | 50 | | | | | **50** |
| Wareham (WARF) | Known/Control | | | | | 50 | | | | | | | | | | | | | | | | | | | **50** |
| Christchurch (X11) | Unprovenanced | | 4 | | | | 7 | | | | | | | | | | | | | | | 1 | | | **12** |
| Dorchester (W67) | Unprovenanced | | 3 | | | | | | | | | | | | | | | | | | 2 | | 3 | | **8** |
| East Holme (RW) | Unprovenanced | | | | | | | | | | | | | | | | 49 | | | | | | | | **49** |
| East Worth (ACW1295) | Unprovenanced | | 3 | | | | 2 | | | | | | | | 1 | | | | 3 | | | 1 | | | **10** |
| Fordingbridge (W4075) | Unprovenanced | | 3 | | | | 7 | | | | | | | | | 1 | | | 1 | | | | | | **12** |
| Gillingham (ACW1250) | Unprovenanced | | 2 | | | 1 | 2 | | | | | | | | | | | | 6 | | | | | | **11** |
| Horton (HOR-18) | Unprovenanced | | 4 | | | | | | | | | | | | | | | | | | | 6 | | | **10** |
| Lymington (ACW1012) | Unprovenanced | | | | | | 1 | 5 | | | | 1 | | | | 1 | | | | | | | | | **8** |
| Poole (PM9) | Unprovenanced | | 4 | 2 | | | 6 | | | | | | | | | | | | | | | | | | **12** |
| Salisbury (W7924) | Unprovenanced | | 1 | | | | 7 | | | | | | | | | 2 | | | 2 | | | | | | **12** |
| Shaftesbury (SAVED19) | Unprovenanced | | 3 | 1 | | | 6 | | | | | | | | | 2 | | | 1 | | | 1 | | | **14** |
| Southampton (SOU) | Unprovenanced | | 3 | | | 2 | | 4 | | 1 | 1 | | 1 | 2 | | | | | | | | | | | **14** |
| Stratton (STN) | Unprovenanced | | 4 | 2 | | 3 | 2 | | | | | | | | | 1 | | | | | | | | | **12** |
| Wilton (W9525) | Unprovenanced | | 1 | | | | 3 | | | | | | | | | 1 | | | 1 | | | 2 | | | **8** |
| Wimborne Minster (W398) | Unprovenanced | | 3 | | | | 2 | | | | | | | | | 1 | | | | | | 3 | 1 | | **10** |
| Total by assigned fabric | - | **13** | **38** | **5** | **50** | **56** | **45** | **9** | **50** | **51** | **1** | **1** | **1** | **23** | **1** | **9** | **49** | **399** | **14** | **50** | **2** | **14** | **54** | **50** | **985** |

## Table 46: Predicted Group Results for DFA 2 of Unprovenanced Samples

| Site (Site Code used by excavator) | Sample ID | Prediction by Site (Based on Results of DFA2) | Percentage Likelihood of Prediction |
|---|---|---|---|
| Christchurch (X11) | X1 | Poole - Unprovenanced | 60% |
| Christchurch (X11) | X2 | Poole - Unprovenanced | 53% |
| Christchurch (X11) | X3 | Christchurch - Unprovenanced | 72% |
| Christchurch (X11) | X4 | Christchurch - Unprovenanced | 85% |
| Christchurch (X11) | X5 | Fordingbridge - Unprovenanced | 45% |
| Christchurch (X11) | X6 | Christchurch - Unprovenanced | 70% |
| Christchurch (X11) | X7 | Salisbury - Unprovenanced | 84% |
| Christchurch (X11) | X8 | Christchurch - Unprovenanced | 100% |
| Christchurch (X11) | X9 | Christchurch - Unprovenanced | 100% |
| Christchurch (X11) | X10 | Holnest | 51% |
| Christchurch (X11) | X11 | Dorchester - Unprovenanced | 99% |
| Christchurch (X11) | X12 | Southampton - Unprovenanced | 71% |
| Dorchester (W67) | DOR1 | Dorchester - Unprovenanced | 85% |
| Dorchester (W67) | DOR2 | Dorchester - Unprovenanced | 100% |
| Dorchester (W67) | DOR3 | Dorchester - Unprovenanced | 100% |
| Dorchester (W67) | DOR4 | Dorchester - Unprovenanced | 90% |
| Dorchester (W67) | DOR5 | Dorchester - Unprovenanced | 100% |
| Dorchester (W67) | DOR6 | Lymington - Unprovenanced | 27% |
| Dorchester (W67) | DOR7 | Lymington - Unprovenanced | 92% |
| Dorchester (W67) | DOR8 | Lymington - Unprovenanced | 57% |
| East Worth (ACW1295) | EWO1 | East Worth - Unprovenanced | 98% |
| East Worth (ACW1295) | EWO2 | Gillingham - Unprovenanced | 97% |
| East Worth (ACW1295) | EWO3 | East Worth - Unprovenanced | 100% |
| East Worth (ACW1295) | EWO4 | East Worth - Unprovenanced | 100% |
| East Worth (ACW1295) | EWO5 | Shaftesbury - Unprovenanced | 100% |
| East Worth (ACW1295) | EWO6 | East Worth - Unprovenanced | 100% |
| East Worth (ACW1295) | EWO7 | East Worth - Unprovenanced | 80% |
| East Worth (ACW1295) | EWO8 | East Worth - Unprovenanced | 99% |
| East Worth (ACW1295) | EWO9 | East Worth - Unprovenanced | 99% |
| East Worth (ACW1295) | EWO10 | East Worth - Unprovenanced | 100% |
| Fordingbridge(W4075) | FOR1 | Laverstock (LAVC) | 85% |
| Fordingbridge(W4075) | FOR2 | Fordingbridge - Unprovenanced | 40% |
| Fordingbridge(W4075) | FOR3 | Christchurch - Unprovenanced | 42% |
| Fordingbridge(W4075) | FOR4 | Fordingbridge - Unprovenanced | 93% |
| Fordingbridge(W4075) | FOR5 | Fordingbridge - Unprovenanced | 62% |
| Fordingbridge(W4075) | FOR6 | Poole - Unprovenanced | 38% |
| Fordingbridge(W4075) | FOR7 | Fordingbridge - Unprovenanced | 94% |
| Fordingbridge(W4075) | FOR8 | Fordingbridge - Unprovenanced | 85% |
| Fordingbridge(W4075) | FOR9 | Fordingbridge - Unprovenanced | 100% |
| Fordingbridge(W4075) | FOR10 | Fordingbridge - Unprovenanced | 87% |
| Fordingbridge(W4075) | FOR11 | Fordingbridge - Unprovenanced | 99% |
| Fordingbridge(W4075) | FOR12 | Fordingbridge - Unprovenanced | 40% |
| Gillingham (ACW1250) | GIL1 | East Worth - Unprovenanced | 99% |
| **Gillingham (ACW1250)** | **GIL11** | **East Worth (VER2)** | **56%** |
| Gillingham (ACW1250) | GIL2 | Gillingham - Unprovenanced | 68% |
| **Gillingham (ACW1250)** | **GIL3** | **East Worth (VER2)** | **99%** |
| Gillingham (ACW1250) | GIL4 | Gillingham - Unprovenanced | 100% |
| Gillingham (ACW1250) | GIL5 | Gillingham - Unprovenanced | 100% |
| Gillingham (ACW1250) | GIL6 | East Worth - Unprovenanced | 61% |
| Gillingham (ACW1250) | GIL7 | Gillingham - Unprovenanced | 65% |
| **Gillingham (ACW1250)** | **GIL8** | **Horton 2 (HOR2)** | **89%** |
| Gillingham (ACW1250) | GIL9 | Gillingham - Unprovenanced | 97% |
| Gillingham (ACW1250) | GIL10 | Southampton (SOU105) | 99% |
| Horton (HOR2-18) | H2WCW1 | Horton - Unprovenanced | 100% |
| Horton (HOR2-18) | H2WCW2 | Horton - Unprovenanced | 99% |
| Horton (HOR2-18) | H2WCW3 | Horton - Unprovenanced | 99% |
| Horton (HOR2-18) | H2WCW4 | Horton - Unprovenanced | 94% |
| Horton (HOR2-18) | H2WCW5 | Horton - Unprovenanced | 49% |
| Horton (HOR2-18) | H2WCW6 | Horton - Unprovenanced | 75% |
| **Horton (HOR2-18)** | **H2WCW7** | **Horton 1 (HOR1)** | **33%** |
| Horton (HOR2-18) | H2WCW8 | Horton - Unprovenanced | 100% |
| Horton (HOR2-18) | H2WCW9 | Horton - Unprovenanced | 95% |
| Horton (HOR2-18) | H2WCW10 | Horton - Unprovenanced | 92% |
| Lymington (ACW1012) | LYM1 | Lymington - Unprovenanced | 71% |
| Lymington (ACW1012) | LYM2 | Lymington - Unprovenanced | 95% |
| Lymington (ACW1012) | LYM3 | Southampton - Unprovenanced | 57% |
| Lymington (ACW1012) | LYM4 | Lymington - Unprovenanced | 88% |
| Lymington (ACW1012) | LYM5 | Southampton - Unprovenanced | 51% |
| Lymington (ACW1012) | LYM6 | Lymington - Unprovenanced | 100% |
| Lymington (ACW1012) | LYM7 | Wimborne Minster - Unprovenanced | 44% |
| Lymington (ACW1012) | LYM8 | Lymington - Unprovenanced | 75% |

## Table 46 (cont.): Predicted Group Results for DFA 2 of Unprovenanced Samples

| Site (Site Code used by excavator) | Sample ID | Prediction by Site (Based on Results of DFA2) | Percentage Likelihood of Prediction |
|---|---|---|---|
| Poole (PM9) | POO1 | Wimborne Minster - Unprovenanced | 72% |
| Poole (PM9) | POO2 | Poole - Unprovenanced | 96% |
| Poole (PM9) | POO3 | Poole - Unprovenanced | 93% |
| Poole (PM9) | POO4 | Poole - Unprovenanced | 93% |
| Poole (PM9) | POO5 | Fordingbridge - Unprovenanced | 47% |
| Poole (PM9) | POO6 | Lymington - Unprovenanced | 61% |
| Poole (PM9) | POO7 | Poole - Unprovenanced | 71% |
| Poole (PM9) | POO8 | Poole - Unprovenanced | 67% |
| Poole (PM9) | POO9 | Poole - Unprovenanced | 81% |
| Poole (PM9) | POO10 | Poole - Unprovenanced | 87% |
| Poole (PM9) | POO11 | Wimborne Minster - Unprovenanced | 74% |
| Poole (PM9) | POO12 | Poole - Unprovenanced | 49% |
| Salisbury (W7924) | SAL1 | Salisbury - Unprovenanced | 28% |
| Salisbury (W7924) | SAL2 | Salisbury - Unprovenanced | 33% |
| Salisbury (W7924) | SAL3 | Laverstock (LAVF) | 86% |
| Salisbury (W7924) | SAL4 | Salisbury - Unprovenanced | 75% |
| Salisbury (W7924) | SAL5 | Salisbury - Unprovenanced | 98% |
| **Salisbury (W7924)** | **SAL6** | **Crendell (ALD3)** | **51%** |
| **Salisbury (W7924)** | **SAL7** | **Verwood Broadstone Clay Sample** | **67%** |
| Salisbury (W7924) | SAL8 | Wilton - Unprovenanced | 25% |
| Salisbury (W7924) | SAL9 | Dorchester - Unprovenanced | 58% |
| Salisbury (W7924) | SAL10 | Salisbury - Unprovenanced | 100% |
| Salisbury (W7924) | SAL11 | Salisbury - Unprovenanced | 99% |
| Salisbury (W7924) | SAL12 | Salisbury - Unprovenanced | 100% |
| Shaftesbury (SAVED19) | SHA1 | Shaftesbury - Unprovenanced | 98% |
| Shaftesbury (SAVED19) | SHA2 | Shaftesbury - Unprovenanced | 94% |
| Shaftesbury (SAVED19) | SHA3 | Shaftesbury - Unprovenanced | 100% |
| Shaftesbury (SAVED19) | SHA4 | Wimborne Minster - Unprovenanced | 71% |
| Shaftesbury (SAVED19) | SHA5 | Shaftesbury - Unprovenanced | 89% |
| Shaftesbury (SAVED19) | SHA7 | Southampton (SOU105) | 98% |
| Shaftesbury (SAVED19) | SHA8 | Wareham (CW) | 47% |
| Shaftesbury (SAVED19) | SHA9 | Southampton (SOU105) | 93% |
| Shaftesbury (SAVED19) | SHA10 | Shaftesbury - Unprovenanced | 100% |
| Shaftesbury (SAVED19) | SHA11 | Shaftesbury - Unprovenanced | 96% |
| Shaftesbury (SAVED19) | SHA12 | Shaftesbury - Unprovenanced | 100% |
| Shaftesbury (SAVED19) | SHA13 | East Worth - Unprovenanced | 100% |
| Shaftesbury (SAVED19) | SHA14 | Shaftesbury - Unprovenanced | 100% |
| Southampton | SOU1 | Southampton - Unprovenanced | 56% |
| Southampton | SOU2 | Wimborne Minster - Unprovenanced | 96% |
| Southampton | SOU3 | Wareham (FW) | 72% |
| Southampton | SOU4 | Fordingbridge - Unprovenanced | 97% |
| Southampton | SOU5 | Holnest | 39% |
| Southampton | SOU6 | Southampton - Unprovenanced | 93% |
| Southampton | SOU7 | Southampton - Unprovenanced | 85% |
| Southampton | SOU8 | Southampton - Unprovenanced | 72% |
| Southampton | SOU9 | Southampton - Unprovenanced | 37% |
| Southampton | SOU10 | Southampton - Unprovenanced | 97% |
| Southampton | SOU11 | Christchurch - Unprovenanced | 45% |
| Southampton | SOU12 | Lymington - Unprovenanced | 86% |
| Southampton | SOU13 | Southampton - Unprovenanced | 49% |
| Southampton | SOU14 | Wimborne Minster - Unprovenanced | 33% |
| Stratton | STN1 | Stratton - Unprovenanced | 69% |
| Stratton | STN2 | Stratton - Unprovenanced | 87% |
| Stratton | STN3 | Stratton - Unprovenanced | 64% |
| Stratton | STN4 | Poole - Unprovenanced | 44% |
| Stratton | STN5 | Fordingbridge - Unprovenanced | 60% |
| Stratton | STN6 | Wareham (FW) | 62% |
| Stratton | STN7 | Stratton - Unprovenanced | 66% |
| Stratton | STN8 | Stratton - Unprovenanced | 59% |
| Stratton | STN9 | Fordingbridge - Unprovenanced | 70% |
| **Stratton** | **STN10** | **Verwood (VER3)** | **45%** |
| Stratton | STN11 | East Holme (RW) | 74% |
| Stratton | STN12 | Wareham (FW) | 97% |
| Wilton (W9625) | WIL1 | Wimborne Minster - Unprovenanced | 49% |
| Wilton (W9625) | WIL2 | Wilton - Unprovenanced | 78% |
| Wilton (W9625) | WIL3 | Wilton - Unprovenanced | 45% |
| Wilton (W9625) | WIL4 | Wilton - Unprovenanced | 52% |
| Wilton (W9625) | WIL5 | Wilton - Unprovenanced | 50% |
| Wilton (W9625) | WIL6 | Salisbury - Unprovenanced | 76% |
| Wilton (W9625) | WIL7 | Wilton - Unprovenanced | 64% |
| Wilton (W9625) | WIL8 | Lymington - Unprovenanced | 95% |
| Wimborne Minster (W398) | WIM1 | Dorchester - Unprovenanced | 29% |
| Wimborne Minster (W398) | WIM2 | Southampton - Unprovenanced | 73% |
| Wimborne Minster (W398) | WIM3 | Dorchester - Unprovenanced | 64% |
| Wimborne Minster (W398) | WIM4 | Southampton - Unprovenanced | 57% |
| **Wimborne Minster (W398)** | **WIM5** | **Horton 2 (HOR2)** | **57%** |
| **Wimborne Minster (W398)** | **WIM6** | **Horton 1 (HOR1)** | **34%** |
| Wimborne Minster (W398) | WIM7 | Wimborne Minster - Unprovenanced | 90% |
| Wimborne Minster (W398) | WIM8 | Wimborne Minster - Unprovenanced | 67% |
| Wimborne Minster (W398) | WIM-9 | Wimborne Minster - Unprovenanced | 94% |
| Wimborne Minster (W398) | WIM10 | Wimborne Minster - Unprovenanced | 29% |

### Table 47: Functions at Group Centroid for DFA 2 (similar centroids highlighted in red by function)

| Site | Type of site | Function | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| **Crendell Common** | Clay | 1.211 | 2.458 | 1.413 | -0.364 | -0.977 | 3.500 | -2.590 | -5.250 | 0.586 | 1.968 | -0.883 | -2.267 | -1.545 | 0.060 |
| **Farley** | Clay | 0.767 | 4.459 | 1.900 | 1.461 | -0.393 | 1.065 | -0.927 | -0.597 | 0.138 | 0.381 | -0.063 | 0.608 | -1.133 | 0.266 |
| **Horton** | Clay | 0.304 | 3.115 | 0.958 | 0.032 | -0.453 | 3.458 | -2.291 | -2.366 | 0.088 | 0.581 | -0.883 | -1.581 | -0.035 | -0.638 |
| **Old Claygrounds, Crendell** | Clay | 0.930 | 1.780 | 1.036 | -0.595 | -0.692 | 3.657 | -3.973 | -3.990 | -0.432 | 0.874 | -0.417 | -1.313 | -0.507 | 0.152 |
| **Petersfinger** | Clay | -1.910 | 0.540 | 9.775 | -3.130 | -1.961 | 6.078 | -5.193 | 2.742 | 2.126 | 1.530 | -0.171 | 3.974 | -0.999 | 0.635 |
| **Trigon, Wareham** | Clay | 0.005 | -0.761 | -3.143 | -1.023 | -1.269 | -0.339 | -3.681 | 2.915 | -0.642 | 0.416 | 2.472 | -1.022 | -0.836 | -0.786 |
| **Verwood** | Clay | -0.345 | 3.002 | 0.663 | 1.310 | -0.647 | 2.506 | -2.753 | -1.972 | 0.121 | 0.071 | 0.369 | 0.395 | -0.830 | -0.378 |
| **Wimborne Minster** | Clay | 0.850 | 2.053 | 3.111 | 0.308 | 2.102 | 6.339 | -4.361 | -3.052 | -2.282 | 2.484 | -3.030 | 0.574 | -0.216 | 1.132 |
| **Alderholt (ALD3)** | Known/Control | -0.823 | -0.581 | -0.294 | 0.338 | 0.807 | -1.139 | -0.735 | -0.333 | 0.839 | -0.344 | 0.032 | -0.026 | 0.356 | 0.265 |
| **Crendell (ALD3)** | Known/Control | -1.119 | -0.739 | -0.276 | 1.189 | 0.509 | -0.809 | -0.117 | -0.151 | -0.173 | -0.331 | -0.138 | 0.351 | -0.371 | 0.072 |
| **East Holme (DWWPM)** | Known/Control | -1.630 | -2.480 | -3.322 | -0.489 | -1.344 | 0.667 | 0.222 | 0.468 | 0.969 | 0.200 | -0.198 | -0.241 | -0.179 | 0.001 |
| **East Holme (RW)** | Known/Control | -1.496 | 0.738 | -0.591 | 0.341 | -0.874 | 0.040 | 1.015 | -0.024 | -0.176 | -0.277 | -0.068 | -0.257 | 0.110 | 0.089 |
| **East Worth (VER2)** | Known/Control | -3.491 | -2.443 | 3.223 | 0.703 | 0.283 | -0.163 | -0.172 | 0.414 | -0.463 | 0.230 | -0.238 | -0.584 | 0.203 | 0.018 |
| **Edmondsham (EDM1)** | Known/Control | -1.794 | -0.077 | 0.265 | 1.129 | 0.230 | 0.158 | 0.285 | -0.379 | -0.262 | -0.366 | -0.145 | 0.285 | -0.349 | 0.067 |
| **Harbridge (HAR1)** | Known/Control | -1.500 | -0.753 | -0.599 | 0.741 | 0.627 | -1.161 | -0.474 | -0.238 | -0.087 | 0.177 | -0.462 | 0.099 | 0.117 | -0.322 |
| **Hermitage (HER)** | Known/Control | 0.518 | 4.448 | 0.543 | -0.224 | -1.042 | -1.291 | 0.221 | -0.091 | -0.060 | 0.580 | 0.256 | -0.143 | 0.032 | 0.053 |
| **Holnest (HST)** | Known/Control | 0.709 | 5.056 | 0.286 | -0.623 | -0.559 | -0.838 | 0.055 | 0.666 | 0.110 | 0.146 | -0.317 | 0.095 | 0.071 | 0.029 |
| **Horton 1 (HOR1)** | Known/Control | -0.631 | 1.750 | -0.683 | 0.654 | 0.372 | 1.600 | 0.007 | -0.245 | 0.136 | -0.090 | 0.461 | 0.251 | 0.179 | -0.070 |
| **Horton 2 (HOR2)** | Known/Control | -1.779 | 1.750 | -0.444 | 1.650 | -0.100 | 1.721 | 0.809 | 0.244 | -0.365 | -0.156 | 0.009 | 0.051 | 0.273 | 0.105 |
| **Laverstock (LAVC)** | Known/Control | 5.936 | -2.858 | 1.713 | 0.601 | 0.015 | -0.215 | 1.224 | -0.533 | 0.064 | -0.044 | 0.085 | -0.018 | 0.037 | -0.079 |
| **Laverstock (LAVF)** | Known/Control | 5.029 | -1.664 | 0.171 | 1.622 | -1.564 | 0.149 | -0.787 | 0.354 | -0.149 | 0.079 | -0.097 | 0.122 | 0.141 | 0.074 |
| **Southampton (SOU105)** | Known/Control | -0.345 | 1.094 | 1.869 | -2.781 | -2.033 | 0.395 | -2.026 | -0.612 | -0.036 | -1.435 | -0.213 | 0.045 | 0.358 | -0.323 |
| **Verwood (VER3)** | Known/Control | -1.466 | -0.506 | -0.479 | 1.591 | 0.649 | -0.586 | -0.313 | -0.052 | 0.223 | 0.325 | 0.380 | 0.186 | -0.132 | -0.199 |
| **Wareham (WARC)** | Known/Control | 1.057 | -0.732 | -2.102 | -2.847 | 0.998 | 0.064 | 0.485 | -0.675 | -0.315 | 0.203 | -0.421 | 0.382 | 0.336 | -0.017 |
| **Wareham (WARF)** | Known/Control | -0.150 | -2.557 | -2.345 | -1.598 | -0.593 | -0.185 | -0.515 | 0.565 | -1.055 | 0.119 | 0.423 | -0.068 | -0.141 | 0.102 |
| **Christchurch (X11)** | Unprovenanced | 1.601 | 1.427 | 0.223 | -0.826 | 2.371 | 0.798 | -0.936 | -0.013 | -0.239 | 0.963 | 1.217 | -0.095 | 0.473 | 0.072 |
| **Dorchester (W67)** | Unprovenanced | 3.464 | 0.915 | 1.647 | -1.791 | 2.695 | 1.698 | 0.179 | 1.978 | 0.425 | 1.072 | -1.360 | 0.260 | -0.451 | 0.111 |
| **East Worth (ACW1295)** | Unprovenanced | -4.492 | -2.800 | 5.910 | -3.715 | -2.521 | -0.074 | 1.241 | -0.424 | 0.023 | 0.527 | 0.645 | 0.783 | -0.632 | -0.451 |
| **Fordingbridge (W4075)** | Unprovenanced | 1.793 | 0.587 | 0.544 | -0.796 | 1.256 | -0.803 | -1.415 | -0.656 | -0.403 | 0.040 | 0.313 | -0.234 | -0.442 | 0.538 |
| **Gillingham (ACW1250)** | Unprovenanced | -3.350 | -2.766 | 4.535 | -1.738 | -0.639 | 0.505 | 1.457 | -0.335 | 0.820 | 0.553 | 0.355 | 0.329 | 0.414 | 0.286 |
| **Horton (HOR-18)** | Unprovenanced | -0.169 | 0.890 | -0.032 | -1.844 | -0.521 | -0.392 | 1.712 | -2.029 | 0.379 | -0.340 | 0.171 | -0.176 | -0.633 | 0.326 |
| **Lymington (ACW1012)** | Unprovenanced | 2.579 | 2.752 | 0.530 | 0.069 | 0.374 | -0.189 | 0.473 | 1.868 | -0.126 | -0.536 | -0.659 | 0.074 | -0.971 | -0.431 |
| **Poole (PM9)** | Unprovenanced | 2.018 | 2.075 | -0.618 | -1.025 | 2.437 | 0.054 | 0.275 | 0.261 | 0.107 | -0.728 | 0.743 | -0.288 | -0.644 | -0.188 |
| **Salisbury (W7924)** | Unprovenanced | 2.478 | -1.163 | 0.894 | 1.146 | 0.600 | 0.879 | -0.724 | 0.726 | 0.663 | 0.026 | 0.345 | 0.232 | 0.422 | -0.430 |
| **Shaftesbury (SAVED19)** | Unprovenanced | -0.915 | -1.484 | 3.203 | -3.602 | 1.737 | 0.366 | -0.330 | 1.525 | 0.560 | -0.616 | 0.201 | -0.169 | -0.075 | 0.269 |
| **Southampton (SOU)** | Unprovenanced | 2.103 | 1.919 | -0.110 | -1.077 | 0.625 | 0.391 | 0.140 | -0.032 | 0.174 | -0.844 | 0.291 | -0.670 | -0.016 | -0.126 |
| **Stratton (STN)** | Unprovenanced | 0.518 | -0.396 | -0.953 | -0.680 | 0.548 | 0.148 | -0.049 | -0.150 | 0.925 | 0.790 | 0.080 | -0.598 | -0.188 | -0.294 |
| **Wilton (W9525)** | Unprovenanced | 3.916 | -0.463 | 0.955 | 0.839 | 0.272 | 0.586 | -0.508 | 0.686 | 0.504 | -0.612 | -0.144 | -0.404 | -0.559 | 0.655 |
| **Wimborne Minster (W398)** | Unprovenanced | 1.957 | 1.676 | 0.671 | -0.790 | 1.999 | 1.234 | 1.034 | 0.578 | -0.419 | -0.426 | -0.357 | -0.758 | -0.106 | -0.502 |

Furthermore, Table 47 shows that when samples are grouped by collection unit, the results provide poor discrimination. This is due to the high number of groups, some with similar group centroids, providing a discrimination of limited relevance to the research question of identifying wares originating from the Verwood area. When grouping these samples by collection unit, certain variables contain enough information to discriminate groups by collection unit; this derives from post-depositional change.

As previously evidenced, the primary elements of concern in post-depositional change for ceramics comprise calcium, phosphorus, barium, manganese, sodium, iron, lead and arsenic, with DFA 2 using only calcium, barium, potassium and iron. Table 39 reveals that certain functions have a moderate to strong canonical coefficient (+/-0.4 or more); for barium, in functions eight, thirteen and fourteen; for iron - functions two, three, seven, nine and thirteen; for potassium - functions two, four and six; and, finally, for calcium - function one. In total, 11 of the 14 functions have moderate to strong coefficients for elements with known post-depositional change effects on ceramics, thus DFA 2 is an unsuitable test for the unprovenanced group of samples. To remedy this, a new analysis was required.

## *5.12. Statistical Analysis 3 (DFA): Chemical Analysis by pXRF of Samples from Unprovenanced Sites*

Analysis 3 comprised a DFA organised by provenanced fabric type, rather than collection unit. This included an unprovenanced group of a large sample size, comprising all 14 unprovenanced sites, in addition to the uncertain group of East Holme redwares – 15 groups combined into one (Table 48). However, this arrangement left the Southampton area underrepresented – being a group formed only of fineware samples, thus no coarseware or late medieval/transitional ware groups for the analysis to use for comparison. Therefore, the samples derived from the Southampton collection unit, and those assigned to a south Hampshire source, were retained as separate control groups for DFA 3. Furthermore, the results of DFA 2 revealed that only Horton and East Worth can be successfully discriminated within the Verwood-type group. For clarity, this means Harbridge, Alderholt and every Verwood site - excluding East Worth - can be assigned to a new Verwood-type (undetermined) group. The groups, along with group sample sizes, are presented in Table 48.

# Table 48: Visually Assigned Fabrics Grouped for DFA 3

| | Groups submitted for Analysis 3 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fabric Group | Clay Sample | Unprovenanced | Dorset Whiteware (DWW) | Laverstock Fineware (LAVF) | South Hampshire Redware (SHRW) | Southampton Coarse Sandy ware (SOUCSW) | Southampton Fine/whiteware (SOUFSW) | West Dorset Sandy ware (WDSW) | Dorset Whiteware - Post-medieval (DWWPM) | Laverstock Coarseware (LAVC) | Wareham Coarseware (WARC) | West Dorset Sandy ware - Post-medieval (WDSWPM) | Verwood-type (Undefined) | Verwood-type (Horton) | Verwood-type (East Worth) | Total |
| Clay Sample | 13 | | | | | | | | | | | | | | | 13 |
| Dorset Red Painted Ware (DRPW) | | 5 | | | | | | | | | | | | | | 5 |
| Developed Wessex Coarseware (DWCW) | | 38 | | | | | | | | | | | | | | 38 |
| Dorset Whiteware (DWW) | | 6 | 50 | | | | | | | | | | | | | 56 |
| Early Verwood (EVER) | | 45 | | | | | | | | | | | | | | 45 |
| Laverstock Fineware (LAVF) | | 1 | | 50 | | | | | | | | | | | | 51 |
| Uncertain LAVF or EVER | | 9 | | | | | | | | | | | | | | 9 |
| Late Medieval Well-fired Sandy ware (LMWFSW) | | 9 | | | | | | | | | | | | | | 9 |
| Local Pink Sandy ware (LOPS) | | 1 | | | | | | | | | | | | | | 1 |
| South Hampshire Redware (SHRW) | | | | | 1 | | | | | | | | | | | 1 |
| Uncertain but similar to DRPW | | 1 | | | | | | | | | | | | | | 1 |
| Southampton Coarse Sandy ware (SOUCSW) | | | | | | 1 | | | | | | | | | | 1 |
| Southampton Fine/whiteware (SOUFSW) | | | | | | | 23 | | | | | | | | | 23 |
| Verwood-type - early variant (VERE) | | 14 | | | | | | | | | | | | | | 14 |
| Wessex Coarseware (WCW) | | 14 | | | | | | | | | | | | | | 14 |
| WCW with flint | | 2 | | | | | | | | | | | | | | 2 |
| West Dorset Sandy ware (WDSW) | | 4 | | | | | | 50 | | | | | | | | 54 |
| Dorset Whiteware - Post-medieval (DWWPM) | | | | | | | | | 50 | | | | | | | 50 |
| Uncertain Redware | | 49 | | | | | | | | | | | | | | 49 |
| Laverstock Coarseware (LAVC) | | | | | | | | | | 50 | | | | | | 50 |
| Wareham Coarseware (WARC) | | | | | | | | | | | 50 | | | | | 50 |
| West Dorset Sandy ware - Post-medieval (WDSWPM) | | | | | | | | | | | | 50 | | | | 50 |
| Verwood-type (undefined) | | | | | | | | | | | | | 250 | | | 250 |
| Verwood-type (Horton) | | | | | | | | | | | | | | 99 | | 99 |
| Verwood-type (East Worth) | | | | | | | | | | | | | | | 50 | 50 |
| Total | 13 | 198 | 50 | 50 | 1 | 1 | 23 | 50 | 50 | 50 | 50 | 50 | 250 | 99 | 50 | 985 |

Analysis 3 contained 15 groups, with a total of 985 cases. As with DFA 2, DFA 3 used all 14 variables - but with decreased eigenvalues (Table 49).

**Table 49: Eigenvalues for Discriminant Function DFA 3**

| Function | Eigenvalue | % of Variance | Cumulative % | Canonical Correlation |
|---|---|---|---|---|
| 1 | 3.992 | 35.4 | 35.4 | 0.894 |
| 2 | 3.08 | 27.3 | 62.6 | 0.869 |
| 3 | 1.796 | 15.9 | 78.5 | 0.801 |
| 4 | 0.735 | 6.5 | 85.1 | 0.651 |
| 5 | 0.591 | 5.2 | 90.3 | 0.609 |
| 6 | 0.51 | 4.5 | 94.8 | 0.581 |
| 7 | 0.261 | 2.3 | 97.1 | 0.455 |
| 8 | 0.137 | 1.2 | 98.3 | 0.347 |
| 9 | 0.09 | 0.8 | 99.1 | 0.287 |
| 10 | 0.049 | 0.4 | 99.6 | 0.216 |
| 11 | 0.043 | 0.4 | 99.9 | 0.204 |
| 12 | 0.004 | 0.0 | 100.0 | 0.063 |
| 13 | 0.002 | 0.0 | 100.0 | 0.047 |
| 14 | 0 | 0.0 | 100.0 | 0.010 |

Despite being lower than those for DFA 2, these values are considered acceptable for the first three functions; collectively, these explain 78% of the variance. This is supported by the values for Wilks' Lambda (with f at <3.84), as shown in Table 50.

**Table 50: Results for Wilks' Lambda for Analysis 3**

| Test of Function(s) | Wilks' Lambda | Chi-square | df | Sig. |
|---|---|---|---|---|
| 1 through 14 | 0.002 | 5829.0 | 196.0 | <0.001 |
| 2 through 14 | 0.01 | 4270.2 | 169.0 | <0.001 |
| 3 through 14 | 0.05 | 2906.9 | 144.0 | <0.001 |
| 4 through 14 | 0.14 | 1910.1 | 121.0 | <0.001 |
| 5 through 14 | 0.24 | 1375.7 | 100.0 | <0.001 |
| 6 through 14 | 0.38 | 925.7 | 81.0 | <0.001 |
| 7 through 14 | 0.58 | 526.0 | 64.0 | <0.001 |
| 8 through 14 | 0.73 | 301.2 | 49.0 | <0.001 |
| 9 through 14 | 0.83 | 177.0 | 36.0 | <0.001 |
| 10 through 14 | 0.91 | 93.7 | 25.0 | <0.001 |
| 11 through 14 | 0.95 | 47.4 | 16.0 | <0.001 |
| 12 through 14 | 0.99 | 6.1 | 9.0 | 0.7 |
| 13 through 14 | 1.00 | 2.3 | 4.0 | 0.684 |
| 14 | 1.00 | 0.1 | 1.0 | 0.758 |

**Table 51: Standardised Canonical Discriminant Function Coefficients for All Functions in DFA 3**

| | Function | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| **RbLG10** | -0.197 | -0.310 | 0.414 | 0.205 | 0.972 | 0.519 | -0.518 | -0.135 | 0.245 | -0.281 | -0.127 | 0.431 | -0.591 | -0.615 |
| **NbLG10** | 0.134 | 0.070 | -0.153 | -0.616 | 0.304 | -0.984 | 0.351 | 0.420 | -0.360 | 0.092 | 1.092 | -0.498 | -0.015 | -0.391 |
| **SrLG10** | 0.026 | -0.490 | 0.168 | -0.300 | -0.255 | 0.462 | 0.150 | 0.486 | 0.151 | 0.690 | 0.073 | -0.087 | -0.022 | 0.211 |
| **ZrLG10** | 0.187 | -0.329 | 0.407 | 0.634 | -0.127 | 0.172 | -0.415 | 0.027 | 0.367 | 0.048 | 0.313 | -0.262 | 0.348 | 0.440 |
| **FeLG10** | 0.562 | 0.389 | 0.395 | -0.343 | -0.255 | 0.458 | 0.003 | 0.552 | -0.234 | -0.520 | -0.057 | 0.042 | 0.070 | -0.324 |
| **AlLG10** | -0.688 | -0.604 | -0.185 | -0.005 | -0.200 | 0.380 | 0.397 | -0.122 | -0.180 | -0.511 | 0.403 | -0.315 | 0.964 | -0.382 |
| **SiLG10** | 0.647 | 0.374 | 0.194 | 0.015 | -0.002 | -0.377 | -0.298 | -0.594 | 0.013 | 0.594 | 0.100 | 0.801 | -0.223 | -0.129 |
| **KLG10** | 0.202 | 0.433 | -1.153 | 0.364 | -0.630 | -0.111 | 0.137 | 0.350 | -0.186 | 0.161 | -0.079 | -0.271 | 0.513 | 0.173 |
| **CaLG10** | -0.656 | 0.758 | 0.230 | 0.305 | 0.104 | 0.111 | 0.206 | -0.057 | -0.126 | -0.012 | 0.018 | 0.274 | 0.321 | -0.012 |
| **TiLG10** | -0.202 | 0.189 | 0.230 | 0.633 | -0.299 | 0.299 | 0.403 | 0.464 | 0.603 | -0.172 | -1.475 | 0.782 | -0.509 | 0.077 |
| **VLG10** | 0.102 | -0.088 | -0.041 | -0.221 | 0.513 | -0.075 | -0.157 | 0.164 | -0.236 | 0.018 | -0.122 | 0.436 | 0.448 | 0.632 |
| **CrLG10** | 0.069 | 0.018 | 0.008 | 0.148 | 0.502 | -0.121 | 0.286 | -0.870 | -0.125 | 0.801 | -0.055 | -0.667 | -0.086 | 0.079 |
| **ZnLG10** | 0.176 | 0.139 | -0.153 | -0.186 | 0.282 | -0.006 | 0.204 | -0.230 | 0.823 | -0.229 | 0.311 | 0.178 | 0.033 | 0.108 |
| **BaLG10** | 0.119 | -0.121 | 0.105 | 0.383 | -0.244 | 0.032 | 0.451 | -0.283 | -0.335 | -0.173 | 0.240 | 0.357 | -0.531 | 0.331 |

Table 51 highlights that for DFA 3 discrimination in function 1 is driven primarily by iron, aluminium, silicon and calcium. Function 2 has greater involvement of less common elements including rubidium, strontium and potassium – which reduces the effect of the aforementioned elements. This is increased for function 3, with zirconium having a large coefficient and the coefficient for potassium being exceptionally strong. In summary, the elements with the largest effect size on discrimination are calcium, iron, aluminium, silicon, zirconium and potassium. There are also reduced coefficients for barium, iron and potassium, with only eight of 14 functions having moderate to strong coefficients for these variables. This highlights that, in comparison to DFA 2, there is a reduced effect size for certain elements in DFA 3 - especially those elements shown to be susceptible to post-depositional change.

When plotted by function scores, it can be shown that functions 1, 2 and 3, generated by DFA 3, show excellent discrimination between the control group (Figs. 55-57).

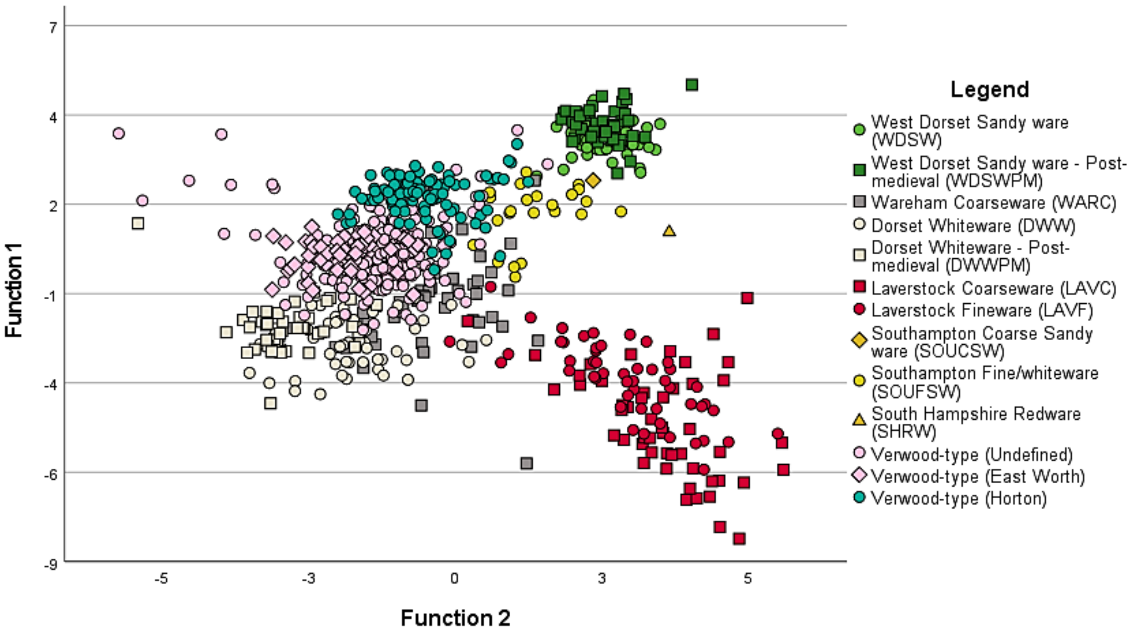


**Fig. 55: Discriminant function scores for functions 1 and 2 for DFA 3, displayed by fabric for control group**

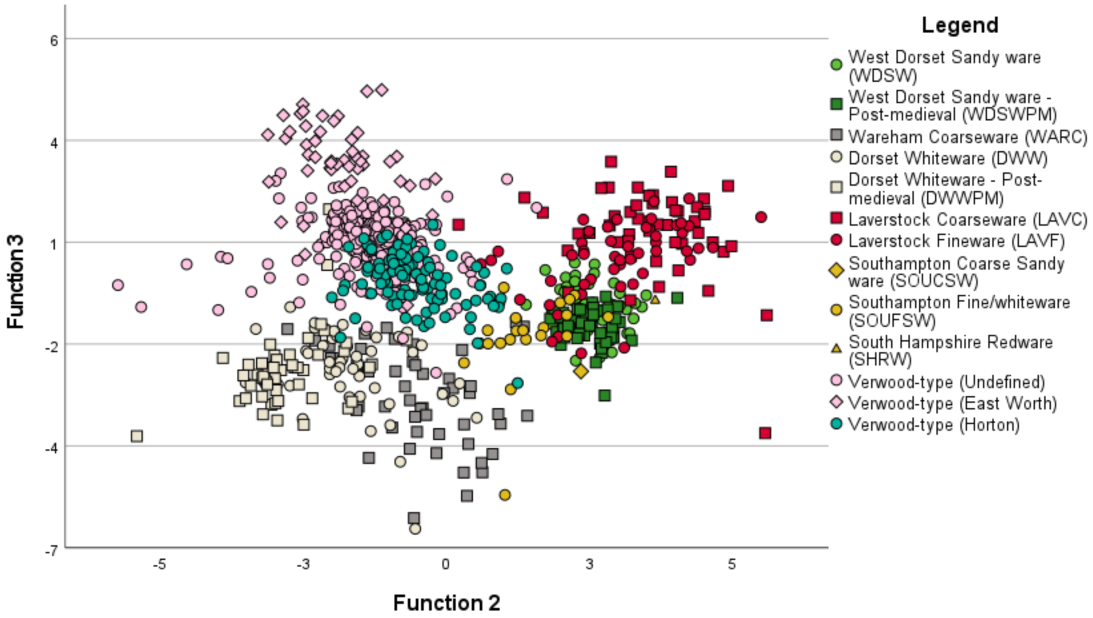


**Fig. 56: Discriminant function scores for functions 2 and 3 for DFA 3, shown by fabric for control group**

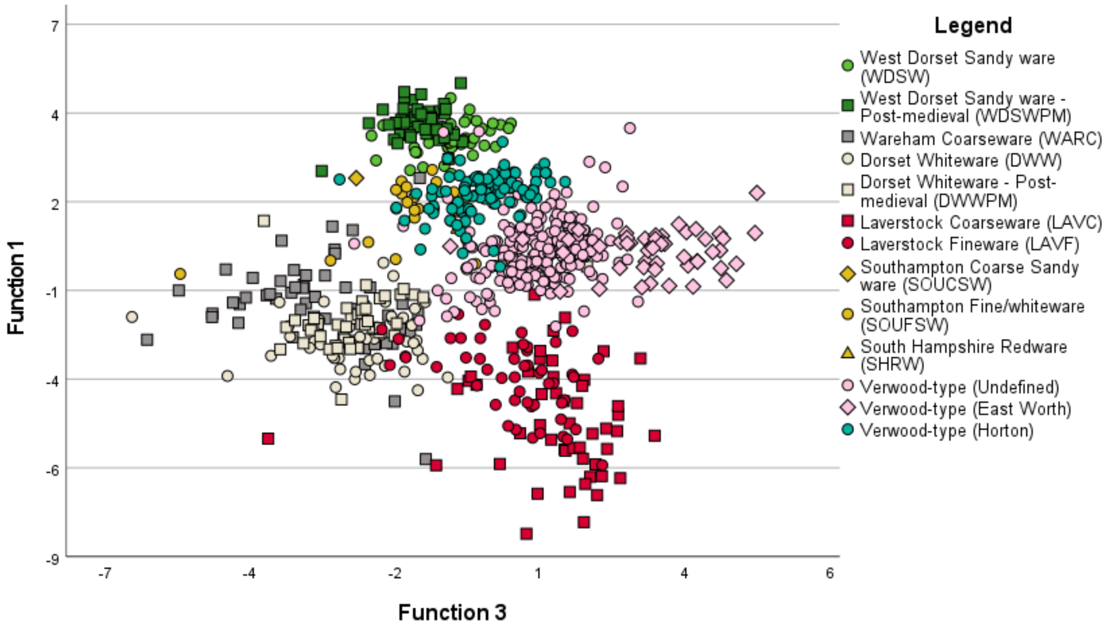


**Fig. 57: Discriminant function scores for functions 1 and 3 for DFA 3, shown by fabric for control group**

Functions 2 and 3 show exceptional discrimination when plotted, with the majority of Verwood-type samples scoring highly for function 2 and low in function 3; other potential sources lie elsewhere on the plot.

Using the predicted group membership process calculated by SPSS, 80% of provenanced samples were correctly classified to their original groups; providing a stronger indicator for successful group attribution. Table 53 displays the predicted group membership for unprovenanced samples, with those attributed a Verwood area origin highlighted.

## Table 52: Predicted Group Membership for Unprovenanced Samples for DFA 3 (those predicted an east Dorset provenance are highlighted)

| Site | Sample ID | Visually Assigned Fabric Analysis | Date of Pottery | Date of Sampled Contexts (if different from pottery) | Prediction of Group Membership from DFA3 | Percentage Likelihood of Group Membership |
|---|---|---|---|---|---|---|
| Christchurch (X11) | X1 | Developed Wessex Coarseware (DWCW) | 13-14th | - | Unprovenanced | 67% |
| Christchurch (X11) | X2 | Wessex Coarseware (WCW) | 12-13th | 13-14th | Unprovenanced | 88% |
| Christchurch (X11) | X3 | Early Verwood (EVER) | 15-16th | - | Unprovenanced | 57% |
| Christchurch (X11) | X4 | Early Verwood (EVER) | 15-16th | - | Unprovenanced | 75% |
| **Christchurch (X11)** | **X5** | **Early Verwood (EVER)** | **15-16th** | - | **Verwood-type (Undefined)** | **83%** |
| Christchurch (X11) | X6 | Early Verwood (EVER) | 15-16th | - | Unprovenanced | 49% |
| **Christchurch (X11)** | **X7** | **Early Verwood (EVER)** | **15-16th** | - | **Verwood-type (Undefined)** | **60%** |
| Christchurch (X11) | X8 | Developed Wessex Coarseware (DWCW) | 13-14th | - | Unprovenanced | 100% |
| Christchurch (X11) | X9 | Developed Wessex Coarseware (DWCW) | 13-14th | - | Unprovenanced | 99% |
| Christchurch (X11) | X10 | Developed Wessex Coarseware (DWCW) | 13-14th | - | West Dorset Sandy ware - Post-medieval (WDSWPM) | 53% |
| Christchurch (X11) | X11 | Early Verwood (EVER) | 15-16th | - | Unprovenanced | 100% |
| Christchurch (X11) | X12 | Early Verwood (EVER) | 15-16th | - | Unprovenanced | 78% |
| Dorchester (W67) | DOR1 | Developed Wessex Coarseware (DWCW) | 13-14th | - | Unprovenanced | 81% |
| Dorchester (W67) | DOR2 | WCW with flint | 12-13th | 13th | Unprovenanced | 100% |
| Dorchester (W67) | DOR3 | Developed Wessex Coarseware (DWCW) | 13-14th | 13th | Wareham Coarseware (WARC) | 88% |
| Dorchester (W67) | DOR4 | Developed Wessex Coarseware (DWCW) | 13-14th | 13th | Unprovenanced | 95% |
| Dorchester (W67) | DOR5 | WCW with flint | 12-13th | 13th | Unprovenanced | 99% |
| Dorchester (W67) | DOR6 | West Dorset Sandy ware (WDSW) | 15-16th | - | Unprovenanced | 58% |
| Dorchester (W67) | DOR7 | West Dorset Sandy ware (WDSW) | 15-16th | - | South Hampshire Redware (SHRW) | 95% |
| Dorchester (W67) | DOR8 | West Dorset Sandy ware (WDSW) | 15-16th | - | Unprovenanced | 74% |
| **East Worth (ACW1295)** | **EWO1** | **Wessex Coarseware (WCW)** | **12-13th** | **13-14th** | **Verwood-type (East Worth)** | **68%** |
| **East Worth (ACW1295)** | **EWO2** | **Developed Wessex Coarseware (DWCW)** | **13-14th** | - | **Verwood-type (East Worth)** | **91%** |
| **East Worth (ACW1295)** | **EWO3** | **Developed Wessex Coarseware (DWCW)** | **13-14th** | - | **Verwood-type (East Worth)** | **100%** |
| **East Worth (ACW1295)** | **EWO4** | **Developed Wessex Coarseware (DWCW)** | **13-14th** | - | **Verwood-type (East Worth)** | **98%** |
| East Worth (ACW1295) | EWO5 | Uncertain but similar to DRPW | 13-14th | - | Wareham Coarseware (WARC) | 55% |
| East Worth (ACW1295) | EWO6 | Early Verwood (EVER) | 15-16th | - | Dorset Whiteware - Post-medieval (DWWPM) | 73% |
| **East Worth (ACW1295)** | **EWO7** | **Verwood-type - early variant (VERE)** | **16-17th** | - | **Verwood-type (East Worth)** | **85%** |
| East Worth (ACW1295) | EWO8 | Early Verwood (EVER) | 15-16th | - | Southampton Whiteware (SOUWW) | 99% |
| **East Worth (ACW1295)** | **EWO9** | **Verwood-type - early variant (VERE)** | **16-17th** | - | **Clay Sample - Verwood Broadstone clay** | **42%** |
| **East Worth (ACW1295)** | **EWO10** | **Verwood-type - early variant (VERE)** | **16-17th** | - | **Verwood-type (East Worth)** | **63%** |
| Fordingbridge (W4075) | FOR1 | Early Verwood (EVER) | 15-16th | 16-18th | Laverstock Coarseware (LAVC) | 73% |
| Fordingbridge (W4075) | FOR2 | Uncertain LAVF or EVER | 13-14th | 13-14th | Southampton Whiteware (SOUWW) | 52% |
| Fordingbridge (W4075) | FOR3 | Developed Wessex Coarseware (DWCW) | 13-14th | 16-18th | Unprovenanced | 100% |
| Fordingbridge (W4075) | FOR4 | Developed Wessex Coarseware (DWCW) | 13-14th | 16-18th | Unprovenanced | 99% |
| **Fordingbridge (W4075)** | **FOR5** | **Early Verwood (EVER)** | **14-15th** | **16-18th** | **Verwood-type (Undefined)** | **79%** |
| Fordingbridge (W4075) | FOR6 | Early Verwood (EVER) | 14-15th | 16-18th | Unprovenanced | 89% |
| **Fordingbridge (W4075)** | **FOR7** | **Early Verwood (EVER)** | **15-16th** | **16-18th** | **Verwood-type (Undefined)** | **59%** |
| **Fordingbridge (W4075)** | **FOR8** | **Early Verwood (EVER)** | **14-15th** | **16-18th** | **Verwood-type (Undefined)** | **59%** |
| Fordingbridge (W4075) | FOR9 | Developed Wessex Coarseware (DWCW) | 13-14th | 16-18th | Unprovenanced | 86% |
| **Fordingbridge (W4075)** | **FOR10** | **Early Verwood (EVER)** | **15-16th** | **16-18th** | **Verwood-type (Undefined)** | **76%** |
| **Fordingbridge (W4075)** | **FOR11** | **Verwood-type - early variant (VERE)** | **16-17th** | **16-18th** | **Verwood-type (Undefined)** | **55%** |
| **Fordingbridge (W4075)** | **FOR12** | **Early Verwood (EVER)** | **14-15th** | **16-18th** | **Verwood-type (Undefined)** | **86%** |
| **Gillingham (ACW1250)** | **GIL1** | **Developed Wessex Coarseware (DWCW)** | **13-14th** | - | **Verwood-type (East Worth)** | **85%** |
| **Gillingham (ACW1250)** | **GIL2** | **Developed Wessex Coarseware (DWCW)** | **13-14th** | - | **Verwood-type (East Worth)** | **100%** |
| **Gillingham (ACW1250)** | **GIL3** | **Verwood-type - early variant (VERE)** | **16-17th** | - | **Verwood-type (East Worth)** | **98%** |
| **Gillingham (ACW1250)** | **GIL4** | **Early Verwood (EVER)** | **15-16th** | **13-15th** | **Verwood-type (East Worth)** | **47%** |
| **Gillingham (ACW1250)** | **GIL5** | **Early Verwood (EVER)** | **15-16th** | **13-15th** | **Verwood-type (East Worth)** | **48%** |
| **Gillingham (ACW1250)** | **GIL6** | **Dorset Whiteware (DWW)** | **13-14th** | **13-15th** | **Verwood-type (East Worth)** | **95%** |
| **Gillingham (ACW1250)** | **GIL7** | **Verwood-type - early variant (VERE)** | **16-17th** | - | **Verwood-type (Horton)** | **71%** |
| **Gillingham (ACW1250)** | **GIL8** | **Verwood-type - early variant (VERE)** | **16-17th** | - | **Verwood-type (Horton)** | **99%** |
| Gillingham (ACW1250) | GIL9 | Verwood-type - early variant (VERE) | 16-17th | - | Unprovenanced | 80% |
| Gillingham (ACW1250) | GIL10 | Verwood-type - early variant (VERE) | 16-17th | - | Southampton Whiteware (SOUWW) | 87% |
| **Gillingham (ACW1250)** | **GIL11** | **Verwood-type - early variant (VERE)** | **16-17th** | - | **Verwood-type (Horton)** | **64%** |
| Horton (HOR2-18) | H2WCW1 | Wessex Coarseware (WCW) | 12-13th | 13-14th | Unprovenanced | 72% |
| Horton (HOR2-18) | H2WCW2 | Wessex Coarseware (WCW) | 12-13th | 13-14th | Unprovenanced | 82% |
| Horton (HOR2-18) | H2WCW3 | Developed Wessex Coarseware (DWCW) | 13-14th | - | Wareham Coarseware (WARC) | 61% |
| Horton (HOR2-18) | H2WCW4 | Wessex Coarseware (WCW) | 12-13th | 13-14th | Unprovenanced | 51% |
| Horton (HOR2-18) | H2WCW5 | Developed Wessex Coarseware (DWCW) | 13-14th | - | Wareham Coarseware (WARC) | 80% |
| Horton (HOR2-18) | H2WCW6 | Wessex Coarseware (WCW) | 12-13th | 13-14th | Unprovenanced | 74% |
| Horton (HOR2-18) | H2WCW7 | Developed Wessex Coarseware (DWCW) | 13-14th | - | Unprovenanced | 55% |
| Horton (HOR2-18) | H2WCW8 | Wessex Coarseware (WCW) | 12-13th | 13-14th | Unprovenanced | 99% |
| Horton (HOR2-18) | H2WCW9 | Developed Wessex Coarseware (DWCW) | 13-14th | - | Wareham Coarseware (WARC) | 97% |
| Horton (HOR2-18) | H2WCW10 | Wessex Coarseware (WCW) | 12-13th | 13-14th | West Dorset Sandy ware (WDSW) | 72% |
| Lymington(ACW1012) | LYM1 | Early Verwood (EVER) | 15-16th | Late Medieval | Unprovenanced | 96% |
| Lymington(ACW1012) | LYM2 | South Hampshire Redware (SHRW) | 14-15th | Late Medieval | South Hampshire Redware (SHRW) | 92% |
| Lymington(ACW1012) | LYM3 | Late Medieval Well-fired Sandy ware (LMWFSW) | 14-15th | Late Medieval | Unprovenanced | 73% |
| Lymington(ACW1012) | LYM4 | Uncertain LAVF or EVER | 14-15th | Late Medieval | Unprovenanced | 62% |
| Lymington(ACW1012) | LYM5 | Late Medieval Well-fired Sandy ware (LMWFSW) | 14-15th | Late Medieval | Unprovenanced | 70% |
| Lymington(ACW1012) | LYM6 | Late Medieval Well-fired Sandy ware (LMWFSW) | 14-15th | Late Medieval | West Dorset Sandy ware - Post-medieval (WDSWPM) | 55% |
| Lymington(ACW1012) | LYM7 | Late Medieval Well-fired Sandy ware (LMWFSW) | 14-15th | Late Medieval | Unprovenanced | 75% |
| Lymington(ACW1012) | LYM8 | Late Medieval Well-fired Sandy ware (LMWFSW) | 14-15th | Late Medieval | Unprovenanced | 87% |
| Poole (PM9) | POO1 | Early Verwood (EVER) | 15-16th | - | Unprovenanced | 99% |
| Poole (PM9) | POO2 | Dorset Red Painted Ware (DRPW) | 12-13th | 13-14th | Unprovenanced | 83% |
| Poole (PM9) | POO3 | Developed Wessex Coarseware (DWCW) | 13-14th | - | Unprovenanced | 75% |
| Poole (PM9) | POO4 | Developed Wessex Coarseware (DWCW) | 13-14th | - | Wareham Coarseware (WARC) | 56% |
| **Poole (PM9)** | **POO5** | **Early Verwood (EVER)** | **15-16th** | - | **Verwood-type (Undefined)** | **80%** |
| Poole (PM9) | POO6 | Early Verwood (EVER) | 15-16th | - | West Dorset Sandy ware - Post-medieval (WDSWPM) | 48% |
| Poole (PM9) | POO7 | Early Verwood (EVER) | 15-16th | - | Unprovenanced | 55% |
| Poole (PM9) | POO8 | Developed Wessex Coarseware (DWCW) | 13-14th | - | Unprovenanced | 91% |
| Poole (PM9) | POO9 | Dorset Red Painted Ware (DRPW) | 12-13th | 13-14th | Unprovenanced | 77% |
| Poole (PM9) | POO10 | Developed Wessex Coarseware (DWCW) | 13-14th | - | Unprovenanced | 96% |
| Poole (PM9) | POO11 | Early Verwood (EVER) | 15-16th | - | Unprovenanced | 99% |
| Poole (PM9) | POO12 | Early Verwood (EVER) | 15-16th | - | Unprovenanced | 94% |

## Table 52 (cont.): Predicted Group Membership for Unprovenanced Samples for DFA 3

| Site | Sample ID | Visually Assigned Fabric Analysis | Date of Pottery | Date of Sampled Contexts (if different from pottery) | Prediction of Group Membership from DFA3 | Percentage Likelihood of Group Membership |
|---|---|---|---|---|---|---|
| Salisbury (W7924) | SAL1 | Early Verwood (EVER) | 14-15th | 13-15th | Unprovenanced | 92% |
| Salisbury (W7924) | SAL2 | Early Verwood (EVER) | 14-15th | 13-15th | Laverstock Fineware (LAVF) | 84% |
| Salisbury (W7924) | SAL3 | Uncertain LAVF or EVER | 13-14th | 13-15th | Laverstock Fineware (LAVF) | 100% |
| Salisbury (W7924) | SAL4 | Verwood-type - early variant (VERE) | 16-17th | 15-16th | Laverstock Fineware (LAVF) | 99% |
| Salisbury (W7924) | SAL5 | Early Verwood (EVER) | 15-16th | - | Unprovenanced | 69% |
| **Salisbury (W7924)** | **SAL6** | **Early Verwood (EVER)** | **15-16th** | **-** | **Verwood-type (Undefined)** | **86%** |
| **Salisbury (W7924)** | **SAL7** | **Uncertain LAVF or EVER** | **13-14th** | **13-15th** | **Crendell Reading clay sample** | **97%** |
| Salisbury (W7924) | SAL8 | Developed Wessex Coarseware (DWCW) | 13-14th | 13-15th | Unprovenanced | 100% |
| Salisbury (W7924) | SAL9 | Early Verwood (EVER) | 15-16th | 13-15th | Unprovenanced | 62% |
| Salisbury (W7924) | SAL10 | Early Verwood (EVER) | 15-16th | - | Laverstock Fineware (LAVF) | 79% |
| Salisbury (W7924) | SAL11 | Verwood-type - early variant (VERE) | 16-17th | 15-16th | Laverstock Fineware (LAVF) | 98% |
| Salisbury (W7924) | SAL12 | Early Verwood (EVER) | 15-16th | 13-15th | Laverstock Fineware (LAVF) | 79% |
| Shaftesbury (SAVED19) | SHA1 | Uncertain LAVF or EVER | 13-14th | - | Unprovenanced | 84% |
| **Shaftesbury (SAVED19)** | **SHA2** | **Developed Wessex Coarseware (DWCW)** | **13-14th** | **-** | **Verwood-type (East Worth)** | **100%** |
| **Shaftesbury (SAVED19)** | **SHA3** | **Early Verwood (EVER)** | **15-16th** | **-** | **Verwood-type (East Worth)** | **56%** |
| Shaftesbury (SAVED19) | SHA4 | Uncertain LAVF or EVER | 13-14th | - | Unprovenanced | 84% |
| Shaftesbury (SAVED19) | SHA5 | Dorset Red Painted Ware (DRPW) | 12-13th | - | Wareham Coarseware (WARC) | 55% |
| Shaftesbury (SAVED19) | SHA6 | Developed Wessex Coarseware (DWCW) | 13-14th | - | Southampton Whiteware (SOUWW) | 69% |
| Shaftesbury (SAVED19) | SHA7 | Early Verwood (EVER) | 15-16th | - | Southampton Whiteware (SOUWW) | 99% |
| Shaftesbury (SAVED19) | SHA8 | Early Verwood (EVER) | 15-16th | - | Wareham Coarseware (WARC) | 65% |
| Shaftesbury (SAVED19) | SHA9 | Early Verwood (EVER) | 15-16th | - | Southampton Whiteware (SOUWW) | 93% |
| Shaftesbury (SAVED19) | SHA10 | Early Verwood (EVER) | 15-16th | - | Unprovenanced | 90% |
| **Shaftesbury (SAVED19)** | **SHA11** | **Verwood-type - early variant (VERE)** | **16-17th** | **16-17th** | **Verwood-type (East Worth)** | **44%** |
| Shaftesbury (SAVED19) | SHA12 | Wessex Coarseware (WCW) | 12-13th | 12-13th | Unprovenanced | 94% |
| Shaftesbury (SAVED19) | SHA13 | Developed Wessex Coarseware (DWCW) | 13-14th | 13-14th | Unprovenanced | 60% |
| Shaftesbury (SAVED19) | SHA14 | Early Verwood (EVER) | 15-16th | 15-16th | Unprovenanced | 100% |
| Southampton (SOU) | SOU1 | Laverstock Fineware (LAVF) | 13-14th | - | Unprovenanced | 88% |
| Southampton (SOU) | SOU2 | Developed Wessex Coarseware (DWCW) | 13-14th | - | Unprovenanced | 100% |
| Southampton (SOU) | SOU3 | Dorset Whiteware (DWW) | 13-14th | - | Dorset Whiteware (DWW) | 90% |
| Southampton (SOU) | SOU4 | Developed Wessex Coarseware (DWCW) | 13-14th | - | Unprovenanced | 97% |
| Southampton (SOU) | SOU5 | Late Medieval Well-fired Sandy ware (LMWFSW) | 14-15th | - | West Dorset Sandy ware - Post-medieval (WDSWPM) | 51% |
| Southampton (SOU) | SOU6 | Southampton Coarse Sandy ware (SOUCSW) | 13-14th | - | Southampton Coarse Sandy ware (SOUCSW) | 98% |
| Southampton (SOU) | SOU7 | Late Medieval Well-fired Sandy ware (LMWFSW) | 14-15th | - | West Dorset Sandy ware (WDSW) | 48% |
| Southampton (SOU) | SOU8 | Southampton Whiteware (SOUWW) | 13-14th | - | Unprovenanced | 95% |
| Southampton (SOU) | SOU9 | Late Medieval Well-fired Sandy ware (LMWFSW) | 14-15th | - | West Dorset Sandy ware - Post-medieval (WDSWPM) | 44% |
| Southampton (SOU) | SOU10 | Late Medieval Well-fired Sandy ware (LMWFSW) | 14-15th | - | Unprovenanced | 93% |
| Southampton (SOU) | SOU11 | Developed Wessex Coarseware (DWCW) | 13-14th | - | Unprovenanced | 100% |
| Southampton (SOU) | SOU12 | Dorset Whiteware (DWW) | 13-14th | - | Southampton Whiteware (SOUWW) | 80% |
| Southampton (SOU) | SOU13 | Local Pink Sandy ware (LOPS) | 14-15th | - | Unprovenanced | 63% |
| Southampton (SOU) | SOU14 | Southampton Whiteware (SOUWW) | 13-14th | - | Unprovenanced | 90% |
| Stratton (STN) | STN1 | Dorset Red Painted Ware (DRPW) | 12-13th | High Medieval | Unprovenanced | 66% |
| Stratton (STN) | STN2 | Developed Wessex Coarseware (DWCW) | 13-14th | High Medieval | Unprovenanced | 98% |
| Stratton (STN) | STN3 | Developed Wessex Coarseware (DWCW) | 13-14th | High Medieval | Unprovenanced | 99% |
| Stratton (STN) | STN4 | Early Verwood (EVER) | 15-16th | Late Medieval | Unprovenanced | 70% |
| Stratton (STN) | STN5 | Developed Wessex Coarseware (DWCW) | 13-14th | High Medieval | Unprovenanced | 55% |
| Stratton (STN) | STN6 | Dorset Whiteware (DWW) | 13-14th | High Medieval | Dorset Whiteware (DWW) | 59% |
| Stratton (STN) | STN7 | Early Verwood (EVER) | 15-16th | Late Medieval | Unprovenanced | 74% |
| **Stratton (STN)** | **STN8** | **Dorset Whiteware (DWW)** | **13-14th** | **High Medieval** | **Verwood-type (Undefined)** | **28%** |
| Stratton (STN) | STN9 | Developed Wessex Coarseware (DWCW) | 13-14th | High Medieval | Unprovenanced | 77% |
| **Stratton (STN)** | **STN10** | **Uncertain LAVF or EVER** | **13-14th** | **High Medieval** | **Verwood-type (Undefined)** | **95%** |
| Stratton (STN) | STN11 | Dorset Red Painted Ware (DRPW) | 12-13th | High Medieval | Unprovenanced | 52% |
| Stratton (STN) | STN12 | Dorset Whiteware (DWW) | 13-14th | High Medieval | Dorset Whiteware (DWW) | 95% |
| Wilton (W9625) | WIL1 | Wessex Coarseware (WCW) | 12-13th | 12-14th | Unprovenanced | 74% |
| Wilton (W9625) | WIL2 | Wessex Coarseware (WCW) | 12-13th | 12-14th | Laverstock Coarseware (LAVC) | 97% |
| Wilton (W9625) | WIL3 | Developed Wessex Coarseware (DWCW) | 13-14th | 12-14th | Laverstock Coarseware (LAVC) | 60% |
| Wilton (W9625) | WIL4 | Early Verwood (EVER) | 15-16th | 12-14th | Laverstock Fineware (LAVF) | 100% |
| Wilton (W9625) | WIL5 | Uncertain LAVF or EVER | 13-14th | 17-18th | Unprovenanced | 90% |
| **Wilton (W9625)** | **WIL6** | **Early Verwood (EVER)** | **15-16th** | **12-14th** | **Verwood-type (Undefined)** | **83%** |
| **Wilton (W9625)** | **WIL7** | **Verwood-type - early variant (VERE)** | **16-17th** | **17-18th** | **Verwood-type (Undefined)** | **40%** |
| Wilton (W9625) | WIL8 | Early Verwood (EVER) | 15-16th | 17-18th | South Hampshire Redware (SHRW) | 97% |
| Wimborne Minster (W398) | WIM1 | Developed Wessex Coarseware (DWCW) | 13-14th | High Medieval - Early Post-medieval | Unprovenanced | 100% |
| Wimborne Minster (W398) | WIM2 | Developed Wessex Coarseware (DWCW) | 13-14th | High Medieval - Early Post-medieval | Unprovenanced | 98% |
| Wimborne Minster (W398) | WIM3 | Wessex Coarseware (WCW) | 12-13th | High Medieval - Early Post-medieval | Unprovenanced | 100% |
| Wimborne Minster (W398) | WIM4 | Uncertain LAVF or EVER | 13-14th | High Medieval - Early Post-medieval | Unprovenanced | 56% |
| **Wimborne Minster (W398)** | **WIM5** | **West Dorset Sandy ware (WDSW)** | **13-14th** | **High Medieval - Early Post-medieval** | **Verwood-type (Horton)** | **79%** |
| **Wimborne Minster (W398)** | **WIM6** | **Early Verwood (EVER)** | **14-15th** | **High Medieval - Early Post-medieval** | **Verwood-type (Horton)** | **50%** |
| Wimborne Minster (W398) | WIM7 | Developed Wessex Coarseware (DWCW) | 13-14th | High Medieval - Early Post-medieval | Unprovenanced | 99% |
| Wimborne Minster (W398) | WIM8 | Wessex Coarseware (WCW) | 13-14th | High Medieval - Early Post-medieval | Unprovenanced | 75% |
| Wimborne Minster (W398) | WIM9 | Wessex Coarseware (WCW) | 13-14th | High Medieval - Early Post-medieval | Unprovenanced | 92% |
| Wimborne Minster (W398) | WIM10 | Early Verwood (EVER) | 13-14th | High Medieval - Early Post-medieval | Unprovenanced | 84% |

The predicted group membership shows 36 unprovenanced samples have a predicted group membership associated with sources in the Verwood area; this is quantified in Table 53.

**Table 53: Numbers of Samples with Verwood Origin by Predicted Group**

| Prediction of group membership | No. |
|---|---|
| Clay Sample - Crendell Reading clay | 1 |
| Clay Sample - Verwood Broadstone clay | 1 |
| Verwood-type (East Worth) | 15 |
| Verwood-type (Horton) | 5 |
| Verwood-type (Undefined) | 14 |
| **Total** | **36** |

The largest group of Verwood area attributed samples from the unprovenanced group were recovered from the East Worth assemblage. The likelihood that elements driving this attribution could derive from post-depositional change has been limited by grouping all unprovenanced assemblages as unknowns. Even if this is the case, only seven of the 36 Verwood origin attributed samples would be guided by this post-depositional change.

The results of the analyses are imperfect, as four samples have been misattributed to the Verwood area, despite other methods showing another provenance. The first of these comprises Wimborne Minster sample 5 - a West Dorset Sandy ware – identified in both hand specimen and thin section. This misattribution is due to high iron content in both Horton samples and West Dorset Sandy ware, which creates an incorrect attribution. Secondly, Poole 5 - a potential early Verwood – was revealed to be a probable North French import in thin section. Thirdly, two Dorset Whiteware samples - Stratton 8 and Gillingham 6 - may have been misidentified by the author in hand specimens, as very pale firing post-medieval wares can often by mistaken with similar Verwood area samples. Sadly, these were not subjected to thin section, thus no further explanation can be provided. This supports the 80% accuracy of allocation for the control group membership samples, as calculated as part of the method in SPSS (Appendix VIII).

Furthermore, the attribution of 32 samples – 36, excluding those discussed above - is also considered conservative when the plots of functions 1, 2 and 3 are considered against the control group samples (plots shown in Appendix X – summarised in Tables 54-56). Here, plots of function scores suggest that for DFA 3, functions 1 and 2 allocate 30 samples to Verwood provenance (Table 54); 69 for functions 1 and 3 (Table 55) and 57 for functions 2 and 3 (Table 56). This clarifies why a conservative estimate provided by the predicted group membership function is considered a more robust method, as it takes into account results from all functions.

It has previously been noted that identification of late Laverstock and early Verwood production is of pivotal importance to the research question. This is re-enforced by the similarity between pottery from these centres in hand specimens, thin section and chemical composition. The attribution of these samples to either centre has important consequences for extending production life at Laverstock and bolstering a start date for Verwood area pottery production. The predicted group membership for DFA3 suggests that both of these elements are reflected in the results of the chemical analyses. When iron and aluminium are plotted, the reason for this uncertainty can be supported.

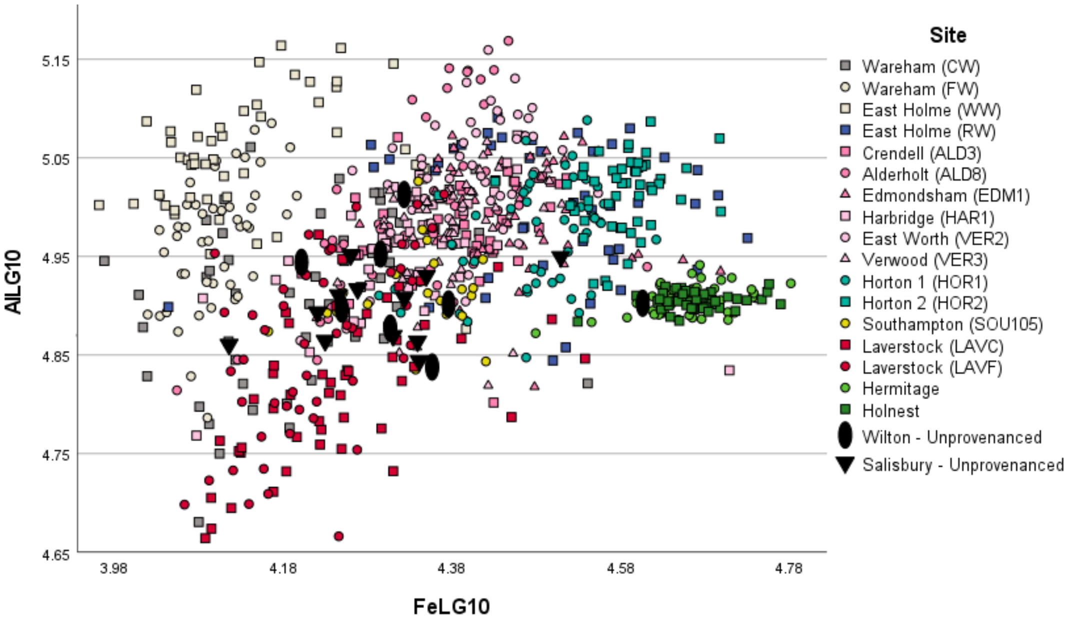


**Fig. 58: Showing transformed results for aluminium and iron; south Dorset samples lie to the left; the mixed source East Holme redwares share the centre of the plot occupied by various Verwood sources, with Horton to the right; West Dorset wares can be shown to occupy a tight group on the extreme right; Laverstock wares share a similar area to Verwood-types**

When iron and aluminium results are plotted, definition between known groups can be ascertained. When the Salisbury and Wilton unprovenanced assemblages are plotted with the control group, it is clear where this uncertainty lies, as few samples share similarity with those from Horton, the Verwood area and West Dorset. Many Salisbury and Wilton area samples sit on the boundary between being assigned as Verwood or Laverstock wares, suggesting that the attribution is far from certain. Instead, discrimination between the two sources is driven by the high function score for calcium – a known leaching element from calcareous soils, such as those samples recovered from Wilton and Salisbury, which both lie on chalk. As a result, the attribution of certain late Laverstock samples should be considered with caution. This shows that when using pXRF, it can be difficult to be certain when differentiating between late Laverstock and early Verwood samples; however, a small number of samples from Salisbury and Wilton certainly fall within the expected range for east Dorset production.

