CHANGING THE FABRIC OF LIFE IN POST-ROMAN AND EARLY MEDIEVAL CORNWALL: AN INVESTIGATION INTO SOCIAL CHANGE THROUGH PETROGRAPHIC ANALYSIS

Submitted by Imogen Wood to the University of Exeter
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In April 2011

I certify that all material in this thesis which is not my own work has been identified and that no material has previously been submitted and approved for the award of a degree by this or any other University.

Signature: Imogen Wood ……………………………………………………………………..

I dedicate this PhD to my future husband Brynmor Morris

ABSTRACT

This study digs beneath the cultural façade of pottery, delving deeper into the individual consciousness and choices behind the selection of the clays used to make them. The social significance of clay and its sourcing practices is rarely considered in ceramic studies, and is generally restricted to an assessment of technical properties. This subject is thus poorly theorised, ignoring the potential of that first choice and act in the social process of ceramic production.

This thesis sets out a theoretical approach – raw-material spatialisation – and utilises a ceramic petrographic methodology designed to investigate social change through the changing composition of ceramic fabrics. The study focuses on the continuous pottery sequence spanning the 4^{th}-11^{th} century AD in Cornwall, a period of immense social, religious and political change, viewed in its regional and national context. The first synthesis of ceramic traditions in the South West for 50 years, this study highlights previously overlooked similarities in the phases of ceramic innovation and production between Cornwall and western Wessex and the role of Devon as an aceramic buffer zone.

Previous studies have highlighted the selection and preference of gabbroic clays, unique to the Lizard Peninsula, used in the production of pottery in Cornwall since the start of Neolithic and which became a tradition that lasted roughly 5000 years. Interpretation has rarely moved beyond David Peacock's original assumption of the technical superiority of this material. This study challenges and overturns that assumption, establishing that social choice was the motivating factor in its procurement. The repeated use of gabbroic clay created and maintained a shared social reality within the socialised landscape occupied by the past peoples of Cornwall.

Gabbroic clay had a totemic meaning within society: its source became a node in the socialised landscape; and its repeated extraction and distribution maintained not only society but regional kinship networks and their identities. The shift away from the exploitation of this totemic material towards clays sourced locally to settlements around the 7^{th}-8^{th} century coincides with the growing influence of Christianity in Cornwall. One of the early monastic foundations was strategically placed at its socially significant gabbro source eventually eroding its totemic meaning. The end of the gabbroic tradition and the region's resilient decentralised system of pottery production came with the Norman Conquest, when the creation of a new market centres, networks and systems of landownership forcibly integrated Cornwall into the wider national framework once more.

This study conclusively demonstrates that the selection of a clay source should be interpreted as an indicator of social, and not merely technical or economic, choice. It also establishes that the use of a rigorous and systematic programme of scientific inquiry, combined with an informed theoretical perspective, can identify the evidence for social change behind the façade of the otherwise largely static pottery traditions of the 5^{th}-11^{th} centuries AD in most parts of the British Isles.

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Chapter 1: INTRODUCTION

1:0 Introduction

This study sets out to determine if social change can be observed in the changing fabrics of pottery of post-Roman and early medieval Cornwall, defined here as 4^{th} -11^{th}-centuries AD. This study takes advantage of the only unbroken ceramic sequence in the British Isles, and this provides a unique opportunity to observe society through its pottery in a period otherwise known – even typified – for its inconsistent, interrupted or non-existent ceramic usage, with implications and applications of a more general nature.

Through a detailed investigation of clay-sourcing practices on three geologically, chronologically and spatially distinct sites, this study will establish if any diachronic fabric changes occur during the post-Roman and early medieval periods. This will be achieved through petrographic analysis, involving both macroscopic *and* microscopic fabric analysis, combined with fresh theoretical perspectives. The analysis will then be contextualised within a broader appreciation of social change over this time period, addressing the themes of Christianity and settlement, and seeking to examine broader ceramic trends in the South West.

The three archaeological sites concerned, Trebarveth, Carngoon Bank and Winnianton, all lie on The Lizard Peninsula in south-western Cornwall (see Fig 1:1). This is a landscape largely untouched by mining or associated urban or quasi-urban development, and, for the most part, agricultural intensification. It is also the home of the *gabbroic clay source*, a highly distinctive raw material (see below).

The unique social perspective of this study will accommodate the first purely ‘bottom-up’ methodology in ceramic studies for this period, in contrast to previous ‘top-down’ approaches guided by textual sources and Roman or medieval societal models, to gain an understanding of the post-Roman and early medieval period in Cornwall. The use of assemblages from contemporary rural sites in the same region will offer an ideal foundation upon which to build a picture of the structure of everyday society over a broad time period. The combination of these unique approaches will provide an overview of socially-motivated clay-sourcing strategies, in contrast to the heavily deterministic views of processual, technological motivations behind clay selection seen in past research.

The theoretical underpinning of post-Roman and early medieval pottery studies is crying out for reassessment, as previous work has almost exclusively focused on economic and technological explanations for ceramic change and distribution. We can and should now concentrate on the potential for social and cultural aspects to influence ceramic production and use. This study will be informed by data but is led by archaeological theory. A combination of archaeological theory and philosophy will together form a new interpretive tool termed ‘raw-material spatialisation’, discussed in Chapter 2, to determine the social significance of pottery in this period.

This study digs beneath the cultural façade of pottery, delving deeper into the individual consciousness and choices behind the selection of the clays used to make them. The social significance of clay and its sourcing practices is rarely considered in ceramic studies, and is generally restricted to an assessment of technical properties. This subject is thus poorly theorised, ignoring the potential of that first choice and act in the social process of ceramic production.

1:0:1 Questioning past conclusions

This study will also challenge past approaches and interpretations of the ‘gabbroic model’, as proposed and established by the pioneering work of Peacock in the 1960s, who uncovered this unique clay-sourcing tradition (1969b). Predominately processual models of a society driven by economic forces were used by Peacock to understand the context of gabbroic pottery in the South West. He proposed that the preference for gabbroic clays was due to its inherent technical superiority in ceramic production and performance, and few alternative explanations or interpretations have been suggested since.

The use of gabbroic clays was a constant facet of everyday life in Cornwall and this tradition was maintained from the earlier Neolithic through to the *c*.8th century AD. This makes an investigation of its period of decline crucial to our understanding of its use over the millennia. The question of whether the end of this practice and the transition from Roman to Anglo-Norman Cornwall is coincidental is an essential one that will be answered by this study.

Peacock's conclusions and social models have stood for 50 years without any rigorous examination or exposure to current theoretical perspectives in archaeology. This work will challenge the conclusions of this early research and interpretation through a bespoke methodology with the aim of demonstrating that data arising from petrographic analysis can go beyond purely technical and economic interpretations and answer wider societal questions of change and the maintenance of social reality. It will also readdress the lack of theory in this period by demonstrating that a theory-led approach to viewing data can provide valid new interpretations of society and social change between the 4th and the 11th centuries AD.

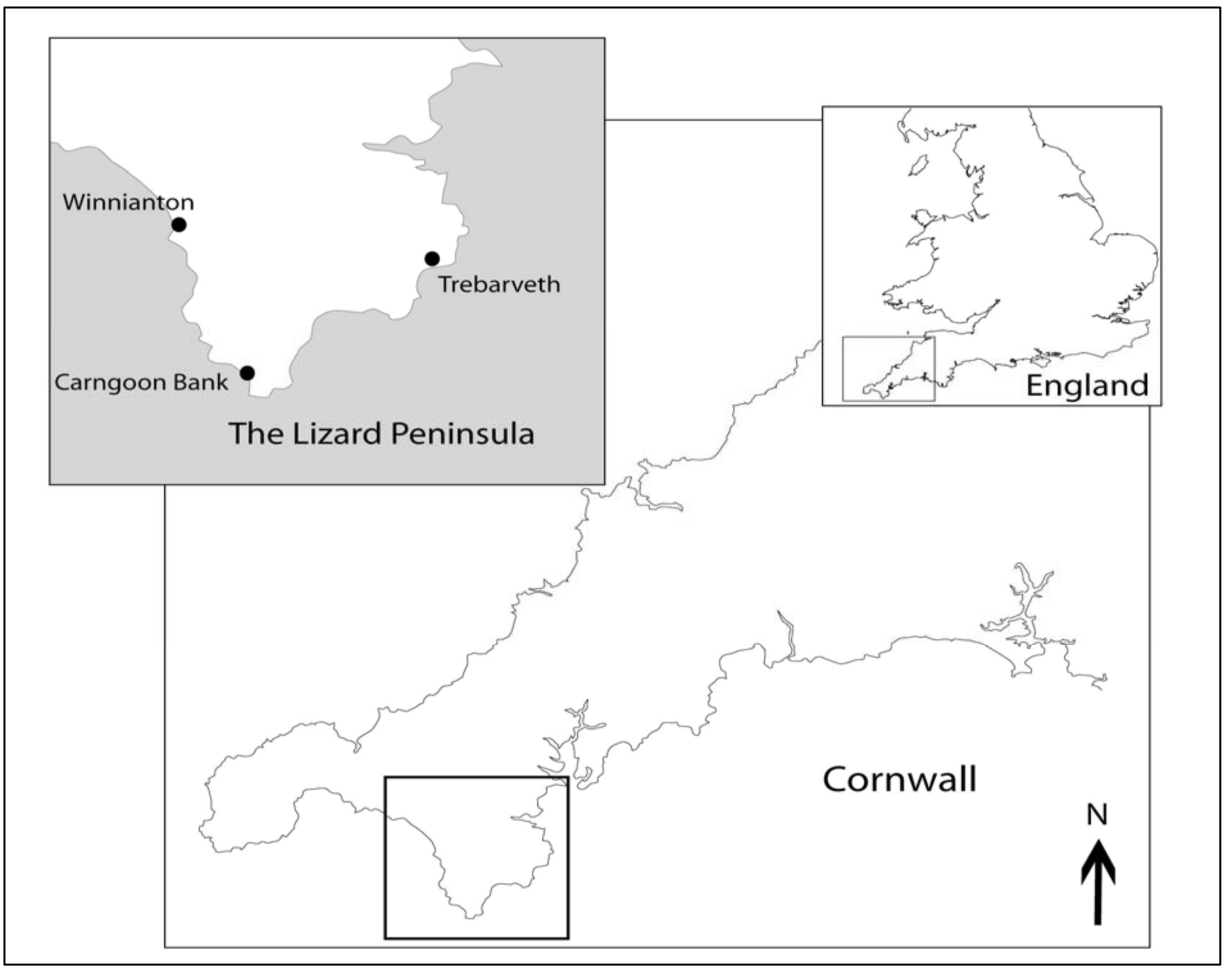


Figure 1:1. Location map of Cornwall and the Lizard Peninsula, with the research sites shown (Author's Illustration).

1:1 Pottery studies in Context

Pottery has been studied in Britain for hundreds of years. The early Antiquarians, with their ambitious typologies, laid the foundations for a dynamic and progressive approach to an understanding of past peoples through their ceramics. Current archaeological pottery studies are based on three approaches: classification, decorative analysis and compositional studies. These have been extensively discussed through the publications of archaeologists such as Prudence Rice (2005), Anna Shepard (1956), Clive Orton (1993), Alan Vince (1989, 2005), David Peacock (1967, 1970, 1977) and Ian Freestone (1995) to name but a few, and pottery studies are a vibrant and essential part of Archaeology. The increasing importance of scientific analysis in pottery studies since the 1960s has led to the development of numerous new methods of examining pottery, and ever more specific research questions, and it is *petrography* that has led the way from the beginning.

1:1:1 Petrography and the Scientific Method

Petrography is a branch of petrology, used in geology to record and characterise rocks by identifying their constituent minerals through their optical properties and is used in archaeology to provenance pottery. It is a well-established technique that has been used in the study of archaeological ceramics since the 1960s (Freestone, 1991, 1995; Freestone *et al.*, 1982; Peacock, 1969). The pottery selected for microscopic analysis is impregnated with resin, cut to a fraction of a millimetre in thickness and then put onto a glass slide: this is called a thin-section. The thin-section is then analysed under a polarising microscope which can use both plain-polarised and cross-polarised light to view the often differing behaviour of minerals and micromass (the matrix of finer clay minerals) within which they are set (Figs 1:2 and 1:3). Under the microscope the shape, colour, appearance and behaviour of minerals can be recorded, with each mineral being identified on the basis of these attributes (this process is more fully described in Chapter 6).

Petrography was the first scientific analysis to establish the location of the clays used to make pots and processing methods in production. It revealed the inner story of each pot and allowed archaeologists to confidently approach questions such as how far a pot had travelled, whether it represented trade or migration and many more new hypotheses concerning the structure and lifestyle of past peoples. As a result, the provenancing of pottery has become a standard analytical tool in most academic and commercial investigations. This technique also underpins the analysis within this study upon which new viewpoints on society and social change will be established.

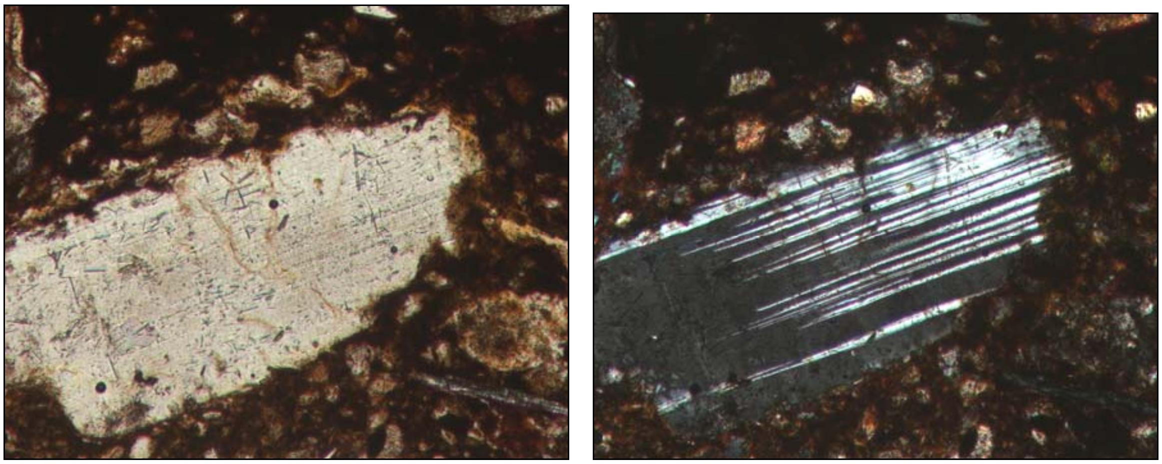


Figure 1:2 and 1:3. Plagioclase feldspar under plain-polarised light (left) and cross-polarised light (right) (Author's Photomicrograph).

1.1:2 Pottery in Theory

The limited interpretive scope of scientific analyses is balanced in pottery studies by the use of archaeological theory to approach the possible social role pottery played in the everyday life of past peoples. Prehistoric pottery studies have led the way, utilising ethnographic studies of pottery production and consumption. Pottery from the medieval and post-medieval periods has not, however, received this level of theoretical attention. Interpretation of pottery in these periods still relies heavily on more traditional models of trade, exchange and distribution patterns, with the notable exception of Cumberpatch and Blinkhorn (1997), and others have incorporated more prehistoric interpretive models.

Alan Vince (1984) sought to establish archaeological and not historical evidence for pottery production and distribution in the medieval period and how that related to the economies in which pottery was used. He wanted to know how a medieval pottery industry arose in the Severn Valley from Anglo-Saxon domestic production (Vince 1984). He suggested the decline in distribution distance in the medieval period as compared to the Late Saxon pottery industry indicated a move from full-time Anglo-Saxon to part-time medieval potters, the root cause of which he saw as the fundamental changes in society that occurred towards the end of Anglo-Saxon rule. However, Vince (1984) would not comment on the precise nature or motivation of these changes, as he saw 'social factors' as being outside the scope of his thesis and better left in the hands of social and economic historians than archaeologists. In contrast, this study will emphasize the potential of petrography in this period, and, more importantly, bridge the conceptual gap between petrographic analysis and its use as a socially significant interpretive archaeological tool.

1:1:3 National pottery studies today

The progression of pottery studies nationally has over the past decade has seen a stronger emphasis placed on standardisation of technique, analysis, quantification and terminology in pottery studies, to enable broader comparison between regions to take place. More recently, a need for *regional research frameworks* has been identified, to identify and address questions that have hampered the development of national syntheses and broader conclusions. This need has underpinned the research aims of organisations like the Study Group for Roman Pottery (SGRP) and the Medieval Pottery Research Group (MPRG), leading to the MPRG publication *A Research Framework for Post-Roman Ceramic Studies in Britain* (Irving 2011). As this publication has emphasized, despite the vast amount of work already undertaken glaring lacunae in the ceramic record still exist, and much work remains to be undertaken.

1:1:4 The background to regional pottery studies

One of the motivations for this study lies in the historical development of pottery studies in Cornwall. The pioneering work of petrographer David Peacock was built upon pottery studies carried out on ceramics from Cornwall, and, more specifically, gabbroic pottery. This work has gone on to have a profound influence on many other subsequent ceramic studies, and thus any critique or refinement of his method or conclusions immediately assumes a far greater importance, with relevance to the whole field of pottery analysis.

1:2 Peacock and the geological petrological approach

A new era for the scientific methods in pottery studies began in Cornwall in the early 1960s, through the detailed petrological analyses carried out by archaeologists and geologists working in collaboration. This was the work of David Peacock and Charles Thomas on wheel-made imported E-ware (Peacock and Thomas, 1967, 119). This initial thin-section and heavy mineral analysis was intended to support Thomas' theory of a French origin for this material and bolster his ceramic chronology (Peacock and Thomas, 1967, 40). Analysis of the tempering material confirmed his suspicions, and this success opened up the new field of petrological research (Peacock and Thomas, 1967, 43).

Peacock's inspired application of heavy mineral analysis, which extracted minerals with a higher specific gravity such as tourmaline from crushed pottery samples, allowed particular diagnostic suites of minerals to be identified, which in turn could identify source areas. Its use in archaeology initially focused on material from western Britain, which ultimately resulted in material from Cornwall receiving pioneering ceramic analyses (1967, 1968). It was in Peacock's analysis of early Iron Age pottery in the South West that native Cornish wares were first identified as having a distinct and locatable raw material provenance: the gabbro (Peacock, 1969a, 44).

Peacock identified two main points: firstly, that from the six raw material sources in the South West, the Group 1 gabbroic clay reached that greatest distance from its source on the Lizard Peninsula; and secondly, that most of the pottery sampled in Cornwall was composed of gabbroic clays (Peacock, 1969a, 44-45). This fabric has since dominated most ceramic analysis in the county, leaving research into non-gabbroic fabrics very limited.

The analytical and interpretive potential of this discovery was quickly recognised by Peacock and others. As Vince (2005, 220) has commented, the gabbroic clay outcrop is one of the few source areas that has met the stringent conditions for petrological analysis required to identify the source of a clay.

1:2:1 The significance of gabbroic clay

The importance of gabbroic clay lies in its highly restricted distribution; in the South West it is limited to an area of just 7km² on the tip of the Lizard Peninsula, and thus the distribution of this clay in the form of pots or the clay itself can be readily identified (Peacock, 1969a). The Mafic geological formation that produced the gabbro is not very common in England, and this makes its derived clay very distinctive and easy to provenance (Fig 1:4).

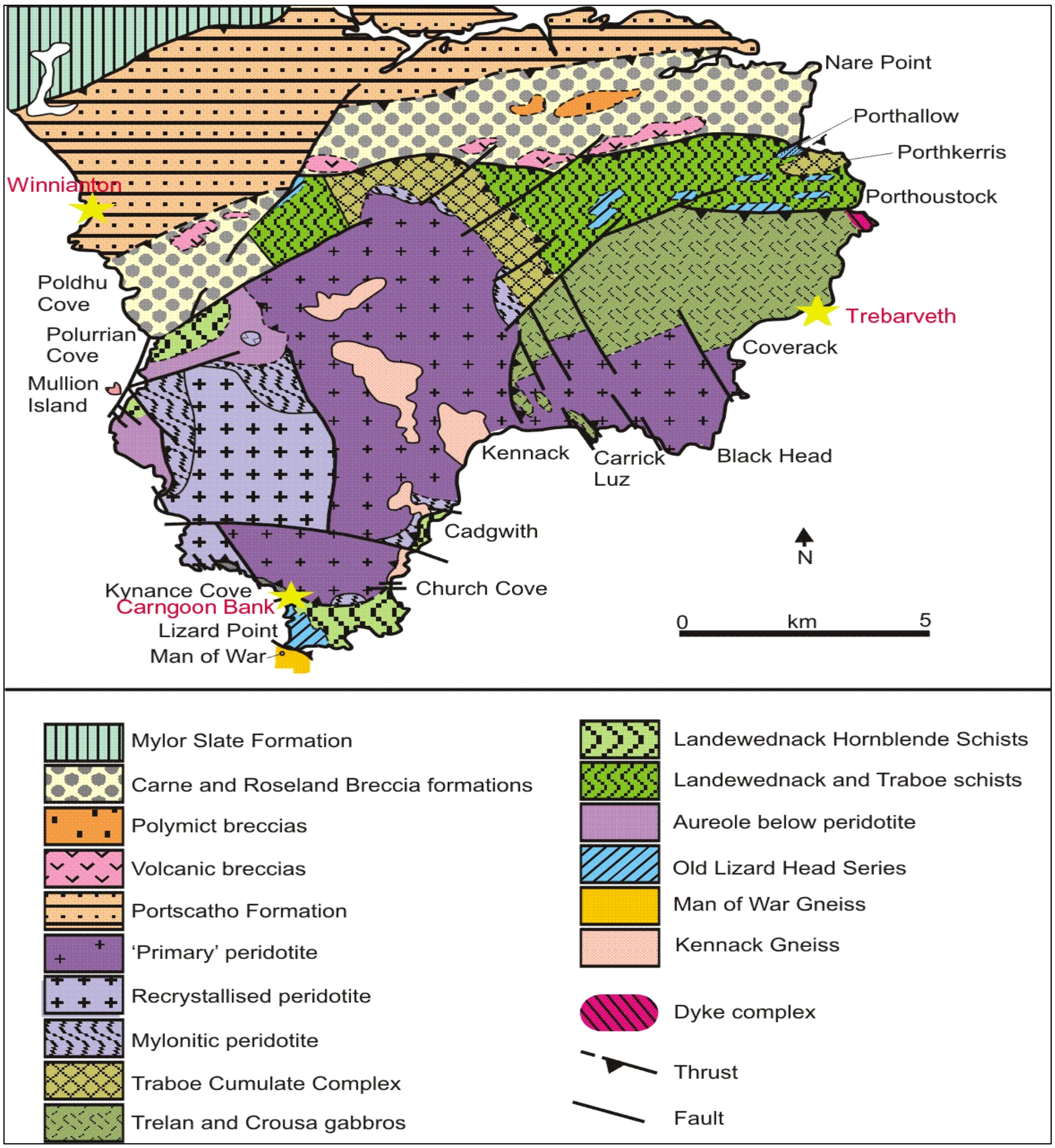
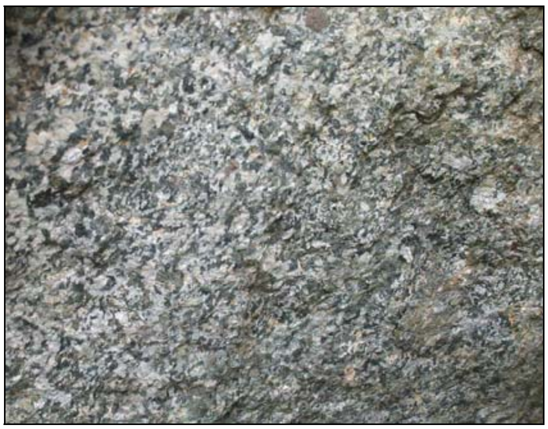


Figure 1:4. Geology of the Lizard Peninsula, the gabbroic outcrop indicated on the right side of the peninsula (After Shail, 2010 forthcoming, Fig 10.4).

Gabbroic rock is distinguished by a mixture of black or greenish-blue and white inclusions within a generally darker matrix (Fig 1:5). Under a polarising microscope using cross-polarised light the dominant mineral is plagioclase feldspar (distinguished by black and white stripes) with the more colourful inclusions generally pyroxenes (Fig 1:6) (see Chapter 7). The gabbroic clay is a product of gabbro rock and is produced as the rock gradually weathers, during which time the individual minerals that form the rock separate and alter to form clay deposits (Fig 1:7).



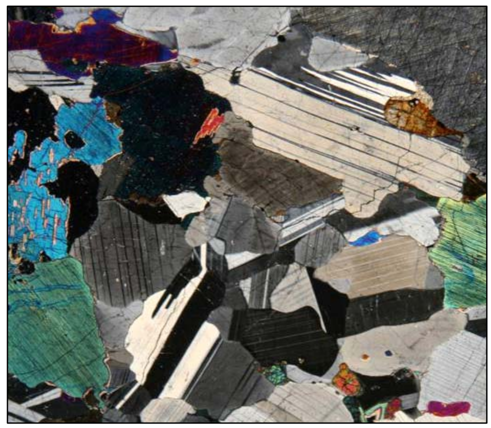
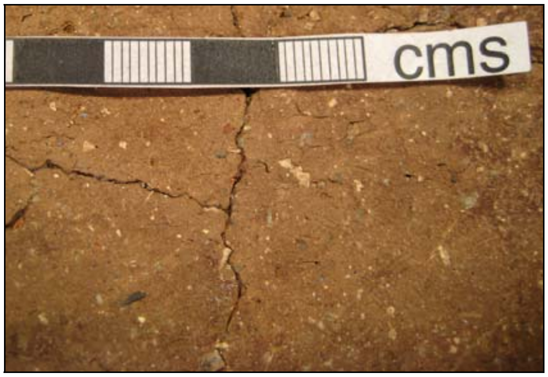


Figure 1:5 (to left). Gabbro rock (Author's Photo).
Figure 1:6 (to right). Gabbro rock under a polarising microscope using cross-polarised light, showing the minerals (Author's Photomicrograph).

Figure 1:7. Gabbroic clay deposit (Author's Photo).

The Cornish pottery that utilises gabbroic clay has a very distinctive fabric. The gabbroic fabric is distinguished during macroscopic analysis (i.e. viewed with hand lens) by the frequent off-white or yellow oblong flecks that are pieces of plagioclase feldspar (Fig 1:8

and 1:9). Microscopic analysis shows the addition of occasional quartz, pyroxenes and rare hornblende, with accessory minerals such as serpentine and olivine (Fig 1:10).



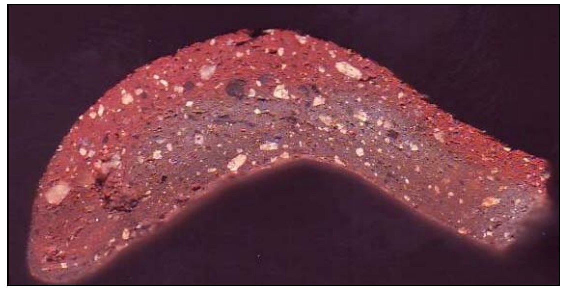


Figure 1:8 (to left). The surface of a gabbroic pottery sherd with its distinctive off white flecks (Author's Photo).
Figure 1:9 (to right). Image of a cross section through a gabbroic sherd, showing the frequency of feldspar in the fabric (Author's Photo).

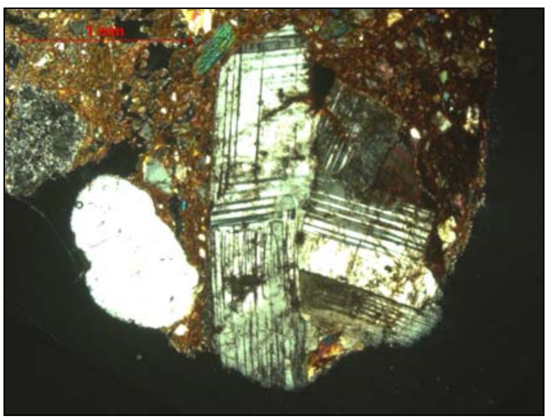


Figure 1:10. Photomicrograph of gabbroic fabric, showing black and white stripy plagioclase feldspar and white rounded quartz (Author's Photomicrograph).

1:2:2 The birth of the Gabbroic Model

The potential for understanding pottery production and exchange in Prehistory were immediately recognised, opening up the possibility that it could be used to model exchange patterns in the South West and beyond (Peacock, 1969b). A focused study of Neolithic pottery in Cornwall resulted in just such a model (Peacock, 1969b). Peacock subsequently proposed that not only were gabbroic pots being exported, but that non-gabbroic vessels elsewhere must be copies of Cornish forms (Peacock, 1969b, 147). Exported Neolithic gabbroic pottery has been found as far afield as Hembury (Devon), Maiden Castle (Dorset) and Windmill Hill (Wiltshire), possibly representing an extensive associated trade network (Anderson, 1984, 121).

The approach adopted by Peacock is typical of the processual studies of that era, in which pottery specialists used quantatitive methods with the aim of achieving objective data, in order to answer questions about society using distribution networks to elucidate economic models of how society was structured and developed.

This approach provided the impetus for broader macroscopic analyses of ceramic assemblages in Cornwall, throughout Prehistory, most subsequently performed by Henrietta Quinnell. As a result of her 1973 excavation at Trethurgy in Cornwall she became intimately involved in the issues surrounding the use and distribution of gabbroic clay (Quinnell, 2004). She has spent the past 40 years endeavouring to further understanding of this raw material source, through a sustained programme of macroscopic textural and compositional analysis (Quinnell, 1987). The combined efforts of Peacock (1988), Williams (1978) and Quinnell (2004) have revealed that this singular raw material source was in use for around 5000 years.

1:2:3 Subsequent research into the use of gabbroic clay

Peacock and Quinnell have sustained a long-term research interest in the provenancing and use of gabbroic clays, but other academics have contributed to the ongoing debate through their independent research.

1:2:3:1 Hutchinson

Hutchinson (1979, 81) carried out a textural analysis of Bar-Lug pottery, dating to between the 7th-11th centuries, as part of a regional review towards establishing the date, manufacture and distribution of this pottery. She found evidence for diverse fabrics and production techniques, inferring that microscopic analysis would yield significant discoveries (Hutchinson, 1979, 90).

1:2:3:2 Sofranoff

Sofranoff, in her 1976 study of the Neolithic assemblage from Carn Brea, near Redruth, identified large amounts of biotite in the fabric of the pottery. She suggested this biotite could derive from the metamorphosed gabbro dykes near the eastern coast or equally from the local clays around the settlement at Carn Brea. Subsequent re-analysis by Peacock (1988, 303) challenged Sofranoff's conclusions, finding that the results of her heavy mineral analysis were incorrect and that there were no mica inclusions, suggesting that she must have confused mica with iron ores. Work by Smith (1981) did, however, identify an adequate local clay source in the Carn Brea area, questioning the primacy of the gabbroic clays. Petrographic analysis demonstrated that the granitic-derived clays used did come from the immediate area and had been mixed with the gabbroic clays (Harrad 2003, 277).

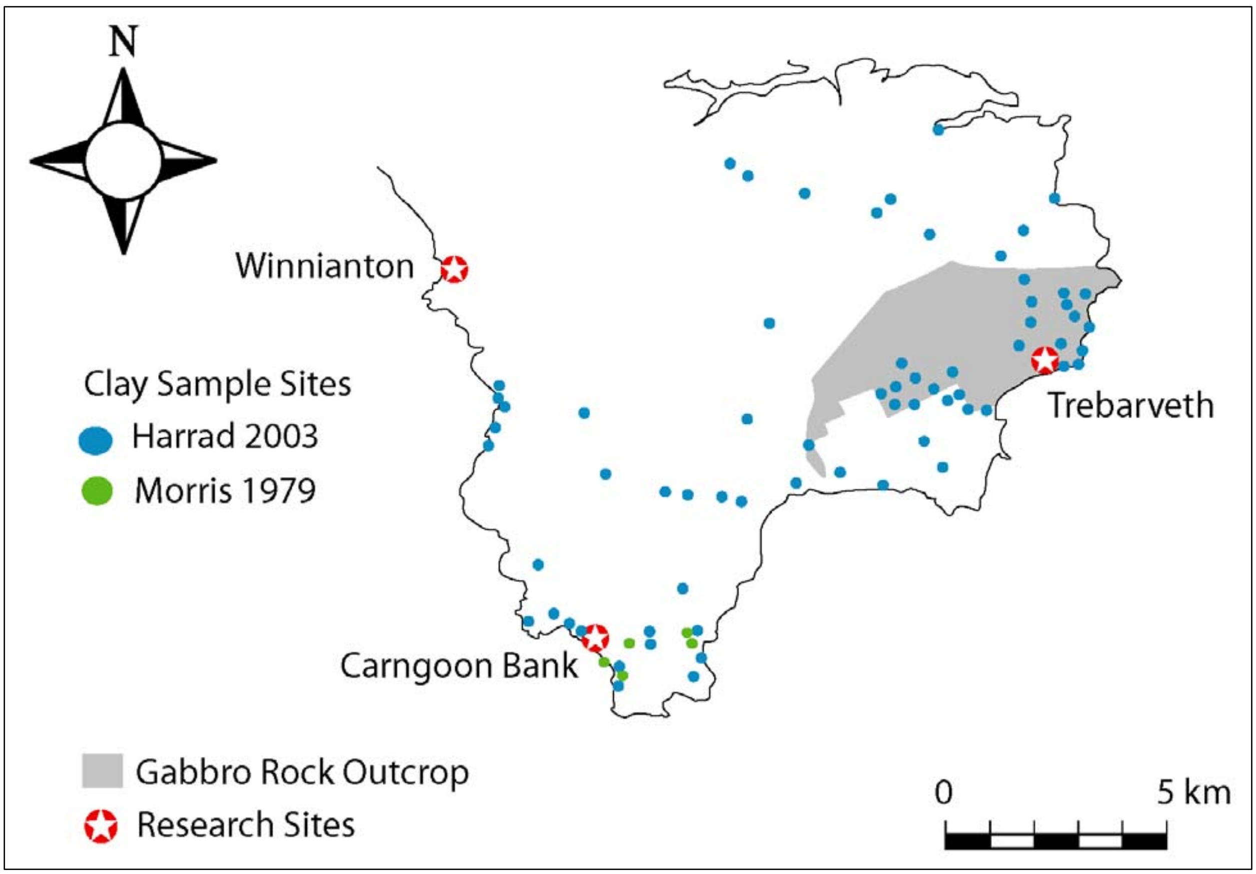


Figure 1:11. The research area, showing the location of the gabbroic clay outcrop and where Morris' and Harrad's clay samples were taken (Author's Illustration).

1:2:3:3 Harrad

The first comprehensive research methodology focusing directly on gabbroic clays was conducted by Lucy Harrad in (2003) as part of her doctoral thesis. Her methodology was based on archaeometric approaches, applying both chemical and petrological techniques, rather than being embedded in a broader interpretive archaeological research framework (Harrad, 2003). Her aim was to investigate how gabbroic pottery was produced and traded (Harrad, 2003, 47). She performed a detailed diachronic study of gabbroic pottery fabrics from a Bronze Age site and a late Iron Age site (Harrad, 2004). The data was then compared to the mineral composition of clay samples taken from strategic locations within the gabbroic clay region (Fig 1:11) (2004). The use of a scanning electron microscope, polarized-light microscopy and inductively-coupled plasmaspectrometry, defined the minerals present in very specific ways, providing the most comprehensive record of comparative clay deposits.

Although not definitive, the closest match to the pottery analysed was a source in an area of *c*.1km² centred on Zoar on the Crousa Downs (Harrad, 2004, 285). This drew attention to the fact that the interfaces of minerals surrounding gabbroic clays could have some bearing on the variation of pottery fabrics and its possible diachronic exploitation. However, it also highlighted the geological diversity of the Lizard Peninsula, suggesting that it was not possible to predict the locations of clay outcrops and that there could be several outcrops of the same mineral (Harrad, 2003, 47).

1:2:3:4 Morris

An alternative approach to clay-sampling on the Lizard Peninsula was taken by Morris in 1979 for a commercial report (see Chapter 5). The aim of Morris' (1980) analysis was to locate the source of the clays used to make the pottery she identified microscopically at Carngoon Bank, and thus it focused on the clays found in the immediate area (Fig 1:11) (Mc.Avoy *et al.*, 1980; Morris, 1980). Instead of sampling gabbroic clay outcrops, she took 13 column-samples from clay outcrops around Carngoon Bank, and the methodology employed demonstrated that non-gabbroic clays were being utilised on site in tandem with gabbroic-derived clays (Morris, 1980).

1:2:4 Summary of past approaches

The range of techniques used in the analysis of Cornish ceramics has been varied and often innovative. In reviewing past methodologies it is clear that they all derive from an archaeometric background focusing on defining and locating the gabbroic clay source through chemical and petrological analysis. Sillar and Tite (2000) have commented that this focus in ceramic research has often tended to encourage functional and material explanations of technological choices in pottery production. The geologically-informed thin-section analysis carried out by Harrad (2003), Peacock (1988), Williams (1978) and Taylor (2011) embodies this archaeometric trend, resulting in interpretations being environmentally, technologically and economically deterministic, with little consideration of cultural factors or possible social motivation.

The pottery analyses carried out on gabbroic pottery have achieved a significance within the contemporary world of ceramic studies that is hard to ignore. The gabbroic distribution model has been widely used and is highly influential. The range of periods covered gives an overall picture of trends and highlights certain questions about clay-sourcing strategies. However, the decidedly unsystematic selection of site assemblages and the lack of focus on particular chronological periods or wares has led to patchy knowledge and generalising interpretations of pottery production in Cornwall. In the absence of firmly research-based sampling strategies and appropriate funding in Cornwall, research will continue to illuminate the small corners but not entire periods.

1:2:5 Wider Implications

The early medieval period is generally thought of as the concluding era in the gabbroic clay-sourcing tradition, a practice that had been performed for over 5000 years. Yet while the use of gabbroic clays was often dominant, it was not always consistent, and this fluctuation of use is important to our understanding of the role gabbroic clays performed over the millennia (Fig 1:12). The use of gabbroic clays was extensive during the Neolithic, but declined in the Beaker and early Bronze Age periods. It was, once again, extensively used during the middle and later Bronze Ages, and declined slightly during the later Bronze

Age and early Iron Age transitional period. It subsequently became more popular in the late Iron Age and Romano-British periods (Quinnell, 1987, 2004).

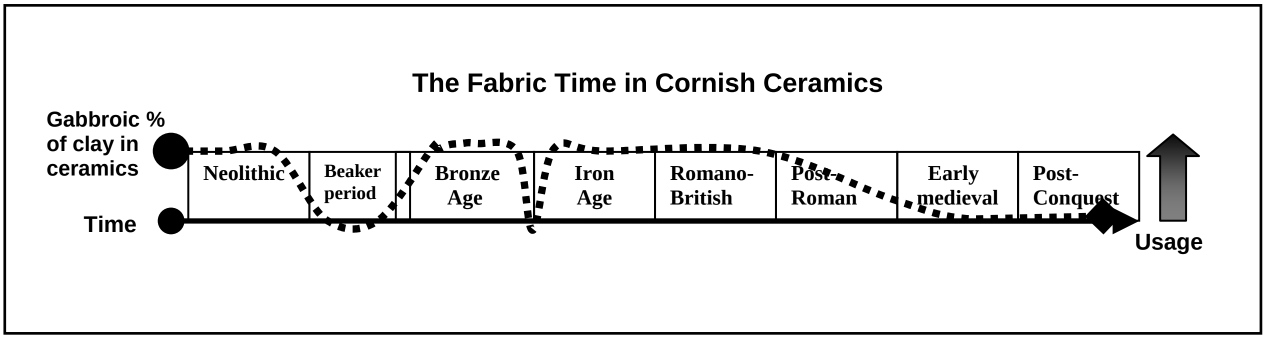


Figure 1:12. Diagram showing the fluctuating use-ratio of gabbroic clays from the Neolithic to the post-Conquest period and the divergence away from British forms in the post-Roman and early medieval periods (Author's illustration).

Throughout the Prehistoric period of Cornish ceramics, gabbroic clays seem to have been involved in social shifts that relate to the region as a whole and, occasionally, external or ecological events (Harrad, 2003). Parker-Pearson's analysis of Cornish Beaker vessels found that they were not made from gabbroic material but were instead formed of a diverse range of local clays (see Chapter 6:4:1) (1990, 5). The connection between an (assumed) influx of Beaker migrants and divergence from local gabbroic traditions is significant in this respect. Late Bronze Age Trevisker Ware witnessed the re-emergence of gabbroic fabrics, albeit incorporating other local raw materials (see Chapter 6:4:2) (Parker-Pearson, 1990). Once the regionally-defined Trevisker style became established, the use of gabbroic clay became standard, with four-fifths of vessels being made of gabbroic clays (Parker-Pearson, 1990, 21). Parker-Pearson suggested that the reasons for this mixing of local and gabbroic clays reflects either a desire for stronger regional identities, pressing ecological factors affecting land allotment, or was linked to the growing control and extraction of copper due to external demand (1990, 23). However, as this period also saw the emergence of the Trevisker decorative style, it is equally possible an internal stimulus was the cause (Parker-Pearson, 1990).

The decline in its use during the Bronze Age to Iron Age transitional period may simply reflect the lack of pottery production in general (Harrad, 2003), and not necessarily a break from past traditions. The Late Iron Age and Romano-British periods saw a peak in the use of gabbroic clays with no discernable break; in fact, Romano-British pottery assemblages in Cornwall are on average composed of 95% gabbroic fabrics (see Chapter 6:4:2) (Quinnell, 2004,108).

While these periods fall outside the remit of this study, it does demonstrate that gabbroic clays were preferentially and consistently used for long periods of time. It could be suggested use was affected in times of transition, a fact that has perhaps escaped previous attention as the time-depth would involve mass data collection making any synthesis extremely daunting. This study focuses on the one period that has not been examined in this sense, which is arguably the most important as it witnesses the end of its usage. When the origins of a tradition lie in the Neolithic, the very best time to understand the prior importance or impact of that tradition is when it ends, as this can throw light on the social or economic systems in which it was involved. It can also address if it was replaced and if so with what and in what context, and even what events may have proved causal factors. Thus one aspect of the unique scope of this study can be said to be its multi-period significance.

1:2:6 Regional pottery studies today

Pottery studies in the region of Cornwall are represented by an ongoing, if sporadic and intermittent, programme of pottery thin-sectioning funded by development-led commercial projects. Prehistoric pottery is more commonly found and has thus received the bulk of the analytical methods available nationally; medieval and post-medieval pottery has received little research or analysis and comprises a vast gap in regional pottery studies. The bulk of funding for pottery studies comes from commercial archaeology, and over the past 50 years David Williams (1977) and Roger Taylor (1978) have produced commercial petrographic reports (largely unpublished) on material from Neolithic, Bronze Age, Iron Age and Romano-British sites in Cornwall, and, to a lesser extent, post-Roman, medieval and post-medieval sites. The total number of thin-sections analysed is not known and the Author is engaged in a project to gather together, catalogue and re-house this material at the Royal Cornwall Museum.

Regrettably, and understandably, no standard sampling strategy for thin-section analysis of ceramics has been drawn up in Cornwall. The Royal Cornwall Museum and Cornwall Archaeological Unit (C.A.U.) do not have a standard code of practice to inform future research or guide other archaeological contractors working in Cornwall. The methods of sampling employed have differed depending on the researcher and the motivation behind the research. The majority of sherds selected for thin-sectioning have been selected by Quinnell in her role as ceramic specialist for the region. Her sampling strategy includes a preliminary macroscopic fabric characterisation, to separate gabbroic from non-gabbroic or mixed fabrics (Quinnell *pers. comm*.), with the selection of samples for thin-sectioning based on determining the composition of the non-gabbroic and mixed fabrics in an effort to establish a diachronic ceramic sequence for Cornwall (Quinnell *pers. comm*.). This sampling strategy focuses on the verification of gabbroic fabric groups as standard for each assemblage and alters depending on the quantity and range of possible fabric groups. This suggests that few assemblages have been subject to a representative sampling strategy of all fabric groups identified macroscopically.

In an effort to find a faster, low-cost and less destructive method of analysis to meet the needs and scope required to tackle ceramics over so many periods, Quinnell and Roberts (1998-9) conducted a pilot study using X-Ray Diffraction (XRD) to identify the gross mineral components of sherds. The XRD study identified slight mineralogical fabric variations which could be matched to statistically known variations within specific periods (Quinnell and Roberts, 1998-9, 129). This analytical technique has now been expanded by Ixer to X-ray Fluorescence, aimed at identifying mineralogical components in more detail to establish their source (Quinnell, 2004, 109). However, since this initial pilot study no further trials have been undertaken.

The majority of ceramic analyses in Cornwall have been site-based textural and macroscopic studies undertaken for inclusion in developer-funded archive reports. Therefore, Quinnell in her role as a ceramic specialist for the region and Carl Thorpe, as the finds officer for the C.A.U., have dealt with most of the material excavated in the last twenty years. However, due to the limited scope of developer-funded reports there have been few opportunities to synthesise their findings or publish reports in a more accessible medium. The majority of the information is dispersed among the appendices of grey literature, and discussion confined to a few brief paragraphs that do not allow the fruits of many years of personal research to be expressed.

1:3 Interpretive approach of this study

The approach adopted in this thesis differs from past research in terms of the scope and period of this study. No single study has covered the time span from the 4th -11th century, nor has any study attempted to investigate social change through petrographic analysis. This study does not take a purely archaeometric approach, seeking only to provenance and explore technical properties, but asks broader questions of why a specific clay source was used for 5000 years and what motivated that choice. Harrad's thesis focused on the technical properties of gabbroic clay, and employed extensive clay sampling to identify the source of this material in the Bronze Age and Iron Age periods. By utilising Harrad's and Morris' clay sample reference collections this study can broaden the scope of its ceramic inquiry, going beyond the singular question of provenance toward investigating clay-sourcing practices and the motivation that behind clay selection.

The social meaning of ceramics has been consistently underestimated in past research into post-Roman and early medieval pottery throughout England. The questions typically asked are generally limited to economic models of distribution and top-down views of production, perhaps considered with the technical properties and functions of vessels, to answer how, why and where medieval society began.

The more difficult questions, such as considering what role everyday pottery plays in the maintenance and construction of the social reality of its users and producers, and its place in a socialised landscape, are arguably avoided due to the lack of adequate methodologies and evidence.

There is a clear need to challenge the infrequent use of archaeological theory in early medieval studies, which has led to stagnation in pottery interpretation. The tension between documentary and archaeological evidence within research frameworks, combined with a disinclination to incorporate theoretical discussion, has arguably stunted efforts to move forward both methodologically and theoretically. The dominance of historical research methodologies has resulted in a related literature generally lacking in archaeological theory (Faulkner, 2004). Johnson (1999, 24) has highlighted the difference between the two perspectives, with Archaeology recognising artefacts and the physical, objective, colonized and bottom-up world whereas History recognises the document and the symbolic, subjective, colonizing and top-down world, demonstrating the root of the problem in researching this period. The approach taken by this study will avoid this dichotomy by incorporating elements of phenomenology, materiality and the life-world principle, and employing ethnographic examples concerning totemism, fetishistic objects, kinship networks and the precepts of space and place within socialised landscapes, to change the way we see this period.

This thesis is therefore set within the broader objective of ‘post-processual’ in so far as it is overtly anthropological and recognises the role of agency in material culture.

1:4 Introduction to the period

The period under consideration is one of change and uncertainty, not only for the people within it, but also for the archaeologists researching it. It is a period of intermingled endings and beginnings floating through a chronology with no absolute markers. It is perhaps the most exciting period of European history, as within it arguably lie the origins of the physical and ideological world in which we live today, from the towns we walk in, to our understanding of Christianity and the beginning of consumer behaviour. One could suggest it is when we, as researchers, begin to recognize ourselves in the past, reifying the ‘true past’ which fell behind into the realms of unfamiliar empires and pagan peoples. England emerged as a nation with a king, a religion and an identity, but the route there from Roman Britannia over the intervening 300 years remains obscure.

Forging through this period are both historians and archaeologists, although neither can confidently identify a clear path. There is an uneasy relationship between the historical and archaeological perspectives, and research into this period demands the methodology and perspective of Prehistorians, Romanists and Medievalists, all of whom have adopted differing (largely implicit) theoretical approaches to interpreting the past. This is a challenging period for the researcher, and it is thus of great importance to make explicit which path this study has chosen, to avoid getting lost.

1:4:1 Approaches to, and perception of, the early medieval period

One approach to appropriating the past has been to label it, using phrases such as 'the Dark Ages' which capture the essence of our interpretation but not its boundaries or theoretical implications. The use of popular nomenclatures to define periods may not be reflected in the archaeological record, and as Gerrard points out it "calls undue attention to the 'joins' between periods" (2003, xi). Despite this, such terms are often unavoidable and the only way forward is to be explicit about what we mean by the 'Dark Ages' and similar labels.

'The Dark Ages' has been used for many years to embody the social and economic aftershocks of the end of Roman Britannia (Dark, 1994; Rahtz, 1982). It does not represent the immediate post-Roman period; rather, as Hardy *et al.* suggest it is "the period from around the end of the 7^{th} to 9^{th} century [that] has tended to suffer in the eyes of researchers through its relative lack of easily identifiable material remains… and its lack of an easily understandable social structure" (2007, 191). It is this dearth of available archaeological or historical evidence that leaves researchers literally in the 'dark' (Pearce, 2004). Ward-Perkins statement epitomises this view: "[a]ncient sophistication died, leaving the western world in the grip of a 'Dark Age' of material and intellectual poverty, out of which it was slowly to emerge" (2006, 2). Yet this phrase was first coined by the philosopher Petrarca in 1330 to describe a society that was only 'dark' when compared to the 'light' that followed it (i.e. the high medieval period), which archaeologists have reversed to envisage the Roman society as the 'light' that came before the darkness (Mommsen, 1942). This presupposes that society in the 5^{th}-7^{th} centuries was a passive agent in the process and benefited from the 'light' of the Roman Empire.

This has understandably influenced interpretations, initially making it hard to employ more optimistic interpretive models. In addition, the 'Dark Ages' also implies that the whole of

Europe and every region of Britain experienced the same process of ‘decline’, presupposing cultural, economical and spiritual homogeneity. Archaeological evidence has demonstrated that Roman Britain was culturally diverse and independent from some or all aspects of Roman governance (Hingley, 2005). ‘The Dark Ages’ have long been out of fashion and similar words and phrases such as ‘decline’, ‘fall’ and ‘crisis’ used from the 1970s have also been replaced by neutral terms such as ‘transition’, ‘change’ and ‘transformation’ (Ward-Perkins, 2006, 4). This study does not view this period as a ‘dark age’, instead highlighting the potential of its unique and diverse archaeological evidence strongly suggesting that society continued to function in different forms throughout Britain.

Periodisation and thematic approaches have been taken to translate the limited evidence of the post-Roman to early medieval period in Britain. The approach advocated by Brown (1971, 1978) focuses on the role Christianity played in Europe from AD 250-800, a period he dubbed ‘Late Antiquity’. This periodisation is used by historians to cover the transition in religion, politics, art and literature between classical antiquity and the Middle Ages across Europe and the Mediterranean, creating a research field independent of its geographical and contextual location and one capable of commenting on everyday society (Brown, 1978). Brown intended this to refer to the ‘face-to-face community’ and not the great cities and empires that, despite being the exception, were so often the subject to research (Brown, 1978, 3). Not all are happy with such an approach, however, as once again the argument comes around to evidence versus assumption. For instance, Faulkner asserts “the Late Antiquity paradigm seems to me to be theoretically weak, methodologically suspect and inadequately supported by either archaeological or historical evidence” (2004, 5), particularly when applied to areas outside the Mediterranean. Yet while it is not infallible, the thematic utilisation of Christianity to link peoples living under very different social and economic conditions affords valuable interpretive continuity for comparative studies of social change.

1:4:2 Christianity

Studies into Late Antiquity have emphasised that society in this period was composed of small-scale rural communities of subsistence farmers supporting an extended family. In reference to British archaeology, Pearce (2004, 77) regards the term Late Antiquity as "emphasising the personal, the emotional, the small-scale", which reinforces the idea that the social theme of Christianity can complement the historically dominant top-down interpretive approaches (Pearce, 2004).

Yet Christianisation as a model itself usually relies heavily on a top-down approach, using early historical texts such as hagiographies, administrative documents and narrative histories, along with many other forms of documentary records. This study will utilise these sources to illustrate the presence and influence of Christianity within rural societies, but will not rely on the historical top-down views of the social structure associated with the Church in this period.

Christianity as a thematic approach does, however, offer a convenient method of defining social organisation and hierarchies based on the assumption it was structurally homogenous and its impact on the political and sociological structure of pagan communities would thus be predictable (Pearce, 2004, 77). Anthropological studies have observed that 20th-century process of Christianisation in emerging nations offer parallels with that of Anglo-Saxon England (Dunn, 2009). These studies have drawn attention to the pivotal position of rulers in conversion and the usefulness of belief systems that already had a 'creator god' aiding the acceptance and understanding of the Trinity (Horton, 1971). The use of Christianity as a tool for understanding society is not all-encompassing, but as Blair (2005) suggests there are some elements such as the form of communities it created that we can attribute to its presence in England. He says "religious communities had ways of gathering, increasing, and using wealth which were new and very important, and which generated more complex, structured, and permanent sorts of place than the English could have created if they had not been exposed to this external cultural stimulus" (Blair, 2005, 6).

1:4:3 A new approach

This study does not employ the Late Antique paradigm in its entirety, but does draw upon Brown's thematic methodology, emphasising a bottom-up view of communities and their relationship with Christianity. It will view the impact of Christianity on a rural society to interrogate the nature of the relationship between the two as equal parties, with the aim of uncovering elements of pre-Christian society and social structure, perhaps made more visible through their utilisation by the church in the process of conversion.

This broad overview of how the period, and more importantly the peoples that occupied it, are perceived by researchers puts this study more firmly within the context of national and European archaeology. This overview, combined with the theme of Christianity, will link the archaeological evidence of the study region of Cornwall to broader discussions within the field of archaeology beyond its borders, which have to some extent restrained its inclusion and valuable contribution to the period. This study will create a new approach to understanding this period in Cornwall and highlight the national importance of the Cornish archaeological resource.

1:4:4 Timeframes explained

The temporal range of this study requires an established terminology of the periods and dates that will be referred to throughout the text. This is important when establishing parallels with national themes as Cornwall has a slightly different cultural timetable to the rest of the country and this must be made clear from the outset. Therefore, periods will be indicated by century, and unless stated otherwise refer to AD not BC. The conceptual timeframes for *this study* will be termed post-Roman referring to the 4^{th} to 7^{th} centuries, early-medieval will be used for the 7^{th} to mid 11^{th} and post-Conquest for the late 11^{th} to 12^{th} century.

1:5 A regional introduction - putting Cornwall on the map

An antiquarian legacy of research in Cornwall has laid the foundations for a typical culture-historical account of the county, an account that has to some extent dominated research over the past 60 years. The main focus of these early studies lay with the prehistoric monuments that litter the countryside and the lives of the Cornish saints as depicted in textual sources (Turner, 2006a). Current approaches to understanding the post-Roman and early medieval period in Cornwall still rely heavily on the antiquarian themes of place-name studies, inscribed stones, Christian crosses and chapels along with the ecclesiastical textual sources (Preston-Jones and Rose, 1986).

The collective works of Charles Thomas, through both historical and archaeological investigation, has reinforced this Antiquarian research framework, and more recent research by Padel on place-names, Herring and Turner on the historic environment, Preston-Jones on Christianity and Pearce on the south-west in general, conform to the tradition. Indeed, it could be argued that current approaches are either the result of this fixed research framework or arise simply because of a lack of any other alternative, though some work over the past ten years has begun to change this. This study will reappraise past approaches and their evidence and develop a new approach to viewing the past though a theoretically informed method with new ceramic data.

Cornwall has been the singular focus of many attempted chronologies and interpretative approaches, most of which have deterred or defied comparison with other regions in Britain. The emphasis on Cornish *differences* over the last century of archaeological investigation has relegated it, both archaeologically and theoretically, to the periphery. This is no more apparent than in the depiction of Cornwall on distribution maps as a peninsula outline containing very little. The maps used to illustrate the cultural past of England present a similar picture of Cornwall in the pre-Roman (Fig 1:13), Roman (Fig 1:14), Anglo-Saxon (Fig 1:15) and to some extent Norman periods.

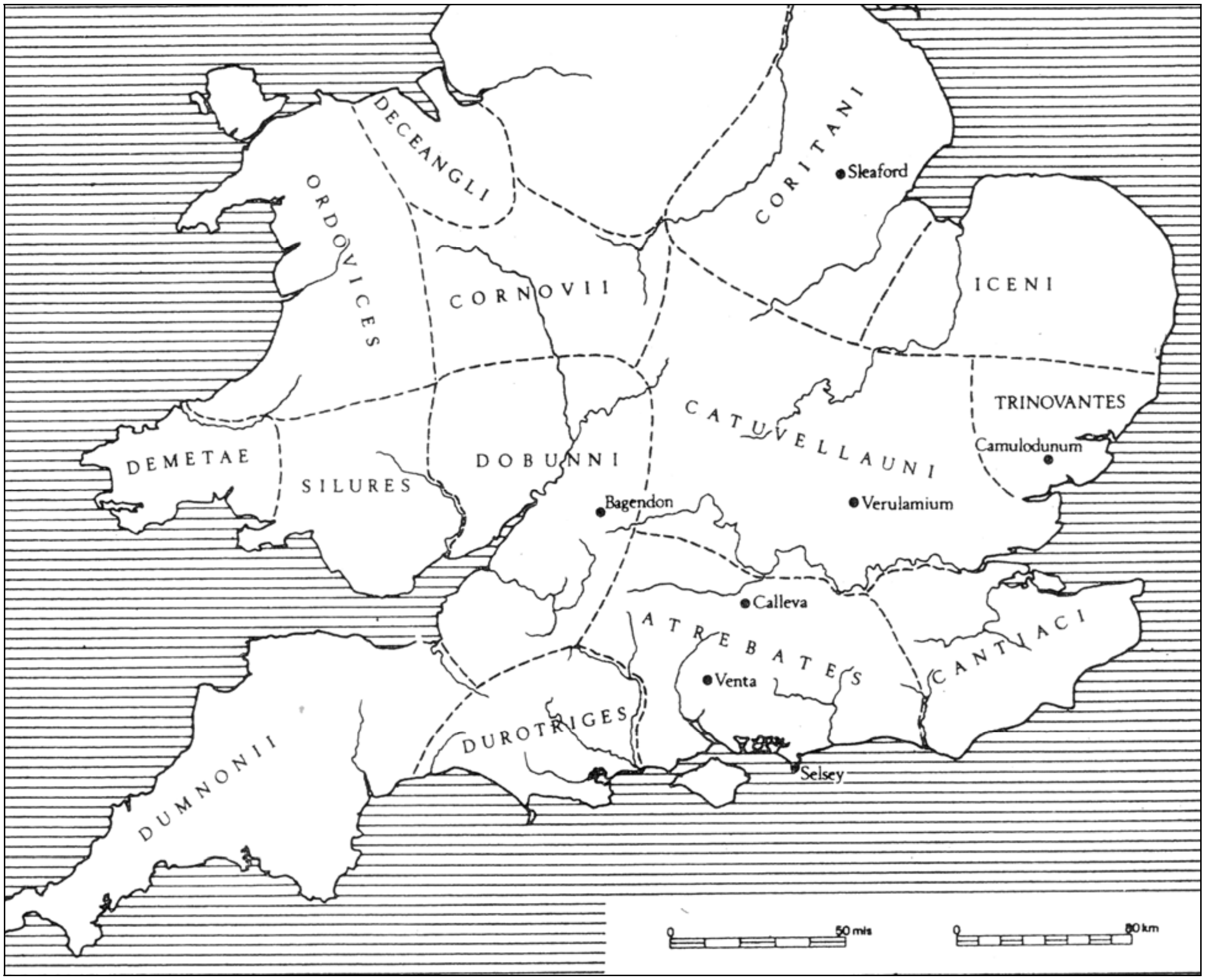


Figure 1:13. Showing the maps of pre-Roman Britain (After Cunliffe, 1975, Fig 7.11).