Cumulatively, the results suggest that there are many more potential east Dorset provenanced samples, as shown by certain functions being plotted similarly to known Verwood-type pottery samples (Appendix X). However, the predicted group membership offers the most robust and statistically reliable method for allocating provenance for these samples, as the group assignment uses all discriminant functions over just the first three functions, despite those explaining the most variance. This conservative number of east Dorset provenance samples leads to the suggestion that medieval pottery production was being undertaken in the Verwood area from the 13-14th century, as shown in samples from Shaftesbury, Gillingham, Wimborne Minster, Stratton, East Worth and Salisbury. Manufacture extends into the 15-16th century onwards - as illustrated by samples from the aforementioned sites, in addition to Poole and Wilton - and can be ascribed to both East Worth and Horton areas.

Table 56 demonstrates that those samples assigned an east Dorset origin in the predicted group membership derive predominantly from well-refined fabric groups *(e.g.* VERE and EVER), with three potential initially misassigned samples from DWW and WDSW groups, and fewer coarseware samples, having matched with the known control group. In comparison, Verwood-type (VER) pottery comprises a comparatively more processed fabric with generally less voids and smaller inclusion sizes – as demonstrated via petrographic thin sections. Arguably, this could lead to a bias in identifying similarity between the two aforementioned groups when compared to the control group in comparison to more coarse counterparts, as shown in the data collected via pXRF. This was explored using the south Dorset samples, where the Trigon Broadstone clay matched best with the provenanced medieval and post-medieval samples from the same area. This level of similarity and almost continuous pottery manufacture, was not matched by any other control group, proving this subset is best suited to explore the relationships between amounts of sand inclusions, raw clay and finished pottery of medieval and post-medieval date.

In terms of future research, it is proposed that investigators attempt to limit the effect of calcium when using bulk chemical analysis with pXRF to discriminate between potential Laverstock and east Dorset provenance. This can be achieved in a discriminant function analysis by employing functions where calcium has coefficient scores closer to zero (Table 51). Table 56 displays that of those samples plotted using function 2 and function 3 – function 3 having a reduced coefficient score for calcium – only eight measured can be assigned to Laverstock, over the 18 assigned using functions 1 and 2 (Table 55) – both with high coefficients for calcium. To remove calcium completely would lead to a reduced, less certain discrimination between a Laverstock or east Dorset provenance (*cf*. Fig. 42 and Fig. 44).

### Table 54: Similarity between Unprovenanced and Control Group when Function 1 and 2 of DFA 3 is Plotted (Appendix X)

| | | **DFA 3 Function 1 and 2 Group Similarity** | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **Like Horton** | **Like Laverstock** | **Like South Dorset** | **Like Southampton** | **Unlike any group (Unprovenanced)** | **Like Verwood (undefined) or East Worth** | **Like West Dorset** | **Total Samples by Site** |
| **Unprovenanced Site** | **Christchurch** | | | | 4 | 6 | 1 | 1 | *12* |
| | **Dorchester** | | | 2 | 3 | 3 | | | *8* |
| | **East Worth** | 2 | | 3 | 3 | | 2 | | *10* |
| | **Fordingbridge** | | 2 | | 1 | 9 | | | *12* |
| | **Gillingham** | | | 2 | 3 | 1 | 8 | | *14* |
| | **Horton** | | | | 3 | 5 | 2 | | *10* |
| | **Lymington** | | | | 4 | 4 | | | *8* |
| | **Poole** | | | | 8 | 3 | 1 | | *12* |
| | **Salisbury** | 1 | 5 | 4 | | 2 | | | *12* |
| | **Shaftesbury** | | | 3 | 2 | 2 | 7 | | *14* |
| | **Southampton** | | 2 | | 11 | 1 | | | *14* |
| | **Stratton** | | | 3 | | 5 | 4 | | *12* |
| | **Wilton** | | 4 | 2 | | 2 | | | *8* |
| | **Wimborne Minster** | | 1 | | 5 | 2 | 2 | | *10* |
| | **Total of Similarity Across Unprovanced Group** | **3** | **14** | **19** | **47** | **45** | **27** | **1** | **156** |

## Table 55: Similarity between Unprovenanced and Control Group when Function 1 and 3 of DFA 3 is Plotted (Appendix X)

| | | **DFA 3 Function 1 and 3 Group Similarity** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Like East Worth** | **Like Horton** | **Like Horton or Verwood (undefined)** | **Like Horton or Southampton** | **Like Laverstock** | **Like South Dorset** | **Like Southampton** | **Like Southampton or Horton** | **Like Southampton or South Dorset** | **Unlike any group (Unprovenanced)** | **Like Verwood (undefined)** | **Like Verwood (undefined) or East Worth** | **Like Verwood (undefined) or Horton** | **Like West Dorset** | **Total Samples by Site** |
| **Unprovenanced Site** | **Christchurch** | 1 | 2 | | | | | 4 | | | | 4 | | | 1 | *12* |
| | **Dorchester** | | 1 | | | 1 | 1 | | | | | 4 | | 1 | | *8* |
| | **East Worth** | 1 | 2 | | | | 1 | | | 1 | 4 | 1 | | | | *10* |
| | **Fordingbridge** | | 1 | 1 | | 1 | | 1 | | | | 8 | | | | *12* |
| | **Gillingham** | 2 | | | | | | | | | 4 | 7 | | 1 | | *14* |
| | **Horton** | | | 1 | | | 4 | 1 | 1 | 1 | | 2 | | | | *10* |
| | **Lymington** | | 1 | | | | 1 | | 2 | | 2 | | | 2 | | *8* |
| | **Poole** | | 1 | 1 | 3 | | | 1 | | 4 | | 2 | | | | *12* |
| | **Salisbury** | | 1 | | | 10 | | | | | | 1 | | | | *12* |
| | **Shaftesbury** | 4 | 1 | | | | | 5 | | | 2 | 1 | | 1 | | *14* |
| | **Southampton** | | 1 | | | 1 | 1 | 6 | 2 | | 1 | 2 | | | | *14* |
| | **Stratton** | | | | | | 5 | 2 | | 1 | 1 | 3 | | | | *12* |
| | **Wilton** | | | | | 5 | 1 | | | | | 1 | 1 | | | *8* |
| | **Wimborne Minster** | | 3 | 1 | | | 1 | 1 | | | 2 | 1 | 1 | | | *10* |
| | **Total of Similarity Across Unprovanced Group** | **8** | **14** | **3** | **1** | **18** | **15** | **25** | **5** | **3** | **16** | **37** | **2** | **5** | **4** | **156** |

## Table 56: Similarity between Unprovenanced and Control Group when Function 2 and 3 of DFA 3 is Plotted (Appendix X)

| | | **DFA 3 Function 2 and 3 Group Similarity** | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Like Horton** | **Like Horton or Southampton** | **Like Laverstock** | **Like Laverstock or West Dorset** | **Like South Dorset** | **Like South Dorset or Horton** | **Like Southampton or Verwood (undefined)** | **Like Southampton** | **Like Southampton or Horton** | **Like Southampton or West Dorset** | **Unlike any group (Unprovenanced)** | **Like Verwood (undefined)** | **Like Verwood (undefined) or East Worth** | **Like Verwood (undefined) or Horton** | **Like West Dorset** | **Total Samples by Site** |
| **Unprovenanced Site** | **Christchurch** | 4 | | | | | 1 | | 2 | | | 2 | 3 | | | | *12* |
| | **Dorchester** | 1 | | | | | 1 | | | | | 5 | | | 1 | | *8* |
| | **East Worth** | | | 2 | | 1 | | | 3 | | 1 | 3 | | | | | *10* |
| | **Fordingbridge** | 3 | | | | | | | 2 | 1 | | 3 | 2 | | 1 | | *12* |
| | **Gillingham** | | | 2 | 1 | 1 | | | 1 | | | 7 | 1 | | | 1 | *14* |
| | **Horton** | | 1 | | | | | 2 | | | | 3 | 3 | 1 | | | *10* |
| | **Lymington** | | | | | | | | | | | 4 | 2 | | 2 | | *8* |
| | **Poole** | 2 | | | | | | | | | | 4 | 4 | | 2 | | *12* |
| | **Salisbury** | | | 2 | 1 | | | | | | | 8 | | | 1 | | *12* |
| | **Shaftesbury** | 3 | | | | 2 | | | 1 | | | 5 | 1 | | | 2 | *14* |
| | **Southampton** | | | | | 1 | | | | | | 4 | 6 | | 3 | | *14* |
| | **Stratton** | 3 | | | | 3 | | | 1 | | | 3 | | | 2 | | *12* |
| | **Wilton** | | | | | | | | | | | 6 | | | 1 | 1 | *8* |
| | **Wimborne Minster** | 2 | | | | | | | | | | 5 | 2 | | 1 | | *10* |
| | **Total of Similarity Across Unprovanced Group** | **18** | **1** | **6** | **2** | **8** | **2** | **2** | **10** | **1** | **1** | **62** | **24** | **1** | **14** | **4** | **156** |

**Table 57: Quantification of Assigned Verwood Samples by Initial Visually Assigned Fabric Type**

| | | Assigned group following chemical analysis | | | | | |
|---|---|---|---|---|---|---|---|
| | | Clay Sample - Crendell Reading clay | Clay Sample - Verwood Broadstone clay | Verwood-type (East Worth) | Verwood-type (Horton) | Verwood-type (Undefined) | Total by initial assigned fabric |
| Visually assigned fabric | Developed Wessex Coarseware (DWCW) | | | 6 | | | 6 |
| | Dorset Whiteware (DWW) | | | 1 | | 1 | 2 |
| | Early Verwood (EVER) | | | 3 | 1 | 10 | 14 |
| | Uncertain LAVF or EVER | 1 | | | | 1 | 2 |
| | Verwood-type - early variant (VERE) | | 1 | 4 | 3 | 2 | 10 |
| | Wessex Coarseware (WCW) | | | 1 | | | 1 |
| | West Dorset Sandy ware (WDSW) | | | | 1 | | 1 |
| | Total assigned group following chemical analysis | **1** | **1** | **15** | **5** | **14** | **36** |

### *5.13. Statistical Analysis 4 (PCA): Chemical Analysis by pXRF of Sand Tempered South Dorset Clay Samples and Provenanced South Dorset Pottery*

During the collection of clay from Trigon, it was also possible to extract a sample of sand from the area, thus replicating the likely situation exploited by historic potters. Seven samples of clay were created (Table 58) and compared to known south Dorset pottery samples using a PCA.

Coarse and fineware samples from the medieval pottery kiln at Wareham were selected, alongside post-medieval whiteware samples from East Holme, to be compared to seven samples of sand tempered clay from Trigon; these samples were numbered TRIG0-6. All clay samples were fired to 1000ºC over the course of a 24-hour firing schedule, identical to the process used for previous clay samples. Table 59 shows that as more sand is added as temper, the 14 elements measured in the previous analyses all decrease - bar silicon, which increases. This suggests that there is likely to be less similarity between heavily sanded, or more coarse fabric, samples in comparison to those with less sand (more fine), despite the two deriving from the exact same clay source.

**Table 58: Samples of Broadstone Clay from Trigon, Wareham and Results for 14 Variables as Measured using pXRF (amended with CRM Till 4)**

| Sample ID | Content | Percentage of total weight formed by sand as temper | Rb | Nb | Sr | Zr | Fe | Al | Si | K | Ca | Ti | V | Cr | Zn | Ba |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TRIG_0 | 10g clay | 0% | 147.34 | 24.79 | 124.25 | 262.88 | 8790.87 | 170483.55 | 341625.57 | 21436.62 | 1510.22 | 8812.34 | 134.95 | 56.29 | 22.03 | 400.47 |
| TRIG_1 | 10g clay<br>2g sand | 17% | 130.90 | 22.31 | 105.53 | 368.63 | 7826.36 | 160150.83 | 348371.74 | 19911.81 | 1326.25 | 8082.52 | 124.38 | 44.80 | 15.57 | 359.45 |
| TRIG_2 | 10g clay<br>4g sand | 29% | 123.65 | 20.14 | 100.27 | 248.19 | 7000.21 | 160459.24 | 340777.13 | 19095.53 | 1308.59 | 7853.13 | 111.90 | 51.42 | 15.43 | 360.61 |
| TRIG_3 | 10g clay<br>6g sand | 38% | 100.30 | 16.64 | 80.22 | 245.87 | 6189.99 | 162708.05 | 340899.19 | 18924.68 | 1320.01 | 7434.06 | 93.52 | 36.64 | 19.48 | 300.38 |
| TRIG_4 | 10g clay<br>8g sand | 44% | 103.19 | 18.37 | 85.52 | 241.56 | 6344.90 | 152904.96 | 352580.22 | 18542.88 | 1329.22 | 7625.96 | 106.72 | 43.58 | 17.07 | 331.19 |
| TRIG_5 | 10g clay<br>10g sand | 50% | 95.55 | 14.51 | 77.23 | 245.25 | 6331.10 | 157712.93 | 342961.10 | 19146.90 | 1379.06 | 7591.16 | 94.93 | 44.09 | 17.66 | 290.77 |
| TRIG_6 | 10g clay<br>12g sand | 55% | 78.17 | 10.64 | 61.39 | 231.74 | 5099.56 | 156701.88 | 357737.72 | 16909.27 | 1442.01 | 7138.23 | 71.44 | 20.50 | 11.37 | 271.92 |

This was explored using a PCA, as the samples are from similar clay sources, thus the differences between them should be minor. The assumptions for PCA were met by retaining the same data transforms as outlined for analyses 2-3. In contrast to the majority of variables, aluminium and titanium failed to pass both Shapiro-Wilkes and Kolmogorov-Smirnov tests of normality, thus rejecting the null hypothesis that the data for those variables have a normal distribution (Table 59).

**Table 59: Test of Normality for Analysis 4 (*denotes largest)**

|  | Kolmogorov-Smirnov |  |  | Shapiro-Wilk |  |  |
|---|---|---|---|---|---|---|
|  | Statistic | df | Sig. | Statistic | df | Sig. |
| **RbLG10** | 0.112023 | 157 | 0.000 | 0.8142299 | 157 | 0.000 |
| **NbLG10** | 0.076036 | 157 | 0.027 | 0.9879258 | 157 | 0.194 |
| **SrLG10** | 0.082266 | 157 | 0.011 | 0.97008 | 157 | 0.002 |
| **ZrLG10** | 0.086771 | 157 | 0.006 | 0.9837613 | 157 | 0.062 |
| **FeLG10** | 0.107289 | 157 | 0.000 | 0.9595732 | 157 | 0.000 |
| **AlLG10** | 0.047225 | 157 | .200* | 0.9932774 | 157 | 0.681 |
| **SiLG10** | 0.08407 | 157 | 0.009 | 0.9685338 | 157 | 0.001 |
| **KLG10** | 0.085818 | 157 | 0.007 | 0.9616497 | 157 | 0.000 |
| **CaLG10** | 0.252514 | 157 | 0.000 | 0.7469704 | 157 | 0.000 |
| **TiLG10** | 0.062995 | 157 | .200* | 0.9839079 | 157 | 0.065 |
| **VLG10** | 0.089849 | 157 | 0.003 | 0.9723449 | 157 | 0.003 |
| **CrLG10** | 0.110646 | 157 | 0.000 | 0.9402407 | 157 | 0.000 |
| **ZnLG10** | 0.110986 | 157 | 0.000 | 0.9575356 | 157 | 0.000 |
| **BaLG10** | 0.078546 | 157 | 0.019 | 0.8849434 | 157 | 0.000 |

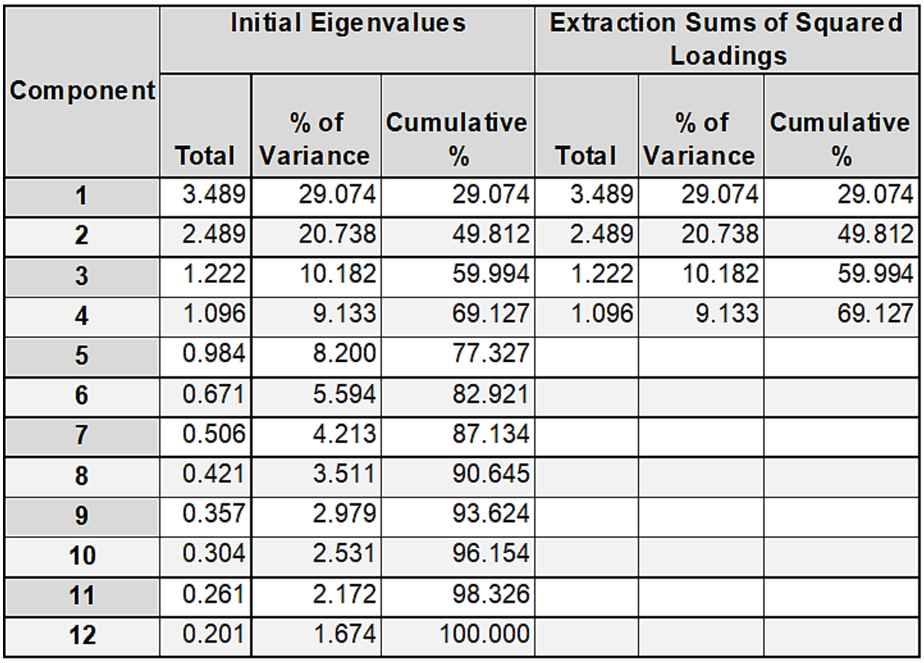
In addition, a Kaiser-Meyer-Olkin (KMO) Measure and Bartlett's Test was run to measure the suitability of the data for factor analysis. A value of 0.703, and a significance of less than 0.001 was considered acceptable (Table 60).

**Table 60: KMO and Bartlett’s Measure for Analysis 4 (PCA)**

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | 0.703 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 707.209 |
| | df | 66 |
| | Sig. | 0.000 |

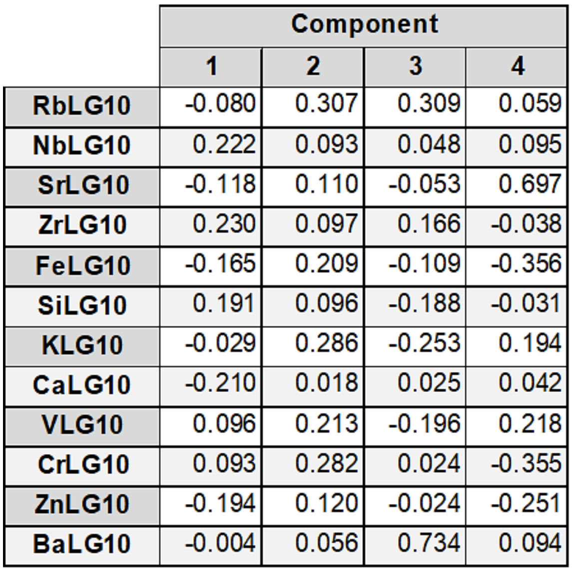
Table 61 shows that 69% of the variance is explained within the first four components, with component 1 having the largest eigenvalue. Cumulatively, components 2 and 3 have an eigenvalue of 3.6 and collectively explain 30% of the variance.

**Table 61: Eigenvalues and Variance Explained for Analysis 4 (PCA)**



| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 3.489 | 29.074 | 29.074 | 3.489 | 29.074 | 29.074 |
| 2 | 2.489 | 20.738 | 49.812 | 2.489 | 20.738 | 49.812 |
| 3 | 1.222 | 10.182 | 59.994 | 1.222 | 10.182 | 59.994 |
| 4 | 1.096 | 9.133 | 69.127 | 1.096 | 9.133 | 69.127 |
| 5 | 0.984 | 8.200 | 77.327 | | | |
| 6 | 0.671 | 5.594 | 82.921 | | | |
| 7 | 0.506 | 4.213 | 87.134 | | | |
| 8 | 0.421 | 3.511 | 90.645 | | | |
| 9 | 0.357 | 2.979 | 93.624 | | | |
| 10 | 0.304 | 2.531 | 96.154 | | | |
| 11 | 0.261 | 2.172 | 98.326 | | | |
| 12 | 0.201 | 1.674 | 100.000 | | | |

**Table 62: Component Score Coefficient for Analysis 4 (PCA)**



| | Component | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| **RbLG10** | -0.080 | 0.307 | 0.309 | 0.059 |
| **NbLG10** | 0.222 | 0.093 | 0.048 | 0.095 |
| **SrLG10** | -0.118 | 0.110 | -0.053 | 0.697 |
| **ZrLG10** | 0.230 | 0.097 | 0.166 | -0.038 |
| **FeLG10** | -0.165 | 0.209 | -0.109 | -0.356 |
| **SiLG10** | 0.191 | 0.096 | -0.188 | -0.031 |
| **KLG10** | -0.029 | 0.286 | -0.253 | 0.194 |
| **CaLG10** | -0.210 | 0.018 | 0.025 | 0.042 |
| **VLG10** | 0.096 | 0.213 | -0.196 | 0.218 |
| **CrLG10** | 0.093 | 0.282 | 0.024 | -0.355 |
| **ZnLG10** | -0.194 | 0.120 | -0.024 | -0.251 |
| **BaLG10** | -0.004 | 0.056 | 0.734 | 0.094 |

Table 62 indicates the effect size of each variable on each component score. Component 1 has relatively poor coefficients in comparison to 2 and 3; when plotting scores, it is therefore preferable to consider these in examining variance between groups. Fig. 59 shows the plot for factor scores 2 and 3, revealing that as the amount of added sand increases, the samples have less in common with the finished pottery - despite the clays, and arguably the sands, deriving from similar sources. Thus, as added sand increases, the measurements with pXRF have less in common with the finer pottery, or raw clay. Due to post-medieval pottery being generally finer, it may be difficult to link very coarse pottery to similar finer variants when using pXRF.

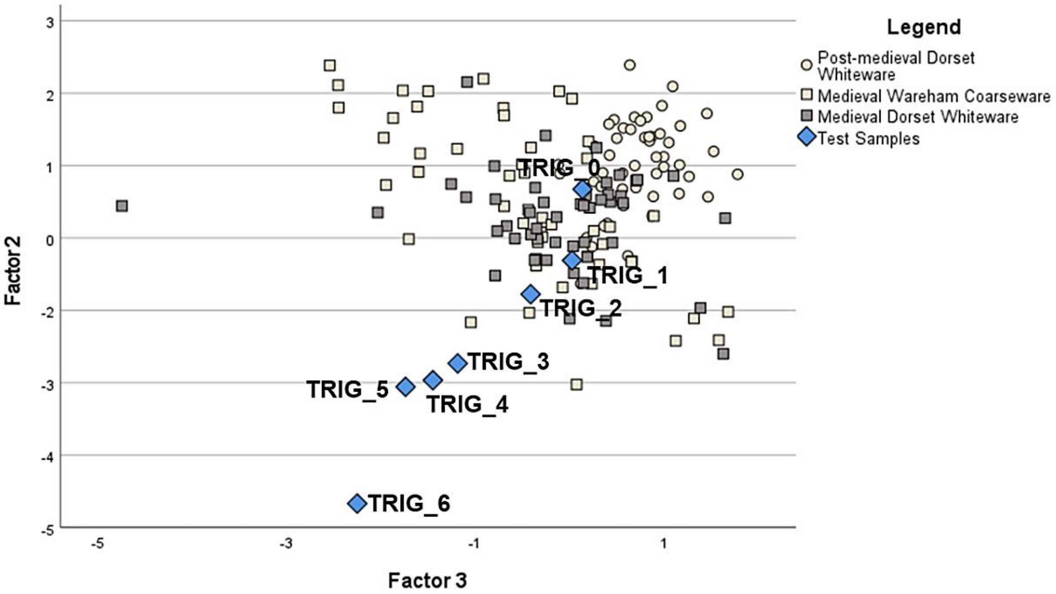


**Fig. 59: Factor Scores for Factors 2 and 3 for Analysis 4**

### *5.14. Discussion*

These analyses have used samples from a wide range of sources within central southern Britain and comprise relevant fabric groups, mostly comprising sand tempered examples. Despite significant change in sand frequency within those fabrics, probably representing technological improvement over time, certain wares can be linked both chemically and visually to raw clay samples that have been shown to differ across the region. This can be shown visually in thin section but is most overt in the chemical analysis. However, despite some success, the chosen method of chemical analysis (pXRF) has been shown to have limitations; the method displays probable influence from post-depositional change and has problems in identifying similar clay sources when number and size of inclusions increases significantly – especially when sand is added as temper, as shown above. This has been a limiting factor in comparing later wares to earlier ones within this study, and has restricted both visual comparisons in the thin section fabric attribution and the statistical comparisons between the many elements forming variables for the chemical analysis attributions. Further complications are evident in the nature of the available dataset, in that both the Southampton and West Dorset areas are clearly underrepresented by a lack of known pottery production assemblages; this is evidenced by some misattribution of certain samples between methods (*i.e.* basic visual, thin section and chemical attribution - *e.g.* Poole sample 6 changing from EVER to WDSW, Christchurch 10 - DWCW to SHRW, Dorchester 7 – WDSW to SHRW, Lymington 6, Southampton 7 and 9 – LMWFSW to WDSW).

Furthermore, there are a substantial amount of samples that remain unprovenanced. While the majority likely derive from production sites yet to be discovered, there could also be multiple factors influencing a lack of provenance distinction; primarily, the inability of the statistical method to draw comparisons between samples, which stems from the data collected. The data collected using pXRF of intact pottery sherds has multiple limitations (Holmqvist 2016; Forster *et al.* 2011). The employment of both glazed and unglazed samples introduces potential lack of similarity between provenanced and unprovenanced groups. This is due to chemical alteration of body fabric as the glaze fuses to the pots during firing. This change could make comparisons between glazed and unglazed counterparts from similar raw material sources unviable. This is considered unlikely here, as clay samples from similar areas have linked well to provenanced glazed pottery groups, plus fine and coarse variants from the same production site in the control group have displayed chemical similarity. Additionally, there is heterogeneity in the surface morphology when sampling an existing broken edge, as no two edges will be the same. This will affect the depth that the X-rays can pass into the sample – a known issue in quantitative measurements with pXRF (Potts *et al.* 1997, Table 2) – and also result in empty space between sample and machine; this leads to air attenuation, which can affect measurements of light elements (Forster *et al.* 2011). Finally, the heterogeneous nature of the fabric of the samples themselves needs to be considered. While these artefacts have been selected based on their similarity, the increased frequency and concentration of those comparable inclusions means that there is less clay being measured in relation to added temper. These are considerations proposed before the multitude of potential post-depositional pathways are considered; the analyses of a broken edge is of primary concern here, as 99% of the analyses is taken on, or near, the surface, to a depth of 0.6mm (Potts *et al.* 1997, Table 2; Holmqvist 2016, p.368) - a prime location for post-depositional alteration and coatings to accrue (Schneider 2016). Despite this, pXRF has been successful in addressing the research question, allowing the identification of pottery production in the Verwood area during the late medieval to early post-medieval transition period. This extends the known period of pottery production for the Verwood-type industry into the 15-16th century. Beyond this, there is limited evidence for samples with a Verwood area provenance which can be dated to the 13-14th century, with tenuous evidence (one sample) attributed to the 12-13th century.

The nature of the fabric of earlier pottery being examined and compared to later pottery can be shown to provide too much discrimination between fabric types. This suggests that for the best results, the method of examining provenance using pXRF should be restricted to comparing fabric types that bear a great deal of similarity in terms of percentages of inclusions, and are limited to groups of coarse or finewares with a degree of similarity. Additional observations from the chemical data tentatively suggest that there is a continuation of pottery production into the 15-16th century in the Salisbury area - whether this is at Laverstock or nearby, the clay sources remain similar. Sadly, these appear to be visually identical and are incredibly difficult to separate in thin section from Verwood products of the same date, but can be shown to be chemically different when calcium is used to provide a greater level of certainty. Furthermore, seven samples of the East Holme redware can be attributed to the Dorset Whiteware medieval (two samples) and post-medieval (five samples) group; these are presented in Appendix XI. These samples have matched despite significant difference in terms of visually different iron content. This suggests that there is a post-medieval south Dorset redware industry that requires additional investigation to be more fully understood, as supported in the thin section samples (*e.g*. EHR-14 – Appendix VII). Sadly, certain ware types could not be conclusively matched to the known control groups (*e.g.* Dorset Red Painted ware (DRPW) and Local Pink Sandy ware (LOPS)); these retain an uncertain provenance.

Despite the aforementioned issues, the data collected via pXRF has shown excellent discrimination between different sources forming the control group, exhibiting an acceptable degree of similarity between known Verwood area samples and those of uncertain provenance - especially when functions 1 and 3, and 2 and 3 are plotted from DFA3. As expected, the results from the visual analysis have proved to be of mixed reliability, with the outcomes of thin section petrography origin attribution differing somewhat when compared to the provenance allocations using statistical methods from the chemical analysis data. This could be reflected by a lack of Hampshire production sites with which to draw comparisons, in addition to limited human error in fabric attribution. However, despite this, four thin section samples have been correctly identified - as corroborated via chemical analysis - as Verwood area provenance, with successful division into sub-groups (*e.g.* Christchurch samples 5 and 7, Gillingham 8, and Wimborne 6). Thus, the presence of medieval pottery production in the Verwood area has been successfully confirmed.

# 6. Specialisation in the Production Cycle

In the preceding chapters, the origins of the post-medieval industry were thoroughly dissected and evaluated. However, it is the growth of the industry from those humble beginnings that allowed for the rise to dominance of the Verwood industry within central southern England in the post-medieval period. But what were the mechanisms involved that allowed a small rural industry to form such a dominant part of the ceramics market of southern Britain? It will be argued here that the degree of specialisation in the production process had a direct role to play in the ascendancy of Verwood-type pottery in the ceramic market of southern England.

First, it is necessary to set the scene of ceramic manufacture and change for southern Britain from the late medieval period onwards and, by association, the potteries of east Dorset. There had already been significant growth in the pottery market during the 13th century, as society moved from being a small, localised, and mostly rural economy to a more urban-based one (Miller and Hatcher 1978, pp.70-1; Ramsay 2001). During this time, there was rapid growth in population across northern Europe, along with the creation of new rural settlements and colonisation of areas for agriculture (Duby 1990, pp.120-123). Cumulatively, this led to more business opportunities, an expansion in trade and a more commercially autonomous populace. Pottery centres had already increased production to meet the needs of this population growth in both urban and rural settings (Moorhouse 1981). This was arguably spurred on by rapid technological change, and the increased appearance of fine imported wares from overseas (Mellor 2005, pp.150-1).

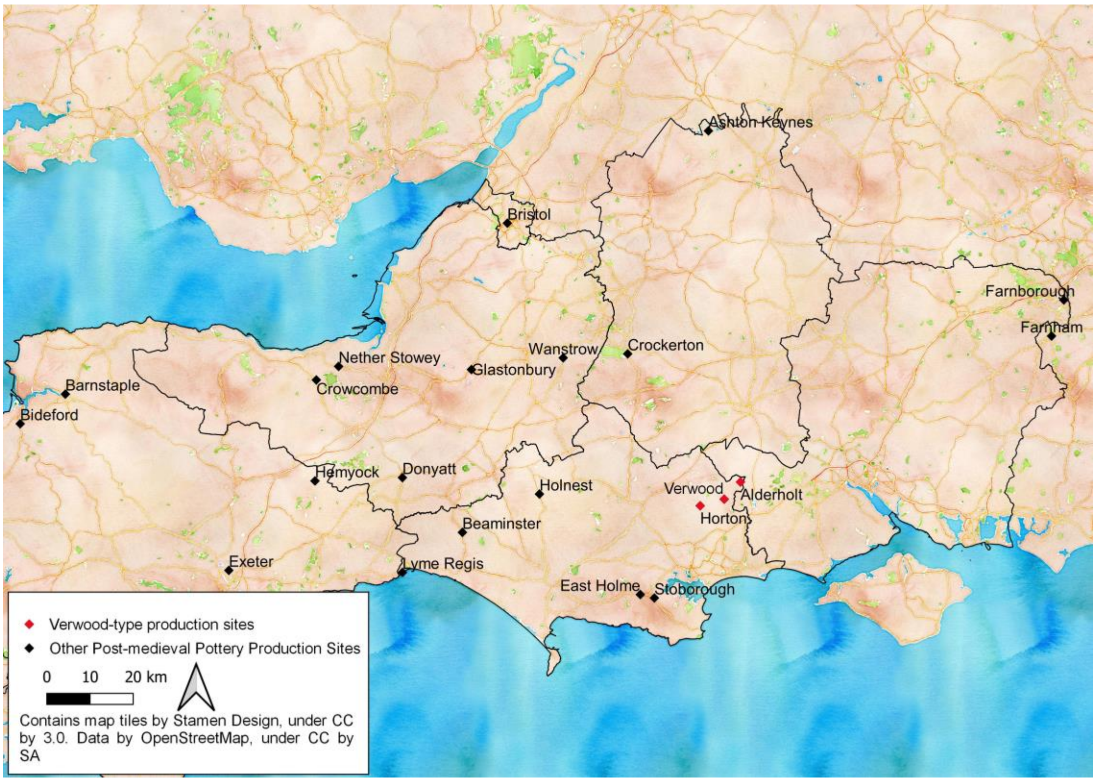
Later, in the 14th century, despite the previous growth in the market, it is apparent that there was a restricted range of forms in coarseware pottery being produced (Cherry 2001, p.207). This is epitomised by the dominance of jars/cooking pots, jugs and bowls in domestic ceramic assemblages identified on 12-14th century sites (McCarthy and Brooks 1988). There can be little doubt that this restricted ceramic range was principally fulfilling the needs of a local, and largely rural, populace who predominantly occupied the lower economic tiers of society. It is these individuals who provided the bulk of the trade for rural potters (McCarthy and Brooks 1988, p.55). Finewares, such as those produced at Laverstock, Wareham and on the Hampshire/Surrey border, somewhat contrast with the previous statement; these centres provided finer tablewares serving the middle to upper echelons of society, and satisfied the needs of larger market centres such as Winchester, Southampton and London (Le Patourel 1968; Brown 1997; Mellor 2005, p.151). In addition, local manors or elite centres could be served, *e.g.* Laverstock supplying Clarendon Palace (Musty *et al.* 1969, p.85).

While the coarseware forms continue to be prominent in the early post-medieval period, there is a growing increase in the range of vessel types produced (McCarthy and Brooks 1988). This increase in variety arguably begins in the late 14th century, with a move towards more personal drinking vessels over their communal counterparts, as evidenced by the development of the mug, cup and goblet forms (Nenk 1997, p.94). In addition, a growth in home brewing, lead to an increase in the appearance of bunghole cisterns, which are commonplace by the 16th century (Brears 2015a). This increase in diversity has been ascribed to increased trade and contact with the continent (Brears 1974, p.101; Grant 2005, p.12), along with a change in eating and drinking habits, together with cooking methods. This necessitated an upsurge in demand for new vessel forms used in the preparation of food stuffs, *e.g.* butter churns (Klemettilã 2012; Brears 2015b). Furthermore, increased demand of presentation and culinary apparatus, such as the chafing dish, porringer and pipkin, is evident (Plate 17).

**Plate 17: Five vessels from Horton kiln 1 of 17th century date. Left to right, jug, tankard, chaffing dish, costrel and pipkin (taken from Draper and Copland-Griffiths 2002, p.41).**

These new recipes and eating behaviours were fuelled by an increase and growth of available potential ingredients, as European markets gain access to the Americas, India, Africa and China due to exploration and increased communication links overseas making many medieval recipes extinct (Brears 2015b, p.21). The exponential increase in the availability of spices, sugar and other culinary ingredients created a need for a wider variety of vessel from which to cook, present and consume these new dishes. Brears (1974, p.15) argues additional spread of continental influence can be discerned from English pottery in the 16th century, with the migration of European protestants into England. In later years, this led to the increased adoption of slip trailing, synonymous with the Midlands (Wondrausch 1986) and pottery centres of the South West (Coleman-Smith and Pearson 1988; Grant 2005). In turn, this promoted numerous Flemish and French recipes, with their associated kitchen apparatus, becoming common place in the English ceramic repertoire (Brears 2015b, p.13).

Thus, there was an increase in the range of desired vessels and demand during the early post-medieval period. To meet this, there appears to have been growth and development at many pottery production centres across the region, including those at Crockerton, Wiltshire (Algar and Saunders 2016); Donyatt (Coleman-Smith and Pearson 1988), Wanstrow (Jefferson 2016, pp.28-30) plus Crowcombe, Glastonbury and Nether Stowey (Allan *et al.* 2018) in Somerset; Bideford and Barnstaple (Grant 2005), Exeter (Allan 1984, pp.136-8) and Hemyock (Smart 2018), Devon. In Dorset, potteries are known in the west at Holnest (Kent 2017), Lyme Regis (Draper 1983) and Beaminster (Draper 2005), and moving south and east, there are production sites at East Holme (Terry 1988) and Stoborough along with Horton, Alderholt and Verwood (Algar *et al.* 1987). These have all been shown to either begin production, or experience rapid expansion and growth, exhibiting an upscaling in production capacity, in the early-mid post-medieval period; these are shown spatially in Fig. 60. All of these centres have intensified production to meet an increased demand to the point where competition between each other became an ever-growing concern throughout the post-medieval period (see Chapter 10).



Contains map tiles by Stamen Design, under CC by 3.0. Data by OpenStreetMap, under CC by SA

**Fig. 60: Known early to middle post-medieval earthenware production centres across south and south west England**

This upscaling in production from the later medieval period was made possible due to the introduction and growth of new technology, such as the increased and widespread use of the fast wheel for throwing, rather than hand constructing or slow wheel turning vessels (Rye 1981; McCarthy and Brooks 1988, p.21-32). Furthermore, an increase in the availability of lead for glazing, following the introduction of new smelting technology (Blanchard 1981; Homer 1991), allowed lead to be more widely available and sold at lower prices (Crossley 1994, pp.182-194). This permitted glazed wares to become the norm, rather than being largely restricted to finewares, as during the 12-14th centuries. These modifications comprise some of the conditions enabling growth of several pottery production centres across Britain, allowing potters to meet growing demand, satisfying the needs of an ever-growing populace, and to extend into markets further afield. In this way, potters could not only meet demand, but also increasingly impact suppliers of utensils and vessels in the home that might be provided in other materials; *e.g.* pewter, wood or horn (Moorhouse 1983, p.107).

To understand the advancements and innovations to the pottery production process which allowed potters to meet growing demand, it is necessary to explore what is currently known of the methods that were used. To achieve this, published evidence, alongside signs of manufacture visible on the pottery, has been used to bolster current thinking. Common trends present within other industries have also been applied as acceptable parallels to infill gaps in current understanding of pottery manufacture. In this way, specialisation and standardisation embedded within the method of pottery making can be drawn out and explored. By charting articles that differ from what is utilitarian, thus less likely to change, it is possible to more accurately chart the development of a given ceramic industry using these elements as milestones in technological change.

### *6.1. What is Specialisation and How is it Defined?*

Specialisation has been a difficult term to define in terms of archaeological material studies. In part, this has been due to a lack of consistency in approach, coupled with the fact that researchers have applied the term to cover a broad range of aspects (*e.g.* Rice 1981; Brumfiel and Earle 1987; Feinman *et al*. 1984). This is further complicated by some researchers employing the terms 'specialisation' or 'specialists', yet rarely supplying a formal definition (*e.g.* Leonard 1989). Furthermore, such definitions can range from a general economic viewpoint to the mechanism and organisation of goods production. Previous definitions of specialisation have included a "regular, repeated provision of some commodity or service in exchange for some other" (Costin 1986, p.328), with specialists being defined as "those who participate in manufacture to a greater degree than … other members of the community" (Blinman 1988, p.76). Similarly, Kaiser (1984, p.280) terms specialisation as "a new division of labour in which individuals or groups are able to focus their efforts on the production of a limited range of goods". Rice (1991) groups these definitions as 'Productive' or 'Producer Specialisation', as a certain group dedicates time and resources to creating a given product in return for goods or services. The work of both Van der Leeuw (1977) and Peacock (1982) were pivotal in developing a structured way of identifying specialisation with regard to modes, or levels of intensification, of production. This approach is often termed production specialisation, and can be helpful in explaining the ways a certain industry produces goods; *i.e*. which methods and support systems are in place to do so, and how that setup generates their output for sale, trade, or to be gifted into a given economy, thus, their distribution to society as a whole. Such production specialisation can be witnessed in the organisation of pottery production in east Dorset as outlined in this chapter.

Additional forms of specialisation include site and resource specialisation (Rice 1991). Site specialisation has previously been put forward by Muller (1984, p.490-2), and can be defined as the intense production of a particular good within an area or by a given population, or the presence of a limited activity on a site. In this respect, it may be argued that almost all pottery production sites are, by definition, undertaking a form of specialisation in comparison to a largely agricultural or woodland economy. This is certainly the case for east Dorset where agricultural and heathland industries dominate the region (Draper 2002; Draper and Copland-Griffiths 2002). In contrast, resource specialisation comprises the selection or targeting of a particular resource or mineral to manufacture a given product. This arrangement could be governed by environmental and geological factors, including the readily available occurrence of raw materials or minerals. In the Verwood area, it is the presence of London and Reading Clay beds, plus readily available fuel sources, which reflects a chosen selection in fuel and raw materials over other available options, as reflected by the increased availability of coal in later years. One example of this was presented by Shepard (1942; 1966), where a 'Glaze-Paint Ware' was produced in the Rio Grande in pre-industrial USA. However, a more relevant example is the procurement of clays from south Dorset by Wedgewood in the 18th century for production of his Queen's Ware in Staffordshire (BCHS 2003, pp.10-11; Rackham 1951, pp.21-29).

Additional specialisation is that of craft specialisation. Yerkes (1983) uses the term to describe the manufacture of certain goods by a select group of concentrated labour, often with specific tools for the purpose. Muller (1984, p.193) argues that this term should be further developed by ascertaining if the craft specialisation was undertaken full-time, or part-time; the former was evidenced in his case study of salt working at the Great Salt Spring, Illinois. In contrast, Evans (1978) lists defined criteria to identify craft specialisation; these include: workshops - spaces devoted to craft activities - tools dedicated for such crafts, storage for completed items, regular exploitation of a set of particular resources, exchange and trade of completed commodities and distributions of completed products. This comprehensive approach examines the steps undertaken in the creation of the goods along with their use life; such examinations are rare (*c.f.* Abbink 1999).

Additional attempts have aimed to quantify specialisation, such as, Feinman *et al.*'s (1981) 'Production Step Measure'. This ordinal index measured the labour input for pottery making from two areas; one at Valley of Oaxaca and one from Pine Lawn Valley, New Mexico, as reflected in the archaeologically recovered ceramic. Numerical values for each identifiable step involved in producing these ceramics is assigned one or two points (Feinman *et al*. 1981, Table 1). The greater the assigned point value, the more steps or actions were involved in its making, thus defining a more specialised product; highly decorated or technically ostentatious vessels gain greater scores. This reflects a greater investment of time exerted in their manufacture. This method is a robust attempt at providing an analytical value towards what level of labour has been invested in a vessel, and by association, an identification of what degree of product specialisation is reflected in the manufacture of a given vessel. While changes in the index show changes in production technology over time, there are major limitations. For example, raw material procurement and preparation is largely ignored, plus each step is measured relatively equally. For this reason, this method is deemed unsuitable for rural British post-medieval pottery.

In summary, there are a range of terms that might be used to examine specialisation. Furthermore, one needs to be specific in terms of what is being explored. Occasionally, archaeologists have approached specialisation from studying standardisation. By examining what is the norm, it is easier to explore what is considered special. The results of such studies have been shown to be robust and reliable (*e.g.* Blackman *et al*. 1993). Costin and Hagstrum (1995, p.619) simplify this hypothesis:

> *"Specialization encompasses many ways to organise craft production… different types of specialization can be characterized by a 'technological profile', which reflects relative labor investment, skill and standardisation*".

## *6.2. Specialisation vs Standardisation*

When skills, labour investment and standardisation are examined together, an effective reflection of how different industries organised production, thus how a producer served the needs of their consumers can be identified and examined. In this way, general trends and themes can be characterised allowing for a greater understanding of how an industry operated. For example, several researchers have put forward the idea that items produced *en masse* by specialists are recognisable in the archaeological record, due to a high degree of standardisation (Balfet 1966, p.163; Feinman *et al.* 1984, p.299; Rice 1981, p.220). In terms of ceramics, apparent standardisation across vessels forms could illustrate a high degree of mass production. Such an arrangement is not often readily linked with rural production.

Costin (1986; 1991) identified four parameters used in outlining the organisation of production of a given commodity. Here, it is only the first one that has relevance; this comprises the context of production. In Costin's 'context' there can be 'attached' and 'independent' specialisation. The attached specialists provide political or socially symbolic goods that are circulated within the social and political systems with which they are affiliated. In contrast, those who are considered 'independent' create utilitarian items to be used within the domestic household. While such separations are not so clear in east Dorset, the utilitarian and domestic wares show exceptional standardisation rather than specialisation.

Due to this, it is considered that production as a whole can be best understood by studying the degree of standardisation present – with any specialisation being reflected in the choices made by the producers, and the degree of mass production undertaken. It is the utilitarian vessels, created for domestic purposes, which numerically form the bulk of the Verwood-type ceramic repertoire that displays the greatest extent of standardisation; thus, the production cycle of these articles will be examined in more detail.

Cumberpatch (2014, p.74) echoes this in discussing the utilitarian wares of post-medieval South and West Yorkshire:

> *"Although widely regarded with some disdain by ceramists from all traditions, the prominent place of such vessels (pancheons, bowls, storage jars and cisterns) in virtually all archaeological assemblages from the 17th century onwards means that they represent a significant part of social and economic practice over a long period of time. This gives them an inherent archaeological significance which should not be dismissed simply because of their ubiquity and mundane role within the household. It should be noted that the continuation of production into the mid-20th century…means that they provide a tangible link with an industry that stretches back to the 17th century and even slightly earlier."*

This reflects a theme that has dominated current Verwood-type pottery research, which is the hypothesis that: "*The potters were very conservative and unaffected by industrialisation. The simple and effective techniques in use at Verwood in 1900 seem likely to have been essentially the same as those used at Alderholt and Horton in the 17th century and probably earlier*" (Algar *et al.* 1987, p.4). This is echoed by Kendrick (1959, p.131), who notes that there was little need for potters to change their methods as they served a small, rural and isolated area; and later again by Sims (1969, p.69), who writes:

> *"To produce pottery by medieval or post-medieval means as late as the mid-20th century is perhaps the most unique and important contribution, and this resistance to change and outside influence is expressed so well by Thomas Hardy in Far from the madding crowd - 'in comparison with cities, Weatherbury was immutable. The citizen's then is the rustic now'…"*

This essentially provides a view of an industry that is static and backward thinking, despite becoming such a leading provider of ceramics for southern Britain. However, the notion that a backward and static ceramic tradition could rise to such heights, surpassing surrounding competitors without being innovative and dynamic, is difficult to accept. While previous interpretations of the industry appear to have taken its long-lived stability and success as a mark of its conservatism, following a more in-depth examination, it will be shown that the overall picture is one of experimentation and gradual innovation, balanced by a respect for strong traditions. Upon inspection, the industry can be shown to be shrewd and practical, expanding traditional methods to increase production and guide modernisation, rather than a conservative and unadventurous group of manufactories that not only exist in isolation from the rest of the world, but appear to shun outside influence - as previously theorised (*e.g.* Kendrick 1959, p.131; Sims 1969, p.69; Draper and Copland-Griffiths 2002, p.9-11). It will be shown that the strong traditional ties and the passing down of these methods, created a solid basis for a high degree of standardisation. Such simplistic, time-tested, procedures could be passed efficiently between generations, and adjusted to enable new vessel forms and ways of working to be readily assimilated into a standardised production sequence.

The following chapters will explore these statements through the examination of specialisation, standardisation, and diversity evident within certain aspects of this pottery industry. These issues have previously been examined in tandem (*e.g.* Rice 1981), and can be used here as a springboard to generate discussion on aspects of the development of the production process used in the manufacture of post-medieval Verwood-type pottery. Through examining the production schedule used to create this type of pottery, it can be shown that a high degree of standardisation is apparent from the very outset; furthermore, this uniformity allowed for rapid growth and expansion of the industry. Contrary to being conservative, this reflects well-established and strong traditions combined with well-maintained production practices, enabling east Dorset potters to provide a large selection and frequency of robust products in an efficient manner. No matter the degree of simplicity, it can be shown that a high degree of standardisation, through the passing down of techniques from potter to apprentice, enabled a rural ceramic industry that once provided a small local area to effectively grow into a dispersed powerful economic powerhouse in the ceramic market of central southern Britain. Shepard (1958, p.452) echoes this premise:

> *"Standardized wares and types may be considered products of pottery making communities having well-established techniques … uniformity within a site may reflect self-sufficiency in pottery production; diversity may indicate a community depending in large measure on trade for its pottery…"*

Cumulatively, this reinforces that to understand any industry there is a need for a rigorous examination of the goods produced and how they were constructed, thus, by association, the society it served.

### *6.3. Towards an Operational Sequence for Wessex Coarseware and Verwood-Type Pottery*

To continue this dissection of specialisation within the Verwood-type pottery industry, it is necessary to employ a descriptive tool for outlining the production methods undertaken, thus identifying where specialisation, standardisation and diversity exist, if at all.

French archaeologist Leroi-Gourhan (1993) developed a successful means of doing so, by examining human behaviour and determining that its social complexities and belief systems can be reflected within its *chaîne opératoires*. These 'operational sequences' can be deeply embedded within human actions and are reflected in all manner of cultural elements, from the organisation of labour and space, down to the creation or alteration of a particular material to form useable or important items (Bourdieu 1977; Stark 1998, p.6-7). Operational sequences view each stage as a series of actions or steps within an overall chain that will ultimately end in a multitude of potential outcomes, and will eventually be repeated. It is important to note that while there is a degree of interdependence between steps in each manufacturing process, a choice at one stage does not necessarily require a set choice to be undertaken at another (Gosselain 1998, p.89). These can lead to a highly complex operational sequence, as a multitude of available options can be seen within the archaeological record, all of which were apparent to the maker at the time of manufacture. Gosselain (1998, p.90) explains this by stating:

> *"field and laboratory results show that technical behaviours cannot be explained in purely materialistic terms and, therefore, are not as predictable as previously thought. This does not mean that procedures are randomly selected, however, or that complete interchangeability exists. Notably, a series of economic and symbolic pressures appears to influence the process of decision-making."*

This does not mean that decision making is strictly bound to the economic and symbolic, as Lemmonier (1993, p.37) notes:

> *"Social representations of technology are also a mixture of ideas concerning realms other than matter and energy. In short, the mental processes that underlie and direct our actions on the material world are embedded in a broader, symbolic system."*

Through examinations of the stages and choices of production undertaken by a maker, it is possible to explore aspects of specialisation within a given industry or tradition. The operational sequence is a robust way of doing this and can be constructed using the wealth of historical documentation, published sources, and a thorough examination of the products that have gone through it.

### *6.4. Raw Materials*

The procurement of raw materials forms the first step in any production chain where items are being produced. Although often an overlooked stage in the process in archaeological terms, the place of procurement was of high importance to the potter, and thus the archaeologist who studies their manufactured goods. The geological material used, along with the site of extraction, is often assumed by the investigating archaeologists (*e.g.* Musty *et al.* 1969). However, the importance in narrowing the location is of pivotal importance to the archaeologist if the scale and economy of production is to be understood, especially where provenance is to be investigated (see Chapter 3). By examining the materials being drawn upon to make the commodities being sold - in this case pottery - potters can be placed within their landscape. They draw upon its resources, place their manufactories within it, and travel across it to undertake various tasks. Furthermore, their consumers reside, work and interact with the same landscape in different ways. This intertwined relationship between people, landscape and the experiences, or tasks, occurring within them are a two-way process, as outlined in Ingold's (1993) concept of a 'taskscape'. Through examining the landscape in tandem with production and the producers, the full context and history of a given produced item, along with the productive landscape within which they inhabit, can be better understood. The landscape is essentially a social construct, and the good produced is not only a part of that social construct, but also helps fuel the society by being utilised within it. The value of the good is arguably of secondary importance - it is the tasks, experiences and acts that were undertaken within the landscape that are of greater importance here. Firstly, the act of gathering those materials within the landscape needs to be outlined.

The high quality of historical documentation allows for certain Verwood-type potters to be linked to places of extraction. For the years 1644–1749, a series of clay rents or payments for extractions exist (HH Ref. Cecil Papers - Accounts and Rentals). For these, the clays are thought to be drawn from Crendell. This site has already been outlined as a source by both Sims (1969, p.3) and, later, by Algar *et al.* (1987, p.4); the latter states this was used from at least 1500 until 1742, when historical documentation suggests that the common is exhausted (HH Ref. Cecil Papers - Accounts 95/4). It has been hypothesised that subsequently, clays were extracted from an area to the immediate south west of Crendell known as 'Old Claygrounds' - identified on the tithe map and Dorset OS Map dated 1886-7 (Fig. 61).

Fig. 61: Extract of Dorset OS Map dated 1886-7, Old Claygrounds is visible to the west of Crendell.

Old Claygrounds lies upon striated bands of Reading and London clay, along with sands (UKRI 2018). The landscape here, although densely wooded, is heavily pockmarked, suggesting that the area has indeed been heavily mined for clay and sand extraction, as noted from a field visit in 2018. This continuous use of an area for clay extraction over a given length of time is not out of the ordinary. Brears (1974, p.33) notes that a single claypit at Farnham, Surrey, was in continuous use from the late medieval period until the 1930s.

From the Norden terrier of 1605 (HH Ref. Cecil Papers - Map 476), the method of clay extraction can be ascertained. It appears that this comprises both larger open pit extraction and smaller, isolated and discrete pit extraction (Fig. 62).

Fig. 62: An extract of the 1605 Norden Terrier. Several isolated ‘Pitts of Potters clay’ across Crendell Common, with an extensive former clay pit on the left called ‘Crundole Ponde’. One similarly sized pit lies open to the North of the tenement occupied by Elizabeth Thorne (taken from Algar *et al.* 1987, Front Cover; courtesy of the Marquess of Salisbury)

Both methods were employed in south Dorset to extract ball/pipe clays throughout the 18th and 19th centuries (BCHS 2003, pp.9-13). Here, special tools - such as long handled cutters and hooked implements were employed - as the workers specialised in clay extraction (BCHS 2003, pp.18-19). In contrast, a potter and their workers do not specialise in gathering clay; this being one task of many in the process to create vessels, thus they are unlikely to need such specialised equipment. Instead, a much simpler method using a shovel can be shown to be perfectly adequate. One such implement was identified during the Horton kiln excavations (Fig. 63).

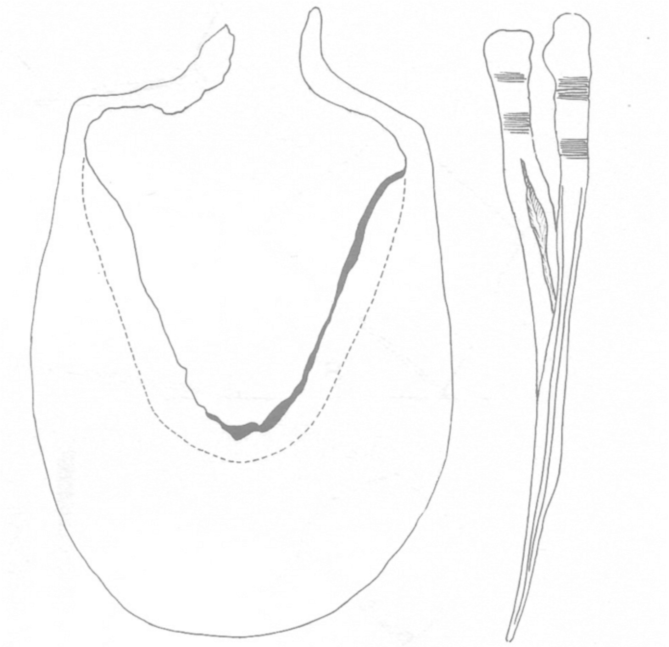


**Fig. 63: Head of an iron shovel recovered from excavations at Horton Kiln 1 (taken from Copland-Griffiths 1990, Figure 11. Shown at 1/4 lifesize)**

Although this piece of equipment could clearly have multiple uses, it is not impossible to envisage that the bulk of the work could have been completed with this simple tool. This method was used by Isaac Button to cut clay for his pottery at Soil Hill, Halifax, Yorkshire (Isaac Button Country Potter 1965). The idea of the potters themselves taking part in clay gathering is well attested as they have knowledge of the clays they desire to work with. This is shown in a letter dated 1909 by Fred Fry, then operator of the Crossroads pottery, Verwood, regarding the potential of opening new clay pits in the Holwell area (south west of Crendell):

> "*We would give you the usual undertaking to remove the top soil, and level down to the utmost of our ability. Giving to depth and wet season we have only dug 40 yards i.e. 40 ton for the four potteries.*" (Copland-Griffiths 1998, p.32).

This indicates that both potters and workers undertook securing clays for production. Furthermore, the mention of four potteries suggests that, to a degree, potters worked collectively to obtain clays, which confirms that, not only do some potters work on obtaining clay themselves, but, on occasion at least, worked collaboratively. This is also reflected in earlier court rolls where multiple potters are listed for the same offense of leaving clay pits open (Tables 1 and 4).

It is not only the position and location of raw material extraction that change over time, but also the nature and method of the extraction. Evidence from recent excavations at East Worth, Verwood, undertaken by AC archaeology Ltd. in 2020 (In Prep), reveal that medieval clay and sand extraction pits tend to be relatively small affairs, comprising discrete circular pits c.2-3m in diameter. In contrast, those of post-medieval date identified on the same site, comprise trenches 10-20m in length, over 5m in width - occasionally with prepared access points. Similar may be said for the clay and sand pits at Potter's Wheel, Crossroads, Verwood (AC archaeology Ltd. forthcoming). Here, pits of later post-medieval date ranged from 3-5m diameter. This is likely to be, in part, due to the upscaling in manufacture, resulting in the need for more clay and sand to meet increased levels of production as technological practices and methods advanced; thus, there is a need for greater quantities of materials (see Chapter 7).

In comparison to clay extraction, there is a distinct paucity of knowledge surrounding sand extraction. The location of sand extraction pits along with the methods, costs and transportation of this raw material, are rarely mentioned in historical documents. For example, the accounts of Mr Sims, Potter of Blackhills, Verwood, clearly outline expenses for both clay and wood for the years 1901-2, but do not list sand expenses until 1903 (DHC ph 530/1-3). It is unlikely a potter would not secure sand for two years, unless he was securing his supply from a source that required no monetary outlay. Furthermore, few sand extraction pits have been identified and investigated in the east Dorset area, in comparison to their clay counterparts. This may, in part, be due to a lack of available datable evidence present within them (*c.f.* East Worth, Verwood – Carter 2021b). In comparison, clay pits occur in larger, more concentrated numbers and are often more expansive due to the larger amount of clay required in comparison to sand. Additionally, clay pits are usually backfilled with large amounts of pottery waste, allowing them to be readily associated with pottery production. These sherds can be easily recognised and approximately dated, whereas sand pits appear to contain relatively little information as to intended purpose for the extracted material. This may be due to the need to rapidly backfill the resultant dangerous deep pond which is created where clay is extracted, over the relatively well-draining hole that slowly slumps in on itself where sand has been removed.

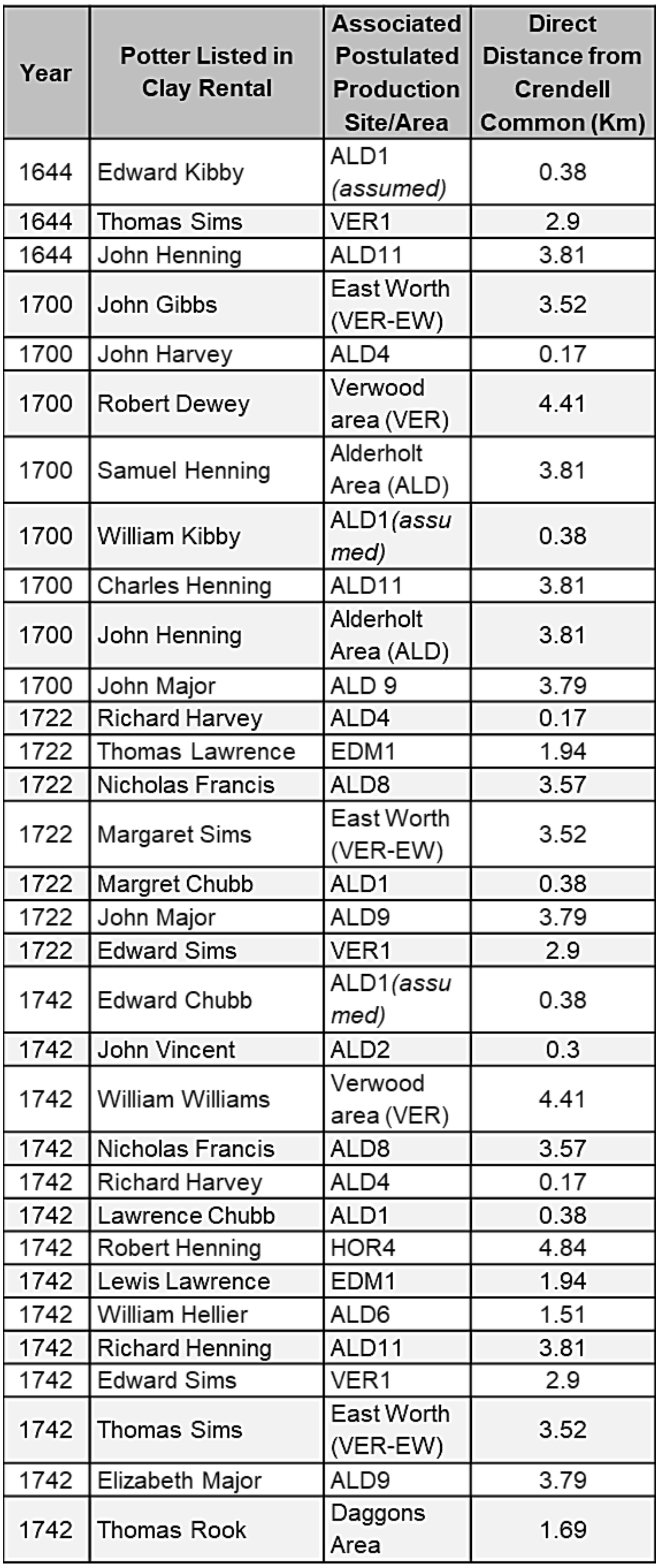
Secondly, the act of transporting these materials, and the journey of the gatherers with the materials removed, needs to be considered as part of the east Dorset potters' taskscape. Sinopoli (1991, p.16) notes that transportation techniques for raw materials can vary considerably. Again, the Sims paybook provides outgoings of 5 shillings per rental of horses and carts in 1903 (DHC ph 530/1-3). There is no reason to believe that this would not have been the method for earlier potters, especially as a cart occurs in the inventory of potter Richard Henning of Alderholt in 1682 (Algar *et al*. 1987, pp.42-3).

Arnold (1985, p.232) has noted that the majority of potting communities obtain their clays and tempers from within 1km of their production site, with certain instances extending to 9km. The quality of available historical documents allows distances from the place of extraction to the potters manufactories to be calculated. This enables comparisons to be drawn in terms of labour investment, thus overall productivity, but also to explore the productive landscape of east Dorset, rather than viewing the potters and workshops as isolated entities within them. One issue with Arnold's measurements is that they constitute bird's eye distances travelled, whereas any number of routes could have been travelled from extraction site to manufactory (Ingold 1993, p.61). However, this perceived flaw does make for robust comparison between different industries, as the journey travelled by past people can be almost impossible to recreate with certainty; in addition, a given landscape may have changed irrevocably as to no longer make an attempt viable (*c.f.* Sunseri 2015). Instead, what is important in comparisons is the general trends and the relative distance implied from the data. Shorter distances can be considered more efficient and economically viable, thus more favourable towards effective production (Jarman 1972). Therefore, by measuring in the same way the distances for clay extraction to the postulated workshop locations of various east Dorset potters, a greater understanding of both raw material extraction and production can be gained. Figs. 64a-d and Table 63 correlates distances from potter's workshops to clay extraction locations, as listed in clay payments for clay from Crendell for 1644, 1700, 1722 and 1742.

From 1742, the locations of extraction are more varied, with areas to the west of Crendell being exploited; these still carry the name ‘Old Claygrounds’, as previously outlined.

Cumulatively, this shows that the distances range from hundreds of metres up to 4.5 kilometres. This reveals that there is a trend of short distance resource exploitation in the east Dorset area, which had an extended period of longevity. Furthermore, the shared source provides an element of standardisation in terms of fabric, chemical composition, and physical characteristics of finished products. This is reflected in the chemical data gathered and presented in Chapter 5. The close proximity to clay source also requires less investment in initialisation, thus cheaper production outlays. Additionally, there is no reason not to consider that the exploitation of clays was undertaken here earlier than the historic documentation suggests, especially when the place name evidence for Crendell likely derives from the old English word ‘*crundell’,* referring to a quarry (Mills 2008, p.35).

**Table 63: List of Potters in Crendell Clay Rentals and Direct Distance from Production Site to Source**



| Year | Potter Listed in Clay Rental | Associated Postulated Production Site/Area | Direct Distance from Crendell Common (Km) |
|---|---|---|---|
| 1644 | Edward Kibby | ALD1 *(assumed)* | 0.38 |
| 1644 | Thomas Sims | VER1 | 2.9 |
| 1644 | John Henning | ALD11 | 3.81 |
| 1700 | John Gibbs | East Worth (VER-EW) | 3.52 |
| 1700 | John Harvey | ALD4 | 0.17 |
| 1700 | Robert Dewey | Verwood area (VER) | 4.41 |
| 1700 | Samuel Henning | Alderholt Area (ALD) | 3.81 |
| 1700 | William Kibby | ALD1*(assumed)* | 0.38 |
| 1700 | Charles Henning | ALD11 | 3.81 |
| 1700 | John Henning | Alderholt Area (ALD) | 3.81 |
| 1700 | John Major | ALD 9 | 3.79 |
| 1722 | Richard Harvey | ALD4 | 0.17 |
| 1722 | Thomas Lawrence | EDM1 | 1.94 |
| 1722 | Nicholas Francis | ALD8 | 3.57 |
| 1722 | Margaret Sims | East Worth (VER-EW) | 3.52 |
| 1722 | Margret Chubb | ALD1 | 0.38 |
| 1722 | John Major | ALD9 | 3.79 |
| 1722 | Edward Sims | VER1 | 2.9 |
| 1742 | Edward Chubb | ALD1*(assumed)* | 0.38 |
| 1742 | John Vincent | ALD2 | 0.3 |
| 1742 | William Williams | Verwood area (VER) | 4.41 |
| 1742 | Nicholas Francis | ALD8 | 3.57 |
| 1742 | Richard Harvey | ALD4 | 0.17 |
| 1742 | Lawrence Chubb | ALD1 | 0.38 |
| 1742 | Robert Henning | HOR4 | 4.84 |
| 1742 | Lewis Lawrence | EDM1 | 1.94 |
| 1742 | William Hellier | ALD6 | 1.51 |
| 1742 | Richard Henning | ALD11 | 3.81 |
| 1742 | Edward Sims | VER1 | 2.9 |
| 1742 | Thomas Sims | East Worth (VER-EW) | 3.52 |
| 1742 | Elizabeth Major | ALD9 | 3.79 |
| 1742 | Thomas Rook | Daggons Area | 1.69 |

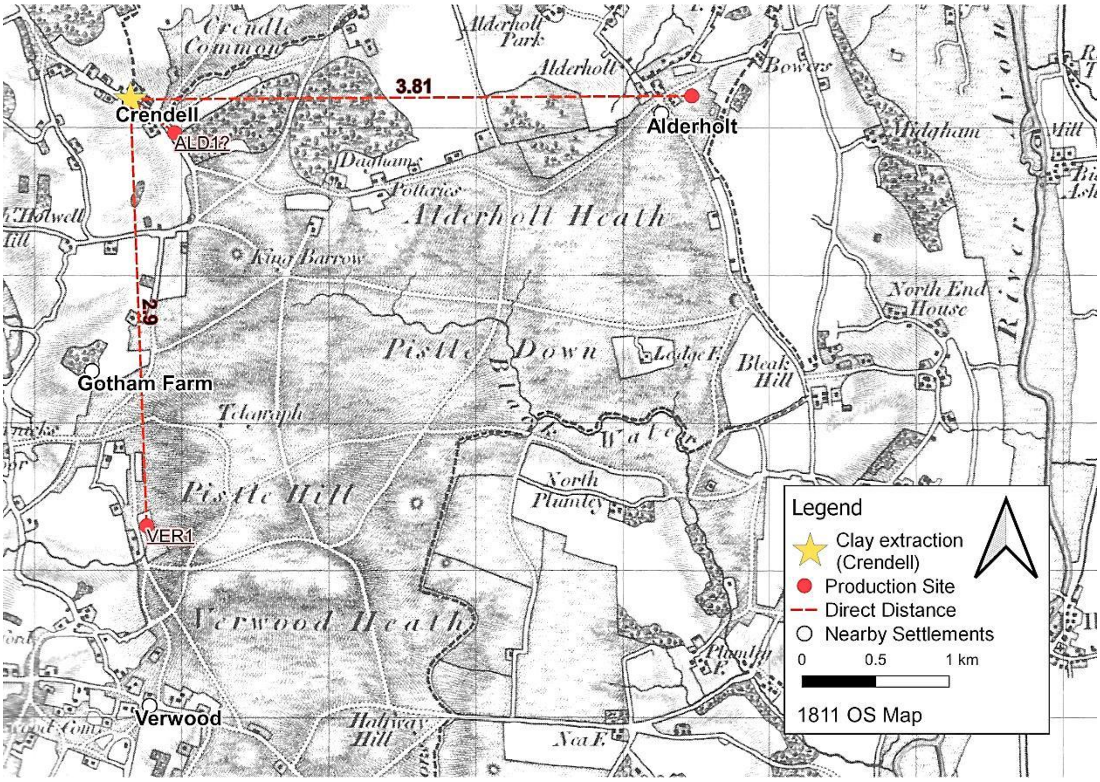


Fig. 64a: Distances from clay source to workshop for 1644 (in Km; Table 63). The 1811 OS Map is provided as a backdrop to envision numerous potential routes taken by potters

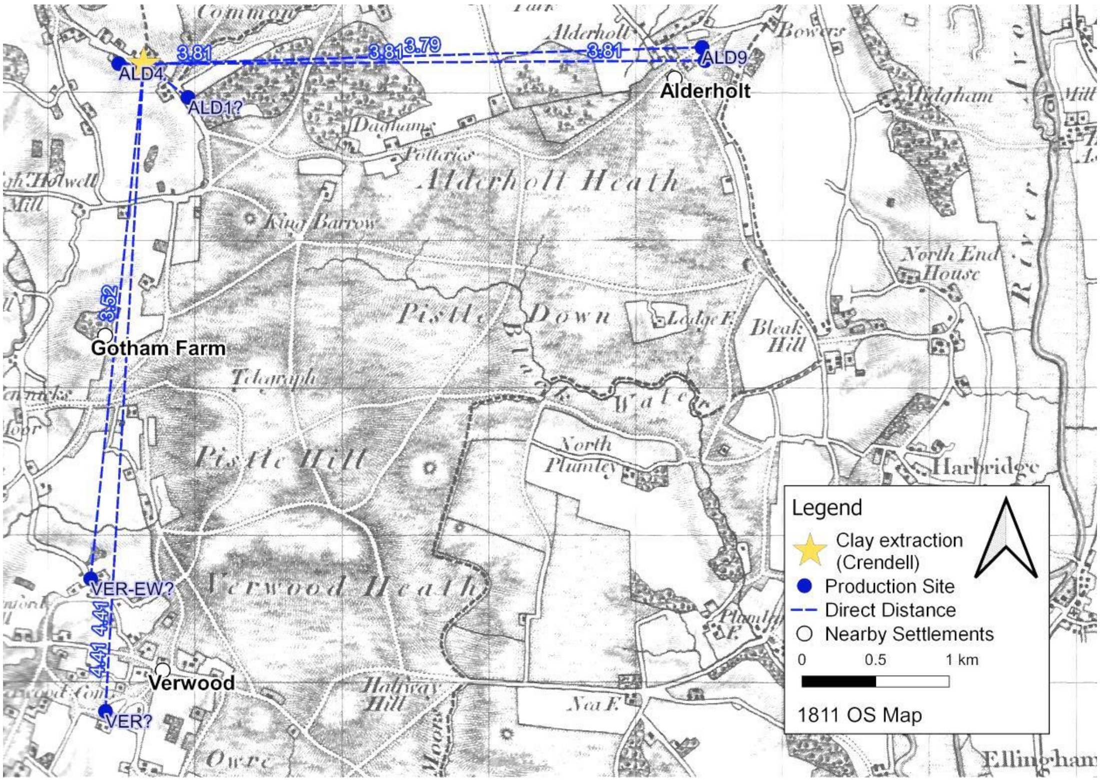


Fig. 64b: Distances from clay source to workshop for 1700

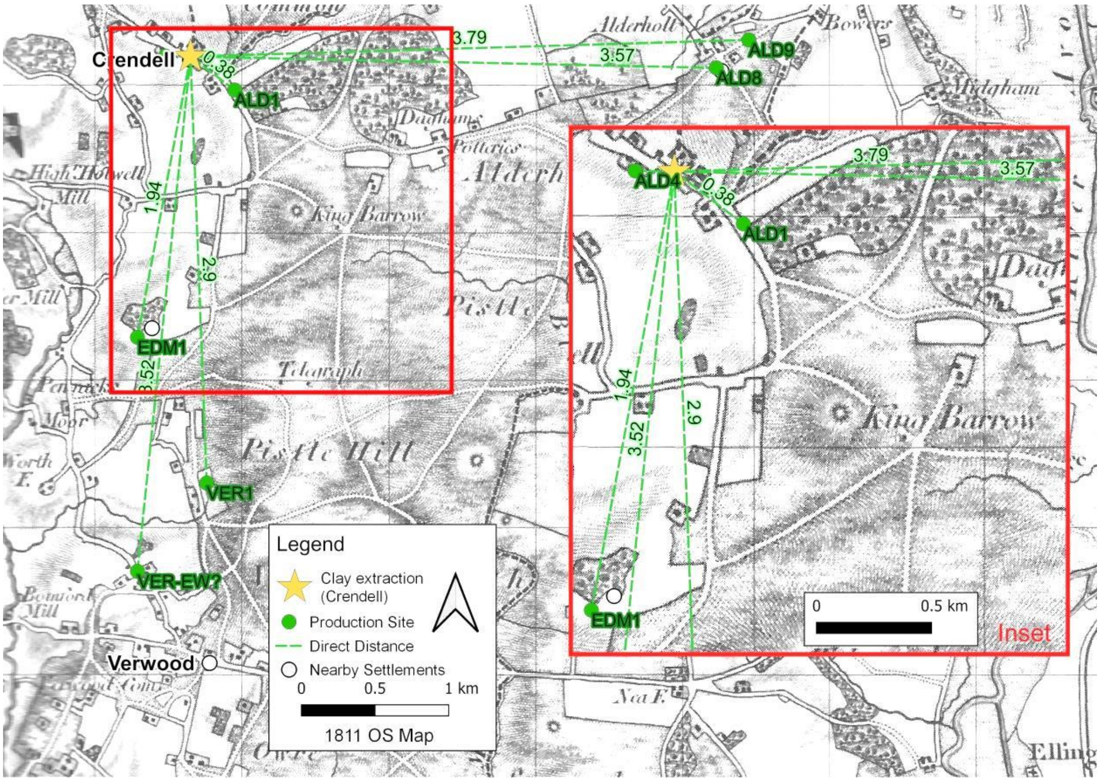


Fig. 64c: Distances from clay source to workshop for 1722

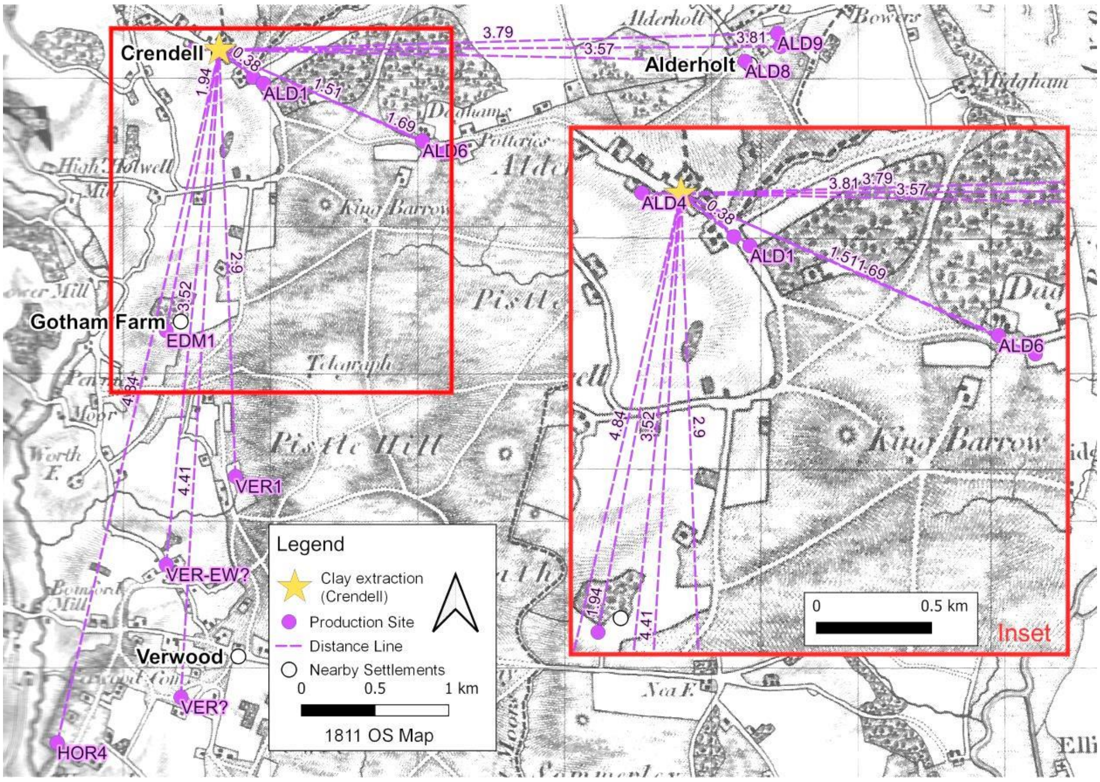


Fig. 64d: Distances from clay source to workshop for 1742

From observations of the vessels in comparison to gathered clay samples in the area (Chapters 4-5), it is evident that following the gathering of raw materials, a degree of alteration or preparation of the clay occurred to form viable products.