These maps rarely ever include both the negative and positive settlement distributions. For example, the distribution of settlement in Roman Britain gives the impression that Cornwall was uninhabited, despite extensive evidence for widespread 'native' occupation.

Figure 1:14. Showing Roman map of Britain (After Collingwood and Myres, 1998, Map 3).

In most of the archaeological and historical literature, a physical line is drawn to delineate the ‘Anglo-Saxon’ east from the ‘Celtic’ South West. The South West Archaeological Research Framework (SWARF) has highlighted the importance of its problematic chronology in influencing past research questions (Webster, 2008). Its conclusion sets out a basic guide, stating:

> “The region has always been perceived, both in terms of landscape history, and in terms of early medieval political and ethnic geography, as two entities: one ‘British’ (covering most of the region [South West] in the 5th century, and only Cornwall by the end of the period), and one ‘Anglo-Saxon’ (focusing on Old Sarum/Salisbury area from the later 5th century and covering much of the region by the 7th and 8th centuries)” (Webster, 2008, 169).

Thus the *perceived* physical and ethnic division is thought to represent a genuine distinction in the archaeological record of the South West (Webster, 2008). Another important point made in the SWARF document is that:

> "Research questions have to deal less with a period, than with a highly complex sequence of different types of early medieval archaeology, shifting both chronologically and geographically in which issues of continuity and change from the Roman period, and the evolution of medieval society and landscape, frame an internally dynamic period" (Webster, 2008, 169).

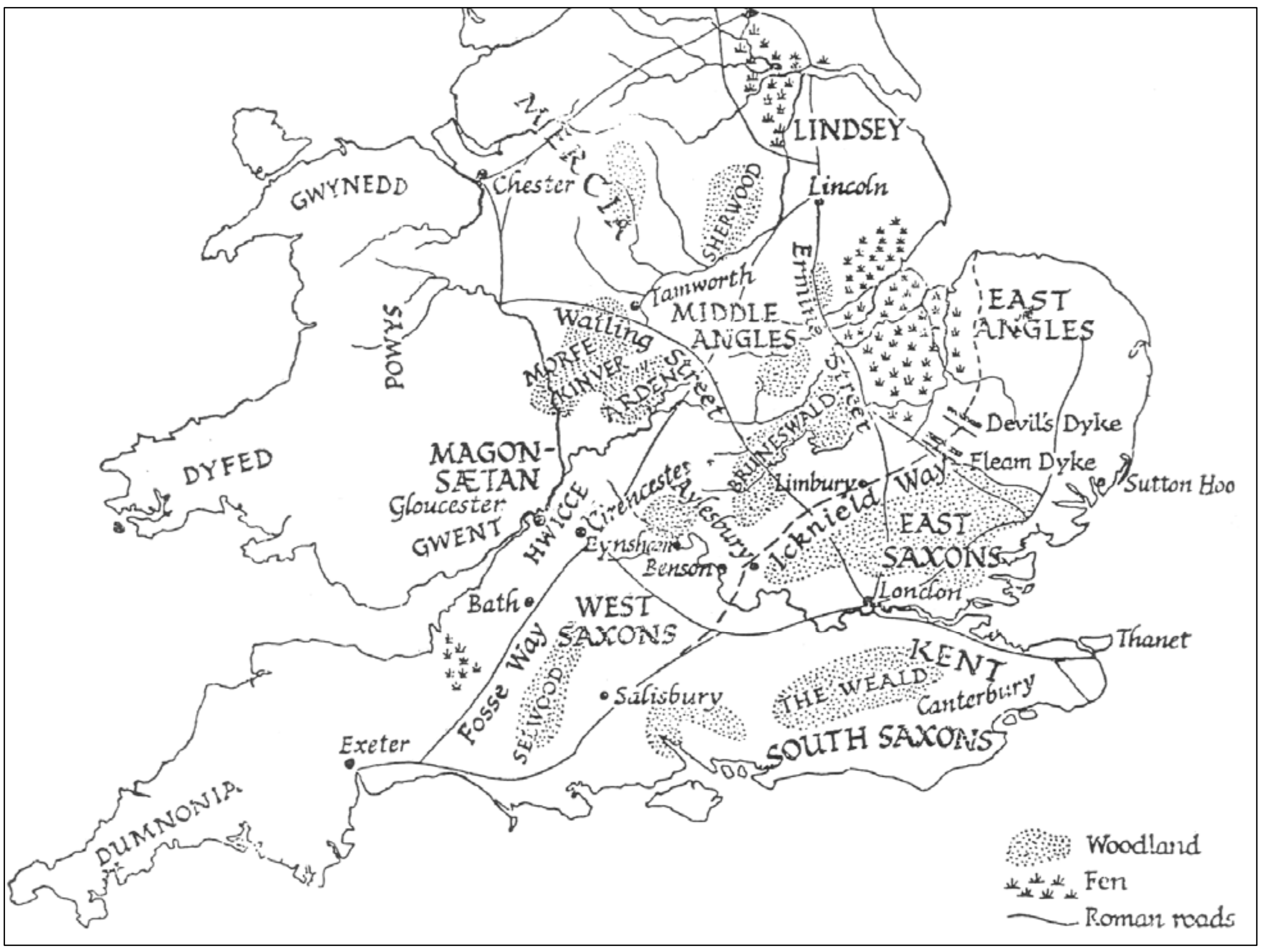


Figure 1:15. Showing Anglo-Saxon map of Britain (After Blair, 1970, map 3).

This study will draw together the chronologies of the South West through its pottery with the aim of establishing similarities not differences, towards an understanding of how each region within it dealt with external factors in social change.

Cornwall is often labelled and academically assigned to the 'Celtic' cultural group which has unintentionally excluded it from research projects with 'non-Celtic' areas in the past. In archaeology, the 'Celtic label' has come to represent a peripheral cultural group who retained their identity throughout the Roman and Anglo-Saxon periods who occupied Ireland, Wales, Brittany, Scotland and Cornwall. The Atlantic peninsulas and islands which they occupy infer a community on the periphery of society, a view that has influenced the majority of current literature, but is open to question (James, 2000).

1:5:1 Summary

There is no denying that there are differences in Cornish material culture, settlement and contacts with other groups as seen through imported goods in the 5^{th}-6^{th} centuries (Campbell, 2007; Pearce, 2004; Thomas, 2007; Todd, 1987; Turner, 2006). These differences have generally restricted Cornwall's rich archaeological assets from being incorporated into wider debates concerning social and economic changes in post-Roman and early medieval Britain.

This study will redress this imbalance, and will utilise and contextualise Cornwall's unique ceramic tradition to explore social change in Cornwall and parallel developments in pre- and post-Conquest England. Such a comparison will lead to a greater understanding of social change on a purely rural population, providing a much needed bottom-up perspective of Britain during this period.

1:6 The study area – The Lizard Peninsula

The Lizard Peninsula lies at the western end of Cornwall and is the most southerly point on the British mainland (see Fig 1:1). It comprises an area of approximately $150km^2$ or 58 square miles, almost wholly cut off from the rest of Cornwall by the Helford estuary and the former estuary of the Cober. The remaining narrow neck of land is bisected by the Meneage Crush Zone, a geological formation that has created deeply incised, narrow valleys. The landscape of The Lizard comprises a combination of open rough ground (the Goonhilly, Crousa and Lizard Downs), pasture, arable and an extensive rugged coastal shoreline that provides a microcosm of the topography of Cornwall as a whole (see Chapter 5:4). In addition, The Lizard is one of the most geologically diverse areas in the South West, with important implications for clay provenancing.

The Lizard Peninsula provides not only the physical but also the historic landscape in which the three study sites are located. It is an isolated region within Cornwall with a notable lack of urban centres. The lack of synthesis concerning the historic character and documentary resource for The Lizard has meant that some fundamental questions about the nature of early medieval landscapes and social structures have long gone unanswered. Remote from the eastern border of the county, largely untouched by the widespread mining landscapes of the north and north-east, and lacking the associated sprawling urban or quasi-urban centres, The Lizard is an ideal area in which to study earlier archaeological periods. In drawing these resources together for this study, it has become apparent that the area can provide a unique perspective on this period and represents an ideal area within which to investigate social change (see Chapter 5).

1:6.1 Historical discussion and documentary background

There are references to The Lizard in the geographical works of Ptolemy (AD 125-150), the peninsula of *Dumnonii* (Orme, 2010, 1), but the importance of The Lizard historically lies in its name. The place-name '*Lys-Ardh*' meaning 'court at a high place' (Padel, 1985, 278), suggests there was far more to the area than simply a peninsula.

Anglo-Saxon charters from the late 10th century strongly suggest that an early ecclesiastical framework had been in place for many years and that landholding in severalty may also have existed (see Chapter 5:5 for discussion). This insight offers this study a unique view within Cornwall of a possible social structure in the early medieval period. Further investigations as part of this study have demonstrated that early forms of Christianity played a significant role in the social structure of The Lizard, and that the influence of Breton missionaries may have been key to this process. There are place-name references to ‘monks land’ and the ‘court of the monks’, supporting the idea of an early Christian centre of regional importance.

The Lizard gains further historical significance as being selected for the location of the largest Royal Manor in Devon and Cornwall: Winnianton. This is listed in the Doomsday Book as holding 36½ hides and functioned as the hundredral manor (Salzmann, 1924, 62; Williams and Martin, 2002). Its location on the western side of The Lizard Peninsula is unusual as all the other early documentary references to settlement are to places on the eastern side of the peninsula; the reasons for its location and its significance are discussed further in Chapter 5:5:3. The Manor of Winnianton has yet to be located, but extensive evidence for post-Roman settlement has been identified at the approximate location (see Chapter 5:6:4). The pottery assemblage from Winnianton has been chosen to link the ceramic sequence of this study to a pivotal era of society in Cornwall.

Thus the historical evidence for the Lizard contributes a vital element towards understanding social change over the 4th-11th centuries in Cornwall, linking the ceramic assemblages to broader social trends nationally.

1:6:2 The research sites

The ceramic petrographic analyses undertaken in this study will look at three archaeological sites located on The Lizard (see Figs 1:1 and 1:11). These are: Trebarveth (St. Keverne) occupied in the 2nd-6th centuries AD, Carngoon Bank (Lizard), occupied in the 6th-7th centuries AD, and Winnianton, occupied in the 7th-10th centuries AD. The sites have been selected for their unique underlying geology and spatial relationship to the gabbroic clay source, making the clays locally available to the sites particularly diagnostic. The pottery assemblages are primarily composed of domestic vessels, generally storage jars, cooking pots and serving dishes. The size of the assemblages varies between the sites; at Trebarveth 36.871kg of pottery was excavated, of which 15.581kg has been selected for analysis. Carngoon Bank produced 151.441kg of pottery, of which 13.738kg has been selected. Winnianton has produced the smallest assemblage, with only 2.472kg of pottery. The differing sizes of the assemblages are of no concern as a representative sampling strategy will be used (see Chapter 6).

1:7 Unique scope of this study

The unique scope of this study covers:

Theoretical

- Explicit theoretical framework for the analysis of ceramic material
- Reassesses the Gabbroic Model, with profound implications for understanding ceramic clay-sourcing strategies elsewhere
- Goes beyond technical properties to consider social aspects of pottery production
- Incorporates ethnographic and anthropological analogies
- Develops a unique theoretical perspective: *raw material spatialisation*

Methodological

- Undertakes and incorporates both macroscopic *and* microscopic ceramic analyses
- Employs a representative sampling strategy
- Analysed a large volume of material: 17,157 sherds of pottery and 77 thin-sections
- Explicitly relates method to theory in ceramic studies
- Provides a model that can be applied to other areas, sites and time periods

Thematic

- Utilises the only unbroken ceramic sequence in post-Roman Britain
- The first synthetic study of Cornish ceramics during the 4^{th}-10^{th} centuries AD
- Incorporates the first synthesis of post-Roman pottery in the South West for 50 years
- Identified trends and changes in Cornish pottery related to wider national trends and changes, and the implications considered
- Develops a new understanding of social change in Cornwall during the post-Roman and early medieval periods, with implications for understanding the social landscape of Cornwall from the Neolithic

1:8 Structure of the Thesis

The structure of this study reflects the author's research principle that theory should inform research and data collection from the beginning. The diagram (Fig 1:16) illustrates this holistic principle, situating data and theory as the main spheres whose intersection is determined by a methodology that results in an informed discussion and finally conclusion. The essential elements of the pottery, period and context of the data are integral to the validity and significance of the conclusions. The social context and themes are equally vital in connecting the theory to frameworks beyond the region and archaeology, bringing the interpretation of the data into focus.

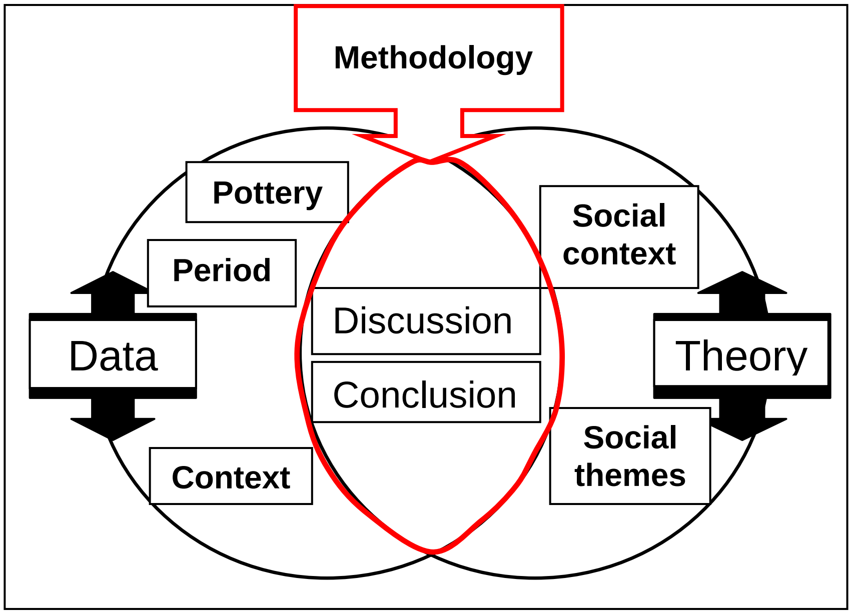


Figure 1:16. Holistic principle of PhD in non-linear structure (Author's illustration).

The linear format of this text represents this principle by beginning with an exploration and definition of the theoretical position of the study in Chapter 2. This chapter draws heavily on ethnography and the philosophical concepts that have defined how Western society perceives the role of material culture in creating and maintaining our reality and identity. It delves into the concept of the life-world and place in the socialised landscape before introducing the role of macro- and micro- sociologies in the creation of social networks. Chapter 3 adopts a thematic approach using the universal themes of Christianity and settlement in the post-Roman and early medieval period to introduce the archaeological evidence in Cornwall. Pottery forms the focus of Chapter 4, providing a compressive synthesis of its production and consumption from the 4^{th}-11^{th} century throughout the South West of England, situating the ceramic sequence of Cornwall within a national framework and chronology. Chapter 5 locates the three ceramic assemblages under analysis within the physical and historic landscapes of the Lizard Peninsula, introducing the nature and period of the archaeological sites they derive from. The methodology is then explained in Chapter 6, beginning with a critical analysis of pottery studies and scientific analysis in the development of ceramic studies in Cornwall, followed by a detailed description of the analytical techniques and unique approach used to retrieve the data. Chapter 7 presents the raw data arising from the macroscopic and microscopic analysis and its statistical output, concluding with the provenance of the clays used to make the pottery based on geological information and comparison with previous petrographic studies. The culmination of all previous chapters are discussed in Chapter 8, which builds its way from the results of the data, relating it directly to the theoretical perspective, and combined interpretations are discussed in relation to the contextual, thematic and chronological grounding of the study. Chapter 9 addresses the research objectives outlined above and concludes the study.

Chapter 2: THE SOCIAL LIFE OF CLAY

2:1 Introduction

The social life of clay is explored in this chapter through ethnographic analogy and archaeological theory, with the conclusions reached used in later chapters to interpret the data in relation to the research question. The discussion begins with my theoretical stance, as I believe it is essential to state this explicitly from the outset. Then the foundations and assumptions of current interpretive approaches in ceramic studies as used by archaeologists and ethnographers will be explored.

This is followed by a discussion of studies of clay procurement and its social context within ceramic studies, with three ethnoarchaeological examples provided to illustrate the potential of this avenue of research in understanding past societies. A suite of archaeological theory pertinent to this study is then approached, enabling a discussion of the main influences drawn from archaeology, sociology, philosophy and ethnography. The framework within which the theoretical suite resides utilises macro- and micro- networks as used in sociology which will be described.

2:2 Archaeological theory made explicit

The use of the term 'Theory' and its meaning in archaeology is interpreted and used differently by every archaeologist. Its validity and use are often questioned and in some cases this is warranted, especially when a theory is applied to archaeological data as an afterthought, resulting in interpretation that has no particular goal in expanding our knowledge or use of theory. Archaeological theory should be considered as a philosophy which informs every step of archaeological practice from research designs, excavation, analysis, the final report and its dissemination (see Wood, 2008). This requires the archaeologists to be a 'jack of all theories and master of none' as comprehending and absorbing every aspect of archaeological theory is undoubtedly a challenge. I envisage archaeological theory as a cloud of concepts, approaches, ideas, principles, propositions and musings, floating above the archaeologist's head from which some elements precipitate downwards at the relevant interpretive moment.

Therefore, the use of archaeological theory in this study was initially informed by traditional approaches to ceramics, such as material culture theory, but was not limited to it, as this would be a contradiction to the aims stated above. Instead, it has proceeded with an open mind to enable other relevant concepts within the realm of archaeological theory, to form organically throughout the entire process of enquiry that is ‘a PhD’. In accordance with this principle this chapter was written after all others, but prior to the discussion and conclusion. The suite of archaeological theories introduced below represents the pertinent concepts that arose and have informed the interpretation of the data rather than being applied to it.

Archaeological theory however, does not form out of thin air; it begins in the corners of other fields and musings over past work and approaches. Therefore, it is vital to make those beginnings and influences from other fields explicit. This study is concerned with a bottom-up approach so where better to start than the pottery itself.

2:3 Pottery as material culture

Pottery is the most common and valuable element of material culture we possess, and has been used by archaeologists to define past peoples and their cultures for hundreds of years. Pottery is used in nearly all cultures over millennia, providing a wealth of comparative information and data with which to elucidate the society that produced it. The idea that culture is materialised in the physical remains it has left behind was established by antiquarians as early as the 1900s, in order to classify the field of study artefacts belonged to. This expanded on work in the enlightenment era when an interest in the materiality of social life began (Buchli, 2002). This concept of material culture developed in the 1960s and 1970s by incorporating semiotics (see Barthes, 1973; Baudrillard, 1996) and structuralism (see Lévi-Strauss, 1988) along with the interpretive scope offered by social anthropology, all of which offered new ways of understanding (Buchli, 2002). Material culture is culture made material: its study uses objects to approach human thought and actions to be read like text in which each artefact is a word within the story of culture (Glassie, 1999, 41). In the broadest terms, material culture represents anything produced as a result of human action or thought on a material, from a footprint in the mud to an aeroplane.

Pottery is an ideal medium as it has the ability to represent a utilitarian object that can also express social and cultural meaning. How those *meanings* are extracted or established is a contentious issue, as is the Cartesian separation of material and culture which will be explored later. Generally, in ceramic studies they are classified as utilitarian objects used in everyday life and part of an economic livelihood, which are thus situated in many realms that can not be encompassed within one viewpoint alone (Rice, 2005). Skibo and Feinman suggest “pottery, like any piece of material culture, is woven into the complex tapestry of people's lives" (1999, 1). His basic definition is expanded by Cumberpatch saying, "a pottery vessel has an existence, and is experienced, as part of a wider context, one of the many elements which makes up the human subject's world" (1997, 125). Therefore, pottery is not only a medium for explaining the mechanics of a society, but a way of revealing its inner workings at every level.

There are many viewpoints through which pottery is currently studied, of which archaeology is just one, and the value of anthropological, ethnoarchaeological, technological and behavioural perspectives cannot be disputed (Arnold, 1988; Costin, 2000; Rice, 2005). No matter what the question or analysis carried out, pottery must be understood in its context whether in the past or the present (Rice, 2005, 113). Ethnoarchaeology has provided an opportunity to develop our understanding of how, and in what way, meaning is given to pottery by the user and the archaeologist.

2:4 Ethnography to Ethnoarchaeology

Ethnography has provided an interpretive resource for ceramic studies, enabling an understanding of every aspect of contemporary pottery production from its initial motivation, procurement of materials, mechanical techniques in production, post-production, consumption and deposition. Rice (2005, 114) has summarised it as having two methodological tools essential to interpretation: firstly, the way pottery moves from its context of use to place of deposition, and secondly, it enables discussion on the nature and explanation of variability in ancient ceramics. However, its use in archaeology has grown beyond a methodological tool for analysis, opening up many new ways of understanding pottery as an active participant in society.

In the past, ethnographic data was considered inappropriate for understanding ceramics in archaeology, but when the potential of such a resource was identified and appreciated, the new field of ethnoarchaeology was born (Sinopoli, 1991, 71). Ethnoarchaeology is a subdiscipline of ethnography, and one that has endeavoured to study living cultures from archaeological perspectives. It has been used to inform research strategies, and not just the theoretical or methodological. Thus it embodies a range of approaches with which to understand the relationships between material culture and culture as a whole. The unique ability of ethnoarchaeology to observe this relationship in action, and follow its material products as they pass into the archaeological record, has been used to inform archaeological concepts and interpretation (David and Kramer, 2001, 2). Arnold's (1988) early initial work highlighted the economic *value* of ceramic production in terms of risk, time and effort that each individual potter takes into consideration before production begins. His research has shown that “pottery thus encodes both chemical information from the source and behavioural information from the potter” (Arnold *et al.*, 1991, 88). This wealth of ethnographic research and literature concerning material culture has provided pertinent avenues of investigation and interpretation for the study of ceramic in the past.

In exploring how the data and conclusions of ethnoarchaeology are best applied to ceramic studies, Costin (2000, 377-378) outlines three objectives in research: firstly, “completely describe production systems”, secondly “explain why those historically specific systems have developed and changed as they have” and finally “identify and explain cross-cultural regularities and variability in production systems”. Ethnoarchaeology has devoted far more attention to the motivation and social context of pottery production than archaeology has, and has now expanded into the studies focused on clay sourcing strategies of central relevance to this study. The use of ethnoarchaeology should be understood as ethnography has been in the past, “as a source for analogies and for a finer background appreciation for technological processes, organization, and social context” (Costin, 2000, 399). However, the use of ethnoarchaeology as an interpretive tool in archaeology must be employed with caution and an acknowledgment that it cannot be directly applied (Costin, 2000; Costin and Hagstrum, 1995; Neupert, 2000; Stark *et al.*, 2000).

Ethnographic studies of ceramic production have highlighted the numerous factors that *cannot* be solely defined by archaeologists through geological variability, processing practices and political/cultural regions (Costin, 2000, 381). Costin (2000, 384) has observed that archaeologists tend to focus on resource distribution as a primary concern, whilst population density and transportation are seen as secondary. Therefore, the archaeology has selectively drawn upon ethnoarchaeological data and interpretations to focus on defined research aims, rather than utilising the more holistic view of ceramics within society through ethnography.

2:5 Pottery to the Archaeologist

In archaeology the study of ceramics relies on establishing its typology, chronology, production (patronage, specialisation or household) and asks questions typically centred around identity (class and gender). The antiquarian legacy to current archaeology is the ‘corpus’, listing every type of an artefact group in chronological order to convey ‘culture’, which is still how many people perceive pottery today.

The emphasis on classification in ceramic studies feeds into the paradigm that a pot sherd is a basic unit of study which can be scientifically analyzed (Arnold, 1988, 4). Therefore, its attributes are split up then clustered and reassembled to produce 'data', and this is used to make interpretations about its value and meaning in that culture or society. However, as Arnold (1988, 5) points out, "pot sherds are not cultural units of behaviour. They are only arbitrary divisions of such units".

This highlights the fact that in the past, pottery to the archaeologist has only been used as a cultural object, dating evidence or a technological indicator (Orton, 1993; Orton *et al.*, 1993). This situation has not dramatically changed as there is still a tendency to see pottery in isolation, constraining its analysis to a restricted range of parameters from which complete and accurate 'stories' of past people are related (Gosselain, 2008, 67).

Scientific analysis of pottery such as petrology, ICP and SEM are standard tools used in the academic research and the commercial sector to enable classification, which has contributed to an understanding of cultures through their ceramics for the past 50 years. This has led to a quantifiable and data-driven understanding that sets out to determine the nature of production, distribution and function, through identifying the technical processes and inferred choices involved. As discussed, material culture studies and ethnoarchaeology have significantly broadened the questions we can ask of pottery, but the source of the data still relies on the quantifiable approach and output developed in archaeology. At this point it should be noted that, whatever the question, the results of analysis will always be concerned with the sourcing of clay and its geographical location, yet the question of *why* the clay was sourced is usually limited to technical choice, ignoring any element of social choice or context. A source of clay is a subjective term in archaeology and is defined purely on its mineralogical constituents and geological location, whilst a clay source infers an active relationship with people through its extraction and exploitation.

2:6 The social life of clay

Clay is not considered part of material culture until it is formed into a pot; to many it is a material awaiting culture. Clay is the primary element in this study, particularly the social practices and context prior to production. What themes are then pertinent to the selection and preference of a clay source? As already stated, the most popular avenue in archaeology and ethnography is its choice due to its technological properties, namely its ability to withstand the production process and its suitability in performance during its use-life. However, this presumes a singular motivation behind selection. An equally important factor is the context of clay sourcing and extraction in relation to the social and economic circumstances within a community or cultural group as a whole.

2:6:1 Technological choices

In the past the relationships between technology and society in ceramic studies has been reduced to either the effects of technology on society or society on technology (Van de Leeuw, 1993, 240). The concept of 'technological choice' relates to what choices are made at each stage of pottery production, from clay preparation to firing, by developing an understanding of the conceptual processes and determining the factors involved. Lemonnier's (1993) early ethnographic work on the subject states "the expression 'technological choice' emphasizes the sorting out of possibilities on which the development of a technical system is *de facto* based, although usually in an unconscious and unintentional way" (1993, 7). Sillar and Tite (2000, 3) have developed a more intentional meaning in archaeology as "questioning what the actor wanted to achieve, the techniques s/he chose to use, and the consequences of these choices". As Latour proposes "technology is society made durable" (1991, 103). This emphasises the point that archaeologists see the *result* of technology on artefacts, whilst anthropologists and ethnographers see the practices involved and the intrinsic knowledge required.

The many processes involved in production give rise to an infinite variety of choices, making it almost impossible to draw any firm conclusions. The most successful approach to this problem has been to tease out the choices by questioning each step in the operational sequence throughout the production process (Sillar and Tite, 2000). The idea of a logical progression of technological actions has led to the *chaîne opératoire* approach to understanding technological choice (Van de Leeuw, 1976). This has been developed and used in many artefact-based studies, particularly pottery, to elucidate behaviours (Gosselain, 2000), identity (Gosselain, 1998), agency (Dobres, 2000) and continues to expand. The reconstruction of this operating chain is intended to highlight variants and choices in the production process towards an understanding of the people behind the pots (Van de Leeuw, 1993, 240). However, the act of clay procurement and sourcing in the *chaîne opératoire* is often limited to a technical choice of a 'suitable material'.

These areas of investigation assume that the choice of the clay was simple and motivated purely by technological properties. Typically the choice of clay is determined by archaeologists as being linked to the local geology, transportation available, intended use of item and how it is formed. There is rarely any consideration to the social choices attributed to this part of the production process. Ethnoarchaeological studies are changing this perception, as they highlight that all forms of production are informed by the society in which it is preformed, and that every step of the process is embedded in its social context.

2:6:2 Social choices

Gosselain's (1998, 84) work in the Cameroon in the 1990s attempted to identify a *chaîne opératoire* that investigates the performances and limitations that form each transformation process, by observing potters and questioning them about their choices at each stage of production. The results of this investigation showed that "material constrictions are by no means the sole factor in clay selection and processing. Instead cultural, economical concerns are decisive elements effecting decision making" (Gosselain, 1994, 99). It became apparent that the origin of knowledge, selection of materials, technical operations and evaluating performances were what characterised each transformation process (Gosselain, 1998). His approach has emphasised the importance of clay procurement and selection in material culture studies, concluding there is great complexity and variability in behaviours related to clay selection (Gosselain, 1998, 2008; Gosselain and Livingstone-Smith, 2005). On returning to his early conclusions, after working in Niger Africa, he has realised that production makes no sense "without considering the multiple facets of the potters' social identity, historical processes that affect the area in the recent and more distant past, and the movements of individuals as a result of environmental and economical constraints" (Gosselain, 2008, 67). Technical choice requires options to be selected and others rejected, and this is perhaps where social choice comes into the process of expressing and reproducing society through the creation of material culture. Mahias (1993, 162) has noted that there are functional links between the various processes of pottery production, comprising "an internal technical logic" of the contextual, material or social elements.