### *6.5. Preparation*

Shepard (1956, p.6) notes that clay can contain a variety of minerals and materials; not all are desirable to the potter. Often a degree of refining is required to make the clay more desirable. The fine nature of clay is an important property, dictating workability and firing behaviour. While clays used for wheel throwing are generally more fine-grained, all clays develop plasticity when mixed with water; this plasticity is needed for ample working into desired forms.

The potters of the past lacked the modern equipment used in archaeological materials analysis to examine the composition of clays, and to measure relative frequencies of temper. Instead, it is likely that recipes for preparing clays were passed down through generations, with potters adding or removing constituents until the clay had the right 'feel'; this could only have been identified through extensive experience (Sinopoli 1991, p.15). Furthermore, Gosselain (1998, p.89) notes that the concept of clay suitability is not one subject to group consensus, but instead is a question of individual appreciation. Such an arrangement can be visible in the proposed chronological change of gradual reduction in the size of quartz grains noted by Mepham (2001, p.89). Here, a postulated gradual change in grain size shows that the same recipe, comprising the adding of quartz from sand temper, is a long-lived aspect of Wessex Coarseware pottery, and is a recipe developed over generations. The gradual refinement of grain size, and abandonment of the adding of flint temper, from the 12th century onwards, can arguably be two-fold. First, a refinement in end product; the smaller the inclusions, the lesser the likelihood of vessel failure during drying or firing due to bloating, spalling or cracking. Secondly, the smaller grain size and abandonment of flint temper allows for faster throwing, which was increasingly used from the 13th century onwards (McCarthy and Brooks 1988). This is evidenced with vessels made using a 'slow wheel', suggested by the wheel turned rims of composite vessels - those made by a combination of hand-building and wheel throwing – as apparent on pottery recovered from archaeological features datable to that period *e.g.* Laverstock (Musty *et al.* 1969) and other archaeological contexts from sites across Wessex (McCarthy and Brooks 1988, p.80).

There is no information, other than that which can be drawn from the pottery itself, on how the clays of the Verwood pottery industry were prepared throughout the post-medieval period. Instead, one must turn to 20th century operations at Crossroads, Verwood, to fill the gaps in our knowledge. There is a wealth of evidence from this site relating to the preparation of raw materials, gleaned from photographs (*e.g.* Draper and Copland -Griffiths 2003), a video (The Wheel Stops Turning 2002), and interviews with those who worked on the site (held by MED). This allows Crossroads to be used as a form of contemporary ethnoarchaeology. This theoretical framework provides "insights into past behaviour derived from observations of contemporary behaviour" (Kramer 1979, p.2). However, this approach has limits as one cannot assume every aspect of past behaviour shares similarities with those observed in the contemporary (Binford 1962). Conversely, it should not be assumed that all cultural behaviour identified in the contemporary is comparable with the past. In this case, the contemporary behaviour occurs within living memory for some. Such an approach is especially common in pottery studies (*e.g.* Sinopoli 1991; Longacre and Skibo 1994; Kramer 1997), as noted by Shepard (1956, p.49) who states:

> *“The ethnologist trained in ceramics will recognise the significance of the potter’s procedures. For example, when he knows that it is common practice to age clay in order to improve its plasticity, he will simply note that it is stored in a moist place until needed, but will inquire whether this is done as a matter of convenience or with the intent of improving its working quality.”*

Kendrick (1959, p.129) is one such example, who speaks of the clay being placed in a shallow pit about 10ft square, set in the floor of the workroom. The act of keeping the clay wet had two benefits; firstly, allowing clay to settle in a large tank of water would keep it moist and workable, ready for the next phase of preparation, and secondly, impurities - such as organics and unwanted coarse components - could be removed via a form of simple levigation, using water and gravity. This pit remains inside the only remaining existing building of Crossroads, now the Heathland Heritage Centre - Verwood, Dorset. This comprises the only physical evidence remaining as to any preparation of raw materials for the Verwood pottery industry. However, evidence from interviews with former employees of this pottery show that:

> *“After soaking for about three days it was shovelled on to a brick floor sprinkled with sand. The clay was there*[sic] *wedged with the bare feet, the wedger holding onto a stout stave of wood to give some support on the slippery surface. When evenly trodden the clay was rolled up, more sand put down and the process repeated, in all three times. This gave a mixture of about ten parts clay and one part of now evenly distributed sand.”* (Algar *et al.* 1987, p.5).

This process is outlined in plates 18-21; this ratio of nearly 10% added sand is somewhat lower than the proportion of non-plastics expected in a prepared clay, which Rye (1981) notes typically range between 20 and 50% of the total volume. It is therefore likely that the clays themselves contain some level of quartz; an expected content of 20-40% to meet Rye’s range. This quantity is supported from Verwood-type thin section samples, as shown in Chapter 5.

Comparable processes were undertaken at Farnborough, Hampshire, in the 19th century by William Smith (Bourne 1999). Here, clay was put into two pits in layers with intermittent shovel loads of sand; water was then added and left for 24 hours. This soaking allowed water to surround the clay particles creating a plastic and workable consistency. The clays were then rolled out and spread on the floor of a workshop. “There men, barefoot, trod it into little ruts, picking out any stones with their feet found” (Bourne 1999, p.49). Kendrick (1959, p.129) points out that this is a common way of working clay in preparation for forming and was still practiced at the time of his writing by Japanese potters.

Further wedging by hand was undertaken to remove any additional air pockets, and missed impurities, stones etc. Following this, the clay was measured into weighed balls ready for throwing. The weighted measures of clay for throwing provide a simple means of ensuring a basic level of standardisation. Clay balls weighing 35–40lbs were used to form the large bread bin jars (Kendrick 1959, p.129).

Overall, this rather simple and quick method has been undertaken for centuries across the world as an effective way of treating raw clays, removing any air pockets, large coarse components, and ensuring adequate mixing of temper for the next stage of the production sequence: the forming of vessels.

**Plates 18- 21: Treading the clay, with the removal of large inclusions and the addition of sand undertaken simultaneously. When complete, the clay is rolled and taken away to be weighed before throwing (stills taken from Primitive Potters of Dorset 1912)**

Despite a degree of clay refinement, large inclusions may still be identified within finished products (Plate 22).

**Plate 22: Bowl with large flint inclusion protruding into interior surface (top left), re-covered from East Worth (Author's Own)**

### *6.6. Forming*

Barton (1975, p.15) notes that there are three ways of forming pottery. The first method comprises the use of hands only; either combining rolled coils or a pinched-out ball construction. The second involved the semi-mechanical use of tools; rolling out flat and regular blocks/sheets for slab construction, or the use of a slow turned wheel or turn table, creating a hybrid of hand forming and wheel turning. Finally, a method comprising solely mechanical wheel throwing or press moulding.

Nearly all the Verwood-type pottery was wheel thrown, with the exception of dripping pans, saucers and ridge tiles; these were moulded and hand formed (Copland-Griffiths 1998, p.35). At Crossroads, there were two wheels; one crank driven, and another more mechanically advanced, hand operated with bicycle pedals, a chain and cogs (McGarva 2000, p.48; Plates 23 and 24).

**Plates 23 and 24: The two wheels in action at Crossroads, Verwood, showing that hand powered wheels were favoured, with two required to work each wheel. The difference in mechanical apparatus suggests that there was no standardisation in the powering mechanism (MED Accession ref. VER-0043 and VER-0042; courtesy of MED)**

While it is not known how the late medieval and early post-medieval throwing wheels were powered, whether hand turned, kick wheel - powered by foot - or mechanically driven by another means, as that at Crossroads - it is certain that they were in use. This wheel throwing is evidenced by the vessel uniformity, the evidence from thin section samples, the throwing lines evidenced on most of the vessels (Plates 25-28), and the wiring off markings on the base.

**Plate 25: Two 'early Verwood' sherds recovered from excavations at Ivy/Brown Street, Salisbury of 15-16th century date (Author's Own)**

**Plate 26 (left) and Plate 27 (right): Two 16th century bowls of east Dorset origin, recovered from Southampton. Illustrated in Platt and Coleman-Smith (1975, Fig. 165.695 and 165.696 respectively). Obvious and regular throwing lines are evident on both examples (Author's Own)**

**Plate 28: Examples of sherds recovered from a pit of wasters at East Worth (17-18th century date); again, throwing lines are prominent on all examples. Note that the lead glaze can occur in green, olive, yellow shades or colourless (Author's Own)**

All of these vessels date from the 15th century onwards illustrating that wheel throwing had become commonplace from that time onwards. Throwing wheels are noted in numerous wills in the post-medieval period; including those of Elias Talbot of Horton dated 1672 (PRO Ref: PROB 11-344-38), and an inventory of Richard Henning previously outlined. However, from the 18th century onwards, these are no longer listed in wills or inventories, suggesting that the items are so commonplace within a potter's workshop that the value of such items had decreased to that of a fixture or fitting. It is not known for how long the mechanical hand crank powered wheel at Crossroads, Verwood, was in use, but it was certainly well used by the closure of the pottery in 1952 and can be seen in the short film *Primitive Potteries of Dorset* (1912). From this, it is evident that the clay was kneaded, or worked again, to remove air pockets, and then shaped into balls ready for throwing (Plate 29).

**Plate 29: Final wedging of clay prior to throwing (still taken from Primitive Potteries of Dorset 1912)**

McCarthy and Brooks (1988, 80) note that the use of a wheel for throwing gradually becomes more apparent from the late twelfth and thirteenth centuries. However, for the greater Wessex area, the appearance is almost ubiquitous by the fifteenth century when tempering materials and pottery fabrics become increasingly sandy with less coarse components (*e.g.* Brown 2002 – Transitional Sandy Ware). McCarthy and Brooks (1988, p.90) agree, stating that the:

> "…*trends in pottery production from the fifteenth century exhibit both a movement towards some specialization, and a degree of standardization in form and fabric over wide areas...*"

This change in fabric is necessitated by the introduction of the potter's wheel, which imposes limitations on the nature of the clays and tempers that can be used (Sinopoli 1991, p.101). While the potter's wheel is an incredibly efficient mechanism for manufacturing vessels, not all clays are suited to being wheel thrown, thus potters employing the method must be highly selective and spend time preparing clays for use.

For the prehistoric and medieval potter who hand-built their pots using coil-construction (Plates 30-31), standardisation was harder to achieve.

**Plate 30: The interior of a South Hampshire Redware coil-built jug/pitcher with a thumbed base. Recovered from Lymington, of 13-14th century date (Author's Own)**

**Plate 31: Sherds of 12-13th century Wessex Coarseware jars from Poole; it is still possible to see where the coils have been smoothed (Author's Own)**

While general shape and form could be replicated by eye, other aspects - such as a measurement or profile gauge - would have to be utilised to achieve acceptable uniformity. Again, there is no physical evidence within the archaeological record to draw upon to support such a hypothesis, other than the visual evidence from Crossroads (Plate 32). While there is no reason to believe this is an east Dorset invention, as potters still employ such articles today (John Leach pers comm – Mulchelney, Somerset), such an arrangement allows for greater vessel shape uniformity between specimens.

**Plate 32: The throwing guide, attached to the frame of the throwing wheel (still taken from Primitive Potteries of Dorset 1912)**

Certain vessels may have undergone some surface treatment, such as rouletting of patterns and incised lines being commonly undertaken while still on the wheel. While these elements have a decorative function, they may have been purposefully placed (on the body, shoulder and below the neck) to allow for a better grip on the vessel, or as a manufacturing guide to limit excess glaze use. The former has parallels with markings on Romano-British Black Burnished wares and Alice Holt vessels, allowing for increased grip (Lyne and Jefferies 1979, p.37).

Following the forming of the vessels, it was necessary for the vessel to be dried - at least partially - before any further additional work, such as intensive surface treatments or the application of additional appendages, could be applied.

### *6.7. Drying*

One of the most characteristic properties of clay is its ability to harden through drying when subjected to even small amounts of heat (Shepard 1956, p.6). This drying is required to be uniform across all surfaces, to ensure that any shrinkage is even (Grim 1968). Where drying is not uniform, stress cracks can form; these will become more prominent as drying increases, eventually leading to failure for the vessel once fired (Fraser 2005).

Water usually occurs within clays in two modes. Firstly, water encloses the capillary spaces between clay particles, and secondly, water can be chemically bound, and hidden within the clay structure (Shepard 1956). Given sufficient time and heat, the first component can readily leave the clay structure, but the chemically bound must be removed during firing (Rice 2015); this process can transform the plastic clay - often irreversibly - into a ceramic product (Arnold 1985, p.61). Therefore, the correct drying of completed products is of paramount importance in ensuring that hours spent forming vessels is not wasted as an incompletely dried vessel fails due to the pressures and stresses that take place during firing (Rye 1981).

Once formed and sufficiently stable, any intensive surface treatment - along with the addition of any applied elements, such as handles - can be attached (Plate 33).

**Plate 33: Attaching a handle to a part-dried Verwood jug (still taken from Primitive Potteries of Dorset 1912)**

Thrown vessels are then transferred from the wheel onto boards to be removed for drying. This allows the workshop to be kept clear allowing forming to continue. Boards are referred to in both Elias Talbot's and Richard Henning's wills and are visible in numerous photos taken at the Crossroads pottery (Plates 34 and 35). These boards varied in length and width according to what was being transported; at Crossroads, they measured 18 inches wide and 6 feet long (McGarva 2000, 52).

**Plates 34 and 35: Wares on boards for drying at Crossroads in the early 20th century (Plate 34 from Copland-Griffiths Collection Ref. 106.12; Plate 35 MED Accession ref. WIMPH.2017.323.1; courtesy of MED)**

Pottery failures, due to the high pressures created from latent and chemically held water released as steam within the products, and vessel shrinkage can be disastrous, not only for the vessel in question, but - if explosive - additional pots could fail as a result. It is for this reason that purpose built drying sheds were employed, or in good weather pots could be dried outdoors (Plates 36 and 37). Large buildings comprising drying sheds can be witnessed on numerous sites such as Cracked Pot Cottage (Fig. 65), Sandleholme (Fig. 66) and Crossroads (Fig. 67). Periodic turning can be identified through markings on the base and rims of vessels; these certainly occur after wiring off, as there is a degree of stratigraphy present, *i.e*. one event takes place and covers another (Plates 38 and 39).

**Plates 36 and 37: Drying of wares outside at Crossroads in the early 20th century (Plate 36 MED Accession ref. VER-0121; Plate 37 Copland-Griffiths collection 104.55; courtesy of MED)**

**)**

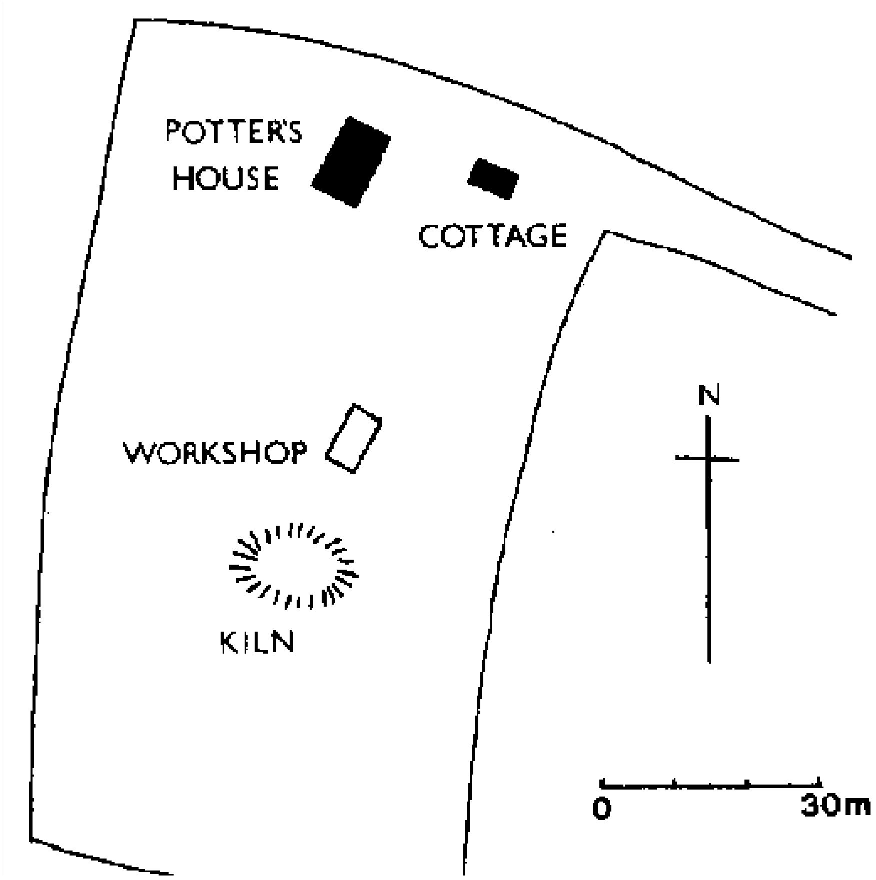


**Fig. 65: Plan of the layout at Crocked Pot Cottage (HOR4) showing the multi-functional workshop that served also as a stoke- and drying-shed (taken from Algar *et al.* 1987, Fig. 19)**

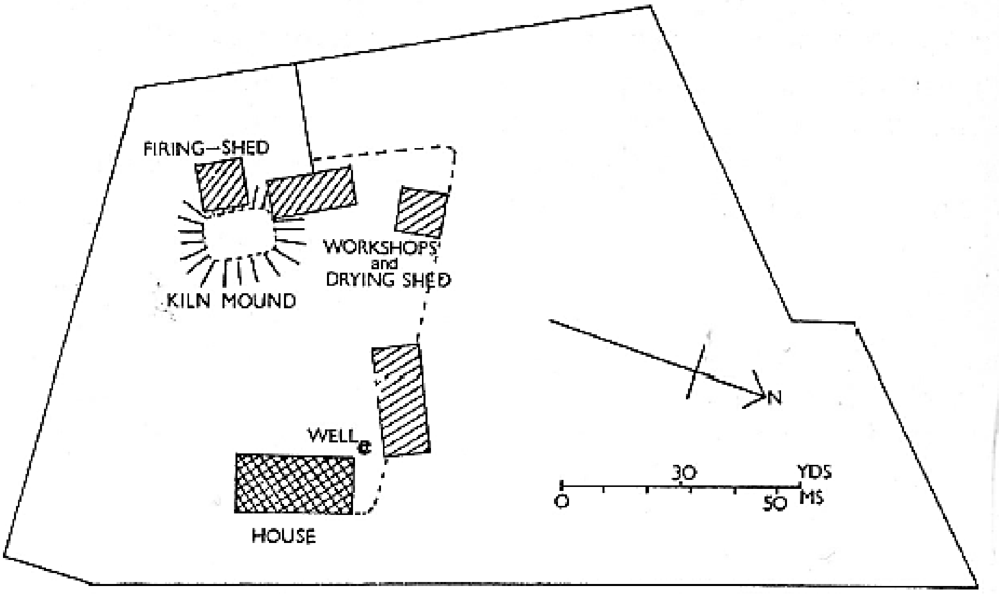


**Fig. 66: Plan of Sandleholme (VER9) showing workshops, stoke-, and drying-sheds; (taken from Algar *et al.* 1979, Fig. 15)**

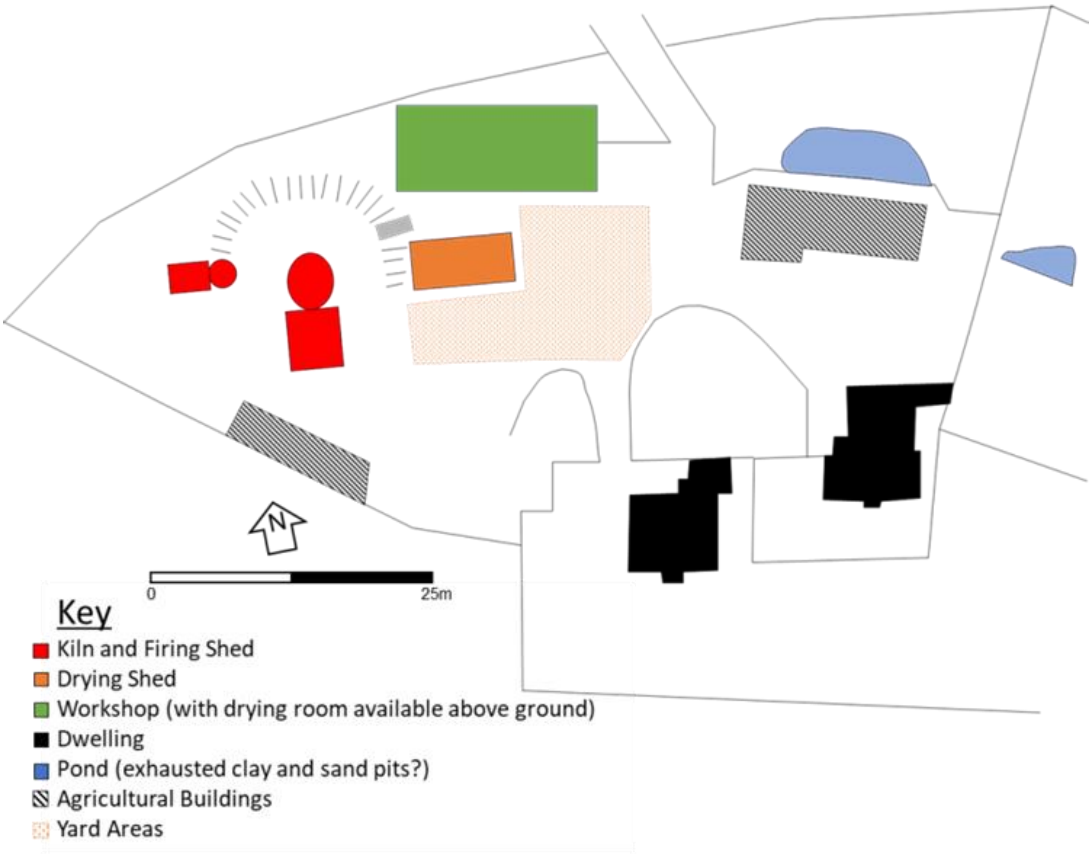


**Fig. 67: Re-drawn from a highly detailed plan by Martin Hammond, unpublished original dated 2000, constructed using various sources of evidence**

**Plates 38 and 39: showing marks on base sherds where pots have been lifted and turned using sticks to prise partially dried vessels off the boards. Left from East Worth (VER2), right from Crendell (ALD3); Author' Own**

Drying sheds tend to be large, enclosed structures, designed to house the maximum number of pots. Often these have a combined purpose; for example, the Crossroads drying shed held a pit for clay and an indoor space to tread clay in poor weather (Sims 1969, p.46). To efficiently use the space, the roof space could be used for drying pottery; as evidenced by blackened roof timbers from decades of low temperature fires being set. Post-medieval evidence for this practice is shown in a Cranborne Manor Court order, dated 1758, for potters not to cut turf, heath or furze from the wastes and commons for burning in the drying houses or kilns under penalty of £2. Additional references are outlined by Sims (1969, p.46) throughout the 1700s. By 1775, an entry of "no turf is to be cut in the potter's trade" shows that the growth of the potteries in the area, and their utilisation of common land resources, had become a significant nuisance and concern, as it consumed materials that were relied upon by the entire heathland populace; a vital resource for heat and cooking. Sims (1969, p.46) notes that:

> "…*turf would have been one of the basic domestic fuels used in the area, and we have a figure of 8,000 turves a year given in a lease of 1739*".

Similar processes of drying were undertaken at Farnborough. Here, "fires of turf … were kindled in the open sheds: round the walls the raw pots were stacked in rows about waist high" (Bourne 1999, p.51). Furthermore, the drying time is mentioned:

> "*By about two in the afternoon the pots set in the morning and slightly hardened by light fire, were fit to bear the weight of the mornings 'setting'. This lasted three days, by which time the potter, usually clean in his dress, was as black as a sweep.*" (Bourne 1999, p.52).

Thus, this cheap and simple strategy appears to have been employed for hundreds of years.

### *6.8. Glazing*

Ceramic glaze is essentially a form of glass. During firing, when a suitable temperature is reached, this highly viscous coating melts and fuses with the ceramic surface; once cooled, a solid shell is formed. Firing glazed pottery is notoriously difficult with the outcome being based on the conditions within the kiln (Rice 2015, p.7). This difficulty often leads to failures, making the identification of glazed pottery waste so recognisable in comparison to their unglazed counterparts (Historic England 2015b, p.34).

Ceramic glazes comprise three components; a network former, network modifier, and intermediates (Rhodes 1981, pp.88-94). The network former is usually silica and combines with oxygen forming $SiO_2$; this comprises the bulk of the glaze network. The melting point of silica is exceptionally high, being 1710ºC. To lower this, and make glazed ceramic production more viable, a network modifier can be added; this readily combines with and weakens the bonds of the $SiO_2$. Modifiers include sodium, potassium calcium and manganese, but the most common in archaeological ceramics is lead. Intermediates form the final aspect and can have multiple roles. Some increase the shine of a glaze, but mostly it is glaze viscosity and strength that is required in pottery production. This is often sought to ensure the glaze successfully covers a surface and a range of angles or curves, or to reach a particular lustre. The glaze needs to successfully combine with, and adhere to, the ceramic body to avoid crazing and cracking; often, aluminium oxide in the form of a thin clay slip is used as a successful intermediate when applying a glaze to ceramic (Cooper and Lewenstien 1983).

The purpose of the glaze is often two-fold. Firstly, a glaze aids in the natural tendency of a fired ceramic to hold water, creating a more waterproof vessel. Secondly, the application of a glaze has a decorative function, providing a way to add colour and sheen to a ceramic that is not viable via the application of a slip. During the late medieval period, many centres produced polychrome glazed pottery, including Laverstock. However, it is the potters of Saintonge, France (Hurst 1974), and later those of Westerwald, Germany, that are famed for multicoloured glazes in Northern Europe (Gaimster 1997b). By dipping or brushing a wet mixture of lead monoxide (litharge) or lead sulphide (galena) mixed with clay and sand and fired to a high temperature (approaching 1000° Celsius), the medieval and post-medieval potters of southern Britain were able to create a shiny, colourful and waterproof glaze (Brears 1974, p.50). The use of a galena-based glaze is suggested for the post-medieval Verwood-type wares, as pale-yellow areas of sulphur can be identified in poorly vitrified glazes; this sulphation is a common attribute of failed Verwood-type wares (Brears 1974, p.51; Plate 40).

**Plate 40: Degrees of sulphation from heavy (left, from Horton) to mild (right, Crendell - Alderholt) due to poor glaze vitrification during firing; Author's Own**

The work of Newell (1995) has shown that the colour of the glaze is heavily influenced by the presence or absence of oxygen in a given firing. Green lead glazes occur in a reduced (low oxygen) atmosphere, while a clear glaze shows an oxygen rich atmosphere (Plate 28). This relationship with oxygen is shared with the clay body of the pot (Rice 2015).

There is little information relating to the procedures surrounding the glazing of pottery from the late medieval period onwards. One reference in *De coloribus et artibus romanorum* - attributed to Eracilus, yet probably the work of various individuals added to between the 10-13th centuries (Muňoz-Viňas 1998) - outlines a powdered lead and clay suspension mixed with wheat flour, which could have been employed for glazing pottery (de Boüard 1974). The addition of brass fillings is thought to provide a green colour, whereas a yellow is created without the brass. Due to a lack of available archaeological evidence, it is the products themselves which provide the bulk of the information upon which hypotheses regarding glazing have been constructed (*e.g.* Barton 1990; Newell 1995). Thus, our current understanding of glazing is limited at best, if not biased from studying mostly the products that are successful. In contrast, the wasters and failed pottery sherds receive only cursory attention in terms of glazes and comments on condition (*e.g.* Field and Musty 1966; Musty *et al.* 1969). Very rarely are glazed wasters examined in detail (*c.f.* Buckland *et al.* 1979; Hurst and Freestone 1996). Eracilus' suggestion of glazing via the application of a flour paste has been shown to ensure ample adhesion to the body of the pot in trials by Griffiths and Redknap (1991). These experiments displayed that a lead-laced clay-flour mix ensures a glaze vitrifies and adheres to pottery when fired at 880ºC.

This method is corroborated for the Verwood-type industry during the post-medieval period, as noted by Wake Smart (1841, p.89) who describes:

> *"After the ware is formed it is set aside to dry and in about 24 hours is sufficiently firm to take the glaze. The glaze is made by melting metallic lead until reduced to a black powder, as an oxide which is mixed with barley meal for use…"*

He also notes that 250lb (113kg) of lead is mixed with two bushels (16 gallons or 60.5 litres) of meal. Wake Smart (1841, p.89) continues by stating:

> *“The surface of the vessel is then moistened by a small mop dripped in a mixture of cow dung and water and the glaze being dusted over, it adheres to it. They are now ready for the kiln.“*

There is no mention of the method used in the creating of the lead powder, however one is put forward by William Smith, potter of Farnborough, who notes:

> “*A furnace, divided into two compartments, held fire on one side and lead in the other… as soon as the lead began to ‘flow’ the man in charge had to begin raking it backwards and forwards, and continue until all was liquid. Then the raking had still to go on as the lead cooled, to bring it to a fine powder, but the powder was not cold enough to be handled for several days. A fine wire sieve at last separated from the powder any lump that had escaped; and then the glazing of the pots could begin.”* (Bourne 1999, p.51).

It can be gleaned from the wills of both Richard Henning and Elias Talbot that pots were used to melt lead for preparation of a glaze mixture. It is unclear what material this pot was constructed of; metal is perhaps most likely, given the worth of Richard Henning’s ‘Laed[sic] Pot’ valued at 3 shillings (Algar *et al.* 1987, p.42). However, a large, well-tempered ceramic pot may not be entirely out of the question. One curious example comprises that discovered at Hallgate, Doncaster, here, a shell tempered vessel was considered a potential receptacle for melting lead in (Buckland *et al*. 1979, p.53). While there can be little doubt that all post-medieval Verwood-type potters employed a lead glaze for their pots, Sims (1969, p.43) notes that out of eight inventories, only that of Richard Henning lists a hundred weight of lead valued at 13 shillings. Further ascertained use of lead oxides is evidenced in the Cranborne Manor Court for 1778 (HH Ref. Cranborne Manor Court Rolls), whereby no potter shall throw out any lead dross within the tithing of Holwell and Alderholt under penalty of 40 shillings.

While the majority of post-medieval Verwood-type vessels are glazed on the inside, the sheer amount of lead present in a kiln can lead to a firing atmosphere that contains a high degree of lead vapour. This vapour can form on the surfaces of vessels, identifiable as a sheen (Plate 41) and proved to be problematic in the chemical analysis (Chapter 5). This indicates the considerable amount of lead glazing carried out within the kiln, in addition to the quantity present within a single kiln load.

**Plate 41: Exteriors of sherds, one covered in lead vapour (right), recovered from a waster filled pit at East Worth. Example of the left displays no vapour/sheen; Author's Own**

Additional evidence for lead glazing was identified during excavations at Black Hills, Verwood (Plate 42). Here, the base of a brick oven built into the wall of the stoke shed was interpreted as being an area for preparing lead oxide due to the large amounts of adherent present. Similarly, an oven structure is noted in the firebox of the kiln identified at Salisbury Arms Farm during a watching brief, but was not photographed (ALD8; Algar *et al.* 1987). These sites are detailed in Chapter 7.

**Plate 42: Splashed lead brickwork, above burnt brickwork, in the stoke shed at Black Hills, Verwood. Shown with a 2m scale; (taken from the Black Hills project archive currently held by the author)**

While powdered glaze can be sprinkled, or the exterior of a vessel dipped in a pre-mixed receptacle, later glazes were applied using a brush - as at Crossroads (Kendrick 1959, p.130) - or glaze was mixed with a light clay slip, with the mixture then poured into a vessel, which is then swirled until the interior is coated. This was undertaken at Soil Hill (Isaac Button Country Potter 1965).

No evidence could be found linking potters to a place of purchase for the lead utilised in the glazing of their pottery. While no direct links between the Mendip mines and the Verwood potteries could be found, this source is perhaps likely, as Sims (1969) has tentatively suggested. The assumption being that the Mendips are the nearest known and active at the time. This source was known to produce both lead and manganese, used for the glazing of ceramics (Gough 1967; Burr 2015). However, it is possible for coastal trade to have brought lead from sources further west, such as Cornwall, or even from overseas trade, thus a potential source from elsewhere should not be discounted.

### *6.9. Kiln Preparation*

The setting of the kiln was of primary importance prior to firing. Almost all of the Verwood-type pottery kilns, identified thus far, have comprised a circular to ovoid ware chamber. Due to the upper portion of the kiln rarely surviving, it is assumed that the arrangement used at Crossroads - an open topped cylinder covered with temporary capping - was the norm. This allowed access into the ware chamber, and for wares to be stacked high inside. This event comprised a precarious operation, upon which the success of the past several weeks' work depended, thus, its undertaking was probably completed by the master potter (Plate 43). The packing of a kiln required a skilled hand to achieve reliable results, as a failure of the kiln load would yield less products, thus less wages being paid (McGarva 2000, p.98). Copland-Griffiths (1998, pp.40-1) notes the results of one such failure:

> *"Gertie Sims, the daughter of potter Freddy Sims of Verwood, recalled the disastrous aftermath of a kiln collapse and her mother's tearful cries that they would have no food for many weeks to come…"*

**Plate 43: The placement of large jars form the skeleton of the stack (MED Accession ref. VER-0046; courtesy of MED)**

**Plate 44: The completed stack of wares, showing jugs and bowls positioned between jars. Although possibly staged, the positioning of the wares is unlikely to be drastically different from the norm to limit breakage (Copland-Griffiths Collection Ref. 136.58; courtesy of MED)**

The loading initially comprised the placement of large sized jars or ‘pans’ at the base of the stack, with medium-sized vessels forming the upper most portions - as shown in Plates 33 and 34. The potter would stand upon boards spread across several jars to disperse his weight across the stack (McGarva 2000, p.98). Smaller vessels could be positioned higher up the stack or positioned within larger items to shield them from direct heat.

McGarva also notes that:

> *"If one imagines the pans in plan, where three circular pots are packed tightly together there is a triangular space. In each space a bottle or jug could be suspended, supported upside-down and touching at three points. The glaze on the narrower neck had no risk of touching, and it was this method of firing them that dictated their shape."* (McGarva 2000, p.99).

One example where indications for the positioning of wares within a kiln firing was Horton (Copland-Griffiths 1990, Fig. 10). Here, the stacking of wares could be discerned by studying the running of iron oxides visible within the glazes.

The firing of large wood fired kilns is unlike that of modern electric and gas fired ones, in that when they are filled with unfired wares there are hot and cold spots. An experienced potter repeatedly firing the same kiln would learn from experience where those spots were, thus could pack the kiln accordingly. For example, McGarva (2000, p.98) notes that the correct packing of the kiln allows for better distribution of heat, and cold spots can be occupied by unglazed wares such as flowerpots. A microcosm of this effect can be witnessed on the pots themselves, as shadows are evidence where areas around the pot are in oxidation, reduction, and/or experience different temperatures (Plates 45- 47).

**Plate 45: Bases of two jars showing kiln scars from other vessels placed onto the bases of these 18-19th century jars (taken from Draper and Copland-Griffiths 2002, p.98)**

**Plate 46: Base of a 17-18th century jar from East Worth shows similar markings to Plate 45 (Author's Own)**

**Plate 47: Kiln shadows on Verwood jugs corroborate the positions noted from the packing of the kiln. The darker areas show areas of localised reduction in contrast to areas of oxidation (taken from Draper and Copland-Griffiths 2002, p.99)**

Cumulatively, this shows that large jars were fired face down, corroborating the placement in Crossroads photographs. In contrast, bowls, jugs, and other wares were fired at various angles. Smaller, finer vessels, such as mugs, appear to have tended to be fired upright, perhaps protected within either large jars or purpose-built holding vessels known as saggars, a type of kiln furniture.

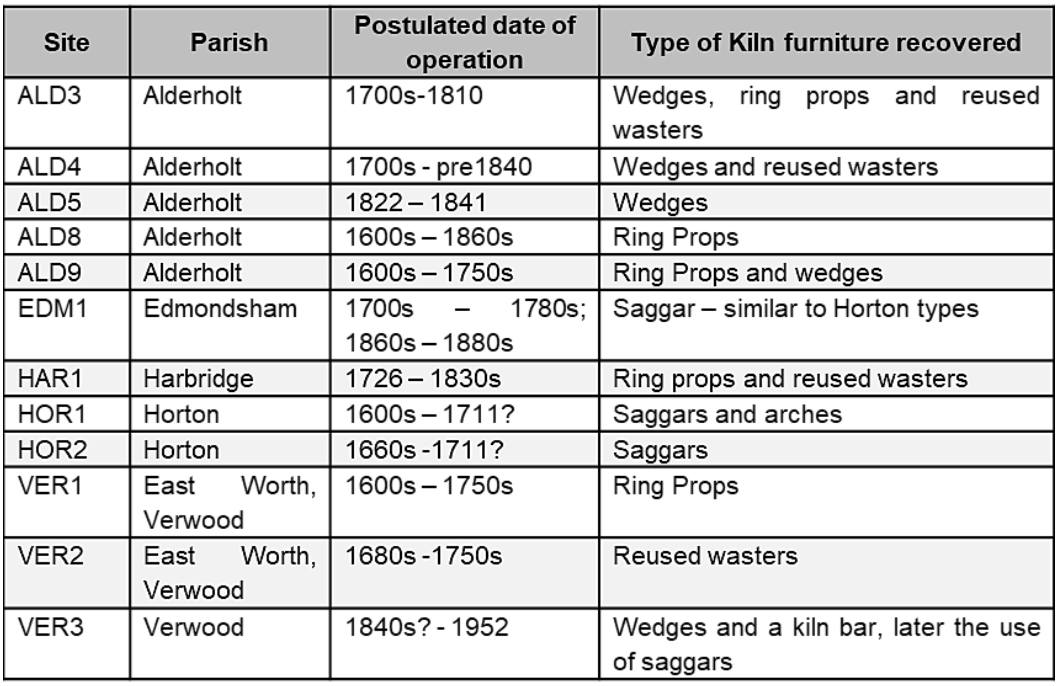
### *6.9.1. Kiln Furniture*

The firing of earthenware can be a relatively simple affair. It is possible to dig a shallow pit, fill it with unglazed dried clay vessels, supply ample fuel, then set the fire and achieve temperatures of roughly 700ºC. This level of simplicity has been used for many millennia in creating earthenware (Rice 2015). However, the moment that glaze is introduced to pottery manufacture, the production becomes much more intricate. Primarily, a temperature upwards of 850ºC is required. If the temperature is too low, the glaze may not successfully vitrify; too high, and the glaze will begin to bubble and eventually volatise, becoming metallic and brittle. The vitrification sought can also create problems as glazed surfaces can stick to other surfaces.

Copland-Griffiths (1998, p.40) notes that the potters could overcome this by placing old pottery sherds between vessels, and could manufacture specialised shapes to separate their pots. Saggars were also used. The saggar is a protective ceramic container, which holds and protects the vessels in the kiln (Rhodes 1981, p.158).

The excavated 18th century production site at Crendell (ALD3) revealed a wealth of kiln furniture, comprising wedges and ring props (Plate 48). This infers that there is a degree of specialisation in terms of what centres were using kiln furniture. In fact, when one takes a detailed look at the sherds collected from kiln sites by VDPT field visits, it can be shown that kiln furniture is a relatively widespread phenomenon (Table 64).

**Table 64: Types of Kiln Furniture Recovered from Verwood-Type Pottery Sites**



| Site | Parish | Postulated date of operation | Type of Kiln furniture recovered |
|---|---|---|---|
| ALD3 | Alderholt | 1700s-1810 | Wedges, ring props and reused wasters |
| ALD4 | Alderholt | 1700s - pre1840 | Wedges and reused wasters |
| ALD5 | Alderholt | 1822 – 1841 | Wedges |
| ALD8 | Alderholt | 1600s – 1860s | Ring Props |
| ALD9 | Alderholt | 1600s – 1750s | Ring Props and wedges |
| EDM1 | Edmondsham | 1700s – 1780s; 1860s – 1880s | Saggar – similar to Horton types |
| HAR1 | Harbridge | 1726 – 1830s | Ring props and reused wasters |
| HOR1 | Horton | 1600s – 1711? | Saggars and arches |
| HOR2 | Horton | 1660s -1711? | Saggars |
| VER1 | East Worth, Verwood | 1600s – 1750s | Ring Props |
| VER2 | East Worth, Verwood | 1680s -1750s | Reused wasters |
| VER3 | Verwood | 1840s? - 1952 | Wedges and a kiln bar, later the use of saggars |

Generally, there appear to be four types of kiln furniture employed at east Dorset potteries. Firstly, the wedge; this was created using a band of clay with a triangular profile, which could be deployed in an upright position, raising a vessel, or supporting a vessel at an angle. Secondly, a ring prop comprised a small circular arrangement with small protruding pointed lugs - three appear to be the norm. These were efficient at keeping smaller mugs, jugs and tankards supported, and limiting contact between glazed surfaces. Thirdly, an arch; a wheel thrown tube cut in half, which performed a similar function to the wedge. Finally, the saggar; unlike the aforementioned components, the saggar is itself a vessel, holding pieces within it to protect them. This is usually employed for smaller, finer vessels. The east Dorset saggars appear to be generally rounded or ovoid with several holes to allow greater passage of heat. Saggars have only been noted at Crossroads (Plate 49) and Horton kilns no. 1 (Fig. 68a-c) and 2 (author’s observations), suggesting that they were not extensively used at Crendell, nor later sites. The Crossroads saggars are a relatively late introduction attributed to the arrival of an ex-Poole-potter, Gertie Gillam (Draper and Copland-Griffiths 2002, pp.170-1).

**Plate 48: Kiln furniture recovered from Crendell in 1975. Left - wedges; right - ring props; (taken from the CR75 project archive, held by the author)**

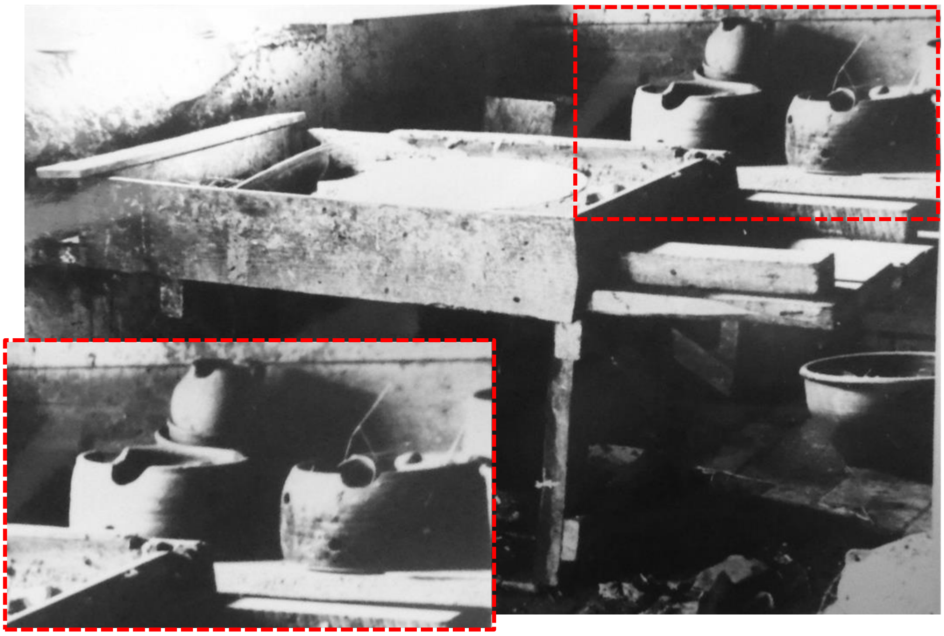


**Plate 49: The abandoned potter’s wheel at Crossroads, shows rounded saggars with perforations in the sides and rim to control the passage of hot air (taken in c.1960s; Copland-Griffiths Collection 136.27; courtesy of MED)**

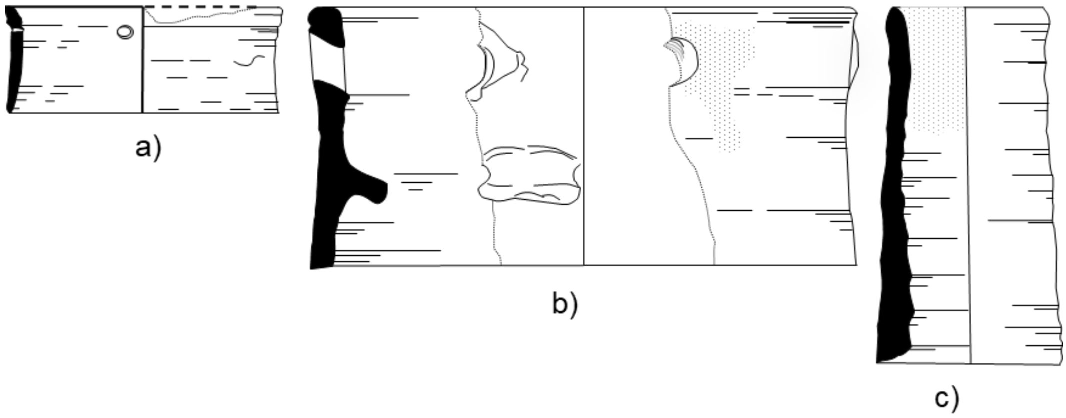


**Fig. 68a-c: These purpose-built saggars (a and b) plus an arch (c) were recovered from Horton kiln 1 in 1990-1 (a – re-drawn from Copland-Griffiths 1990, Fig. 8.104; b and c – re-drawn from Copland-Griffiths and Butterworth 1991, Fig. 5.12 and Fig. 5.15); shown here at ¼ life size**

This shows that the use of kiln furniture was common from the 17th century at east Dorset potteries, but was not ubiquitous. The presence of kiln furniture, and its use within the industry, show that time was invested in protecting finer wares, and ensuring firing success in general, highlighting both intensive production and a degree of specialisation. The evidence suggests that the saggar appears to be abandoned by the mid-18-19th centuries, and returns only at the end of the industry as part of the rapid diversification to make Crossroads more economically viable (Draper and Copland-Griffiths 2002, pp.170-172). This goes against Rhodes' (1981, p.156) argument that purpose-built kiln furniture is solely a modern invention, employed only by the large manufactories of the 19th century.

The issue is somewhat problematic however, as the usage of waste pottery sherds reused as spacers between vessels for firing (Copland-Griffiths 1998, p.42) means there would have been little need for purpose-built kiln furniture. Furthermore, these reused spacers are very difficult to identify in the archaeological record; the key indicators being glaze over broken edges, alongside numerous kiln scars (Plate 50).

**Plate 50: Sherds from VER13 (Ebblake) reused as spacers, heavily marked with kiln scars and glaze run over broken edges (Author's Own)**

Once the vessels were stacked within the kiln, there was a requirement to cap the top. The capping material has been subject to dispute, as there is little evidence with which to corroborate a working hypothesis. Present thinking is that waste pottery sherds or tiles were employed, creating an almost tortoise shell structure (Copland-Griffiths 1998, p.42). Gaps between allowed smoke and hot gases to exit and permitted the kiln to maintain air flow or 'draw'.

### *6.10. Firing*

The maintenance of a purpose-built structure for firing ceramics was of key importance for repeated successful glazed pottery production. Kilns essentially comprise boxes constructed of a refractory substance able to retain heat directed into it (Rhodes 1981, p.92). The kiln allows for the potter to have improved control over firing conditions and draught, negating - to a degree - unfavourable weather conditions, along with the ability to reach greater temperatures in relation to open pit firing (Shepard 1956, p.75). Overall, this increases the likelihood of achieving a successful firing, allowing more pottery of a higher quality for trade and sale. Thus, investment in kilns that can repeatedly achieve successful results is an asset for an effective potter. It is perhaps for this reason that potters of east Dorset repeatedly took over existing sites, with some sites in almost continuous operation for hundreds of years (Algar *et al.* 1987). The use of the same kilns on certain sites for this duration allows the potter to become fully familiar with the 'quirks' of a kiln. Experimentation would present locations of hot or colder spots, along with an understanding of the best methods to achieve a good draw needed to achieve a successful firing. Such a set up can be seen today in modern wood firing potteries, such as the Leach's climbing kiln (Mulchelney, Somerset), where certain bricks must be removed from the wall of the firebox to achieve a certain draw (John Leach pers comm).

Updraught kiln technology involves setting a fire, and the hot air being drawn into the body of kiln via convection. The method requires a chimney or flue to create this draw, and an efficient convection process. Alongside convection, heat is transferred to the many surfaces inside the kiln, including vessels and the kiln walls. Further heat is transferred inside the kiln via conduction between surfaces within the fully stacked kiln, and via radiation from the hot surfaces (Rhodes 1981, p.97). The bricks used in the construction of these kilns - which were being produced in the area, thus readily available (Coulthard 2007, pp.122-3) - are well suited, not only for retaining heat, but for passing it between adjacent surfaces via conduction. Due to the interactions of these many processes, a well-built and insulated updraught kiln can efficiently, effectively and repeatedly create usable ceramics. The degree of insulation around Verwood-type kilns can again be witnessed from photographs at Crossroads (Plate 51).

**Plate 51: Potters of Crossroads c.1930 carrying fired pots from the kiln. The top of the kiln is accessed via steps cut into an insulating turf mound around the kiln. The mound is clearly taller than the men and thus quite sizeable (taken from Draper and Copland-Griffiths 2002, p.76)**

Kiln technology generally requires greater investment in fuel to reach the higher temperatures desired, when compared to simpler methods such as pit firing (Rye and Evans 1976, p.165). For Verwood-type kilns, this means drawing on local woodland. Furthermore, the adoption of such technology requires investment of capital, labour for construction and maintenance, plus the ability to secure large amounts of fuel and materials. To limit the costs, the repeated engagement of existing production sites over the creation of new ones (see Appendix I) would reduce outlay and time investment, especially in areas such as Verwood that are notably poor during the medieval and post-medieval periods (Darby and Welldon-Finn 1967; Bettey 1987; Kerr 1993).

This reuse of existing kiln sites perhaps explains why there has been a preoccupation of targeting kilns - a recurrent theme throughout past Verwood pottery research (Young 1979; Copland-Griffiths 1990; Copland-Griffiths and Butterworth 1991). Consequently, we understand much of the firing sequence and its associated apparatus (Crossley 1994, p.274; McCarthy and Brooks 1988, p.52), but little in regard to the buildings within which the initial stages of production took place (*cf.* Yates 1989; Carter 2008). This has provided a rather skewed view of the entire production cycle of Verwood-type pottery.

All known kilns of the Verwood-type pottery industry are wood-fired (Algar *et al.* 1987; Draper and Copland-Griffiths 2002). This is based upon observations from wills and inventories that record vast amounts of wood, in addition to observations made by Kendrick (1959, p.130), following the closure of the Crossroads kiln in Verwood:

> *"Firing took up to three days and nights, and during that time the kiln required constant attention. Wood was the only fuel used, except that towards the end of the firing faggots and gorse were thrown on to the fire to clear the smoke and raise the temperature enough to flux the glaze."*

This is supported by Wake Smart and Hawkins (1983, p.89) who notes that dried wares:

> *"When in the kiln, … are exposed to a fierce heat at first gradually applied and continued for three days and two nights. In the course of 24 hours after the fire has been extinguished, the ware is cool enough, though still very hot to be drawn* [out]*."*

Kendrick (1959, p.130) goes on to describe the mechanics of the kiln at Crossroads, as:

> *"… a well on a mound of earth. The 'well' was made of bricks and reached down in to* [sic] *the mound for some distance. Under the 'well' was the firing chamber, with one fire mouth through which all the fuel had to be fed. The floor of the 'well' or 'kiln chamber' was full of holes to allow the flames through on to the pots."*

McGarva (2000, p.90) discusses the same kiln, and provides further details explaining that the kiln is composed of:

> *"…a cylindrical chamber 8 to 10 ft (2.5 -3m) in diameter… as tall as …* [it is] *broad. Brick arches over the single firebox supported the floor and extended in transverse walls across the chamber, forming both flue-ways to distribute the flame and heat, and as supports for the wares. The firebox went from front to back of the chamber, under these arches, and extended through the mound of earth and shards which provided support and insulation from the chamber wall to the firemouth, usually within the shelter of a stoking shed."*

Updraught kiln technology is an ancient art. It has been employed to make ceramics across Egypt, Mesopotamia and the Aegean from the Bronze Age onwards (Rhodes 1981, p.16). To create the upward draw of air necessary for an updraught kiln to work, several principal components are required (Fig. 69).

For the Verwood industry, each kiln usually possesses a single firebox - although 17th century kilns at Horton appear to employ two opposing fireboxes (Figs. 88-89, Chapter 9). The firebox is the location where the heat is introduced via burning fuel. From here, the heat is drawn into the firing chamber, a space located below the ware chamber. The firing chamber is the location where combustion of the fuel takes place. The division of these two elements limits the exposure of the dried vessels to direct flame lowering the potential for scorching and rapid thermal changes in the pottery, thus limiting vessel failures; especially in the case of glazed wares (Nenk 1997, p.97). The pottery is held in the ware chamber, composed of a rounded tall brick structure, which doubles as a flue for drawing the warm air upwards and out of the structure via convection. This tall 'chimney' arrangement allows for an efficient draw of air, thus allowing greater temperatures to be reached (Rhodes 1981, p.41). The capping of the structure limits the draw of air flow somewhat, allowing some of the heat to be retained and pass slowly through the chamber to fire the pottery, thus acting as a baffle (Fig. 70). This also provides some level of protection against any adverse weather conditions.

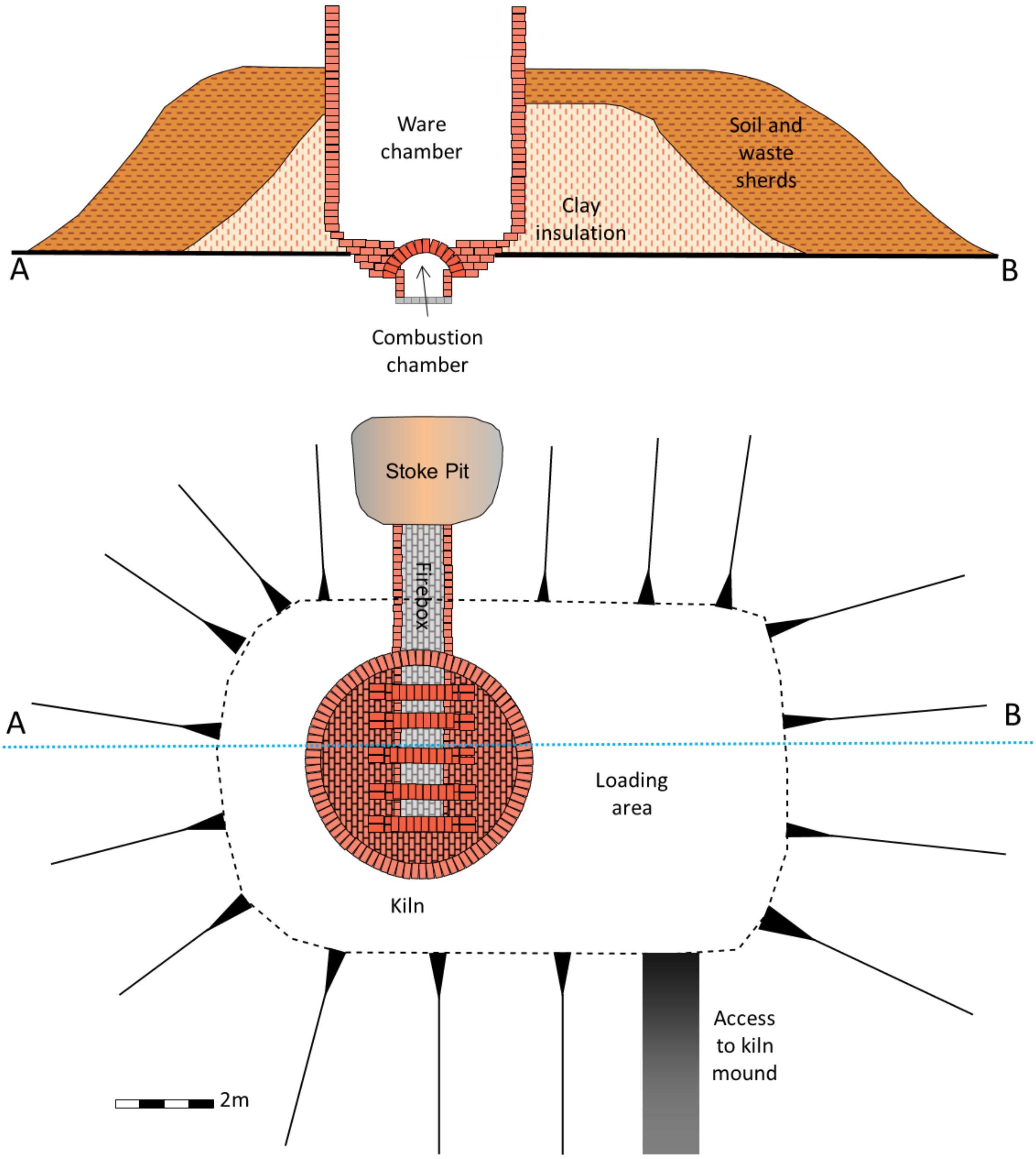


Fig. 69: Plan and profile of the Verwood-type pottery kiln at Crendell (ALD3), excavated in 1975 (after Algar *et al.* 1979, Figure 6)

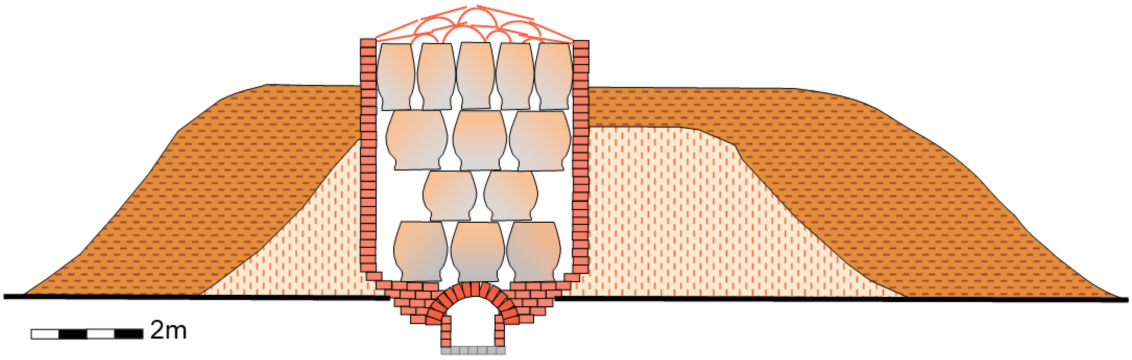


**Fig. 70: Representation of a potential setup for a fully loaded Verwood-type kiln (based on ALD3; after Algar *et al.* 1979, Figure 6)**

Cylindrical designs such as this, with a domed top, have been considered to be advantageous for improved circulation of air, thus efficiently achieving greater heat (Rhodes 1981, pp.116-7). Experimental firings at both Barton-on-Humber and Leeds, using open-topped opposing- and single-firebox kilns, have shown that a covering of sherds and tiles before firing allowed for maintenance of even heat and reduced wastage of pottery (Mayes 1967; Bryant *et al.* 1970).

Any comment on amounts of fuel used per firing are largely conjectural, as atmospheric and environmental conditions can alter the amount of fuel needed for a given firing, along with the size and type of kiln, plus the fuel used. Shepard (1956, p.215) notes that:

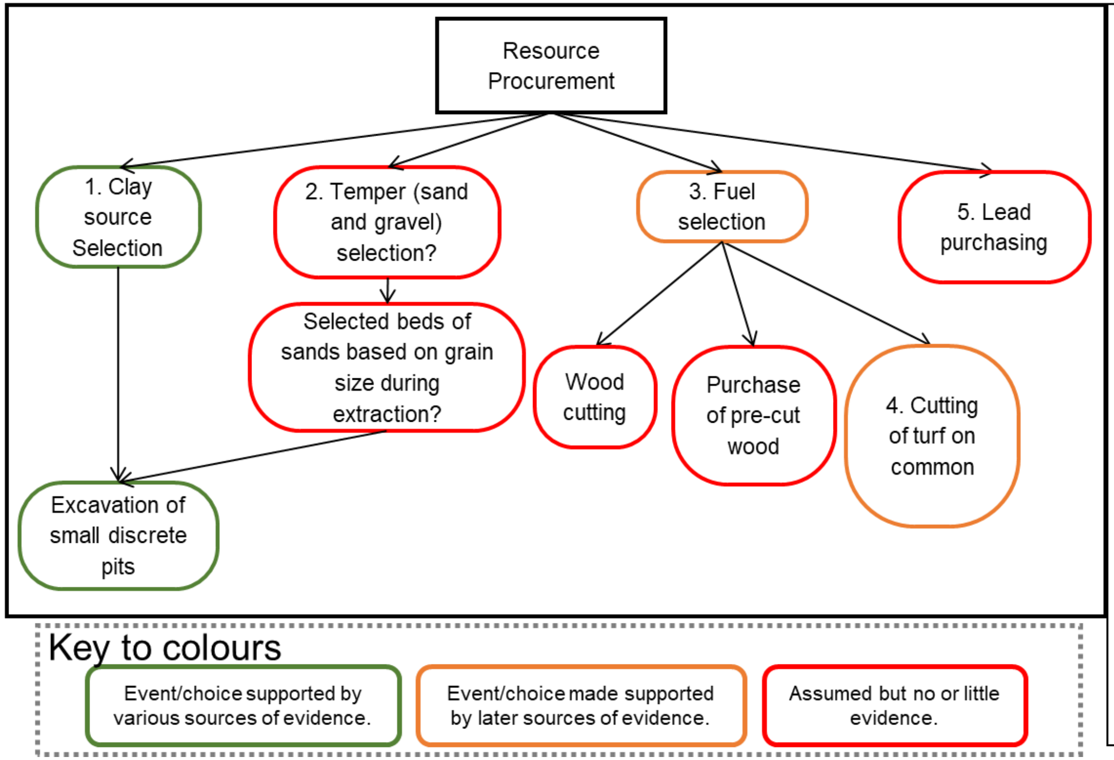
> *"The various kinds of wood burn very differently, as anyone who has watched a campfire well knows. Some woods have a quick, hot flame, others burn slowly; some give off black smoke and have a sooty flame, others burn with little smoke and have a clean flame."*

Following the cooling of the kiln and the end of the firing, the pottery would have been unloaded. Successfully fired pottery would have been readied for sale or stored for distribution, while waste pottery could have either been reused as additional insulating material for the kiln, backfilled into open raw material extraction pits, or even reused as capping on the open topped kiln for the next firing.

## *6.11. Operational Sequences and Choice*

From the evidence accumulated, it is possible to construct a clear operational sequence that outlines all the choices that are reflected in both the archaeological and historic documentary records. In terms of the manufacture of materials the operational sequence can be complemented with examinations of technological style (*e.g.* Lechtman 1977). In these cases, the various combinations of manufacturing processes used to create certain items can be employed to act as a further discriminator when understanding technological choice. Thus, by association, the social aspects that are not overt within the archaeological record become clearer. Through studying technological choice, alongside technological style evident on different vessels, a more thorough picture of the operational sequence can be provided. This can be shown for both late medieval Wessex Coarseware/early Verwood pottery (Fig. 71a-e), and post-medieval Verwood-type pottery (Fig. 72a-e).

*Initialisation*



**Evidence**

1. Clay extraction from: Crendell Common and Alderholt Common?
2. Assumed from later evidence.
3. Assumed from later evidence.

**Who is involved?**

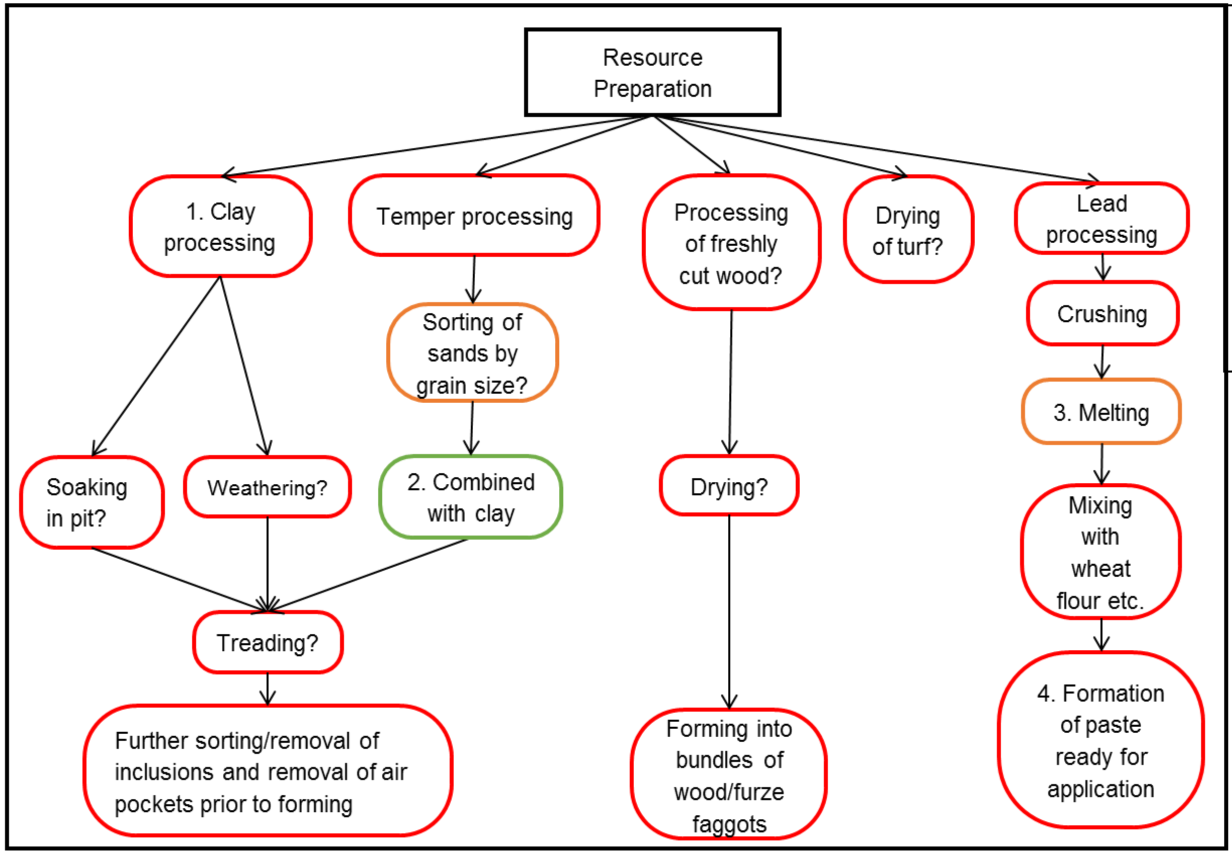
1. Notes listing numerous people taking part in clay digging. Perhaps not all of these are potters? Some are likely potters labourers and others possible hired labour.
2. No mention of sand or temper extraction.
3. No mention of fuel procurement. Wood assumed as a local resource.

**Where undertaken?**

1. Clay pit. Location unknown. Crendell considered likely.
2. Sand pits. Unknown.
3 and 4. Wood from local woodland, purchased from third party, or collected turf from common lands, wastes or other sources.
5. Unknown. Over land from Mendip? Or coastal trade from Cornwall or elsewhere.

**Fig. 71a: Operational Sequence for late medieval east Dorset pottery**

*Processing*



| Evidence | Who is involved? | Where Undertaken? |
|---|---|---|
| 1. Visible from products.<br>3. Evidence from later documents e.g. Elias Talbot's will<br>3 and 4. Are assumed from products | All unknown. Master Potter Assumed. | 1 -4. Production site/workshop |

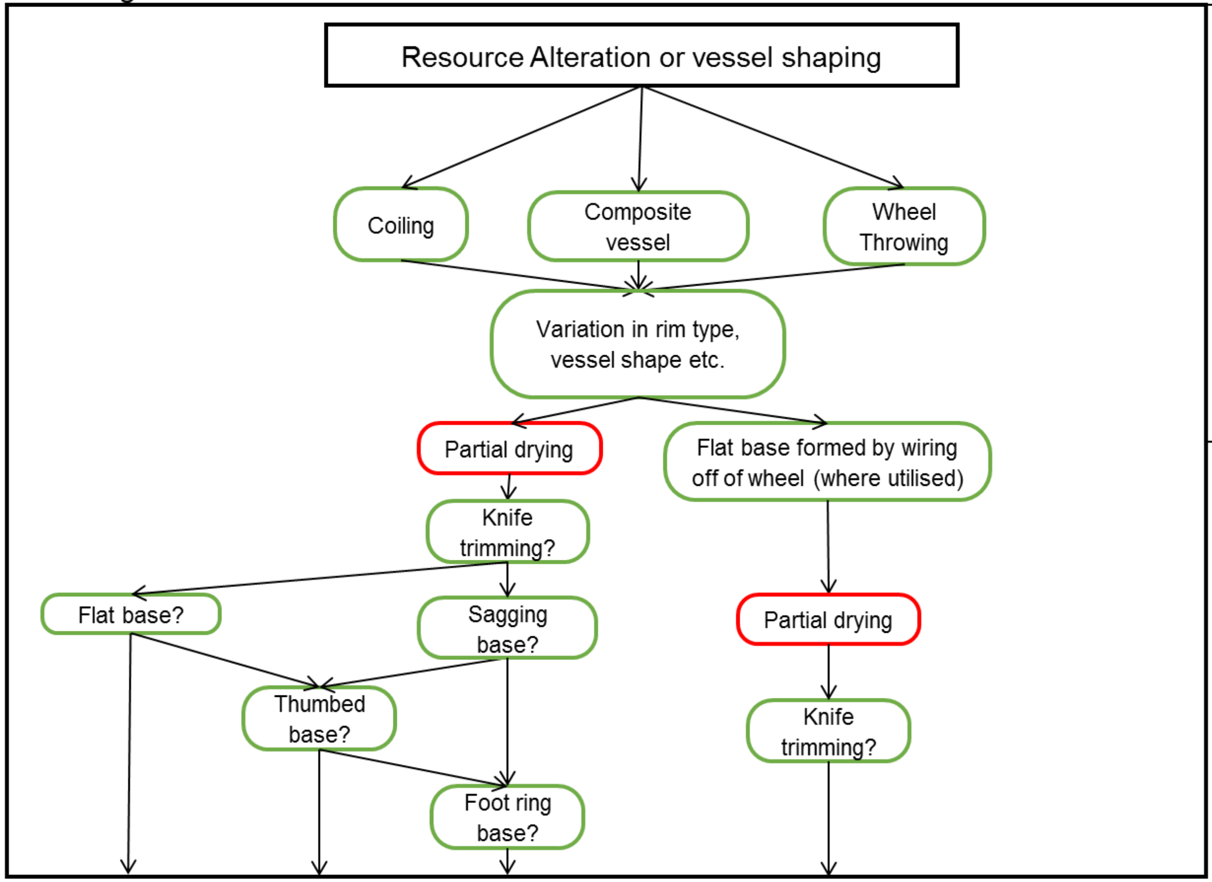
🟩 Event/choice supported by various sources of evidence.

🟧 Event/choice made supported by later sources of evidence.

🟥 Assumed but no or little evidence.

**Fig. 71b: Continuation of Operational Sequence for late medieval east Dorset pottery**

*Forming*



| Evidence | Who is involved? | Where undertaken? |
|---|---|---|
| All visible from products<br>*Finewares within the Wessex Coarseware tradition have only been shown to have been created at the Laverstock and Wareham production centres. | Assumed all master Potter? | Assumed all at workshop |

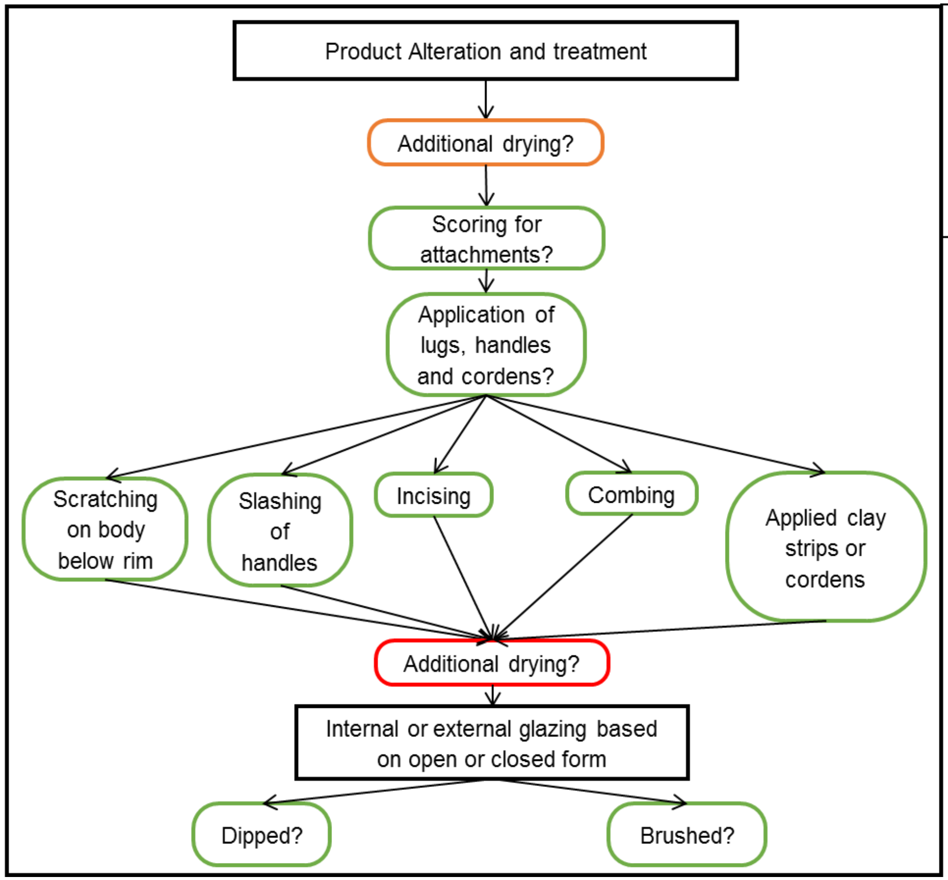
🟩 Event/choice supported by various sources of evidence.