The acknowledgement that technological choices must also be seen in their social and economic contexts is now apparent in most ethnoarchaeological ceramic studies (Costin, 2000). It is now clear that the environmental and technological constraints, the economic and subsistence base, the social and political organisation, and ideology or belief all have a profound effects on the objects produced (Sillar and Tite, 2000). In addition, Gosselain and Livingstone-Smith state that ethnographic studies of clay procurement have provided much evidence to support a "series of mechanisms underlying the spatial and temporal variations in clay selection and processing" (2005, 34). Despite this, this evidence is rarely applied to archaeological ceramic studies, which remains restricted to interpretations of fabric composition, and continues to focus on establishing chronological markers and techno-functional indicators (Gosselain and Livingstone-Smith, 2005, 34). Incorporating these variables in archaeology may be problematical, but it must be attempted to gain a more complete understanding of the societies studied.

Ethnographic analogy has helped bridge the gap between the excavated pottery and the societies that made it, opening up new viewpoints from which to approach seemingly static assemblages (Orton *et al.*, 1993, 17). We must then look to ethnoarchaeology to provide evidence for social choices in clay sourcing and procurement to understand how it might be investigated through archaeology.

2:7 Ethnographic contributions

Ethnoarchaeological ceramic studies have proven that there are no universal processes or criteria to which potters around the world adhere (Arnold, 2000; Arnold *et al.*, 1991; Costin and Hagstrum, 1995; Gosselain, 1992, 1998, 2008; Neupert, 2000; Sillar and Tite, 2000; Stark *et al.*, 2000). The three examples below exemplify this and highlight the contribution that a more holistic understanding of clay-sourcing practices and its social context could offer.

2:7:1 The politics of Paradijion potters

Neupert (2000) has demonstrated the effect that socio-political constraints can have on the traditional potters of Paradijion in the Philippines, which is summarised in narrative form at the begging of this thesis to emphasis the inspiration this case has provided. He demonstrated the link between the socio-political behaviour of the potters and the patterns in clay composition using neutron-activation analysis on ceramics from two factional groups within one community (Neupert, 2000, 249). The potters were independent manufacturers, but were occasionally forced to form groups to petition the Mayor to represent them when access to a clay source was restricted by farmers or landowners (Neupert, 2000, 257). The agreements were between the landowner and Mayor; consequentially, the potters became affiliated to a Mayor and a political party. However, the Mayor was subject to re-election, whilst the other candidates attempted to gain favour with the groups of potting voters by assuring access to quality clay sources (Neupert, 2000, 257). The two political parties also offered incentives such as medical treatment to potters, thus securing their allegiance to a particular faction. This subsequently led to two distinct political factions and thus two fabric groups within the community (Neupert, 2000). There may be scope here for a more horizontal rather than vertical situational context, as Neupert (2000, 260) observed that potters used both clay from the factional source and a private source for a small number of household vessels. This example highlights the potential impact of changing political systems or organisation on the fabric composition of pottery.

2:7:2 The appropriate clay of Niger potters

The extraction and selection of a clay source is also of importance and again receives little attention in archaeology. A study of 350 pottery-producing villages in south-western Niger in Africa demonstrated that the physical properties of the clay are not always the biggest concern (Gosselain and Livingstone-Smith, 2005). In an effort to understand how and why individuals exploited a particular clay source, Gosselain and Livingstone-Smith (2005, 39) analyzed the technical suitability of clays within the surrounding landscape of a community. Recipes used in the combination of temper and clays intentionally represents specific social identities which is effected by socio-professional status and spatial distribution (Gosselain, 2008, 77). They found that all the clays were suitable for potting, but that the potters (all women) had a clear idea of what clay was ‘appropriate’ and that it could not be extracted anywhere (Gosselain and Livingstone-Smith, 2005). It was accepted that clay could be found in riverbeds, swamps, alluvial planes and hillsides demarcated by cracked soils and the colour of puddles, which created a landscape of specific meaning to potters (Gosselain and Livingstone-Smith, 2005, 39). Despite this, most sources were (preferentially) discovered by accident in the process of other daily activities, which is interpreted as the clay revealing itself to them, due to their belief that it is a living material that travels underground (Gosselain and Livingstone-Smith, 2005, 39).

The source is subjectively judged on physical properties, but this does not mean that all potters consider it appropriate (Gosselain and Livingstone-Smith, 2005, 40). Distance from the potters’ homes is a determining factor, with sources generally occurring in other agricultural activity areas to reduce time and energy in transportation. Most sources were to be found within a radius of 1-3 km, providing a non-random distribution pattern (Gosselain, 2008, 70; Gosselain and Livingstone-Smith, 2005, 40). Ritual and taboos were another integral aspect to source selection and exploitation as extractors must be of a single sex, avoid certain practices on the eve of extraction such as sex or singing; and prohibit uninitiated people, children, pregnant or menstruating women, twins and warriors attending (Gosselain and Livingstone-Smith, 2005, 40). In other African potting communities the life span is similarly determined, for example being abandoned if a blacksmith enters the source, the occurrence of accidents instigated by witchcraft or move a source due to spirits that reside in them (Gosselain and Livingstone-Smith, 2005, 40). They concluded that potters "negotiate a path across a patchwork of knowledge and experience that are both inherited- and thus widely shared- and constructed through their daily practice" (Gosselain and Livingstone-Smith, 2005, 44).

2:7:3 The clay journeys of Shipibo-Conibo potters

The transportation of clay is acknowledged as a determining factor in preferential clay sourcing. An ethnographic study, carried out in the Ucayali Basin in Peru, looked at the procurement of materials in pottery production practiced by the Shipibo-Conibo Indians (DeBoer and Lathrap, 1979). The researchers found that the pottery was made in the household of its use by women and that they preferred a combination of three clays and different tempers (DeBoer and Lathrap, 1979, 116). The clays were found in different locations throughout the valley, representing a journey of a day or more. However, the procurement and transportation of clay throughout the valley relied upon informal visitation by family and friends and the men who travelled from the village to do seasonal work. DeBoer and Lathrap concluded that "such a network of informal visitation is sufficient in itself for circulating manufacture" (1979, 115). This network and household mode of production produced very different fabrics, as each person had their own recipe which changed slightly due to availability and the form, e.g. cooking pots were more uniform than drinking vessels (DeBoer and Lathrap, 1979, 116). The results of this ethnographic study proved that its archaeological value was limited because there was no 'rule' or uniform methodology that would have represented a cohesive cultural group if archaeologically investigated (DeBoer and Lathrap, 1979). David and Kramer commented that this study shows "that natural, economic and socio-cultural factors are involved in the production distribution and consumption of material culture" (2001, 4). This demonstrates the integral element of social networks within which clay can circulate, which would otherwise infer more technical and economic motivation.

2:7:4 Summary

These ethnoarchaeological examples point to the great potential for understanding clay procurement practices by going beyond the popular technological choice avenue in archaeological ceramic studies. They demonstrate that the composition and fabric of the pottery analyzed can reveal data, but that interpretation without an understanding of the social context makes it meaningless. How then can archaeology gain *meaning* from evidence whose social context is lost in the past?

2:8 Archaeological Theory

The greatest challenge for archaeologists is to find meaning in the artefacts unearthed through archaeological investigation. Archaeological theory attempts to fill this void by drawing on the vast array of concepts, approaches and philosophies disseminated to construct meaning. How meaning is derived must be made explicit for its use to have validity and allow comparative interpretation to contribute not only towards interpretation; but also the much needed development of current archaeological theory. Therefore, the ensuing discussion outlines the concepts and philosophies that became appropriate and pertinent to the specific research aims and data of this study.

The themes that arose are: *materiality* concerning the construction of meaning and nature of relationship to objects, the *life-world* which shapes our perception and ability to gain meaning through action within a temporal framework. This concept is closely related to the *socialised landscape* or *taskscape* in which this action occurs and our experience of it. Finally, the *social networks* that create and maintain society from within, and where micro-and macro-level systems operate.

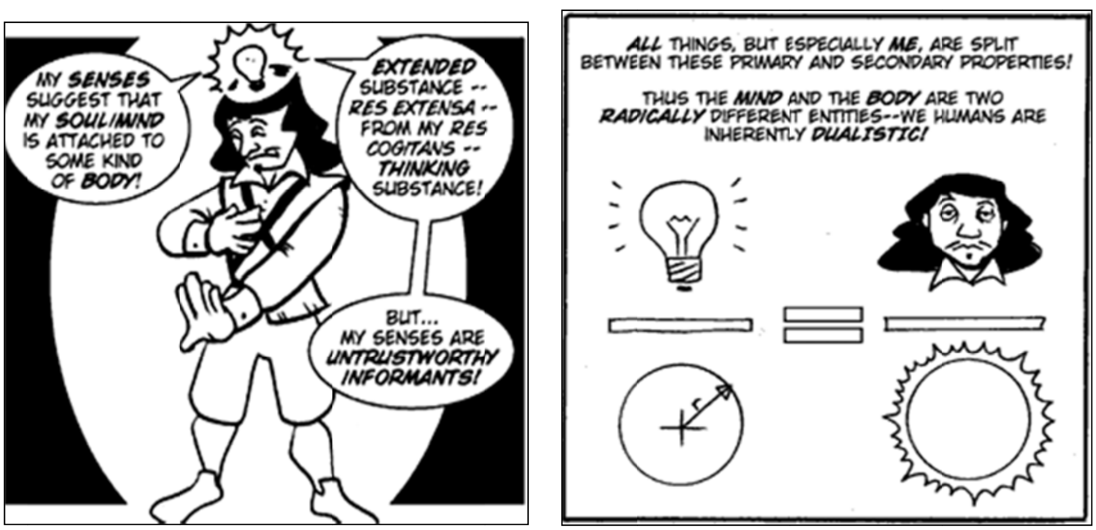


Figure 2:1. Descartes rational behind his Cartesian dualism separating us from our bodies in the 17th century (Lente and Dunlavey, 2006, 37-38).

2:8:1 Materiality

Our perception of objects in the past is ultimately defined by how we perceive objects today. Foucault (1985) proposed that modernity has come to represent a particular relationship between *people* and their *world*. This dualism has its origins in Descartes ontology that the mind and body are separate, defining his Cartesian perspective (Fig 2:1). This concept developed during the Enlightenment era of the 18th century, creating our ‘modern’ way of viewing the world through philosophy and science. This challenged traditional institutions, customs, morals and beliefs and resulted in the self-reflexive renegotiation of our position in the world and our relationship with material culture. This paradigm has governed thought processes for around 300 years, which Tilley has termed the “Anglo-American ethnophilosophical analytical tradition” (2004, 217). This Cartesian perspective has since been related to most concepts of critical thought creating a reflective consciousness which abstracts itself from the world we experience (Cottingham, 1992). Today we assign and separate the elements that make our world, creating boundaries often justified by science or social conditioning (Latour, 1993), forming classes, indexes and taxonomies that have gradually alienated us from the world around us. Structuralism furthered this view of the people and the objects in it, by rationalising hierarchies of objects and consciousness where one is evolutionarily subordinate to the other (Thomas, 1995, 12).

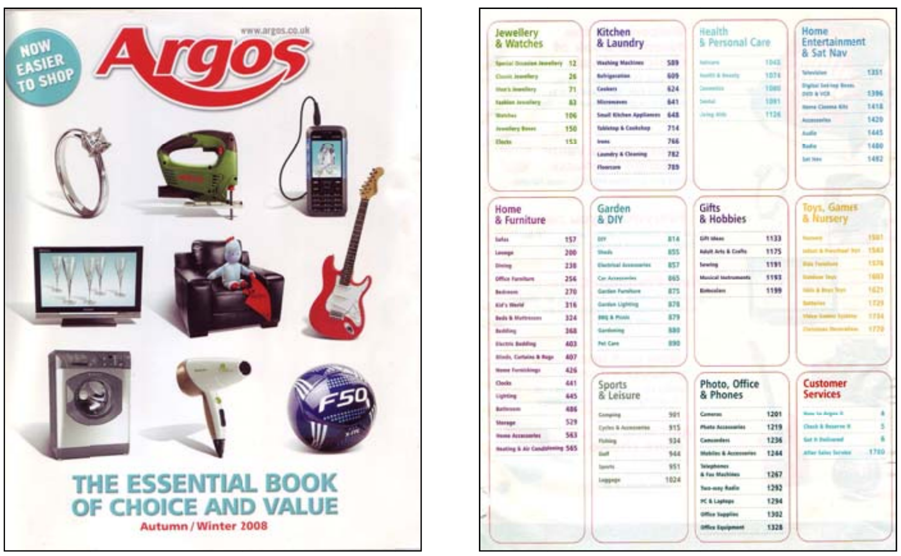


Figure 2:2. Argos Catalogue demonstrating the Western indexical perception of material culture (Argos, 2008).

An example of this modern view can be found in an ‘Argos Catalogue’ (Fig 2:2). When flicking through the pages of this sales document you will see objects typologically ordered by their function, followed by their hierarchy of cost or value which corresponds to social hierarchies and status. The Argos Catalogue even categorises objects into physical and spatial social contexts such as the Kitchen, Garden, Office and Nursery, and also fields of human practice such as home entertainment, hobbies, leisure, personal care and sports (Fig 2:2). This unorthodox source book also maintains and reinforces our understanding of material culture, as everybody knows how to find an object within it, and if not, it teaches us how to.

These views validate to most that material culture is the product of culture or human action upon materials, and as Karl Marx (1970) suggested the moment ‘man’ appropriates ‘nature’ for his own needs we alienate those objects from ourselves so that they can circulate independently as a product within society. Archaeologists are fervent practitioners in reinforcing this separation in the way they contextualised, analyze and interpret material culture, projecting their modern western views of people and objects into the past to establish the meaning of an artefact within the society that produced it.

However, the belief that objects and people are separate, in that objects only gain value or meaning when culture shapes them, makes any conclusion as to the significance, meaning or social function of an artefact a contradiction. This raises the point that, as Thomas states, the “archaeological evidence becomes no more than a poor reflection of relationships which are now entirely vanished” (1995, 13). The culture-historical and processual archaeologies reduced objects to their material and economic values, quantitive units to be measured, technological and functional properties to be delineated and style and form to be translated into culture to gain ‘meaning’.

2:8:1:1 Blurring the nature culture boundary

Yet ethnographic studies of non-Western cultures demonstrate that objects and people do not always inhabit separate realms and that the boundaries are often blurred. This is exemplified in the western idea of fetishistic objects in non-Western societies, where a clay figurine could perform in many realms, operating as a agent within society as an idol, a spirit and a clay fabric, accommodating all relations and meanings in one object (Nakamura, 1995, 23). Fetishism was defined by 18th century explorers and missionaries because they could not taxonomically assign an object such as a clay idol to mind or matter (Graeber, 2005). A new category was created for blurred objects in our world that are generally disapproved of and seen as dangerous in Western culture, because it challenges our realty in which people and objects are separate (Latour, 2004, 241).

These objects perform an integral function in many societies, where the Western idea that we are separate from the world around us seems very strange to their reality (Graeber, 2005). Spyer (1998, 36) has observed that in some societies they only realised that certain objects were symbolic and retained ritual significance until they were identified by missionaries and their loss was imminent. This not only highlights our Western preoccupation with a need to separate mind and matter but also the possibility that the relationship and meaning of objects in the past may go beyond their simple attributes.

2:8:1:2 Fetishistic objects

Fetishistic objects are also an interesting example of how Western colonial groups destabilised indigenous beliefs, by encouraging them to adopt a Cartesian view of the world, making their clay figurines just objects with no social power. This process made native peoples around the world more amenable to accept Western ways of life, social structure and even religion adopting new objects of power such as a Christian cross, a gun or a bowler-hat (Thomas, 1991, 85). The vacuum created by deconstructing these native objects of social power enabled new forms of power to flourish and be adopted (Glassie, 1994). Missionaries in New Zealand actively discouraged the carving of Maori totem-poles until the tradition died out, and today native Maoris are appropriating social power by remaking these objects of native social significance (Kramer, 2008, 23).

The acknowledgement that the Cartesian view of material culture may not be the only way to interpret artefacts has been addressed over the past 40 years by investigating how we construct meaning in society and how it is expressed. Integral to an understanding of material culture is recognising its ‘materiality’ which highlights the mutually constitutive relationships between people and the material world. Objects or artefacts are then an equal participant in social relations and everyday life rather than a neutral material upon which culture is inscribed. This relationship goes both ways as Lazzari says “materiality is thus a recursive relationship between people and things; a spiralling series of continual reflection, opposition, affirmation, similarity and difference between the way people make things and the way things make people”(2005a, 127). Miller has emphasised this approach, expanding upon Bourdieu’s concept of Habitus, in suggesting that the material life-world, that is conceived and constructed by us, also shapes the human experience in daily praxis (1987, 1995, 2005, 2009).

Figure 2:3. Experiencing a pot (Author's Photo).

In our Western social reality, if we are given an unfamiliar pot our way of interpreting the experience is cultural-specific to our Cartesian understanding of the objectified world. We would acquaint the feel of the pots surface as relating to its production method, rough equals crude and handmade and its form infers a function. We would accept the decoration as both aesthetic in terms of artistic creativity and that it may have meaning, which if unknown, is attributed to the potters identity (Fig 2:3). All of these assumptions are based on our objective perception of the experience based on our social knowledge stock, which is essentially how an archaeologist would view an artefact. But the archaeologist as an individual knows that pots have a different meaning to the owner, because we have an unconscious awareness of their materiality. It is the quest for the owners' meaning that drives research because we know that meaning is the key to understanding a society.

Materiality, then, blurs the boundaries between us and the objects we experience by breaking down the Western Cartesian view of material culture. Objects are intertwined and inseparable from us and our daily action in the world, making it impossible to define the object from the person. This realisation situates artefacts in a complex material life-world world where boundaries and meanings are indefinable within an arena of reciprocal action that constructs and maintains our reality.

2:8:2 Life-world

The concept of the life-world explores the reality that *is* lived experience created through action in our everyday lives (Schutz and Luckmann, 1989). It works on the principle that we experience the life-world through our lived experience in the past and are unaware of the direct presence of a meaning of an object, person or environment because we unconsciously know about it (Schutz and Luckmann, 1989). Although similar, it differs from Bourdieu's idea of Habitus, because it explores the realm of how new experiences are incorporated into the province of everyday human practice and how our actions can change that realm and construct meaning.

Human action in the life-world is the subjective performance of consciousness motivated by the projected goal of the actor and informed by the experience of previous action (Schutz and Luckmann, 1989, 5). Schultz and Luckmann (1989, 3) suggest that meaning is gained by reflecting on previous encounters in a broader context to find something similar, which is then open to enquiry and memorable. The experiential memory of the actor can be expanded by drawing on a social knowledge-stock as a member of a historical society (Schutz and Luckmann, 1989, 42). In this way a frame of reference is constructed to inform social choices in acts and gain meaning from their experiences.

The memories of past experiences are encoded through appresentation, a performance of consciousness essential to the life-world experience. It is formed of signs, symbols, indicators and marks which convey information to the present when required (Schutz and Luckmann, 1989, 131). Signs help us in reciprocal communication with others to cross the boundaries. Symbols embody a different reality when combined with ritualised acts helping us cross boundaries to other realities, even death. Indicators, point to other things, disguised or 'hidden', and makes it an accessible reference for experience. Marks help us overcome barriers to the future by projecting memories for later to transmit information like memories but tangible (Schutz and Luckmann, 1989, 131).

Through appresentation, past experience can form knowledge-stocks which enable the actor to create a theory of reality within which the unconscious action of everyday life is constructed and used. However, we cannot experience everything ourselves and this forms barriers in the life-world that we have to break to reaffirm our reality. These barriers are not physical but conceptual, such as knowing distant places exist without experiencing them, interpreting dreams, or at the extreme: death itself. These form barriers in the life-world which can only be crossed through transcendence by using appresentation, for example oral traditions (signs), participation in ritualised acts (symbols), tangible objects or places (indicators), or imagining a future journey or act (marks) (Schutz and Luckmann, 1989, 131).

2:8:3 Being in the world

This model of how reality is created and maintained in the world highlights the importance of the human experience and the more tangible elements of appresentation in indicators and signs which could appear in material culture or oral traditions. Lazzari says "The life-world allows us to understand how social existence is woven through the pre-discursive or pre-reflective daily existence in which objects, those quiet performers, dominate" (2005a, 135). The tangible and immaterial elements of everyday life such as holding and seeing a decorated pot, or feeling the wind in our face and the sound of our feet on a gravel track, have meaning in *a* reality specific to members of a social group and form the foundations of their identity.

Figure2:4. Aboriginal Woman at rock art site in the Australian social landscape (Griffiths, 2009, plate 1).

For example, the identity of Australian Aboriginal peoples is based on a reality entirely different from our Western perspective. It is based in a socialised landscape established in the Dreaming when ancestral beings created the topographic features through their actions (Smith, 1999, 193). Moving through this socialised landscape enables them to transcend time and space, because their life-world signs, symbols, markers and indicators form a specific social knowledge-stock creating alternate life-world boundaries. Places in the landscape form fixed points in social space where people can interact with the ancestral past by visiting them. As Smith observed, "social identity is constructed and reconstructed in relationship to place and ancestral associations, as people live in and move through their landscapes" (1999, 193). Whilst at these places time does not exist, they are at once in the past with their ancestors and in the present (Fig 2:4) (Burridge, 1973). Their relationships to place, and thus identity, require them to visit these places regularly, and children are not considered part of the social group until they have done so too and have been told how their ancestors in the Dreaming created them (Smith, 1999, 199). The only materialisation of their identity is through the physical performance of creating rock art which visually embody intangible stories, principles and truths, reinforcing their identity in that place (Burridge, 1973, 80).

Figure 2:5. Post Box as a place in the socialised landscape (Author's Photo).

The importance of place in a socialised landscape is of great relevance to a study concerned with the social context of material culture. The materiality of an object is as interwoven with us as we are within the environment we inhabit, forming a cyclical relationship between all conscious and unconscious elements of our world. Therefore, places in the social landscape represent nodes of transcendental meaning to be accessed by informed agents and engaged with through bodily action. In our social landscape a post-box is a 'place' to which we journey for a specific purpose and engage with by dropping a letter in the post-box, reaffirming our position in the life-world (Fig 2:5). The post-box is an *indicator* with which to acknowledge the presence of distant places we have not experienced ourselves but know to exist. The letter is a *mark* conveying our individual belief that there is a world beyond our experience and that it is possible to transcend time and space in the delivery of it.

2:8:4 The meaning of a place in the landscape

This social landscape is of course subjective and based upon or within the physical environment we dwell which is constantly shaped by our action in it and perception of it (Gosden 1994; Merleau-Ponty, 1962; Tilley, 1994). This has prompted a phenomenological approach to understanding the landscape. Gosden (1994) was one of the first to speak of social landscapes and the larger spatial frames of reference in the landscape . Using the archaeology of Cranborne Chase as a canvas he highlighted the insight which it offers our understanding in the creation and use of human space over an entire landscape (Gosden 1994, 97). The monuments and field boundaries erected over time structured not only the landscape but who its occupants were and their view of their place in the world around them (Gosden 1994).

Ingold (2000) views action in the world around us as forming a 'taskscape' rather than a landscape, as land implies a quantifiable element. He proposes a social space in which an array of activities are performed that are quantitative and heterogeneous, and that places are not locations but histories and nodes in the matrix of movement (Ingold, 2000, 195). This is a reaction to the assumption that the landscape, like material, passively awaits for significance to be inscribed upon it, which comes back to the mind versus matter ontology once again. Gosselain (2008, 77) has emphasised the importance of the 'space of experience' in the landscape in observing potters in Niger Africa. He found that identity and a sense of belonging was built upon the daily chores, seasonal migration, family networks, exchange and travel within which clay extraction sites became embedded locations of social knowledge transforming the significance in the landscape (Gosselain, 2008, 77).

Heidegger's phenomenological perspective of 'Being in the World' (Dreyfus, 1991), has led to a great awareness of our everyday relationship with it, emphasising our place not 'upon it' but 'in it'. Heidegger's hermeneutic phenomenology saw life within the flow of everyday life, he took a series of everyday things and looked at their role in our lives and how knowledge of the everyday world was generated (Gosden 1994, 108). His shift in thinking from thought to being and a hoped for new understanding of the relationship of thought and life are outlined in his 'Being and Time' which offers a starting point for understanding all other forms of life (Heidegger 1962). To Heidegger the self and world merged in the activity of dwelling in the world with no beginning and no end point.

Merleau-Ponty (1962) was also concerned with Cartesian view of the world and emphasised the body as a physical thing and the significant role of perception in this process of understanding. He suggested that “underneath the objective and detached knowledge of the body that other knowledge which we have of it by virtue of its always being with us and of the fact that we are our body’ (Merleau-Ponty 1962, 206), also that “perception is experience that takes place before reflection and theorising” (Merleau-Ponty 1962, 131). This sounds very similar to the life-world of Schutz and Luckman’s (1989), underlining the fact that it is our awareness and interpretation of sensations that forms our world. Both Heidegger and Merleau-Ponty saw a world beyond the Cartesian façade and worked in different ways through phenomenology to view the world.

The perception of our experience whilst moving through the taskscape then forms our view of the world, thus it is through journeying from place to place that we construct our life-world and generate meanings as we go. It has been suggested that landscapes are the relationships between places which are made of human feelings, emotions, dwelling, movement, action and as such they do not have boundaries (Tilley, 2004). Tilley reinforces this saying “we carry times to places through our movements and prior experiences, and direct contact with these places acts as a mnemonic trigger for stories and the construction of personal biographies” (2004, 31). The hagiographies or tales of Cornish saints could represent an important realisation of this practice, using landscape features and already sacred places to embellish and legitimise the lives of the saints (Harvey, 2000). The stories and sacred places of pre-Christian peoples in Cornwall could have been interwoven with saints’ lives to legitimise their social position and cultural identity (see Chapter 3) (Harvey, 2000, 2002).

The materiality of objects, and the phenomenology of social landscapes, is well established in archaeology and anthropology. Both fields of study have used the same sociological and philosophical underpinnings to conclude that materials/landscapes and culture/social are not separate but inextricably entwined and dependant upon one another. Therefore it is a natural step to merge the two, allowing a more complete picture of society to be created, and a clearer picture of how communities operate within their social landscape to be formed. Material culture moves in meaningful ways and not solely in relation to economic models of trade and exchange or ethnicity. This study asserts that specific objects/materials moving through a socialised landscape actively create a reality and identity of the peoples within it. It is difficult to establish a term that encompasses the heterogeneity of materiality and social landscape studies but the author suggests ‘raw-material spatialisation’. Raw material refers to a physical resource utilised through human action to make a product; spatialisation refers to its use in the social sciences (see Law, 2000; Shields, 1991), as action that gives physical space character through the institutionalised representations and everyday practice giving meaning to place in an imagined spatial world. This encompass the theoretical elements discussed in the context of this study specifically relating to the production and movement of objects as an act of creating of social space within a landscape. This theoretical position will inform the interpretation of the data in this study which are situated in the practice of clay sourcing and the observation of social networks over a large geographical area and time period.

2:9 Putting theory into practice

This theoretical approach has been realised in some recent archaeological studies, highlighting the obvious potential inherent in physical evidence such as pottery, stone tools and settlements, to confront this merger of materiality in the socialised landscape. The foundations of this approach can be seen in the early analysis of British Neolithic stone axe sources and their later inclusion into debates concerning their prominent landscape location, such as Great Langdale in the Cumbrian mountains (Bradley, 2000; Bradley and Edmonds, 1993; Edmonds, 2004). Although the interpretative value of the Langdale stone axes appeared to lie in their role in exchange and kinship relations, the sources prominence in the landscape was seen as equally important to their object biographies (Bradley and Edmonds, 1993). A number of archaeological studies have developed this to observe the construction of identity within regions of small communities through the distribution of material culture related to specific material places in the social landscape.

Moore (2006, 2007) has identified the significance of biographical landscapes in which the extraction of materials from prominent places play an important role in reinforcing social bonds through their exchange. The material sources of Late Iron Age pottery and quernstones used in the Severn Valley are located in the Malvern Hills in Gloustershire, which are very prominent landscape features (Moore, 2007, 87). He suggests that the sourcing of these materials in the Malvern Hills allowed objects used in everyday life to act as a physical reference to larger perceived communities (Moore, 2007, 79). Their use may have reminded people of their regional identity and kinship relationships, reinforcing their place in society (Moore, 2007, 95). The clay and stone of the Malvern Hills had been used since the Middle Bronze Age, perhaps contributing to their biographical importance in the landscape. As Moore states: “this location was being sought as a clay source, potentially marking the growing importance of the places as a social monument” (Moore, 2007, 90). He points out that material source locations for clay, metals and salt are often in marginal or liminal places in the landscape and that extraction may thus have been situated in a symbolic landscape (Moore, 2007, 90).

The clay and temper used in pottery were sourced both locally (within 10km of settlements) and regionally (in the Malverns, up to 40-60km) (Moore, 2007, 83). However, he points out the difficulty of establishing what is 'local' rather than 'regional', as their definition of distance to the material may not be the same as proximity to the source (Moore, 2007, 83). This highlights the issue of temporality and space in the socialised landscape, which, as demonstrated by the Australian Aboriginals Dreaming, are often relative to the society in which it resides. He suggests that communities close to the source may have considered them a regional resource and not local (Moore, 2007, 83). The results of his analysis challenged the theory that Malvern pottery was exchanged because it was decorated, and thus of high status, instead revealing that local plain wares were more popular, indicating the use of source materials was more complex (Moore, 2007, 84). The frequency of 'regional' Malvern pottery increased over time and overtook locally-sourced and produced wares, which he interpreted as a growing need to reinforce social relationships due to land shortages or social instability (Moore, 2007, 84). Moore concluded that source locations were not marginal, and that "in some cases at least they may have acted as a social foci, as places that were widely visible to many communities" (2007, 90). Also that "the existence of regional exchange networks of material such as the Malvernian ceramics, allowed communities to form both localised and more distant sets of social relations, embedding themselves within sets of social obligations tied to the landscape" (Moore, 2007, 95).

2:9:1 The local/non local continuum

This study will draw upon Moore's definition of local and non-local or regional. The distances within the study region of the Lizard between the sites and the gabbroic clay source are very small. It is argued here that in the life-world attributed to the perspective of the peoples that sourced clays in Cornwall does not relate directly to the physical distance but its identity as a regional resource. This distinction of local vs non-local is relevant regardless of actual physical distance because it is a metaphor for individual and group identity; as this chapter has discussed the life-worlds of many cultures are not constrained by physical and temporal boundaries highlighting the potential of thinking outside the western Cartesian ontology.