🟧 Event/choice made supported by later sources of evidence.

🟥 Assumed but no or little evidence.

**Fig. 71c: Continuation of Operational Sequence for late medieval east Dorset pottery**

*Final forming and surface treatment*



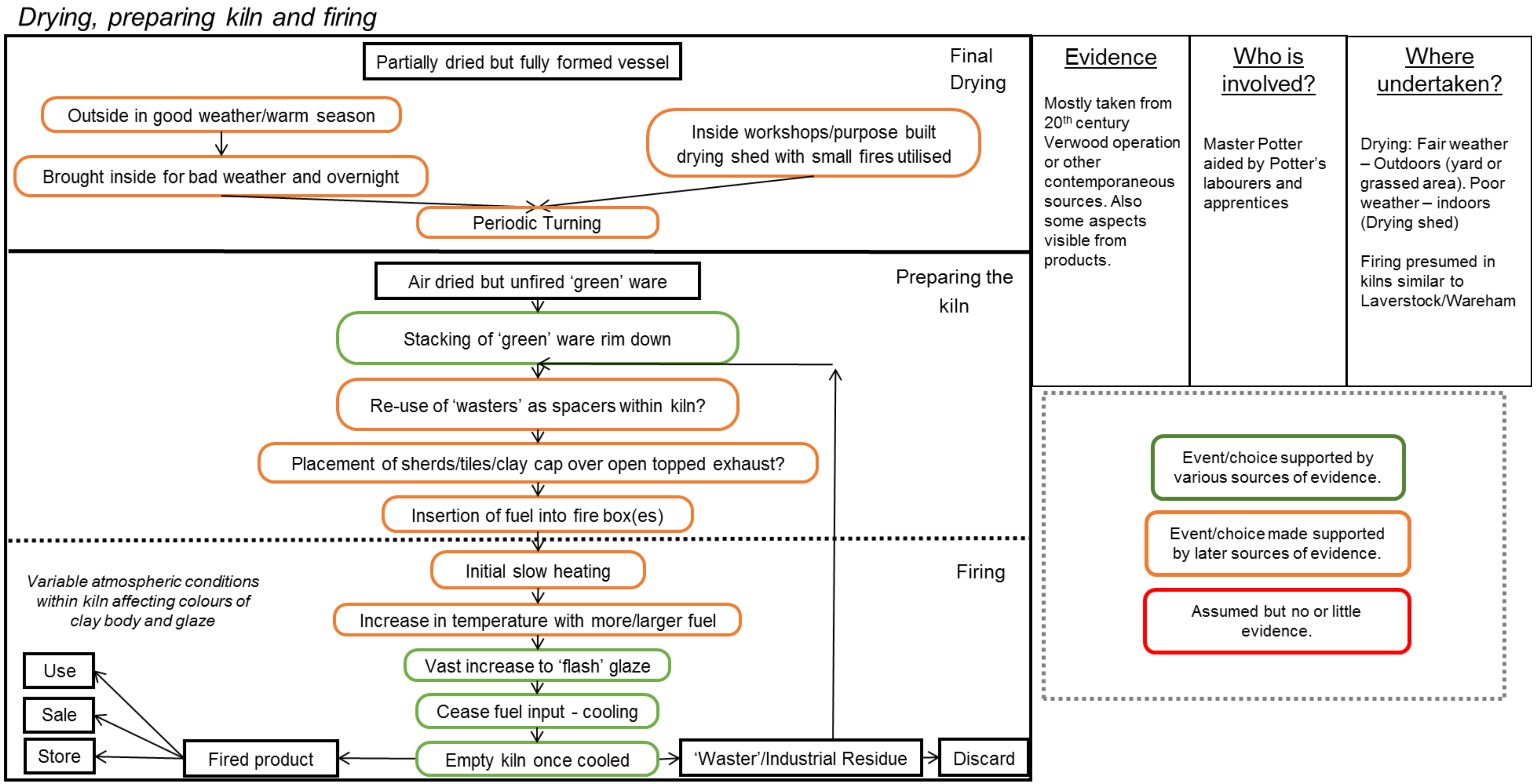
| Evidence | Who is involved? | Where undertaken? |
|---|---|---|
| All visible from products | Assumed Master Potter | Assumed all in workshop |

🟩 Event/choice supported by various sources of evidence.

🟧 Event/choice made supported by later sources of evidence.

🟥 Assumed but no or little evidence.

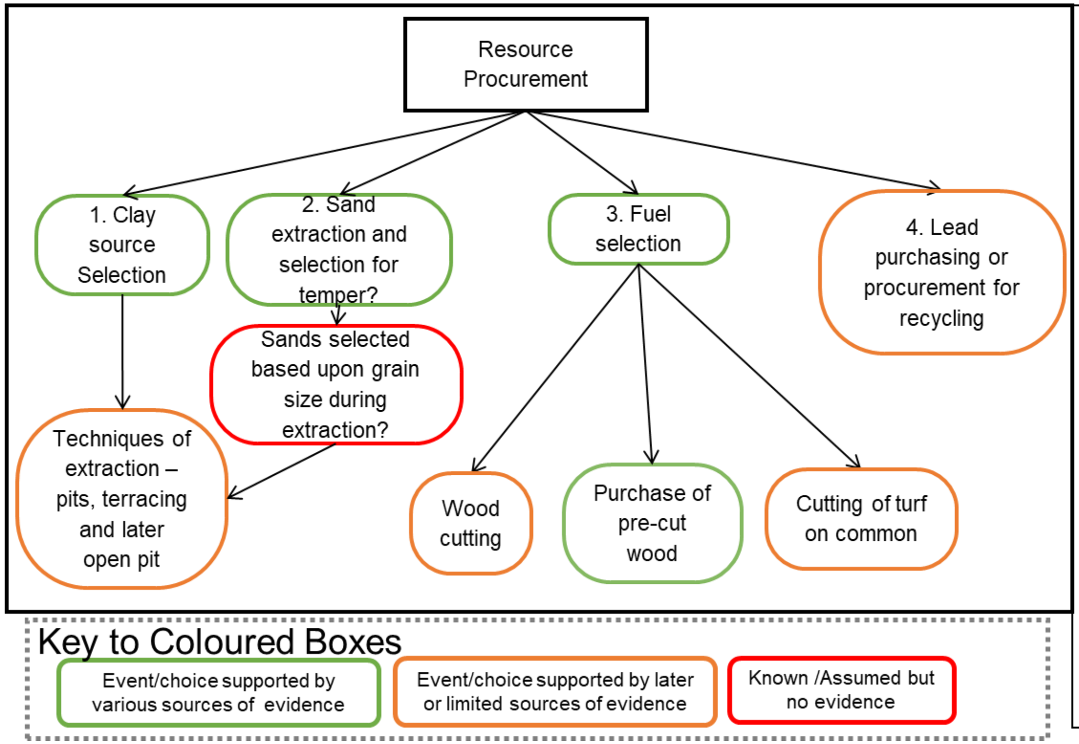
**Fig. 71d: Continuation of Operational Sequence for late medieval east Dorset pottery**



| Evidence | Who is involved? | Where undertaken? |
|---|---|---|
| Mostly taken from 20th century Verwood operation or other contemporaneous sources. Also some aspects visible from products. | Master Potter aided by Potter's labourers and apprentices | Drying: Fair weather – Outdoors (yard or grassed area). Poor weather – indoors (Drying shed)<br>Firing presumed in kilns similar to Laverstock/Wareham |

**Fig. 71e: Continuation of Operational Sequence for late medieval east Dorset pottery**

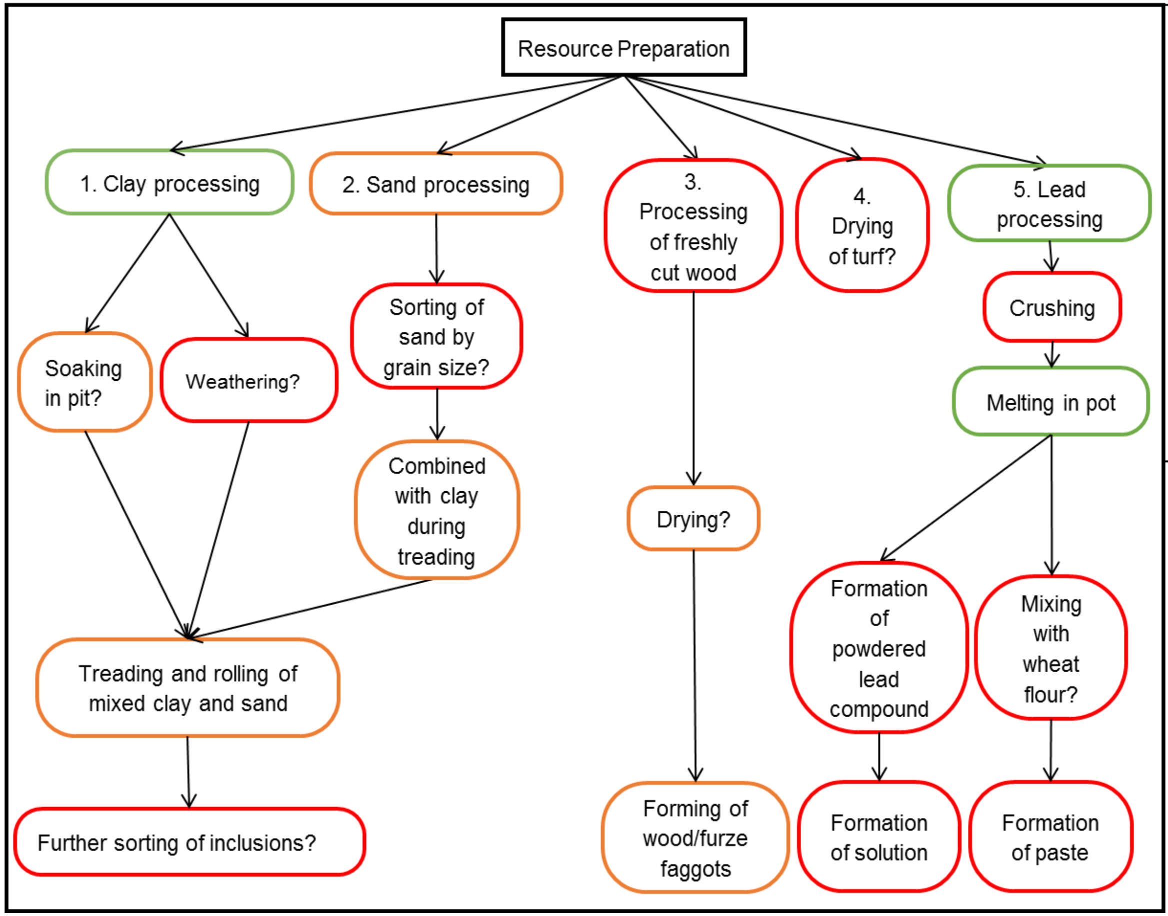
*Initialisation*



| Evidence | Who is involved? | Where undertaken? |
|---|---|---|
| 1. Clay extraction from: Crendell Common. | 1. Historic documents list numerous people taking part in clay digging. Not all are potters, some labourers and others possible hired 'day labourers'. | 1. Clay pit, usually on common land/waste. |
| 2. Numerous historic documentary references to sand extraction. Only East Worth is known. | 2. No individuals listed for sand extraction. | 2. Sand pit, again usually on common lands or waste. |
| 3. Noted in wills, and later accounts. Some historic references for illegal procurement. | 3. Some potters involved in fuel procurement. Evidence from wills for buying from wood merchants, some evidence for access to owned woodland. | 3. Wood cut from copse, purchased from third party, or collected turf from common and wastes or other source. |
| 4. Single documentary reference – to dross being re-used – being kept too close to highway | 4. No Evidence – only 20th century | 4. Recycled lead melted in workshop, or purchased from unknown source – possible via middlemen? Likely from Mendips via over land trade or other sources from ports/markets. |

**Fig. 72a: Operational Sequence for post-medieval Verwood-type pottery**

*Processing*



| Evidence | Who is involved? | Where Undertaken? |
|---|---|---|
| 1. All taken from 20th century sources | 1. Apprentices and labourers | 1. Production Site |
| 2. As above | 2. Apprentices and labourers | 2. Sand pit? |
| 3. Assumed | 3. Unknown | 3. Woodland/copse |
| 4. Assumed | 4. Apprentices and labourers | 4. Common land/waste |
| 5. Evidence from wills e.g. Elias Talbot of Horton | 5. Labourer and or Potter | 5. Workshop |

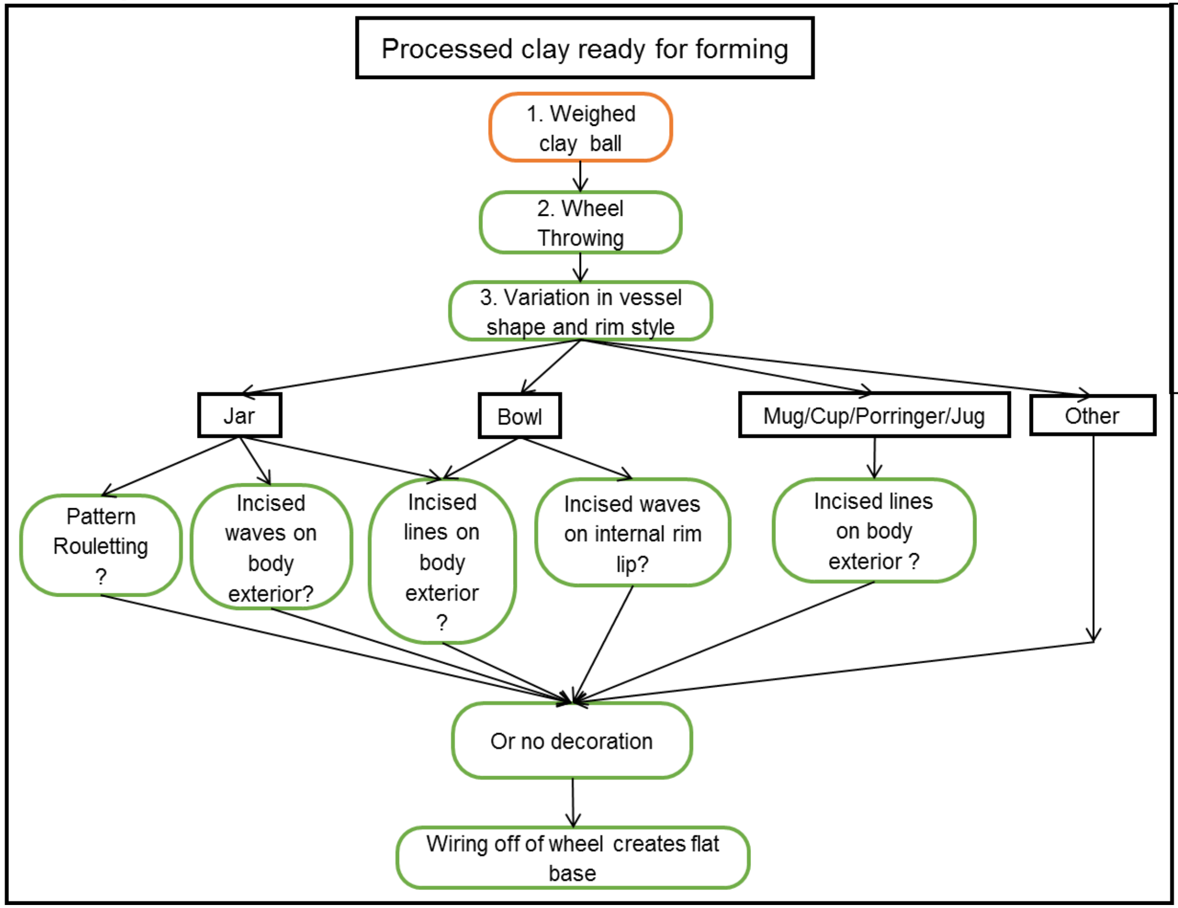
🟩 Event/choice supported by various sources of evidence

🟧 Event/choice supported by later or limited sources of evidence

🟥 Known /Assumed but no evidence

**Fig. 72b: Continuation of Operational Sequence for Verwood-type pottery**

*Forming*



| Evidence | Who is involved? | Where undertaken? |
|---|---|---|
| 1. Taken from 20th century sources | 1. Apprentices / Potters Labourer | All forming usually done in workshop. |
| 2. Visible from products and historic documentation | 2. Master Potter, wheel powered by apprentices | Wheel throwing outside in good weather on 'open days' at Cross Roads |
| 3. Visible from products | 3. Master Potter | |

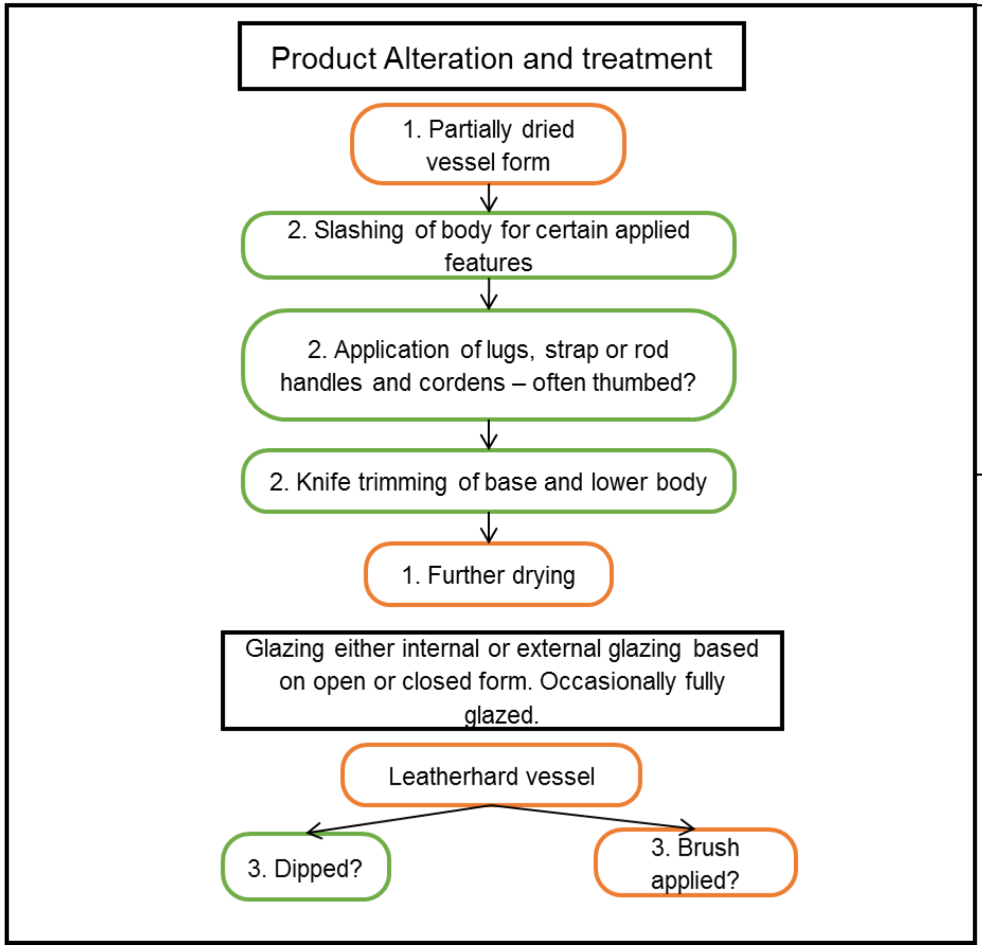
🟩 Event/choice supported by various sources of evidence

🟧 Event/choice supported by later or limited sources of evidence

🟥 Known /Assumed but no evidence

**Fig. 72c: Continuation of Operational Sequence for Verwood-type pottery**

*Final forming and surface treatment*



| Evidence | Who is involved? | Where undertaken? |
|---|---|---|
| 1. Taken from 20th century sources | 1. Master Potter | 1. Fair weather – Outdoors (yard or grassed area). Poor weather – indoors (Drying shed with burning of turves for slow burning heat) |
| 2. Visible from products | 2. Master Potter | 2 and 3. Workshop |
| 3. Visible from products | 3. Master Potter/Potter's Labourer | |

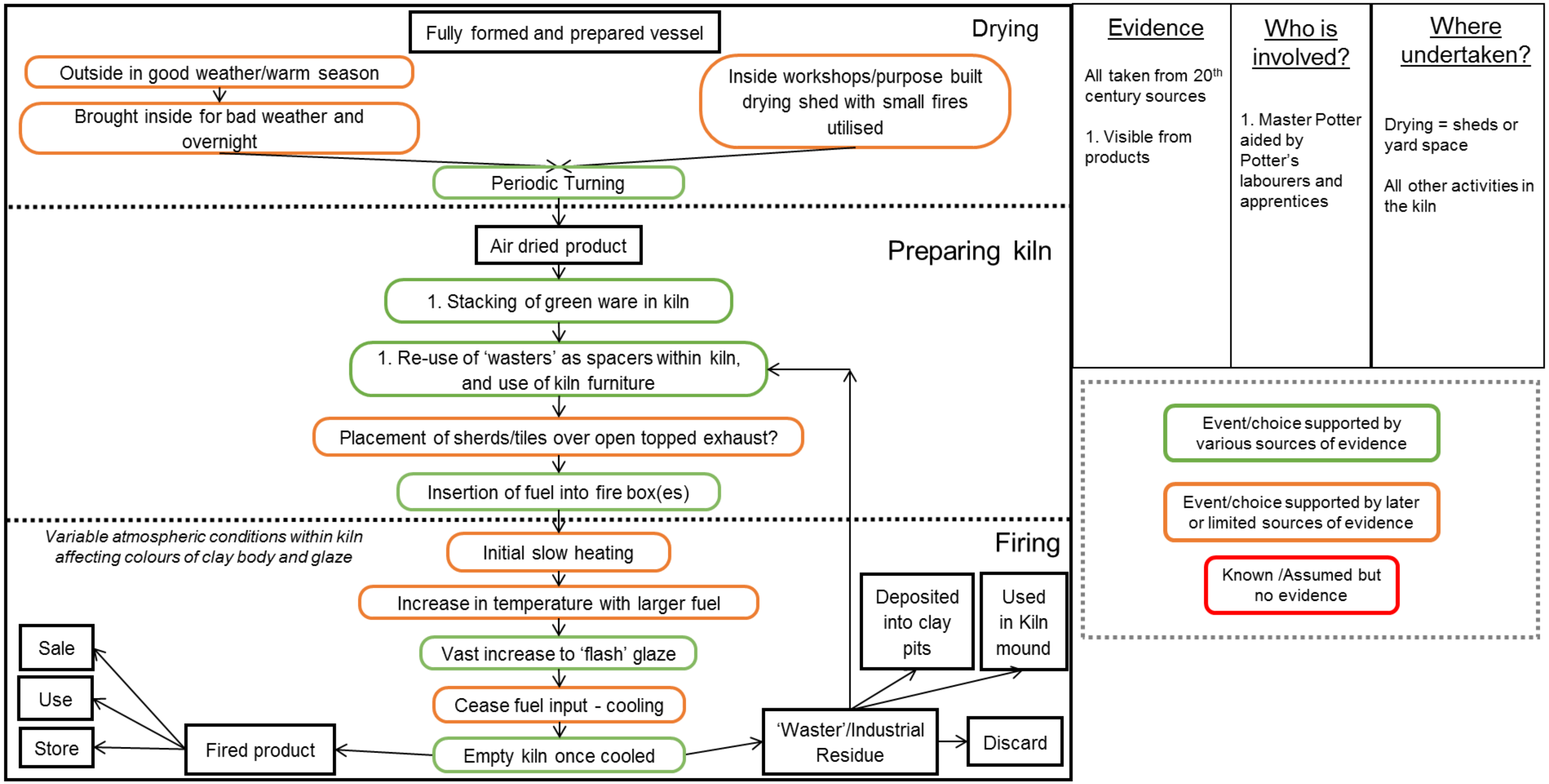
🟩 Event/choice supported by various sources of evidence

🟧 Event/choice supported by later or limited sources of evidence

🟥 Known /Assumed but no evidence

**Fig. 72d: Continuation of Operational Sequence for Verwood-type pottery**

*Drying, preparing kiln and firing*



| Evidence | Who is involved? | Where undertaken? |
|---|---|---|
| All taken from 20th century sources<br>1. Visible from products | 1. Master Potter aided by Potter's labourers and apprentices | Drying = sheds or yard space<br>All other activities in the kiln |

Fig. 72e: Continuation of Operational Sequence for Verwood-type pottery

The previous figures show the various stages of production and the range of choices that were available to east Dorset potters across numerous time periods, but also highlights how much of our current state of knowledge stems from the firing processes and end products of the production process. Less is known of the procurement of materials and subsequent preparation procedures.

In any given production chain, items are manufactured via a series of behaviours - these usually comprise a staged series of cyclical and ordinary actions (Stark 1998, p.6). Such a consistent methodology is often seen as a localised cultural tradition associated with a given geographical region or cultural group of people (Wiessner 1984). This is reflected in the aforementioned operational sequences, whereby numerous vessel forms are made through similar events. For example, a medieval spouted pitcher is constructed using almost the same steps as that of a cooking pot. Their paths diverge in the production chain, when a handle is added and a spout created. Despite having different intended purposes, they share certain characteristics.

Both the operational sequence and technological style can be best understood when approached using ‘habitus’ - a structuration theoretical framework (Bourdieu 1977; Giddens 1984). Structuration theory comprises the recursive relationship between structure and agency, where there are social rules understood by those within a given society. These rules are understood and manipulated, and by so doing they are reinforced, perpetuated, and sometimes transformed; thus, the relationship is back and forth (Giddens 1984; Johnson 2010). The idea of habitus is somewhat related. It centres on the unconscious manifestation of similar characteristics undertaken by individuals, which are embedded via repeated actions. Where there are no obvious confinements or a director in the actions, the role of habitus could help explain certain behaviours witnessed in ceramics manufacture and use (*e.g.* Blinkhorn 1997). These characteristics are ingrained through repetition and learning within a given society; this not only reflects that society, but helps to perpetuate it. Pottery is an ideal example to apply this framework, as repetitive routine actions are undertaken to form vessels. Upon completion, the process begins again; over and over. When a given operational sequence achieves successful and effective results - producing a product that can be both used and sold - the chain is more likely to be repeated, and possibly refined.

These frameworks were, in part, created as a reaction to the processual archaeology of the 1960s and early 70s whereby, rather than describing the system of a culture and its characteristics, the goal with structuration is to gain an insight into the complexities that compose it. Such an approach is considered more beneficial than explaining differences and comparing different societies (*e.g.* Binford 1962). This ‘interpretive archaeology’ employs perceptions of agency and culture, alongside a structured social order with its own practices, institutions and traditions (Hodder 1995). Agency can be expressed as the mutual symbiotic relationship between an individual and their culture. For example:

> *“…a society is more than the sum of its members and its members are more than a reflection of the social ‘whole’. Any individual is a socially constituted individual and a social actor, but is so in his or her own way.”* (Abbink 1999, p.27).

Society or culture has been defined by Hodder (1982) as a distinguished framework of ideals, customs and principles which help to guide a person’s decisions, and their understanding of the world around them. This transcends into the material culture that a person creates via their behaviours, traditions and actions. These structures have often been seen as a form of ‘social text’, needing to be read to be understood (*e.g.* Hodder 1986; Tilley 1991). One way a ceramic community functions and replicates itself is through teaching. By passing on the information and methods employed in product creation within a given community to an apprentice, the knowledge is forever tied to a given productive community, thus reinforcing itself (Mauss 2006; Budden 2008; Høgseth 2012). This is particularly relevant to the east Dorset pottery industry, as there are several generations of potter or potter's labourer within the same family (Fig. 73). These family groups have an extended history of association with the potteries with skills passing down the family line. Intermarriage between these groups is well attested. It can be argued that this increased cohesion reinforced styles and degrees of standardisation evident in the products created (Sims 1969), and is mirrored in other rural contemporaneous potteries (*e.g.* Ticknall – Spavold and Brown 2005; Donyatt – Coleman-Smith and Pearson 1988; North Devon – Grant 2005).

The passing of knowledge from potter to apprentice is an internationally recognised aspect of pottery production, evident in cultures around the world (*e.g.* Cameroon - Gosselain 1998, Wallaert-Pêtre 2001; India – Perryman 2000; Moravia and North Carolina – Taylor 2010). However, this passing of techniques is area specific, thus culturally unique, based in part on the clays and materials available and construction methods involved, plus surface treatments. This is echoed in Fishley Holland's memoir (1958, p.30):

> *"When I was taught my trade, I naturally thought that all our methods were correct and the only ones by which to make a pot well…; but I was soon to find there were different methods in other parts of the country. The various potters worked in different ways, which in the course of time became the traditions of their localities."*

The embedded views and thoughts on styles of ceramics could also have been introduced at a young age. During an interview with the Bournemouth Echo in 1937, an interviewer asked Mr Mesach Sims, a Crossroads potter, about his past and how he became a potter. Draper (2002, p.40) notes that "[he was] *born and brought up at pottery. His father was a potter and as a child he played with broken 'crocks'…".* This shows that the potteries were an important part of daily life, and that the populace interacted with products - whether one was a potter or not - from an early age, either with those being used in the home or as discarded items to be played with; as a result, there was an unconscious familiarity with the local pottery forms and styles.

Sackett (1990, p.36) notes that there are two distinct points of view regarding style. Firstly, active style; this purposeful, deliberate, and premeditated behaviour embraces a form of cultural messaging that recognises and upholds boundaries between social groups. In this regard, style comprises the east Dorset potters within the Verwood-type potting community. This echoes Wobst's (1977) view of style as a form of information exchange that is "delightfully multidimensional".

|  | Date of reference to pottery industry activity (potter, labourer, dealer etc.) |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
| **Family Name** | **1600** | **1650** | **1700** | **1750** | **1800** | **1850** | **Family Ties** |
| Andrews |  |  |  |  | ■ | ■ | Henry Andrews (potter) marries Keturah? Shearing 1814. Mark Andrews (potter) m. Ann Sims 1852. |
| Bailey |  |  | ■ | ■ | ■ | ■ | Stephen Bailey (potter) m. Elizabeth Lawrence 1734. James Bailey (potter) m. Ann Shearing 1812. Esau Bailey (potter) m. Mary Brewer 1847. |
| Brewer |  |  |  |  | ■ | ■ |  |
| Chubb |  |  | ■ | ■ |  |  |  |
| Ferrett |  |  |  | ■ | ■ | ■ | Amos Ferret m. Elizabeth Sims 1867. |
| Foreman |  | ■ | ■ | ■ |  |  |  |
| Francis |  |  | ■ | ■ |  |  |  |
| Fry |  |  |  |  | ■ | ■ | Charles Fry (potter) m. Peninnah Sims 1856. |
| Harvey |  |  | ■ | ■ |  |  |  |
| Henning |  |  | ■ | ■ | ■ |  |  |
| Hurle |  |  | ■ | ■ |  |  |  |
| Lawrence |  |  | ■ | ■ | ■ |  | Thomas Lawrence (potter) m. Alice Foreman c.1737. Lewis Lawrence (potter) m. Judith Rose 1758. |
| Major | ■ | ■ | ■ |  |  |  |  |
| Miller |  |  | ■ |  |  |  |  |
| Oxford |  |  |  |  |  | ■ |  |
| Rook |  |  | ■ |  |  |  |  |
| Shearing |  |  |  | ■ | ■ | ■ | Robert Shearing (potter) m. Jane Ferrett 1832. Henry Shearing (dealer) m. Love Brewer 1850. |
| Sims | ■ | ■ | ■ | ■ | ■ | ■ | William Sims (potter) m. Louisa Shearing 1827. |
| Thorne |  |  |  |  |  | ■ |  |
| Trigoll |  |  | ■ | ■ |  |  |  |
| Vincent |  |  | ■ | ■ |  |  |  |
| West |  |  | ■ | ■ |  |  |  |
| Williams |  |  | ■ | ■ |  | ■ |  |
| Zebedee/Roper | ■ | ■ | ■ | ■ | ■ | ■ |  |

**Fig. 73: Longevity of historic documentary references to potting activities by family group, along with notes on identified family links by marriage**

The second viewpoint maintains that style is passive. This position assumes that stylistic variables are an unconscious creation - built into human nature. Sackett (1990) uses the example of differing styles of furnishings from country to country; in this case, ethnic messages are more often interpreted or read rather than actively conveyed. This is partly phenomenological, as it is something which is experienced differently by each individual. Such a viewpoint is echoed by Glassie (1975) in his work on rural housing in post-medieval Virginia, who coins the term “communicative interchange”, as such objects are set within the particular context of their given landscape or setting, such as the house itself or the land around it (Glassie 1975, pp.144-5). This has particular relevance with regard to the potter-apprentice relationship; initially, one does as one is taught, and if the method is deeply embedded through repetition, then various aspects of the technique eventually become unconscious actions (Bourdieu 1977). This is especially relevant in throwing on a wheel, where movements must be relatively quick and experience is built up by ‘feel’ (Malafouris 2008); following enough repetition, the method is essentially completed by muscle memory (Høgseth 2012, p.68). One example of this is, when throwing, a potter ‘lifts’ the clay from a centred ball on the wheel to form a basic cylinder with vessel shape being formed from practiced movements. These actions must be undertaken efficiently and within a certain threshold; *i.e.* if the clay is not centred, or if the top of the cylinder becomes out of sync with the rotation of the lower section during a lift, then the entire enterprise will crumple and fail.

This passive style in no way inhibits new ideas, but heavily influences the means in which they are applied, performed and presented within the maker’s products. This is evidenced in rural potters copying forms seen elsewhere, but creating them with their own ‘accent’, in the way they know how and have been taught. Donyatt’s puzzle jugs, the North Devon and Midlands slipwares, and the cruder examples of east Dorset’s oil jars and bartmann style bottles (Chapter 7) are all examples of imported vessel types which have been copied in a unique vernacular style by potters who have not invented the form.

Occasionally, alternate ways of working - in terms of a new method, action, or material selection - are tested, copied, or identified by an artisan, and reflect a systematic understanding of their embedded manufacturing tradition. Such an innovative ‘way of doing things’ can then be passed between workshops and emulated by potters (Mellor 2005, 151), or passed from one generation to the next, leading to a gradual change in the way goods are produced. These changes are reflected in the items created (Lectman 1977; Sackett 1990 and Gosselain 1992). In this way, technological styles “reflect conscious and unconscious elements of technical choices” (Stark 1998, 6), which are part of deep rooted, often historical, traditions.

It is evident from the operational sequence that there is a high degree of standardisation involved in the various stages of production; arguably, this is itself a form of specialisation, in that these specialists developed and employ an efficient and rigorous production schedule that has been streamlined over years of production while retaining deep rooted traditional ways of working. The actions undertaken to create pottery are embedded as part of the ceramic tradition passed down from potter to apprentice from the medieval period onwards. But to what extent is this standardisation of technique reflected in products? Furthermore, how does this standardisation and specialisation witnessed in the vessels change? Plus, if it does change, can these alterations be charted chronologically to further refine the use of Verwood-type pottery as a dating tool? This will now be addressed.

# 7. Specialisation in Utilitarian Verwood-Type Pottery

In the previous chapter, the nature of specialisation in the manufacturing process was explored, it was found that standardisation of technique was a prominent feature of the industry. But to what extent does that encompass the products themselves? The degree of craft specialisation, as defined by Yerkes (1983) will be explored here. It will be shown that the utilitarian wares were being manufactured by a select group of concentrated labour, with specific tools that are evident within the archaeological and historic record used specifically for the purpose of pottery production. It will also be argued that the degree of specialisation in the utilitarian products had a direct role to play in the ascendancy of Verwood-type pottery in the ceramic market of southern England.

## ***7.1. Changes in Vessel Shape*** (Illustrations in Appendix XII)

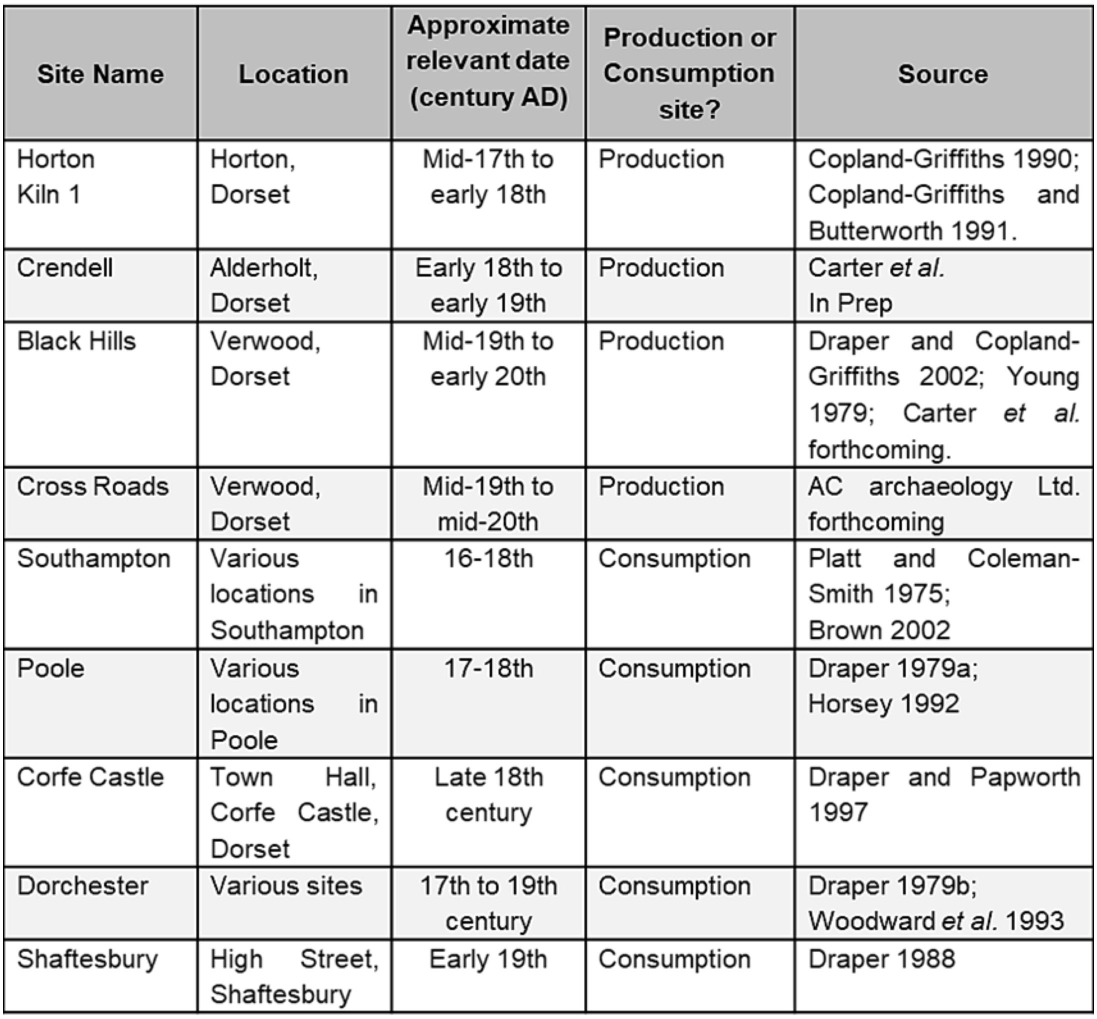
Despite the variety of post-medieval east Dorset vessels generally increasing over time (Algar *et al.* 1987; Draper and Copland-Griffiths 2002), the dating of east Dorset products can be difficult:

> *"…if a pot is not from a well-stratified group, it is difficult to distinguish between differences which are due to date, and differences due to which kiln they are from."* (Draper 2002, p.45).

This change is most visible in vessel form - stemming from technological choice and style - but is heavily influenced by a strongly embedded tradition of ceramic manufacture with a history that extends back to at least the 1300s. Such a successful longevity of ceramic manufacture is likely to promote deep rooted behaviours, actions and belief systems associated with that success. It has been previously noted that function comprises more than just the practical role of a vessel. The terms socio- and ideo-function comprise elements of stylistic difference that reflect the traditions of a given culture or social structure, and how this is reflected in a particular product when it is created (Skibo 1992, p.34). Thus, when examining the utilitarian range of vessel forms, it is necessary to remember that - although largely domestic and functional - each item illustrates the culinary, domestic, religious or industrial purpose for which it was manufactured (Barton 1975, p.9). As a result, the intended potential use for the vessel can only be inferred. Different vessel shapes, types or forms that have been identified may have had multiple or shared functions (*e.g.* MPRG 1998). It should also be remembered that, although modern terms are employed for vessel shapes and forms, both the maker and the intended user had different names for a given form, with each form having a range of potential uses (Kent 2015).

The following comprises observations based upon vessels recovered from published and unpublished production and consumption sites, and identifies relative change apparent over time (Table 65). They outline obvious, notable trends and general themes of vessel style, by century, rather than a comprehensive itemised timeline of every vessel ever created by the east Dorset industry. Each vessel type is explored in turn and, where applicable, terms recommended by current recording guidelines have been employed (MPRG 1998).

**Table 65: Examples of Production and Consumption Sites Used to Explore General Changing Themes of Vessel Style for Verwood-Type Pottery (illustrations in Appendix XII)**



| Site Name | Location | Approximate relevant date (century AD) | Production or Consumption site? | Source |
|---|---|---|---|---|
| Horton Kiln 1 | Horton, Dorset | Mid-17th to early 18th | Production | Copland-Griffiths 1990; Copland-Griffiths and Butterworth 1991. |
| Crendell | Alderholt, Dorset | Early 18th to early 19th | Production | Carter *et al.* In Prep |
| Black Hills | Verwood, Dorset | Mid-19th to early 20th | Production | Draper and Copland-Griffiths 2002; Young 1979; Carter *et al.* forthcoming. |
| Cross Roads | Verwood, Dorset | Mid-19th to mid-20th | Production | AC archaeology Ltd. forthcoming |
| Southampton | Various locations in Southampton | 16-18th | Consumption | Platt and Coleman-Smith 1975;<br>Brown 2002 |
| Poole | Various locations in Poole | 17-18th | Consumption | Draper 1979a;<br>Horsey 1992 |
| Corfe Castle | Town Hall, Corfe Castle, Dorset | Late 18th century | Consumption | Draper and Papworth 1997 |
| Dorchester | Various sites | 17th to 19th century | Consumption | Draper 1979b;<br>Woodward *et al.* 1993 |
| Shaftesbury | High Street, Shaftesbury | Early 19th | Consumption | Draper 1988 |

### *7.1.1. Costrels, Bottles and Jugs*

The two most readily identifiable Verwood-type vessels are the ‘Dorset Owl’ - or rounded costrel - and the squat belly jug. It may be surprising to learn that both of these are relatively late phenomena, being common forms from the 19th century onwards.

Costrels are a medieval form, designed to transport liquids as a temporary container. Perforated lugs tend to occur close to the neck. While a great range of costrels occur, barrel-type costrels were most common during the medieval period (Coleman-Smith and Pearson 1988, p.118). Post-medieval east Dorset examples are mostly globular, becoming larger, rounded and more squat over time. This is evidenced in the 17th century, with forms further resembling a squat globular flask with a well-defined neck and often slight pedestal style bases; bodies commonly display horizontally incised lines (*e.g.* Fig.XII.120 and XI.121 in Appendix XII). Similar can be said for larger costrels which display prominent perforated lugs and, occasionally, wavy incised decoration alongside the usual horizontal lines (*e.g.* Fig. XII.122 in Appendix XII). Mammiform costrels - comprising a rounded vessel with a flat base and flat reverse side - are not unknown, but are certainly uncommon. One was recovered in fragments from the Holt area, but has subsequently been lost following the demise of the VDPT. This suggests that the item was of late 17th to mid-18th century in date, and was only externally glazed; no perforated lugs could be identified, and the item is similar to one held by Hampshire Museums service (Draper and Copland-Griffiths 2002, p.128). Additional examples are known in the 19th century, but are exceptionally rare. The development of the costrel and its variant styles are difficult to classify, as relatively few complete 18th century costrels have been recovered, and even fewer are illustrated as part of archaeological excavation reports; they certainly appear to be uncommon within post-17th century urban domestic assemblages (*cf.* Platt and Coleman-Smith 1975; Draper 1988; Draper and Papworth 1997; Horsey 1992). This is further complicated by the appearance of a barrel costrel in a Verwood-type fabric, which is held by Hampshire Museum service; this dates to the 18-19th century, but is a highly unusual occurrence. More detailed publication and illustration of rural post-medieval domestic assemblages across southern Britain may help to elucidate this.

Nearly all costrels in the 17th century are externally fully glazed. By the 18th century, partial examples from Crendell show that items are incompletely glazed on the exterior down to an incised horizontal line. This glazing arrangement appears to occur into the 19th century and onwards. The ‘Dorset Owl’ (Fig. XII.123 in Appendix XII) was identified at Crossroads and Black Hills, showing that by at least the mid-19th century, the style was ubiquitous.

Based upon current evidence, bottles appear to be an 18th century addition to the east Dorset potter’s repertoire, although fragments recovered from 17th century Horton (Copland-Griffiths 1990, Fig. 6.76-7) may reflect flagon or bottle types that have not yet been identified elsewhere. Unusual examples of Bartmann style bottles having been copied by east Dorset potters have been noted across both Dorset and Hampshire (Fig. XII.1 in Appendix XII); these are believed to date to the 17th century (Draper 1979a, p.120). Bottles, and certainly flasks, are a relatively uncommon occurrence until the 19th century; this may be because this function is fulfilled by costrels, or the products of other industries. Additionally, a slender late-18th century bottle was recovered from Poole (Fig. XII.2 in Appendix XII); again, this is considered a copy of a German stoneware form. By the 19th century, this bottle form is a common element of the east Dorset pottery assemblage, with a partial example recovered from the Black Hills kiln (Carter In Prep). At this time, the bottle shares characteristics with the costrel and the jug (see below), in that it is glazed on the upper outside only, with the glazed extent limited to a single incised line at the shoulder (Draper and Copland-Griffiths 2002, p.116).

Verwood-type flagons are an unusual occurrence in post-medieval assemblages. Much like the bottle, their existence in the 17th century has not yet been confirmed. One 18th century flagon is held by Salisbury Museum (Draper and Copland-Griffiths 2002, p.117), with a further example held by Poole Museum in a manganese-laced lead glaze (Fig. XII.4 in Appendix XII). This demonstrates that there were at least two types; one thin neck, the second wider neck, both with low slung bellies. This is mirrored in the later classic Verwood jug form. Thin necked flagons, most dating to the 19th century, are held by Dorchester Museum (Draper and Copland-Griffiths 2002, p.117), showing that this form was still in production at this time.

East Dorset jug forms display a variety of sizes and vessel styles overtime. Generally, these can be subdivided into small and large examples, with certain examples being so large and heavy that it is a wonder that they could be lifted when full. In the 17th century, smaller jugs appear to be curvaceous with a clearly defined thickened rim. The upper neck, below the rim, is often heavily incised. Some examples display no signs of a spout (*e.g*. Fig. XII.7 and XI.8 in Appendix XII). Larger jugs display an increased amount of horizontal incised lines, usually at the neck and shoulder (*e.g.* Fig. XII.9 and XII.10 in Appendix XII); two examples exhibit rouletting on the exterior below the rim. The first, a 17th century jug from Southampton (Platt and Coleman-Smith 1975, Fig. 169.782); the second, a jug inscribed “Church Pell 1807”, noted by Draper and Copland-Griffiths (2002, p.109). Glazing arrangements range from interior and exterior glazing, to an all-over exterior glaze only, or even completely unglazed. For the 17th century, larger jugs are generally shouldered above the mid-line of the vessel. By the 18th century there appears to be more uniformity; the retention of both the tapering, highly defined, neck - along with the high shoulder - is apparent. Numerous examples display an all-over internal glaze, which extended over the rim and down to a single horizontal incised line; this similarity is shared with the costrels and bottles (*e.g.* Draper 1988, Fig. 2.27; Horsey 1992, Fig. 56.485). This arrangement appears to be fully established at both Crossroads and Black Hills by the 19th century (AC archaeology Ltd. forthcoming; Draper and Copland-Griffiths 2002; Carter In Prep). At this time, the appearance of the low-slung, rounded-belly jug with tapering neck and pedestal base was commonplace, along with its larger equivalent. It is interesting to note that this form was made alongside a high shouldered form at 20th century Crossroads; this illustrates that these observations contribute to general themes rather than strict typologies.

Furthermore, several examples exhibiting two handles are discussed by Draper and Copland-Griffiths (2002, pp.110-111).

### *7.1.2. Puzzle Jugs*

The occurrence of puzzle jugs is likely a medieval invention, with a near complete - though restored - 13th century Saintonge jug recovered from Exeter in 1899 being an early example (Coleman-Smith and Pearson 1988, pp.286-7). By the post-medieval period, puzzle jugs are a relatively common occurrence (Newton *et al.* 1960, p.374; Brears 1967, p.25), with the most well-known examples being those of Donyatt (Coleman-Smith and Pearson 1988). There are few examples known in east Dorset fabrics; items are identified based on the occurrence of perforated holes below the rims on suspected jug-like sherds. Examples have been recovered from 19th century contexts at Crossroads (AC archaeology Ltd. forthcoming) and 18th century ones from Crendell, Alderholt (Carter In Prep). There are no complete forms in east Dorset coarseware fabrics with which to illustrate vessel profiles, thus the ability to chart change over time. However, examples occur in manganese-laced lead glazed Verwood-type pottery in the form of ring bodied vessels (see Chapter 8).

### *7.1.3. Jars*

This ancient ceramic form is clearly based upon medieval styles, and exhibits a fair degree of stylistic change over time. In the 17th century, designs are commonly relatively curvaceous, usually with well-defined necks (see Copland-Griffiths 1990). The placement of an applied thumbed band of clay is common in the 17th century and continues into the 18th century (Fig. 74a-e; Fig. XII.21 in Appendix XII); surface treatment is confined to horizontal incised lines, free hand incisions and combing (Fig. 74d-e; Figs. XII.21, XII.22, XII.25, XII.26 in Appendix XII).

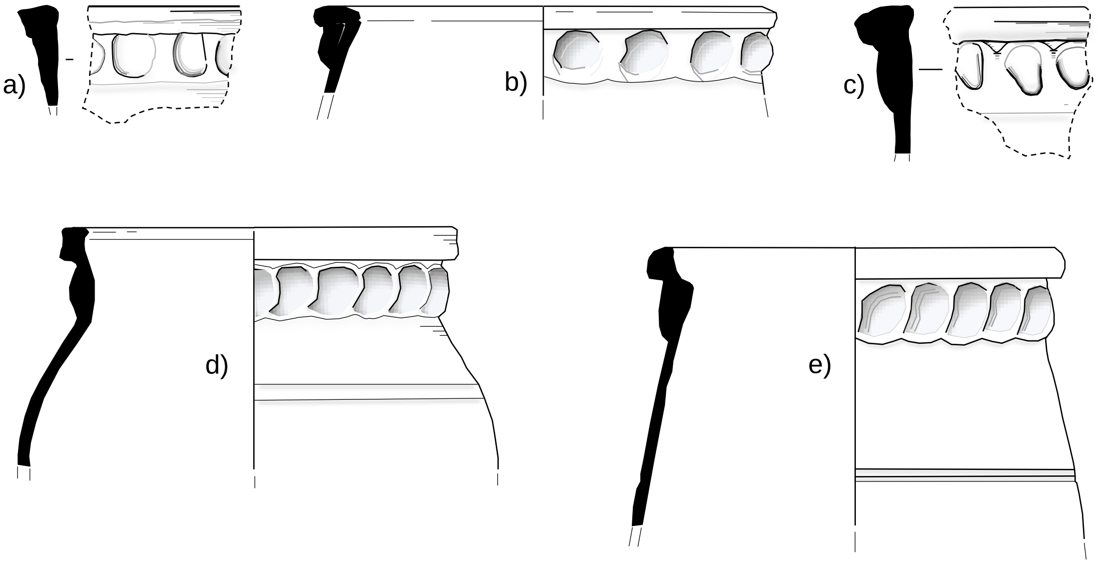


**Fig. 74: Various examples of applied thumbed bands below the rim on jars; a and c from site EDM1 (18th century); b, d and e from site HOR1 (17-18th century). All ¼ life-size; a and c drawn by author, b, d and e re-drawn from Copland-Griffiths 1990, Fig. 5.58, 5.62 and 5.62**

One unusual example from East Worth, is not thumbed and may show a transition in the step away from the applied decorative band on jars – instead being purely of functional purpose (Plates 52a and 52b).

**Plates 52a and 52b: Jar rim recovered from a waster pit at East Worth, this example exhibits an applied band to thicken and support the rim, which has been applied using scoring to aid adhesion (left – complete; right – deconstructed). 18th century in date (Author’s Own)**

The example above shows that the neck of the jar can be scored achieving better adherence. This application of clay is likely to strengthen a weak point in the form, the neck, increasing robusticity to aid supporting the vast weight of the unfired wares placed above it in the kiln. This shows a great degree of time investment; suggesting an importance in both the need for jars to hold the weight of the stack in the kiln, and to perform successfully when in use in the home.

While the horizontal incisions and combing remain consistent into the 19th century, the free hand incisions and thumbed band becomes less popular from the mid-18th century and is eventually abandoned.

This is likely due to the change in vessel shape, when a neck and shoulder is no longer favoured and the jar forms generally become more straight sided or inturned, tapering at the mid-point down the jar (*e.g.* Horsey 1992, Fig. 59.537); this lead to a 'bread bin' variant, evident from the late 17th – early 18th centuries (Smith 1993, Fig. 28.32; Figs. XII.31 and XII.32 in Appendix XII), becoming abundant by the 19th century (as at Black Hills – Carter In Prep). The 18th century also sees the regular occurrence of rouletting on jars. This form of surface treatment is almost exclusive to jars, although rouletting rarely occurs on jugs (*e.g.* Platt and Coleman-Smith 1975, Fig. 169.782; Draper and Copland-Griffiths 2002, p.109). Examples of bowls exhibiting rouletting on the edge of the rim were recovered from Crendell (Carter In Prep); these form a minority, with most rouletting occurring on jar exteriors. It remains unclear as to why this surface treatment is partially restricted by vessel form. Jars are almost exclusively glazed on the inside only, with few examples exhibiting exterior glazed surfaces. Where this has been noted, the items are almost exclusively of 17th century date (*e.g*. Copland-Griffiths 1990; Platt and Coleman-Smith 1975). The range of rims styles on jars is extensive. In the 17th century, these comprise inturned, clubbed, collared, ribbed and hammerhead types, with rounded and rolled jar rims styles appearing to occur in a minority (Copland-Griffiths 1990). By the 18th century, collared rims appear to be in decline, with clubbed, squared and complex thickened, flanged, hammerhead and inturned rim forms being most common (*e.g.* Horsey 1992, Fig. 58.509-513). These more complex rim styles are stronger than thinner examples, and would provide excellent security for any form of organic or fabric lid. By the 19th century, rounded, rolled and complex flanged rim styles appear the norm; these flanges can be downturned or upturned (*e.g.* Draper 1988, Fig. 2.33-34).

Handles - if applied at all – usually occur on one side of the vessel (Horsey 1992, Fig. 42.230). Handles on each side are usually opposing, small and restricted to the rim or just below. One unusual 18th century example is noted by Platt and Coleman-Smith (1975, Fig. 172.820). Conversely, certain examples possess horizontal lug-like handles (*e.g.* Smith 1993, Fig. 28.32; Copland-Griffiths 1990, Fig. 5.59; Draper and Copland-Griffiths 2002, 131). Occasionally, a lid seating is apparent on the interior of the vessel; usually these comprise an internal recess situated on the interior of the rim or upper neck (Horsey 1992, Fig. 42.230).

When creating a form of storage - such as a jar - an additional form of standardisation is introduced by the local weights and measures; a form of socio-political pressure. For east Dorset, these comprise imperial dry weight volumes, and jar forms were created to house set capacities of a given dry product. Thus, jars were constructed and referred to in terms of dry weight capacity. These comprise a quart, peck and bushel (Draper and Copland-Griffiths 2002, p.132). Eight quarts equated to one peck, while four pecks equalled one bushel. In modern terms a bushel of peaches weighs approximately 21kg, while the same of wheat flour weighs roughly 18kg. The fact that these jars were often made and sold in sets - designed to fit inside one another (Plates 51 and 53) would have major impacts on standardisation.

**Plate 53: A ceramics shop in 1880s Dorchester, showing Verwood-type jugs on the floor, with jars stacked within each other (taken from Draper and Copland-Griffiths 2002, p.62)**

### *7.1.4. Commode Liner/Lavatory Pans*

This form comprised a relatively slim jar with everted, flat and/or squared rim styles. The vessel tends to taper inwards at a steep angle and is always internally glazed. The item was designed to sit into a slot or chair and suspend, meaning strength, a sleek form and a light weight were desirable. The form exhibits relatively little change from the 17th century onwards (see Copland-Griffiths 1990; Fig. XII.65 in Appendix XII) and continues to be made beyond the 19th century.

### *7.1.5. Pipkins*

The pipkin form is a medieval invention composed of a jar on three feet with a handle protruding from the lower section of the body. The handle is usually of strap-type, with rod examples not unknown. In the 17th century, squat forms occur alongside taller examples (*e.g.* Figs. XII.44-47 in Appendix XII). Rim styles include hammerhead, upright, squared and clubbed. By the 18th century, there appears to be more uniformity, with more jar-like pipkins becoming squat, with rounded bellies. Occasionally, these are footless with spouts (*e.g.* Fig. XII.43 in Appendix XII). Decoration on these appears to be confined to horizontal incisions and combing undertaken on the wheel. In the 17th century, incised lines occur on the upper exterior in addition to the body. By the 18th century, this appears to be confined to only the body. Pipkins appear to decline in use by the late 18th century and rarely occur in 19th century assemblages.

### *7.1.6. Cisterns*

While arguably a form of jar, the earliest confirmed east Dorset ceramic cistern are 17th century in date (Copland-Griffiths 1990), but undoubtedly these forms were being made earlier. Where found they exhibit a single bunghole; this usually occurs close to the base of the vessel, to draw off its contents without any of the associated sediment, which accumulated there. It is worthy of note that no second or third bunghole has, as yet, been identified in an east Dorset fabric. However, this may be because whole or near complete examples are rarely found. Such an arrangement, with various openings, is occasionally seen in examples further west for the use of “strong White Ales” (Brears 2015a).

### *7.1.7. Bowls and Dishes*

Bowls are an ancient form, with east Dorset examples being usually flat based and internally glazed. Knife trimming is common on the lower exterior of bowls, becoming less common from the late 18th century onwards. From the 17th century, bowls broadly fall into three classes; steep sided – over 45° angled, 45° angled and less than 45° bowls (Draper and Copland-Griffiths 2002, p.144). From the mid-18th century, additional rounded bowl profiles can be seen (Platt and Coleman-Smith 1975; Horsey 1992). Surface treatment is usually limited to the exterior of vessels on the body and rim, comprising incisions, combing, and thumbed impressions; the former being restricted to a flange, cordon or rim edge (*e.g.* Copland-Griffiths 1990, pp.75-6). Occasionally, combing and incisions are displayed on the upper lip of the rim (Copland-Griffiths 1990, p.76); these are likely marked while still on the wheel. Rim styles in the 17th century generally appear thickened, collared, flanged and hammerhead styles, often with elaborate changes of angle (*e.g.* Copland-Griffiths 1990, Fig. 4.48-50; Fig. XII.58 in Appendix XII), although rounded and rolled style rims are not unknown. By the 18th century, rounded and rolled, clubbed and everted rims appear more common, with thickened rims and complex angular rim styles becoming less common, and changes in angle even less so (*e.g.* Draper 1988). Surface treatment at this time is restricted to incisions and combing as on 17th century vessels; this continues into the 19th century, with 19-20th century rim styles being almost solely rounded, clubbed and everted. Only one saucer/dish example is known to display a two-colour glaze and is considered an experimental piece (Copland-Griffiths 1990, Fig. 2.2).

Colanders largely follow the same trends as bowls, yet a single example from Alderholt (ALD8) exhibits incised lines within the bowl in a pattern that cannot be defined from one fragment (Fig. 75a). Similarly, marked bowl/dish examples exhibit incised lines on the interior but are too incomplete to discern overall patterns (Fig. 75b-c).

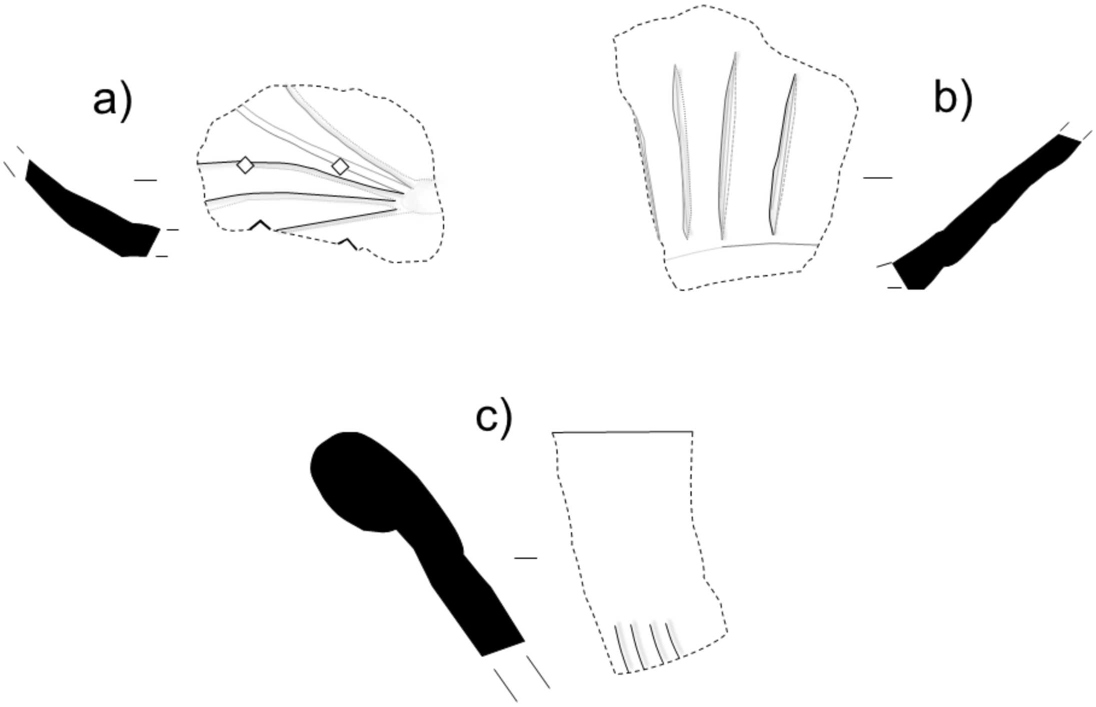


**Fig. 75a-c: Freehand incised decoration inside bowls/colanders; a and b from ALD8, dated between 17-19th century, colander and bowl; c - from Crendell (ALD3) dated 18-19th; all ½ life-size, drawn by author**

The largest form, which east Dorset potters were particularly famed for, was the creamery bowl or dish. It is common for vessels of this type to possess diameters of over 40cm. Generally, these vessels have heavy, relatively simple, rounded, rolled, clubbed and hooked rims and occasionally possess a spout (*e.g.* Horsey 1992, Fig. 37.130; Fig. XII.73 in Appendix XII). Conversely, deep, steep sided bowls occur, representing almost a cross between a jar and bowl, which follow the same styles as those bowls outlined above.

Dishes mirror bowls in many regards, but occasionally rims are pie crusted from the 18th century onwards (*e.g.* Draper 1988, Fig 2.15). Dishes are known to display incised decoration on the interior, generally on, or just below the rim. In the 17th century, inturned rim styles have been noted (Figs. XII.51 and XII.52 in Appendix XII), but everted and hammer-head rims appear to be the norm. By the 18th century, everted, thickened and bevelled rims are commonplace. The lipped or flanged dish/bowl is a common form from the 18th century onwards (*e.g.* Horsey 1992, Fig. 59.550; Figs. XII.68-70 in Appendix XII); likely evident from the early 17th century onwards (*e.g.* Copland-Griffiths 1990, Fig. 2.1 and 3; Horsey 1992, Fig. 44. 285).

### *7.1.8. Porringers*

The 16th century saw the development of new ceramic vessels, which complemented a broader change from shared, to personal, eating habits; one item that defines this was the porringer. This large cup or handled bowl initially occurred in pewter in the early 16th century (Brears 2015b, p.445), with some of the earliest southern English porringers being noted at Farnborough Hill, in Surrey/Hampshire Border ware (Pearce 2007, p.110). By the late 17th and early 18th century, this form was well-established and would have been a common occurrence in many homes.

Mid-17th century east Dorset examples have been recovered from Horton (Figs. XII.85-86 in Appendix XII); although identified as small bowls, these items exhibit horizontal rod handles and could easily have been employed as porringers. The vessels comprise relatively complex profiles, with changes in angle and a globular body - reminiscent of late medieval cooking pots. Similar examples were recovered from Crendell (ALD3) and Poole (Horsey 1992, Fig. 42.238), but this is somewhat superseded in the 18th century by a less complex profile, ranging from squat rounded shapes (*e.g.* Horsey 1992, Fig. 56.477; Figs. XII.88 and XII.90 in Appendix XII) to steep-sided squat jar-like forms, often with incised horizontal lines between the neck and the shoulder (*e.g.* Horsey 1992, Fig. 56.470; Fig. XII.89 in Appendix XII). The former of these was noted at Black Hills, which verifies that production of this style of vessel continued into the 19th century.

### *7.1.9. Skillets, Dripping and Roasting Pans*

Skillets rarely occur in east Dorset fabrics from the 17th century onwards, having been almost completely replaced by dripping pans and pipkins. One example from Poole, recorded as a handled bowl, is known (Horsey 1992, Fig. 44.266). Elsewhere, skillets have almost completely disappeared from the rural ceramic repertoire by the 17th century (*e.g.* Vince 1977, p.266). Dripping or roasting pans are likely a form that share many possible functions, as they could also have been used as shallow salters. In the 17th century, dripping pans are generally squared with extended lug type handles (*e.g.* Figs. XII.126-7 in Appendix XII). The dripping pan form does not change much into the 19th century; an example from Shaftesbury appears to be waisted at the mid-point (*e.g*. Draper 1988, Fig. 2.32), and similar forms are apparent in 18th century Crockerton assemblages (Author's observations). Forms are usually glazed internally, although examples from Crendell (dated 18-19th century) are glazed inside and out, down to the base.

### *7.1.10. Chafing Dishes*

This vessel comprises two components; a bowl mounted on a tall pedestal base. Commonly, three or four strap-built supports extend from the rim to elevate another vessel, usually a plate or dish, over hot coals or charcoal fuel in the bowl. The bowl is normally perforated to allow for adequate draught for the fuel. The vessel is used to undertake simple cooking and to keep food warm (Brears 1971, p.244). These forms often occur in both ceramics and metal, and are initially seen in the medieval period (Brears 2015b, p.66).

The earliest east Dorset examples can be dated to the 1550s (Figs. XII.112-4 in Appendix XII). These examples were highly decorative, with stamped patterns on the rim. Chafing dishes are usually glazed all over, with a hollow pedestal; the pedestal was occasionally opened up to increase draught or be employed in housing incense - doubling as a fuming pot (*e.g.* Platt and Coleman-Smith 1975, Fig. 168.762; Copland-Griffiths and Butterworth 1991, Fig. 5.9-10). Various less decorative examples were recovered from 17th century at Horton (Copland-Griffiths 1990; Copland-Griffiths and Butterworth 1991; Fig. XII.113 in Appendix XII). Chafing dishes become less common throughout the 18th century, although they are not completely unknown (*e.g.* Platt and Coleman-Smith 1975, Fig. 174.854).

### *7.1.11. Cups/Mugs/Tankard/Tygs*

Excavations at Horton recovered numerous examples of cups and mugs, each occurring in variations of green glaze. Surface treatments involve horizontal incisions - restricted to the neck and above the shoulder - while combing and wavy incisions can occur on the neck and body (*e.g.* Fig. XII.92-3 and XII.96-7 in Appendix XII). These vessels generally display flared to straight sided forms with short pedestal bases. Alternatively, forms comprise straight sided necks, with rounded bodies and robust, rounded, shoulders. Rim styles are almost entirely upright.

By the 18th century, it is unusual for cups, mugs, tankards and tygs to be made in the utilitarian fabric with the standard lead glaze. This range of forms tends to be reserved for a slightly more refined fabric and glazed in a manganese-laced lead glaze (see Chapter 6). By the late 19-20th century, there is a great variety of cups being made as part of a drive to diversification, as outlined by Draper and Copland-Griffiths (2002, pp.163-172).

### *7.1.12. Candlesticks and Oil Lamps*

Generally, there appear to be two types of ceramic lighting implements created in east Dorset during the post-medieval period: candlesticks and oil lamps. The earliest published examples for both can be dated to the 18th century (Horsey 1992 and Platt and Coleman-Smith 1975; Fig. XII.109-111 in Appendix XII). For candlesticks, examples comprise a small dish with a central hollow shaft to hold the candle, and one handle joining the lower bowl to the cup (*e.g.* Horsey 1992, Fig. 45.300-1; Fig. XII.107 in Appendix XII); examples recovered from Poole, display rouletting on the rim presenting as regular notches. Candlesticks continue to be made into the 20th century. Problematically candlesticks are a rather delicate form. Handle attachments and hollow shafts mean elements are easily broken *(e.g.* Horsey 1992, Fig. 56. 482; Fig. XII.109 in Appendix XII), making identification of items difficult as examples have much in common with oil lamps (*e.g.* Horsey 1992, Fig. 7.81-2).

Oil lamps occur contemporaneously with candlesticks in the east Dorset industry. Oil lamps occur in two styles. Firstly, a shorter form composed of a bowl with a central pedestal supporting a small rounded cup-like receptacle, as those mentioned above. The author has also noted an unpublished example from Wimborne in this style, which exhibited a spout on the lower bowl in order to draw off excess oil, plus a taper spout formed on the rim of the upper ‘cup’. The second type of lamp is much more ostentatious. This lamp comprises a tall hollow pedestal base, with a bowl or saucer halfway up the shaft, to contain any excess or drippings. Above this sits the lamp itself, with a distinct spout-like taper holder (Platt and Coleman-Smith 1975, Fig. 172.818; Fig. XII.111 in Appendix XII). During archaeological investigations at East Worth, a near identical example was recovered (Plate 54).

**Plate 54: Verwood-type oil lamps; right - recovered from East Worth ditch F317 (Garner 2016); left, recovered from Southampton – Platt and Coleman-Smith 1975, no.818, which has been heavily restored and painted brown (taken from Garner 2016, Fig. 22; courtesy of Southampton City Council Archaeology Unit)**

The oil for lamps was secured from whaling, which was undertaken in England from as early as the 14th century. By the 16th and 17th centuries whaling was undertaken from several English ports, harvesting whale oil and baleen along the Norwegian coast (Stone 2017, p.94). By the later 17th century, whaling was largely a European enterprise, with British interests being renewed in the early 18th century (Jackson 2005). Whale oil was recovered from processing whale blubber, which was a distinctly foul process (Dresser 2018, pp.39-40). The oil was utilised for lighting as a precursor to petroleum, with oil from the head of a sperm whale being particularly prized for burning with a cleaner and brighter flame (Dolin 2007, p.85; Dresser 2018, pp.38-39). East Dorset potters created specific oil jars for the purpose of housing this oil. These comprised unglazed small squat jars with thin, well-defined necks and small diameter rims (Copland-Griffiths 1996, p.141). The fact that these vessels are unglazed may be considered odd, however when the viscosity of oil is considered, leakage is considered to have been minor. This, alongside the fact that bottles and costrels of this industry tend not to be internally glazed, means that there was a conscious choice not to glaze these vessels. Oil jars tend to exhibit no surface treatment and are comparable to examples from the continent (*e.g.* Horsey 1992, Fig. 41.212-3).

### *7.1.13. Other Containers*

Chamber pots are essentially a handled jar with a wide-open top. The rim tends to be relatively flat or out turned. Examples are always glazed internally, often externally, and occasionally exhibit horizontal scored incisions, usually below the neck. These items appear to have changed little between the 17th to 19th centuries (Fig.XII.38-41 in Appendix XII). Occasionally, examples exhibit a lid seating (Copland-Griffiths 1990, Fig. 5.5).

Bucket pots comprise an unusual ceramic form. These were used for collecting water (Draper and Copland-Griffiths 2002, p.42) and are made from at least the 17th century, continuing to be made into the early 19th century – although they are certainly in decline by this time. The vessels are composed of a small jar with a handle arching over the top of the vessel with spout on one side. 17th century examples were recovered from Horton, where the handle is central across the vessel (Copland-Griffiths and Butterworth 1991, Fig. 5.21; Fig.XII.42 in Appendix XII); the author has noted several examples from unpublished investigations where the handle is off-centre across the top of the pot, but no published drawn examples of this could be found.

Fuming pots are another unusual vessel type, composed of a jar in various sizes with numerous holes pierced in the body to allow draught. There does not appear to be a clear style to these wares, with variations in form being the norm rather than a standard. For example, a 17th century specimen displays large, squared holes (Platt and Coleman-Smith 1975, Fig. 168.766); another, unglazed, was recovered from Horton (Copland-Griffiths 1990, Fig. 8.100; Fig. XII.117 in Appendix XII). Fuming pot lids were also recovered here (Copland-Griffiths 1990, Fig. 8.98-9; Fig. XII.116 in Appendix XII), but the associated vessels could not be identified. In contrast, an 18th century example incorporates a handled jar with smaller pierced holes, similar to those seen in colanders (Platt and Coleman-Smith 1975, Fig. 174.850; Fig. XII.118 in Appendix XII).

Flowerpots are also a staple of east Dorset potteries – although, these items are often undertaken by brickworks as an additional form of diversification (*e.g.* Carter 2021a). The flowerpot has received relatively little attention by archaeologists and ceramicists alike (Currie 1993, p.227). There appear to be two types made in east Dorset; the ornate ornamental garden features, which have been catalogued in great detail, and the usually smaller, functional and undecorated pots (Draper and Copland-Griffiths 2002, p.150). Both appear to be being made at most sites from the 18th century onwards. There is certainly a drive towards the latter of these types form the late-19th century, which is possibly a form of economic diversification; this is most obvious at Crossroads (Draper and Copland-Griffiths 2002, pp.150-1; *cf.* Fig. XII.130-2 in Appendix XII all from Black Hills).

Roof tiles and other items of roof furniture are a common occurrence in both high medieval and early post-medieval pottery production sites (*e.g.* Field and Musty 1966; Musty *et al.* 1969; Copland-Griffiths 1990). None occur in the Black Hills, Crossroads or Crendell assemblages, suggesting that by the late 18th century these products are not being made at Verwood-type sites.

In summary, all of these forms reflect how a pottery industry was serving the needs of its local region. Being a rural industry, much of the activity undertaken in the area involves those closely connected with agriculture. Activities such as brewing, cider-making, tanning, boot and shoe making, gloving, cheese-making and bacon-curing were common household activities, in addition to small and medium scale industries undertaken in nearby towns (Hudson 1965, p.30). By the 19th century, the principal products of the Verwood industry were jugs, jars, butter churns and costrels (Algar *et al.* 1987, p.23). From the late 19th century - in part, to compete with a growing in-flux of factory-made wares - the last operational Verwood-type potteries, such as that at Crossroads, increased production of ornamental flowerpots and garden wares, egg cups, casserole dishes, money boxes and ash trays (Copland-Griffiths 1998, p.45). Cumulatively, this shows that there is a high degree of vessel standardisation present across most forms, which is established in the 18th century and increases during the 19th century. The establishment of set forms and the restriction of surface treatment using horizontal incisions highlight that the potters' wheel is central to this standardisation. This is echoed in the writings of previous researchers:

> "*All the shapes of Verwood pots were strong and vital…. Their rims were good in form, very strong, and beautifully proportioned. That they were well thrown can be easily seen from the obvious lack of turning. What had to be done was carried out on the wheel."* (Kendrick 1959, p.129).

> *“The potters who were essentially craftsmen had learned their trade at the bench and wheel and regarded it as a job of work aimed at creating useful articles rather than works of art. However, because of their feeling for the medium, they created things of beauty and grace, probably coming nearest to perfection in the traditional wares…which had evolved through the years...”* (Young 1979, p.114).