Lazzari (2005a, 2005b, 2010) has also noted the dynamic relationship between regional and local material culture to construct and maintain reality and identity in first millennium communities of north-west Argentina in South America. Her analysis demonstrated that high quality obsidian found on excavated sedentary communities was traded long distances, but did not seem to have been treated as a high status object (Lazzari, 2005b). Despite the use of the same clay sources, the regionally specific decorative styles on pottery demonstrate distinct identities and links between particular regions or kin-groups (Lazzari, 2010, 60). The known source of the Ona obsidian, in the dry highlands of the Puna, does not respect the same regional kinship boundaries being found on many sites throughout the region (Lazzari, 2005b). In comparison with the locally-sourced lithics the high quality obsidian was not subject to a higher level of investment in its production, specific form or unique contexts of consumption and deposition, suggesting its value was not determined by these attributes (Lazzari, 2005a, 144). The high quality of the Ona obsidian does not seem to have been the reason for its circulation, instead Lazzari suggests "on a regional scale obsidian seems to have united places otherwise unconnected; a silent network of non-explicit connections still indicated and possibly experienced indirectly by the very use of this material in everyday activities" (2005a, 145).

Lazzari evokes Schutz and Luckman creation of reality in the life-world and the materiality of the artefacts to situate the actors in a socialised landscape. Like Moore she interprets the role of materials in the "perpetual transformation and circulation, thus working as a reminder that the world beyond everyday face-to-face interactions was constructed through a complex set of alliances and obligations" (Lazzari, 2010, 60). There was also a strong dynamic relationship between the local and non-local sources saying "the interplay between the represented and non-represented, and the local and non-local, opens interstices for interpreting past social life" (Lazzari, 2005a, 136). The potential of this is taken further to suggest that the journey through the socialised landscape to the Puna highlands transcended time and space through the projected past experiences of the individual representing an initiation rite, economic journey, social event, political opportunity and time travel (Lazzari, 2005a, 130). The obsidian and ceramics are different, yet both "foster different ways of conceptualising reality and performing in everyday life" (Lazzari, 2005a, 129). This unique interplay ended with the gradual centralisation and growing inequality in society as a result of major socio-political changes (Lazzari, 2005a, 148). Materials then represent active agents who reinforce and mediate identity through their circulation, making concrete aspects of reality that are not visible or beyond everyday experience. The obsidian, the Malvern stone and stone from Great Langdale all fall outside our western view of a raw material as they embody a greater meaning, they could instead be described as totemic materials.

2:9:2 Totemic materials

The inherent meaning or identification of an object outside the realm of a Western Cartesian ontology makes classifying them very difficult, therefore, ethnographers use terms like totemism and animism to explain a different kind of relationship between people and the world around them (Descola 2009; Pedersen 2001). Totemism and animism are terms to encapsulate the systems through which many cultures view their relationship between the plants, animals and landscape around them (Descola 1996, 2009: Lévi Strauss 1964). In totemic systems non-humans forms such as landscape features or objects are treated as signs and in animic systems a living force or personality can reside or flow through a form and are seen as having relationships (Descola 1996, 87). A totemic ontology is more objective as the object or landscape feature can be viewed by anyone and the meaning passed on. The Australian Aboriginal view of the landscape is essentially totemic, certain places in the landscape are given importance by their ancestors in the Dreaming having been at that place giving it meaning (Ingold 2000, 113). The totemic power of value of these places could be taken away and used, such as the extraction of ochre and clay for body painting giving the wearer protection from bad spirits (Taçon 2004, 36). Taçon (2004, 34) noted that the utilisation of white clay associated with important places were prized and traded over large distances, despite the presence of white clay throughout the region. This study will utilise the term totemic to classify an alternate social understanding of a material such as clay beyond our traditionally western view point.

2:10 Trade and exchange

These archaeological examples have significantly expanded the traditional method of viewing society through the exchange of objects by attributing significance to the biography of objects and the landscape in the creation of reality. The manifesto of trade and exchange in archaeology as set out by Childe (1951, 1958) has always seen sharing and exchange of material objects, within and among communities, as the indicator of social relations and cohesion. The culture historical diffusionist approach mapped people over time and space through objects and innovation; and as a result of processual archaeology developed rigorous deterministic economic models which gained social significance through ethnographic analogy. Despite the undeniable importance of trade and exchange as a field of study, it has become less fashionable through post-processual critic and research agendas (Preucel, 2010, 7). Ultimately, most models still use the pioneering ethnographic work of Mauss in 'the gift' (see Mauss, 1990) and Malinowski (Kula exchange cycle) (Malinowski, 1922) to justify comments on the meaning and motivation behind trade and exchange. Further contributions by Lévi-Strauss 'kin' model (kinship) (see Lévi-Strauss, 1969), and Appadurai 'commodities' model (see Appadurai, 1986) have brought together how trade maintains social bonds no matter what is exchanged (Bauer and Agbe-Davies, 2010, 13).

A new approach to trade and exchange is then overdue. One suggestion is the merger of processual materials based data collection and post-processual themes of identity, agency and materiality (Bauer and Agbe-Davies, 2010). Bauer and Agbe-Davies (2010, 13) have suggested new themes in trade and exchange studies:

1. It operates as a communicative act
2. It transforms relationships between people and things
3. It has significance of agency and power in context
4. Its use in studying consumption and discard in understanding exchange and social interaction

They have broken down the term trade as: formal exchange or market-based on individual or systemic scale; and exchange as the means of transferring goods through wider mechanisms, including ritualised gift, negotiated transactions, barter, markets, one-way exchange, coercion and piracy. Both of these terms must be situated within the themes of context, communication and consumption. The nature of the *context* can alter the meaning of any social action, therefore its physical, social, ideological, historical and spatial contexts have great bearing (Bauer and Agbe-Davies, 2010, 15-17). Trade is a *communicative* activity which conveys more than just goods, but the traditions, values and ideas which circulate as intangible aspects of culture which are not visible in things (Bauer and Agbe-Davies, 2010, 18; Preucel, 2010, 7). *Consumption* is this stage of the objects' life that mediates and maintains social relations of both groups and individuals (Bauer and Agbe-Davies, 2010, 22).

The merger of processual and post-processual approaches will situate trade and exchange at the heart of social archaeology as a social process grounded in the interactions of people, landscapes and relationships (Bauer and Agbe-Davies, 2010, 22). How then are these processes to be made visible? This study will engage with the approach suggested above by focusing on the networks along which these people travelled through the socialised landscape forming relationships and the identity expressed through the objects transported.

2:11 Macro and Micro networks

As discussed (above), it is the agent in the socialised landscape that creates their life-world whilst moving through space and time; as the archaeological examples have shown, artefacts can represent this movement along networks. A useful approach to this can be found in the actor-network theory developed by Latour (1991), Callon (1986) and Law (1999) which further expands its potential by suggesting that any actor, whether a person, object or organisation, is equally important to a social network forming a homogenous social order (Law, 1999). This could situate the agent and the artefact in socio-technical networks of communication which highlight the possible roles and power of production centres, markets, agents or 'nodes', related to pottery and clay exploitation, as places in the socialised landscape. This can be achieved by investigating the connections within a micro/macro level framework (Knappett, 2005, 67).

As seen in Lazzari and Moore's research, there were different levels of material circulation related to regional and local networks operating in society, which could be interpreted as micro-and macro-sociologies networks. This sociological approach was developed towards an attempt to explain limited and specified properties of social reality (Mennell, 1974, 1), among these theories emerged micro- and macro-sociologies. This has been summarised by Cicourel as "the routine activities of an organization or group normally include the integration of micro- and macro- data and theory, because all daily-life settings reflect several levels of cultural complexity" (1981, 52).

This theory has been incorporated into archaeology due to its relevance in understanding past peoples beyond the purely 'vertical' and 'horizontal' semiotic plains of meaning (Knappett, 2005). In this study an exploration of the socio-technical networks of communication will be used to highlight the possible roles and power of places or 'nodes' of social action associated with the practice of clay sourcing and extraction and by investigating the connections within micro/macro level frameworks. The data within archaeology has an additional temporal element, which sociological research lacks, but in archaeology this has resulted in an emphasis on elements such as 'scales' and 'levels'. It has been extensively used in historical analysis, although its application has not been as even as the incomplete nature of historical evidence has resulted in the selection of specific elements.

2:11:1 Macro-sociologies

In explaining the nature of micro- and macro-sociological theory, I would like to point out that I have separated the two elements purely for descriptive purposes, and that no underlying order is implied.

The term *macro* incorporates abstract societal generalizations such as institutions, hierarchies and political organizations, which naturally imply an affiliation with power, large-scale complexity and structure (Dobres, 2000, 144; Knorr-Cetina, 1981, 16). In terms of its exogenous effect on agents within a cultural group, this means that society as a whole moulds individuals, and that they are dependant on social institutions and guided by social facts (Knorr-Cetina, 1981, 13). For example, the creative artist may express emotive subjects in material forms that are in turn encountered by other agents, but he or she is still constrained by the term ‘artist’ and the ‘role’ he or she is culturally expected to follow according to the norms of that society. On a cognitive level, macro-sociology incorporates the guiding force behind decisions or choices, making them social choices that are unconsciously acted out, such as language (Giesen, 1987, 344). As children we learn how to speak and express ourselves within an accepted vocabulary (Giddens, 1981, 164), yet when asked as adults to explain those linguistic rules, many would fall short, giving a partial view while admitting a more implicit understanding (Knorr-Cetina, 1981, 4). In relation to archaeological applications, an agent is acted upon by forces such as a feudal system of control in a region or a political party, who rely on enforced rules and norms to support an ‘aggregation of individuals’ (see Collins, 1981).

The normative foundation of macro-sociology has been defined by Dahrendorf within the Western world as Marxian ‘integration theory’ a “social structure as a functionally integrated system regulated by normative consensus” (1959, 159). Durkheim and Parsons also present a normative approach with ‘coercion theory’ a “social structure as a form of organisation held together by force and constraint transcended in an unending process of change” (Knorr-Cetina, 1981, 2). Thus within a social system individual interactions are not random, but follow a recognisable pattern (Csikszentmihalyi and Rochberg-Halton, 1981, 6). This is reflected the life-world concept, as the social knowledge-stock which provides us with the tools to reinforce society at this macro level.

2:11:2 Micro-sociologies

Contrary to this the term *micro* is more specific, relating to an agent-centred approach that defines social situations in terms a direct ‘face-to-face’ interaction in a particular setting. This level of interaction, as Giddens (1981, 173) states, is based on the presence of others, whereas macro-level interactions are those with others who are absent. Within this endogenous framework the agent is characterized by actions, the environment, context or setting of which are not viewed as external, but on which action is directed, lived and reflected upon (Knorr-Cetina, 1981, 12). This phenomenological interaction is seen in terms of small-scale uniformity in a neutral and powerless environment with no definitive structure, in which predictions of interactions are problematical (Knorr-Cetina, 1981, 16). Therefore, at a micro-level situation such as a local market, the interactions mark a geometric intersection with other agents each with their own attributes (Knorr-Cetina, 1981, 9). This makes it hard to interpret the material remains of the past, as we cannot predict their trajectories within a social and interpersonal framework.

The point to be drawn from the descriptions above is that an inferred linear relationship situates micro-level interactions as the base upon which macro-levels are built. However many believe that this simplistic view should be challenged:

“Participants not only routinely transcend the immediate setting by referring to occasions and phenomena at a different time and place, they also continually employ notions and engage in actions whose mutual intelligibility appears to be based upon their presupposition and knowledge of broader societal institutions.” (Knorr-Cetina, 1981, 12).

Therefore a distinction between the two seems hard to support, as agents act unconsciously on macro-level knowledge in phenomenological micro-level interactions (Giddens, 1981, 163). From this perspective, interaction is made up of unintentional consequences that can exert significant influences on the course of social change, and happens, as Knorr-Cetina suggests metaphorically, “behind the backs of agents” (1981, 25). Callon and Latour (1981, 299) epitomises this problematical division by referring to Enoch Powell’s rise from spokesperson of the common man to political power, thus simultaneously forming part of both micro- and macro-levels.

Therefore the need for a link between micro- and macro-levels, as Alexander *et al.* (1987, 31) asserts, should be the concern of most theorists. The position that the two should be and are used separately is acknowledged by Smelser and Münch (1987, 385) as an erroneous position. In some ways the two have been assigned to a micro- ‘vertical’ and macro- ‘horizontal’ process of communication within society, but as I will demonstrate, it may not be this straightforward. It was Webber who saw a way out of this dualistic problem by avoiding the idea of an order that implies the insignificance of acting individuals (Alexander *et al.*, 1987, 16). Parsons built on this by advocating a cycle in which a macro-level agents response to a micro-level world can in turn, be effected by a micro-level agent impacting on part of a social network in the macro world (Alexander *et al.*, 1987, 23). Thus a world constructed of individuals and not collectively can still be influenced by how others construct theirs (Hinde, 1998, 176). In isolation neither level can aid the interpretation of how past peoples interacted within society as a whole or as individuals, and one cannot raise one level above the other as micro and macro are infinitely interconnected.

2:12 Conclusion

This study is concerned with identifying such networks to situate the movement of objects, ideas and knowledge within the life-world and the socialised landscape of Cornwall. The micro- and macro-level networks provide an analogy and conceptual framework for the distinction between local/face-to-face=micro and regional=macro levels. Once the presence of these levels and the pottery (or specifically the clay) moving within them are identified, the process of unravelling the realities of the past can begin by providing an overview of society over time. The clays identified during the analysis will be related to a regional macro- or local micro-network and it is hoped that this will elucidate the extent and structure of the social networks in action through the ceramic evidence. This will provide the opportunity to map the ebb and flow of these levels, as a reflection of society, over the seven centuries this study covers, with the intention of observing possible changes and relating them to broader issues concerning the period. This unique synthesis of artefactual evidence and socio-technical modelling aims to utilise the new approaches to trade and exchange by combining petrographic data and analysis with essentially post-processual archaeological theory. The theoretical principles of materiality, the life-world and the importance of place in the socialised landscapes will form the conceptual foundations of inquiry in this study now encompassed by the term ‘raw-material spatialisation’.

Theory, however, is nothing without its feet in tangible evidence and a cultural context. The next chapter will populate this study by introducing the people, period and universal social themes of Christianity and settlement in archaeology.

Chapter 3: SETTLEMENT AND CHRISTIANITY IN CORNWALL; THEMES IN POST-ROMAN TO EARLY MEDIEVAL SOCIETY

3:1 Introduction

The themes of Christianity and settlement in post-Roman and early medieval Cornwall have been selected for their relevance to the period and the setting, and their wider relevance to national and international research questions. Christianity and settlement will be used to help interpret the evidence, enabling comparisons that stretch beyond traditional physical or cultural boundaries to form points of familiarity to aid discussion in subsequent chapters. The available archaeological and historical evidence for settlement and Christianity will be introduced and discussed in the context of understanding the post-Roman and early medieval periods in Cornwall. The intended outcome is to connect the archaeological record and interpretive scope of Cornish archaeology with national themes, from which further discussion of changing social and economic networks can be related to the petrographic data.

3:2 Settlement studies

The focus of Anglo-Saxon, post-Roman and early medieval settlement studies has moved from an initial focus on individual settlements to look at the wider rural settlement context, providing another valuable tool through which to investigate society and change. Hamerow (2010, 208) has commented that broad syntheses have demonstrated the value of such a perspective in contributing towards elucidating their socio-economic development. However, the limited archaeological resource and regional variation highlights the partial nature of current interpretations and the need to gain a complete overview of settlement in each region. The Shapwick Project was a structured investigation designed to identify settlements that may previously have been overlooked in the landscape as a whole, but concluded that the evidence suggested that early settlements in Somerset were too small-scale and scattered to produce material culture until the 10^{th} century, and were, or may be, overlain by currently occupied farms and villages (Gerrard and Aston, 2007). These voids in archaeological distribution maps have in most cases been filled with place-name evidence to map the rural settlement patterns in the landscape (Webster, 2008, 173).

3:3 Settlement evidence

The evidence for post-Roman and early medieval settlement in Cornwall is comprised of fairly limited archaeological evidence combined with extensive research into habititive Cornish place-names elements. Both forms of evidence are discussed below in order to provide the reader with an understanding of the nature and quality of data for the period.

3:3:1 Cornish place-name elements

Place-names structure our understanding of settlement in Cornwall from the 5th to 11th centuries. The survival of distinctive habititive place-name elements is the result of Cornwall's unique linguistic heritage. Cornish is a Brittonic language whose true form died with Dolly Pentreath in AD 1777 and was revived in the 19th century using existing Brittonic languages such as Welsh and Bretton to fill in the gaps of existing knowledge (Berresford-Ellis, 1974, 135). Its survival till relatively late that date suggests a long resistance to the adoption of the English language, perhaps with its origins in the 7th century against the Saxon settlers whose linguistic influence diminished at its border with Devon (Padel, 1988, 2007).

A tentative chronology of place-names is available from the Late Iron Age onwards (Padel, 1985). This chronology has not been validated by archaeological investigation and is based on the development of the Cornish and Brittonic languages with, where possible, associations with archaeological evidence (Padel, 1985). The *car, caer, ker* and *gear* elements possibly mean 'fort' and are thought to be the earliest, as they are often associated with Late Iron Age hilltop enclosures for which there is some dating evidence (Todd, 1987, 223). Sometime later *car* 'round' or 'fort' is followed or replaced by the *tre* or *tref* prefix meaning 'estate, hamlet or farmstead' (Padel, 1985), which are topographically located on valley sides, often 600-1000m apart (Preston-Jones and Rose, 2003, 52).

Tre

Tre sites are typically unenclosed settlements not found on hilltops, and are conspicuous by their absence in north-east Cornwall, where 90% of the place-names incorporate the English element *tun* instead, even though they share similar topographic locations (Padel, 2007). Around 1200 examples of *tre* sites are currently considered to date to around the 6th century, or at least represent pre-medieval settlement (Fig 3:1) (Padel, 2007; Preston-Jones and Rose, 1986, 142). The suffix to the *tre* element is generally a personal name, landscape feature or saint's name, perhaps providing a view of how people viewed their landscape and its owners (Padel, 1985). The true distribution of these sites is not fully known, as only a small proportion are to be found in Domesday Book (Pearce, 1978, 50). However, they suggest that settlement shifted from upland 'rounds' to lowland valleys during the post-Roman period (Pearce, 2004; Preston-Jones and Rose, 1986; Turner, 2006a).

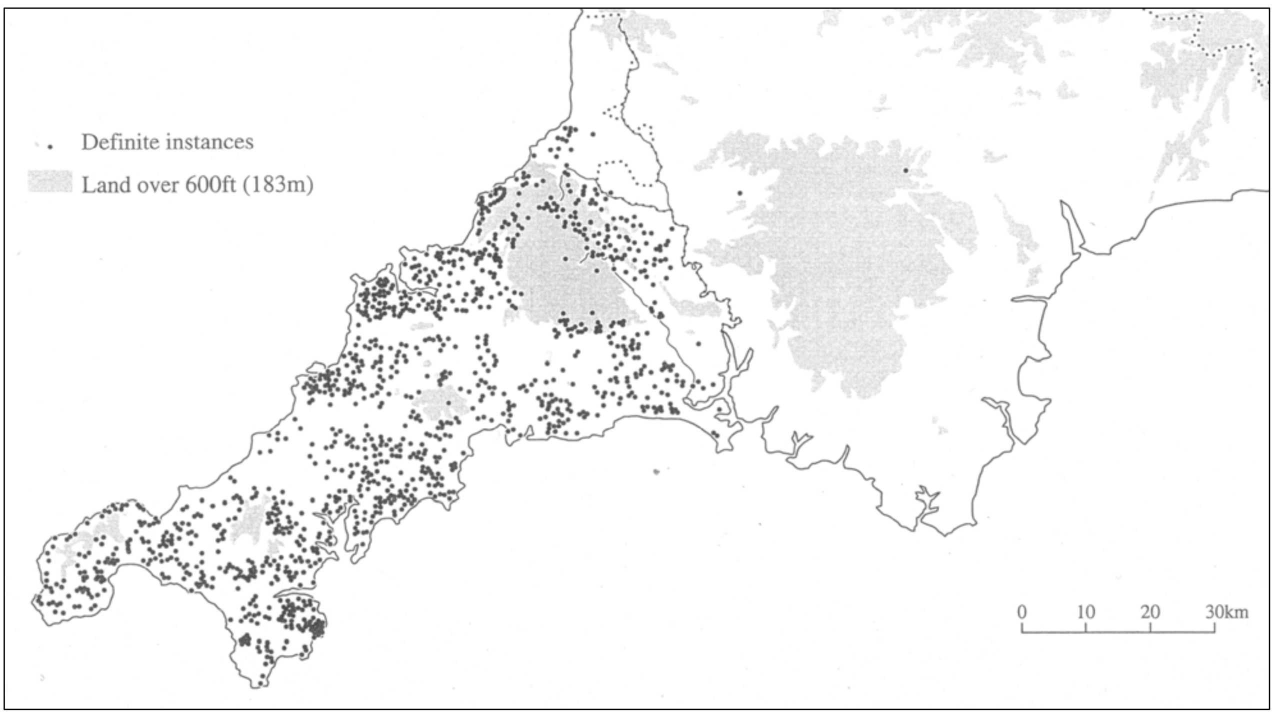


Figure 3:1. Distribution of tre place-name elements in Cornwall and Devon (After Padel, 1999, Map 13.1).

There is minimal archaeological evidence to support the *tre* settlement model. The hypothesised open unenclosed form has made it impossible to identify further examples that lack place-name evidence. The only excavations on *tre* sites are the deserted settlements at Treworld and Tresmorn on Bodmin Moor, which the pottery evidence dated to the 10th century and for which no absolute dates were obtained (Beresford, 1971; Dudley and Minter, 1964; Dudley and Minter, 1966).

These settlements are thought to be proto-estates (as discussed below, 3:6:4) within emerging systems of landholding and not individual holdings (Herring, 2006, 71). The relationship between them and the earlier rounds is unclear. Herring's hypothesis includes the concept of a *tre-lann* model meaning the 'farmstead/estate of the church enclosure', suggesting they represent farms belonging to an estate possibly controlled by a *lann* or church settlement, which occasionally reoccupied the abandoned rounds (Herring *pers. comm.*). In Domesday Book, medieval manors appear to be situated in a landscape populated by *tre* settlements, although it is uncertain if they are contemporary or earlier in date (Preston-Jones and Rose, 1986, 145). These are recorded there as being owned or given to a native social elite possibly controlled by a Norman aristocratic or royal figure such as the Count of Mortain (Padel, 1988). It has been suggested that this represents the beginnings of a pre-Norman system of centralised control and that is why the population did not need to reside in defended settlements (Preston-Jones and Rose, 2003, 66).

Havos and hendre

The place-name evidence has also been used to provide evidence of transhumance in the post-Roman landscape. The name *hendre* 'the old settlement' or 'winter homestead' and *havos* 'summer dwelling', are thought to represent the homes of pastoral farmers moving between the upland and lowlands to graze (Padel, 1985; Preston-Jones and Rose, 1986). Some evidence has been found for this on Bodmin Moor, where the element *havos* is associated with the remains of moorland huts only big enough for two people and which are thought to be post-Roman in date (1996). This demonstrates the mobility upon the landscape over distances actively creating the socialised landscape in which meaning would have been ascribed.

Lys

The *Lys* place-name element provides an insight into possible early administrative centres. Its meaning in Cornish, Welsh and Bretton is 'court' which Padel suggests refers to former administrative centres in Cornwall prior to the English conquest in AD 838 (1985, 150). Its distribution points to a west Cornwall tradition, especially in the hundred of Kerrier. The Lizard Peninsula derives its name from 'Lys+ardh' meaning the 'high court', which is a rare conjunction in the region (Padel, 1988). The place-name 'Lesneague' (lys+manach) on the Lizard refers to the 'court of the monk(s)' indicative of an ecclesiastical landholding. Further more, the nearby settlements of Trelease and Treleague could be interpreted as 'a settlement of the monks' court', perhaps offering a glimpse of an early estate formation.

Lann

The *lann* place-name element is thought to mean 'Christian enclosure, cemetery or church-site' (Padel, 1976-77, 1988, 19). Derived from the Bretonic language and used in Wales, Cornwall and Brittany (Petts, 2009), the earliest recorded use of *lann* is in Wales in the late 6^{th} century Llandaff charters (Pearce, 2004), and in Brittany they can date from 5^{th}-6^{th} century (Giot *et al.*, 2003, 250). The first written reference in the South West, however, dates to the 10^{th} century (Pearce, 2004, 138), though this is more likely to be a reflection of the lack of documentary sources from Cornwall than a true absence. Opinions differ, but Padel suggests the term *lann* was still being coined from the 9th century up until around AD 1200 (1988, 108). Their date could also vary within Cornwall; Pearce suggests that it could have been used in north Cornwall from the 5^{th}-6^{th} to the 8^{th} centuries (2004, 138).

There are around a hundred *lann* sites in Cornwall and the place-name element is generally compounded with a personal name or topographic element. Where enclosures survive they are rounded, oval or sub-rectangular (Preston-Jones and Rose, 1986, 156). The *lann* place-name model, developed by Thomas, proposes that after conversion to Christianity, earlier unenclosed burial grounds were enclosed within curvilinear boundaries (1971, 1994). He suggests that the meaning of *lann* developed from ‘rough meadow’ to ‘small enclosed meadow’ to ‘enclosure’ and finally ‘churchyard, church, monastery’ (Thomas, 1994). There are around 50 church sites with this prefix in Cornwall, with the remaining secular *lann* settlements thought to denote the former existence of a Christian enclosure (Preston-Jones, 1994, 85).

The significance of the term *lann* has, however, begun to be questioned. Turner suggests that the general assumption that all *lanns* started in the post-Roman era has discouraged comparisons between them in terms of their date and status (2006a, 10). Petts has explored the function of *lann*s as cemeteries, pointing out that in Wales the need to enclose and sanctify cemeteries is linked to the 8th-century shift in burial locations requiring a specific Christian place-name (2009, 126). On the basis of the documentary evidence, he suggests that the Cornish *lann*s may also date to the 9th century (Petts, 2009). There is also documentary evidence that the 5th-8th century monastery at Padstow in Cornwall was purposefully situated within an earlier enclosure thought to be post-Roman in date (Preston-Jones, 1994, 90), the evidence for this being the seventeen 8th-9th century burials at Padstow churchyard that respect line of the circular enclosure (Manning and Stead, 2002-3).

Unfortunately, this issue will not be resolved until a *lann* site has been fully excavated and we have accurate dates and information on associated social functions. Despite this, the prefix is the most commonly used dating tool for settlements in Cornwall in this period, often taken as definitive proof of origin. The only archaeological evidence is the location of standing churches or cemeteries of a pre 10th-century date, occasionally with an inscribed stone or stone cross situated within a circular enclosure (Preston-Jones, 1994). Ann Preston-Jones has found that 40% of churchyards with *lann* place-names do have circular/oval forms with a further 26% in sub-rectangular enclosures, 17% of which have early Christian inscribed stones or crosses (1992, 1994, 78). Although it has been suggested that *lann* sites re-occupied the upland rounds in the 9th-10th centuries (Thomas, 1968a), 40% of *lann* churches are instead close to creeks, estuaries and navigable waterways (Preston-Jones, 1994, 85). Therefore, the topographical location may also have implications for our understanding of both their date and function.

Manach, Merther and Eglos

The element *manach* accounts for a third of place-name elements on the Lizard Peninsula, expressed in place-names such as Meneage. It is thought to mean 'monk' the plural of which is *meneghy* referring to 'monk's enclosure', and can also mean 'sanctuary' (Padel, 1985, 156). The date of this element is uncertain but is first recorded in 967 AD at Lesneage (Padel, 1988, 118-119), which considering the proposed early date of the *lys* element could suggest a pre-conquest date.

The place-name elements associated with later settlement are less common and are thought to indicate the names coined in the Cornish language. The last Christian elements are *merther* 'martyr's grave/burial place' and *eglos* 'church', both of which are thought to be later than *lann*s (Padel, 1985; Pearce, 2004, 139-141; Preston-Jones, 1994). There are similarities with the Welsh use of '*merthyr'*, *'ecclesia'* and *'myfyr'*; also in the siting of these settlements near water or in valleys (Edwards and Lane, 1992, 4; Roberts, 1992). The shape of Welsh ecclesiastical enclosures are also often round (Edwards and Lane, 1992, 5).

Tun

Another, possibly contemporary, name is the Old English place-name element *tun,* 'farmstead' or 'estate', whose distribution is restricted to the eastern border of Cornwall (Padel, 1985; Preston-Jones and Rose, 1986). Its presence could represent new land ownership after the Anglo-Saxon invasion of Cornwall in AD 815, after which King Alfred mentions ownership of land in Cornwall in AD 881 (Pearce, 2004, 258). It is after this date, and particularly in the 12^{th}-century post-Conquest period, that Old English names become more common in Cornwall (Padel, 1985, 1988; Preston-Jones and Rose, 1986).

3:3:2 The place-name narrative

This place-name narrative is important for the context of this thesis because it is the basis for the current view of society and settlement from the 4^{th} -11^{th} century, used in both historical and archaeological interpretations of Cornwall. The influence of place-name studies on our understanding of medieval settlement patterns in Cornwall has been considerable. However, place-name evidence is not archaeological evidence. The habititive place-name evidence (above) remains a hypothetical model of settlement, with people initially living in defendable hilltop enclosures in the Late Iron Age period, moving downslope to construct rounds in the Roman period, with these sites abandoned in the 6th century. The population then moved further downslope into the sides of valleys and founded unenclosed farmsteads, possibly joined by ecclesiastics from Wales or Brittany, who constructed circular/oval enclosures close to estuaries and navigable rivers. The east of Cornwall then saw the influx of either new people founding settlements or the renaming of old ones with English names whilst in western Cornwall people continued to live as before until the 11th century. This is, of course, an over-simplified narrative of settlement history in Cornwall (for an up-to-date review of settlement see (Rose and Herring, *Forthcoming* 2011).