From the 17th century onwards, almost all Verwood-type pottery vessels are wheel thrown. The act of throwing vessels on a wheel leads to a degree of standardisation of the form being made, *i.e.* a regular diameter is achieved. It can be argued that the degree of standardisation present within the Verwood-type pottery industry stems from the fact that articles are wheel thrown. Further standardisation is achieved when prepared clay is weighed per vessel. Additional regulation could be achieved by the application of a simple throwing guide, created using a stick held in a lump of clay (Plates 55 - 58).

Using this simple device, a given height and outward diameter of a vessel could be repeatedly attained (Fig. 76). These three restrictive parameters - weight of clay, height, and diameter of a thrown vessel - allow for a high degree of uniformity in forming, which limits variety - especially when the almost subconscious repetition of action of a potter throwing for hours every day is added. This - combined with a strong, long-lived tradition of potting, echoed in the passing of skills from potter to apprentice - creates an environment for a high degree of uniformity between vessels. Thus, the body acts as a conduit between the characteristics of the clay and the potting community within which the potter forms a part, from whence they learnt their trade (Dobres 2000, pp.74-75). Cumulatively, a high degree of uniformity of forms can be achieved and passed down with relative ease.

**Plates 55-7: Showing the throwing guide in use on numerous occasions at Cross-roads (Plate 55 – Copland-Griffiths Collection Ref. 106.10; Plate 56 - MED Accession Ref. WIMPH.2017.323.9; Plate 57 - MED Accession Ref. WIMPH.2017.323.5; courtesy of MED)**

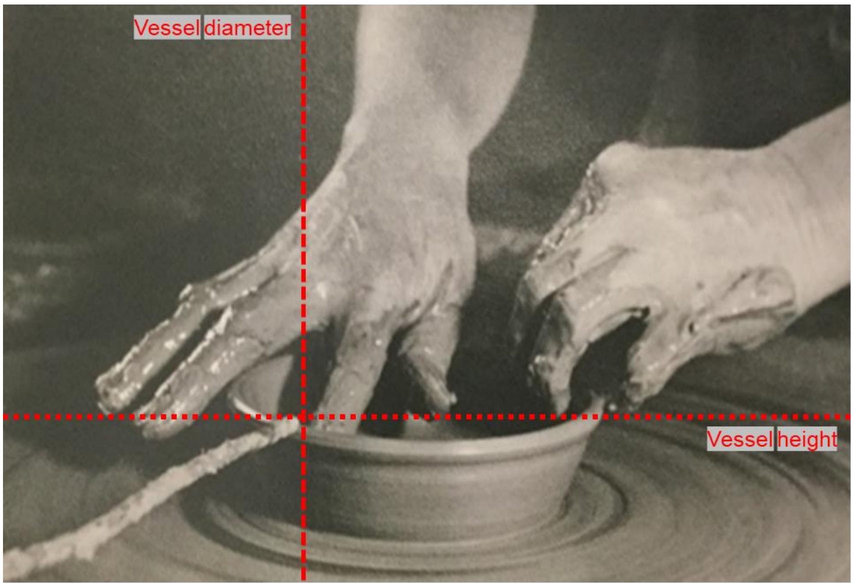


**Plate 58: Altered photograph showing how the throwing guide provided limits to the vessel height and outer diameter (MED Accession Ref. WIMPH.2017.323.10; courtesy of MED)**

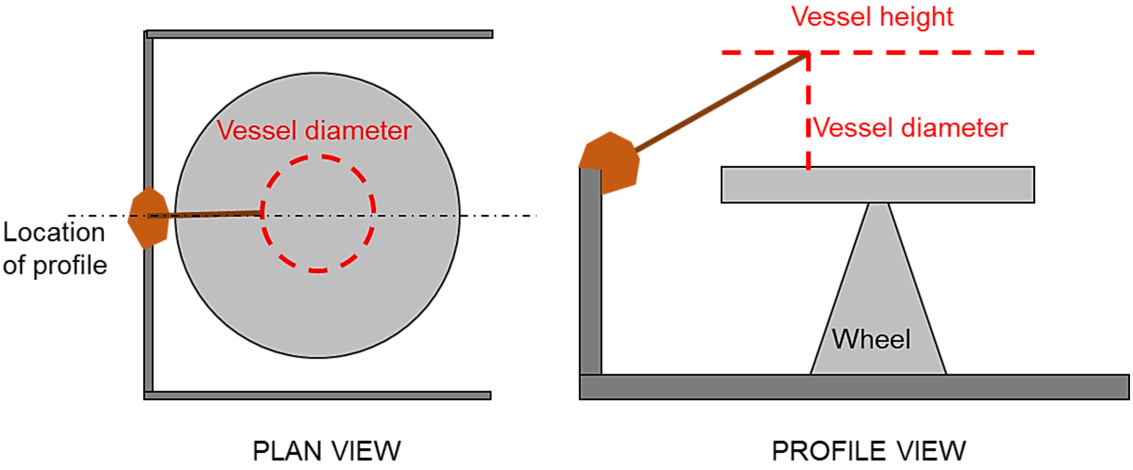


**Fig. 76: Showing how the throwing guide can limit outer vessel diameter and height**

To what extent is this uniformity reflected in the products? Despite excavations at Crendell having been undertaken in 1975 (Algar *et al.* 1987, p.23-4), the material was fortunately never disposed of. This allowed for a thorough examination of the entire assemblage to be undertaken. By measuring the diameter of every rim sherd, data was collected on the nature of standardisation by vessel type. Examinations of 3032 rim fragments, weighing 204kg in total, showed that there was a strong degree of standardisation within both vessel height and outer diameter, which would be consistent with the use of a throwing guide or other limiter. Table 66 shows the numbers of estimated vessel equivalents (EVE - Orton *et al.* 1993) identified by rim, while Fig. 77 shows the distribution of the frequency of outer rim diameters reflected by those vessels. Higher peaks illustrate reoccurring measurements, thus a degree of standardisation. Fig. 78 reflects similar standardisation in repeated vessel heights for certain forms. This suggests that the throwing guide was in use from at least the 18th century onwards.

**Table 66: Rim EVEs for Each Vessel Form Identified at Crendell (ALD3)**

| | **Bowl** | **Dish** | **Jar** | **Jug** | **Porringer** | **Saucer** | **Unidentifiable** | **Total** |
|---|---|---|---|---|---|---|---|---|
| **RimEVE** | 47.8 | 8.6 | 68.3 | 0.3 | 10.4 | 0.2 | 35.7 | 174.5 |
| **Percentage of total** | 27% | 5% | 39% | <1% | 6% | <1% | 20% | |

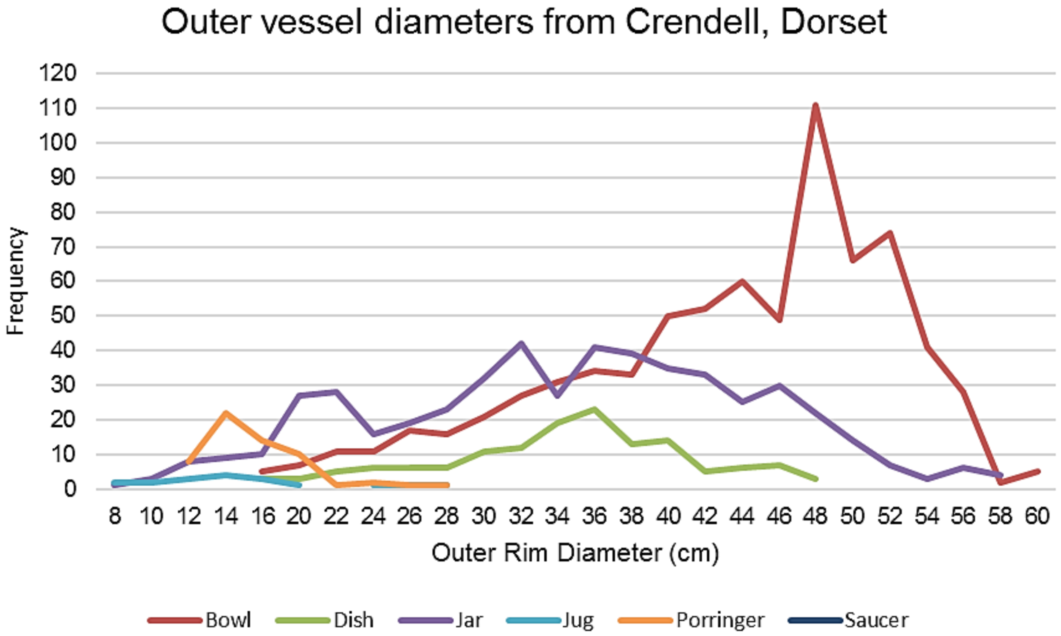


**Fig. 77: Frequencies of rim sherds by vessel type measured by outer diameters from Crendell (ALD3)**

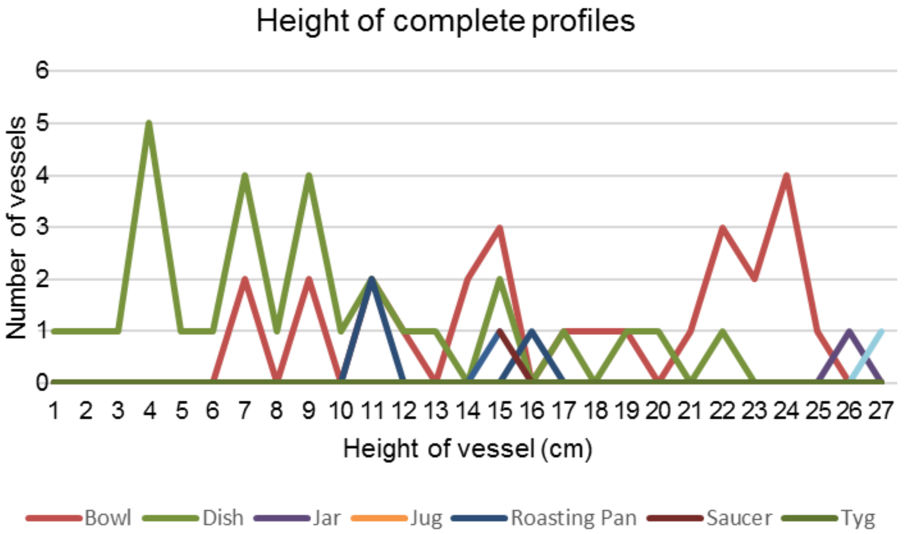


**Fig. 78: Frequency of heights from complete profiles of vessels from Crendell (ALD3)**

### ***7.2. Specialisation in Surface Treatment*** (Illustrations in Appendix XIII)

It has been previously stated that Verwood-type pottery is known for its mundane lack of decoration. This concept has encouraged the notion of a static industry with little innovation. One overlooked aspect of this pottery is the ingenuity of rouletting. While not solely a Verwood-type method (*cf.* Haour *et al.* 2016), this is increasingly seen from the mid-17th century onwards; initially comprising freehand incisions (Appendix XII; Horton – Copland-Griffiths 1990), evolving into repeated rolled stamps (Fig. 79; Copland-Griffiths 1998, p.36), as evidenced at sites such as Crendall, Crossroads and Harbridge. This method employed a variety of tools to imprint motifs into wet clay (Gosselain *et al.* 2016, p.1). For later post-medieval pottery, this usually comprises a rotary device, such as a cog or patterned wheel with attached handle. Using this technique, pottery thrown on a wheel can be decorated rapidly as the rotating pot is impressed; creating an indentation, incision or repeated pattern. Stamps can provide an intricate pattern or the makers mark as a form of self-advertising. Unlike the rim forms present within the industry. The different types of rouletting present on vessels has not been studied in great detail (*cf*. Young 1979); both may have some significance, potentially being used to link pottery to a given production site, if patterns of decoration are unique to sites.

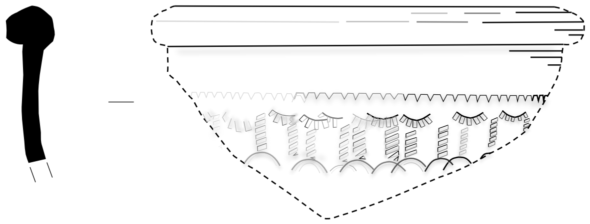


**Fig. 79: Shows the repeated nature of a pattern applied by rolled stamp rouletting, with overlap. Shown at 1/4 life-size, dated 18-19th century from Crendell (ALD3); drawn by author**

Rouletting is widely used, and is often considered purely decorative (Livingstone Smith *et al.* 2016). For east Dorset potters, this most commonly occurs on jars, although its appearance on jugs, bowls and flowerpots is not unknown. The currently known rouletting patterns are outlined in Appendix XIII. Those sherds displaying horizontal incised lines and marks created by a cog occur on numerous sites, thus cannot be ascribed to given sites. Those portraying intricate patterns appear to be site, or potter, specific, and can aid in dating pottery. The use of combing and incised lines appears to be widespread and presents little distinction between production sites.

## *7.3. Concluding Remarks*

In the course of examining specialisation in the utilitarian products, it becomes clear that there is relatively little evident. Instead, there is a high degree of standardisation in utilitarian vessel form, tempered by receptive specialists with reactive responses to changing markets. Far from being isolated from the market, the east Dorset potters were firmly in tune to the needs of the surrounding populace, and used standardised techniques and strong traditions to respond to the needs of their market. It has been shown that this standardisation is driven by many factors. Firstly, the forming of vessels on the wheel with weighed amounts of clay, accompanied by the employment of the throwing guide providing set parameters on vessel diameter and height. This is tempered by innate traditions, passed down between members of this tight-knit potting community, as evidenced throughout the industry's history. These ties go beyond the familial and relate to a shared rural post-medieval ceramic community, who embrace a given tradition, yet embellish and alter its core principles steadily across the span of generations. Only when the entire industry is doomed to failure, with only Crossroads remaining in the mid-20th century, is rapid change and diversity in practices - thus the resultant vessel types - evident. This is echoed by Sackett (1990, p.36) who shows that the behaviour of standardisation creates a structured environment reflected in the pottery itself, which in turn serves to regulate the social fabric of the community that created it. The pots themselves constitute a form of 'iconicism', which functions to promote the group's cohesiveness, and reinforces their distinctiveness. For east Dorset, it was only when the very survival of this distinctiveness was threatened that abrupt change became so readily evident over such a short period of time.

Secondly, additional pressures on standardisation are drawn from the nature of the raw materials themselves, and the capabilities of certain clay recipes; from examinations of the products, these appear to be relatively standardised from at least the 16th century onwards, beginning with the Verwood-type – early variant (VERE) fabric.

Thirdly, pressures are created by the consumers, in terms of demand for vessels that they are familiar with, and know to be strong, hard wearing and able to perform the task for which they are bought. For the east Dorset potter, this comprises all vessels that form their repertoire, which is clearly aimed at the domestic - home and agricultural usage. This is corroborated by a lack of industrial forms being identified *i.e.* no crucibles, sugar cones, and few alembics. The only alembic in a Verwood fabric yet found (from Crossroads - AC archaeology Ltd. forthcoming) can be easily attributed to home brewing and distillation - a consistent part of rural life throughout the post-medieval period and early modern periods (Brears 2015a).

Furthermore, where there was a need to increase the efficiency of vessel production, there is a limited but steady change, which takes place over the course of generations, to create more streamlined and sturdy forms. This is evidenced by the removal of the thumbed applied band around jars in the 18th century, to promote a rapidity of forming, a more secure stacking in the kiln, thus an increased rate of successful production. Such an alteration of product style, to promote production efficacy, is not a new concept (Wobst 1977). This increase in production may not have even been a conscious choice, as the eventual widespread nature of the more rounded jar rim form suggests. Regardless of the reason, it can be clearly shown that the level of specialisation in the utilitarian products is mixed, with standardisation being the norm. It is has now been shown that detailed study of certain utilitarian east Dorset vessel forms, as recovered from datable production and consumption sites, show certain milestones of change allowing for the dating of such materials to be refined. In contrast to the utilitarian wares, a potential Verwood area fineware product now needs to be defined.

# 8. Specialisation in the Fineware Products

The character of the utilitarian Verwood-type ware has been thoroughly examined and the nature of its development, along with any evident specialisation, has been defined. It has been shown that standardisation - a product of streamlined production procedures and the passing down of traditional skills - forms a chief characteristic of the utilitarian Verwood-type vessel repertoire. Conversely, the erroneously termed ‘South Wiltshire Brown Ware’ (hereafter SWBW) - a largely overlooked fineware - was often produced alongside the standard Verwood-type pottery. It will be shown that this ware was created at numerous Verwood-type production centres, and forms a fineware variant of Verwood-type pottery. The presence of this ware type not only debunks the conservatism discussed in Chapter 6, but displays a high degree of workmanship and product specialisation.

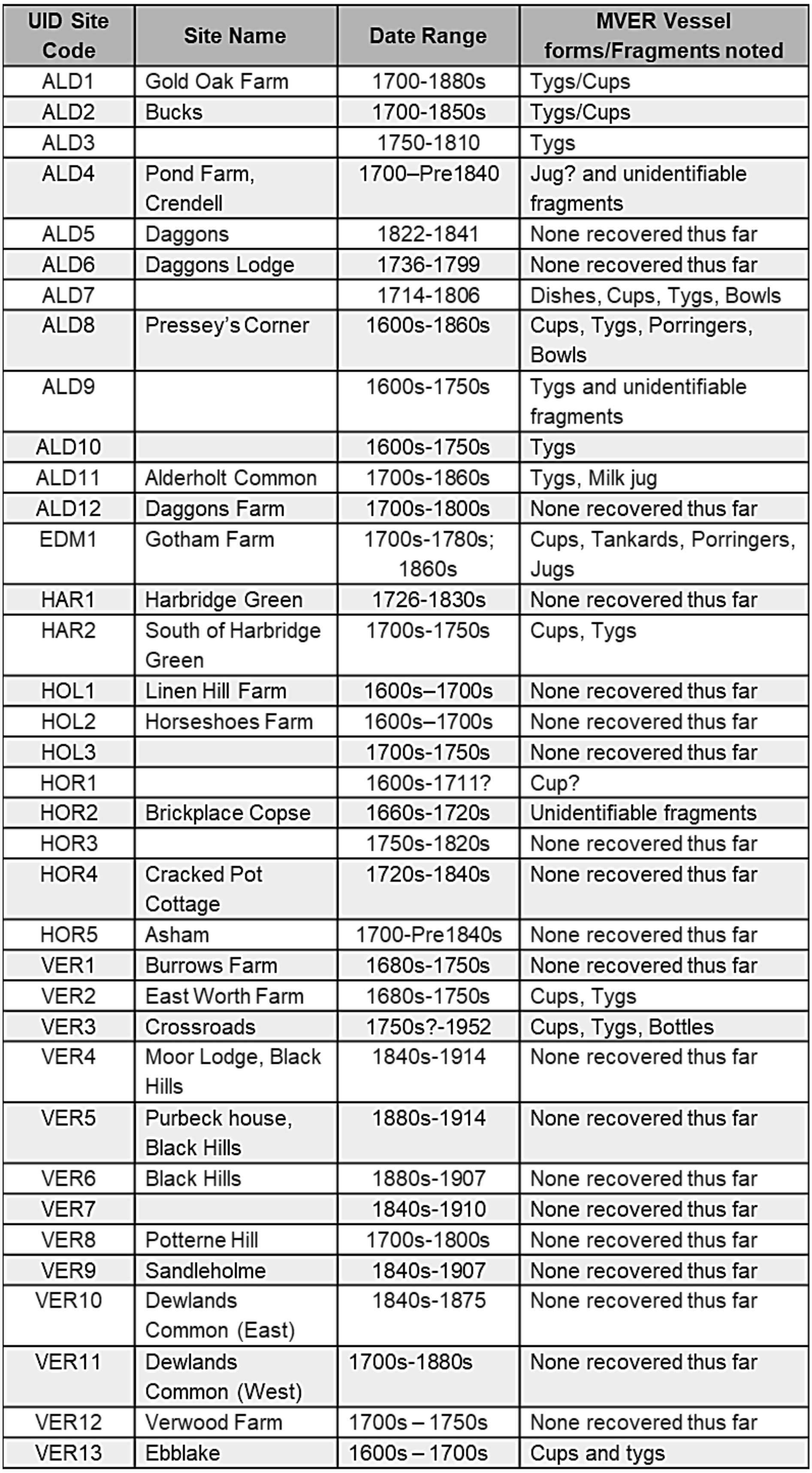
## *8.1. South Wiltshire Brown Ware*

The term SWBW was first seen in ‘*The Catalogue of the Salisbury and Wiltshire Museum’*, dated 1870, and is later reiterated by Hodgkin and Hodgkin (1891), who linked its production to clay tobacco pipe producers in the Amesbury area (Sims 2003). Lomax (1909) and then Rackham (1934), echo these sentiments, with the idea being eventually disparaged by Brears (1971), and completely debunked by Sims (1969; 2003). Instead of being made in south Wiltshire, it can be shown that this ware type was created on at least 14 production centres across the east Dorset and west Hampshire area - all of which belong to the Verwood-type pottery industry (Table 67), with not a single production site being sited within South Wiltshire.

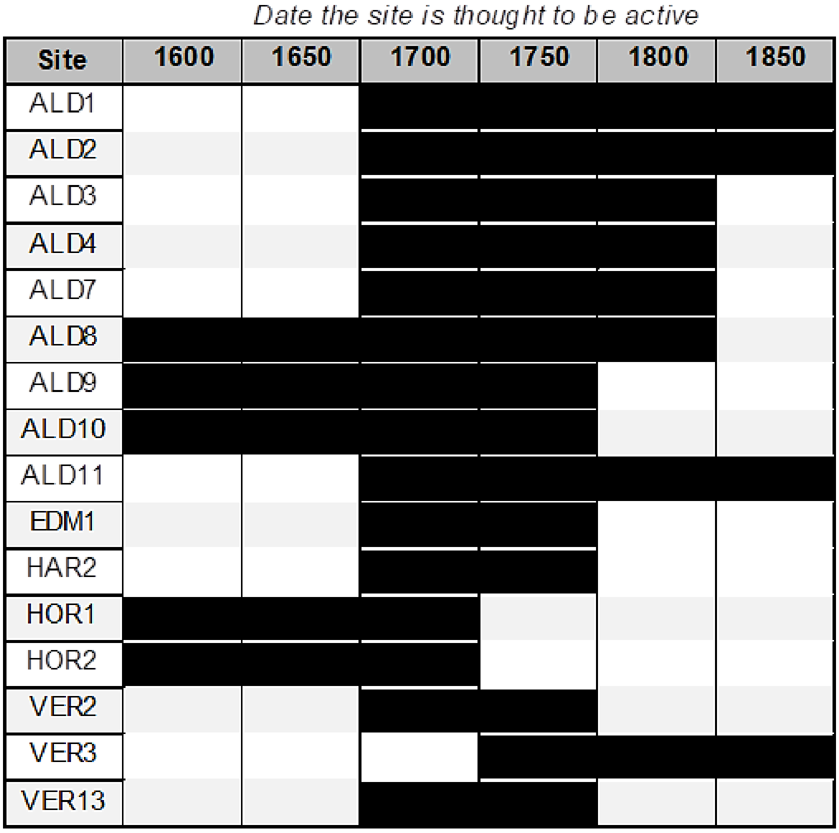
The bulk of the production sites shown to be producing this ware lie in the Alderholt area, where items of this type have been recovered. Thus, it is proposed that the term manganese-laced lead glazed Verwood-type pottery or Alderholt-type ware (as termed by Russel 2016, 23) - henceforth referred to as MVER - is a more accurate term than SWBW. It has been shown that manganese was employed as a colourant to provide the dark brown treacle colouring in the glaze (Guest 1995). The assumed reason for the apparent concentration of Alderholt sites making MVER is that this pottery appears to have a restricted date range, especially in comparison to its more ubiquitous sister, the utilitarian Verwood-type ware (Table 67 and Fig. 80). It will be shown that the production of MVER involves a pre-determined preparation of raw material, a considered selection of form being created, and a specific decision to use the unusual brown glaze over the standard lead glaze. These decisions were made from the 1600s, and had likely ceased in the early to mid-19th century.

Furthermore, it will be demonstrated that MVER occurs in a restricted range of vessels in a refined fabric, highlighting that for this ware type, standardisation is the exception rather than the norm; this stands in stark contrast to the utilitarian pottery. It is this restriction by vessel form, which has encouraged the notion that the MVER vessels perform the role of a Verwood fine- or table-ware. This parallels with most medieval kiln sites of the region, which produced a fineware - often in jug/pitcher forms, alongside utilitarian coarseware jars (*e.g.* Wareham and Laverstock). In this way, the Verwood pottery industry differs from other southern rural centres creating post-medieval pottery (*e.g.* Crockerton, Wiltshire and Wanstrow, Somerset), which instead opt for a coarseware/slipware arrangement.

**Table 67: Verwood-Type Pottery Sites Producing Manganese-Laced Lead Glazed Vessels**



| UID Site Code | Site Name | Date Range | MVER Vessel forms/Fragments noted |
|---|---|---|---|
| ALD1 | Gold Oak Farm | 1700-1880s | Tygs/Cups |
| ALD2 | Bucks | 1700-1850s | Tygs/Cups |
| ALD3 |  | 1750-1810 | Tygs |
| ALD4 | Pond Farm, Crendell | 1700–Pre1840 | Jug? and unidentifiable fragments |
| ALD5 | Daggons | 1822-1841 | None recovered thus far |
| ALD6 | Daggons Lodge | 1736-1799 | None recovered thus far |
| ALD7 |  | 1714-1806 | Dishes, Cups, Tygs, Bowls |
| ALD8 | Pressey's Corner | 1600s-1860s | Cups, Tygs, Porringers, Bowls |
| ALD9 |  | 1600s-1750s | Tygs and unidentifiable fragments |
| ALD10 |  | 1600s-1750s | Tygs |
| ALD11 | Alderholt Common | 1700s-1860s | Tygs, Milk jug |
| ALD12 | Daggons Farm | 1700s-1800s | None recovered thus far |
| EDM1 | Gotham Farm | 1700s-1780s; 1860s | Cups, Tankards, Porringers, Jugs |
| HAR1 | Harbridge Green | 1726-1830s | None recovered thus far |
| HAR2 | South of Harbridge Green | 1700s-1750s | Cups, Tygs |
| HOL1 | Linen Hill Farm | 1600s–1700s | None recovered thus far |
| HOL2 | Horseshoes Farm | 1600s–1700s | None recovered thus far |
| HOL3 |  | 1700s-1750s | None recovered thus far |
| HOR1 |  | 1600s-1711? | Cup? |
| HOR2 | Brickplace Copse | 1660s-1720s | Unidentifiable fragments |
| HOR3 |  | 1750s-1820s | None recovered thus far |
| HOR4 | Cracked Pot Cottage | 1720s-1840s | None recovered thus far |
| HOR5 | Asham | 1700-Pre1840s | None recovered thus far |
| VER1 | Burrows Farm | 1680s-1750s | None recovered thus far |
| VER2 | East Worth Farm | 1680s-1750s | Cups, Tygs |
| VER3 | Crossroads | 1750s?-1952 | Cups, Tygs, Bottles |
| VER4 | Moor Lodge, Black Hills | 1840s-1914 | None recovered thus far |
| VER5 | Purbeck house, Black Hills | 1880s-1914 | None recovered thus far |
| VER6 | Black Hills | 1880s-1907 | None recovered thus far |
| VER7 |  | 1840s-1910 | None recovered thus far |
| VER8 | Potterne Hill | 1700s-1800s | None recovered thus far |
| VER9 | Sandleholme | 1840s-1907 | None recovered thus far |
| VER10 | Dewlands Common (East) | 1840s-1875 | None recovered thus far |
| VER11 | Dewlands Common (West) | 1700s-1880s | None recovered thus far |
| VER12 | Verwood Farm | 1700s – 1750s | None recovered thus far |
| VER13 | Ebblake | 1600s – 1700s | Cups and tygs |



Date the site is thought to be active

| Site | 1600 | 1650 | 1700 | 1750 | 1800 | 1850 |
|---|---|---|---|---|---|---|
| ALD1 | | | ■ | ■ | ■ | ■ |
| ALD2 | | | ■ | ■ | ■ | ■ |
| ALD3 | | | ■ | ■ | ■ | |
| ALD4 | | | ■ | ■ | ■ | |
| ALD7 | | | ■ | ■ | ■ | |
| ALD8 | ■ | ■ | ■ | ■ | ■ | |
| ALD9 | ■ | ■ | ■ | ■ | | |
| ALD10 | ■ | ■ | ■ | ■ | | |
| ALD11 | | | ■ | ■ | ■ | ■ |
| EDM1 | | | ■ | ■ | | |
| HAR2 | | | ■ | ■ | | |
| HOR1 | ■ | ■ | ■ | | | |
| HOR2 | ■ | ■ | ■ | | | |
| VER2 | | | ■ | ■ | | |
| VER3 | | | | ■ | ■ | ■ |
| VER13 | | | ■ | ■ | | |

**Fig. 80: Active timespans of sites known to be producing MVER vessels**

In terms of time frame, the lack of MVER on pottery production sites lying in the immediate Verwood area allows the upper limits of production for this ware type to be suggested. The majority of Verwood area sites operated from the mid-19th century onwards, into the 20th century (Appendix I). This suggests that production of this ware type was in decline in the 19th century, and production had ceased completely by the mid-19th century; a hypothesis supported by the lack of occurrences of MVER within mid- to late-19th and 20th century ceramic assemblages across the region (*e.g.* Draper 1988; Carter 2020a; 2021). While examples of MVER were recovered from Crossroads, the majority of the incidences here can be attributed to deposits of 18th century or earlier date (AC Archaeology Ltd. forthcoming). This is corroborated by the fact that there is no mention of this ware type or glazing method in any interview from the 20th century potters and labourers working there, thus it is considered that the creation of this ware type is not within living memory of those former workers being interviewed by the VDPT. Instead, it is the earlier sites - those datable to the 17th–18th centuries, which largely lie on the fringes of Verwood (*e.g.* Ebblake, East Worth), in Horton, Edmondsham and Alderholt - that can be shown to be making this ware (Fig. 81).

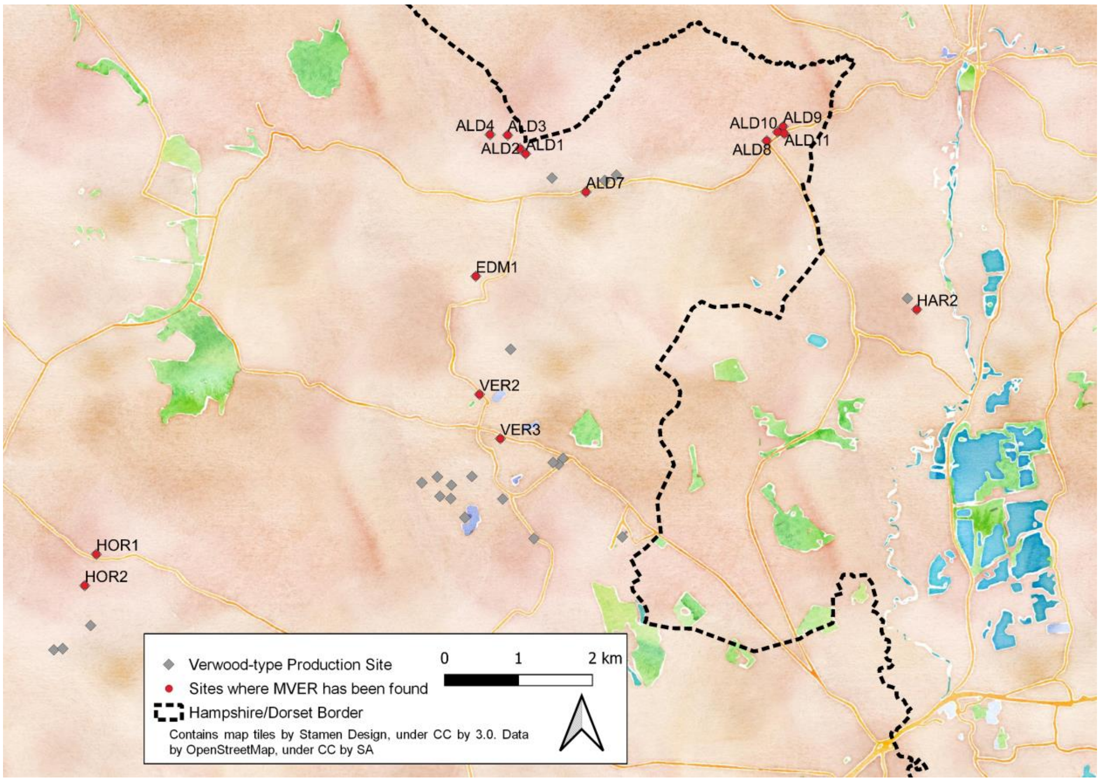


**Fig. 81: Verwood-type pottery sites known to be creating MVER**

While an end point of production has been defined, a beginning is harder to demarcate. Currently, the earliest dated MVER vessel is held by Salisbury Museum. This comprises a ring form puzzle jug, marked ‘W Z 1603’ (Plate 59a and b; Salisbury Museum Ref. B.W.61). The form is unusual for a puzzle jug. Most well-known post-medieval examples such as those from Donyatt (Coleman-Smith and Pearson 1988, pp.287-306), create the typical jug form and add an elaborate spout for drinking direct from the vessel. Later, forms from North Devon and Cornwall employ the same simple form but add numerous drinking spouts (Wondrausch 1986). Instead, the MVER examples have much more in common with Delftware and German stoneware ring-form jugs (Aronson 2013), suggesting strong continental influence.

**Plates 59a and b: Two views of the 'W Z 1603' Puzzle jug, while on loan to MED. The item is approximately 20cm in height (Author's Own)**

Additional puzzle jugs, also marked 'W Z' and 'J.F.M.', are held in Salisbury, with the former makers adding dates of 1606 and 1799 (Plate 60); this demonstrates this ware type extends towards the 19th century (Ref: B.W.63-4). Sims (2003) has catalogued similar, unmarked, examples at the Saffron Walden Museum (Ref: SARWM:CXCIV) and Taunton Museum (Ref: K812.GMI.1981/13).

**Plate 60: Four MVER puzzle jugs, and a probable standard utilitarian Verwood-type fabric variant. All held by Salisbury museum; left dated 1799; second from left dated 1606; central dated 1603; remainder undated (taken from Sims 2003; courtesy of John Sims)**

The dating of MVER vessels has always been problematic. During archaeological excavations at the Crossroads pottery production centre at Verwood, Dorset, the presence of MVER sherds was employed as a method of the dating of deposits (AC archaeology Ltd. forthcoming). The occurrence of these sherds and certain cup/tyg forms, enabled the phasing of certain deposits to between to the mid-18th to 19th centuries (Copland-Griffths pers comm). However, as shown here, the currency of these wares extends beyond these dates, as evidenced by the date marked MVER vessels and the extended operation of kiln sites creating this ware (Table 67). This is further corroborated by the presence of MVER sherds being ubiquitous across contexts at the Crendell kiln - excavated in 1975 (Carter In Prep) - which has a date range drawn from historic documents of c.1760-1810.

Rackham (1935) claimed that the 'W Z' on the puzzle jugs could be assigned to a family of potters in the Amesbury area named 'Zillwood' (alias Selwood); this implies these items are a Salisbury area product, thus supporting the term SWBW. While Zillwoods do occur in the Amesbury area, no potter with this surname could be identified by Sims (1969; 2003), despite a thorough examination of wills held by the Wiltshire History Centre. This highlights some of the complications that have arisen in failing to attribute these vessels to the correct source which has limited research. The fact that these items were made at Verwood-type kiln sites was hypothesised by Algar *et al.* (1979; 1987), who recovered similar sherds at Verwood-type production centres. This was later confirmed by Guest (1995), who used Atomic Absorption Spectrometry to analyse the concentrations of four elements – copper, lead, iron and manganese - within the glazes of 45 MVER examples - seven from three sites; Crendell (ALD3), East Worth Farm (VER2), and an unspecified site in Alderholt. These samples were compared with unprovenanced examples held by Salisbury Museum. The results indicated no significant difference between the unprovenanced examples and those from east Dorset (Guest 1995, pp.32-3).

### *8.2. Manganese-Laced Lead Glazed Vessels*

While the "South Wiltshire" attribution can be firmly refuted, the brown colouring has been accurately attributed to the addition of manganese in a lead-based glaze (Brears 1971; Guest 1995; Percy 2001; Sims 1969; 2003) rather than iron. Often the two can be difficult to differentiate by eye, as both elements can achieve a dark colouring – iron, producing a brown/black glaze in an oxidising atmosphere, and manganese, a brown to purple glaze (Rice 2015, p.122; Rhodes 1973, pp.317-8).

The chemical composition of a selection of MVER glazes was examined using chemical analysis by pXRF, as part of the pilot study for the chemical analysis of this thesis (Chapter 5). This was undertaken to corroborate Guest's (1995) conclusions, and to explore the nature of this glazing technique, with the aim of examining the level of specialisation present within this ware type. The use of the pXRF method has previously been shown to be successful in examining the composition of both fabric and glaze in similar pottery - 18th century black iron-glazed Midlands products - by Davey *et al.* (2013). In summary, it is for this reason that sherds of MVER were included as part of the pilot study using pXRF for chemical analysis for this thesis (Chapter 3).

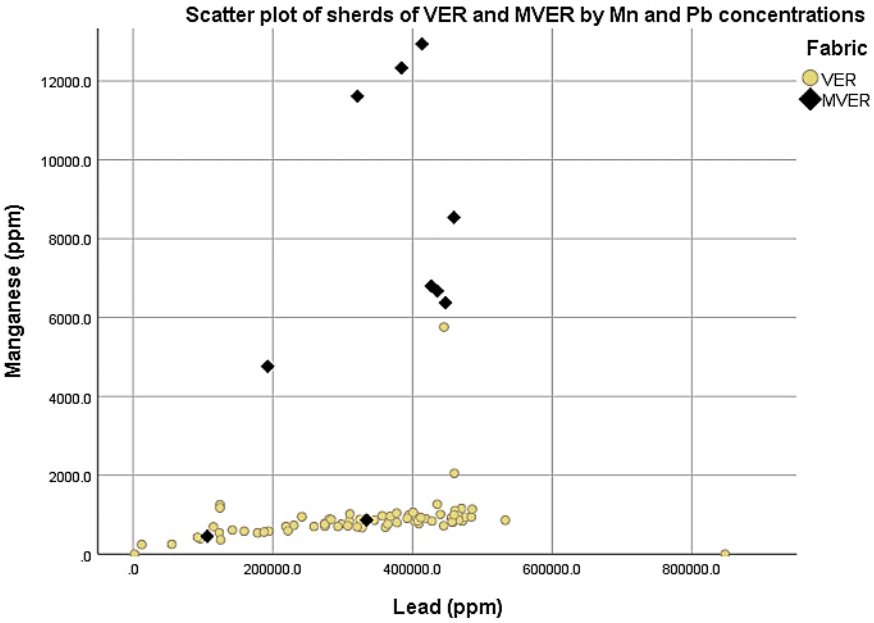


**Fig. 82: Results of pXRF analysis undertaken on the glaze of sherds in MVER and VER fabrics as part of the pilot study, showing concentrations of manganese and lead elements**

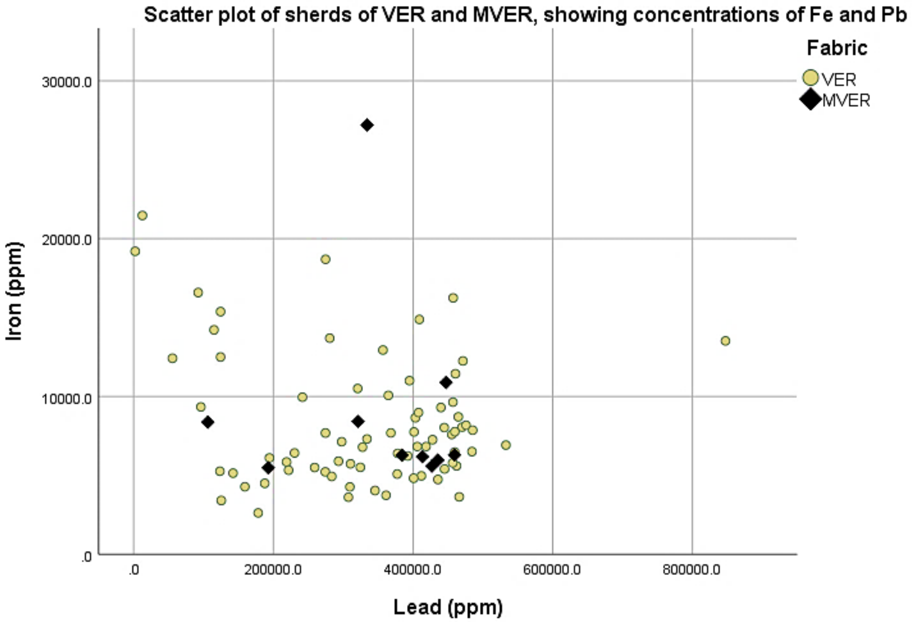


**Fig. 83: Results of pXRF analysis undertaken on the glaze of sherds in MVER and VER fabrics as part of the pilot study, showing concentrations of iron and lead elements**

The results illustrate that - for most MVER examples - manganese is a chief constituent within the glaze recipe (Fig. 82). Thus, it is considered that manganese is purposefully added to the standard lead glaze as a colourant, rather than iron, which shows little deviation in concentrations of MVER from examples in the standard lead glaze recipe for utilitarian Verwood-type pottery (Fig. 83).

One issue of chief concern in examining glazes on sherds when using pXRF, is that the X-rays can pass through the glazed surface and return results from the interior fabric, and even from the exterior surface if the sherd is thin enough. This is particularly problematic when each surface is glazed in a different substance. As a result, return X-rays occur in the wavelength of the body fabric, potentially comprising two differently glazed/slipped surfaces, which can skew results (Holmquist 2016, p.365). One way of overcoming this is to remove the glaze from the sherd and examine it in powdered form (Iňaňez *et al*. 2007). However, this has its own limitations in terms of creating enough powder to adequately represent each sample and ensure each sample is relatively equal in amount, including the damage to the sherd and contamination from the removing agent/tool. Despite the restrictions, the use of sherds in a non-destructive manner using pXRF, should not prevent the use of the method, as it has not prevented other researchers asking similar questions (Davey *et al.* 2013); instead it is recognised that the hypotheses drawn from such tests have limits.

While Rice (1987, p.339) has noted that only a 6% concentration of manganese is required in an oxidising atmosphere to give a lead glaze the purple/brown colouring, Guest (1995) evidenced that lower concentrations - between 0.2-1.2% - are enough to provide the colouring in MVER vessels. Plate 61 shows fragments in this ware type (MVER), alongside the utilitarian ware (VER), with the range of brown to purple shades produced by the manganese colourant being presented in Plate 62.

**Plate 61: MVER vessel fragments (left) alongside the standard Verwood-type lead glazed ware (VER), both from Crossroads (site VER3; author's own)**

**Plate 62: Presents a range of colours occurring in the MVER repertoire. Comprising a light brown (right), tortoise shell effect (centre), to a thick treacle or almost black (left), with a purplish tinge on occasion on hard fired (top left) examples; (Author's Own)**

The results have proved that manganese is employed as a colourant to create a dark brown glaze in MVER glazed vessels. The use of a dark brown coloured glaze in this way is not unique to MVER vessels in ceramics. Earlier continental imports from Saintonge, France (Barton 1963b, 1980; Hurst 1974), and Westerwald, Germany, both exhibit the use of a brown or purple glaze on ceramics, evident from at least the 13th century onwards in France (Hurst 1974; Barton 1980), and the 16th century forwards in Germany (Gaimster 1997b; Attard and Azzopardi 2014). French examples were routinely copied in England, as evidenced by multi-coloured glazed jugs from the both the Wareham and Laverstock kilns (*e.g.* .Musty *et al.* 1969). Later, in the 18th century, the appearance of green/brown stained lead-glazed pottery occurs in various British pottery centres, such as Bristol and Staffordshire (Plate 63). In the Staffordshire potteries, Tortoiseshell Ware - often attributed to Thomas Wheildon of Stoke-on-Trent (Rackham 1951; *cf.* Barker 1991) - also displays a probable manganese laced lead-glaze.

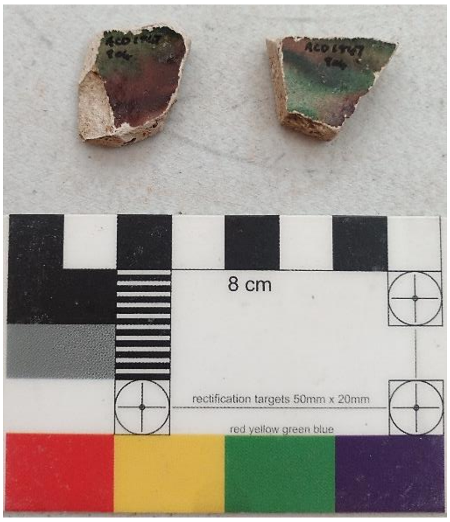


**Plate 63: Fragments of Tortoiseshell ware from the Staffordshire Region, recovered from Gloucestershire (Author's Own)**

Upon initial inspection, the MVER vessels have little in common with those continental examples in terms of fabric, vessel form or firing. In contrast, MVER vessels share much more in common with a late medieval ware type, often termed Cistercian Ware (Plate 64).

**Plate 64: Fragments of Cistercian ware cups recovered from Gloucestershire (Author's Own)**

Cistercian ware was produced at several centres across northern and central England from the 15-16th centuries, with one of the most well-known production centres being Ticknall, Derbyshire (Spavold and Brown 2005). Here, at Church Lane (Boyle and Rowlandson 2008), Dr Alan Vince identified two fabric types being formed. One displayed a well sorted fine-grained fabric in black/brown glazed Cistercian ware cups, while the other displayed less well sorted clays with larger inclusions in coarse Midlands Purple (Vince 2007); this mirrors the MVER/VER situation. In later years, at sites such as Wrenthorpe, Wakefield, Cistercian wares would be replaced by black iron-glazed wares created alongside yellow glazed wares (Boothroyd and Courtney 2004); this arrangement is echoed across the Midlands until the industrial revolution, and is shared with the Verwood pottery industry. The similarities between Cistercian ware and MVER in fabric sorting and raw material refinement is also mirrored by the thick and dark nature of the glazes, plus the vessel types being created, with drinking vessels and table wares being predominant (Brears 1971; 1974; Boothroyd and Courtney 2004; Boyle and Rowlandson 2008).

While the glazes can be seen to be visually similar between MVER and Cistercian wares and, later, black-glazed wares, the colourant used is clearly not. Studies on black-glazed sherds, of types dating from the 18th centuries recovered from the English Midlands, North-West and North Wales, were examined using pXRF, which showed that iron was the element employed as a colourant in their glazes (Davey *et al.* 2013, p.35). These observations are supported by tests on black-glazed pottery from Harlow, Essex (Hughes 2009); cumulatively, this shows that British black-glazed earthenware vessels are generally treated with an iron-laced lead glaze during the post-medieval period, with manganese being a minority. It is clear, therefore, that MVER stands as a peculiarity. With this in mind, it would be wise to identify the colourants for other such glazed earthenware created across southern Britain during the same period, as the author has noted similar examples from sites at East Holme, Dorset; Crockerton, Wiltshire; with other examples noted at Donyatt (*e.g.* Coleman-Smith and Pearson 1988, Fig. 16/15) and in Surrey-Hampshire Border wares (Pearce 2007, pp.122-3). Similar pottery industries have also been shown to draw upon Cistercian/black-glazed wares for inspiration, with brown- and black-glazed wares being produced in Harlow, Essex (Davey *et al.* 2009), and Wrotham, Kent (Rackham and Read 1972). Arguably, the earliest known usage of a manganese laced lead-glaze in southern England as a substantial glazing medium for post-medieval wares lies with the Surrey/Hants border ware industry. Rounded brown glazed mugs from Farnborough Hill date to the 16th century (Pearce 2007, p.124), which pre-dates the earliest known MVER examples by 50-100 years.

The sourcing of the manganese colourant used in the east Dorset potteries remains open to speculation. Similarly, the origin of the lead for glazing is not recorded in historical documentation, and there is scant evidence to rely on. One potential origin is outlined by J.W. Gough (1967), who quotes Dr Merret, writing in 1662, regarding the Mendip area:

> *"… the industry of ye nation hath found in our own country at Mendip-Hills … in Somersetshire, as good as any used in Moran. Wherever the Lead-Orew-Men*[sic] *find it, they certainly conclude that Lead Ore lies under it. They call it Potterne Ore, because the potters spend such great quantities of it, this being the only material wherewith they colour their ware black…"*

Therefore, it is likely that the 'potterne ore' represents either an iron oxide or manganese oxide in association with lead in the Mendip area. It is not impossible to conclude that this could have been traded and brought to east Dorset for use in pottery production.

### *8.3. A Fineware Fabric*

It has been previously noted that the principal difference between the MVER and VER vessels is the glaze colour, which "involves no more advancement in technique and simply entails the addition of a colouring oxide" (Sims 2003, p.4). In more meticulous examinations, it can be shown that MVER vessels not only occur in a different glaze recipe, but also in a refined fabric. This has previously been classified as "a hard pink-buff … covered in a speckled purple-brown manganese-stained lead glaze" (Brears 1971, p.47). While visually similar to the standard utilitarian VER fabric, it is apparent that MVER contains less coarse components (Plates 65-8). This adheres to the given definition of a fineware, as put forward by Historic England (2015b, p.55). Thus, specialisation is reflected in the processing of raw materials used to manufacture them, in addition to the glaze and vessel form.


**Plate 65 (above left): Utilitarian VER fabric sample from Crossroads - VER3.**
**Plate 66 (above right): same fabric from Crendell (ALD3); both at x20 magnification (Author's Own)**


**Plate 67 (above left): MVER fabric sample from Crossroads (VER3).**
**Plate 68 (above right): same fabric from Crendell (ALD3); both at x20 magnification (Author's Own)**

In comparison to the standard Verwood-type fabric, the MVER examples from both Crendell (ALD3) and Crossroads (VER3) are composed of similar clays. The two fabrics fire to comparable colours and contain corresponding coarse components. The inclusions in both MVER examples are visibly smaller in size in terms of quartz, and less frequent in terms of iron oxide inclusions. Due to the two fabrics being recovered from the same production sites and being of similar character, it is likely that the two derive from similar clay sources, with a refinement in the clays of the MVER vessels. This refinement can be explained by a greater degree of sorting, possibly by additional levigation.

The smaller inclusion size in MVER is corroborated by photomicrographs of thin section slides taken of three examples of standard Verwood-type sherds from three different production sites (Fig. 84-5); three examples of MVER were recovered from the same sites (Figs. 86-7). Here, the Alderholt (ALD3) examples display smaller quartz and iron oxide inclusion. The Edmonsham samples (EDM1) exhibit more quartz than the Verwood-type examples, yet the individual items are smaller; similar may be said - but to a greater degree, for the Verwood examples (VER3).

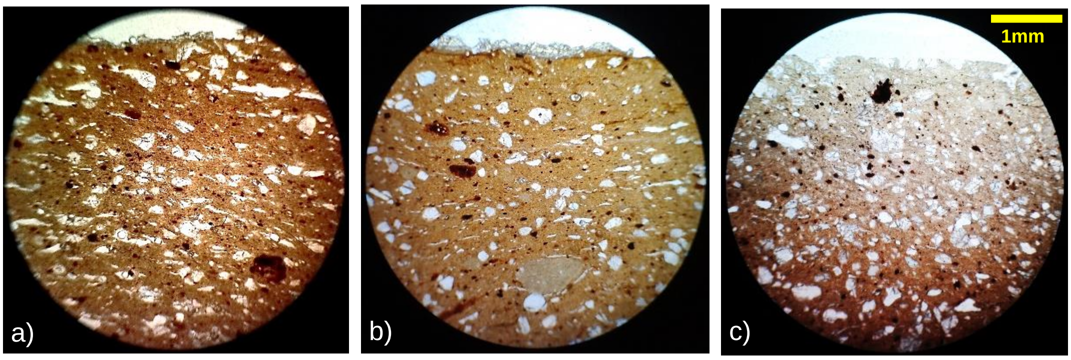


**Fig. 84a-c (above): VER fabric sherds from different sites in thin section, shown in plane polarised light (PPL) at x40 magnification; a)ALD3, b)EDM1 and c)VER3**

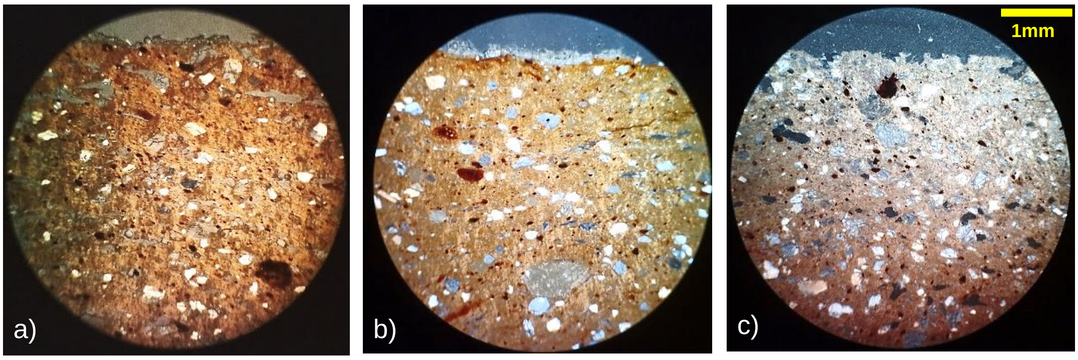


**Fig. 85a-c (above): VER fabric sherds from different sites in thin section, shown in crossed-polarised light (XP) at x40 magnification; a)ALD3, b)EDM1 and c)VER3**

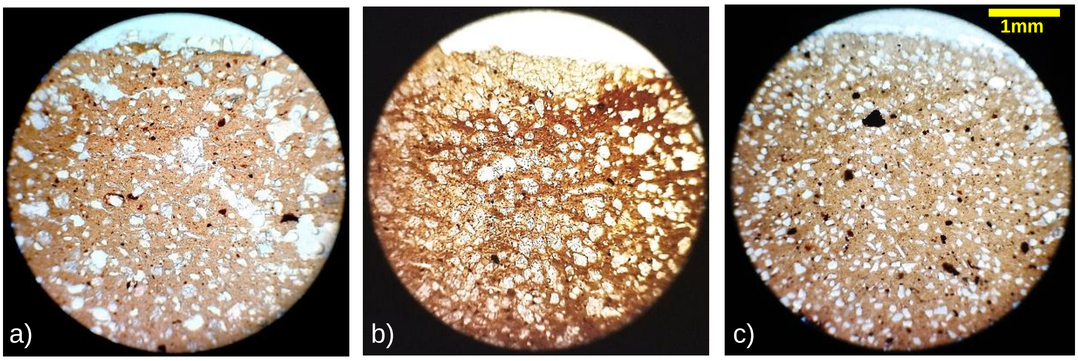


**Fig. 86a-c: MVER fabric sherds from different sites in thin section, shown in PPL at x40 magnification, a)ALD3, b)EDM1 and c)VER3**

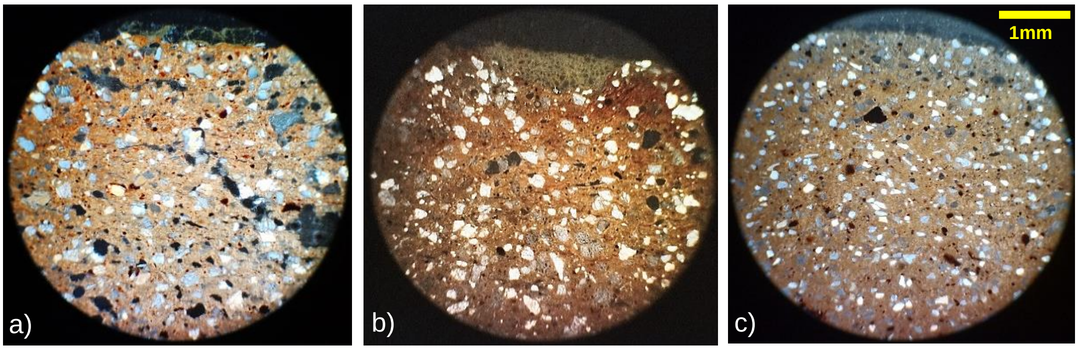


**Fig. 87a-c: MVER fabric sherds from different sites in thin section, shown in XP at x40 magnification, a)ALD3, b)EDM1 and c)VER3**

Collectively, the evidence suggests that the standard Verwood-type pottery and MVER was created using the same clays, but there is a degree of sorting and removal of certain coarse components - potentially via levitation - leading to the removal of larger inclusions for MVER vessels in comparison to the standard VER fabric. This explains the similar chemical composition in the pXRF results, as the same coarse components are evident in the ceramic thin sections samples, with frequency and size being a chief discriminator. This investment in raw material preparation and refinement is a firm indicator of specialisation in the creation of MVER, and confirms the hypothesis that MVER is a fineware variant for the Verwood-type pottery industry.

### *8.4. Fineware Vessel Forms*

Further specialisation is evident in the restriction of vessel forms occurring in this fabric and glaze, reinforced by certain examples displaying a high degree of workmanship. Often, MVER examples display intricately detailed modelling techniques on the exterior surfaces (*e.g.* Plate 69) and exhibit complex forming methods (*e.g.* Plates 59-60) - along with flamboyant twisted plaited handles and intricate incised decoration and script (Brears 1971; Draper and Copland- Griffiths 2002, pp.52-3).

**Plate 69 (left): A four handled lidded bowl/christening goblet. This is created in the style of Verwood-type ware, with strap handles and a pedestal base similar to those seen on tall oil lamps and chaffing dishes, but with a greater extent of decoration. The item has been held by Salisbury museum for over 100 years. The base is initialled RC and SK. The inscription reads 'HERE IS THE GEST OF BARLY KORNE GLAD HAM I THE CHILD IS BORN 1692 IC RC SK'. Salisbury museum Ref: B.W.58. The item is approximately 20cm in diameter and 30cm tall, (photo taken from Sims 2003; courtesy of John Sims)**

Christening goblets such as these are clearly unique, displaying an extraordinary degree of skill, intricate decoration, and are highly specialised. Salisbury Museum holds at least two examples (Ref. B.W.58 and 59), with a further example held at the Alton Gallery (Ref. DA.1991.25). One fragment recovered from Poole (Horsey 1992, Fig. 69.804) is highly likely to be another such item. Further specialised MVER items include posset pots (Horsey 1992, Fig. 42.288), some with spouts (Plate 70), fuddling cups (Plate 70), mugs (Platt and Coleman-Smith 1975, Fig. 173.844) and multi-handled tygs (Platt and Coleman-Smith 1975, Fig. 172.827; Horsey 1992, Fig. 42.235-6; Sims 2003).

**Plate 70: A selection of MVER items: a small milk jug (left; recovered from site ALD11, now held by MED), (centre and right) a posset pot and fuddling cup (18th century date, held by DCM); (taken from Draper and Copland-Griffiths 2002, 52)**

While such an investment in time, materials and technique is consistent with the production of a fineware, the fact that such vessels were fired alongside the standard utilitarian products reinforces the theory that these comprise but one aspect of the output of the whole production process. Accidental run off of MVER brown glaze onto utilitarian VER vessels show that these items were fired together (Plates 71 and 72). Fragments displaying this are usually jar bases and rims. It has been presented that jars form the base of the stack within the loaded kiln (Chapter 5), and usually sit side by side. The presence of MVER glaze on jar fragments suggests that MVER vessels were placed nearby, and possibly within them as a form of saggar. The employment of ring props and wedges would aid in the reduction of these pieces fusing, and reduce the occurrence and size of kiln scars. Small rounded kiln scars are occasionally evident on the base of MVER items, along with bulbous drips of glaze on the base (Plate 73 and 74). Cumulatively, these show that items were, at least on occasion, not sat directly onto other vessels but were instead suspended, most likely on a ring prop; this is reflected in the small contact points evidenced by rounded kiln props. One sherd from kiln debris at Ebblake (VER13), of 17-18th century date, exhibits a small diameter consistent with a brown glazed cup/tyg form. The standard glaze over the broken edge shows that this sherd has been reused as a spacer to separate brown glazed and standard lead glazed vessels.

**Plate 71 (above): Manganese-laced lead glaze run-off and drips on jar rims recovered from East Worth (site VER2); (Author's Own)**

**Plate 72: Basal jar sherds showing manganese-laced lead glaze, from site VER2 (Author's Own)**

**Plate 73: Basal tyg/cup fragments, displaying a range of kiln scars and indentations, in addition to drips of glaze showing the vessels were generally fired upright (Author's Own)**

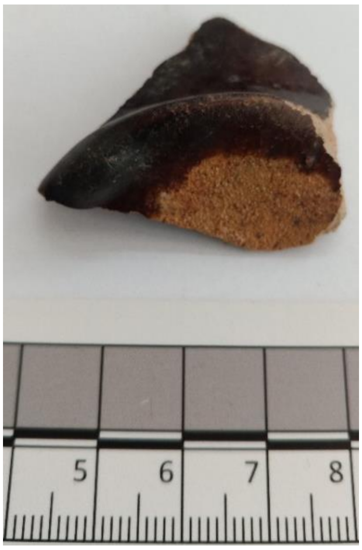


**Plate 74 (left): Base of a tyg or cup recovered from Gillingham, Dorset. A drip of glaze and a tiny (2mm diameter) circular kiln scar is evident on the base, possibly from the use of a kiln prop (Author's Own)**

**Plate 75 (right): A spacer sherd used to separate an MVER cup or tyg from a standard VER vessel, recovered from Ebblake (site VER13); (Author's Own)**

### *8.5. Concluding Remarks*

In summary, it has been revealed that the products of the Verwood-type industry are far more complex and specialised when the entire repertoire is viewed as a whole. There is strong evidence for technological choices being made at the raw material level, all the way through the operational sequence, to the forming of vessels and subsequent glazing, that reflect a distinct nature to these vessels. Cumulatively, this reflects that, from the outset, MVER was created to be different to the utilitarian Verwood-type pottery. The paucity of this ware type on consumption sites, in comparison to that of the standard Verwood-type pottery, corroborates its place as specialist product. The fact that the provenance of MVER vessels has previously been tied to other areas has not only limited past studies of the industry, but primarily has reinforced a perceived conservative nature in the industry generally, thus providing a skewed and prejudiced view of the entire industry. Evidently, specialisation is present in almost all levels of Verwood-type pottery production, and the creation of a Verwood-type fineware in the form of MVER significantly bolsters this argument. Furthermore, such a restricted date range of MVER could aid in future dating and interpretation of this poorly understood ware type.

Now that the nature of change and specialisation has been thoroughly outlined for the products of the Verwood industry, it is time to explore the role that the industry played as a whole in the ceramic economy of southern Britain, starting with the significance at the local level – the study area. These themes will be explored in the next chapter.

# 9. Characterising the Post-Medieval Verwood-Type Pottery Industry at the Local Level and its Role in the Local Economy

It has been established that specialisation in the products of the Verwood-type pottery industry was a symptom of industrialisation, coupled with strong ties to a ceramic manufacturing tradition with an extended longevity. It is apparent that this dichotomy between specialised products and partial mass-production was established and maintained through family ties, the potter-apprentice relationship and the nucleated nature of the industry. Furthermore, specialisation of product is most obvious in the fineware MVER vessels, which have been previously overlooked. Examination of the manufacturing cycle has displayed a great degree of standardisation, tempered with a ready acceptance of new forms, as dictated by the demands of the local ceramic market. Investigation now turns to the support network which sustained the industry fuelling its industrialisation and, in return, the resultant impacts of the development on the local landscape, economy and people. This is vital to understand the level of specialisation present in the industry, to explain the mechanisms behind how this rural potting centre became such a major player in the ceramic market of southern Britain, and to reveal how the industry, as a whole, changed spatially and chronologically.

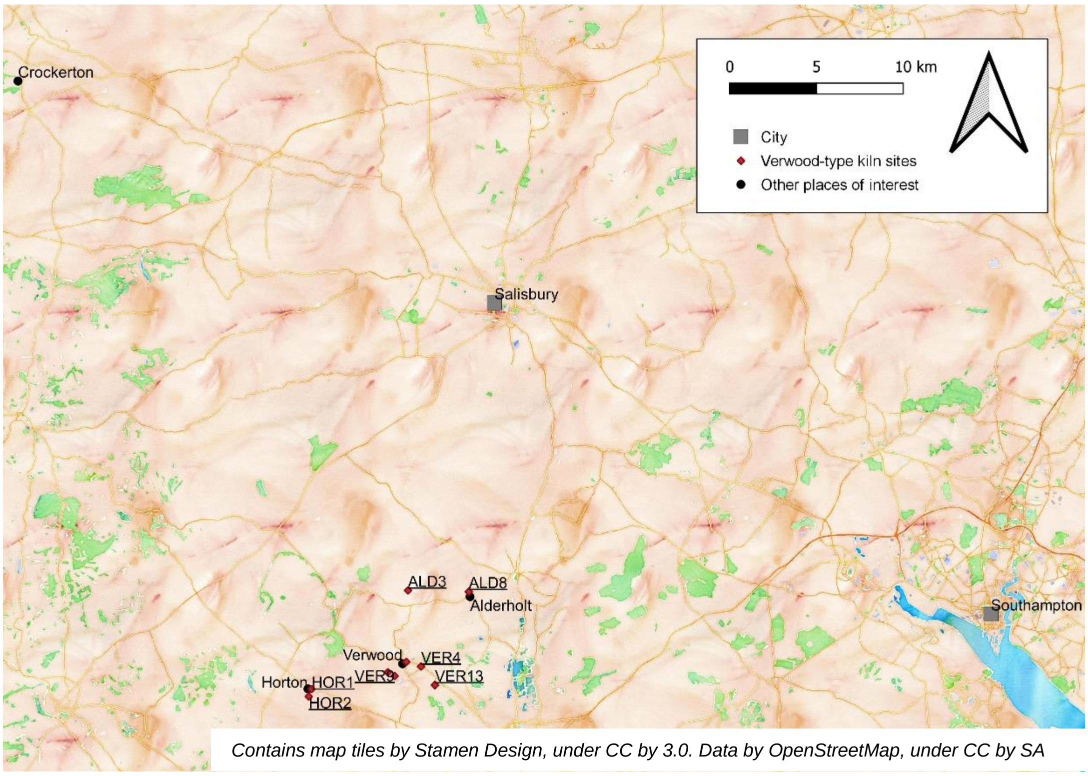
When investigating a past industry, the study of products alone provides a skewed picture of production processes, the technology employed in their creation, and the role both the trade and its products played in the overall economy. Instead, a more comprehensive picture of the entire industry is provided via detailed inspection of the production sites and surrounding locales, alongside an examination of the products. This has been particularly effective for past pottery production (*e.g.* Coleman-Smith and Pearson 1988; Pearce 2007; Davey *et al.* 2009), and allows for the industry to be categorised in terms of the general scale of the ceramic industry (*c.f.* van der Leeuw 1977; Peacock 1982), to understand the many processes operating in the Verwood-type ceramic economy. To achieve this, it is considered wise to begin at site level and develop understanding of the role the industry played in the economy of the local area, before proceeding beyond from there.

### *9.1. The Heart of a Pottery Production Site*

The pottery kiln is the central element, the most risk laden activity, on a ceramic production site. Failure in this component results in wastage of all preparatory and manufacturing work prior to firing, with fewer or no products available for trade or sale to support the potter and their dependants. The pottery production system is reliant on a successful kiln firing for the entire ceramic production arrangement to be worthwhile, and to provide continuous effective workflow. Unsuccessful, or poor quality, pots are less marketable. The kiln is the most identifiable aspect of a ceramic production site, in terms of seeking ceramic production sites via geophysical survey and during archaeological excavation; both derive from the extreme heat involved, the changes that derive from this, and that the kiln forms a robust structure, as noted in Chapter 6. Kilns are often the predominant and most obvious element of a ceramic production site, as they often occur in association with a mound or topographical feature. This may explain why the study of kilns has formed the focus of repeated past studies (*e.g.* Musty 1974; Swan 1984; Dawson and Kent 2008); this, is particularly prominent for the Verwood-type industry, where the kiln has been repeatedly targeted, in preference to other aspects of the site which, consequently, have been largely neglected (*e.g.* HOR1 – Copland-Griffiths 1990, Copland-Griffiths and Butterworth 1991; ALD3 – Algar *et al.* 1987, ALD8, VER13).

It can be shown that the kilns themselves are a perfect reflection of the dichotomy of increasing industrialisation and standardisation while keeping to traditional methods of manufacture. This apparent paradox has been revealed as a repeated key theme in the Verwood-type pottery industry (Chapters 6-7). This is exemplified by the fact that the kilns employ an ancient firing technology, being solely of updraught style (Rhodes 1981; Algar *et al.* 1987; Swan 1984). This does not mean that kiln design and technology is static within the Verwood-type industry, when examined closely, this is not the case.

Beginning with the earliest known example; a 17th century kiln at Horton, Dorset (HOR1; Fig. 88), which was excavated by Copland-Griffiths over two seasons (1990; Copland-Griffiths and Butterworth 1991). Investigation revealed that the first phase of this kiln comprised a single firebox leading to a firing chamber with a central plinth, which supported a ware chamber (Fig. 89).



*Contains map tiles by Stamen Design, under CC by 3.0. Data by OpenStreetMap, under CC by SA*

**Fig. 88: Pottery production sites mentioned in text**

**Fig. 89: The excavated kiln at Horton (HOR1), first phase (taken from Copland-Griffiths and Butterworth 1991, Fig. 3)**

This chamber supported the exhaust, which is assumed to be topped with a temporary capping, allowing access to the interior for loading and unloading. In all known examples of Verwood-type kilns, the entire affair is built in brick. Later, an opposing secondary firebox is constructed along with a baffle adaptation fitted into the firing chamber – again all in brick (Fig. 90). This creates two opposing heat sources, thus when temperatures of each firebox are relatively balanced, the occurrences of cold spots in the kiln should be reduced; this may have been the driving force behind the change, as it may have allowed a higher even overall temperature to be achieved.

Brick has an extended period of production in the area, with brick kilns identified to the north of Horton, which is likely to date from the late 16th century (Carter 2008); this ceramic production continues in other areas such as Verwood into the 20th century (Coulthard 2007, pp.122-3). Tile production can be shown to be undertaken at an earlier date at Alderholt (Table 1 – Chapter 1), and seemingly extends for a similar length of time.

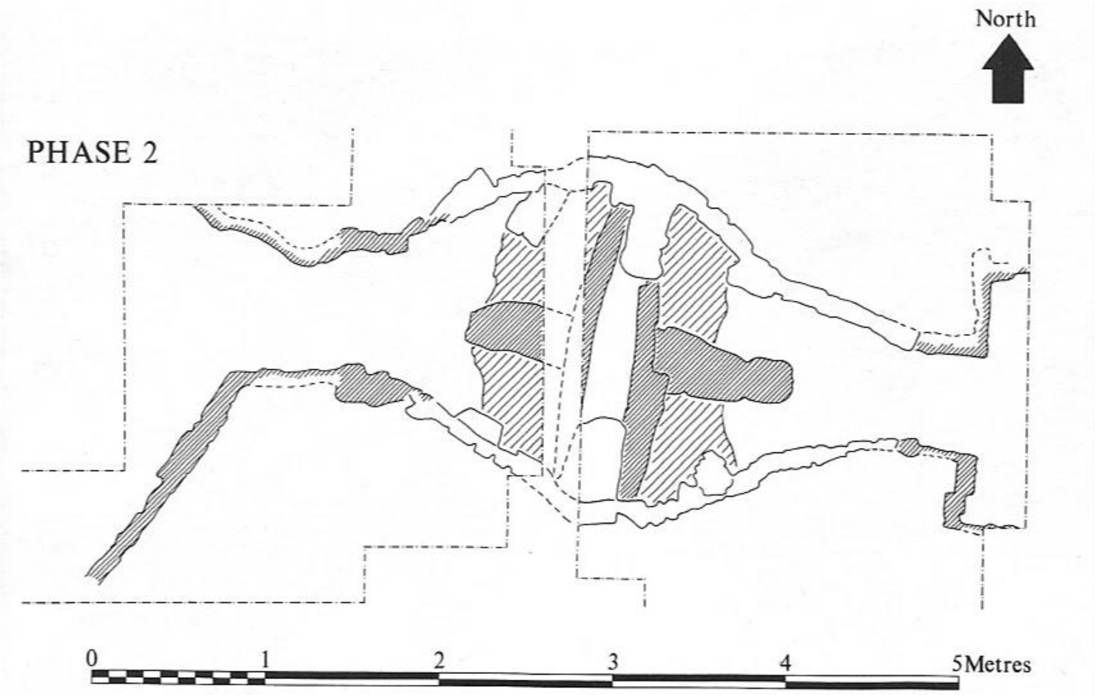


**Fig. 90: The excavated Horton kiln, phase 2; (taken from Copland-Griffiths and Butterworth 1991, Fig. 3)**

Similar may be said of the kiln south of Horton (HOR2); this has never been excavated, but was subjected to a number of geophysical surveys (Carter 2008; Carter *et al*. 2016). In particular, the results of the earth resistance - undertaken at a sample interval of 0.5m, with 0.5m spaced traverses - provided a detailed picture of the kiln and interior. This suggested that the HOR2 kiln is similar in nature to HOR1 (Figs. 90 and 91), evidenced by a circular chamber, divided by a central plinth, with at least one firebox stretching towards the north; an additional, opposing firebox may extend south, although this remains unclear, as the area is obscured by high resistance from another geophysical anomaly. The size of the ware chamber can be estimated from the earth resistance data to be 8m by 6m; as this is far beyond the size of any other example, these measurements must be used with caution.

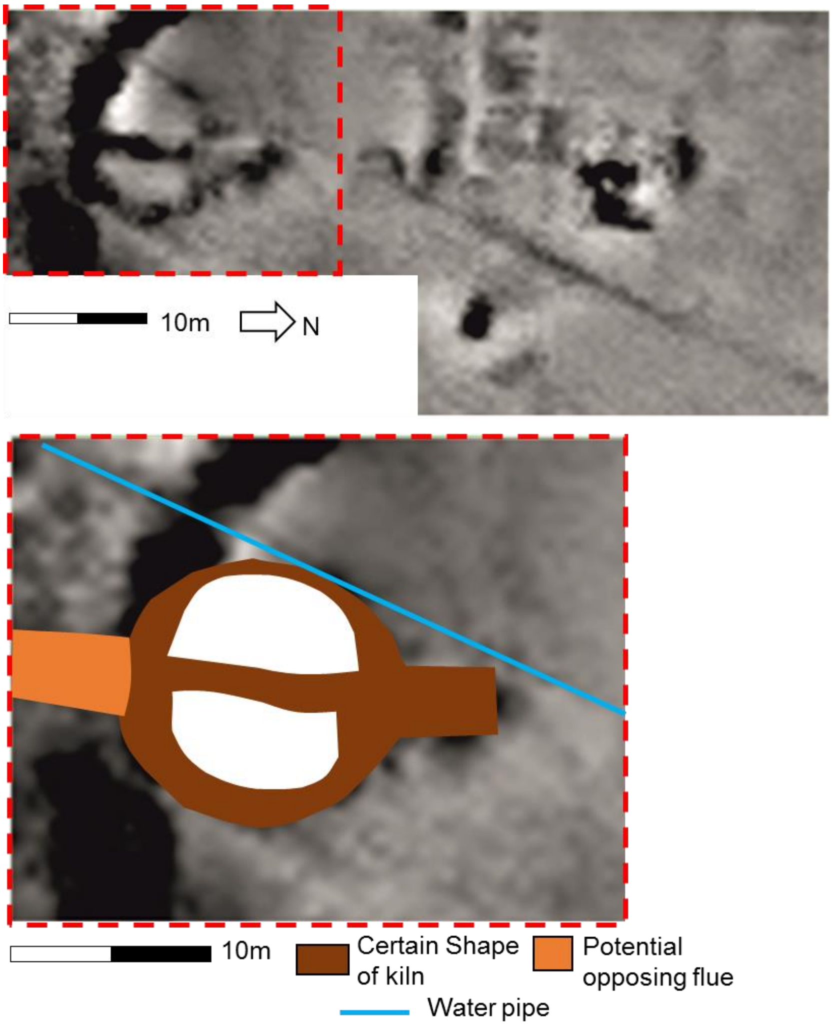


**Fig. 91: Earth resistance results, with interpretation, from site HOR2 (after Carter *et al.* 2016)**

The third example comprises the kiln at Ebblake (VER13); an unusual example, as the shape in plan was squared. The feature was identified below a sizable mound, located in what is now the Ebblake Industrial Estate, Verwood. The site was excavated by Alan Graham in 1997, having been commissioned by the former VDPT; however, the pottery was never fully examined, thus the report remains uncompleted. The excavation has limitations, as only the kiln was examined to limit project costs, yet the excavation revealed the kiln had been almost completely demolished. No documentary evidence of the site could be identified to aid in dating; however, the products - based upon initial examinations - suggest a date of 17-18th century. This is supported by the presence of chafing dishes, pipkins, decorated flanged dishes, and MVER wares. This kiln was particularly unusual, as the construction cut was of squared to rectangular nature, making the entire feature sub rectangular in plan, with an extensive fire/rake-out pit (Fig. 91). This serviced a rectangular kiln, which is assumed to have had a rectangular firebox and combustion chamber, which sat below a rectangular ware chamber. The ware chamber floor is considered to have been supported by several brick arches, with regularly spaced openings, or vents, to allow for air flow. A small brick drain was identified below the kiln, which was later extended at least twice by the creation of a large drainage ditch; later, a drain was created from pots (Plate 76a and b).