We must, therefore, turn to the archaeological evidence for settlement to establish if this model can be substantiated and also to gain a better understanding of the social and economic structure of post-Roman and early medieval Cornwall.

3:4 The archaeological evidence for settlement in post-Roman and early medieval Cornwall

3:4:1 The Roman state

Cornwall is thought to have been part of the area termed as Duro-Cornoviorum within the tribal group of the Dumnonii (Pearce, 1978, 2004). The name Duro-Cornoviorum is thought to mean ‘fort of the Cornovii’ and ‘corn’ element meaning ‘horn’ being a reference to the peninsula (Pearce, 2004; Todd, 1987). The extent to which Cornwall was part of Roman Britain has been a subject of great debate (Pearce, 1978, 2004; Quinnell, 1986; Thomas, 1957; Todd, 1987). It clearly *did* form part of Roman Britain, even if the material footprint of the Roman Empire was almost non-existent. Ptolemy’s reference to the ‘Tamaris’, thought to be the river Tamar, on the eastern border of the county, suggests to many an early subdivision of the Dumnonii (Pearce, 1978), and has remained the administrative border until the present day.

3:4:2 Roman forts

Evidence for the Roman military occupation of Cornwall has recently risen to three forts. The fort at Nanstallon at the head of the Camel Estuary had timber buildings which were only occupied from AD 55-60 and possibly AD 70-80, with a *praetorium*, four barracks, workshops and storehouses (Fox and Ravenhill, 1972; Todd, 1987). The recently excavated fort at Calstock, above the Tamar Estuary, dates to the mid-1st century with evidence of metal working and grain drying (Smart, *forthcoming*). Geophysical survey, aerial photography and field-walking have identified another Roman fort at Restormel at the head of the Fowey Estuary, with three possible phases of occupation (Hartgroves and Smith, 2007; Irwen, 1975). The strategic potential of the forts' locations confirms their primary function in Cornwall. The distance between the fort at Restormel and Nanstallon is only eight miles, and both are at the head of estuaries forming a gateway through which east-to-west traffic would have to pass (Fig 3:2). All three forts would also be accessible by water as the estuaries are navigable. This suggests the Roman authorities monitored or attempted to control trade networks. The short occupation of Nanstallon could represent an initial outpost whilst or before the Restormel fort was constructed. The pottery here dates from the mid 1st to early 4th century (Hartgroves and Smith, 2007).

Another possible fort is a less substantial rectangular enclosure excavated at Carvossa in mid Cornwall, dated by coins and Samian pottery to the mid to later 1st century (Douch and Beard, 1970). Despite the unusual form of the enclosure and the lack of internal planning, it is thought to indicate another form of military presence in the region (Todd, 1987).

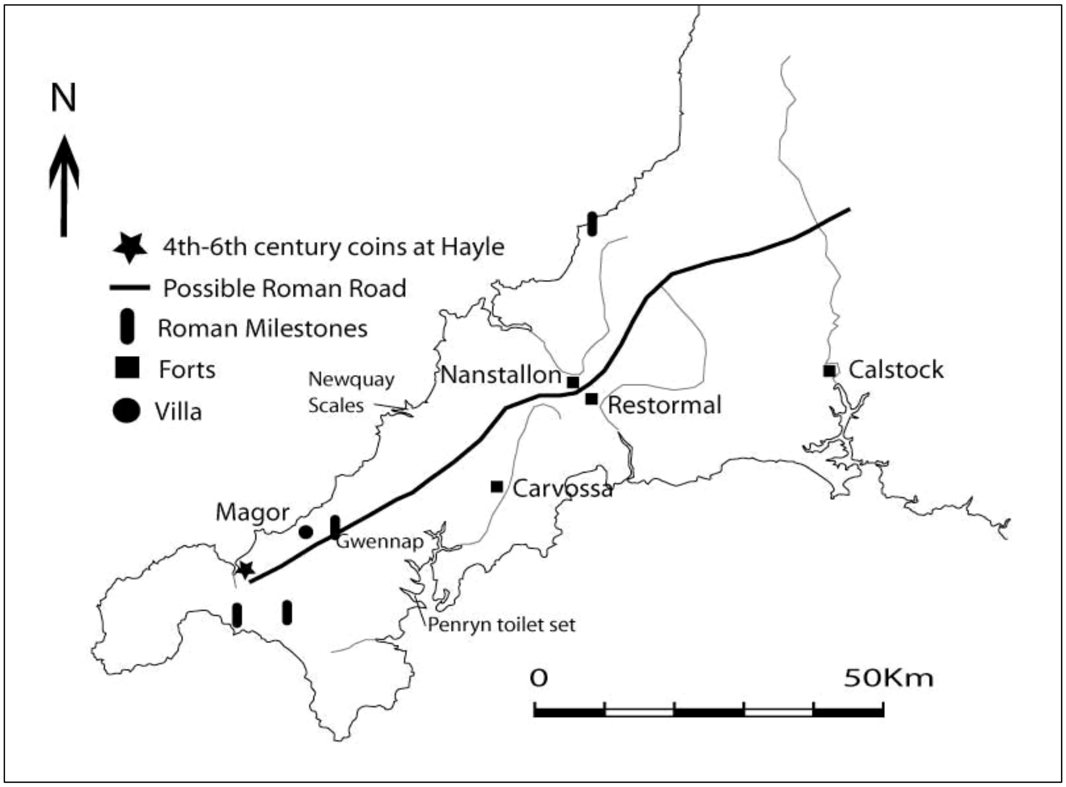


Figure 3:2, Map showing Roman features and finds in Cornwall (Author's Illustration).

3:4:3 Roads and miles stones

There are five Roman milestones dedicated to Roman Emperors of the 3rd and early 4th century (Collingwood and Wright, 1965; Quinnell, 1986, 130), one of which survives *in situ* at Gwennap in mid Cornwall, dedicated to Gordian III (Todd, 1987, 218). Although no roads have been identified, the current route of the A30 along the granite ridge of Cornwall is often considered to have been a possible Roman route way (Fig 3:2) (Pearce, 1978; Todd, 1987).

3:4:4 Romanization in settlement form

The only evidence of 'Romanised' settlement in Cornwall is the single villa at Magor near Camborne in central Cornwall, dating from the 2nd to late 3rd century (O'Neil, 1934). This is the most westerly example of a Romanised structure in England and, in contrast to received opinion, is highly Romanised in form, structure and decoration. The villa had a winged corridor format with thirteen rooms visible in the floor plan, which were altered over four phases of occupation, indicating a long-lived structure (Fig 3:3) (O'Neil, 1934). The villa had tessellated floor surfaces set into cement, *opus signinum* floors and drainage channels, white plastered walls decorated with ornate red floral patterns (O'Neil, 1934). However, apart from the sherds of amphora and 22 Roman coins, the excavated assemblage was somewhat unusual with no Samian ware or mortaria present (O'Neil, 1934, 12). Instead the pottery found was locally-produced and imitated East Dorset BB1 forms (Quinnell, 2004, 125). O’Neil suggested that as “there is not a right angle to be found in its construction” it was built by local craftsmen (1934, 15), although this conveniently overlooks the fact that ‘local’ craftsmen could not have any experience of building such highly Romanised structures.

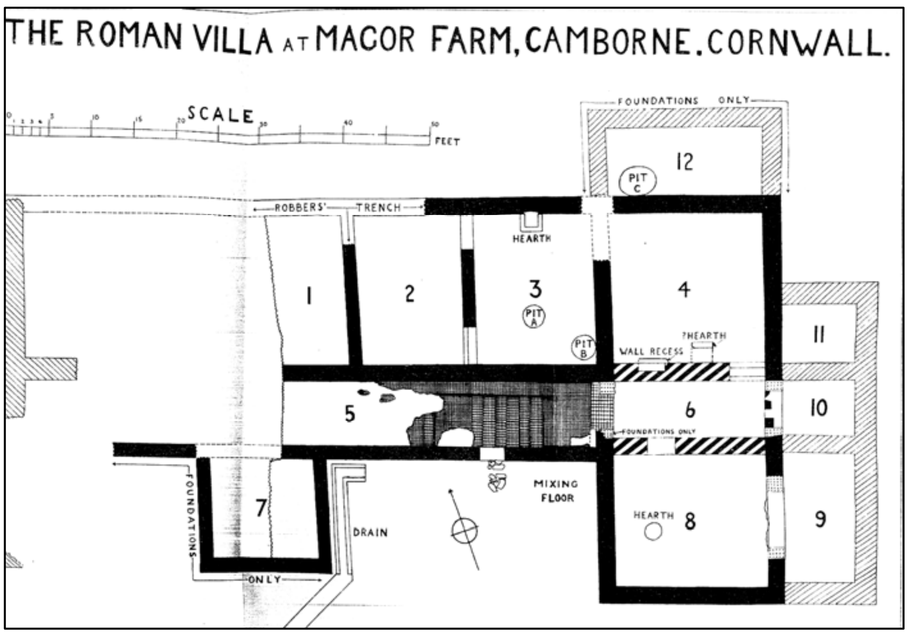


Figure 3:3 Floor plan of Roman Villa at Magor Farm near Camborne (After O'Neil, 1934, plate 3).

The Magor villa is generally considered a poor example of its type, suggested to have been constructed for a local tin merchant who aspired to a Roman lifestyle, or perhaps a retired official, but not a ‘real’ Roman figure (Gerrard, 2000, 22). This single villa does not, therefore, provide much evidence for domestic or rural occupation for ‘Romans’ in the county (Todd, 1987, 222), but may yet demonstrate an interest in the tin extraction, as it is located at the heart of the Cornish mining district (Penhallurick, 1986; Wacher, 1998). The extraction and demand for tin is generally considered the motivation behind trade and Roman involvement of Cornwall (Pearce, 1978; Penhallurick, 1986; Thomas, 1966).

3:4:5 How Roman was Cornwall?

Cornwall is often classified as a region that escaped Romanisation and one that retained a continuous native elite (Pearce, 1978; Todd, 1987; Turner, 2006a), although such an elite would still have been ruled by the Romans. The material culture evidence suggests that the Romano-British population of Cornwall was in contact with the Roman Empire prior and during the occupation of Britain (Pearce, 2004; Preston-Jones and Rose, 1986; Quinnell, 2004). There is, however, no indication of an influence on settlement form or distribution, although it is clear from the regular occurrence of Roman material culture in Cornwall that the native population chose to adopt some elements of Roman practices (Quinnell, 2004). The presence of amphora on native settlements suggests that wine or oil was available (Quinnell, 2004; Thorpe, 2007), and there have also been many Roman coin hoards and occasional pieces of Roman metal work found in the region (Penhallurick, 2010). The presence of material culture such as the bronze toilet set found in Penryn and the collapsible weighing scales from Newquay suggest portable objects played an important function in Romano-British Cornwall (Tyacke *pers. comm*.).

Roman coin finds, recently collated by the Portable Antiquities Scheme, demonstrate that there were actually *more* coins in circulation in Cornwall before and during the Conquest than is the national average for Britain. By the mid 2nd century circulation stops and the region diverges from the national trend. Moorhead believes that Cornwall was not part of the monetary economy of Britannia from this period onwards and that coins found represent losses made by paid officials resident in Cornwall, officials who were responsible for collecting taxes in the form of minerals that were then exported by sea directly to the Rhine and later the eastern Mediterranean (Moorhead *pers. comm*.). He suggests that Roman contact was by sea and not overland through Devon (Moorhead *pers. comm*.). The unusually high frequency of 4th -6th century eastern Empire coins around the Hayle estuary perhaps provides significant support for this argument (Moorhead *pers. comm*.).

The Roman presence, as expressed though its material culture, is not as apparent as it is on the native settlements of Devon, which in relative terms had many more forts and villas. Yet the Romanisation of Devon is clearly partial and differs again from that observed to the east, and this must indicate differing expressions of Romanisation or access to material culture. Therefore the archaeological evidence for the effect of the Roman Empire on Cornwall (and Devon) clearly indicates a relationship that is yet to be defined.

In conclusion, and when compared to the rest of the South West, the evidence for a Roman presence in the county, whether that be military or civilian, is limited and does not indicate a comparable level of integration. The absence of urban centres strongly suggests that if material resources were being extracted from Cornwall they were being transported to urban sites elsewhere, possibly Exeter (Isca Dumnoniorum). The presence of forts in strategic locations clearly suggests that movement in and out of the county overland was being monitored or controlled (Hartgroves and Smith, 2007).

3:4:6 Native settlement: Courtyard houses

Around 60 courtyard houses, a form of settlement unique to the West Penwith area of Cornwall, are known to have been occupied from the 2nd century BC to the 4th century AD, with some occupied into the 6th century AD (Quinnell, 1986, 120; Todd, 1987). These oval houses were multi-roomed and centred around an open courtyard and included under-floor drainage and cobbled surfaces in the single substantial entranceway (Fig 3:4) (Weatherhill, 1982, 10). It has been suggested that the format and social function of these structures is similar to the layout of early atrium houses of the late first millennium BC in Italy (Cripps, 2007, 151). At Chysauster the eight courtyard houses were aligned along a possible street (Hencken, 1933; Weatherhill, 1982), argued to offer the closest Cornish example to an ‘urban’ settlement form prior to the 11th century (Preston-Jones and Rose, 2003, 63). Interestingly, their abandonment in the 4th-5th century broadly coincides with the abandonment of rounds (Preston-Jones and Rose, 2003, 66).

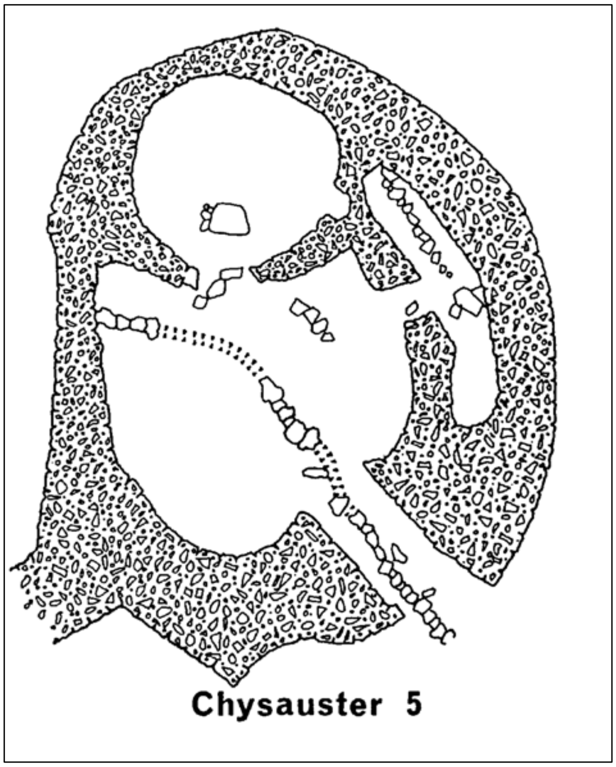


Figure 3:4. Typical example of a courtyard house, House 5 at Chysauster (After Quinnell, 1986, Fig 3).

3:4:7 Native settlement: Rounds

The most prominent native settlement form, and the one that has come to define settlement in Cornwall from the mid 2nd-6th century, is the 'round'. The 'round' is a small univalate or revetted stone enclosure, roughly oval or circular in shape, situated on a spur or prominent hill-slope, with a singular entrance on the downslope side (Gossip and Jones, 2007, 40). They typically enclose around a hectare and are thought to represent the home of a single family group (Quinnell, 2004, 211). Based on archaeological survey and aerial photography, around 2500 enclosures have been identified as possible rounds (Fig 3:5) (Preston-Jones and Rose, 2003, 57; Young, 2001).

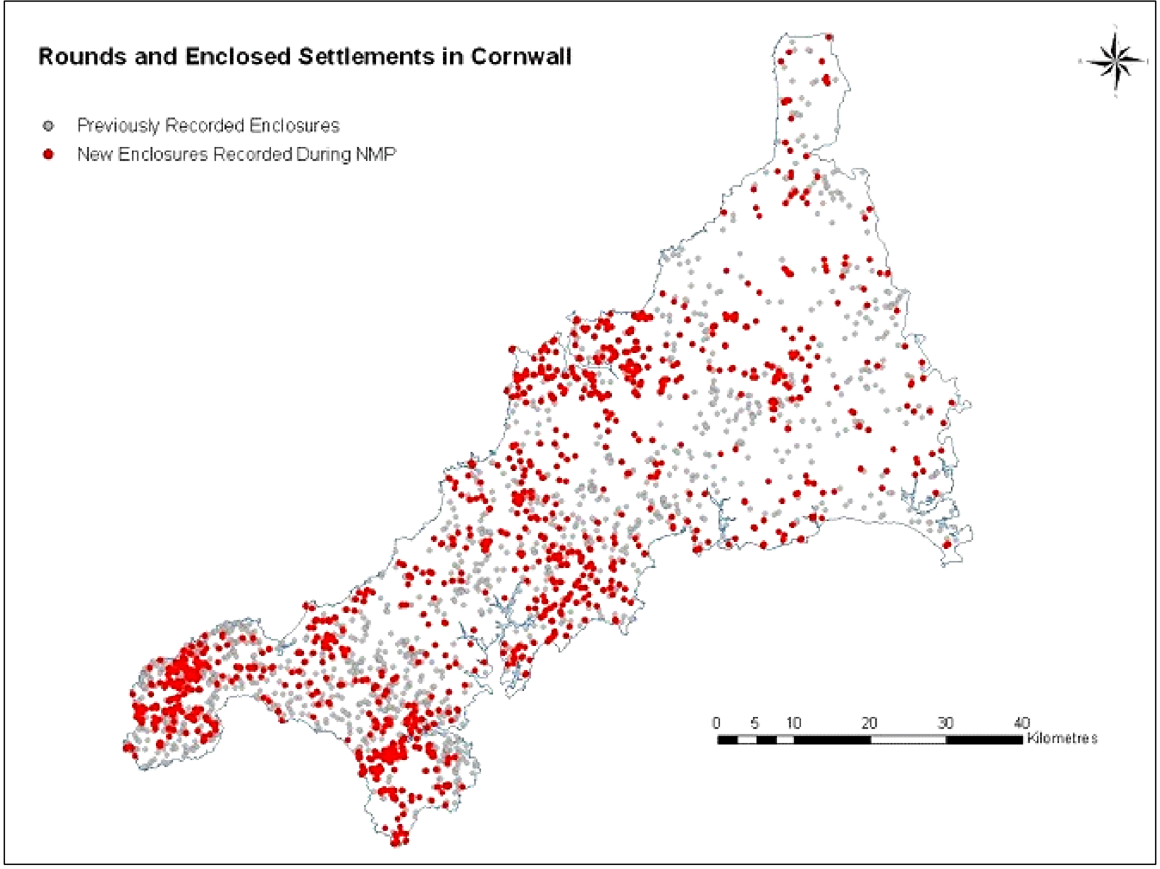


Figure 3:5. Distribution map of circular enclosures thought to be rounds, NMP refers to National Mapping Program (H.E.S., 2010).

These are generally dispersed over the landscape with one round per 3km², although, in some areas such as West Penwith, there is one every 2km² (Quinnell, 2004, 211). They are often associated with contemporary field systems as at Tremough and possibly Pollamounter (Fig 3:6) (Gossip and Jones, 2007; Jones and Taylor, 2004). The dating of these settlements is based on around 22 excavated examples, of which Trethurgy is the only fully excavated site (Quinnell, 2004). Some date from the 1st-century, such as Threemilestone Round (Schwieso, 1976), although the majority appear to have been built in the 2nd century (Gossip and Jones, 2007, 44). The evidence from Trethurgy suggests the occupants grew cereals and kept livestock as well as producing and working copper alloy, tin and iron objects (Quinnell, 2004). Metalworking evidence was also found at Little Quoit round (Lawson-Jones, 2003) and Killigrew round (Fig 3:6) (Cole and Nowakowski, 2008).

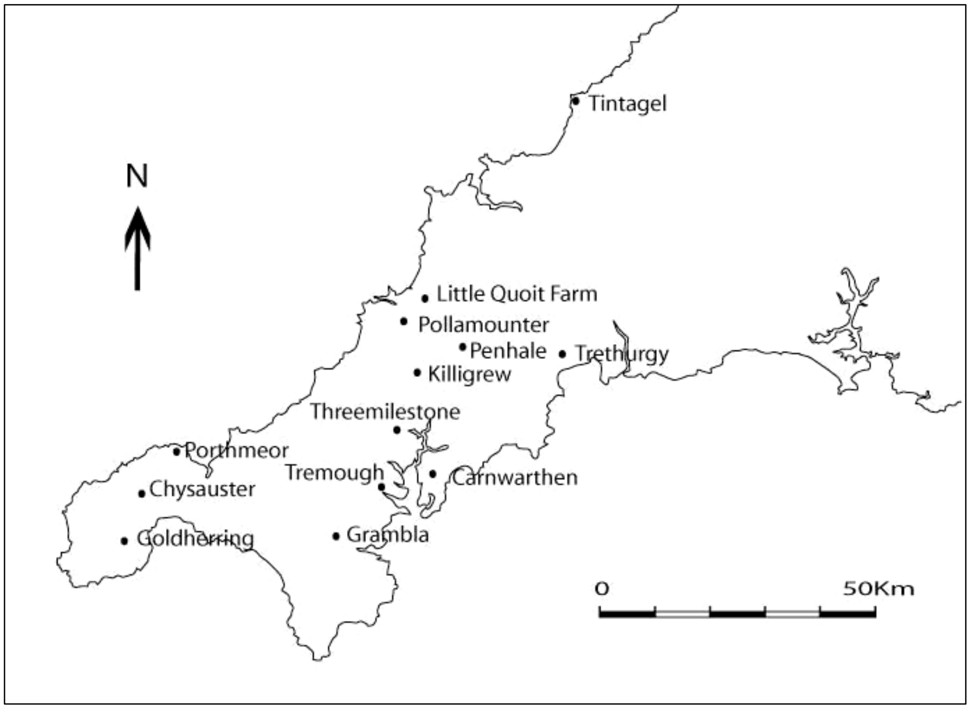


Figure 3:6. Location map for Native settlement sites (Author's Illustration).

The rationale behind the need to enclose settlements in the 2nd century AD is unclear. Quinnell suggests they "enforce prestige, status and social control in a period of enhanced stability within Britannia" (Quinnell, 2004, 114). The artefactual assemblages from these sites suggest a similar level of status with equal access to imported goods and regional materials, such as gabbroic clay. Contrary to this it has also been suggested that they represent a desire for security, reflecting the wealth of the occupants (Cripps, 2007; Johnson and Rose, 1982). Hingley has suggested that the enclosure of Late Iron Age households may represent socially independent productive units that were linked through kinship and exchange on a horizontal social level (1999). Another interpretation is that they may reflect the changing social unity of the occupants (Preston-Jones and Rose, 2003, 62). Herring has suggested that rounds represent a mid point on the Cornish social hierarchy, with unenclosed settlements paying tribute to rounds and rounds paying tribute to hillforts (2006, 71) and possibly sites like Tintagel (Quinnell, 2004). Their relationship to contemporary hillforts is unknown. The initial assumption that they represent elite residences is no longer popular, and functions as possible meeting places are favoured (H.E.S., 2010).

In summary, the consensus seems to be that rounds were independent self-sufficient farmsteads occupied by family groups operating within a horizontal level of society linked through kinship networks, the evidence of which can be seen in the equal access to imported goods and gabbroic clays for pottery, those onsite production represents the maintenance of Prehistoric traditions.

3:4:8 Native settlement: unenclosed

The prevalence and proliferation of rounds cannot be taken to imply that all settlement in the Cornish landscape was enclosed. The excavation of a Late Iron Age settlement near Threemilestone Truro (Fig 3:6) revealed twelve unenclosed house clusters, and within each cluster two or three structures were found laid out in an arrangement similar to that found in rounds (Gossip, 2005, 2006). The significance of this settlement is that it was occupied at the same time as the nearby round at Threemilestone, and there are several other rounds in that area (Gossip, 2005). This dramatically changes the previous conception of settlement hierarchies, demonstrating the existence of a more diverse social structure, and one perhaps in line with Herrings *tre-lan* model (Herring, 2006). If unenclosed settlements occupy the same landscape as rounds, this suggests a whole new dimension to settlement patterns and system of proto-estates.

3:4:9 Native elite settlement?

These settlement forms became firmly established in the Romano-British period and remained in use until their post-Roman abandonment, but where does a supposedly ‘elite’ settlement like Tintagel fit into this pattern? Occupation at Tintagel is contemporary with the later phases of rounds and courtyard houses but continues into the post-Roman period. The 70 or so rectangular buildings identified through survey on Tintagel Island makes it perhaps the most known yet least understood site in Cornwall (Barrowmen *et al.*, 2007;

Radford, 1939; Thomas, 1986, 1993). The site has also produced substantial amounts of imported pottery dating from the 5th to 7th centuries (Thorpe, 2007). The most recent excavations produced radiocarbon dates suggesting three phases, initially the Romano-British between 395-460 cal AD, followed by the second phase that incorporates the imported pottery from 415-535 cal AD and the last phase dating to between 560-670 cal AD (Barrowmen *et al.*, 2007, 53). The many years of excavation have provided interpretations ranging from a monastic site, the home of Kings of Dumnonia and an international trading emporium (Barrowmen *et al.*, 2007).

The site is well known for its links with the Mediterranean, south-west France and southern Spain in the post-Roman period (Campbell, 2007) (see discussion in Chapter 4). Thomas has compared it with the 7th century Scottish site of Dunadd (Nieke and Duncan, 1988), saying that sites such as Tintagel "should be envisaged, not as normal ports of trade, but as socially and economically specialised inlets" (Thomas, 1988a, 11). There are similarities with the west coast of Scotland: Dunadd and Dunollie were 6th century hillforts with evidence of imports and textual references suggesting royal connections (Alcock, 1992, 211). A similar pattern is seen at Dumbarton at the entrance of the Clyde and Whithorn on the Solway estuary, and both have imported goods and royal connections (Alcock, 1992, 211). Similarly, Cadbury Congresbury, Glastonbury Tor and South Cadbury hillfort are served by the Severn estuary (Alcock, 1992, 211).

However, little is known of the relationship between Tintagel and the general population of Cornwall. It is generally assumed it was a high status centre presiding over lesser settlements, but the imported pottery which defines this status is also found on rounds, courtyard houses and unenclosed settlements of the period, suggesting they also had access to exotic goods. Tintagel has never produced any native pottery (Thorpe, 2007), despite the abundance of native pottery on all other settlements of the period, and it would seem that only exotic ceramics were used at this site. Tintagel is not referred to in any historical texts concerning the Cornish elite such as the Kings of Cornubia or Dumnonii or ecclesiastical figures that frequently travelled along the north coast between Ireland and Wales. There are no inscribed stones that refer to individuals belonging there or a concentration of these stones at Tintagel. As Preston-Jones and Rose (1986, 172) point out, it barely receives a mention in Domesday Book, and only appears as a castle in the mid 12th century. Thomas suggests that the 5th-7th century occupation was intermittent, perhaps only for special or ceremonial occasions, as the material remains found appear to indicate permanent occupation (1988b, 429). Susan Pearce has expanded this suggesting it had a "official or quasi-official background" (2004, 231), being a summer meeting place where the local ruler could meet lesser men and transact business to reify his status (2004).

The existence of a settlement hierarchy in the post-Roman period implies a comparable social hierarchy, but some disagree, suggesting that the society was relatively 'horizontal' with no dominant central authority (Harvey, 1997). There seems to be a great urgency in the literature to establish whether society was complex or horizontal, and which came first and when. The ramifications of a complex social structure in the Roman or medieval societies, is thought to infer retrospective social implications for the Iron Age period (Quinnell, 1986; Turner, 2006a, 10). The role and function of Tintagel continues to be a problem, the most logical conclusion being that elite figures did patronise the site and that there must therefore be an elite presence in the region. Yet this singular site cannot be considered representative, and thus by extension its utility for exploring the social structure of post-Roman and early medieval Cornwall is limited.

3:4:10 Settlement shift in the 7th century

The archaeological evidence suggests that rounds and courtyard houses were abandoned around the 4th-5th century (e.g. Penhale, Carnwarthen, Porthmeor, Goldherring, Little Quoit farm) (Fig 3:6) (Guthrie, 1969; Hirst, 1937; Lawson-Jones, 2003; Nowakowski, 1998; Opie, 1939), although some were occupied into the 6th and 7th centuries (e.g. Trethurgy and Grambla) (Jones and Taylor, 2004, 115), which would coincide with the abandonment of Tintagel (Barrowmen *et al.,* 2007). The reason for this abandonment is unknown, and is usually taken to coincide with the foundation of the extant medieval settlement pattern represented by the *tre* place-name element as discussed above (Preston-Jones and Rose, 1986; Turner, 2006a). Some were later reoccupied as chapel sites (e.g. St Kew and St Buryan (Preston-Jones and Rose, 1986, 154), suggesting their significance continued to be appreciated into the early medieval period.

The 7th century appears to be a pivotal point in the transition from Roman to medieval Britain, perhaps representing the true end of the political and cultural influence of Roman Britain (Dark, 1994, 256). Some suggest a more structuralist or deterministic reason, proposing that global climatic changes around AD 530 or a plague in *c*. AD 565 led to a prolonged period of decline, with recovery only from the 7th century (Gunn, 2000; Pearce, 2004). But it is generally accepted that the 7th century marks the point of recovery from the events of the later 4th century in Britain and the beginning of a new economy and social structure that laid the foundations for the medieval era (Dark, 1994; Hodges, 1982).

The hypothesised shift from rounds to *tre* settlements in the 7th-8th century mirrors changes in settlement patterns as observed elsewhere in Britain, indicating that events in Cornwall were in some way connected to more general phenomena. The motivation behind the displacement of peoples in the landscape is ultimately unknown and it would be deterministic to assume a single cause. Most theories suggest the migration of peoples was ultimately responsible, either the incoming Anglo-Saxons or Irish, or the outgoing Britons to Brittany in the late 5th century (Payton, 2004; Todd, 1987, 238). Breton literary sources from the 6th-7th century state that Frankish King Louis the Pious wanted the non-tax paying British refugees to return to their homes, and there are some other literary references to migration, such as the comments of Procopius and Gildas, but very little archaeological evidence has ever been found (Giot *et al.*, 2003, 63).

It has been suggested that the abandonment of rounds, the relocation to *tre* settlements, the formation of markets and the establishment of some system of landholding could be attributed to the adoption of Christianity from the 5th-6th century onwards (Preston-Jones and Rose, 1986). Despite the lack of absolute archaeological dates for the foundation of the Christianity in Cornwall, this is usually cited as the causal factor in social change in post-Roman Cornwall.

The influence of climatic change in relation to landscape usage may yet be of relevance (Bulchin, 1983, 66), and farming systems may have developed a more pastoral emphasis (Herring, 1996). The survey of Bodmin Moor found numerous transhumance sites in the upland areas and place-names in the lowlands such as *hendre* inferring winter occupation (1996). Seasonality seems to have become a concern in the early medieval period, and the site of Stencoose has recently provided evidence for a possible transhumance shelter dated to AD 880-1220 (Fig 3:7) (Jones, 2000-1, 89). The earlier, permanently occupied, post-Roman site at Stencoose was dated to AD 434-762; it then seems to have been abandoned and later only saw seasonal use (Jones, 2000-1, 86). The evidence for a largely pastoral post-Roman landscape can be glimpsed in the pollen records of neighbouring Devon, which appear to show continuity between the 4th-6th centuries, with a shift to cereals in around the 7th-8th centuries (Rippon, 2010, 59). This strongly suggests a change in landscape usage in 7th century Devon (Rippon, 2009, 2010), but unfortunately such palaeoenvironmental evidence does not exist for Cornwall for comparison.

Preston-Jones and Rose propose that, considering the evidence from both landscape usage and settlements, a retreat from the uplands does appear to have taken place during the 5th-6th centuries, with those areas re-colonised in the later medieval period (see below) (1986, 148).

3:4:11 Native settlement forms from the 7th to 9th century

The archaeological evidence for settlement in this phase is extremely limited, making it difficult to surmise what form it may have taken and its distribution. Typically, the *tre* place-name element is substituted for this absence, although no *tre* sites have been excavated to establish their date range, as they often underlie current settlements. The evidence suggests either a decrease in settlement density compared to the Romano-British period, or that such sites are less visible in the landscape (Jones, 2000-1, 86). The near invisibility of settlement could be due to the ephemeral nature of structures in Cornwall. The excavated evidence from Gwithian (Thomas, 1958a), Tintagel (Thomas, 1993), Carngoon Bank (Mc.Avoy et al., 1980), Duckpool (Ratcliffe, 1995) and Gunwalloe (Jope and Threfall, 1947) (Fig 3:7) suggests houses were low, turf-walled structures with stone footings and/or revetted walls, perhaps also seen at Bantham in Devon (Silvester, 1981).

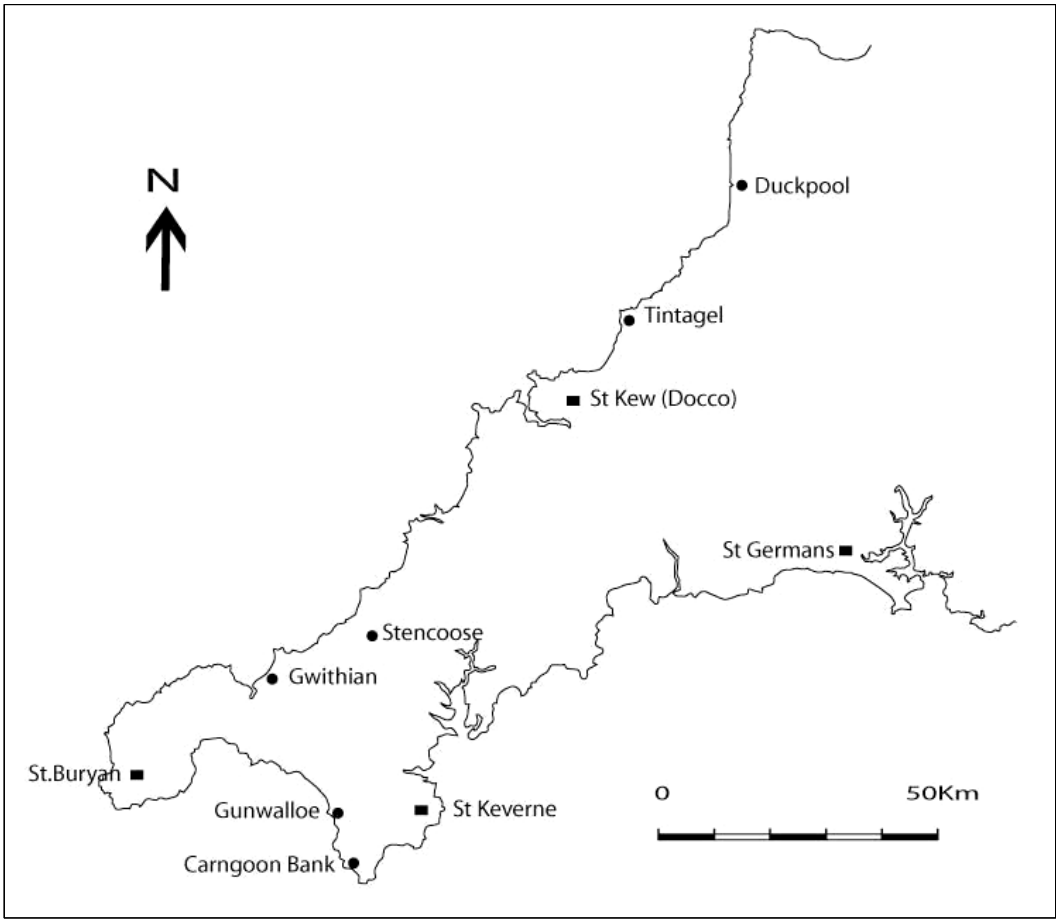


Figure 3:7. Map of 7th -9th century settlements and early ecclesiastical sites (Author's Illustration)

3:4:12 Sunken houses in the sand

The only dated, excavated early medieval structures are at Gwithian (7th-9th century) and Gunwalloe (8th-10th century) (Nowakowski *et al.*, 2007; Wood, 2010b). These two sites, and the distribution of Bar-lug and Grass-marked pottery associated with these settlements, suggests a preference for coastal locations (see Chapter 4) (Hutchinson, 1979). Gwithian and Gunwalloe are both built on sandy dunes and consist of sunken-floored buildings with ephemeral stone foundations for what are assumed to be turf walls (Figs 3:8 and 3:9) (Nowakowski *et al.*, 2007).

The settlement at Gwithian is thought to have been industrial rather than domestic in function; the houses are ovoid in shape with sunken floors and there were also sunken rectangular buildings with stone and turf-revetted walls (Fig 3:8) (Nowakowski *et al.*, 2007, 42). It is not known if the settlement was enclosed, but the orientation of houses indicates no uniform arrangement (Sturgess, 2007).

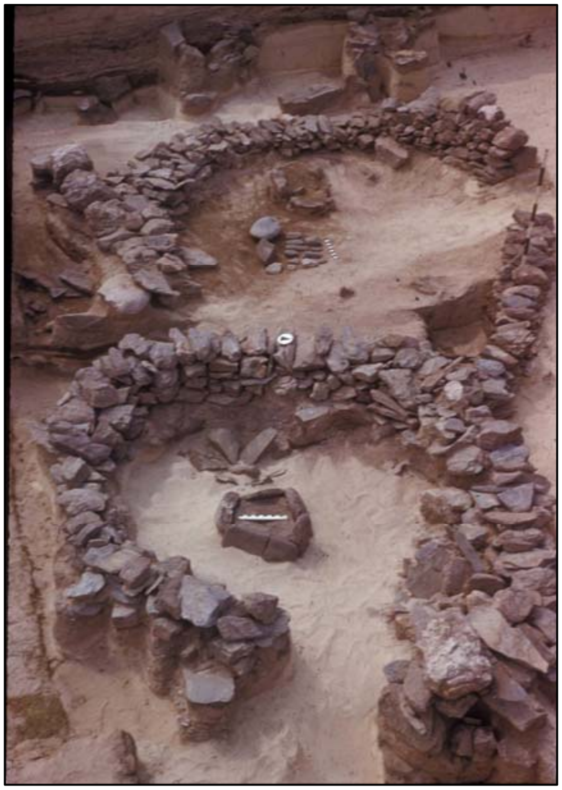


Figure 3:8. Left, excavated structures at Gwithian reconstruction of the walls (After Nowakowski et al., 2007, Colour plate 12).
Figure 3:9. Right, Sunken structure at Gunwalloe with revetted clay bonded stone walls with internal clay render and central circular hearth (Author's Photo).

The sunken structure at Gunwalloe had been constructed in a rectangular cut hollow within which revetted clay bonded stone walls, one with a decorative herring bone design were constructed using midden material to support the exterior of the walls. The walls were rendered with clay on the interior and had a floor made of compacted sand, probably through use, and a circular central hearth (Fig 3:9) (see Chapter 5) (Wood *forthcoming*). The excavated evidence suggests that there were many phases and overlapping occupation areas (Wood *forthcoming*). Based on geophysical survey and earlier investigations, the settlement is estimated to have occupied a stretch of coastline *c*.370m long by around 100m wide, making it the largest post-Roman settlement in Cornwall (Wood, 2010b). The middens from these sites provide evidence for a community involved in agricultural and pastoral subsistence but who also farmed the sea. The amount of pottery and occasional metalwork suggests the existence of a skilled craft base.

There is very little evidence for inland sites. The only dated example is Stencoose AD 434-762, thought to have been a boat-shaped turf house with a hearth (Jones, 2000-1), but this site has not produced any diagnostic Grass-marked or Bar-lug pottery and would not have been identified as post-Roman were it not for the radiocarbon date (Jones, 2000-1). There have been several other post-Roman radiocarbon dates from Cornwall, suggesting that more settlement types have yet to be identified (Nowakowski *pers. comm.*). Despite this, Cornwall is unique in the South West in that it has excavated rural settlements of the period, providing an invaluable insight into contemporary society.

3:4:13 Native elite settlement

The annexation of Cornwall by the Anglo-Saxon Kingdom of Wessex in the 9th century has left no visible archaeological impact. In AD 936 Athelstan fixed the east bank of the river Tamar as the boundary between Anglo-Saxon Wessex and peoples of Cornwall (Stenton, 1943, 341). The charters and grants that exist are relatively late in date, but do give us some insight into the foundation of some of the monastic houses such as St Germans (AD 931) in the east and St Buryan and St Kew (also called Docco) to the west (Fig 3:7) (Orme, 2007, 10). None of these sites have been subject to archaeological investigation, and the early evidence would doubtless lie concealed beneath the later remains (Shepard, 1976).

Alfred the Great’s will of AD 881 states that he held royal estates in Cornwall, perhaps represented by the *tun* place-name elements (Padel, 2007, 223). In addition, 10th and 11th century charters record grants of land to laymen and the church in Cornwall, such as the church at St Buryan and estates in St Keverne (Hooke, 1994; Ravenhill, 1999, 99). Domesday Book records the presence of pre-Conquest manors with large estates (Pearce, 1978), so we may assume the presence of a land-owning elite in the 10th century. It is difficult to establish or indeed define what system or form of land-holding existed in

Cornwall at this time, whether it was by kin group, tribe or individuals and on what scale this was expressed in terms of farms, manors or areas. These questions fall beyond the scope of this study.

The literature on early medieval Cornwall has focused on working backwards from post-Conquest records. The division of Cornwall into six administrative Hundreds is suggested to have happened earlier under the Kings of Dumnonia (Thomas, 1964b). The Hundreds of Penwith, Kerrier, Pydar, Powder, Trigg and West/East Wivelshire cut the county into almost equal parts (Padel, 1985; Thomas, 1964, 73), and the boundaries and names of these areas can still be seen in modern administrative divisions and ecclesiastical documents. The location of the elite centres assumed to have controlled these lands remains unknown, although the place-name element *lys,* 'court', such as Helston or Liskeard, is thought to indicate such sites (Padel, 1985).

3:4:14 Native settlement forms in post-Conquest 10th -11th century

The archaeological evidence for settlement in this period is far more substantial, but there are relatively few excavated examples. Such sites are assumed to lie beneath most current villages and towns, and the lack of urban archaeological excavation has not aided the overall view (Fig 3:10) (Preston-Jones and Rose, 1986, 162; Shepard, 1976). Again, it is the documentary evidence that is generally used to establish their quantity and distribution across the region. All of the excavated examples are to be found in rural upland locations and were subsequently deserted (Johnson and Rose, 1993).

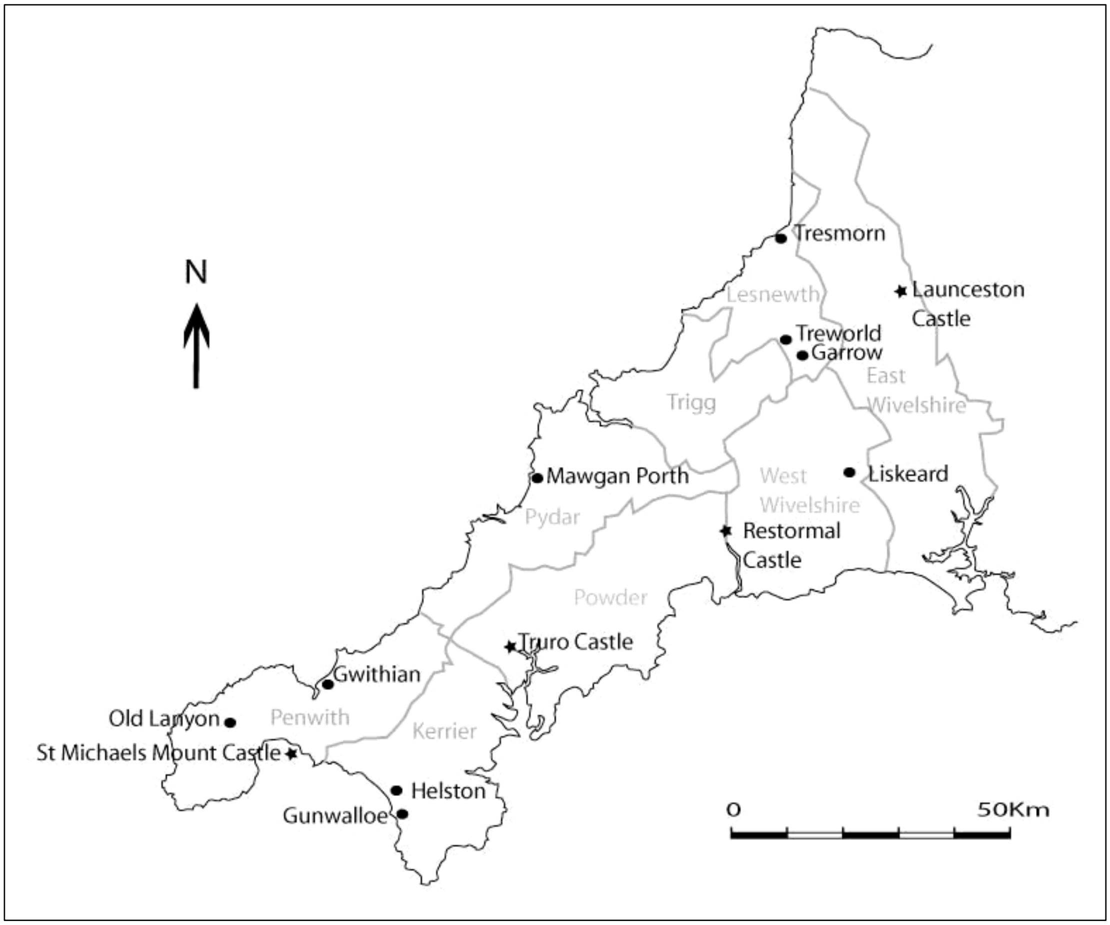


Figure 3:10. Map of Cornwall with Hundreds of Penwith, Kerrier, Powder, Pydar, Trigg, West Wivelshire, East Wivelshire and Lesnewth indicated in grey and post-Conquest sites (Author's Illustration).

The evidence from Garrow and Treworld on Bodmin Moor indicates they were occupied from the 10th century (Fig 3:10) (Dudley and Minter, 1964, 1966), Old Lanyon Farm in West Penwith from the 8th to14th-15th century (Beresford, 1994; Minter, 1965), and Tresmorn on the north coast from the 10th-14th century (Beresford, 1971, 57). These sites belong to the *tre* phase of settlement, but as they were excavated in the 1950s or early 1960s, some doubt may be cast on the excavation practices employed, and they all lack radiocarbon dates. Domesday Book could perhaps shed more light on this period, but it is neither as comprehensive or reliable as one might wish (Turner, 2006a, 80).

Mawgan-Porth on the north coast of Cornwall is the most extensively excavated site dating to between the 10th-11th century (Fig 3:10) (Bruce-Mitford, 1997). It consisted of three rectangular stone walled houses with outbuildings and a cemetery dating from AD 990-995 (Bruce-Mitford, 1997, 87), representing a typical later medieval longhouse with ancillary buildings (Preston-Jones and Rose, 2003, 53). It is thought to have been abandoned in the 11th century due to the encroachment of the sand dunes (Bruce-Mitford, 1997, 88). This may have its early equivalent in settlements like Gwithian and Gunwalloe. It should be made clear that the 'settlements' (above) represent excavated structures, and not entire settlement sites.

The only other domestic structures in Cornwall for the 11th century are the eight 'sunken-floored buildings' representing the first phase of occupation at Launceston Castle (Saunders, 2006, 90). The roughly rectangular sunken hollows had hearths and contained Bar-lug and Chert-tempered pottery, dating these features to around the 11th century (see Chapter 4 for pottery dating) (Saunders, 2006, 98). It has been suggested that they are broadly comparable with the Sunken Featured Buildings (SFBs) typically associated with Anglo-Saxon settlements in eastern England (Saunders, 2006), but if so, they are only comparable with the disparate group of late Saxon examples only found in urban contexts and having no clear relationship with the earlier *Grubenhaüser* (Tipper, 2004, 13-14) These early sunken-floored buildings were replaced by rectangular post built halls in the late 11th century (Saunders, 2006, 99).

The houses containing Bar-lug pottery are thought to be slightly earlier and than those with Chert-tempered pottery (Saunders, 2006, 99), but the use of pottery to establish this is dubious. The singular presence of Bar-lug pottery in one of the buildings could equally represent a community with differing traditions, as seen in the Hiberno-Norse settlement in 11th century Waterford in southern Ireland (as discussed in Chapter 4 (Wood, 2010a).

3:4:15 Native elite settlement

The plantation of castles and villages in England often related to existing settlements and centres of power (Creighton, 2002, 176), but in those areas like Cornwall, where pre-Conquest lordly control of the landscape is not apparent, the impact of the Norman Conquest was visibly different (Preston-Jones and Rose, 1986). A review of the Cornwall

H.E.R. lists many instances of documentary evidence for what have been classified as timber castles and fortified manor houses of possible Norman date; but only Launceston Castle (#2753), Restormal Castle (#6730), St Michaels Mount Castle (#29222) and Truro Castle (#25246) are classified as 11^{th} century castles (Cornwall H.E.R.) (Fig 3:10). The survival of only a single Norman castle in Cornwall at Launceston perhaps supports their scarcity (Saunders, 2006). Beresford has stated that “in no other English county was the creation of a new centre so natural a solution” (1968, 402). The planted urban settlements in Cornwall were often the only nucleated centres in their area. Unlike counties where the manor, church and farmsteads had a clear hierarchy and delimitated space in relation to one another, in Cornwall the church, manor and nucleated settlements all occupied different locations with no obvious foci or hierarchy (Beresford, 1968, 400). The only prior hubs of revenue were the ecclesiastical houses, which prompted the Norman impetus to remove markets from ecclesiastical control such as at Launceston, St Germans (Beresford, 1968) and possibly at St Keverne (to Winnianton) to extract an income.

Little work has been done to challenge Beresford’s early conclusions, but it does seem clear that the 11^{th}-century plantations and Norman markets established in Cornwall represent a significant break with the past, and indicate the situation in Cornwall prior to the Conquest was quite different to that in the rest of England, which already possessed a network of urban or proto-urban centres.

The nature of administration and settlement in Cornwall prior to Domesday Book is poorly understood. In 981 the Earl Ordulf, the uncle of King Ethelred, owned a substantial amount of land in the South West and held the ‘Castle Moresk’ near Truro (Pearce, 2004). It is thought to have been a timber or stone castle which a 15^{th} century document mentions was destroyed in 1104, with ‘old walls’ that survived into the 17^{th} century (Cornwall H.E.R. #22676.10). It is assumed that the post-Roman Dumnonian Hundreds still existed after the Norman Conquest (Preston-Jones and Rose, 1986). The Hundreds of Penwith and Winianton/Kerrier were held by the King, whilst Pydar and Powder were given by the King to Robert the Count of Mortain (Pearce, 2004, 254-255). In 1086, 277 out of the 350 manors recorded in Domesday were owned by Robert the Count of Mortain, who had an important lordship centre at Launceston castle (Preston-Jones and Rose, 1986). It is thought that the royal administrative centres for the Kings' Hundreds were at the manors of Winnianton (Kerrier) and Connerton (Penwith) (Pearce, 2004, 255).

3:4:16 Ecclesiastical landholders

Some of the manors listed in Domesday can be proven to have earlier origins, and it has been suggested that, on the basis of Alfred's will in AD *c*.881 and land Saxon grants in the later 10th century, there were substantial Cornish landholdings that may have been taken over from ecclesiastical landholders (Pearce, 2004, 253). Ravenhill suggests that a framework of pastoral care by individual priests, loosely tied to monastic houses, may have existed (1985, 57), and that the Cornish saints' lives may have been used to secure their jurisdiction and more importantly their landholding claims under the new Norman rule and the Anglo-Norman Bishops (Harvey, 2000).

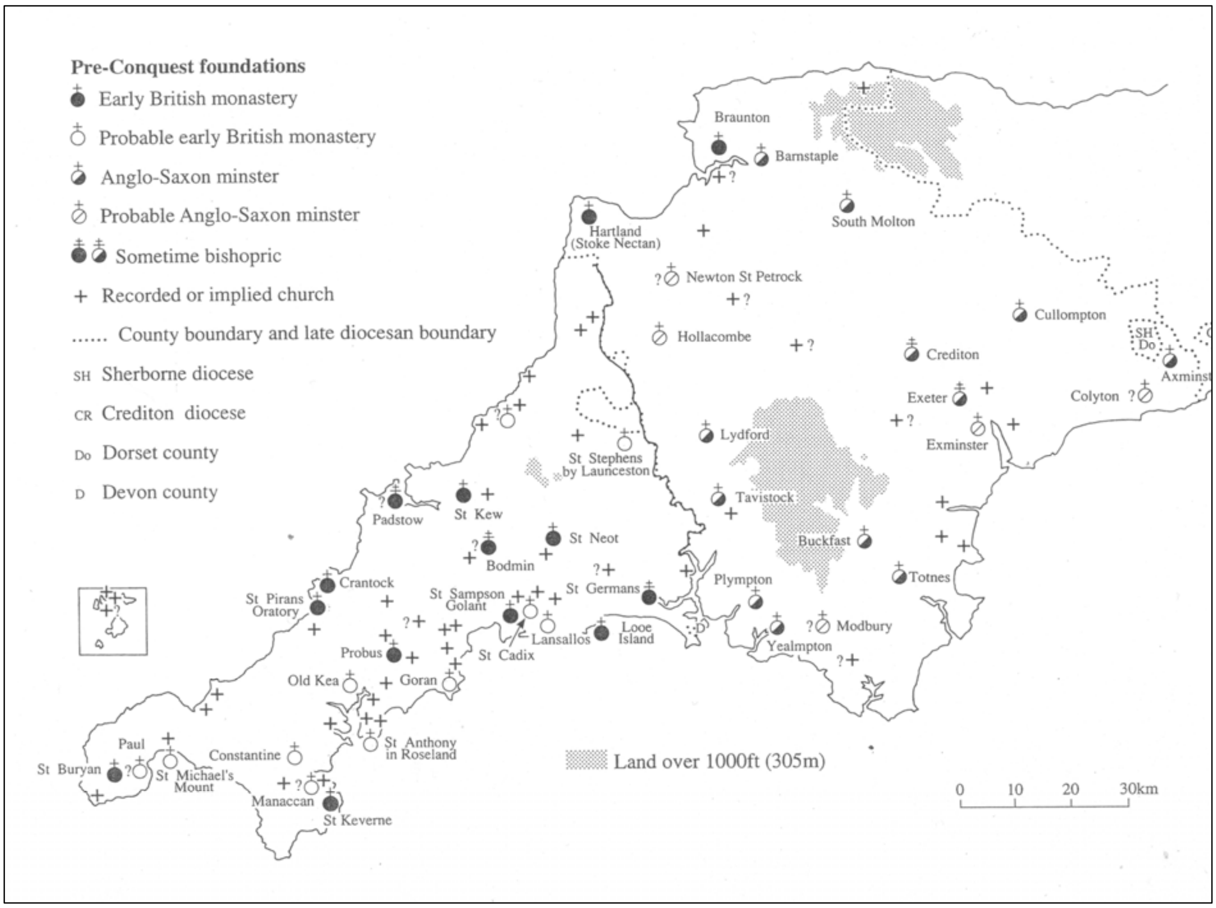


Figure 3:11. Map showing pre-Conquest ecclesiastical sites (After Hooke, 1999, Map 14.1).

Harvey suggests “they [Saints’ lives] represent how medieval societies came to terms with the institutional developments that were occurring around them, reflecting the dialogue between the political manoeuvrings of an ecclesiastical elite, and an existing communal ethos” (2000, 208). Herring suggests that monasticism “underpinned not just change in ritual and belief, but also affected more fundamentally the ways that people related to each other and to authority, including the ways in which land was owned, held and organised” (2006, 73). Pearce uses the example of Winnianton to demonstrate this, noting that its location, eight miles from the monastic landholding of St Keverne, was not a coincidence (Fig 3:11) (2004, 255).

It has been well established that the survival of early post-Roman monastic houses relied on efficient agriculture and land management (Faith, 1997, 16). Olsen proposes that St Keverne was the location of the collegiate Church of Lannachebran, also mentioned in Domesday Book as a manor, and thus Winnianton could have usurped a large ecclesiastical estate (1980). Turner supports this, suggesting that, based on settlement patterns and fieldsystems, the medieval landscape of Cornwall was formed between the 7th and 9th centuries (2006a, 7). The manor of Winnianton includes the place-name elements of *tun*, an Old English suffix, with *winia* referring to the Breton St Winwaloe (Orme, 2007; Padel, 1988). Pearce suggests that the manor served as a royal administrative centre to collect dues (2004, 255). The nature, formation and form of ecclesiastical estates on the Lizard Peninsula is discussed in more detail in Chapter 5:4.

3:4:17 Beginning of towns?

The post-Conquest apportionment of land to a new social elite, composed of the church, aristocracy and earls, gave for the first time gives a complete overview of landownership (Todd, 1987). At the same time it shows that many of the early towns were planted settlements starting in the 11th century or later, with no preceding occupation, confirming that settlement in Cornwall was essentially rural for the whole of the post-Roman period (Preston-Jones and Rose, 2003). Beresford has commented that due to the absence of Anglo-Saxon towns in Cornwall the Norman planted towns were very successful saying “when population pressure increased, and with more fields came more market opportunities, and with more markets came more towns” (1968, 402). The movement from markets to towns seems to have been the first step towards urbanisation of the region.

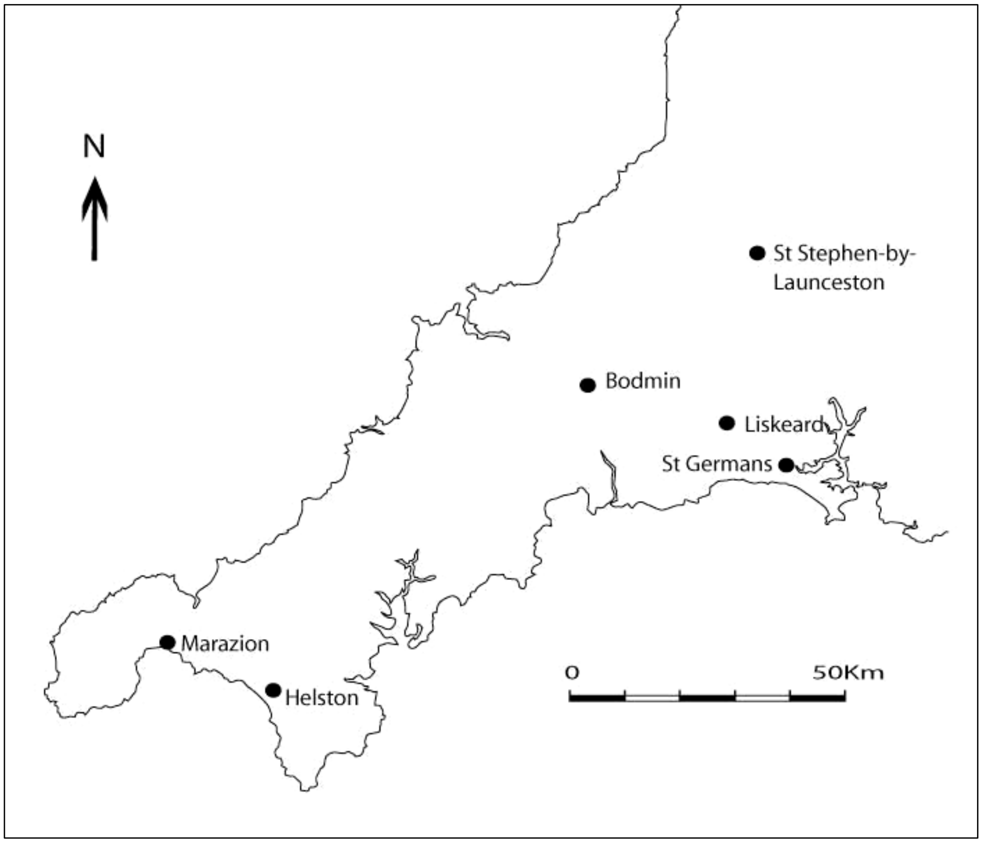


Figure 3:12. Early towns or market centres in Cornwall (Author’s Illustration).