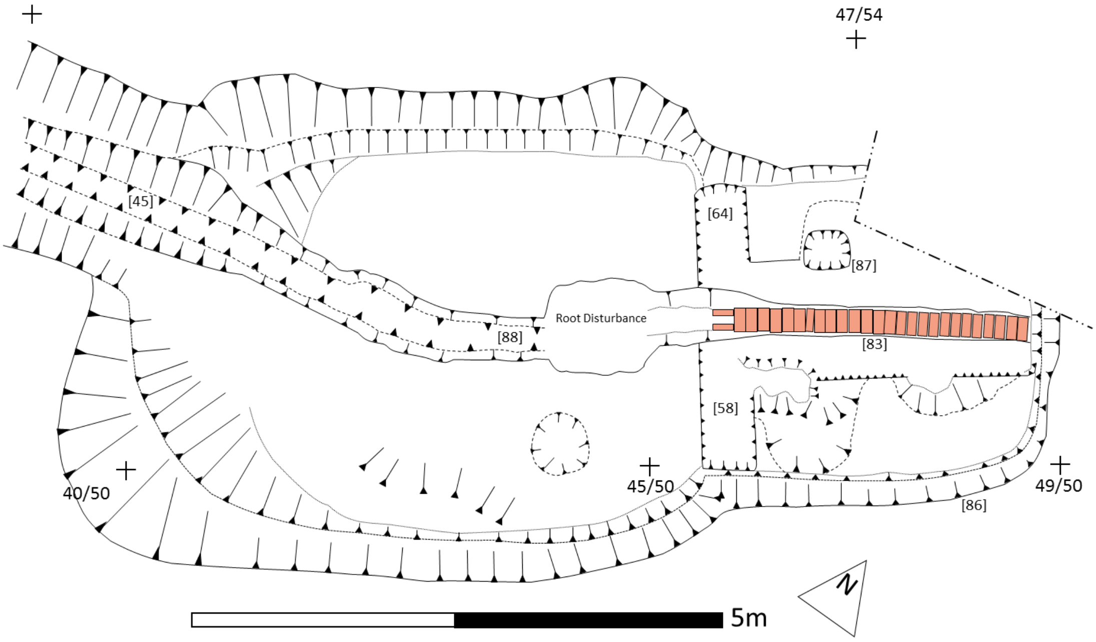


**Fig. 92: Plan of kiln remains at Ebblake. The kiln - nos. [58] and [64] - had been almost completely demolished, the brick drain [83] with associated ditch [45 and 88] can be seen traversing the centre of the feature extending to the north west (re-drawn from the project archive, held by author)**

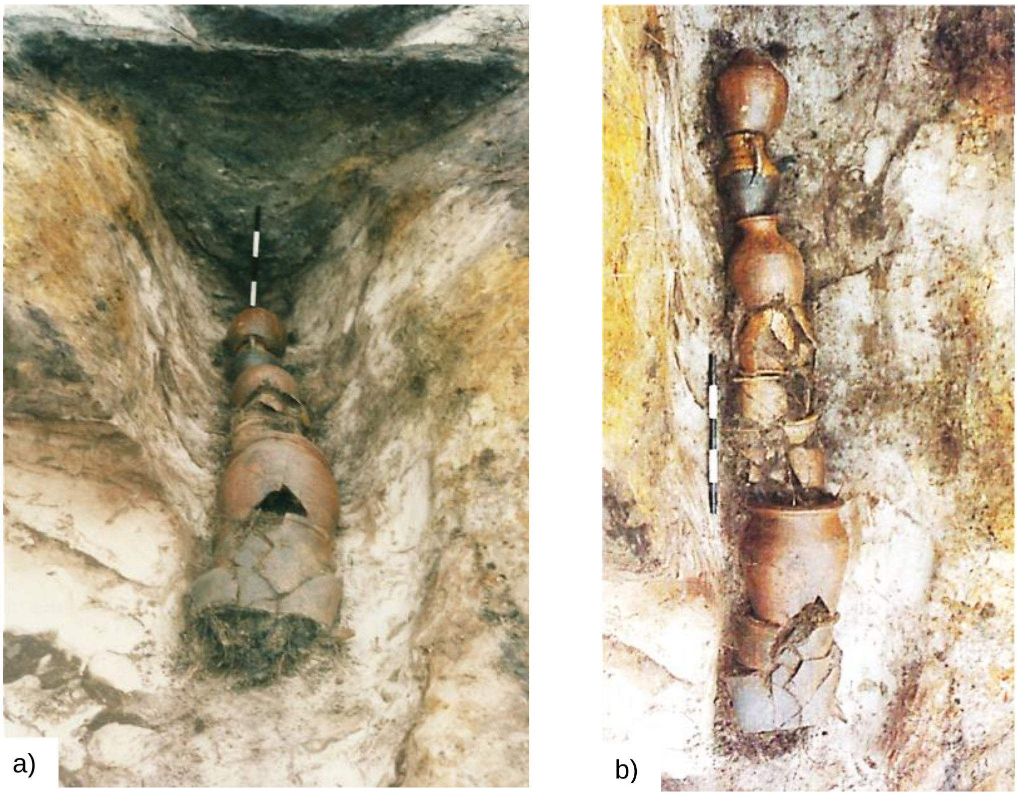


**Plate 76a and b: The drainage ditch at Ebblake; feature [45] in Fig. 92, with a later addition of pots, both shown with a 0.5m scale (taken from project archive, held by author)**

This suggests that the damp nature of the area was an issue from the outset of the kiln's creation into its later life, which may be reflected in the unusually compact nature of the kiln. One recreation of a potential layout was undertaken by brick historian, Martin Hammond, who provided a detailed interpretation of the potential kiln structure (Fig. 93a-c). His arrangement is essentially a compacted rectangular version of the HOR1 phase 1 kiln, with the firebox and firing chamber comprising one element; the ware chamber lies above, supported by brick arches. The concepts for this model are drawn from a later example of a Verwood-type pottery kiln at Crendell (ALD3) and, excluding the squared nature of the kiln shape, it shares much with a 15th century kiln identified at Crockerton, Wiltshire (Fig. 94), in that a large stoke pit was constructed to ensure adequate air flow. It will be shown that this adaptation will evolve to favour a covered stoking shed.

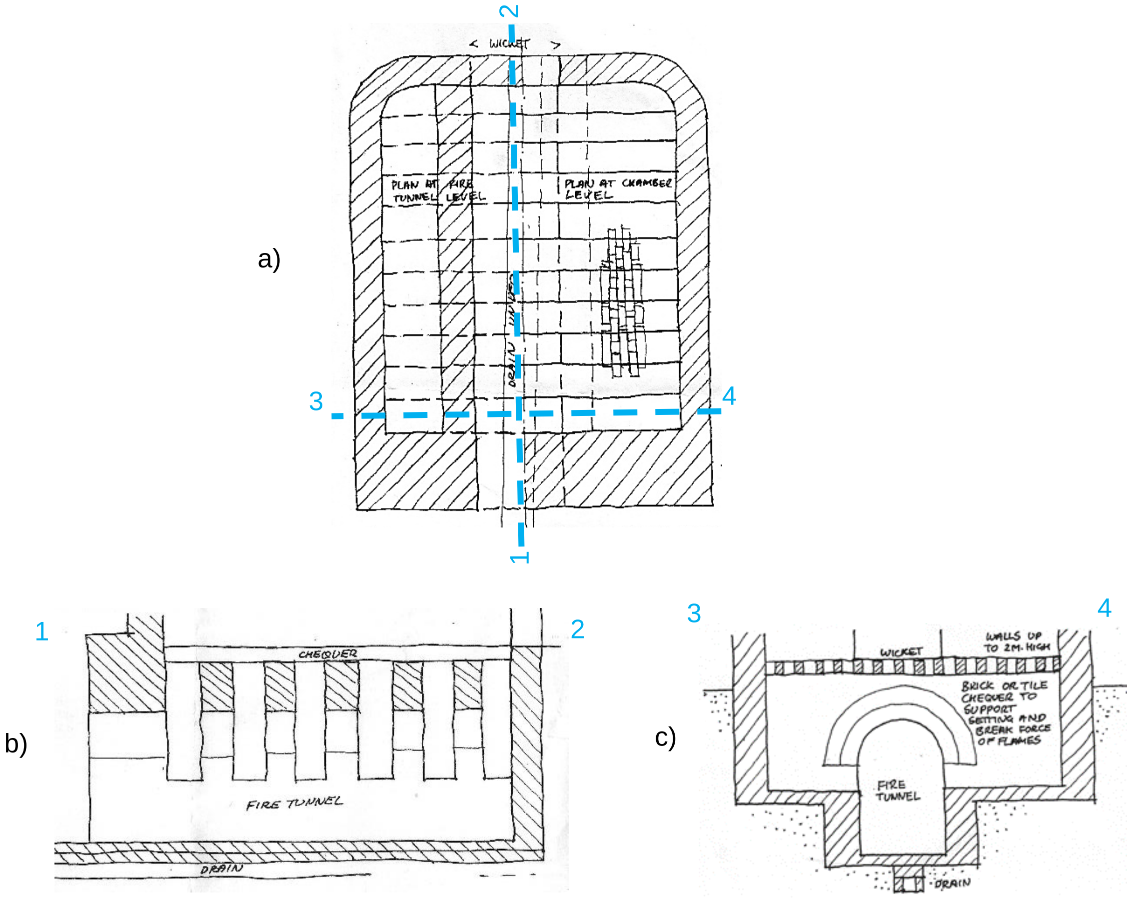


**Fig. 93a-c: Martin Hammond's interpretation of the possible layout of the pottery kiln at Ebblake, dated July 1997; the layout shares many similarities with contemporaneous brick and tile kilns (taken from project archive, held by author)**

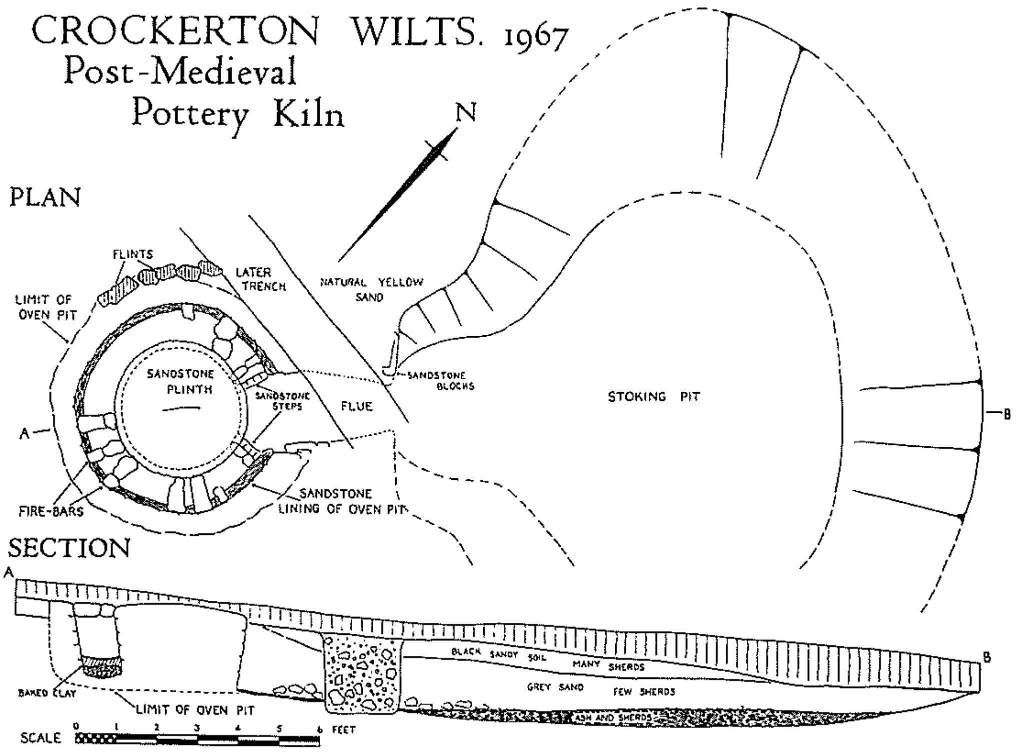


**Fig. 94: Crockerton pottery kiln; (taken from Algar and Saunders 2016, Fig. 2)**

The fourth example comprises a kiln excavated at Crendell in 1975 (ALD3; Algar *et al.* 1987). Despite the age of the excavation, this example remains unpublished - similar to that of Ebblake - and has been dated using historical documentation, in tandem with the products that were recovered; the site has an operational date range of mid-18th - early 19th century. In general terms, the layout is a hybrid of HOR1 (Phase 1; Fig. 89) and Ebblake, involving a single squared firebox, extending into a rectangular combustion chamber, located directly below the ware chamber; the two constituting one element (Fig. 94). This chamber would have been supported on a series of brick arches, serviced by open ‘vents’. As with most archaeological pottery kiln discoveries, the upper extent of the kiln did not survive. Therefore it is assumed, as with all Verwood-type pottery kilns, that the ware chamber was open topped and covered with a temporary capping (Musty 1974). The ware chamber of the kiln is rounded, and contained within a substantial earthen mound. Later, a large cut feature removed the stoking area.

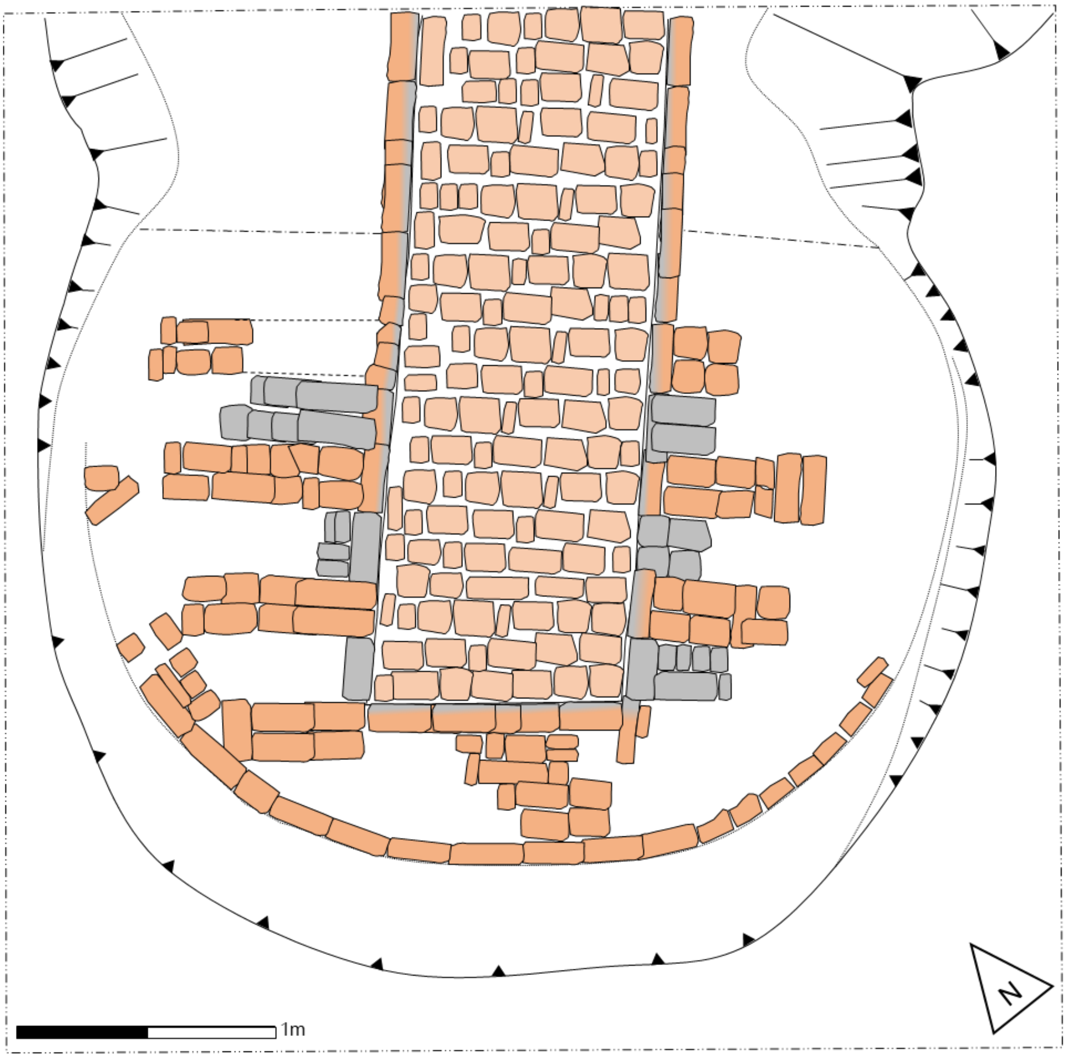


**Fig. 95: Plan of the kiln at Crendell (ALD3); the floor of the firebox and combustion chamber are represented by lighter coloured bricks, with darker upper courses of brick. These upper courses comprise the top of the combustion chamber, the lower sections of the ware chamber, and the raised bases of the arches that would have supported a perforated ware chamber floor; the vents are shown in grey (re-drawn from project archive, held by the author)**

Crendell provides a significant example of a Verwood-type pottery kiln (Fig. 95-6), as it is one of only a few to have had the surrounding mound examined (Fig. 97). The excavation of two pits either side of the kiln provide a section through the kiln mound (Fig. 98). The nature of the deposits show that the area was prepared by excavating down to the natural subsoil, and was subsequently built up around the constructed kiln. Over time, this mound was supplemented by a combination of additional soil and waste pottery. This arrangement was also noted at Cracked Pot Cottage (HOR4 – Young 1979, pp.112-113), and Alderholt (ALD8; Fig. 99a and b).

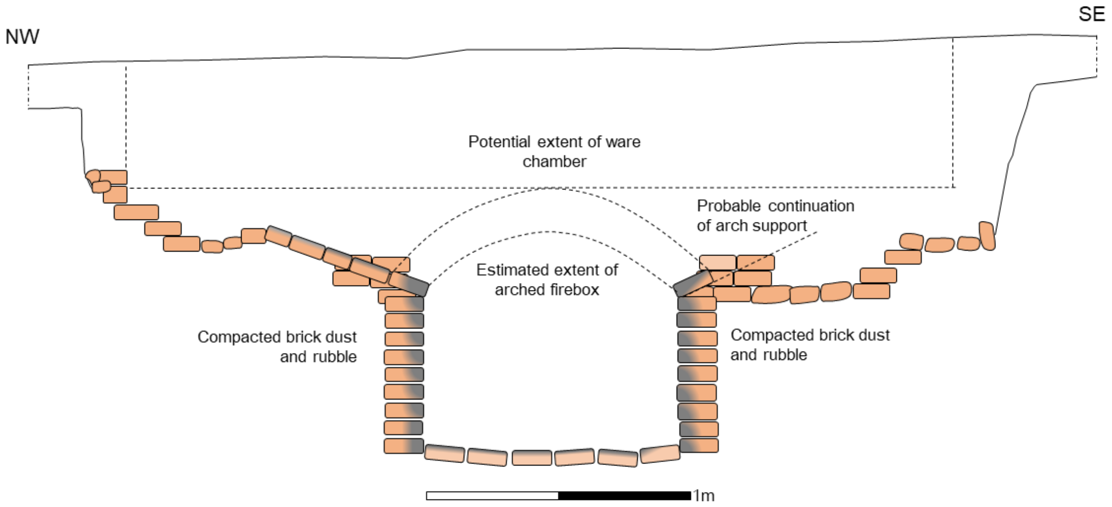


Fig. 96: Section through the firebox of the Crendell kiln (site ALD3); (re-drawn from the project archive, held by the author)

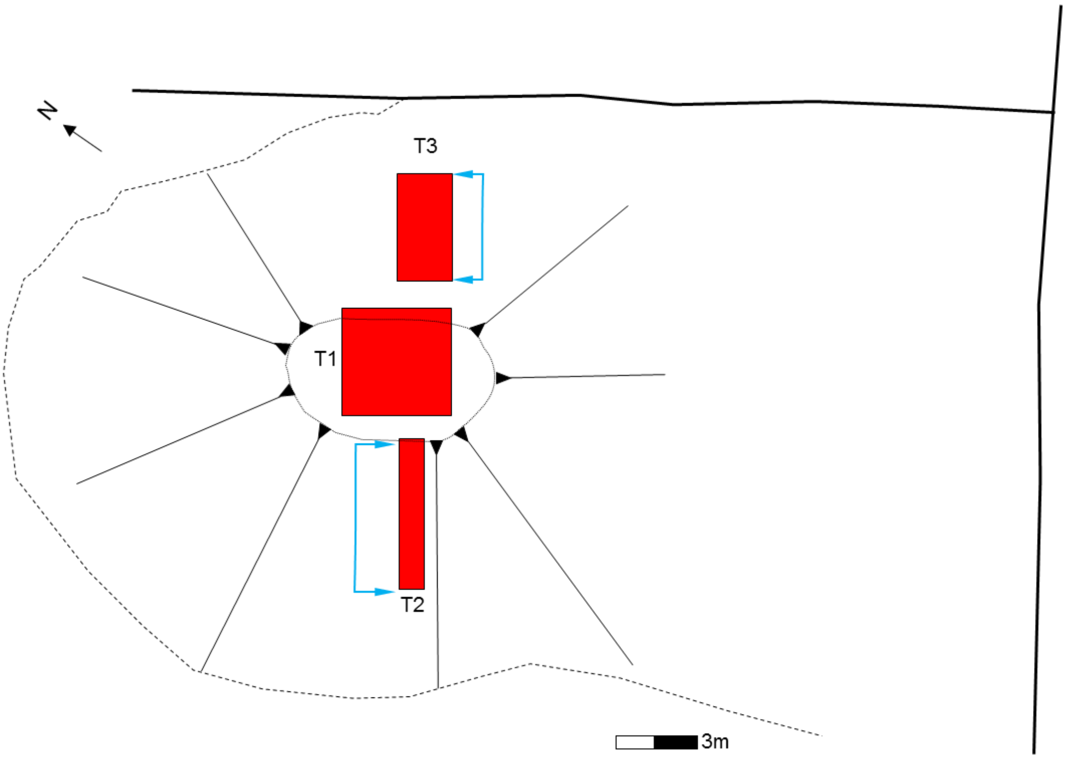


Fig. 97: Locations of trenches at Crendell (ALD3) to investigate both kiln and mound. The kiln in Figs. 94 and 95 is in T1, with the sections shown in blue presented in Fig. 97 (re-drawn from the project archive, held by the author)

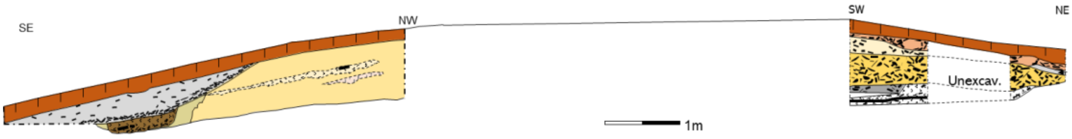
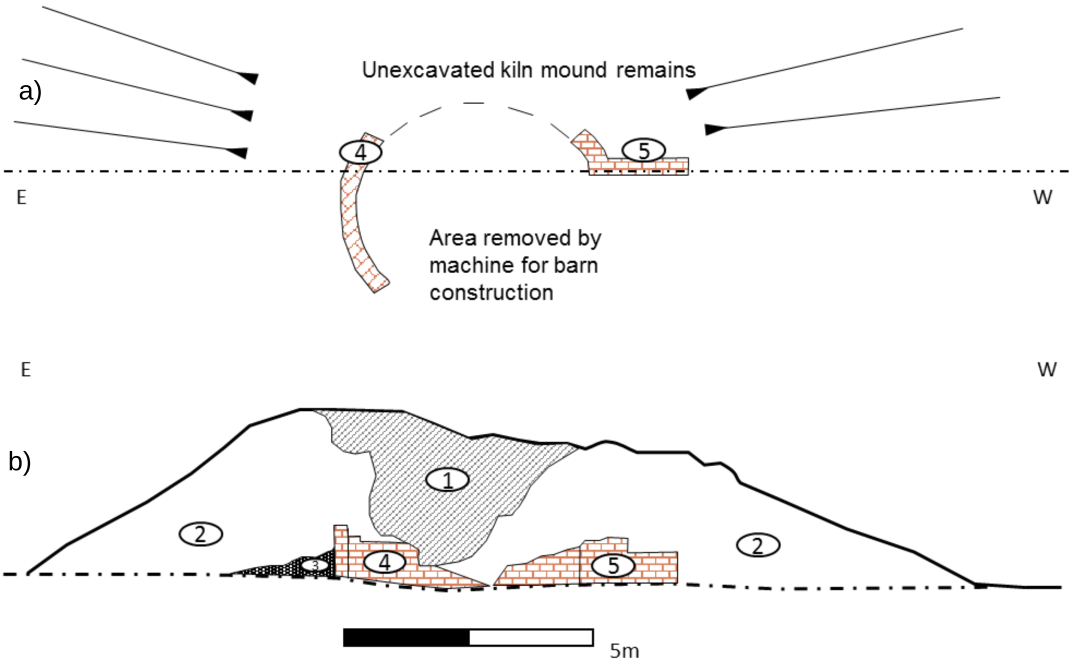


**Fig. 98: Combined sections of T2 and T3 at Crendell (ALD3), which highlights the mound is artificial, and secondly, that its creation is not the result of a single event, it was established and modified over time; pottery fragments are presented in black showing that layers are re-deposited (re-drawn from project archive, held by author)**

During the groundworks for a new barn in the 1980s at the ALD8 site, a rapid rescue style watching brief was undertaken, revealing elements of the pottery kiln and surrounding mound. Such a mound would provide a substantial amount of insulation, reducing the amount of heat lost through convection and conduction, allowing the kiln to efficiently retain heat, meaning less fuel would be required to sustain high temperatures.



**Figs. 99a (plan) and 99b (section): The plan and section of the kiln remains recorded at ALD8. Context 1 comprises sherds and dark soil backfilled after the kiln's destruction. Context 2 is a dark sandy soil with redeposited natural sand and abundant pottery sherds of 18th century date. Context 3 comprises a deposit of burnt material and black sand. Contexts 4 and 5 represent nine courses of brick with heavy burning on the interior surfaces, consistent with a pottery kiln; the shape in plan suggests an ovoid ware chamber with a single straight sided firebox (re-drawn from the project archive, held by author)**

This arrangement, both in terms of mound and ovoid kiln style, was also found at Black Hills (site VER4; Fig. 100-101a and b) and Crossroads (Fig. 102), both in Verwood, and is considered to be the standard 'Verwood-type' kiln (*e.g.* Algar *et al.* 1987 and McGarva 2000). A covered stoking area also appears in these 19th century examples, in contrast to the open stoking pit of Ebblake.

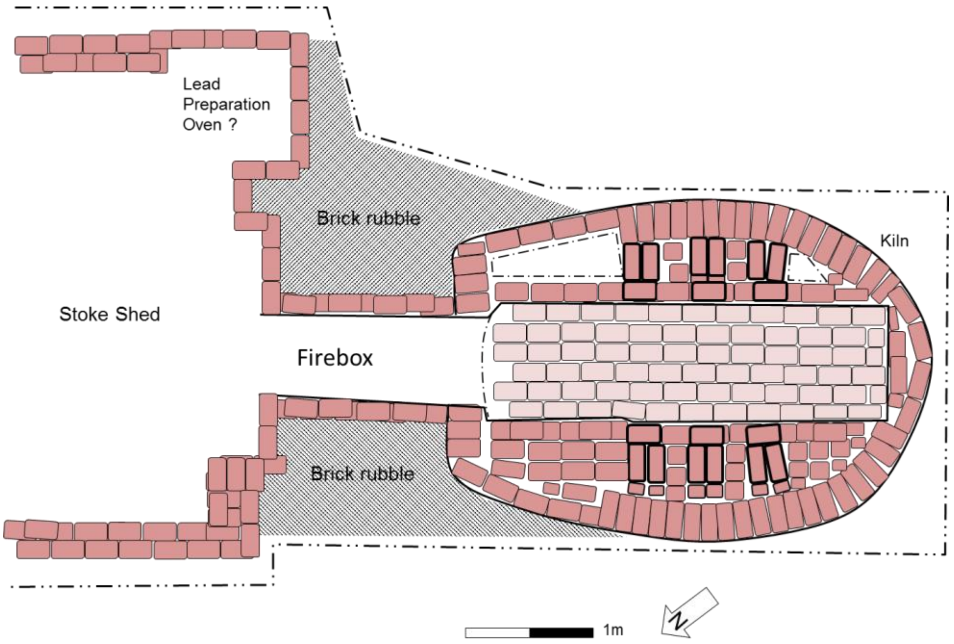


**Fig. 100: Plan of the pottery kiln excavated at Black Hills, Verwood (VER4); the same light/dark colouring of bricks as applied for Fig. 95. The plan shows the elongated nature of the body of the kiln, with its firebox and squared central combustion chamber. In this example a stoking shed is evident, with a possible lead preparation oven (Chapter 6). The dark outlined bricks represent the bases of the probable arches, used to support a perforated ware chamber floor (re-drawn from the project archive, held by author)**

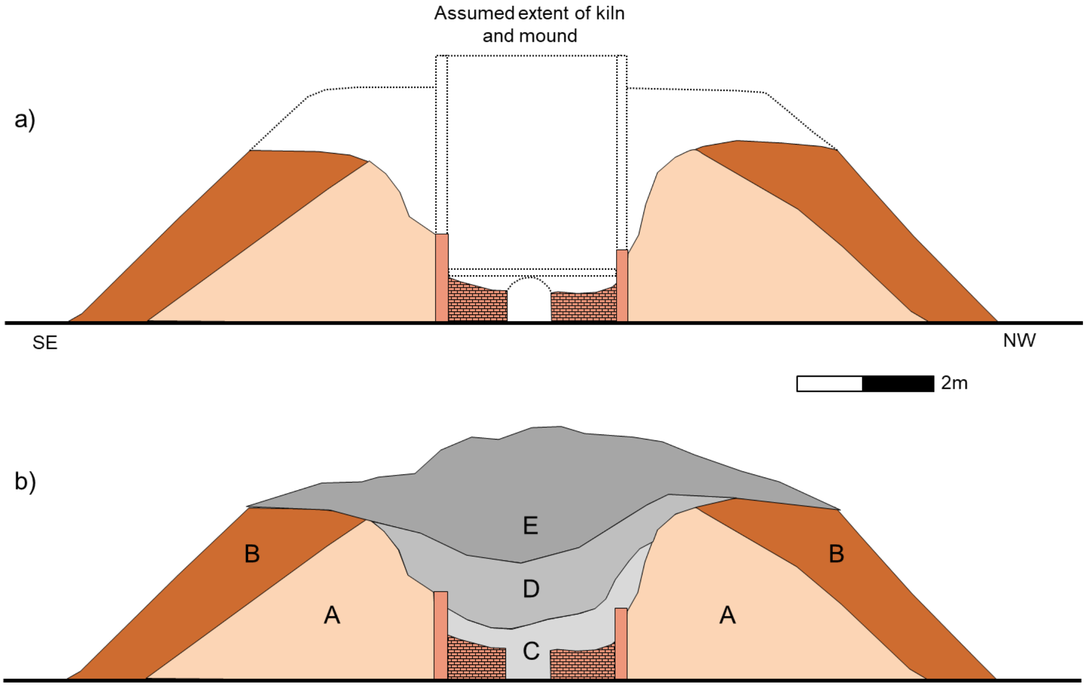


**Fig. 101a: Shows the profile of the kiln mound of VER4, and the postulated height of the ware chamber. Fig. 101b: Shows the recorded section of VER4; comprising a re-deposited natural deposit (context A), with a more topsoil derived period of stabilisation (context B). Contexts C-E comprise later layers associated with the demolition of the kiln itself. Pottery sherds occur throughout all deposits (re-drawn from the project archive)**

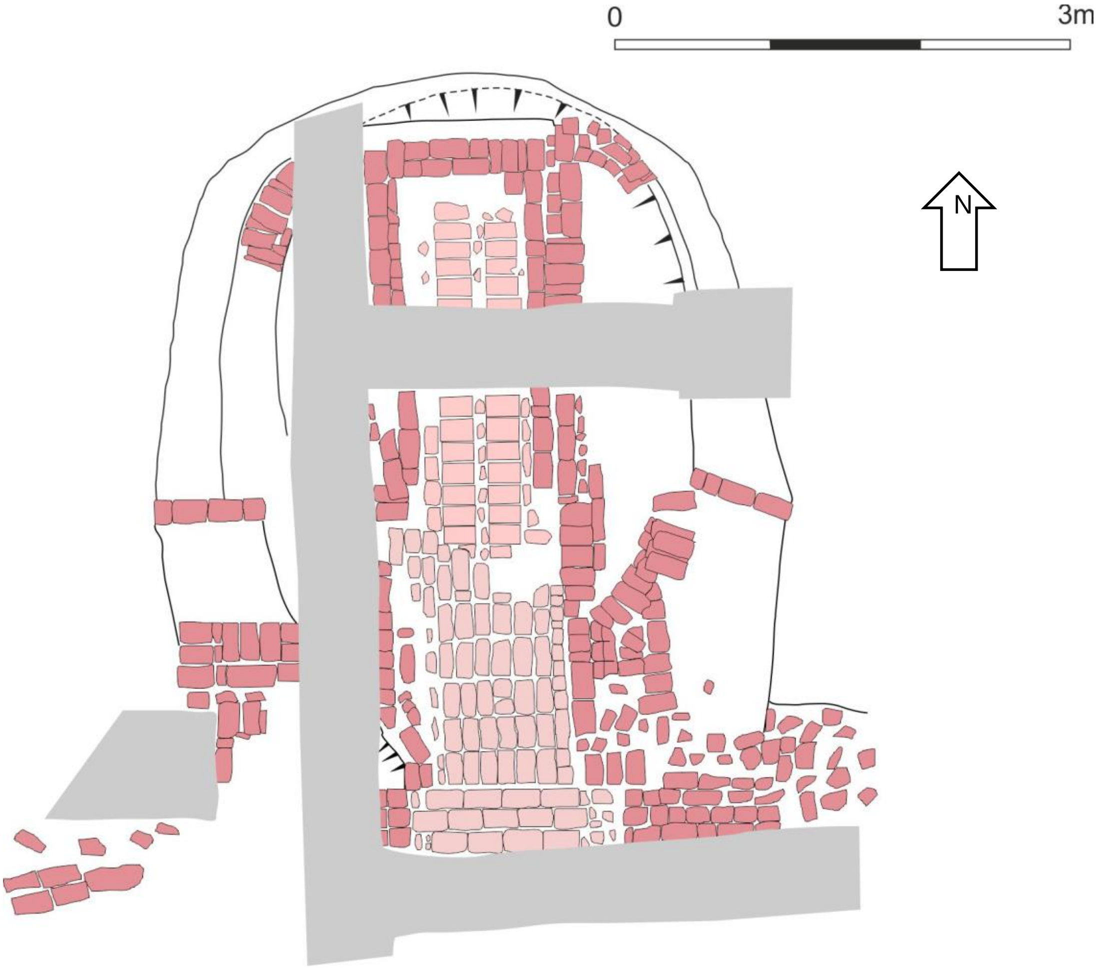


Fig. 102: The larger of two pottery kilns at Crossroads (VER3). The same light/dark colouring of bricks as applied for Fig. 100, with grey comprising later concrete footings of a cottage built over the site (reproduced from the excavation archive; courtesy of AC archaeology Ltd)

**Table 68: The Increase in Verwood-Type Pottery Kiln Ware Chamber Size Over Time**

| Site ID | Kiln Site Name | Estimated Date Range (century) | Estimated length X height of ware chamber(m) | Area ($m^2$) | Volume* ($m^3$) |
|---|---|---|---|---|---|
| HOR1 | Horton Kiln 1 | 17-18th | 2.5 x 2 | 3.93 | 7.85 |
| HOR2 | Horton Kiln 2 | 17-18th | 8 x 6** | 37.70 | 75.39 |
| VER13 | Ebblake | 17-18th? | 3 x 2.5 | 5.89 | 16.49 |
| ALD3 | Crendell | 18 – 19th | 3.2 x 3 | 7.54 | 15.07 |
| ALD8 | Salisbury Arms Farm, Alderholt | 18? –19th | 4.5 X 4 | 14.14 | 28.27 |
| VER4 | Black Hills, Verwood | 19-20th | 3.75 X 2.75 | 8.15 | 16.19 |
| VER3 | Crossroads, Verwood | 18-20th | 4.5 x 3 | 10.60 | 21.20 |

**There is great disagreement over how tall a kiln should be (Rhodes 1981, 117-8) therefore a nominal 2m was employed as a standard measurement to estimate total volume of the ware chamber. **Estimated from an earth resistance survey*

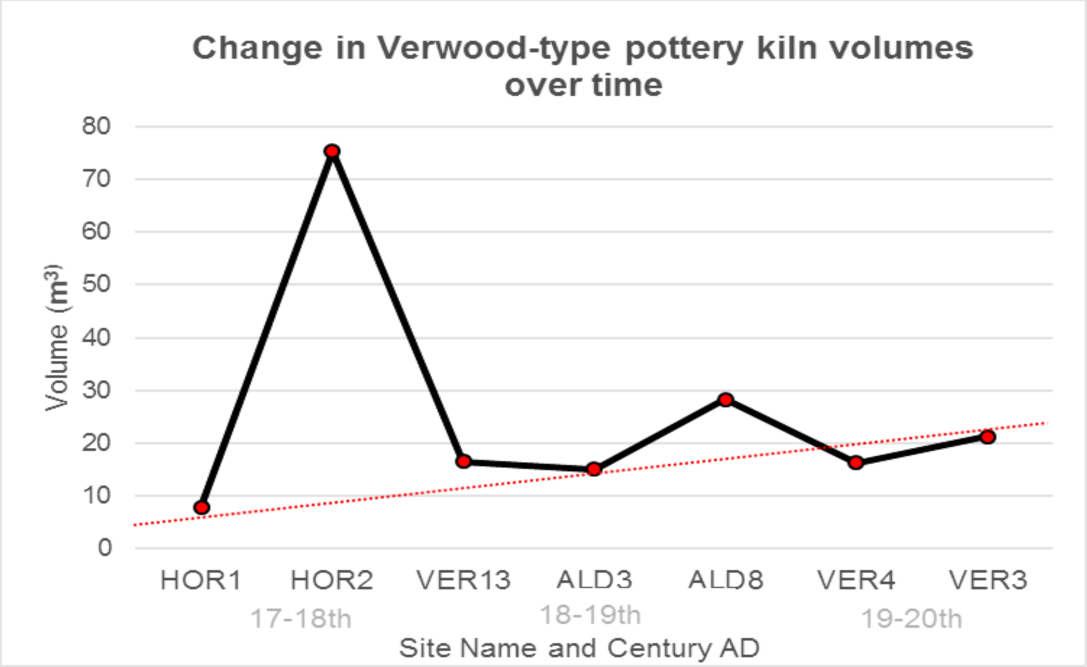


**Fig. 103: Increase in Verwood-type kiln volume over time; the general trend (red) showing a slow and gradual increase over two hundred years.**

Both Table 68 and Fig. 103 shows a substantial increase in ware chamber sizes from earlier examples in other industries where sizes can be shown to be 7x6ft (2.1 x 1.8m) at Crockerton (Algar and Saunders 2016), with examples at Laverstock being less than 6x5ft (1.8x1.5m; Musty *et al.* 1969, Table 1). The large size of the kiln at HOR2 is considered an anomaly; these values could derive from measuring the magnetic and resistance effect size from the two geophysical methods used to investigate it, rather than the physical size as measured during an excavation, thus is not a reliable measurement.

Cumulatively, the evidence demonstrates the development of a standardised kiln style was established over some two hundred years, with a consistent approach to kiln arrangement across the industry eventually becoming prevalent; this correlates with the course of the products created in these kilns (Chapters 7 and 8). While the evolution of the Verwood-type pottery kiln followed a gradual process, there is additional growth in the size of the ware chambers over time, allowing potters to achieve greater yields, meaning more products sold.

These larger kilns required greater amounts of clay to create the higher volumes of wares to fill them, and an increase in the amounts of fuel required to fire them. Cumulatively, this required robust and developed raw material pathways to successfully service them. In turn, this allowed for improved levels of production, leading to cheaper prices and an increased ability for Verwood-type pottery to flood the local markets with their products. In an attempt to advance production levels and yields, the growth in size and simplification of updraught kiln technology prompted a form of rural industrialisation. This success is emulated across the whole industry, having been noted at several sites dating from the late 18th century onwards.

It should be noted, however, that the kiln forms but one aspect of a given production site. While central to its success, the kiln is most effective when filled with wares that have been adequately formed and dried. The ability, rapidity and efficiency of a potter to successfully fill a kiln has a major impact on the quantity of wares available for sale; which in turn, provides the products that fuel the pottery industry of the area. To comprehensively explore these aspects, and the role of the entire production site on the local economy, the associated buildings and general layout of the sites must be examined.

## *9.2. The Veins of a Pottery Production Site*

If the kiln forms the metaphorical heart of a pottery production centre, then the associated buildings comprise its veins. These feed the kiln with the unfired green wares, and form the places where the early stages of the operational sequence are undertaken. The associated buildings comprising the wider pottery production site have been a somewhat neglected field of study for post-medieval pottery production (Yates 1989; Carter 2008). The nature of different buildings, and their role within the operational sequence at a pottery, has been detailed in Chapter 6, where the chaîne opératoire for Verwood-type pottery has been proposed. It is recognised that for some sites, there is a pattern to the layout of the buildings which can be linked to the production process. The positioning of structures in series based upon the steps of production undertaken within them saved time and energy expenditure during production. This reveals a degree of pre-planning in the arrangement of certain Verwood-type pottery sites, which complemented the operational sequence. In essence, the buildings are often arranged in sequence to facilitate efficient feeding of the kiln in a systematic way, mirroring any well-organised industrial system. One example of this is Crossroads. Here, the layout of the site, and the usage of particular buildings, has been previously charted in a detailed survey of the site, undertaken by Martin Hammond (Fig. 104). Chapter 6 showed that initial raw material preparation took place in, or near, the workshop. The forming was then undertaken in the same building, with the pottery subsequently being taken out to a drying shed, dried outside, or placed in the rafters of the workshop. Once dry, the wares were transported to the kiln and stacked for firing; once fired, the process was then repeated for new vessels. Evidently, there is a sequence to the way the site was used and traversed, corresponding with the sequence of steps in the chaîne opératoire, thus the buildings and their arrangements form part of the industrial system.

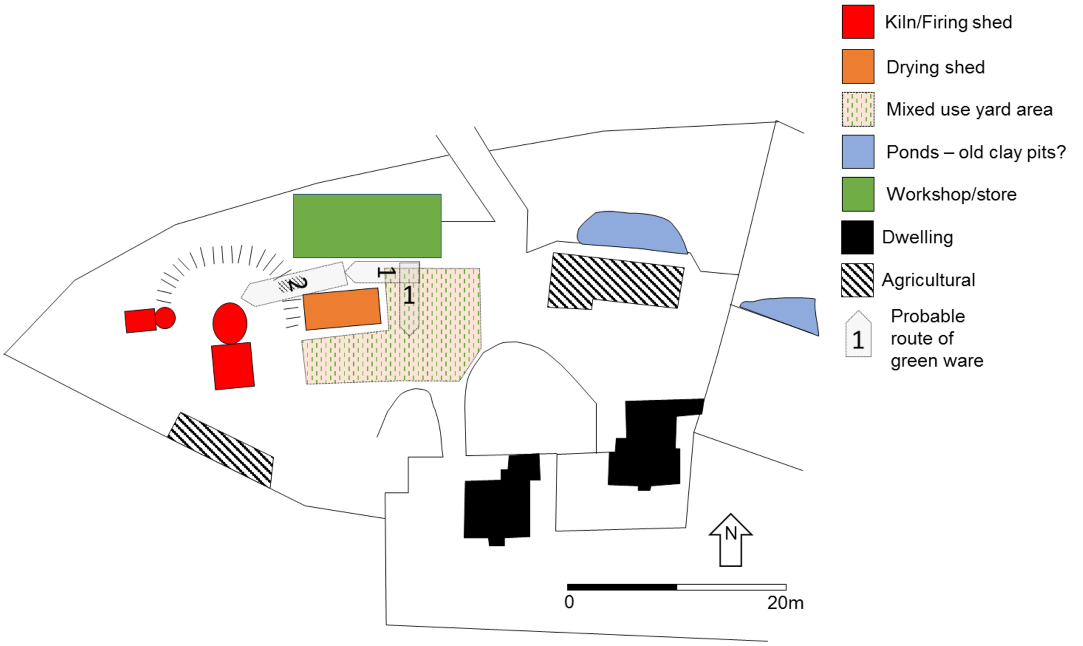


**Fig. 104: Interpretation and potential route of green ware at Crossroads (VER3), based upon map data, interviews, photographs and film**

Equally, this is seen at Sandleholme (VER9; Fig. 105). Here, the workshop is located away from the kiln, where raw materials are kept close at hand for forming. Once formed, wares are brought closer to the kiln for drying in the shed, before subsequently making the final steps into the kiln. Each time the pots move, the distance they travel to the next step is reduced; this is repeated until they are removed from site for sale, or sold directly. Additionally, this can be seen at Cracked Pot Cottage (HOR4; Fig. 106), and at Black Hills, Verwood (VER4; Fig. 107).

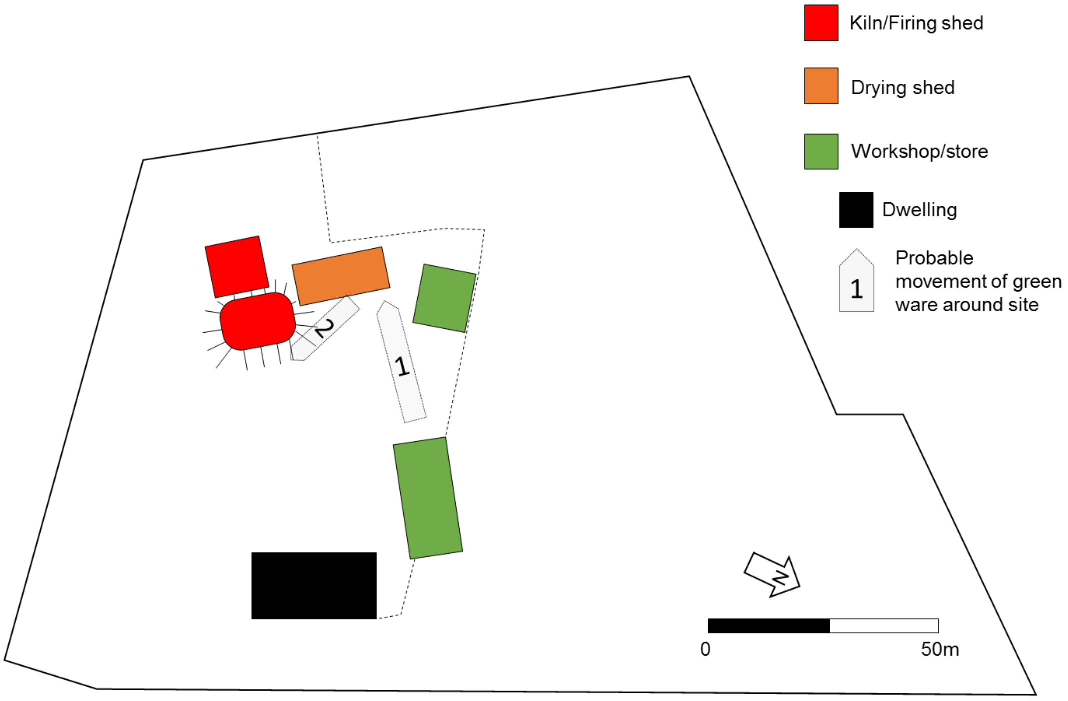


**Fig. 105: Interpretation and potential route of green ware at Sandleholme (VER9) based upon map data and Algar *et al.* (1979, Fig. 15)**

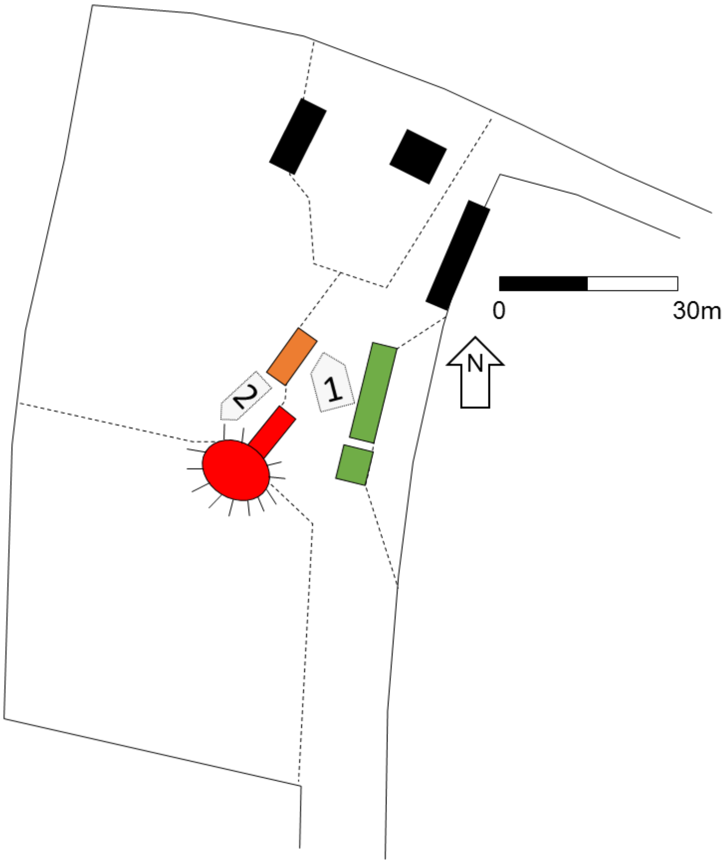


**Fig. 106 (left): Cracked pot cottage (HOR4). Interpretation and potential route of green ware based upon map data and Algar *et al.* (1987, Fig. 19)**

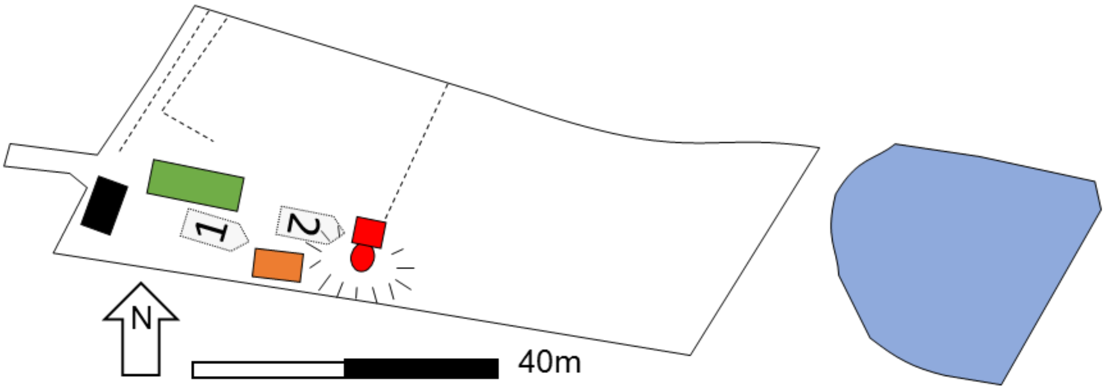


**Fig. 107: The site at Black Hills (VER4). Interpretation and potential route of green ware based upon OS Map data and notes from a rescue watching brief undertaken on the site**

Further energy, time and fuel savings can be saved by combining the use of certain buildings, which occurred at Black Hills. Although an incomplete example, the stoking shed was thought to double up as a drying shed - supported by the presence of a lead oven for the preparation of glazing (Fig. 100). The glaze material would have been applied once the pots were leather-hard, with glazed green ware requiring further drying before being taken to the kiln.

Evidently, there is a sequence and flow to the way the buildings are utilised in Verwood-type pottery production sites, in line with the operational sequence. The way in which pots moved across the site on their journey to becoming finished products was clearly a pre-determined consideration of potters. While some would argue this is simple common sense, this arrangement takes into account the risk of lowered productivity, as any time lost moving large amounts of often bulky pots for distances across a production site was time wasted. Reduced distance and frequency of movement also limits breakages as noted by Arnold (1985, Table 6.3). Streamlining the production sequence through a stepped procedure, and use – or multi-use - of buildings, increased time dedicated to production. This improved yields and lowered costs; both played key roles in improving industries during the post-medieval industrial revolution (Crossley 1994). By closely examining the different elements that comprise a production site, the nature of industrialisation can be defined, and an increasingly comprehensive view of the production process is provided. In summary, it can be argued that the evolution of the Verwood-type kiln, coupled with the systematic arrangement of the production site, formed aspects of a rural ceramic industrialisation, which would have aided the industry to create more products - at cheaper prices, and subsequently dominate the local market. Berg (1980, 2) has shown that “rationalisation of production and the standardisation of product” in the 19th century were key aspects of an industrial revolution that was far from universal and consistent. The Verwood-type industry is a robust rural example of this.

It is possible to become too engrossed by the production site alone, with its many compositional elements, or even the products themselves, becoming buried by the sheer volume of data gathered by studying a given production site. As a result, the potters, workers and support networks that serviced these sites can be concealed, and it is easy to overlook the fact that these sites existed as part of a wider system and landscape. Thus, there is the potential to fail to recognise the additional relationships potters have with their landscapes, omitting vital information on the impact that these enterprises collectively had on the local economy and, in turn, how that economy affected the surrounding landscape.

### *9.3. Measuring the Role the Potteries Played in the Local Economy*

Peacock (1982) tells us that the relationship between a ceramic workshop and its supply networks is one of many factors that allow commercial success to be measured. He states:

> *“The economic effectiveness of a workshop will depend on a number of parameters of which the most important seem to be the availability and quality of the clay, the abundance and type of fuel and the distance, density and sophistication of the markets”* (Peacock 1982, 25).

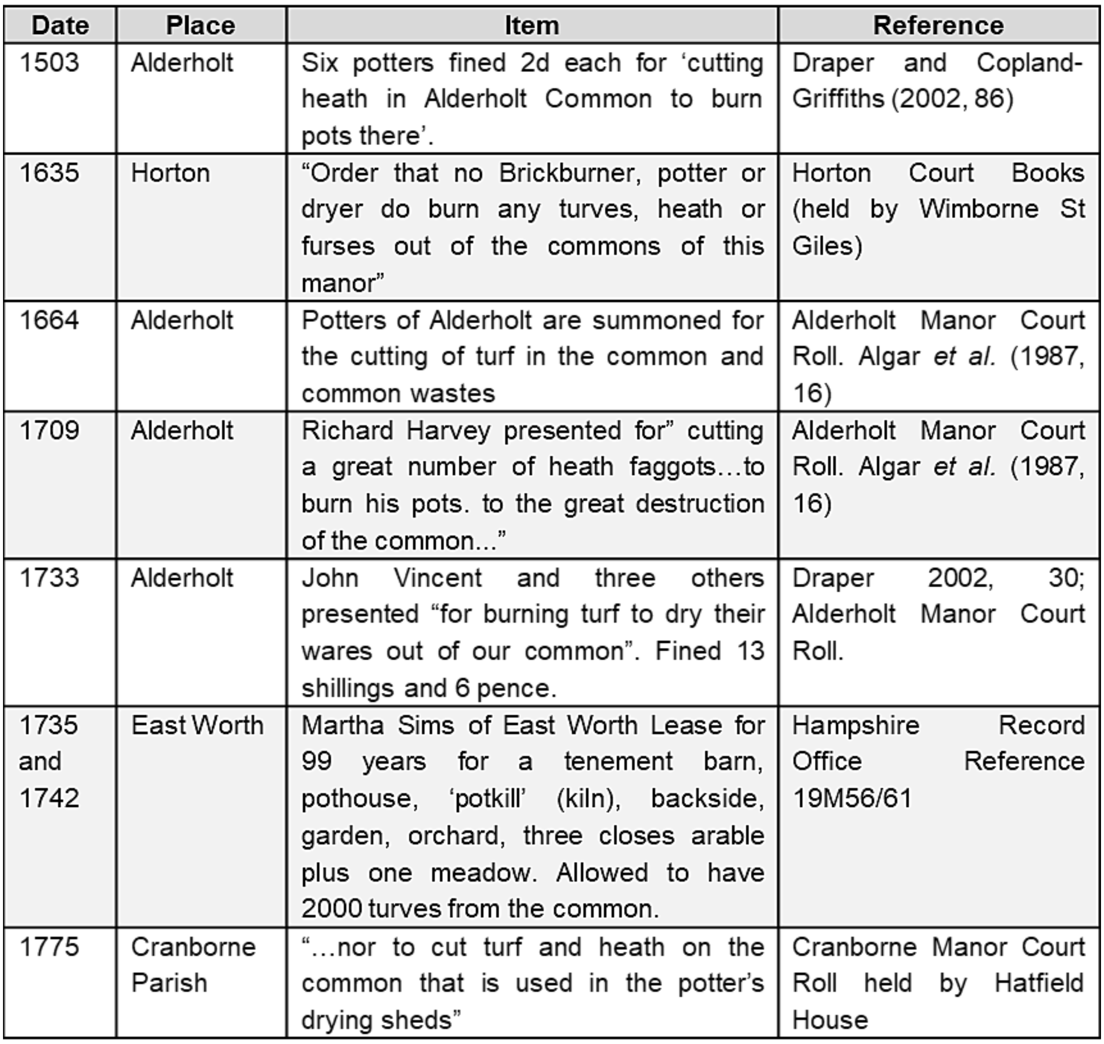
This reminds us that potters do not function in isolation; they are part of a network involving both raw material and fuel provision, alongside product distribution and other aspects. These roles are often fulfilled by additional individuals, providing a range of services to other enterprises in the area; collectively, they perform a role in the local economy of the region.

It can be said with certainty that when examining van der Leeuw’s (1977) - and later, Peacock’s (1982) - model on the scale of a given ceramic economy, the east Dorset pottery industry complies with the rural nucleated industry level.

Firstly, this is evidenced by the individual workshops that form the industry, which all comply with the given parameters in both models; for example, production occurs in a range of buildings and there is a degree of mechanisation involved in using the wheel, in addition to purpose-built kilns. Peacock (1982, 38) notes that while nucleation maybe readily evident, *i.e*. a number of workshops with shared characteristics lying within a given area or region, the reasons for this nucleation can be harder to define. One key aspect of the nucleation of the ceramic industry in east Dorset derives from the existence of readily available fuel and raw materials. For the former, the occurrence of suitable clays in the area – along with the control of this resource through clay rentals - has already been discussed (Chapters 1 and 6); nucleation is further reinforced by many workshops drawing from shared sources. These clays had to be dug using labour appointed by the Lord of the Manor (Algar *et al.* 1987, p.4), which reinforces the controls over clay acquisition, and shows that there were people other than manufacturers who benefited from local ceramic industries.

In contrast, the supply of fuel is less understood. It is apparent that several types of fuel – turf, furze and wood - were readily available in the area (Copland-Griffiths 1998, p.8). Sadly, no paleoenvironmental samples have ever been recovered or studied from kiln excavations to confirm this hypothesis. However, the control over such items can be glimpsed through several mentions apparent in numerous court rolls (Table 69).

**Table 69: Summary of Mentions of Turf, Furze and Wood Procurement for Pottery Production in Historical Documentation**



| Date | Place | Item | Reference |
|---|---|---|---|
| 1503 | Alderholt | Six potters fined 2d each for 'cutting heath in Alderholt Common to burn pots there'. | Draper and Copland-Griffiths (2002, 86) |
| 1635 | Horton | "Order that no Brickburner, potter or dryer do burn any turves, heath or furses out of the commons of this manor" | Horton Court Books (held by Wimborne St Giles) |
| 1664 | Alderholt | Potters of Alderholt are summoned for the cutting of turf in the common and common wastes | Alderholt Manor Court Roll. Algar *et al.* (1987, 16) |
| 1709 | Alderholt | Richard Harvey presented for" cutting a great number of heath faggots…to burn his pots. to the great destruction of the common…" | Alderholt Manor Court Roll. Algar *et al.* (1987, 16) |
| 1733 | Alderholt | John Vincent and three others presented "for burning turf to dry their wares out of our common". Fined 13 shillings and 6 pence. | Draper 2002, 30; Alderholt Manor Court Roll. |
| 1735 and 1742 | East Worth | Martha Sims of East Worth Lease for 99 years for a tenement barn, pothouse, 'potkill' (kiln), backside, garden, orchard, three closes arable plus one meadow. Allowed to have 2000 turves from the common. | Hampshire Record Office Reference 19M56/61 |
| 1775 | Cranborne Parish | "…nor to cut turf and heath on the common that is used in the potter's drying sheds" | Cranborne Manor Court Roll held by Hatfield House |

Such restrictions in wood and timber procurement in east Dorset are reinforced by a stipulation of most leases at the time to “preserve all timber, and other trees, and saplings, and not to lop or shroud any pollard without leave” (Stevenson 1812, pp.111-3). Meaning, if not owned, alternative sources of wood fuel were needed.

Table 69 shows that references for the cutting and burning of turf by potters is as prominent as the removal and usage of heathland furze and wood. The presentments before the court evidence that the removal of turf for the ceramic industries was considered an important issue. This is likely because the cutting and burning of turf was a staple fuel for everyone. While it is not unknown for locals to cut fuel from the common lands for this very purpose (Draper 2002, pp.17-19), there were people who relied upon this activity for their subsistence. Lot Oxford, a pottery distributor, writing of a Daniel Haskell of Verwood; who worked as a turf cutter noted:

> *“…everybody had a big rick of turf I heard my grandfather says*[sic] *he had seen as many as 20 or 30 wagons out of the common at once…”* (Oxford 1929, p.61)

This is mirrored by Stevenson (1812, p.333):

> *“…much turf is procured from the heaths, at the rate of 2s/6d. 1000 turfs which are conveyed many miles by the farmers for the use of their labourers; and the want of this article of firing is much felt and complained of by the poor at Ringwood….”*

The cutting of turf was not as simple as one might think; in order to encourage regrowth and maintain a sustainable source the process was often undertaken in a gridded pattern, as shown at Whitefield Clump, Hampshire, some 6km from Verwood (Fig. 108).

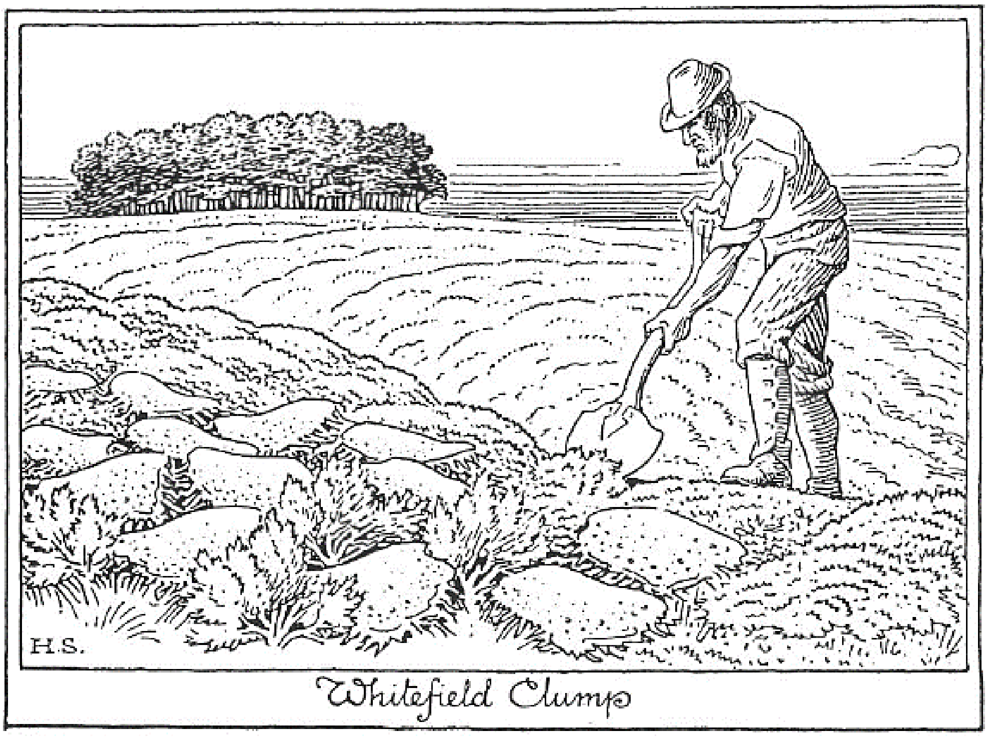


**Fig. 108: Turf cutting in the New Forest; drawn by Heywood Sumner in 1910 (taken from Draper 2002, p.30)**

The procurement of fuel was undoubtedly of primary importance to the potter, yet fuel appears to be the largest outlay. Numerous inventories associated with wills for east Dorset potters of the post-medieval period reflect this. Firstly, the 1722 inventory of John Major, Potter of Alderholt, lists £40 of "wood and faggots about the house", which equates to roughly 20% of his total wealth (Algar *et al*. 1979, 40). Furthermore, John Vincent's inventory of 1719 lists £4/16/6d worth of "faggots and wood"; roughly 40% of the value of the estate.

One further historical document which presents insight into the operations of a Verwood-type pottery workshop is the finances of Fred Sims, who operated the VER7 site in modern Springfield Road, Verwood, which was active between 1898 to 1910 (Algar *et al.* 1987). A series of three books record his entire accounts (DHC Ref: Ph/530/1-3); this source can be difficult to decode as the document was clearly a personal tally comprising abbreviations, the meanings of which have been lost. The accounts show numerous references to outgoings for raw materials in the form of clay, sand and wood for fuel. It is often difficult to ascribe whether this was all employed for kiln firing as in later life, the accounts outline various building projects; however, it elucidates that certain wood was delivered on account, showing a trusting working relationship between different aspects of the heathland network.

This is mirrored in the buying of wood prior to being felled, which is mentioned in Richard Henning's inventory of 1682, which states "Wood bought and payed for being not yet felled" £5/15s. "One thousand faggots £2, a coyle fire of wood 18s and brush faggots 4s" equating to £3/2s, collectively this comprises over 10% of the total value of the estate. This displays a level of organisation of woodland resources, and shows that prior planning of fuel procurement was not only required, but fundamental.

Forward planning was commensurate with the sustainable management of woodland, which was undertaken by historic woodsmen across the country (Young 1989; Seymour 2001). Management schemes, such as coppicing and pollarding of woodland, was an ancient craft requiring long term organisation to ensure successful maintenance of this vital resource. Seymour (2001, p.25) notes:

> *"The rotation of coppiced trees depends on the size of the wood required… walking sticks grow in five to six years, hazel for spars in eight years and sweet chestnut for hop poles and ash for hurdles in 15 years."*

These forest resources were relied upon as a source of fuel and raw materials by numerous heathland industries. Both Stevenson (1812, p.169) and Draper (2002, pp.17-19) record that making hurdles, thatching spars, sheep cribs, besom brooms, baskets and crates were also common enterprises drawing on east Dorset wood and heathlands resources. The interconnection between industries is embodied by the fact that pottery distributors also transported besom brooms and baskets (Oxford 1929; Draper 2002; Draper and Copland- Griffiths 2002; Plates 77 and 78).

**Plate 77: Lot Oxford with his cart, loaded with Verwood-type pottery and besom brooms. Photo by Major Maxwell-Lyte (taken from Oxford 1929, 64; courtesy of The Society of Dorset Men)**

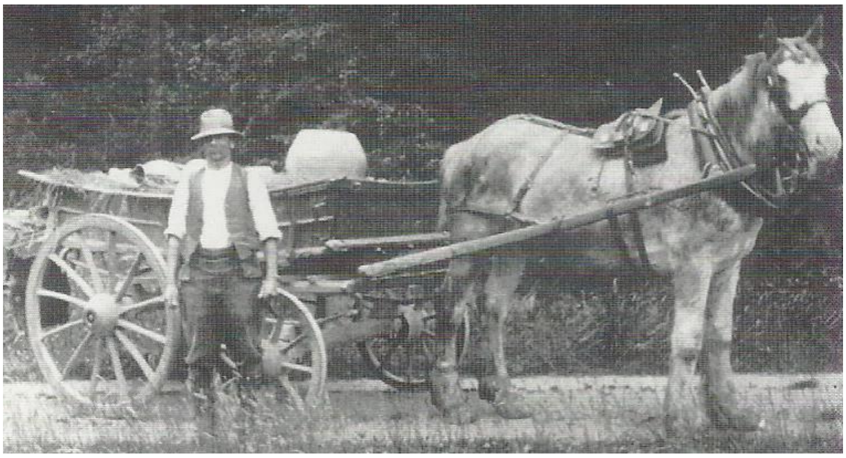


**Plate 78: 'Pans' Brewer with his cart, transporting Verwood pottery and brooms. Heather, gorse and straw was used as a packing agent for transportation, highlighting how the local resources are continually linked with the Verwood-type pottery products even after firing; (taken from Draper and Copland-Griffiths 2002, p.100)**

The sheer scale of the area of woodland required for fuel, and the variety of its use, is explained by Young (1989, p.118):

> *"Not all of a crop would be used for the same purpose. An acre of hazel coppice for example, harvested after 10 years' growth, could provide 3500 hedge stakes, 188 bundles of pea sticks, 127 bundles of bean rods, 148 barbed wire stakes, 70 faggots for burning, 27 clothes-line props and a tone of kindling."*

The use of faggots (bundled branches) is well attested at Crossroads (Plate 79 and 80).

**Plate 79: Bundles of wood faggots stacked at Crossroads, with some being taken to the kiln ready for use (still from Primitive Potters of Dorset 1912)**

**Plate 80: Wood faggots being burned in the kiln at Crossroads (still from Primitive Potters of Dorset 1912)**

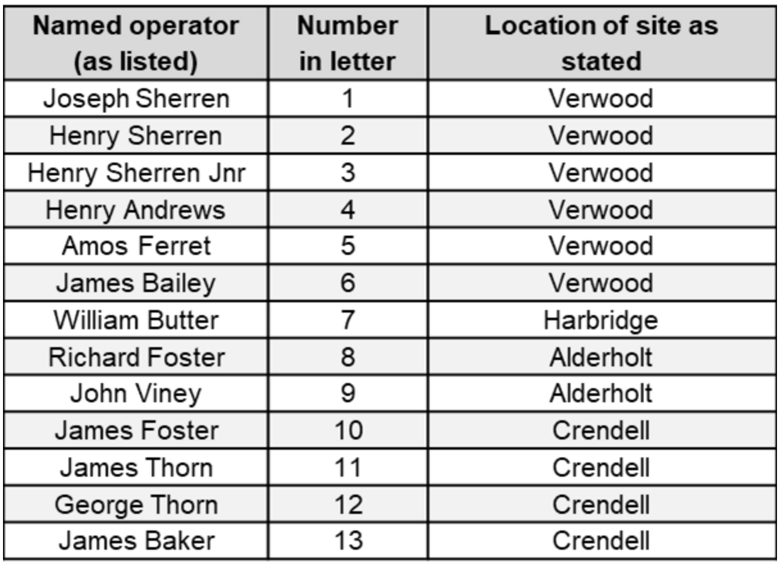
It is evident that almost every east Dorset craft, along with agriculture, relied upon effective management of the area's woodland resources and the heathland network, of which they are all a part. This allowed more time to be dedicated to the making of pottery, thus an increase in the productivity and yields for sale and trade (Bourdieu 1977; Arnold 1985). Therefore, it is apparent that the potteries formed one aspect of a vibrant heathland economy, with extensive raw material pathways and shared fuel procurement networks.

The attribution of the Verwood pottery industry as a nucleated industry in van der Leeuw's (1977) and Peacock's (1982) model for scaling ceramic industries is bolstered by similar contemporaneous industries being used as examples of such industrial scales (*e.g*. Farnham, Surrey - Peacock 1982, p.38). However, of greater significance is the fact that the potters themselves identified as part of a close-knit industry with shared interests, approaches and traditions, which is evidenced by the historic documentation.

### *9.4. The Scale of the East Dorset Pottery Industry*

In April 1832, Henry Moyle of Alderholt wrote to the 2nd Marquis of Salisbury to highlight the negative effects of a proposed new turnpike road through the area. In so doing, Mr Moyle presents a thorough examination of the condition of the industry at the time, and outlines 13 production sites along with their employees (Table 70).

**Table 70: List of Sites and Operators Referenced in the Moyle Letter**



| Named operator (as listed) | Number in letter | Location of site as stated |
|---|---|---|
| Joseph Sherren | 1 | Verwood |
| Henry Sherren | 2 | Verwood |
| Henry Sherren Jnr | 3 | Verwood |
| Henry Andrews | 4 | Verwood |
| Amos Ferret | 5 | Verwood |
| James Bailey | 6 | Verwood |
| William Butter | 7 | Harbridge |
| Richard Foster | 8 | Alderholt |
| John Viney | 9 | Alderholt |
| James Foster | 10 | Crendell |
| James Thorn | 11 | Crendell |
| George Thorn | 12 | Crendell |
| James Baker | 13 | Crendell |

For each of these production sites, Moyle outlines:

- Eight potters and their assistants in each workshop, plus clay diggers, wood and turf cutters;
- Two carriers - people involved in the transportation of goods/materials;
- Fifteen traders/wholesalers who buy ware from the potter and sell it on.

On average this comprises 25 people, totalling 325 persons for all 13 sites.

Moyle subsequently states that if the wives and children of the above were included, this would exceed 500 people who are reliant on the potteries for subsistence. The letter is undersigned by William Roper - pottery foreman; Stephen Sherring and John Viney - pottery proprietors; and Richard Foster - Trader; stating that they "*declare to the best of our knowledge and belief that the above is a true statement of the real fact"*. This provides important details as to the number of manufactories, alongside information about the materials networks involved, plus those reliant on the potteries. Furthermore, it tells us that these people collectively saw themselves as a distinct community, with shared interests, within society. The reason for the fear over the proposed new road is not clear. Perhaps the community felt that the additional tolls for clays and materials moving along the new road and around the area, plus the pottery moving out of it, would make the business unviable. Additionally, concerns may have been raised regarding improving the likelihood over new wares being brought into the area. Either way, these figures are corroborated by another writer; Mr Key of Alderholt Park, Dorset. Key wrote to the Marquis of Salisbury in March 1854 arguing for clemency for a pottery hawker caught selling wares without a licence. He states that the enforcement of such laws was detrimental to the entire industry, due to such high payments. He states:

> *“I have been soundly informed that the three kilns, Zebedee's and Thorn's at Crendall*[sic] *and Bailey’s at Alderholt (Mowland’s the second at Alderholt has just been shut up) support almost entirely 13 men, women and children, independent of the employment it gives to wood and turf cutters, many of whom are unfit for farm labouring and must get a living.”* (HH Ref. Cecil Papers – Correspondence).

While Mr Key’s values are slightly lower than the statistics provided by Mr Moyle, they are similar, and can be corroborated by other references which suggest that these numbers of workers can be extended back into the mid post-medieval period. One example comprises an inquest at Alderholt on 26th March 1702, which was held to explore the death of Richard Henning, aged 14 - son of potter, Charles Henning. Richard’s death was caused by his older brother, Charles, kicking young Richard in the side following intensive teasing in the workshop. The details of this unfortunate event record that Charles senior employed his sons and three other men - Richard Harvey, John Savage and John Nicholls; a total of six individuals. This corroborates the numbers in the Moyle letter (if two woodsmen, turf or clay cutters are included), despite this being almost 150 years prior to the letter being written.

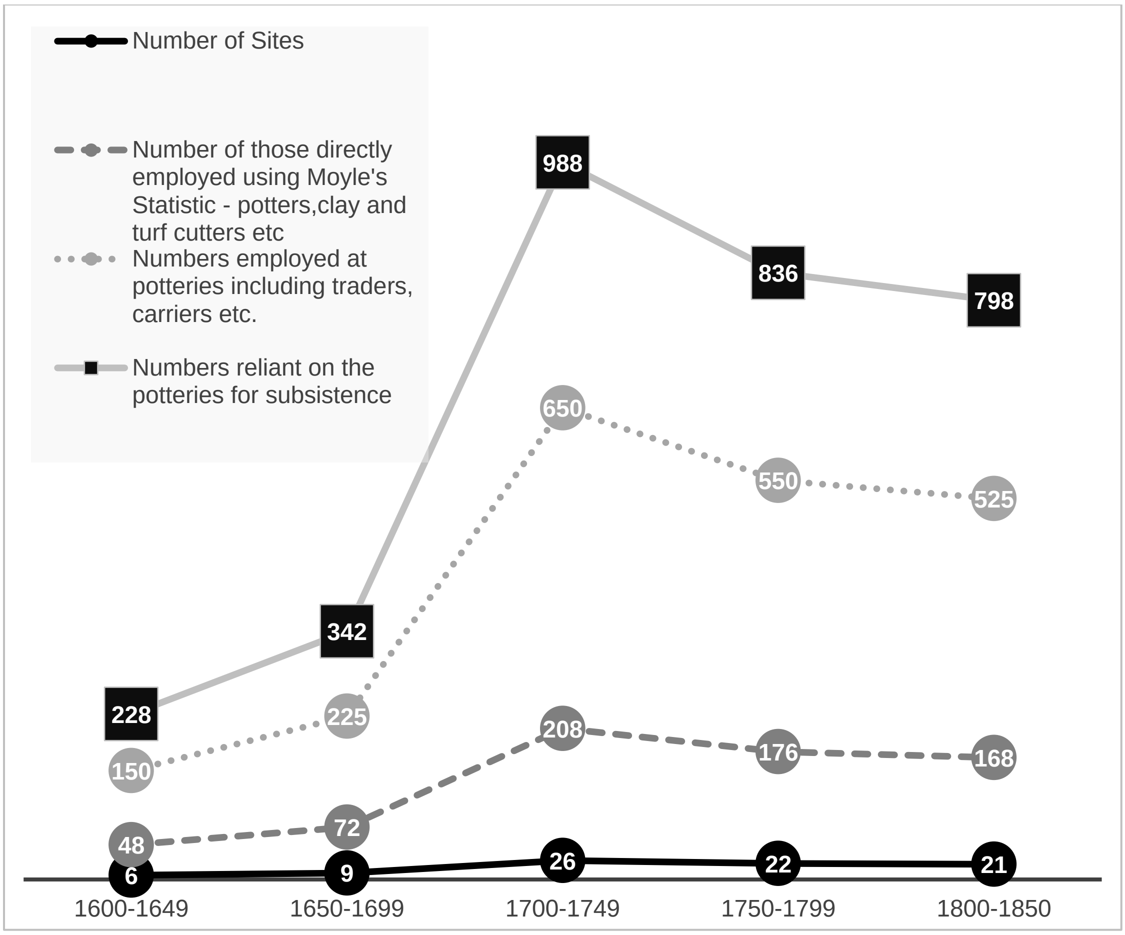


**Fig. 109: Projected estimates for the numbers of people directly involved (potters, labourers, material providers etc.), alongside those indirectly involved (traders, carriers) and those reliant on the east Dorset ceramic economy; all based upon Moyle’s statistics, writing in 1832**

As a result, it is possible to estimate the numbers of people involved in the potteries over time (1600-1850), using both the statistics in Moyle's letter and the number of postulated pottery sites (Fig. 109).

The letters by Moyle and Key depict how the potteries performed a vital role in the economy of east Dorset, supporting hundreds of individuals from the 17th to 19th centuries. But just how important was the pottery industry in terms of the economy of the area overall? Thankfully, the 1841 census provides the earliest reasonably detailed survey of the population across the study region. Using Verwood tithing as an example (Fig. 110), it is possible to test these estimates.

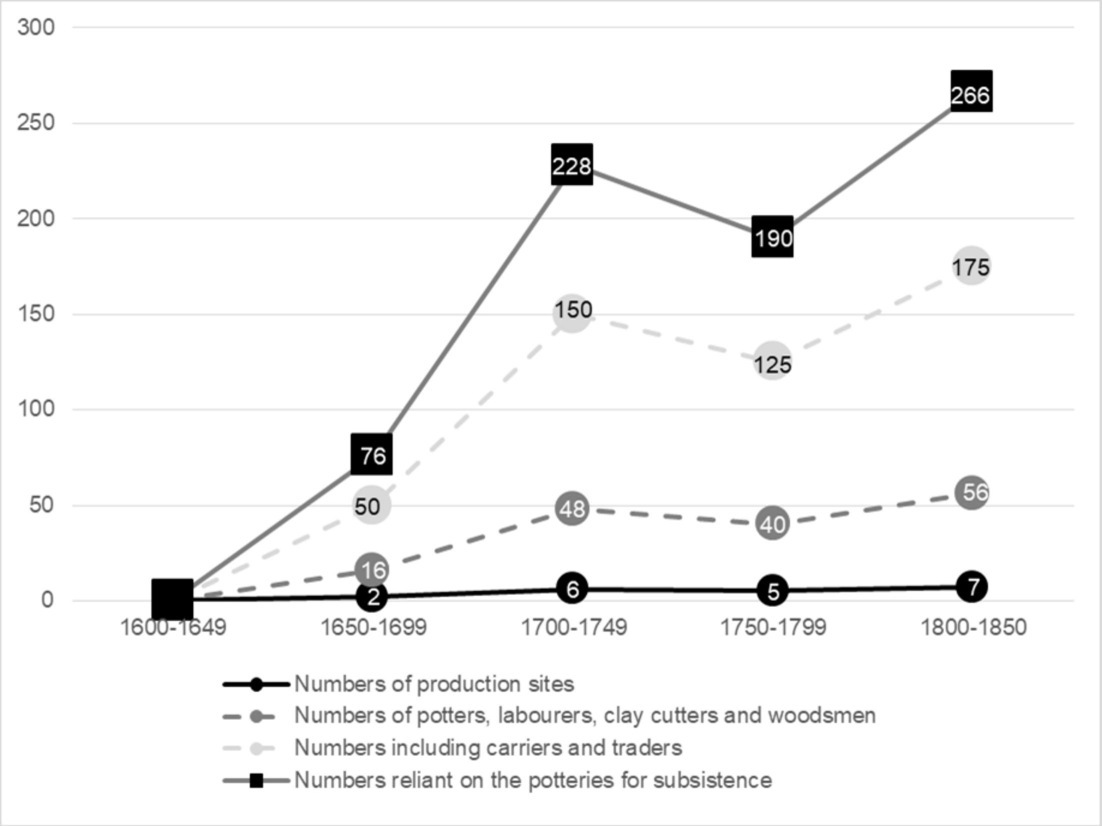


**Fig. 110: Numbers of people involved in potting in the Verwood tithing based upon the number of production sites using Moyle's statistics**

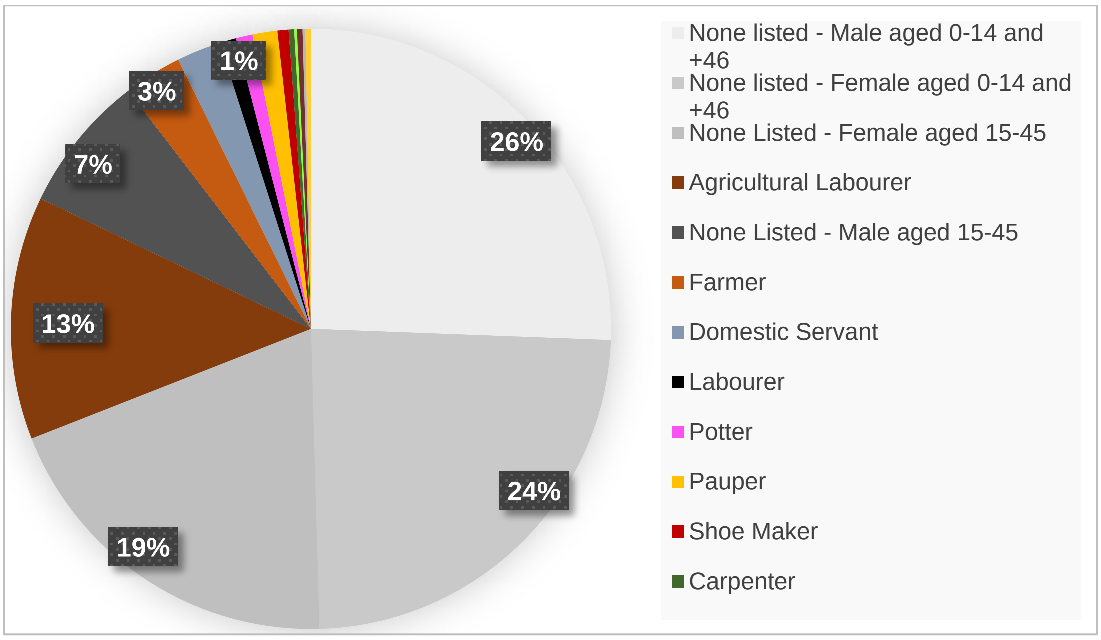


**Fig. 111: Proportion of occupations listed in the 1841 census for the Verwood tithing**

In total, 689 inhabitants were listed in the 1841 census for the Verwood tithing; of these, six are listed as potters – roughly 1% (Fig. 111 - pink) - six are listed as labourers, although the term is unspecific, and one hawker - <1% (Fig. 111 – green) - who is presumed to be a seller of ware. Thus, in total, the census presents less than 3% of the population in the tithing of Verwood as being involved in the manufacture and sale of pottery. This is inconsistent with Moyle's statistics, which, for Verwood (Fig. 110), suggests 266 people are reliant on the pottery for subsistence (roughly 38%); 175 directly benefit from the industry (25% of the population of the tithing) and only 35 individuals are directly employed (5%). This 5% estimate is slightly above the 3% of the population suggested from the census, which may be more indicative of the limitations of the county's first census survey. This is reinforced by the fact that 76% of the population in the survey have no occupation listed. Collectively, this suggests that while there is disparity between the estimates provided by Moyle's statistics and the census data, the two figures are not remarkably distant; thus, as an estimate, the Moyle's statistic should be considered an acceptable guide.

### *9.5. The East Dorset Ceramic Economy*

It is significant that the tithing of Verwood was chosen as an example to test the historic economic statistics for east Dorset pottery manufacture. The gazetteer exhibits that, by the 19th century, most east Dorset pottery production sites lie close to the Verwood tithing (made a parish in 1887), highlighting that Verwood was the area's primary economic hub for ceramic manufacture at this time.

This concentration of the pottery trade at Verwood has never been adequately defined. Copland-Griffiths (1998, p.21) cites the enclosure act as a primary driver for the growth in Verwood-type potteries occurring within that parish during the late 19th/early 20th century, which reinforces the settlements position as a contemporary regional ceramics production hub, giving the industry its name. The enclosure movement created boundaries within the wastes and common lands across England, depriving commoners of their ancient rights to graze animals and gather fuel. This was introduced to increase the size and productivity of certain fields, with private ownership replacing the shared and scattered nature of farming and tenantry under the medieval open field system. Initially, this was an informal agreement, but by the 17th century was authorised via Acts of Parliament:

> *"Overall, between 1604 and 1914 over 5,200 enclosure Bills were enacted by Parliament which related to just over a fifth of the total area of England, amounting to some 6.8 million acres"* (UK Parliament 2021).

Taylor (1970, pp.120-7) notes that this was initially sporadic in Dorset from the fourteenth century onwards, with most examples lying in the west and north – as evidenced by the increase of sheep farming on the chalk downlands. The uptake of such enclosures appears to be more piecemeal in the east, possibly due to less favourable geological conditions coupled with expansive tracts of woodland. The drive to enclose east Dorset fields is best explained by Stevenson (1812, p.17), an agricultural expert of the time:

> *"The heathland is almost entirely unenclosed, except the parts occupied by fir plantations, which are surrounded by sod banks, with furze sown on the tops of them; and this is perhaps the best kind of fence that can be afforded for enclosures on a soil so exceedingly barren and unimprovable."*

He goes on to state that wastes or commons:

> *"…might be improved by enclosing, draining, paring and burning, chalking etc. but the great expense of Bills of Enclosure, will never be repaid by the improvement of a few acres"* (Stevenson 1812, p.332).

However, the 1841 census exemplifies that the population of Cranborne - one of the largest parishes in Dorset - was heavily employed in agriculture. This is evidenced by over 800 from the 2158 people surveyed (37%) being employed in agricultural roles, which reflects data from the rest of the county (Bettey 1987; Kerr 1993). Sims (1969, p.53) agrees, noting that the county was almost solely devoted to agriculture, with a reputation for low wages and poverty that went far beyond that experienced by neighbouring counties.

The various inventories, some of which have already been mentioned in terms of fuel, elucidate how agriculture was undertaken alongside pottery manufacture by east Dorset potters. It has been noted that many potters went on to become full-time farmers or agricultural labourers, suggesting that this occupation was favoured - perhaps being more lucrative and allowing for a more comfortable living (Bettey 1987, p.34). Examples include James Budden, who is listed as an agricultural labourer in the 1871 census and Fred Sims, who abandoned potting and became a farmer in 1915 (Draper and Copland-Griffiths 2002).

However, Bettey (1987, p.40) and Draper (2002, p.31) note that numerous individuals in various occupations took part in agriculture, where possible, to supplement income, lower food costs and avoid starvation. This leads to an interesting argument regarding what Arnold (1985, p.168) terms a "feedback mechanism", comprising the connection between a given population choosing to make pottery or undertake agricultural production, or a balance of the two. The many pressures that add gravity to this decision can be complex, comprising environmental issues, material supplies, market demand, and time investment. The mechanism is often expressed as: where available land for agriculture and/or productivity decreases, there is increased investment in industrial occupations, such as pottery manufacture (Arnold 1985, p.168). While this can generally be applied to east Dorset, a poor heathland environment, it should not be seen as the sole factor for the initial undertaking of pottery in the region; the origins of this pottery tradition are still poorly understood, especially without physical evidence for a medieval pottery production site in the area (Chapter 4). Instead, the role of agriculture being undertaken on a small-scale by post-medieval pottery production proprietors should be viewed as an alternative subsistence strategy - especially where the agricultural land is poor and population pressure upon it is high, as is the case for east Dorset. This is reflected best in Thomas Sims' estate inventory following his death in 1707, which states he had corn threshed and unthreshed, as well as in the ground, five horses, six cows, two pigs and thirty-one sheep; similar may be said for Charles Henning who died in 1710 (Draper and Copland-Griffiths 2002, p.45). Comparable situations have been noted by Bourne (1999) for contemporaneous Farnham potters, and by Kemper (1977) in Tzintzuntzan, Mexico. Here, agricultural land is limited, comprising large stony areas with steep inclines and shallow soils, leading to potters occupying marginal locations (Foster 1967).

This feedback mechanism between available productive agricultural land and the marginal locations of pottery manufacture is not only evident in the east Dorset potting community, but has influenced east Dorset settlement patterns down the centuries. Algar *et al*. (1979, p.35) notes that:

> *"A combination of factors was making the region attractive for settlement, not the least of which was the availability of previously waste land. It is likely that encroachment was easier, the area being relatively remote from the more extensively farmed older villages. In the latter, supplies of wood, turf and sand were becoming harder to obtain as the once large commons were gradually enclosed, but in Verwood raw materials were still readily accessible."*

This movement in pottery production cannot be readily explained. For example, there is no apparent exhaustion of clay supply, as Crendell clays continued to be extracted (Copland-Griffiths 1998, p.32), and it can be shown that, despite a reduction in waste/common land and woodland for fuel supply, the source is not exhausted (Fig. 112-3).

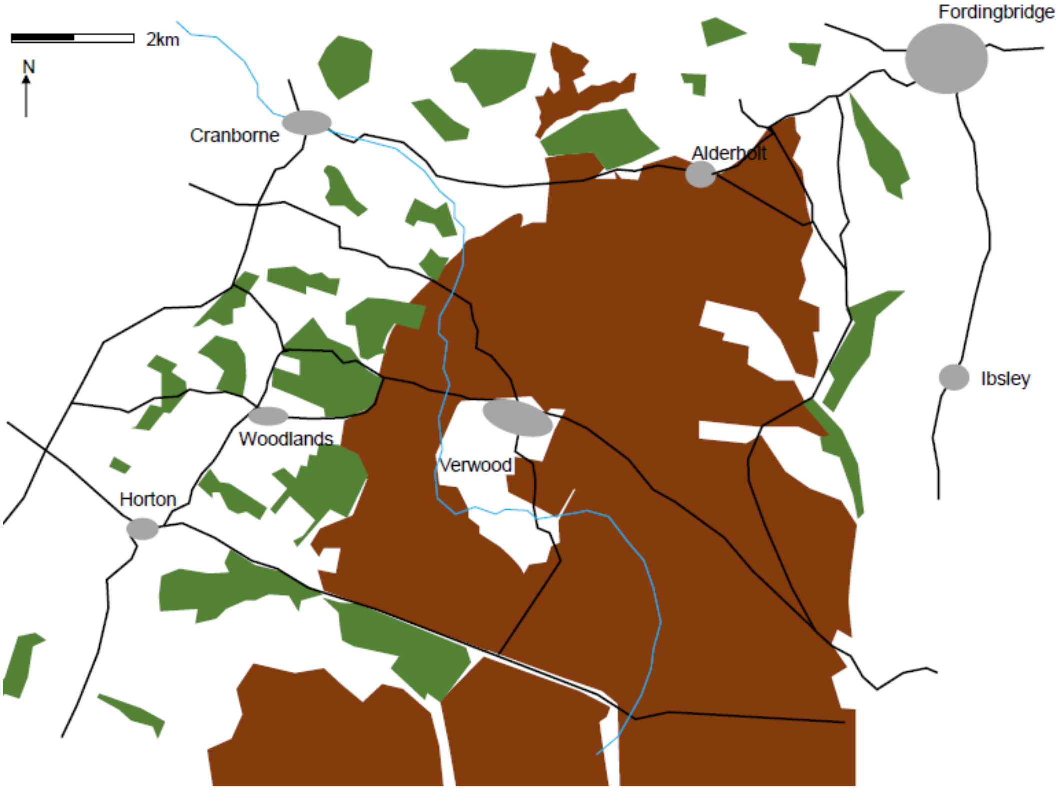


Fig. 112: Woodland and commons as displayed on the 1811 Ordnance Survey; waste/common land is shown in brown, areas of woodland in green, the River Crane in blue and major roads in black

Fig. 113: As previous but for 1902; the railway is dashed black

Detailed examination of the ordnance survey maps of 1811, 1881 and 1902 suggest that this loss of common lands represents a systematic increase in the available agricultural land at the expense of the woodland and wastes, evidenced by an increase in discrete farmsteads. This is mirrored by a range of historical documentation evidence for earlier assartments from the common, which show that wastes were constantly being reduced. Thus, to make use of the commons for cheaper land rents and adequate supplies of heathland resources such as wood and turf, the Verwood area appears to be favoured for pottery manufacture.

In his ‘Ceramic Ecology’, Matson (1965) has demonstrated that numerous cultural, biological, political and physical factors can determine where a particular manufacture takes place and prospers. He has illustrated that there are various ways that such production can respond to environmental and ecological change. This is echoed by Peacock (1982, p.25), who states: “almost all modern industries develop a symbiotic relationship with the natural environment”. This suggests that a reduction of fuel or clay source can often be overcome by a manufacturer altering their raw material or fuel source, or by adjusting production accordingly, rather than completely relocating or closing. Instead, another explanation for the concentration of 19th century Verwood-type pottery production in the Verwood area lies in that which cannot be readily explained by either historical mapping or the archaeological data: such as economic factors.

It is proposed that economic pressures resulting from a desired increase in agricultural land as part of the agricultural revolution - alongside population pressures from a growing populace - were driving factors in the increasing nucleation of pottery workshops in and around the Verwood area starting in the 19th century. This is evidenced by the contrast between the declining number of production sites in other parishes, and the region generally, with those in Verwood - which increase between AD1800-1850 (Fig. 114). Algar *et al.* (1987, p.31) argue that this concentration was “little more than a southward extension of the earlier activity at East Worth”. The historic mapping data, along with the historic documentation, argues that this is much more than an extension of existing production, but a clear choice of movement in response to agricultural, population and economic pressures to an area with less pressure; one surrounded by common lands which experience less population pressure and political control over resources such as turf.

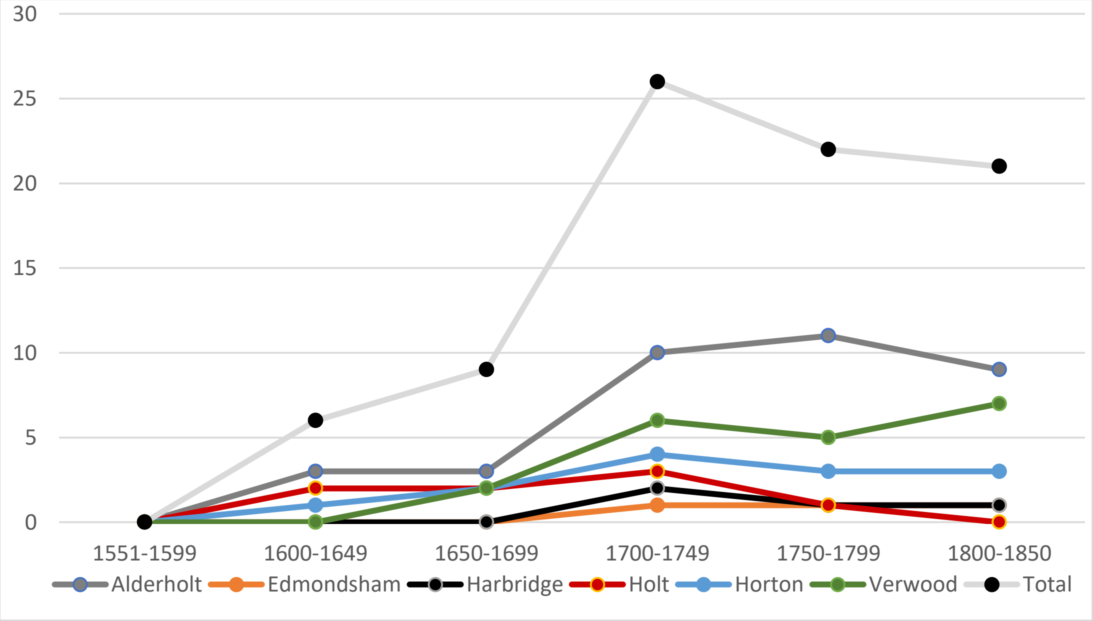


**Fig. 114: Numbers of Verwood-type pottery production sites over time by modern parish**

Arguably, this may have been one of many potential driving factors in the extinction of pottery production sites in neighbouring parishes, such as Horton and Holt in the 18th century, plus Edmonsham and Harbridge in the 19th (Fig. 114).

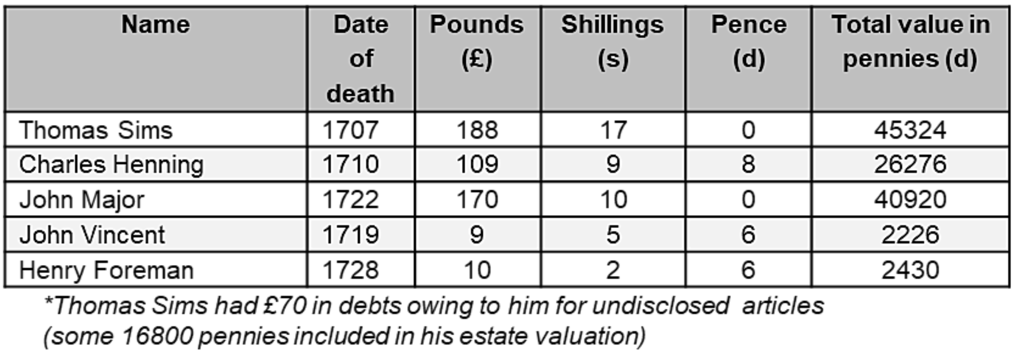
This rise of agriculture in the area would have been a double edged sword for the industry. Increased population meant more consumers, new farms meant an increase in sales of certain particular forms such as dairy and storage vessels, whilst simultaneously providing less land available for fuel, and driving increases in rents for potters who leased land that could be used for intensive farming.

Additional aspects of the nucleated industry, such as that in 19th century Verwood, as termed by van der Leeuw (1977) and Peacock (1982), involve attempts to extend the working season as much as possible, often using more advanced technology, alongside increased co-operation between producers. This can be seen in the extensive use of drying sheds to dry wares throughout the year, plus the mechanisation of wheel throwing wares to make forming and surface treatment more efficient (Chapters 6 and 7). The working season for potters is a topic that has frequently been discussed by those exploring ceramic manufacture, particularly in behavioural studies and ethnographic cases, as to whether pottery is a part- or full-time occupation (*e.g.* Rhodes 1970; Litto 1976; Bourdieu 1977; Arnold 1985). This is an important issue to understand the scale of the ceramic economy, as Gosselain (1998, 90) notes:

> *”…where pottery production is just a part-time activity with weak economic returns, potters tend to subordinate their work to their primary economic concerns and to limit as much as possible their investment in time and energy.”*

The evidence for most Verwood-type potters’ leans in favour of full-time potting, with some subsistence agriculture alongside. Interestingly, two potters, John Vincent of Alderholt (d. 1719) and Henry Foreman or East Worth (d.1728) both have no animals, corn or agricultural equipment listed in their inventories, suggesting these men solely potted. The duality of farming/potting seems to lead to increased wealth for some, probably due to decreased food costs and additional income through any sales of excess agricultural products; as exemplified by Thomas Sims of East Worth (d. 1707) and Charles Henning (d.1710) both potter-farmers, who had estates worth more than their non-farmer counterparts (Table 71). For some potters, this balance changes over time - perhaps until enough capital is accumulated to move to farming full-time – as it was for Fred Sims.

**Table 71: Total Value of Estates from Inventories for Known East Dorset Potters in the 18th Century**



| Name | Date of death | Pounds (£) | Shillings (s) | Pence (d) | Total value in pennies (d) |
|---|---|---|---|---|---|
| Thomas Sims | 1707 | 188 | 17 | 0 | 45324 |
| Charles Henning | 1710 | 109 | 9 | 8 | 26276 |
| John Major | 1722 | 170 | 10 | 0 | 40920 |
| John Vincent | 1719 | 9 | 5 | 6 | 2226 |
| Henry Foreman | 1728 | 10 | 2 | 6 | 2430 |

**Thomas Sims had £70 in debts owing to him for undisclosed articles (some 16800 pennies included in his estate valuation)*

The aforementioned accounts of Fred Sims (DHC Ref: Ph/530/1-3) have relevance here. They suggest that, for some potters, firings were undertaken year-round, demonstrating that agriculture, which is also mentioned in his accounts, was a supplement rather than a seasonal or part-time undertaking. The accounts list firings by lot, and have a broad range of prices, from £34/5/3 to £19/17/0. In total, 76 firings are noted; this equates to between five to seven annually for 1898 to 1909; only two firings took place in 1910. Fig. 115 shows the value of pottery sold for each firing, with a sinuous pattern comprising rising and lowering income correlating with the time of year, suggesting that the more lucrative firings took place in the summer months. The amounts are displayed here in old English pennies (d), to directly show the relationship between each firing. The relationship is best presented when all years are combined and displayed by month (Fig. 116). Despite some anomalies, the general trend shows summer months to be more lucrative; possibly as these are warmer and drier, leading to drier pottery, a drier kiln, and less temperature fluctuations in firing, thus reducing pottery waste.

Although operating late within the industry’s life span, these accounts give such fine detail that they should not be easily discounted. While the east Dorset potters relationship with farming has been shown to be mixed, Fred Sims’ accounts give an indication that cannot be gleaned from archaeology alone.

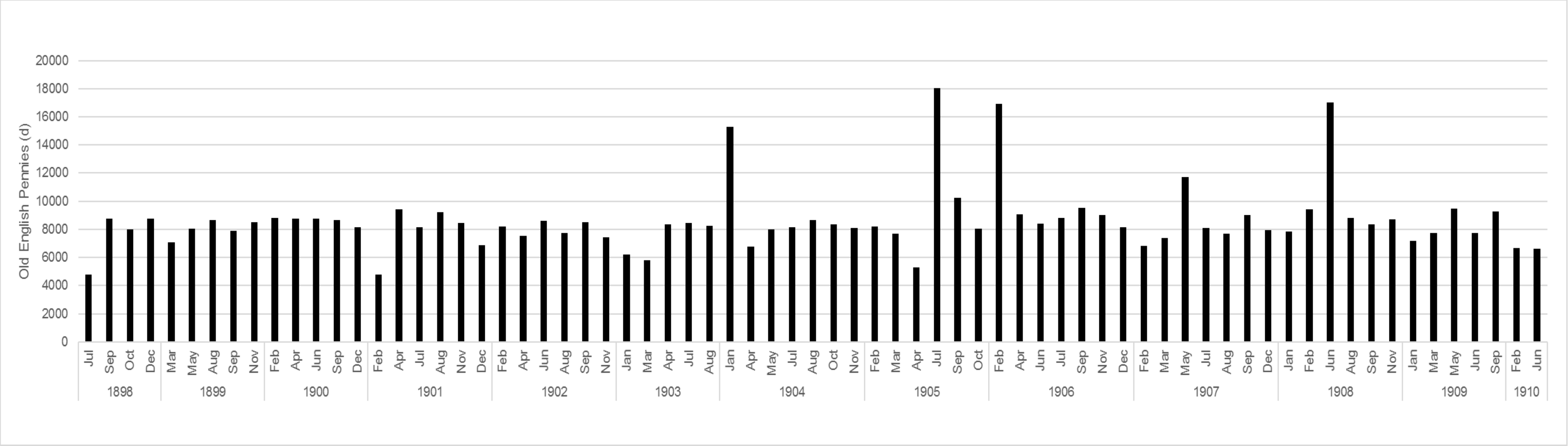


**Fig. 115: Income from pottery recorded in Fred Sims' accounts, listed by month of firing**

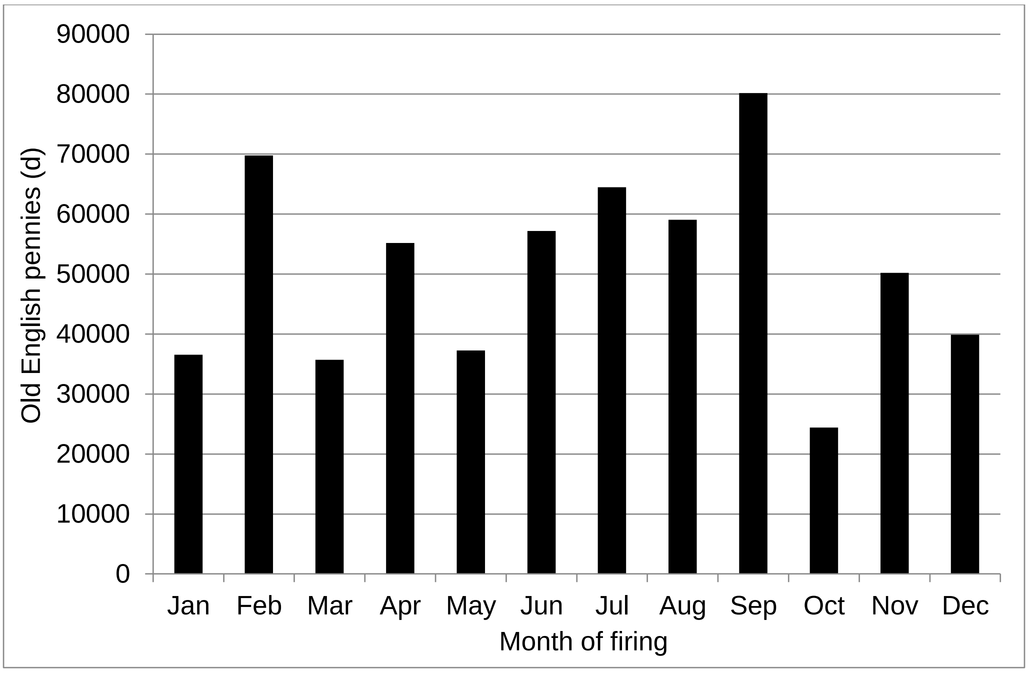


**Fig. 116: Total income in Fred Sims' accounts with all years combined by month**

The accounts also provide a detailed insight into the length of time necessary to establish a successful pottery. Initial firings produced little in the way of income for Mr Sims, taking two-three years for a steady income to be established. Also, despite being an established potter, some years could be particularly difficult *i.e.* 1903 (Fig. 117).

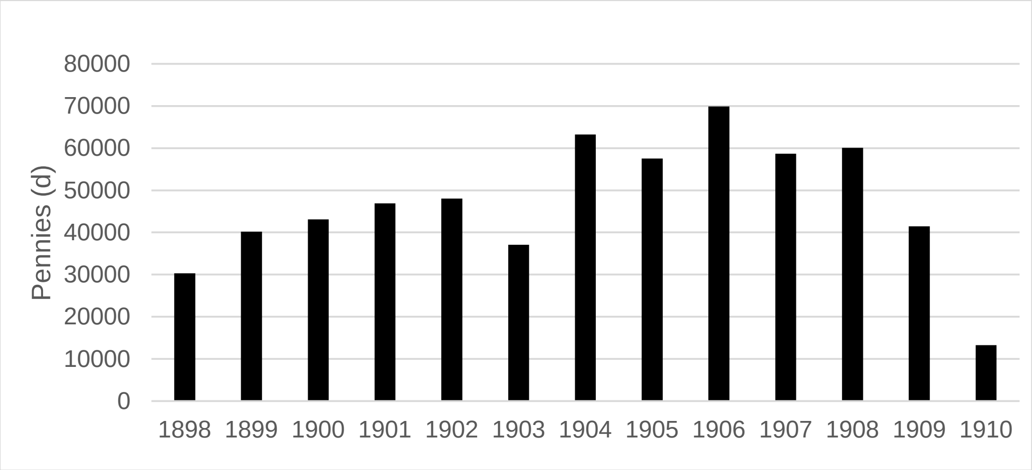


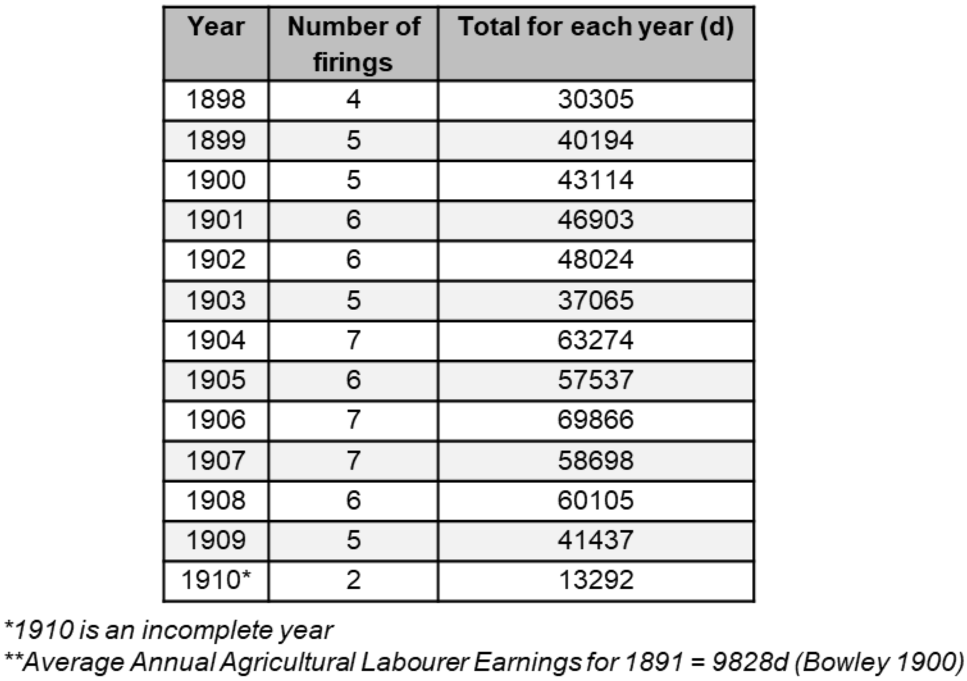
**Fig. 117: Annual income in Fred Sims' accounts between 1898-1910**

These figures are largely meaningless, in terms of numbers of vessels, as they clearly comprise entire kiln loads. Thankfully, costs of certain items are also listed; these prices refer to the rare occurrence that items were sold direct to the customer, and comprise:

- A set of three large pans at 3s/6d;
- A butter churn 1s/6d and 1s/4d;
- A cream pan 7d and 4d.

When Fred Sims' accounts are used as an example to estimate the general state of wealth for a Verwood potter in the late 19th/early 20th century, it can be estimated that he received a relatively low to average wage; although comparatively slightly above that of an agricultural labourer (Table 72), who might receive £40/19/- a year at this time (Bowley 1900, p.35). It should be stated that the agricultural labourer would not have to concern himself with the wages of those who worked for him, along with common ceramics outlays such as £8/6/8 for wood in February 1909 (2000 pennies) and £3/4/0 (768 pennies) for four loads of clay in June 1908.

**Table 72: Income from Sims' Pottery per Annum**



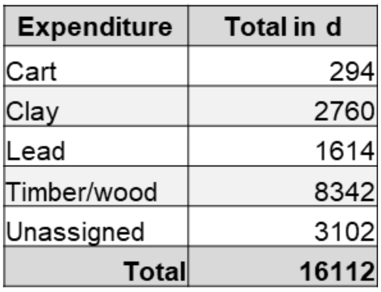
| Year | Number of firings | Total for each year (d) |
|---|---|---|
| 1898 | 4 | 30305 |
| 1899 | 5 | 40194 |
| 1900 | 5 | 43114 |
| 1901 | 6 | 46903 |
| 1902 | 6 | 48024 |
| 1903 | 5 | 37065 |
| 1904 | 7 | 63274 |
| 1905 | 6 | 57537 |
| 1906 | 7 | 69866 |
| 1907 | 7 | 58698 |
| 1908 | 6 | 60105 |
| 1909 | 5 | 41437 |
| 1910* | 2 | 13292 |

**1910 is an incomplete year*

***Average Annual Agricultural Labourer Earnings for 1891 = 9828d (Bowley 1900)*

Expenditures in the accounts are extremely difficult to decipher, with the most comprehensible year being 1902 (Table 73; Fig. 118). This gives an indication of the annual costs involved in running an early 20th century Verwood-type pottery, with fuel being the primary outlay.

**Table 73: Expenditures Listed in Sims' Accounts for 1902 Relating to Pottery production**



| Expenditure | Total in d |
|---|---|
| Cart | 294 |
| Clay | 2760 |
| Lead | 1614 |
| Timber/wood | 8342 |
| Unassigned | 3102 |
| **Total** | **16112** |

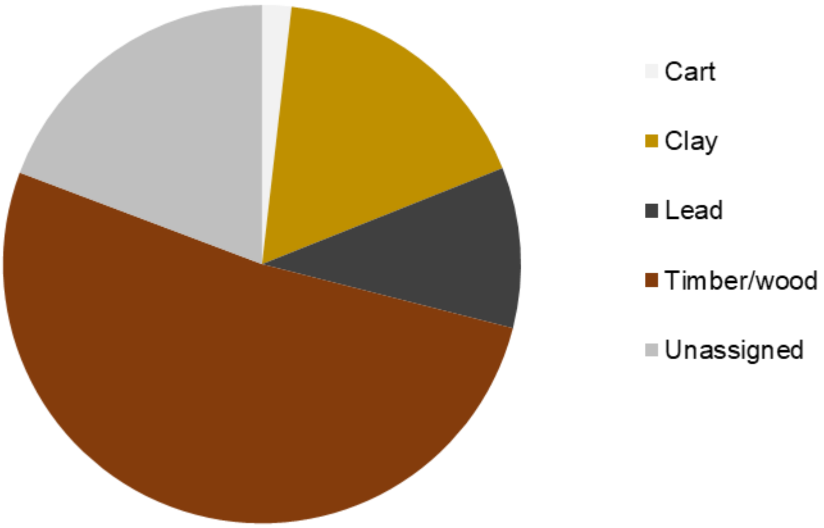


**Fig. 118: Production costs for the year 1902 from Sims' accounts**

For earlier periods, prosperity of potters can be estimated from the inventories as part of wills in the 18th century. They reveal a great range in terms of wealth and prosperity between Verwood potters (Table 71), illustrating varying success rates among east Dorset potters. This may explain why a more stable wage as a farmer would have been favoured over the relatively unpredictable income received as a potter.

In summary, growth in the industry can be numerically estimated using Mr Moyles' statistics, and the organisation of raw material procurement is evident in a range of historical documentation. This reveals that the industry relied on an organised network of woodland industries and raw material pathways, of which the potteries also formed a part. The fact this network additionally supplied other industries meant a robust supply from an organised, efficient and long-established procurement strategy. Furthermore, the woodland industries were of vital importance to the area, thus it can be argued that the chronological concentration of the potteries can be charted by defining the changing settlement patterns influenced by increasing pressure for agriculture and the creation of new farms, at the expense of areas of managed common and woodland. This led potters to occupy fringe positons with low rents, while often engaging in subsistence agriculture to reduce outgoings. Despite these economic counter-measures, the accounts and inventories of the potters highlight that, even in times of great boon for the industry, there were potters who experienced mixed success. Additionally, while production throughout the post-medieval period is unlikely to have been strictly seasonal, the summer months were certainly more prosperous with higher yields resulting in increased sales. Cumulatively, these elements enabled Verwood-type pottery to be highly competitive in comparison to neighbouring industries. It is the distribution network, the relationship that Verwood-type pottery had with other regional pottery manufactories, and the role that the industry played in the wider ceramic economy of southern Britain that now needs to be defined.

# 10. The Wider Economy and the Distribution of Wares

Evidence reveals that an extensive local heathland resource network supplied a range of east Dorset industries; each of these provided diversity to a heathland economy that is otherwise dominated by agriculture. This network, and the ability of certain potters to diversify, allowed for reduced overheads and a highly competitively priced product to be produced by nucleated workshops working as part of an interconnected productive landscape. These factors enabled robust and functional vessels to be distributed at relatively low costs. The collaborative nature of this economic heathland community is presented by a letter from Fred Fry - potter of Crossroads - written in 1909, which discusses the possibility of maintaining a clay supply at Holwell, east Dorset:

> *"We regret the Bell Trustees have decided to stop the clay digging, you are aware that the pottery working is practically the sole industry of Verwood (excepting brick making), and many poor people depend on their living by the industry. On behalf of three other potters and myself, we shall be very pleased if you would represent our case to Lord Salisbury as a means of taking some land to enable you to supply us as heretofore….Firewood is brought from Lord Salisbury through George Fry of Crindall*[sic]. *Following is a list of people engaged: Potters 8, Labourers 10, Hawkers carrying brooms 6 & pottery local made 12, Total 30"* (Copland-Griffiths 1998, p.32).

The hawkers mentioned in the letter comprise the people who bought, carried, and distributed these heathland products into the wider markets. They were responsible for the dispersal of the pottery, and have a central role in promoting the spread of Verwood-type pottery across the ceramic market of southern Britain. This is in contrast to William Smith, a contemporaneous potter of Farnham, who dedicated much of his time to market his own wares (Bourne 1999). Chapter 9 showed that during the late 19th/early 20th century, these hawkers moved heathland products via horse and cart, thus they were reliant on the long-established road and track networks. This network had been upgraded through the creation and maintenance of turnpike roads. Subsequently, railways allowed an increased quality of connections across the network, thus accommodating improved movement of products. Through understanding the distribution of Verwood-type pottery throughout southern central Britain, the importance and significance of the role that this industry played within the late medieval and post-medieval ceramic market of the region can be ascertained. Arnold (1985, p.237) supports this premise:

> "…*by comparing the relative frequency of vessel shapes with the composition of the fabric of these shapes, the archaeologist can assess the relative economic dominance of a pottery making community in an area…fabric analysis can provide important information about ceramic distribution patterns and accompanying economic relationships in an area."*

Through studying the composition of pottery fabrics comprising ceramic assemblages recovered from consumption sites, it is possible to explore the relationships between different potting centres. Here, it is the presence of Verwood-type pottery and its competitors that are particularly relevant. The identification and quantity of said pottery can elucidate the nature and quality of connections between towns across the late medieval and post-medieval periods; this can be used to show the commercial importance of certain urban centres and markets within a given region (*e.g.* Streeten 1985; Spoerry 1989; 2016).

Furthermore, a developed consideration of the methods of circulation of the finished products provides a greater understanding of the economy that supported the industry, along with an improved appreciation of the interactions that occurred for each completed product once the production process was complete. The relationship between the aforementioned hawkers, potters, and their markets can be further elucidated using Fred Sim's accounts, other historical documentation, and supplemented with data from interviews collected by the VDPT. Collectively, these items explain the post-medieval archaeological data as a form of ethnographic archaeology (*e.g.* Binford 1962; Kramer 1979; Peacock 1982).

### *10.1. Hawkers*

The accounts of Fred Sims, potter of Verwood, were presented in Chapter 9. This valuable historic source not only covers production elements, but provides a unique insight into the workings of the distribution system of Verwood-type pottery in the late 19th/early 20th centuries.

While the accounts list numerous sales to unnamed customers, there are frequent references to regular and repeated sales to hawkers; these bear the bulk of the sales. In total, there are over 37 buyers from each individually numbered firing (Table 74; Fig. 119). Additional orders include repeat business for purchases of flowerpots and unspecified wares. The results illustrate that these buyers are not purchasing in repeated set amounts for each transaction; the amounts are not constant, and certain purchasers acquire the bulk of wares, such as 'JK' or 'King' - as mentioned in the accounts (Fig. 120). Patterns can also be discerned where hawkers are buying variable amounts of wares for short periods of time, and subsequently are replaced by other individuals, *e.g*. EB with FS, plus AS with GB, thus elucidating that buyers either went elsewhere for supplies, went out of business, or died and were replaced by others. It can often be difficult to identify individuals from a set of initials or a single name or surname (Table 74). Furthermore, numerous entries lack any identifiable buyer, which are listed below as 'Private sales'.

## Table 74: List of Buyers Identified in Fred Sims' Accounts

| Initials in Accounts | Date in Account | Potential Individual or Organisation Identified from Initials | Residence/Location of Identified Name |
|---|---|---|---|
| AS | 1899-1900 | Amos Shearing | Newton, Verwood listed in Census |
| B | 1903 | Possibly a member of Bailey or Brewer family, but uncertain. | |
| BB | 1904 | William (Bill) Bailey | Vine Cottage, Ringwood Road, Verwood as listed in 1901 Census |
| CB | 1898-1899 | Occasionally a C. Bailey is listed | |
| CF | 1899, 1907 | Possibly Charles Ferret | Manor Road, Verwood, as listed in 1901 and 1911 census. |
| Damerham | 1906-1909 | Repeat order for flowerpots to Damerham, often appears as "Dam" or "Pots to Dam" | Could be flowerpots delivered to a large estate house or gardener in Damerham |
| EB | 1898-1901 | Esau Bailey | Newton, Verwood as listed in census |
| EC | 1904 | Possibly Edward Cructher | Three legged Cross as listed in 1901 census |
| FB | 1899, 1902, 1904-9 | Possibly Frank Budden, certainly F. Budden appears repeatedly | Verwood in 1901 census |
| FS | 1906-1910 | Fred Shearing | Verwood in 1901 census |
| G Brewer | 1898 | George Brewer | Newton, Verwood in 1891 census |
| G Bailey | 1907 | George Bailey | |
| GB | 1899, 1902-1910 | Occurs repeatedly, this could be either G Brewer or G Bailey, or another GB - Uncertain, but cetainly a repeat customer. | |
| GT | 1899, 1907 | Unknown | |
| HB | 1898-1906 | Herbert Bailey | Verwood in 1901 census |
| HO | 1905 | Unknown | |
| JA | 1901-1910 | Joseph Andrews | East Worth, Verwood in 1901 census |
| JB | 1906 | This is likely to be either Job Brewer or James Bailey | Both listed in Verwood in 1891 census |
| JH | 1904-1906 | Unknown | |
| JK | 1898-1909 | Job King | Newton, Verwood in 1901 census |
| JR | 1898 | Possibly John Read | Ringwood Road, Verwood in 1891 census |
| JS | 1898-1908 | Possibly Jane Steele. A Steele occurs by surname on occasion. | Boveridge Common, Cranborne in 1891 census |
| JT | 1902 | Joseph Trickett | Newton, Verwood, listed as market dealer in 1891 census |
| LB | 1898, 1901-1904 | Lot Brewer | Verwood in 1891 census |
| LO | 1899-1910 | Lot Oxford | Ringwood Road, Verwood in 1901 census |
| MB | 1899 | Possibly Matthew Bailey | Verwood |
| MF | 1900-1902 | Possibly Martin Ferrett, who has known connections to the pottery industry. | Verwood |
| NB | 1900 | Unknown | |
| Private | 1899-1900 | Certain item bought direct - buyer not listed | |
| RB | 1903-1905 | Unknown | |
| Ringwood | 1906 | Repeat order "to Ringwood" of uncertain nature | |
| RS | 1899, 1909 | Possibly Robert Sims | Newton, Verwood in 1891 census |
| SA | 1907 | Unknown | |
| SB | 1898-1902, 1904-1910 | Sidney Bailey | Ringwood Road, Verwood in both 1901 and 1911 census |
| SG | 1909 | | |
| SO | 1904 | Possibly Seth Oxford | Ringwood Road, Verwood in 1891 census |
| SS | 1903, 1906, 1907, 1909 | Seth Sims | Newton, Verwood in 1901 census |
| TS | 1906-1908 | Possibly Tom Shearing. TS and Tom Shearing appear repeatedly throughout these years. | |
| WB | 1898, 1901-1910 | Possibly Walter Brewer | Ringwood Road, Verwood in census 1911 |
| WF | 1898-1899 | Possibly Walter Ferrett, former potter. | Verwood |

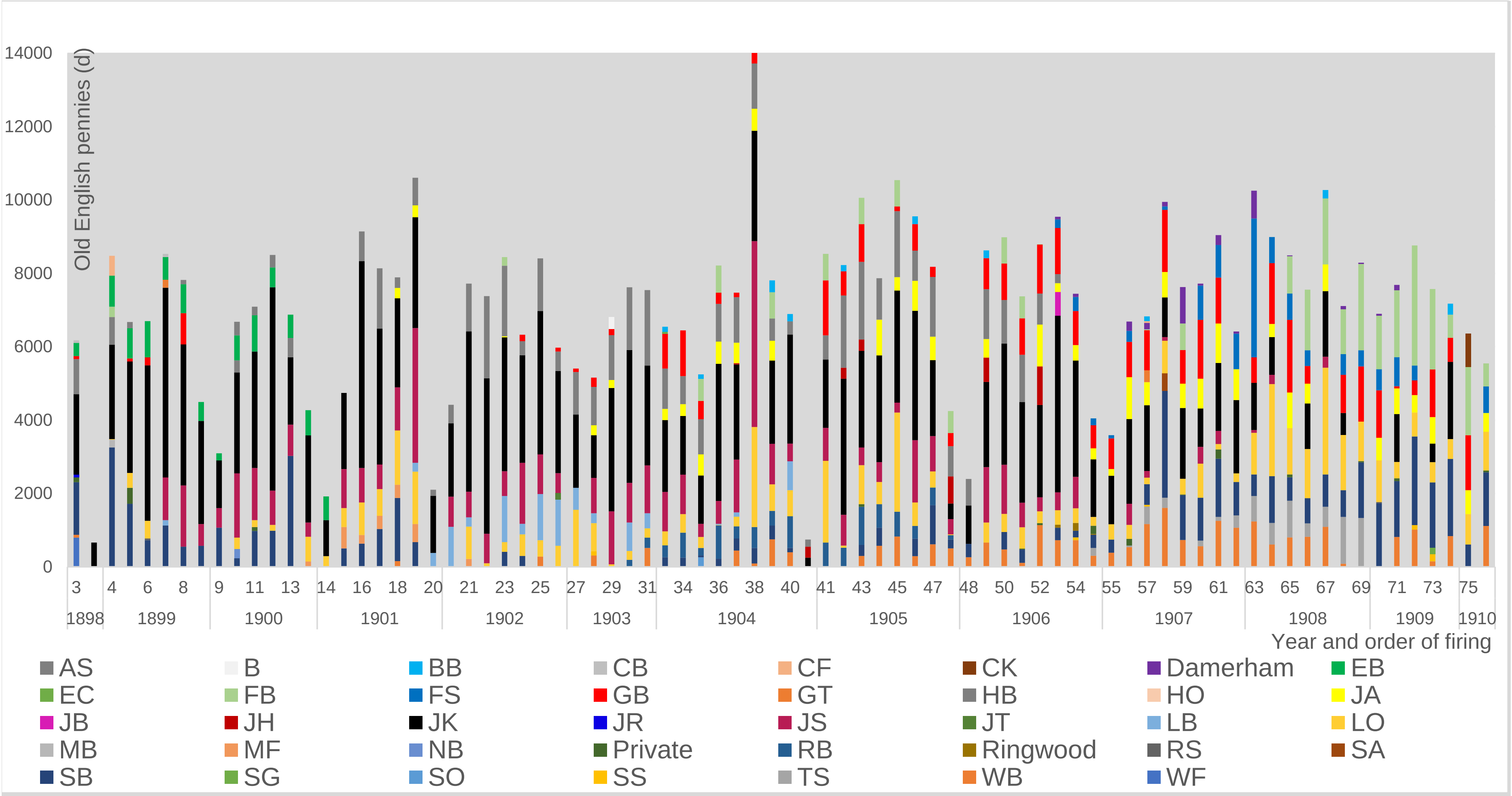


**Fig. 119: Value of sales by buyer per kiln load from Fred Sims' accounts**

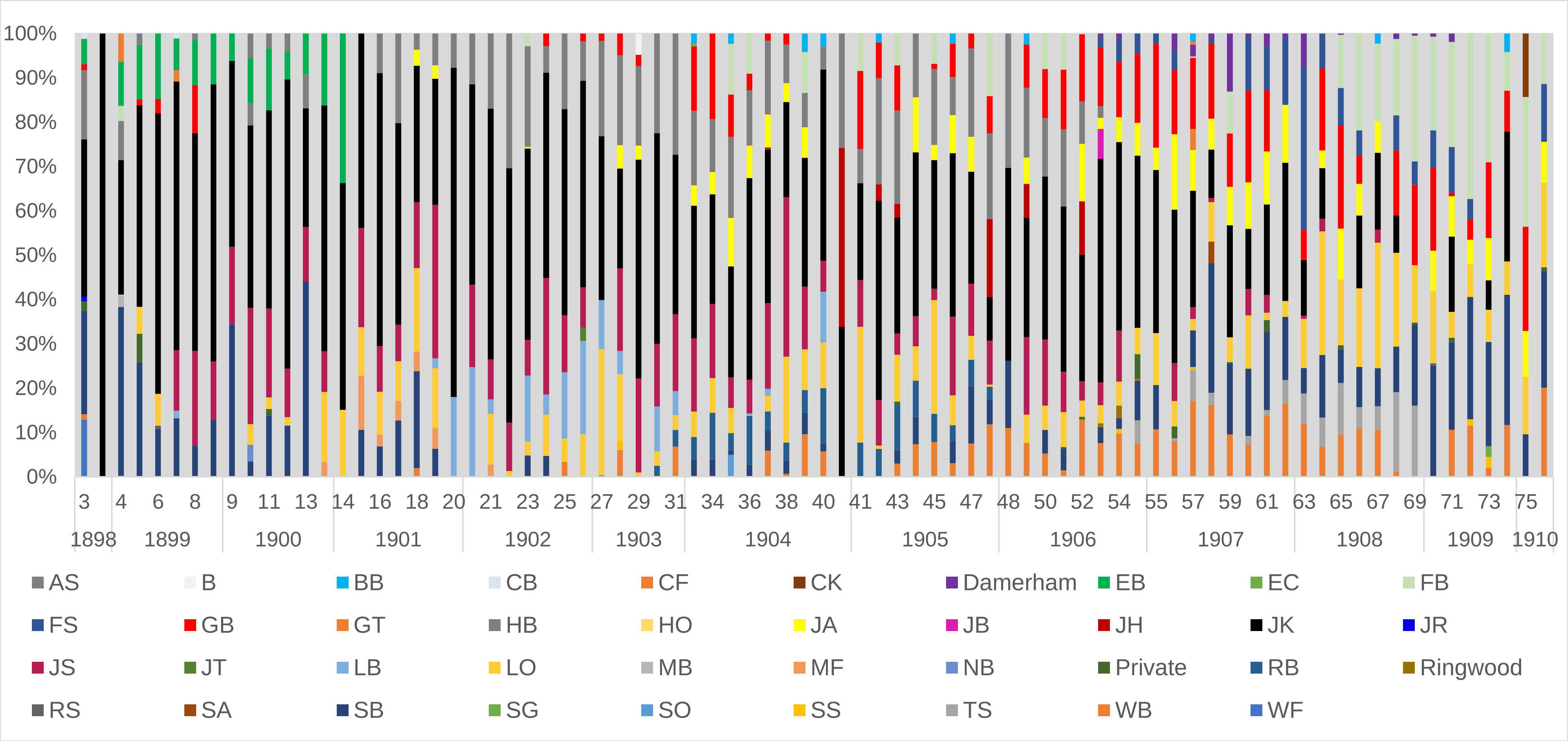


Fig. 120: Percentage sales by buyer per kiln load from Fred Sims' accounts

The accounts show that there is no set system, *i.e.* there is no minimum spend and no obvious contracts evidenced by repeated set amounts bought - although recurrent orders of similar values are not unknown, they are uncommon. Fig. 120 shows the values for purchases by repeat customers (those placing in excess of 50 orders). Those repeat orders exhibit a system reliant upon trust, evident through monetary lending. There are numerous entries for amounts owing from hawkers, *e.g. "*Feb 1908 £13/17/7 from 1906 owing to me from FS", and "25th March LO pays 14s/6, owes 2/6". This might have been reflected in Thomas Sims' (d.1707) inventory; with £70 of debts owing to him, this suggests the system has extended longevity. This confidence is reinforced by the family ties outlined in Chapter 6, and is bolstered by a strong sense of community, as the sellers live within close proximity to both each other and the potter (Table 74). Table 75 goes further, showing that the major buyers purchase over an extended period of time, who comprise JK, JS, LO and SB, with purchases comprising over 9% of the total sales over the time recorded. Minor buyers, of less frequency appear on a more ad hocor short term basis *e.g.* LB, RB and TS – less than 4% of total sales. Also principal sellers are replaced over time, perhaps as certain large scale buyers retire, go elsewhere for trade or go out of business *e.g.* HB and FB, JK and JA, EB and WB.

### *10.2. Overland Trade*

Where regularity in sales is noted, there is patterning in terms of days of purchasing for certain hawkers; this is shown visually in Fig. 121 and detailed in Table 75. Here, hawkers such as 'JK', 'EB', 'FB' and 'WB' choose to purchase on the weekends, whereas 'LO', 'GB', and 'SB' - among others - tend to purchase throughout the week. This suggests a planned and repeated system of distribution by hawkers, with lower frequency of purchases across the week from the potter representing longer travelled journeys, and more frequent purchases reflecting less distance travelled, thus local sales. This hypothesis is corroborated by interviews of immediate decedents of several hawkers, undertaken by the VDPT in the 1970s (Table 76).

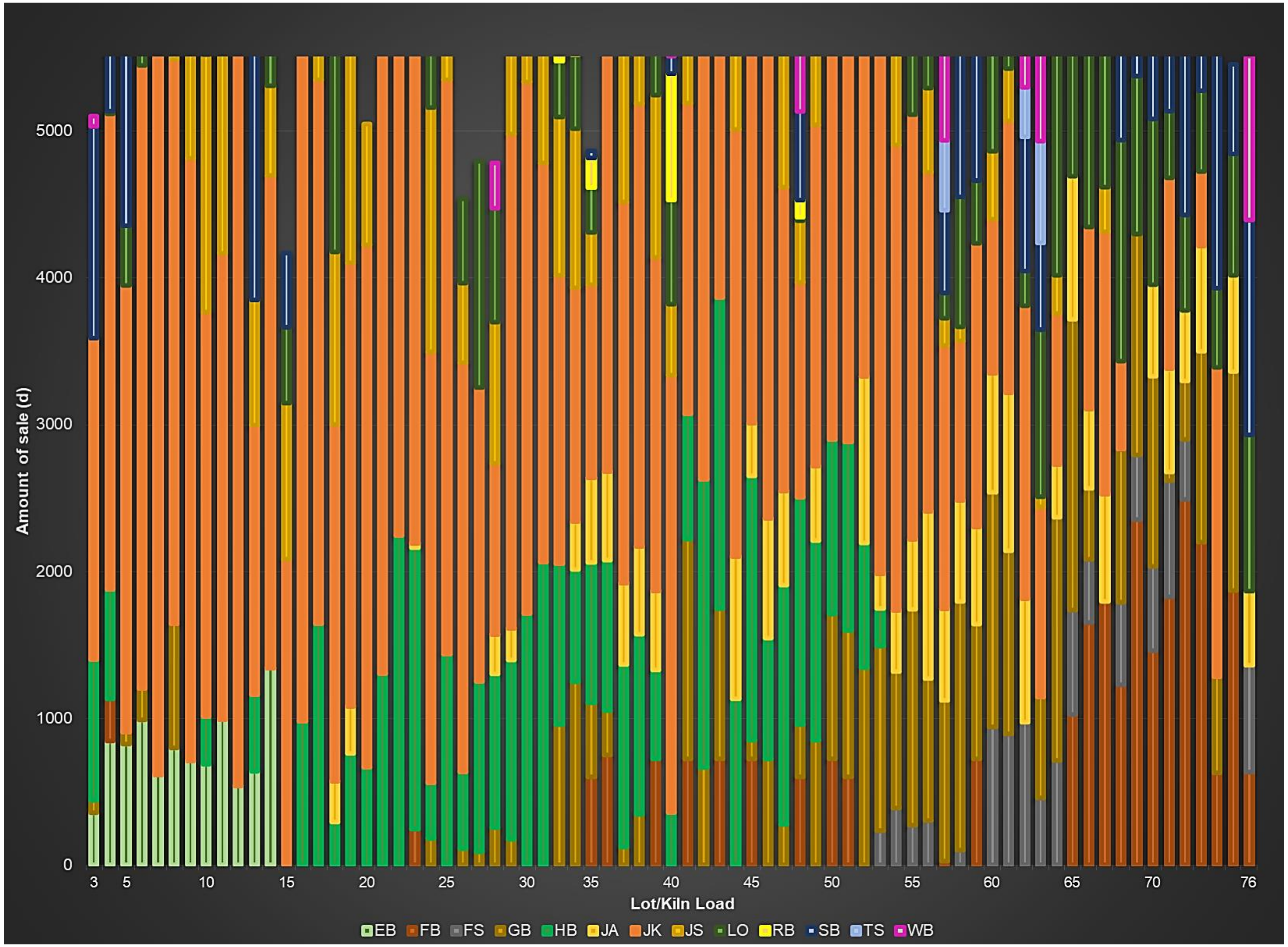


Fig. 121: Values of transactions made by repeat customers of Fred Sims between 1898-1910

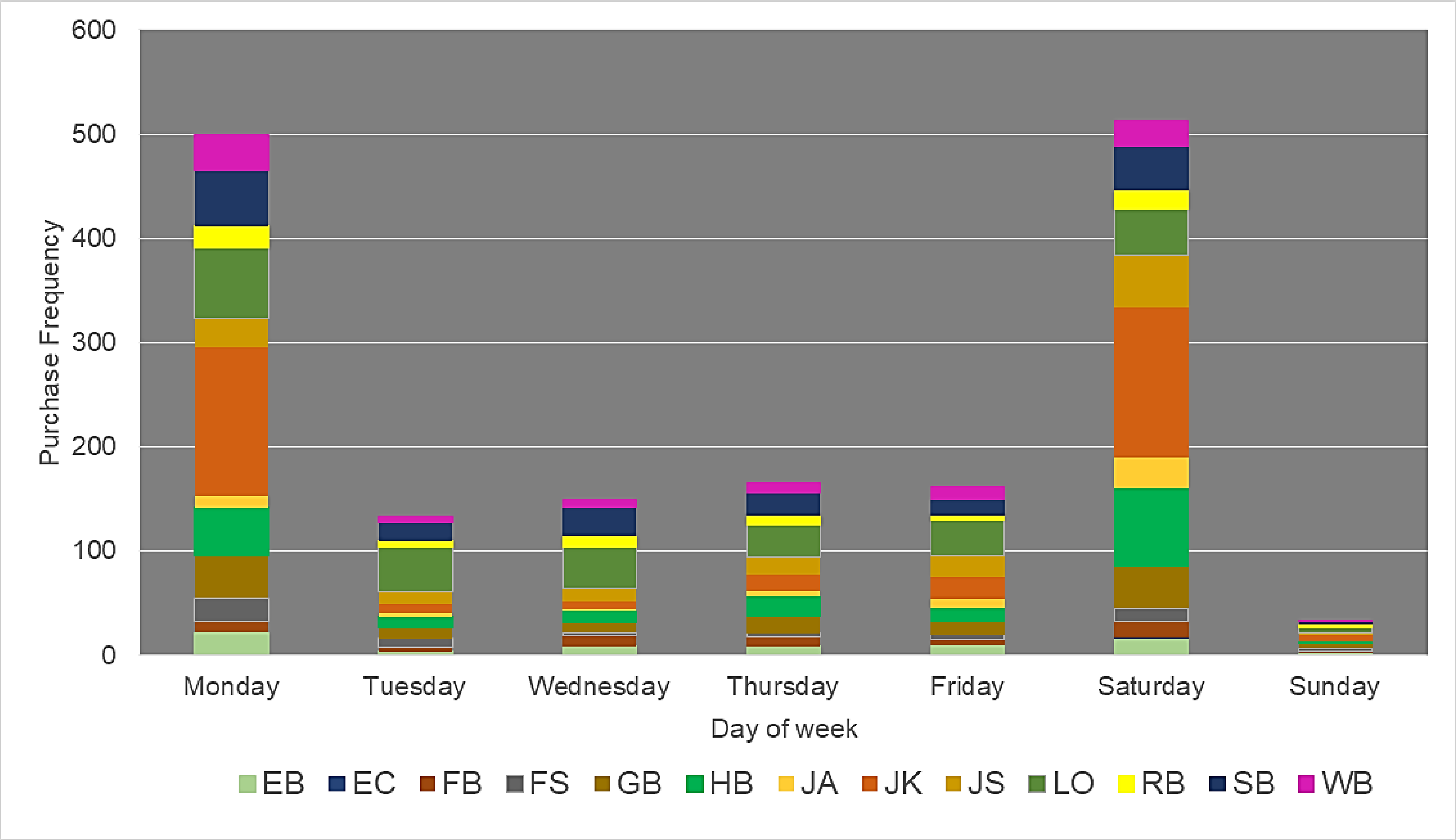
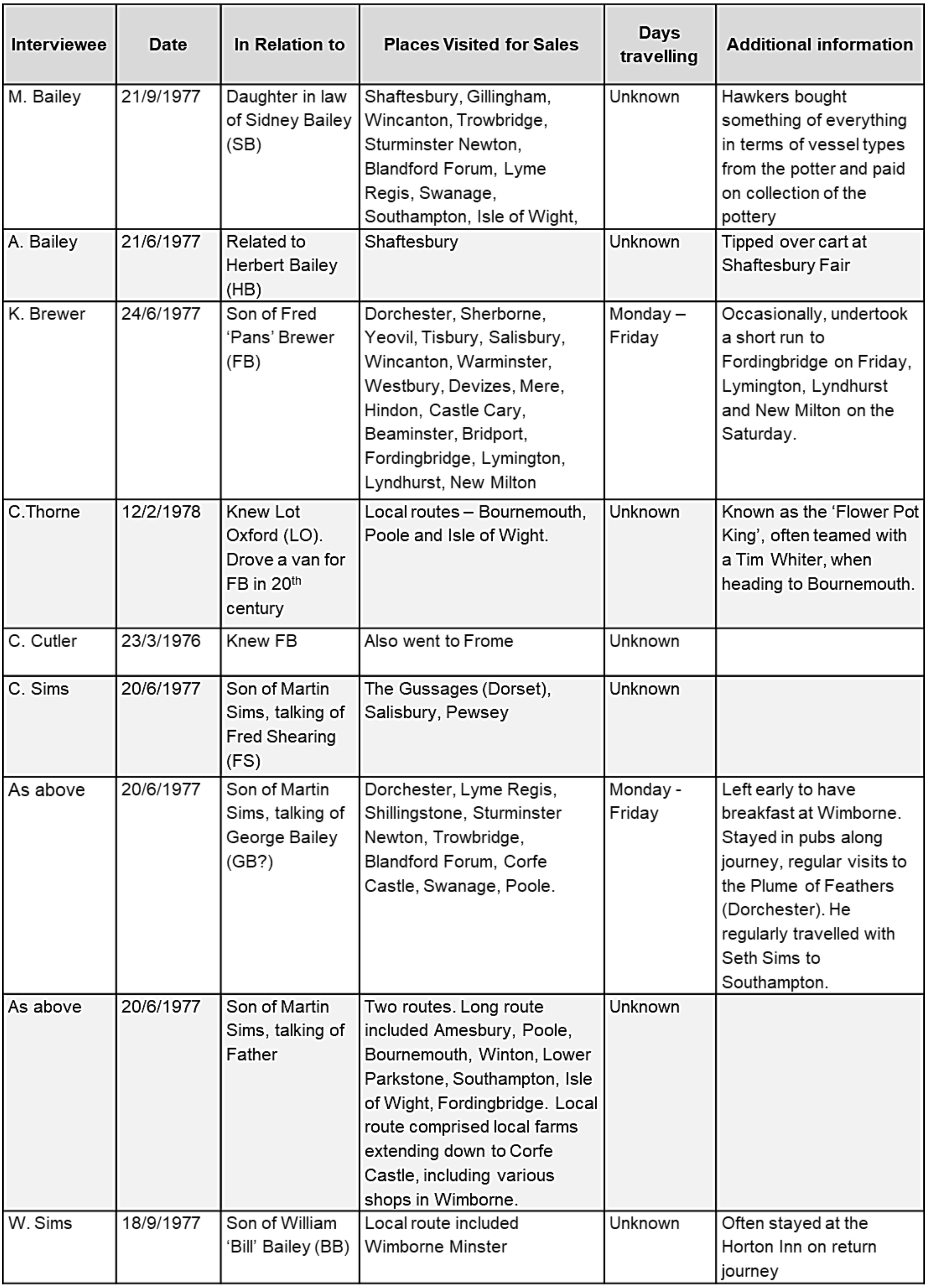


**Fig. 122: Days of sales for repeat customers of Fred Sims pottery between 1898-1910**

## Table 75: Details of Sales from Figs. 119-121 presented by year by percentage and old English pennies

| | Year of sale (old English pennies - d / percent -%) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1898 | | 1899 | | 1900 | | 1901 | | 1902 | | 1903 | | 1904 | | 1905 | | 1906 | | 1907 | | 1908 | | 1909 | | 1910 | | Grand Total (d) | Overall Percent (%) |
| Buyer | d | % | d | % | d | % | d | % | d | % | d | % | d | % | d | % | d | % | d | % | d | % | d | % | d | % | | |
| AS | | | 282 | 1% | 947 | 3% | | | | | | | | | | | | | | | | | | | | | 1229 | 0% |
| B | | | | | | | | | | | 327 | 1% | | | | | | | | | | | | | | | 327 | 0% |
| BB | | | | | | | | | | | | | 780 | 1% | 384 | 1% | 210 | 1% | 126 | 1% | 234 | 1% | 300 | 1% | | | 2034 | 0% |
| CB | 72 | 1% | 90 | 1% | | | | | | | | | | | | | | | | | | | | | | | 162 | 0% |
| CF | | | 540 | 1% | | | | | | | | | | | | | | | 45 | 1% | | | | | | | 585 | 0% |
| CK | | | | | | | | | | | | | | | | | | | | | | | | | 906 | 8% | 906 | 0% |
| Damerham | | | | | | | | | | | | | | | | | 162 | 1% | 1933 | 3% | 912 | 1% | 192 | 1% | | | 3199 | 1% |
| EB | 354 | 5% | 4574 | 11% | 3726 | 10% | 648 | 1% | | | | | | | | | | | | | | | | | | | 9302 | 2% |
| EC | | | | | | | | | | | | | 48 | 1% | | | | | | | | | | | | | 48 | 0% |
| FB | | | 288 | 1% | | | | | 240 | 1% | | | 2064 | 3% | 2760 | 4% | 1330 | 2% | 744 | 1% | 8040 | 13% | 9373 | 25% | 2496 | 21% | 27335 | 5% |
| FS | | | | | | | | | | | | | | | | | 802 | 1% | 3276 | 6% | 6645 | 11% | 1774 | 5% | 726 | 6% | 13223 | 2% |
| GB | 84 | 1% | 1152 | 3% | | | | | 288 | 1% | 516 | 2% | 3467 | 5% | 4664 | 7% | 6982 | 12% | 8365 | 14% | 7358 | 12% | 3715 | 10% | 1494 | 13% | 38085 | 7% |
| GT | | | 216 | 1% | | | | | | | | | | | | | | | 324 | 1% | | | | | | | 540 | 0% |
| HB | 961 | 14% | 748 | 2% | 858 | 2% | 3666 | 8% | 8313 | 17% | 7202 | 22% | 7485 | 12% | 10950 | 16% | 5653 | 10% | | | | | | | | | 45836 | 8% |
| HO | | | | | | | | | | | | | | | 6 | 1% | | | | | | | | | | | 6 | 0% |
| JA | | | | | | | 606 | 1% | 30 | 0% | 486 | 1% | 3503 | 6% | 2793 | 4% | 2610 | 5% | 6030 | 10% | 2607 | 4% | 2522 | 7% | 1167 | 10% | 22354 | 4% |
| JB | | | | | | | | | | | | | | | | | 642 | 1% | | | | | | | | | 642 | 0% |
| JH | | | | | | | | | | | | | 336 | 1% | 1356 | 2% | 1716 | 3% | | | | | | | | | 3408 | 1% |
| JK | 2849 | 42% | 21683 | 51% | 16979 | 46% | 19407 | 44% | 23880 | 49% | 12867 | 40% | 19706 | 31% | 20193 | 30% | 21492 | 38% | 13329 | 23% | 5946 | 10% | 3909 | 10% | | | 182240 | 32% |
| JR | 72 | 1% | | | | | | | | | | | | | | | | | | | | | | | | | 72 | 0% |
| JS | | | 3426 | 8% | 5891 | 16% | 7526 | 17% | 6285 | 13% | 4796 | 15% | 11233 | 18% | 6101 | 9% | 5248 | 9% | 1677 | 3% | 630 | 1% | | | | | 52813 | 9% |
| JT | | | | | | | | | 183 | 1% | | | | | | | | | | | | | | | | | 183 | 0% |
| LB | | | 147 | 1% | | | 618 | 1% | 5409 | 11% | 2049 | 6% | 942 | 1% | | | | | | | | | | | | | 9165 | 2% |
| LO | | | 903 | 2% | 1332 | 4% | 5339 | 12% | 2851 | 6% | 2878 | 9% | 5616 | 9% | 7773 | 12% | 2988 | 5% | 3599 | 6% | 11731 | 19% | 3319 | 9% | 1884 | 16% | 50213 | 9% |
| MB | | | 216 | 1% | | | | | | | | | | | | | | | | | | | | | | | 216 | 0% |
| MF | | | | | 144 | 1% | 2027 | 5% | 216 | 1% | | | | | | | | | | | | | | | | | 2387 | 0% |
| NB | | | | | 252 | 1% | | | | | | | | | | | | | | | | | | | | | 252 | 0% |
| Private | 132 | 2% | 432 | 1% | 108 | 0% | | | | | 18 | 1% | | | 72 | 1% | 300 | 1% | 452 | 1% | 114 | 1% | 72 | 1% | 44 | 1% | 1744 | 0% |
| RB | | | | | | | | | | | 474 | 1% | 4282 | 7% | 4482 | 7% | | | | | | | | | | | 9238 | 2% |
| Ringwood | | | | | | | | | | | | | | | | | 315 | 1% | | | | | | | | | 315 | 0% |
| RS | | | 48 | 1% | | | | | | | | | | | | | | | | | | | 36 | 1% | | | 84 | 0% |
| SA | | | | | | | | | | | | | | | | | | | 480 | 1% | | | | | | | 480 | 0% |
| SB | 1440 | 21% | 7938 | 19% | 6282 | 17% | 4563 | 10% | 708 | 1% | | | 2034 | 3% | 2568 | 4% | 2084 | 4% | 8732 | 15% | 6318 | 10% | 9563 | 25% | 2076 | 17% | 54306 | 10% |
| SG | | | | | | | | | | | | | | | | | | | | | 178 | 1% | | | | | 178 | 0% |
| SO | | | | | | | | | | | | | 264 | 1% | | | | | | | | | | | | | 264 | 0% |
| SS | | | | | | | | | | | 108 | 1% | | | | | 78 | 1% | 48 | 1% | | | 317 | 1% | | | 551 | 0% |
| TS | | | | | | | | | | | | | | | | | 210 | 1% | 1386 | 2% | 5799 | 10% | | | | | 7395 | 1% |
| WB | 72 | 1% | | | | | 156 | 1% | 282 | 1% | 828 | 3% | 1683 | 3% | 3117 | 5% | 4403 | 8% | 7319 | 13% | 4650 | 8% | 2823 | 7% | 1116 | 9% | 26449 | 5% |
| WF | 799 | 12% | 18 | 1% | | | | | | | | | | | | | | | | | | | | | | | 817 | 0% |

**Table 76: Results of Interviews with Relatives of Hawkers by VDPT**



| Interviewee | Date | In Relation to | Places Visited for Sales | Days travelling | Additional information |
|---|---|---|---|---|---|
| M. Bailey | 21/9/1977 | Daughter in law of Sidney Bailey (SB) | Shaftesbury, Gillingham, Wincanton, Trowbridge, Sturminster Newton, Blandford Forum, Lyme Regis, Swanage, Southampton, Isle of Wight, | Unknown | Hawkers bought something of everything in terms of vessel types from the potter and paid on collection of the pottery |
| A. Bailey | 21/6/1977 | Related to Herbert Bailey (HB) | Shaftesbury | Unknown | Tipped over cart at Shaftesbury Fair |
| K. Brewer | 24/6/1977 | Son of Fred 'Pans' Brewer (FB) | Dorchester, Sherborne, Yeovil, Tisbury, Salisbury, Wincanton, Warminster, Westbury, Devizes, Mere, Hindon, Castle Cary, Beaminster, Bridport, Fordingbridge, Lymington, Lyndhurst, New Milton | Monday – Friday | Occasionally, undertook a short run to Fordingbridge on Friday, Lymington, Lyndhurst and New Milton on the Saturday. |
| C.Thorne | 12/2/1978 | Knew Lot Oxford (LO). Drove a van for FB in 20th century | Local routes – Bournemouth, Poole and Isle of Wight. | Unknown | Known as the 'Flower Pot King', often teamed with a Tim Whiter, when heading to Bournemouth. |
| C. Cutler | 23/3/1976 | Knew FB | Also went to Frome | Unknown | |
| C. Sims | 20/6/1977 | Son of Martin Sims, talking of Fred Shearing (FS) | The Gussages (Dorset), Salisbury, Pewsey | Unknown | |
| As above | 20/6/1977 | Son of Martin Sims, talking of George Bailey (GB?) | Dorchester, Lyme Regis, Shillingstone, Sturminster Newton, Trowbridge, Blandford Forum, Corfe Castle, Swanage, Poole. | Monday - Friday | Left early to have breakfast at Wimborne. Stayed in pubs along journey, regular visits to the Plume of Feathers (Dorchester). He regularly travelled with Seth Sims to Southampton. |
| As above | 20/6/1977 | Son of Martin Sims, talking of Father | Two routes. Long route included Amesbury, Poole, Bournemouth, Winton, Lower Parkstone, Southampton, Isle of Wight, Fordingbridge. Local route comprised local farms extending down to Corfe Castle, including various shops in Wimborne. | Unknown | |
| W. Sims | 18/9/1977 | Son of William 'Bill' Bailey (BB) | Local route included Wimborne Minster | Unknown | Often stayed at the Horton Inn on return journey |

K. Brewer goes further in an interview dated 10/2/1978, stating that his father loaded the wagon during the weekend, ready for Monday. Leaving at 1:00am, he travelled at four miles an hour, arriving at Shaftesbury for breakfast, staying at various pubs to stable the horse, and calling in at farms, large houses and ironmongers for sales. In addition to pottery, he sold besom brooms, and helped the potters dig clay when required; this further reinforces the interplay of the varied heathland economy. Cumulatively, this highlights a planned and systematic approach to the sale and distribution of Verwood-type pottery. Local sales were made by hawkers such as Lot Oxford (LO), who sold at Poole and Bournemouth, while others, such as Fred 'Pans' Brewer (FB) travelled longer distances, restocking from Fred Sims' on the weekends. When this data is plotted geographically (Fig. 123), there is evidence that some hawkers tended to stick to a certain area, *e.g.* George Bailey covers southern Dorset, while Lot Oxford and Martin Sims covered eastern Dorset and western Hampshire and Fred Shearing covered the gap - Shaftesbury to Salisbury and environs. In contrast, some hawkers covered several areas – both east and west – *e.g.* Fred 'Pans' Brewer and Sidney Bailey.

Collectively, this data has limits; it relates to the late 19th-20th centuries, thus covers only the end of the post-medieval period. As a result, it can be used as a form of ethnographic analogy, from which to draw parallels with information witnessed in the archaeological data. The data can be further enhanced by consulting historic newspaper articles, which place individuals of interest - in this case, known pottery hawkers - at a particular place in time, suggesting additional points of sale in their journeys (Fig. 124; Table 76).

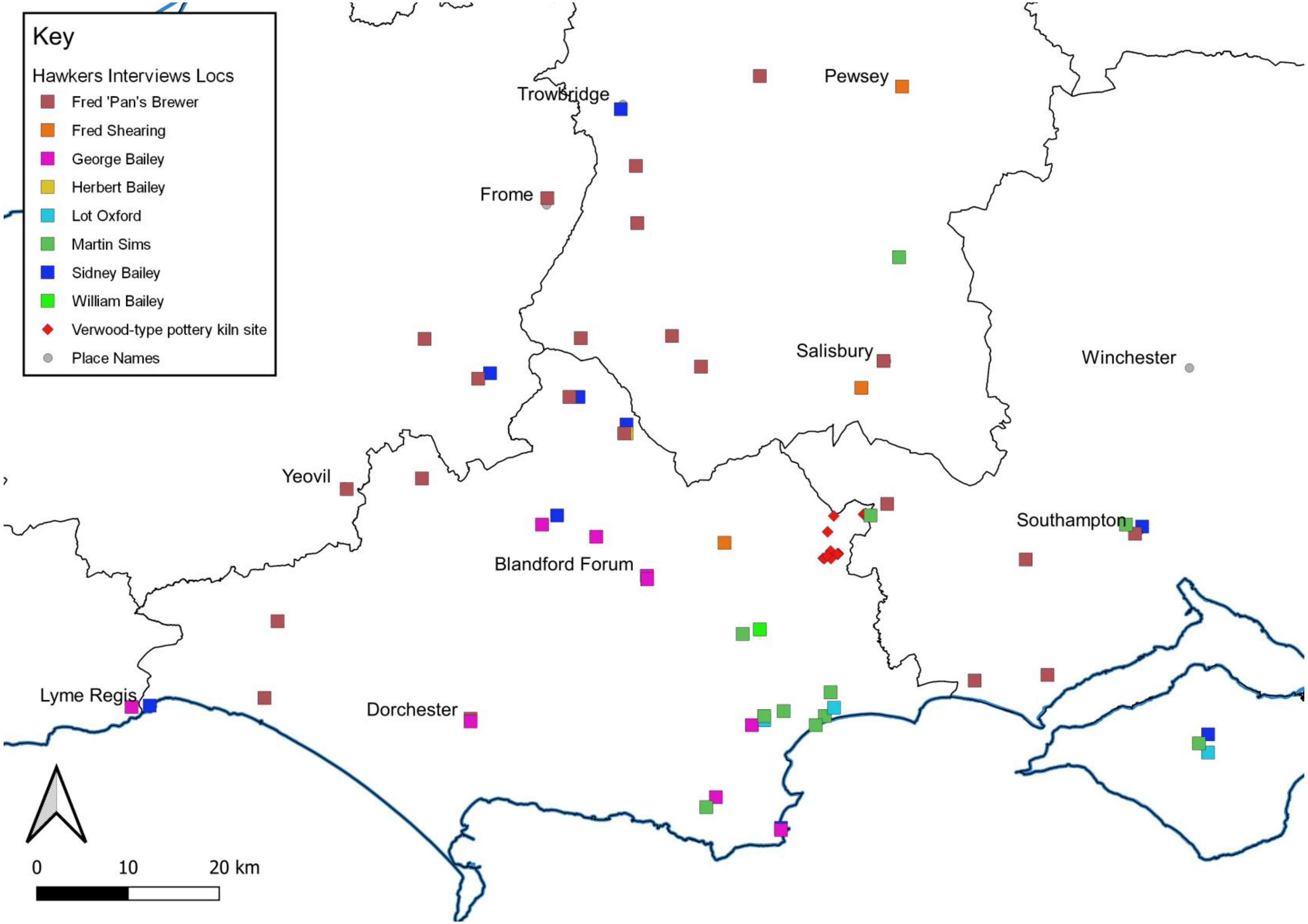


Fig. 123: Locations of various hawkers sales from VDPT interviews

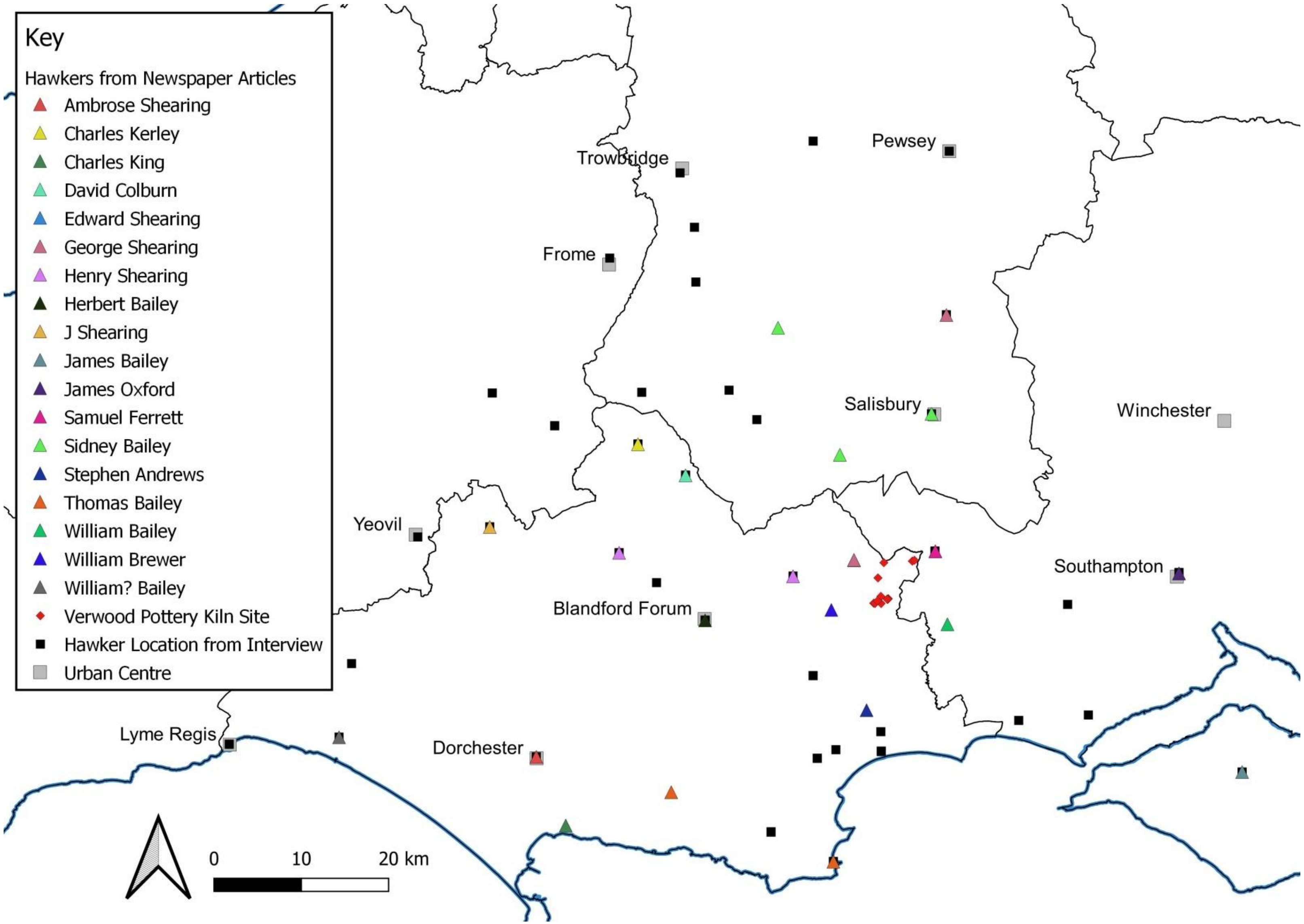


Fig. 124: Locations of hawker sales with additions from newspaper articles

## Table 77: Hawkers Mentioned in Historic Newspaper Articles

| Paper | Date of article | Date of event | Day of week (where known) | Location of Event | Name of Hawker,dealer or carter | Summary |
|---|---|---|---|---|---|---|
| Dorset County Chronicle | 1st June 1865 | 24/7/1865 | Monday | Grimstone | Ambrose Shearing | Hawking without licence |
| Salisbury and Winchester Journal | Dec 12 1868 | Dec 1868 | Unknown | Gussage St. Michael | Amos Ferrett, Henry Sherring | Negligence |
| Western Gazette | February 27th 1903 | N/A | | | C Ferrett | Buying potters wheel |
| Salisbury and Winchester Journal | July 24th 1880 | 6/7/1880 | Tuesday | Gillingham | Charles Kerley | Asleep in charge of horse and wagon |
| Western Gazette | Oct 8 1869 | 28/10/1869 | Tuesday | Plough Inn, Osmington | Charles King | Victim of Theft |
| Western Gazette | Apr 28 1877 | April 1877 | Unknown | Verwood | Charles King | Victim of theft |
| Western Gazette | March 23 1894 | 2/3/1894 | Friday | Shaftesbury | David Colburn | Obstructing the highway |
| Western Gazette | 26th Feb 1904 | 1493 | Unknown | Southampton | Edward Shearing | Animal cruelty |
| Dorset County Chronicle | Thur Oct 28 1858 | 18/10/1858 | Monday | Verwood | Fred Bailey | Accident |
| Western Gazette | Nov 20 1903 | N/A | | | Fred Sims | Advert |
| Hampshire Independent | May 10 1871 | May 1871 | Unknown | Alderholt | George Brewer, Henry Fry | Owner of unjust scales |
| North Wilts Herald | Sat Apr 4 1874 | 31/1/1873 | Friday | Orcheston St Mary | George Shearing | Theft |
| Weymouth Telegram | June 30 1876 | 9/6/1876 | Friday | Albion Hotel, Verwood | George Shearing | Victim of theft |
| Western Chronicle | 30 May 1890 | May 1890 | Unknown | Verwood | George Shearing | Illegal Animal |
| Western Gazette | Fri Jan 7 1870 | Jan 1870 | Unknown | Cranborne | George Sherring | Hawking without a license |
| Western gazette | Mar 19th 1886 | N/A | | | H Ferrett | Advert |
| Western Gazette | Fri Jan 15 1869 | Jan 1869 | Unknown | Sturminster Newton | Henry Shearing | Hawking without a license |
| Salisbury and Winchester Journal | Sat Feb 24 1900 | 16 | Tuesday | Blandford | Herbert Bailey | Obstructing the highway |
| Salisbury and Winchester Journal | Sat May 19 1900 | 122 | Unknown | Fordingbridge | Herbert Bailey | Unlit cart |
| Salisbury and Winchester Journal | Apr 6 1818 | April 1818 | Unknown | Sherborne | J Shearing | Victim of theft |
| Isle of Wight Observer | Saturday 9 July 1898 | 9/5/1898 | Monday | Isle of Wight | James Bailey | Hawking without licence |
| Hampshire Advertiser | May 3rd 1862 | April 1862 | Unknown | Southampton | James Oxford | Assault |
| Salisbury and Winchester Journal | Jan 19 1895 | Dec 1894 | Unknown | Verwood | Lot Brewer | Debt |
| Western Gazette | Jan 2 1869 | 25/12/1868 | Friday | Verwood | Lot Brewer, George Steele | Assault |
| Western Gazette | Nov 25th 1927 | 10167 | Unknown | Unknown | Lot Oxford | Animal cruelty |
| Western Gazette | February 6th 1925 | 9165 | Monday | | Messrs Hankinson & Son | Selling Crossraods |
| The Bridport News | Sep 1st 1893 | 29/8/1893 | Tuesday | Bridport | Mr Bailey | Accident |
| Western Gazette | June 4th 1937 | N/A | | | Robert Thorne | Selling items from Crossroads |
| Western Gazette | May 1st 1925 | N/A | | | Robert Thorne | Job Advert |
| Salisbury and Winchester Journal | Sept 26 1868 | 19/10/1868 | Saturday | Fordingbridge | Samuel Ferrett | Accident |
| Salisbury and Winchester Journal | Sat May 18 1901 | 487 | unknown | Salisbury | Sidney Bailey | Animal cruelty |
| Warminster and Westbury Journal | June 8 1895 | 12/5/1895 | Tuesday | Codford | Sidney Bailey | Asleep in charge of horse and wagon |
| Salisbury and Winchester Journal | Sat 22 June 1895 | 7/6/1895 | Friday | Broadchalke | Sidney Bailey | Asleep in charge of horse and wagon |
| Western Gazette | Fri June 22 1894 | June 1894 | Unknown | Cranborne | Sidney Bailey | Drunk in charge of horse and wagon |
| The Western Flying Post | Aug 7th 1866 | 19/6/1866 | Thursday | Kinson | Stephen Andrews | Hawking without licence |
| Bridport, Beaminster and Lyme Regis Telegram | Fri Mar 12 1886 | 25/2/1886 | Thursday | Wool | Thomas Bailey | Drunk in charge of horse and wagon |
| Dorset County Chronicle | Nov 27th 1879 | 30/10/1879 | Thursday | Swanage | Thomas Bailey | Hawking without licence |
| Dorset County Herald | Dec 19th 1857 | 9/12/1257 | Wednesday | Ringwood | Two unknown carries of Verwood earthenware | |
| Western Gazette | May 2 1902 | 852 | | | William and George Brewer | Poaching |
| Salisbury and Winchester Journal | Sat Sept 12 1874 | 22/8/1874 | Saturday | Verwood | William Bailey | Drunkeness |
| Western Gazette | Fri June 22 1894 | June 1894 | Unknown | Cranborne | William Bailey | Animal cruelty |
| Western Gazette | July 3rd 1925 | N/A | | | William Bailey | Selling equipment |
| Salisbury and Winchester Journal | Sat Oct 1 1881 | September 1881 | Unknown | Poulner | William Bailey | Asleep in charge of horse and wagon |
| Salisbury and Winshester Journal | Sept 17 1864 | N/A | | Horton | William Brewer | Obstructing the highway |
| Western Gazette | Oct 6 1908 | 2723 | Monday | Verwood | William Brewer, Charles King, Fred Trickett | Arson |

Historic newspaper articles concerning hawkers repeatedly mention inns and public houses, thus it can be ascertained that these perform an important role in providing both lodging and potential sales along the route. Furthermore, it can be shown that hawkers are present in the vicinity of large towns on certain days, most likely taking advantage of trade from local markets whether directly or indirectly via passing trade. The days of certain markets held in towns has been taken from Pigot and Co.'s *Commercial Directory* (1830) and checked against the Victoria County Histories (Page 1908; 1911; Crittal 1962; Bainbridge 2011).

Examples of this include Sidney Bailey in Bridport on a Tuesday prior to the market the following day. He appears to have been unloading pottery, possibly to an ironmonger or wholesaler. In 1895, he is found asleep overnight at Codford, Wiltshire, most likely having been present at Salisbury market earlier that day. George Shearing was at Orcheston St Mary, Amesbury on a Friday in January 1873, probably having been at market earlier that day. Charles King, hawker, was present at the Plough Inn, Osmington, Dorset in October 1869, most likely having been at Weymouth earlier that day for the Tuesday market there. From Osmington, it is feasible he could have travelled to Dorchester to take advantage of the Wednesday market there. Finally, David Colburn, dealer of earthenware from Verwood, was found to have left a cart parked overnight at the Mitre Inn, in Shaftesbury, Dorset in March 1894, probably ready to sell his wares at the Saturday market the following day. The role of markets and fairs cannot be understated, and almost certainly played a vital role in the sale and distribution of pottery for the lifetime of the Verwood-type pottery industry. Sims (1969, p.51), having examined the Salisbury Market Records (Salisbury Municipal Archives ref. J286 and J287), notes eight earthenware stall holders at Michelmas 1796; two of these - John Haytor and Mr Hall - appear significant. A Thomas Hall of Fordingbridge appears again from 1808-1817; it is possible that this man is a relative of Richard Hall, potter of Alderholt in the 1780-90s - while there is potential that a John Haytor - known to be potting at Daggons in 1784 (Algar *et al.* 1987) - is the same person, or a relative of - the man previously referenced at the market in Salisbury. It is unclear if these men are stall holders or itinerant hawkers, the latter is more likely for Thomas Hall, if living in Fordingbridge.

Sims (1969, p.52) states that the rail network, established in the 19th century, enabled dealers to send pottery ahead; allowing potters to sell the load they carried from home, and then restock en route and continue to sell an increased amount of pottery. K. Brewer mentions that his father 'Pans' Brewer did this. The Southampton and Dorchester Railway was the first of its kind in the area - accessed via Ringwood from 1847 - which enabled eastward travel (Maggs 2009). On December 20th 1866, additional track was laid. This allowed direct access from Alderholt and Verwood, and provided access to the north east to Salisbury, west to Dorchester and south to Weymouth (Coulthard 2007, p.81). These additional links were a double-edged sword; they allowed more Verwood-type wares to be sold, extending the potential distribution network, and fueled population growth in the area, but also reduced the transport costs for incoming wares - such as those from Bristol and Staffordshire (Bishop 1991, p.50).

Cumulatively, this illustrates that the road networks, with the associated inns and public houses, provided the means for long distance sales and an extended distribution network. Such a situation allowed for sales to be made to individuals on the premises, while providing much needed rest stops to enable hawkers to reach certain destinations in time for fairs and markets to procure further sales. Hawkers selling wares at major economic centres, such as towns, fairs, and markets – in addition to private dwellings and farms - provide a distinct insight into the nature of the post-medieval economy. This also highlights the significant role of the market and fair; these were vital in the distribution of products, including ceramics, within post-medieval southern Britain. Successful hawking required a degree of planning and knowledge to effectively navigate the road network, exploit the inns en route, and arrive at a given destination in time to take advantage of a market, fair or the extra custom one might gain from them. Elements of this network can be corroborated as taking place in the 18th century, and probably earlier.

## 10.3. Coastal Trade

Once such wares had reached urban centres with adequate portage, such as Southampton, Christchurch, Poole, Wareham, Weymouth, Melcombe Regis, Lyme Regis and Bridport - to which evidence has shown that east Dorset hawkers were regular visitors - it became possible to export pottery to locations further afield, including international markets. Coastal trade has formed a significant part of the economy of southern England; for example, it has been noted that in the late 14-15th centuries, between 60-80% of the overall trade for Exeter and Southampton was coastal in nature (Kowaleski 1995, pp.224-32; Hicks 2015). The significant role that coastal trade has played in the distribution of post-medieval ceramics across Britain has previously been outlined by Allan (1983), who explained that this method was employed for Elizabethan stonewares from London. These wares were then redistributed from ports such as Lyme Regis. Allan (1983, Fig. 4.2) showed that Lyme Regis was the major Dorset port for ceramic re-distribution further west, to centres such as Plymouth; between 1710 and 1720, Plymouth took in 664 dozens of earthenware from Lyme Regis alone (Allan 1986). The importance of coastal trade in Dorset for the 13-15th centuries has previously been effectively evaluated, with Poole, Lyme Regis and Melcombe Regis being the principal ports; for the 15-16th centuries, it has been demonstrated that the principal ports comprised Lyme Regis, Weymouth and Poole (Forrest 2017, pp.25-6; Hinton 2018). The presence of east Dorset wares in Weymouth and Poole suggest that export from these centres is a strong likelihood - certainly when the merchants of Poole are considered to possess “a hinterland within Dorset around Wareham, Wimborne and Shaftesbury” (Forrest 2017, p.29), including the Verwood/Alderholt/Cranborne area. This method is most likely to be responsible for the transportation of Verwood-type wares of 17-18th century to Okehampton Castle (Allan and Perry 1982), Plymouth (Allan and Barber 1992), and limited potential examples from Exeter (Allan 1984; pp.126-7; N. Payne pers comm).

## 10.4. Overseas Trade

Arguably, it is via coastal trade that Verwood-type pottery made its way to Jamestown, Virginia, with sherds of an early 17th century tripod pipkin being recovered at the early fort there, from Structure 165 - known as ‘The Factory’ - dated post-1610 (Kelso 2006; Howell Creative Group 2021). The coastal trade is considered a likely origin for this item - rather than direct purchase from a potter or hawker - as pipkins are an uncommon item, and Verwood-type pottery occurs in minority when compared to the amounts of Donyatt-type (Coleman-Smith *et al.* 2005) and Totnes-type (Allan and Pope 1990), suggesting that the bulk of English pottery was imported from Devon ports. This is supported by Watkins (1960), who has demonstrated that the bulk of this trade derives from the ports of Barnstaple and Bideford; however, it is noteworthy that English imports comprise only 16% of those recovered in certain assemblages (Pecoraro and Givens 2006, Fig. 3).

Verwood-type pottery has also been recovered from Newfoundland, Canada. The pathway for these sherds potentially derived from slightly more direct trade, rather than the down-the-line coastal approach evident at Jamestown. These links were born from the fish trade, for which Newfoundland was exceptionally rich due to the presence of The Grand Banks. These comprise a series of underwater plateaus where the Labrador currents meet the Gulf Stream; it was here that smaller species - such as krill and plankton – gathered, providing food for cod (Norcliffe 1999, p.98). Various European states created seasonal fishing stations, which remain evident in certain place names on the Newfoundland Islands; for example, the French predominantly settled to the north, the Basque to the west and the Portuguese to the south and east (Pope 1986, pp.1-16). The English interest overtook Iberian enterprises, with English stations established at St John's and Ferryland by the late 16th century. More permanent English plantations had been established at Cupids, New Cambriol, Bristol's Hope, St John's, Ferryland and Renews by the early 17th century (Pope 1986, Table 1). The site at Ferryland, Newfoundland was shown to be using Somerset, Dorset and Surrey/Hampshire Border ware pottery (Pope 1986, p.108; Temple 2004). Temple (2004, Table 4.1) has shown that of 61 sherds of English wares examined, nine are likely to be Verwood-type (13% of those examined). The possibility of direct contact from Dorset ports is considered greater for Newfoundland in comparison to the North American mainland, as the port of Poole - a known Verwood-type pottery distribution node - has firm historic links with the island (Beamish *et al.* 1974). Poole experienced rapid economic growth from the 1600s onwards, becoming exponential in the 1700s. The driving force behind this success was the fishing industry, as ships returning to Poole brought salted and dried fish from Newfoundland to England (Beamish *et al.* 1976, p.55). In return, Poole (and presumably Weymouth and Southampton) exported provisions, nets, cordage, clothing and "commodities of every kind" (Pigot and Co. 1830, p.156). Cell (1969, p.163) notes that between 1610-30, 51 ships returned from the Grand Banks to Poole, with 25 returning to Southampton and 18 to Weymouth. This decreased to 25 for Poole, nine for Southampton, and 18 for Weymouth between the years 1631-66. Continuation of this contact is demonstrated in the Salisbury Journal; on April 5th 1756, a convoy of 30 ships are noted as ready to set sail from Poole to Newfoundland, comprising an annual transport of goods and provisions, which occurred a month prior to the formal onset of the Seven Years War. This is corroborated by Pope (1992, p.124) who quotes a Captain Poole, writing in 1677, estimating 70% of smaller ships coming to Newfoundland carried goods. These commodities could well have included Verwood-type pottery, as one documentary reference suggests. The Poole Town Accounts for 1731-2 state that 6d was paid for a "half load of earthenware to Mr Lawrince of Verwood". The 'Lawrence' in question could have been Lewis Lawrence, Verwood potter - or a relative - and the low value of the entry likely relates to cartage of pottery to Poole for export (Coulthard 2007, p.135). Pope (1992, p.125) goes further, describing this movement of goods as a North Atlantic triangular trade between the southern British coast, Newfoundland, Iberia and France (Fig. 125), which is echoed by Bartlett (2018, pp.2-3).

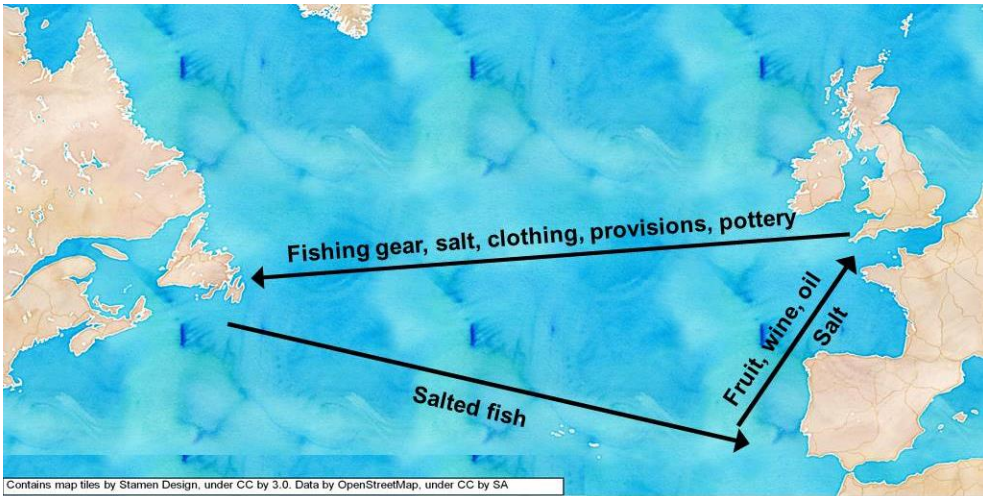


**Fig. 125: Summary of North Atlantic triangular fish trade (after Bartlett 2018, 3)**

Temple (2004, pp.35-7) has noted that, to the uninitiated, Verwood-type pottery can be easily confused with products of the Border ware, Midlands (yellow and purple) and certain south-Somerset industries; it may be that additional sherds await to be re-categorised from North American sites, allowing for a greater insight into the overseas distribution of Verwood-type ware. The dating from well-documented historical events noted on certain sites in North America - *e.g.* Jamestown and Ferryland - may also provide the enhanced dating sadly lacking in the majority of British post-medieval sites, allowing for a more refined dating of English earthenwares; this is important, as direct trading contact between Poole and Newfoundland had ended in the early 1800s (Stevenson 1812, p.24).

### *10.5. East Dorset Pottery Distribution*

The method of distribution for east Dorset pottery has now been thoroughly outlined. The efficiency of this system is evident from the dominance of this ware type at certain regional urban centres across different time periods (Figs. 126-8). The plotting of occurrences of a given ware type on an archaeological site have consistently been viewed as the best way to present its given distribution (*e.g.* Vince 1977; Spoerry 2008; Jervis 2011b; Walker 2012). These distribution maps display where pottery was found, but cannot reveal how that item arrived there (Moorhouse 1983, p.45). For the 17th century onwards, the distribution of Verwood-type pottery complements the information noted for the hawkers from historical documentation, and evidence shows that this distribution has chronological variance, increasing over time. Such an arrangement is only possible due to an upscaling in production that was established between the 17-19th centuries (Chapters 6 and 9).

Fig. 126 shows that there is a restricted distribution of early Verwood (EVER) and Verwood-type (early variant - VERE) wares dating to the 15- 16th centuries, with this pottery type only forming a major component (considered here as a subjective 40% upwards in weight of the assemblage for this period, as 40% often comprises the majority of a ware type within a given assemblage within the dataset *e.g.* Warminster - Mepham 1997) in Wimborne Minster, Fordingbridge and possibly Salisbury; although chemically, those examples analysed - and those from Wilton - have more in common with Laverstock (see Chapter 5). The area of greatest concentration - suggesting the source of these wares - is likely to lie between Fordingbridge and Wimborne, yet no confirmed production sites are currently known. The sites where these pottery fabrics plays a more minor role in the assemblage (1-39% by weight) demonstrates that this ware type was dispersed over a relatively wide area, distributed via an inland trade network.

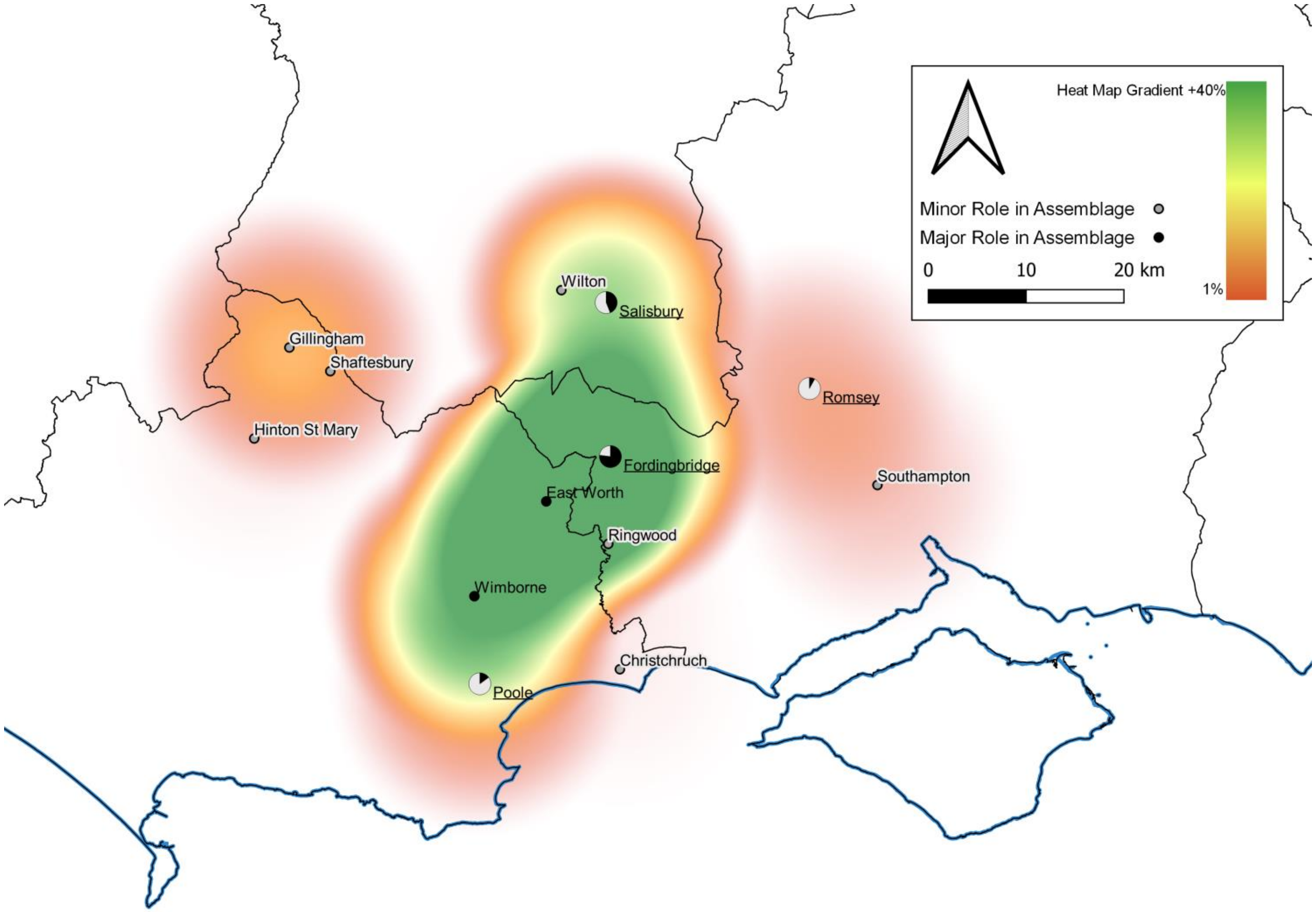


**Fig. 126: Occurrences of early Verwood (EVER) and Verwood-type - early variant (VERE) on archaeological sites with deposits datable to the 15-16th centuries; percentages for heat map based upon weights with source of data in Appendix XIV (black portions of pie charts represent east Dorset origin pottery, grey represents other sources)**

It is evident that by the 17-18th centuries (Fig. 127), the distribution of Verwood-type pottery has expanded. Fuelled by a robust production system which is undergoing periodic refinement at this time (see Chapters 6 and 7); this ware type evidently became dominant in areas where previously it only played a minor role. The ascendancy of Verwood-type wares is apparent in Poole, Salisbury, and Romsey, with large numbers also recorded in Shaftesbury, Dorchester and Southampton. This reflects an effective supply to these places, alongside a ready market for these utilitarian wares. While a heat map type distribution was possible for the late medieval/early post-medieval pottery, the same is not possible for the 17-18th century as there is a distinct lack of attention paid to the accurate recording of values of post-medieval earthenwares across the region. This is reflected in publications, where statements such as Verwood-type pottery "becomes the dominant source by the end of the 17th century" (Portsmouth - Fox *et al.* 1986, p.83) are not only accepted, but relatively commonplace over the presentation of counts and weights. This led to limited values being available for a heat map type distribution to be constructed for Figs. 127-8, therefore a major/minor role in assemblage was employed, which is reflected in the recorded values in Appendix XIV. While reporting of post medieval pottery has improved somewhat in more recent times, (*e.g.* Poole – Watkins 1994; Southampton - Brown 2002) there are certain areas that still lag behind. An example of this is demonstrated at Winchester, where the recent long awaited publication of the post-Roman pottery type series (Hawker and Matthews 2022), based on pottery recovered from 15 excavations targeting suburbs and the city defences, gives little information regarding post-medieval wares (those of post-17th century date). Similar can be said for the publication regarding Jewry Street, Winchester (Ford *et al.* 2011, p.261), where the small number of post-medieval sherds that were collected, were not assigned to fabric or origin, and are instead assigned to a catch all post-medieval (PMED) group.

Additionally, the presence of Verwood-type pottery on the Isle of Wight is strongly likely at this time, evidenced by the presence of such wares at Carisbrooke Castle. The occurrence of Verwood wares in Devon and overseas – as mentioned previously (section 10.3) - reveals that this established industry had a developed distribution system with multiple pathways, *i.e.* land routes, coastal and overseas transportation; these methods relied upon both direct or linear trade, and a probable down-the-line exchange mechanism to reach its eventual recovery locations. The importance of coastal trade of pottery in the post-medieval period is readily apparent in the Verwood-type distribution, with concentrations at Southampton, Portsmouth and Havant, and reduced numbers across inland Hampshire – *e.g.* Winchester. One additional mechanism for the upsurge in dispersal can be attributed to improvements in the inland road network; this developed significantly during the 18th century, from rather simplistic medieval routes to well-constructed and maintained turnpike highways that were created across the region.

It has previously been shown that the overland distribution via hawkers in the 19th-20th centuries was reliant on a network of roads and trackways (section 10.2). However, little is known regarding the late medieval/early post-medieval road network of southern Britain. The Gough map shows the earliest depiction of the British network in any detail (Millea 2007, 9). Dated mid-14th century, it displays a limited number of roads in central southern Britain; only one major road - the London to Exeter route passing through Salisbury and Shaftesbury - bears particular significance here. This was the principal artery for the area at this time, with lesser roads and trackways linking towns, villages, and farmsteads (Good 1966). Penn (1980, pp.48-9) suggests that an additional road, further south, ran through Cranborne, forming a southern passage to London, which is maintained into the 17th century and appears on later maps. For the 16th and early 17th centuries, three maps hold significance; firstly, Saxton's Map of Dorset, dated 1575, the second, William Kip's in William Camden's *Britannia*, dated 1607 and finally, John Speed's - dated 1610 (Beaton 2001). While all are incredibly detailed, none show any discernible roads. From the later 17th century, the road networks of Britain feature more prominently on maps, suggesting that internal trade and communication links are becoming more important as areas become more accessible. This is best illustrated by Ogilby in his 1675 *Britannia* atlas. Here, Ogilby's maps are concentrated on road networks providing points of reference for travellers, with places along a given route and compass bearings (Beaton 2001, pp.30-31). This change in mapping shows that there was a need for maps concentrating on specific routes, suggesting a country wide increase in the movement of people and goods.

From the 1750s onwards, the entire country underwent an extensive improvement and extension of the road network in response to this economic boon. For the study area, this comprised a turnpike road - enacted by Parliament, funded and maintained by a trust – built in 1753, running from Donhead St. Andrew to Shaftesbury, from Winterslow to Salisbury, and on to Southampton (Crittall 1962; Hudson 1965). In 1832, an additional turnpike road is added to improve connections between Bristol and southern Hampshire (Hawkins 1983, p.xix). Thus, there was significant improvement and expansion of the road network across the region, allowing for an increase of internal movement along an enhanced road network from the 17th century onwards. This coincides with an increase in the dispersal of Verwood-type pottery, and it is difficult to see the two as unconnected - especially given the importance of the hawkers for distribution, who are certainly operating in the 19th century and probably earlier. While these developments undoubtedly allowed for greater movement of goods, including pottery, it will be shown that these improved networks could detrimentally impact rural industry, despite posing benefits.

The final period of discussion is the 18-19th centuries. Fig. 128 shows the extent of the Verwood-type pottery industries' distribution at the height of its economic power, and the subsequent beginnings of its decline. Wares are present across five counties - Dorset, Devon, Somerset, Wiltshire and Hampshire - plus clear evidence for a large number of wares on the Isle of Wight. The apparent spread across west Dorset into Somerset, along with northern expansion into Wiltshire, is a product of overcoming the local competition. In this way, new markets were opened. Previously, Verwood ware was not present in these areas, but by the 18th century, expansion into mid-Wiltshire and east Somerset is evident. The reduction in percentages of Verwood-type pottery by weight, at sites such as Warminster and Andover, reflect a growing influx of industrially produced wares from production centres that lie further afield, *e.g*. Bristol, Staffordshire, Nottingham and London. This challenge of Verwood-type pottery as the established local ware type is exemplified by Mepham (1997), who writes of the assemblage in Warminster. Here, the local utilitarian Crockerton wares were dominant in the 16th - early 17th century, comprising 89% by weight; later, this figure drops to 25%, with Verwood presenting at 43% in the 18th century (Smith 1997, Fig. 22). However, this dominance is short-lived, as by the 19th century, Verwood-type pottery has been superseded by an influx of English stonewares and transfer printed earthenware; this collectively comprises 57% of the assemblage, while Verwood-type only provides 24% of the weight. Additional evidence for the influx of English industrial wares into rural southern Britain is displayed in an inventory of Ann Shergold of Blandford, Dorset, who was a dealer of glass and ceramics, stocking Nottingham stonewares and English China in 1759 (Draper 1982b). Cumulatively, this indicates that an improved road network initially allowed the Verwood-type pottery industry to thrive, expand and overcome local competition in the 18th century, but by the middle the 19th century, there is significant decline; this decline is also reflected in the number of production centres (Appendix I). This is, at least in part, due to an exponential influx of mass-produced ware types entering from areas external to the region which, from the 19th century onwards, impacted the Verwood-type pottery distribution. The many aspects of the eventual end of the Verwood-type potteries lies beyond the scope of this thesis, and it is considered sufficient to show that the character of this decline is evident in the archaeological data from the mid-19th century onwards.

In retrospect, it is clear that developed systems of production and distribution for the Verwood-type pottery industry were improved upon over time, and that this industry took full advantage of improvements in the national road network, eventually employing rail transportation. Collectively, this allowed the ware type to become relatively dominant across areas of central southern Britain, with additional forays towards the west. Eventually, the influx of mass-produced wares applied sufficient economic pressure to begin to limit, and then constrain, the spread of east Dorset ceramics.

From the nature of the distribution and the historical evidence of the activity of hawkers, the method of distribution was reliant on the role of the central place and hinterlands for both the post-medieval and late medieval periods. The importance of a regional centre in settlement networks, commodity and service provision has formed a repeated aspect of economic geography and human systems theory, often deployed to understand settlement patterns, interaction and the supply of communities within a given landscape (*e.g*. Lösch 1954; Christaller 1966). This theory has featured prominently in describing the role of regional town markets for distributing British medieval and post-medieval pottery (Moorhouse 1981, p.108; 1983; McCarthy and Brooks 1988, pp.82-89), with the importance of the central node being a key theme (*e.g.* Heighway 1972, p.vi; Streeten 1985; Spoerry 1989; 2016). This relationship of a regional distribution node providing services and commodities to an outlying network of smaller settlements continued into the post-medieval period, where markets and fairs were seen as economically important to a given locality (Bettey 1987; Crossley 1994).

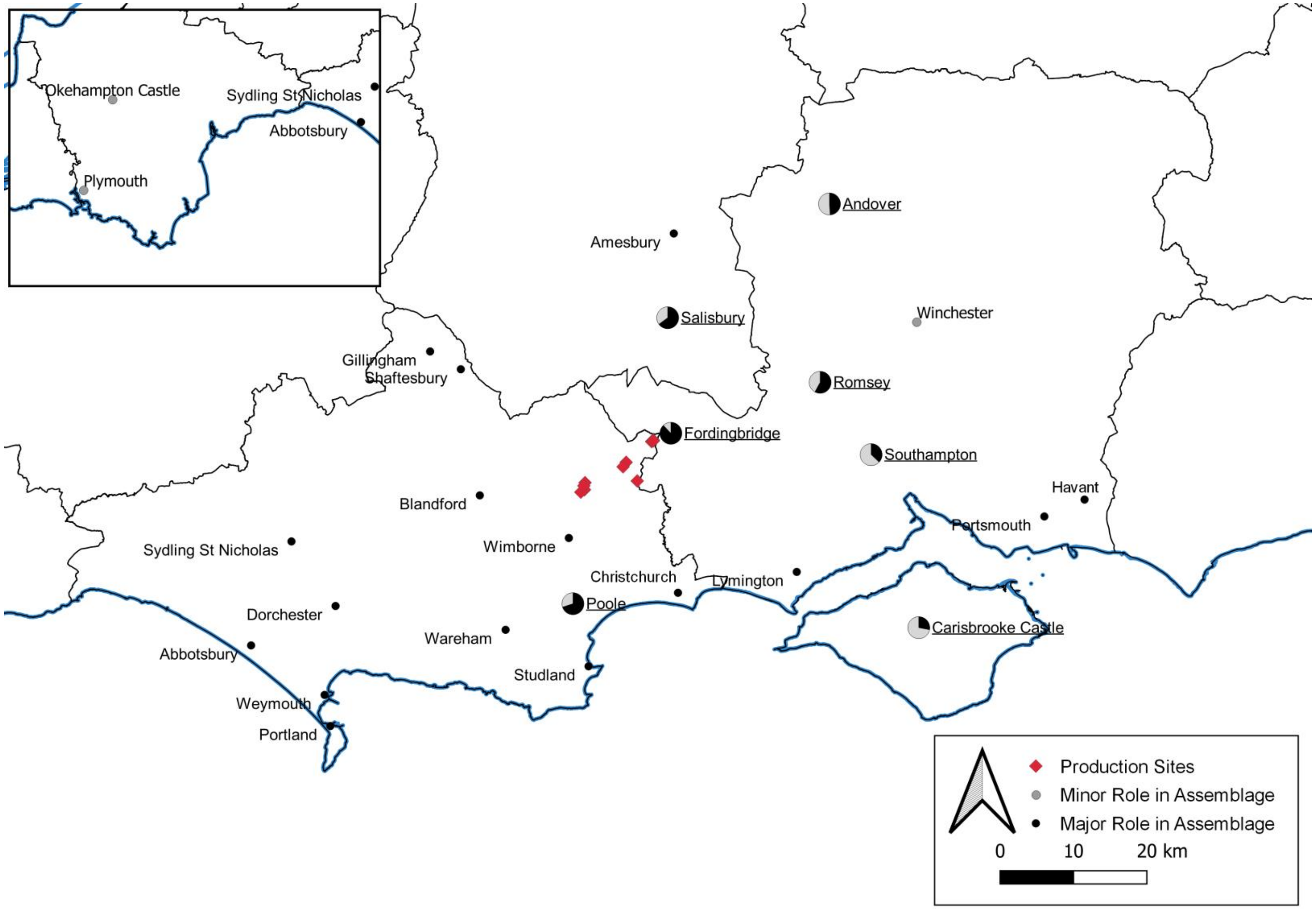


Fig. 127: Distribution of Verwood-type wares from archaeological sites with 17-18th century dated deposits; percentage by weight, with source of information in Appendix XIV; occurrences in Devon are inset, top left (black portions of pie charts represent east Dorset origin pottery, grey represents other sources)

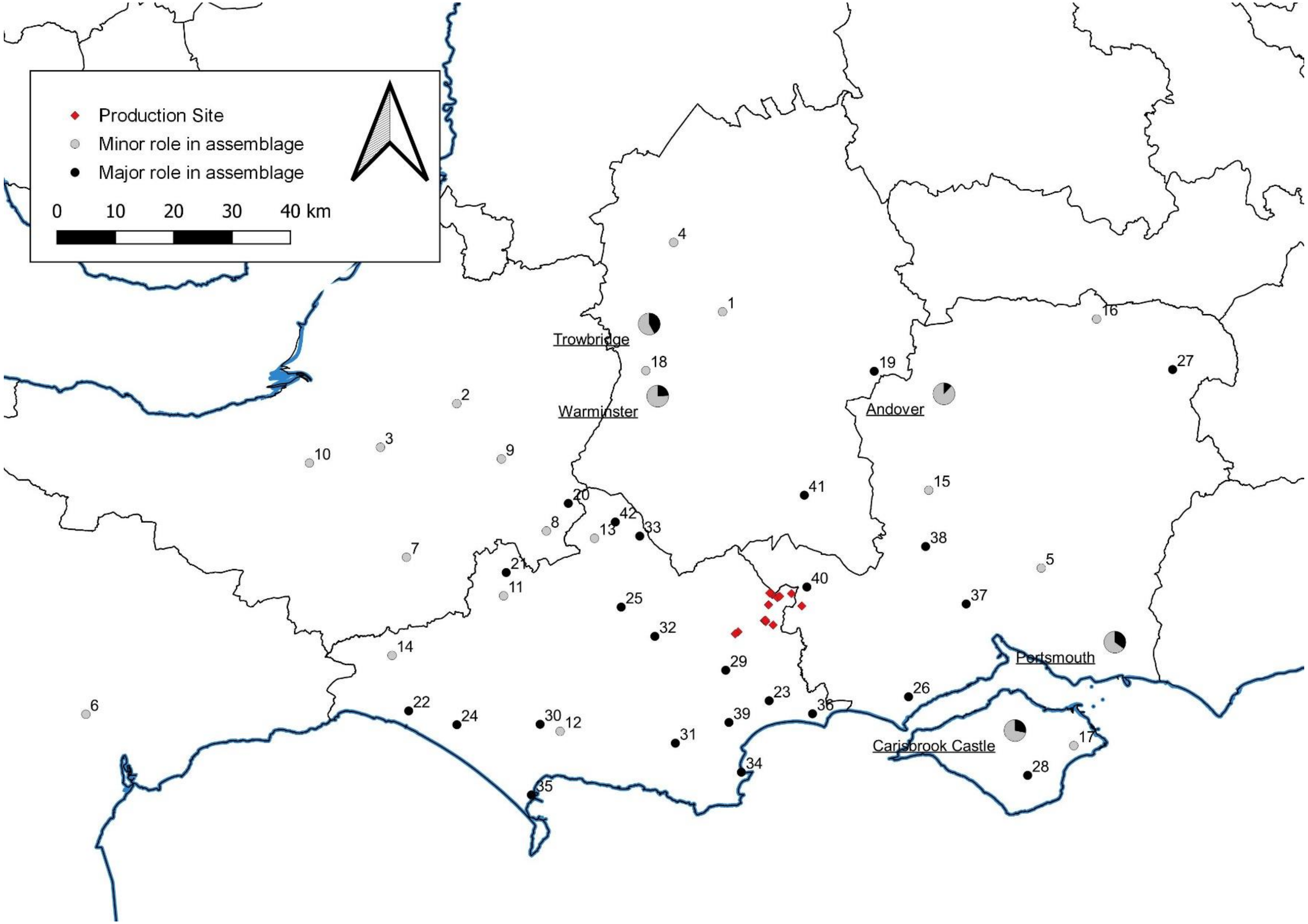


Fig. 128: Occurrences of Verwood-type wares dated 18-19th century; percentage by weight with numbered locations are listed in Appendix XIV (black portions of pie charts represent east Dorset origin pottery, grey represents other sources)

It has now been demonstrated how, and to what extent, Verwood-type pottery was distributed across southern Britain. The low cost and readily available nature of these vessels provided cheap and robust utensils suited for households, agricultural concerns, and non-industrial crafts. Chapters 6, 7 and 8 have shown that these economic activities often went hand in hand in southern Britain during the medieval and post-medieval periods. These activities dominated the rural economies of Dorset, Hampshire and Wiltshire (Crossley 1994). Chapter 7 evidenced that the Verwood-type industry created jars for storage, colanders, large bowls or ’pans’ and butter churns for dairying, bunghole cisterns and jars for brewing, plus chamber pots and commodes for waste; collectively, these items provided the apparatus for daily life. Low level industry could also be catered for, as evidenced by an alembic recovered from Crossroads (AC archaeology Ltd. forthcoming). In addition, Chapter 7 showed that the Verwood pottery industry also produced vessels for presenting and consuming foodstuffs at table - all of which were distributed by the hawkers.

East Dorset was not alone in providing these wares across central southern Britain for the late and post-medieval periods, with many centres known and hypothesised across the area; including manufactories at Donyatt and Wanstrow in Somerset; Holnest, Lyme Regis, East Holme and Stoborough in Dorset; Surrey/Hampshire Borderwares; and Crockerton in south Wiltshire (Fig. 129). It is likely that economic pressure from these centres limited early Verwood-type vessel distributions, such as that noted between the 15-17th centuries; once sufficient advances in raw material networks, production methods and distribution systems had been refined, it was possible to apply sufficient economic force to expand the distribution into new areas, and become dominant in these new markets. This economic power can be demonstrated in the Warminster assemblage in relation to Crockerton-type pottery in southern Wiltshire (Mepham 1997, pp.31-2). Here, Crockerton-type utilitarian wares comprised 89% of the Emwell Street assemblage in the 17th century, falling to 25% in the 18th century, when Verwood comprised 43%. Similar may be said for Dorset Whitewares (East Holme-type) in the Poole assemblage (Spoerry 1994, p.46). Here, East Holme wares comprise only 5-10% of the 17th century and later assemblage, in comparison to Verwood, which comprised 25-70% across the 17-18th centuries. The expansion of Verwood-type pottery into west Dorset from the mid-late 17th century onwards was shown by Smith (1993, pp.61-4) at Dorchester, which was previously dominated by West Dorset Sandy wares (*c.f.* Woodward *et al.* 1993). This is indicative of the decline of west Dorset potting centres - those often stylistically grouped with the south Somerset slipware industry - at centres such as Lyme Regis (Draper 1983), Holnest (Kent 2017) and to a lesser extent, Beaminster (Draper 2005); there is no evidence of these centres on the relevant 1880s OS maps, suggesting they had ceased production some time prior to this.

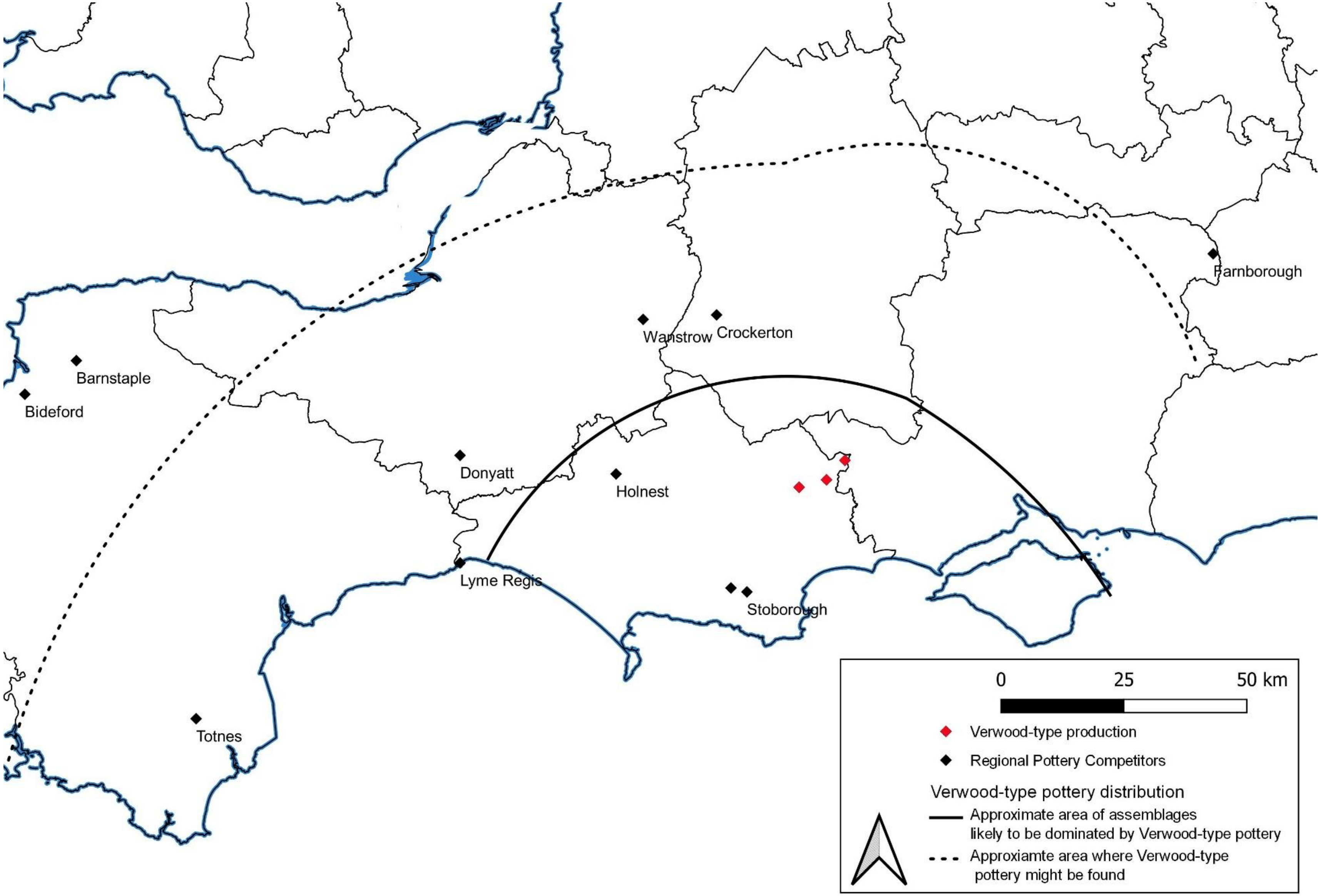


Fig. 129: Post-medieval competitors to the Verwood-type pottery industry

## 10.6. Concluding Remarks

In summary, it has been demonstrated that Verwood-type pottery was widely circulated. The distribution has been explored from both the archaeological data and the historic documentary references, which prove to be complementary. Collectively, they provide a more satisfactory picture of the nature of the post-medieval ceramic economy for southern Britain. This dispersal was driven by the hawkers, who travelled far and wide along established, planned, and repeated routes. This aligns with Sinopoli's (1991, p.101) hypotheses on pottery distribution, whereby one of many mechanisms comprises the dispersal via a merchant group. This group transports the pottery to sale on a regular basis to regional centres. The itineraries of the hawkers were scheduled to take advantage of markets and fairs, while distributing to large houses and farms along their journey. These markets and fairs were pivotal for circulating wares into the wider hinterlands, using a road network that saw substantial improvement during the 18-19th centuries. Furthermore, coastal trade and limited overseas dispersal provided an additional form of distribution. This supports the hypothesis of Nicklin (1971), alongside Ellen and Glover (1974), who have shown that water transportation can greatly expand the distribution network of wares beyond the expected 240km limit proposed by Foster (1965, p.56). The nature of the overland distribution of Verwood-type pottery is considered to involve a linear network of exchange (Strathern 1971; Renfrew 1977), as there is evident fall off from source – with the amount of Verwood-type pottery decreasing as distance from origin increases. This is coupled with an element of redistribution from various regional nodes - whether via ironmongers, glass and ware dealers, or additional travelling salesmen (*e.g.* the occurrence at Okehampton Castle, which was likely sourced from Plymouth or Exeter via coastal trade). The hawkers selling along organised routes took advantage of taverns and coaching inns, allowing rest stops and the potential for additional sales. These robust and well-formed wares were used for household, agricultural and small-scale industrial purposes, and were sold at low prices due to a streamlined production process which allowed greater yields of wares, achieved only via integrated and well-established raw material pathways. It is a logical assumption that an increase in the number of available pots to be sold had an impact on increasing the distribution (van der Leeuw 1984, p.744), and partially explains why this ware type had achieved such a wide and thorough dispersal in the 17-18th centuries.

Cumulatively, this shows that the east Dorset pottery industry - a rural ceramic industry - developed a distribution network built upon family ties and communal trust; this eventually had the economic power to adversely affect similar businesses in neighbouring areas, which then opened up new markets and hinterlands. The distribution of wares was extended through an established coastal trading network, and the domination of certain port nodes - *e.g.* Poole and Southampton - led to additional advantages in the shipping of wares to overseas settlements, such as Ferryland, Newfoundland.

# 11. Conclusion

The nature and extent of the evidence for a late medieval/early post-medieval pottery industry in east Dorset has been thoroughly presented and dissected. This has revealed that there are ample indicators suggesting pottery production here from the 14th century onwards, with an explosion in scale evident from the 17th century onwards. Examinations of the pottery using pXRF and thin section petrography suggest that the areas with the most promise for pre-17th century production evidence comprise the modern parishes of Verwood and Horton, with little but documentary evidence relating to the Alderholt area.

The study has shown that pXRF is a suitable method for examining pottery provenance, although complications can arise when investigations are extended to include fabric groups that display significant similarities in inclusions - especially when increasing quantities of sand is added as temper across different fabric groups. There is also ample evidence showing results can be impacted by post-depositional change with this methodology; perhaps unsurprising, given that measurements were taken from an existing break on pottery sherds – a pathway for taphonomic change. However, it has been demonstrated that the post-depositional alteration in these samples has not been significant enough to prevent similarity or discrimination between groups being recorded; this has allowed certain samples to be matched with samples of known origin, thus allowing the relevant research question to be answered.

In terms of change across the life of the industry, development is evident in production, manufacture, and raw material organisation, with expansion most notable during the 17-18th centuries. The products mirror this development, displayed by increasing consistency; likely due to innovations to improve efficiency, such as standardised clay preparation, weighed amounts of clay, a throwing gauge setting parameters of vessel diameter and height, and - to lesser extent - vessel shape. These elements are tempered by strong traditions and a clear potter/apprentice relationship, which was often reinforced through family ties and the iconic nature of the pottery within the productive community. While standardisation is the norm, the potters remained in tune with market demand, creating robust utilitarian forms for the domestic and rural agricultural market, alongside new forms inspired by those introduced from overseas; this continued consciousness of the changes in consumer need, and altering culinary practices over time, evidences a highly specialised community producing very consistent robust vessel forms in line with their traditional values. This is contrasted by manganese-laced lead glazed Verwood-type examples (MVER), introduced from the 1600s onwards, which present extensive specialisation. It has been shown that vessels in this fabric and glaze occur in a more refined clay body and can be incredibly flamboyant, displaying a clear restriction of vessel types for items designed to be seen, or used, at table. Frequently, MVER vessels can be shown to be highly specific, demonstrating significant expertise, with certain examples being one-off, bespoke items.

The factors that contributed to Verwood-type pottery becoming such a dominant player in the ceramic market of southern Britain, and its successful exportation overseas, derive from the robust and well-organised raw material pathways embedded in local economies within a highly managed landscape geared for ceramic production; a landscape displaying methods of management that have been refined for potentially thousands of years, before succumbing to the growing need of land holdings for agriculture and increasing population pressure. In tandem with the increased homogeneity of products, standardisation and uniformity of methods seem key to a rapid rise in production. This is evidenced in the kilns and the layout of sites, with speed of manufacture being carefully balanced with quality of product. This eventually manifests in the creation of products with a distinctive Verwood-type twist – the Dorset Owl and the Verwood-type jug being the most obvious examples.

Furthermore, one imperative aspect of the success of Verwood-type pottery sale can be attributed to the hawkers; the people who distributed the bulk of the pottery, travelling widely to centres within the region to sell the manufactured goods. It has been shown that their itineraries in the 19th century were scheduled to take advantage of markets and fairs, with routes including large houses and farms along the journey, which increased potential for sales. Such an arrangement is likely to have taken place in earlier centuries, but lacks the corroborating historic documentation. Coastal trade also had an imperative role to play in the wider distribution of these wares, accounting for occurrences in Exeter, Okehampton and the Isle of Wight. This shows that the rural east Dorset pottery industry developed a distribution network built upon family ties and communal trust, eventually building economic power to adversely affect similar neighbouring industries; this allowed Verwood to acquire new markets and hinterlands; as demonstrated by extensions into West Dorset from 17-18th century onwards and extensions into central Wiltshire during the 18-19th centuries.

Cumulatively, the results show that the Verwood-type pottery industry started life from a small-scale medieval industry, likely to have been producing similar wares at several locations across east Dorset. These enterprises formed part of a wider ceramic tradition exhibiting an extended history, with shared manufacturing methods and styles of coarseware vessels similar to those of its neighbours (Laverstock and Wareham). This continued until the 15-17th centuries, when the development of wheel throwing vessels became ubiquitous, and the industry saw rapid growth. This expansion was fuelled by steady innovation and the streamlining of traditional practices eventually allowing Verwood-type pottery to become a dominant ceramic within post-medieval southern England. The demise of the industry is evident through incursions of mass-produced imported regional wares from the 18th century onwards, which mirrors the actions of the Verwood-type industry itself taking over markets from surrounding rural pottery centres in the 17-18th centuries.

The wider implications of this study indicate that studies of post-medieval pottery can be suitable to the construction and corroboration of production models for commodities and their exchange. This example has shown that for the more recent past, historic documentation can provide a beneficial factor employed to increase understanding. It has also highlighted that there are universal themes present within pottery production; for example, the various theoretical frameworks usually aimed at understanding the prehistoric potter display just as much relevance when comprehending the decisions made by a medieval or post-medieval potter, whether it be the Exploitation Threshold Model or the concept of Habitus - both of which are considered robust examples.

## *11.1. Evaluation of the Methodology*

The study reveals that although the chosen methodology was successful in addressing the research questions, there is certainly room for improvement. The nature of the staged approach to pottery analysis - from the less complex method to the more complex - is arguably not well suited for ceramic fabrics exhibiting such a degree of homogeneity as those examined here, where the major chronological changes – the amounts and size of quartz inclusions driven by technological change - have been used as a chief discriminator in assigning fabric. Instead, a more successful outcome might have been achieved through a methodology comprising initial visual fabric attribution, followed by chemical analysis using pXRF to rapidly narrow potentially relevant samples, with subsequent targeted thin section petrography. Furthermore, the size of groups for chemical analysis (985 in total) meant that the analysis took an extended period of time; in hindsight, based on the acquired knowledge that most Verwood-type samples cannot be easily discriminated, the use of so many samples of the same fabric (*e.g.* Verwood-type) was perhaps an inefficient approach. In contrast to the methodology sequence chosen here, it is suggested that in future studies using visually homogenous pottery groups, chemical analysis using pXRF should be considered as an initial discriminator, as opposed to the immediate employment of selective thin section petrography as a corroborative mechanism. Such an approach would have provided a more targeted sample selection for thin section petrography, potentially presenting more robust results, thus a more effective methodology.

Additional limitations of the methodology include the scanning of a broken edge of ceramic samples. While initially not considered an issue, it became apparent that existing broken edges from certain kiln site assemblages can exhibit surface adherents, extending into the clay body, that are not readily apparent. This is particularly problematic where samples comprise lead glazed materials, as certain surfaces broken pre, or mid, firing, can accrue lead vapour, leading to the presence of elements which do not constitute the original clay body. Where not readily identified, these surfaces may then be unwittingly analysed by the pXRF. It is often not immediately obvious as to the extent of lead vapour adherent, as this must be examined with an experienced eye. Where present, and accidentally analysed, the unidentified lead vapour produced high concentrations of arsenic and sulphur; where this was apparent, analyses were repeated to limit the effect on the median averages.

In hindsight, increasing the number of measurements for coarser pottery fabrics could perhaps have improved results, especially for the Wessex Coarseware samples. Holqvist (2016, p.367) recommends five or more analyses per sample for coarse materials; however, this was discounted when constructing the methodology, as it may have introduced a bias into the data. The nature of any bias would need to be explored through an additional pilot study, but would be incredibly time consuming for the large number of samples involved here. This highlights sample heterogeneity as a significant factor in this study. This was noted in a study by Forster *et al. (*2011, pp.389-396) when examining Chalcolithic pottery from Turkey. Here, identification of similar groups was successful; based on the results, the method was recommended for further pottery provenance, but with the caveat of an appropriate choice of artefacts being selected (Forster et al. 2011, pp.395-6). Arguably, it is only through studies such as this thesis, which examine a range of potentially similar artefacts, that this suitability can be explored.

This heterogeneity can be detrimental for provenance studies, as results of pXRF analyses can be heavily variable dependent on how deep into the sample the XRF signal extends (Potts *et al.* 1997); this is affected by many factors, including surface coatings and variation in surface morphology (*e.g.* Forster *et al.* 2011). Ceramic fabric variability – especially for frequency of certain minerals - may alter extensively as depth into the sample increases. One potential way to negate this might be through employing additional thin sectioned samples as, cut by mechanical saw, these would be less affected by the irregular surface of an existing break, surface treatments, and post-depositional change. In contrast, one could turn to destructive chemical analysis, but this would mean losing the advantage of pXRF in being non-destructive. Analyses using this method for pottery samples may prove beneficial, as these would be less affected by surface morphology variation (Forster *et al.* 2011); this would remove the outer surface which contains the bulk of post-depositional change and any potential lead vapour. However, this method would be destructive, thus limiting the likelihood of accessibility to potential samples due to reluctance from curatorial bodies.

In short, the use of pXRF in pottery provenance has been successful here - but significant limitations were highlighted. Arguably, the pXRF results suggest that to be statistically meaningful enough to secure acceptable discrimination between groups, fabrics sharing differing frequencies of similar temper need to be compared with each other. This was not undertaken here, placing all samples - regardless of quartz tempering quantity - into the same statistical analysis to be matched. It is hypothesised that more certain results could have been achieved using a staged statistical analysis; for example, the post-medieval samples compared to the transitional, the transitional to the late medieval and so on. Undertaking so many separate analyses would be considerably time consuming, but may bear fruit in similar future examinations. Similarly, an approach using Bayesian statistical methods could be beneficial. For example, fabric, form, date and recovery location in relation to distance from source of kiln/clay source, could be introduced as Bayesian inferences employed to construct probabilities of correctly attributing samples to potential production sites (*e.g.* Buck 1993; Otárola-Castillo and Torquato 2018, pp.445-7). While the results of this thesis were successful at demonstrating early post-medieval/transitional pottery production in the east Dorset area, the results for the late medieval samples are less convincing. This may be the result of little to no pottery production occurring in the area at this time, but based on the attribution of very small numbers of samples, this cannot be said with certainty.

### *11.2. Where Next?*

This study has shown that examinations of homogenous pottery can be fruitful when thin section petrography and non-destructive pXRF chemical analysis are deployed alongside more basic observations regarding fabric analysis and changes in vessel form. Examinations of medieval and later pottery can also be aided through the examination of historical documents and the results of past interviews, which have been pivotal here in adding flesh to the bones of distribution maps created from data regarding sherd recovery made by field archaeologists in both published sources and unpublished grey literature. It has been shown here, that when combining the two, a more comprehensive picture of the distribution of archaeological phenomena can be outlined, especially when a recognisable artefact type, such as Verwood-type pottery, forms the subject of study. It is hoped that this thesis will be seen as a successful case study employing methods that can be readily used on similar pottery, wherever researchers feel it is appropriate to do so.

While this thesis has advanced the study of Verwood-type pottery, there is still much work to do. In particular, the dissemination of fieldwork not yet published by the former VDPT should be an immediate priority. It is hoped that the study of Verwood-type pottery will continue beyond this thesis, and that this work has shown that the study of post-medieval earthenwares, and homogenous ware types generally can be not only fruitful, but as important and relevant as that of earlier more heterogeneous archaeological ceramics.

Furthermore, this thesis has shown that dating of British post-medieval ceramics has much to gain from the occurrence, accurate identification and recording of such wares where they appear overseas. This should especially be the case for former colonial centres, which often have more restricted and well understood date ranges due to a plethora of historical documentary references recording European arrivals and interactions (*e.g.* Jamestown and Newfoundland – Chapter 10). It is hoped that the work of archaeologists overseas, drawing on the expertise of their British counterparts, can be beneficial to the studies of both British and foreign archaeology and associated artefacts of international importance.

Additionally, this study has exposed many inconsistencies with current archaeological understanding of English medieval and post-medieval pottery across the study area. Examinations of such dated assemblages have shown that there is a distinct lack of uniformity concerning the attribution and description of fabric groups, identification of known/postulated production centres, and illustrations of products within publications. Such a situation raises difficulties when comparing large assemblages and vessel change over time, requiring the need to visit many large paper project archives - which often do not elucidate the situation - or re-examining several large assemblages. This highlights that there is a need for a coherent, uniform, and widespread pottery fabric database, spanning across regions - such as southern England as a whole, or a county-based system, which is cross-referenced between counties. This collated rationalisation of fabric groups would aid broader regional understanding to identify the extent of ceramic distributions, which – as has been shown here – can extend for long distances from the hypothesised source.

This study has reinforced the need for physical evidence of medieval pottery production in the east Dorset/west Hampshire area, to allow for the creation of a known group of readily comparable pottery to be compared to similar samples. It has been shown that these products exist within consumption sites, thus the kilns that created them must have existed. The DBA suggests that the most promising parishes for this comprise: Alderholt, Cranborne, Horton and Verwood in Dorset, plus Damerham in Hampshire (Appendix II), thus future archaeological investigations here should be seen as a regional priority.

The words of Dr Paul Spoerry (1989, p.274) remain as true today as they did over 30 years ago:

> *"The identification of the ceramic types manufactured in the early stages of the Verwood industry, and the location of at least one medieval kiln site here, may eventually prove crucial to the understanding of the … pottery of east Dorset."*

This thesis has reinforced the foundations laid by Spoerry for the analysis of such a kiln site and its products, alongside narrowing its likely location.

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# Abbreviations

## *In References*

BCHS - Ball Clay Heritage Society

DNHAS - Dorset Natural History and Archaeology Society

HS – Hampshire Studies, formerly Proceedings of the Hampshire Field Club and Archaeology Society

MA – Medieval Archaeology

MC – Medieval Ceramics

MPRG – Medieval (and later) Pottery Research Group

PDNHAS - Proceedings of the Dorset Natural History and Archaeology Society.

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