Helston was one of the first settlements to be granted a market and may have been established by the early medieval monastery at St Keverne, which is suggested to have held most of the land on the Lizard Peninsula (Hooke, 2003, 108). Preston-Jones and Rose have noted that of the early urban centres (St Stephen-by-Launceston, Liskeard, Bodmin, St Germans, Marazion and Helston) the only non-ecclesiastical centre is Liskeard (Fig 3:12) (1986, 164). Liskeard was the first stannary town in Cornwall, chiefly concerned with the assaying and administrative aspect of trading metals such as tin and copper. This suggests that the early impetus for towns was not driven by opportunistic merchants or local elite but established ecclesiastical centres.

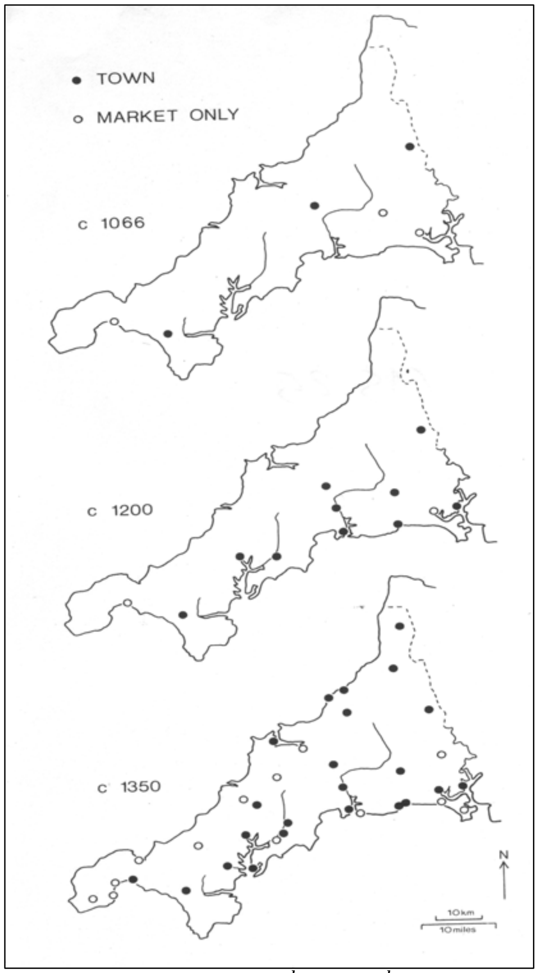


Figure 3:13. Early Market towns from the 11th to 14th centuries (After Preston-Jones and Rose, 1986, Fig 11).

Excavation within Cornish towns with supposedly early medieval origins has provided little archaeological insight into their origins or date. The depth of archaeological deposits in Lostwithiel, Bodmin and Truro rarely reach 0.5m in thickness, which compared to most other English urban centres is very little (Jones, *pers. comm.*), and more medieval pottery has been found in fields of Cornwall than in the urban centres (Jones, *pers. comm.*). Nucleated settlements rarely appear to have evolved into towns, and the urban centres were initially created through the markets often sponsored by ecclesiastical centres or planted by new Norman landowners to create revenue (Fig 3:13) (Preston-Jones and Rose, 1986). The impact of the Norman occupation of Cornwall cannot be overstated: the foundation of towns and markets from the late 11th century onwards created the first centralised systems of control, perhaps destabilising existing social networks through the creation of new ones.

3:4:18 Summary

The archaeological evidence for settlement discussed above suggests that initially Cornwall did not adopt Romanised settlement forms, and that the abandonment of rounds and courtyard houses in the 6th century perhaps reflects wider trends in settlement dislocation as seen in the rest of Britain. The post-Roman sunken-featured revetted stone structures offers some evidence for new settlement forms from the 7th century onwards, but not a settlement pattern. It is likely the Anglo-Saxon elite and ecclesiastics had a formative role in establishing markets and a system of landholding, although the exact nature of this is unknown. It was not until the post-Conquest period that Cornwall develops planted urban centres and markets, forming entirely new settlement forms and patterns with no apparent antecedents.

3:5 Christianity

Christianity (see above) is a concept commonly used to interpret evidence and events in the post-Roman and early medieval periods, as well as providing a tool allowing comparison with other areas. The archaeological evidence, composed chiefly of inscribed stones, stone crosses, cist-graves and possible chapel structures, has been used to identify and assess its presence in the county. The historical evidence relies heavily on hagiography to illuminate the development and role of Christianity in Cornwall. The form and mode of Christianity in Cornwall from the post-Roman period onwards is assumed to be part of the ‘Celtic’ church tradition. Therefore, a brief explanation of the Celtic church is presented below, followed by a review of the documentary and archaeological evidence.

3:5:1 The Celtic Church

The ‘Celtic Church’ tradition is specific to the ‘Celtic nations’ of Ireland, Wales, Brittany and Scotland (Davies, 1992; Harvey *et al.*, 2002; James, 2000). It is held to be characterised by an adherence to the Old Testament and the continued use of old Latin texts which were no longer used on the Continent (Davies, 1992, 18). The Celtic church is considered to have developed separately from the Roman church of Western Europe, or that it did not adopt European strictures and traditions until a later date (Davies, 1992). It was rurally based, often represented as a single ecclesiastical practitioner within a community who was dedicated to a particular saint or martyr (Davies, 1992), which some have called local Christian cults (Preston-Jones, 1994; Preston-Jones and Rose, 1986). Carver has commented that Prehistoric ritual practice was influential in the development of early Christianity and that the cult of relics associated with saints built on these pre-Christian foundations (Carver, 2009). These ecclesiastical figures were affiliated to a Bishop and ministered to the settlement's religious needs (Olson, 1980; Orme, 1991, 2007). This did not necessarily require a standing church building, and there is little identifiable archaeological evidence of such structures in settlements of this period. The other defining factor is an emphasis on the display of devotion through penitence and exile in hermitages, living alone in secluded locations (Orme, 2007).

However, the idea of a 'Celtic nation' with a unified 'Celtic church', whilst convenient, is now generally thought to be unrealistic (Davies, 1992; Koch, 2007), "there is merely the Christian church in Celtic-speaking lands" (Thomas, 1992, 145). Davies argues that the 'Celtic' church is a fabrication and that Christianity in this period has been constructed from "a word from one source and a sentence from another… taken to apply to all areas and all centuries" (1992, 12).

3:5:2 Documentary evidence

Cornwall possesses very few pre-conquest documents, either because they have been lost or the tradition was not as strong as it was in other regions. The earliest records, produced by the collegiate church at Glasney in Penryn, date to the 13th century and include three of the four known Saints plays in England, as well as documents in the Cornish language (Padel *pers. comm.*). Literacy seems to have been very restricted in pre-Conquest Cornwall (Pearce, 2004), with the only evidence limited to the inscribed stones (discussed below). The main documentary references occur in the lives of saints such as Samson and Germanius (Olson, 1980; Orme, 2007). As a result, extensive work has been done on the lives of saints in an effort to understand the process of Christianisation and its practices in Cornwall.

3:5:3 Hagiography

In relative terms, the wealth of documentary evidence in Wales and Ireland has led to hagiography being used to understand society in this period. Despite the general lack of similar material in Cornwall, antiquarians such as Borlase (1754) have termed the post-Roman period ‘The Age of the Saints’ (see also Doble, 1962, 1964, 1965, 1970; John, 1981; Orme, 2007). The more recent work of Thomas and Doble has further reinforced the belief that a study of the saints’ lives offers a viable avenue of research in understanding society of post-Roman and early medieval Cornwall (Doble, 1960, 1962, 1964, 1965, 1970; Thomas, 1961, 1966; Thomas, 1977, 1994; Thomas and Mattingly, 2000; Turner, 2006a). The only specific texts are the lives of St Samson and St Pauli Aureliani, which mention monasteries, topographical locations and allude to life in post-Roman Cornwall (John, 1981; Olson, 1980). The presence of monasteries is recorded in Domesday Book, which refers to many landholding collegiate churches such as St Petroc (Bodmin) and Lannachebran (St Keverne) (Doble, 1935, 1938, 1962; Olson, 1980, 87-88).

Harvey has suggested that individual saints hagiographies may have been used in “securing, upholding and protecting certain existing land rights and privileges” (2000, 205). These stories incorporate natural landscape features such as springs and woods, which are woven into the tale to mark out the land sacred to the saint, or belonging to his followers, as well as indicating the significance of natural places in the landscape (Harvey, 2000, 2002). The saints tales “connect not only certain values and norms of behaviour but also an entire landscape, to a suitable historic past and, by implication, attempt to legitimise ecclesiastical authority, ritual and organization” (Harvey, 2000, 207). Padel has commented on the unique entry of St Germoe as a landowner in Domesday Book (Padel *pers. comm.*), which further supports Harvey’s suggestion.

The presence of the early Christian saints in Cornwall is reinforced by an unusually high proportion of extant ‘Cornish’ or ‘local/unique saints’ names and dedications at possible early Christian settlements (Todd, 1987, 241; Turner, 2006a, 7). Turner suggests that either the saints' names have been retained due to the diminished impact of the Anglo-Saxons in the county, or represents a conversion process unique to Cornwall, and is somehow indicative of the region's native identity (Pearce, 2004, 322).

There are around 200 saint place-name elements in Cornwall, of which 120 are unique to the county. Considering that there are only 220 native non-universal saints' names in the whole of England, this can only emphasize the importance of this tradition (Padel *pers. comm.*). There are only 35 dedications to universal saints and the region also has the highest number of Breton dedications (22) (Turner, 2006a). Despite Thomas' long held assertion that Christianity was brought to Cornwall from Ireland via Wales (Pearce, 2004, 322; Turner, 2006a, 8), the six Welsh and five Irish saint dedications are to few to support this, instead suggesting a stronger affiliation with Brittany (1971; , 1972; , 1973). The documentary and place-name evidence clearly supports the presence of strong social networks between Brittany and Cornwall in the post-Roman period (Pearce, 2004, 322; Turner, 2006a, 8), reflected in the proliferation of dedications to the Breton saint Winwaloe. This assertion lacks the support of archaeological evidence, however, and must remain a tentative suggestion, and the reliance on ecclesiastical textural sources such as the saints' lives and dedications is, as with most sources of this period, questionable (Laing, 1993, 137).

3:6 Archaeological evidence for Christianity

As discussed above, the antiquarian Cornish research framework has focussed attention on chapels, long-cist graves, inscribed stones and stone crosses, and the archaeological evidence for other ecclesiastical sites has proven elusive (Pearce, 2004). The only archaeological features identified as Christian are the cemeteries and stone crosses, as structures do not seem to have been diagnostically Christian in appearance during this period (Preston-Jones and Rose, 1986). However, considering the general lack of structures dating to this period it is difficult to establish how a secular structure might differ. Thus there is currently little archaeological evidence for Christianity in the county before the 7th to 9th centuries (Preston-Jones and Rose, 1986, 143).

3:6:1 Chapels

In general, most of the 'Christian' structures that have been excavated lack artefactual or scientific dating, but are regarded as 8th to 10th century in date. These include Thomas' excavations at Tintagel, Fenton-Ia Chapel, Merther Uny and in the Isles of Scilly (Fig 3:14) (After Haslam, 1844, Fig 1), along with those of Pool at Chapel Carn Brea (1967, 1968b, 1986) and Chapel Jane (1969). The exception is the small rectangular chapel on Teän in the Scillies, which has associated burials and pottery dating to the 7th-8th centuries (Russell and Pool, 1968).

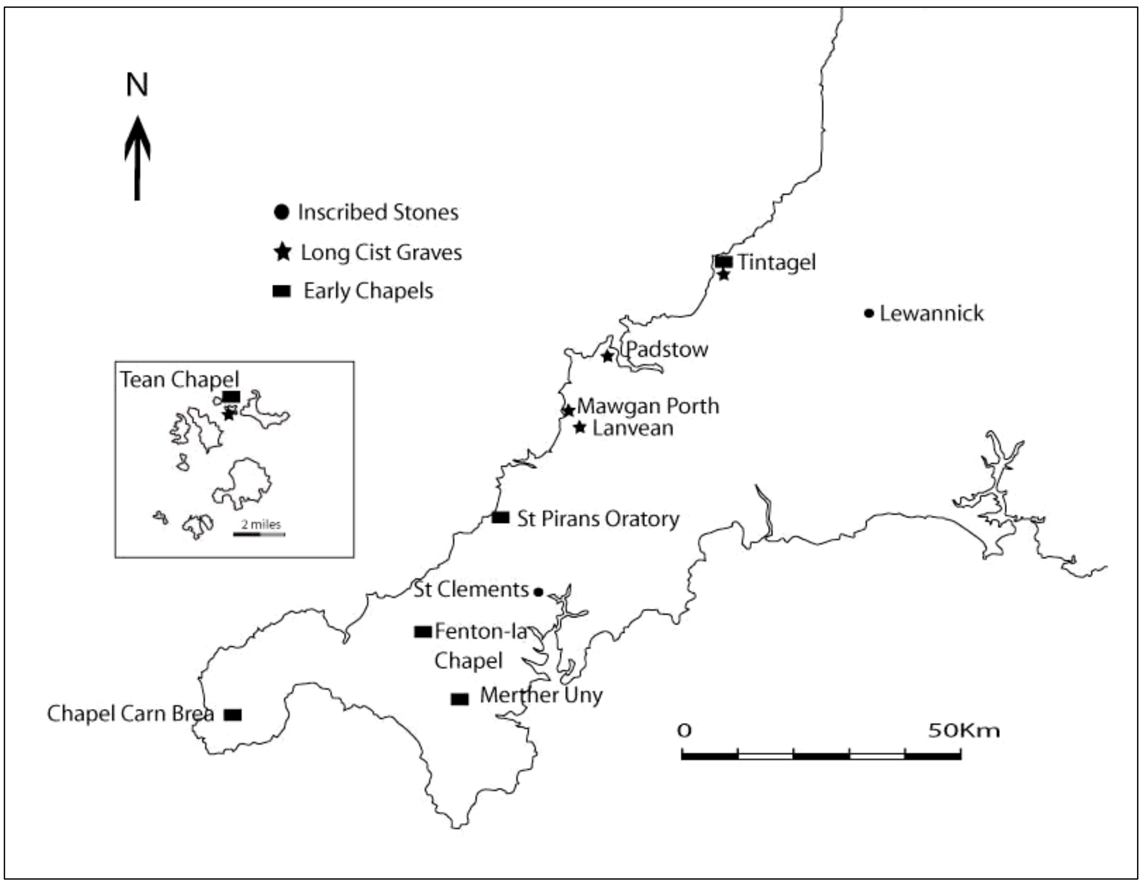
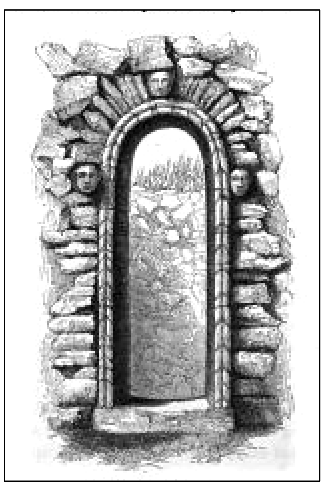


Figure 3:14. Location map of Early Chapels, Long Cist Graves and Inscribed stones mentioned in the text (Author's Illustration).

In general, the 'chapels' are rectangular structures five to ten metres long and roughly three metres wide, sometimes with burials and evidence of occupation (Pearce, 1978, 69). The earliest example is thought to be St Pirans' oratory, buried beneath the dunes near Perranporth on the north coast of Cornwall, and dated by the saint's life to the 6th-7th century (Fig 3:15) (Todd, 1987, 293). It is a stone walled rectangular structure nine metres in length and four metres wide (Fig 3:16), orientated east-west with carved stone heads above the door (Fig 3:17), a stone slab altar and numerous graves excavated to the south of the chapel. Unfortunately, excavation in 1835 has left little dating evidence (Fig 3:15) (Orme, 2000, 221).

Figure 3:15. Ruin of St Pirans Oratory by Haslam (Turner, 2006b, 31).

There are no examples of what would traditionally be termed churches that date to before the 8th century, and some current churches retain 10th-century elements (Haslam, 1844).



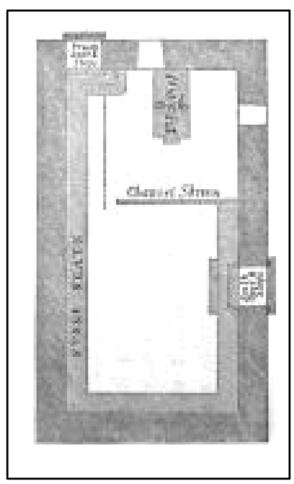


Figure 3:16. Left, Showing Doorway with carved heads (Thomas and Mattingly, 2000, 12).
Figure 3:17. Right, Plan and illustration of St Pirans (After Haslam, 1844, Fig 70).

3:6:2 Long-cist graves

Several long-cist cemeteries dating to the 7th-12th centuries have been excavated in Cornwall and demonstrate an awareness of Christian traditions and devotion. Early Christian long-cists are found in Wales, Scotland, Brittany, Lundy and the Isles of Scilly and Man and are generally found in coastal and estuarine locations (After Haslam, 1844, Fig 73). The discovery of a 6th century slate-lined long-cist from Tintagel churchyard has led some to suggest the church was a post-Roman foundation (Preston-Jones, 1984, 173). There are 25 long-cist cemeteries in Cornwall, 12 of which are pre-Norman (Nowakowski, 1990, 1992). Some of the dated examples are at Padstow (8-9th century), Lanvean (8-12th century), Mawgan-porth (9-11th century), Tintagel (6th century) and Tean (7-8th century) (Fig 3:14) (Preston-Jones, 1984). Their general distribution along the north coast, often in sand dunes, is thought to indicate a Welsh Christian influence (Manning and Stead, 2002-3; Preston-Jones, 1984). As Preston-Jones points out, this distribution appears to avoid the main areas of early Cornish Christian activity, as defined by inscribed stones, Chi Rho symbols and *lann* place-name parish churches, in West Penwith and the south coast (Preston-Jones, 1984).

3:6:3 Inscribed stones

The main evidence for early Christianity in Cornwall is the forty or so inscribed memorial stones and crosses which are thought to date to between the 5th-9th centuries (Fig 3:13) (Preston-Jones, 1984, 173). Thomas (1994) has dated them on the basis of the epigraphy, the wording, contexts and occasionally accompanying artwork (Thomas, 1994; Thomas and Mattingly, 2000, 11). These inscribed stones are spread throughout the landscape, and in contrast to other classes of evidence do not have a coastal distribution. The practice of commemorating the dead with an inscribed pillar stone is thought to demonstrate a link to late or sub-Roman Christian traditions of Gaul (see also Thomas and Mattingly, 2000, 11). However, the Ogam text on several inscribed stones in Cornwall shows links with Ireland, where Ogam is thought to have originated in the 5th-6th centuries (Pearce, 2004, 12). The Lewannick stone in east Cornwall (Fig 3:14) has two Latin inscriptions and one Ogam inscription, demonstrating a cross-cultural influence from either Wales or Ireland, and is also associated with a *lann* place-name (Pearce, 2004, 214). These stones can also be palimpsests of the evolving Christian faith in Cornwall, with the addition of a Christian cross to an existing memorial. One example at St Clement is thought to have been a prehistoric menhir, later inscribed with a Latin text, then an Ogam text and finally the top was fashioned into a cross (Fig 3:13) (Thomas, 1994).

Figure 3:18. Inscribed stone with cross head in churchyard at St Clement, Cornwall (Author's Photo).

3:6:4 Stone crosses

The carving of crosses on stones is usually thought to be a later tradition than inscription, but some examples where a cross has been added to an inscription date to the 6^{th} century (Fig 3:18). The free-standing cross is generally dated from the 8^{th}-9^{th} century and thought to be associated with ecclesiastical centres, boundaries, or meeting places on routeways (Okasha, 1993). The 700 stone crosses in Cornwall represent the largest group in the South West, and over 50 of them bear pre-Conquest decoration (Turner, 2006a). The crosses are difficult to date but Preston-Jones has identified three groups based on design, layout and geographical location (Preston-Jones *pers. comm.*). First, the *panelled interlaced groups* (e.g. King Doniert's stone on Bodmin moor) (Turner, 2006a, 33). The second group is composed of the *Penwith group* (typically with a Crucifixion on one side and a cross-head with five bosses on the other side) and the *Mid-Cornwall group* (plant scrolls and trails decoration with ring-heads whose wide-flaring arms are decorated with triquetra knots) (Preston-Jones *pers. comm.*). The final group have a wide distribution and are defined by their incised decoration; these date from the end of the pre-Norman period to the 11th-12th century (Preston-Jones *pers. comm.*).

Stone crosses were present throughout the county from the 9th century onwards, and reflect both native and external influences in their form and decoration. It is uncertain whether their function within society changed over time or what they represented to all levels of society. Their social function is difficult to define; Orme suggests that they performed a role similar to that of churches, being places of worship prior to the widespread foundation of churches in the 9th century (Orme, 2007, 3). However, Langdon highlights the point that these crosses were often moved to churchyards or to elite centres to convey status and possibly an affiliation to the saints they were dedicated to (1992, 1994, 1999). Their value and function in society may have changed over time, suggesting that their physical appropriation was integral to elite status. Equally, such stones could and were moved by antiquarians in an effort to rescue and preserve them.

3:7 Conclusion

In conclusion, this chapter has problematised the relationship between the use of historical and archaeological sources and the current methods and approaches to interpreting this period. The use of terms and labels has hindered the much needed synthesis of archaeological evidence between perceived differing cultural and geographical regions with historically delineated boundaries. Despite difficulties inherent in establishing broad national or even regional chronologies, the use of the common themes of settlement and Christianity can be utilised to explore broader interpretive approaches to understanding social change in the post-Roman and early medieval period.

The settlement evidence in Cornwall offers a unique sequence of visible settlement forms with an enduring dispersed nature of settlement representing a firmly rural population who did not form nucleated or urban centres until the post-Conquest period. The dispersed rural community in Cornwall from the 4th to 10th centuries offers a unique opportunity to understand social networks that are not reliant on urban centres to maintain economic and social stability. This may offer one explanation as to why Cornwall was not as affected by the retreat of the Roman Empire from Britain, perhaps suggesting a semi-independent network and economy. The perceived settlement shift in the 6th century suggests that despite Cornwall's apparent isolation from the rest of Britannia, it also experienced similar disruption in settlement pattern. However, the archaeological evidence of the appearance of sunken houses in sand-dune coastal sites from the 7th century onwards offers a uniquely visible change in settlement form and location in the landscape. The historical evidence suggests the gradual establishment of an Anglo-Saxon elite and ecclesiastical form of landholding and markets began to emerge from the 9th century onwards. This system of ownership was inherited and partly adopted by Norman settlers, who founded the first towns and more markets.

The role of Christianity and the process of Christianisation in Cornwall reinforces a rurally-based community that adopted individual saints, who perhaps represented their traditional expression of freedom in constructing their identity through their new belief system and loosely bound by the practices of the 'Celtic church'. The limited archaeological evidence through crosses and inscribed stones suggests the gradual appearance and adoption of Christianity in the 6th-7th century which coincides with the change in settlement patterns. The chapels and long-cist cemeteries assumed to date to the 7th-8th century suggest a new structural tradition and primacy in visibility of Christianity in the landscape. The historical evidence suggests Cornwall had strong links with Brittany as seen in the saint's dedications, perhaps representing existing networks along which faith may have travelled. The limited evidence for the establishment of monastic houses around the 8th-9th centuries resulted in the first forms of centralisation and gradual incorporation into the national Anglo-Saxon polity.

In conclusion, the 4th-11th century represents a period of significant social and economic change, the evidence of which can be seen in the archaeological and historical resources. The thematic approach taken to incorporate the evidence and interpretation of this period in

Cornwall's past, has successfully established a platform upon which further discussion can take place. It has not however, discussed the ceramic sequence associated with this period in Cornwall, a knowledge of which is essential to a study based on petrographic data. The next chapter will introduce and discuss the pottery sequence from the 4^{th}-11^{th} century within the broader framework of the South West of England to put the evidence described above in a ceramic context.

Chapter 4: POTTERY IN THE SOUTH WEST AND BEYOND

4:1 Introduction

This chapter presents an overview and critical analysis of the post-Roman and early medieval ceramic sequence of Cornwall and its context within the South West and Britain as a whole, thus forming a frame of reference for further discussion. It will list the main forms and wares referred to throughout this study, spanning the research period from the 4th to the 11th century. It will give a brief description of each ware and its own chronology, and explore their significance in the study of pottery for the period.

The ceramic sequences will be discussed in chronological order by subdividing the period into three units which exemplify wider changes in ceramic production. The first will span the 4th to the 6th centuries to establish the nature of pottery production in the post-Roman period: the second from 7th to the 9th centuries, discussing the emergence of production centres; and finally the 9th to the 11th centuries, which witnesses the effect of the Norman Conquest and the re-establishment of production networks throughout the region. The structure of each unit will successively describe the ceramic evidence for Devon, Wessex and the national context after which the ceramics from Cornwall can be introduced in relation to the regional and national trends discussed above.

The South West has been divided into three areas that correspond to archaeologically distinct areas of pottery production, consumption and traditions. These divisions are perhaps not coincidental as each region has a different occupational, settlement and cultural legacy which may have impacted on later ceramic traditions, as discussed in Chapter 3. The three areas are: Cornwall, Devon and the western part of Wessex (referring to Somerset, Dorset and Wiltshire). Gloucestershire has not been included due to its physical and cultural dislocation from the other counties considered to represent the South West. This division has great relevance to the broader view of ceramics in this period, as the area considered as Wessex has been identified by Alan Vince as having minor typological and decorative differences from other groups in England between the 5th and 7th centuries (Vince, 2005, 225). The inclusion of Wessex contributes a crucial comparative element to the discussion of the ceramic traditions of Devon and Cornwall, as will be discussed.

4:2 South West synthesis

The pottery of the South West has received little attention in comparison to the pottery of the eastern and north-eastern England in the early medieval period. This is due to the common perception that the region lacks the ceramic assemblages to formulate a comparative pottery sequence and is thus of limited interpretive potential. This is most certainly true for some counties, especially Devon, but this should not preclude the synthesis of old and new ceramic evidence that has the potential to offer new insights into early medieval society in the South West.

Studies of the early medieval period in Cornwall, Devon, Somerset, Dorset and Wiltshire have tended to concentrate on the perceived ‘gap’ between the Roman and medieval pottery traditions (Webster, 2008, 169). The region suffers from an internally diverse chronology and divergent archaeological evidence, which the South West Archaeological Research Framework (SWARF) document labels “British (covering most of the region in the 5th century, and only Cornwall by the end of the period), and ‘Anglo-Saxon’ (focused on the Old Sarum/Salisbury area from the 5th century and covering much of the region by the 7th and 8th centuries”) (Webster, 2008, 169). This cultural and chronological division has hampered attempts to gain a better understanding of the region as a whole within a specific field of data.

The discussion below attempts to blur the boundaries between counties and current chronological divisions by allowing the pottery to lead the discussion. It will focus on typologically and culturally significant eras starting with the period of ceramic change in the 5th-6th centuries after the departure of Roman forces, then the emerging industries of the 7th -9th century and finally the re-emergence of wide spread pottery production in the 9th -11th centuries. Within each era an account of pottery from Devon, Wessex (Somerset, Dorset and Wiltshire), the national picture and Cornwall will be given detailing the wares produced and their significance towards our understanding of ceramic traditions in the South West.

4:3 After the fall: ceramics of the Post-Roman 5th -6th centuries

The ceramic sequence for the South West in the post-Roman period is the most complex and diverse of any region in the England. This period in England's ceramic past is renowned for the end of wheel-made, mass-produced pottery, or as some say, the forgetting of the art of throwing pots (McCarthy and Brooks, 1988, 61) with a return to household production and hand-made bonfire-fired vessels (Hurst, 1976, 283).

The map of the South West (Fig 4:1) depicts the different trends in pottery consumption in this period between the three regions defined above.

4:3:1 Devon

The evidence for native pottery production is markedly different between the three regions. Devon is virtually aceramic until the 8th-9th centuries or even the post-conquest period (Griffith, 1986, 49). Allan (1984, 12) queries the complete absence of pottery in this period as occasional pottery sherds have been found in urban contexts in Exeter prior to AD 1020, although he admits that in relation to earlier periods there is very little. The lack of production in this period compared to the mass-production of Grey wares, South-Western Black Burnished (BB) ware and south Devon Burnished ware, produced between the 3rd to 4th centuries, is surprising (Holbrook and Bidwell, 1991). The south Devon Burnished ware copied the popular BB1, made near Poole in Dorset and also in southern Devon. The vessels produced at Poole were consumed and distributed throughout Britain by the Roman military (Gerrard, 2004; Holbrook and Bidwell, 1991). South Devon Burnished ware has been found in Cornwall, Devon and east Dorset, but is not found after the early 5th century (Holbrook and Bidwell, 1991). Interestingly, a cremation vessel found at Tregony in Cornwall, radiocarbon dated to AD 250-430, was made in a gabbroic fabric but copied the late Black Burnished ware form and decoration. This unique discovery suggests an affiliation with traditions that ended in the rest of Britain in the late 3rd century (Wacher, 1998, 271), with a vessel style synonymous with the Roman military and Devon, and most importantly *not* consistent with burial traditions of Cornwall. Another possible instance is the cremation urn recently found in Collumpton, Devon (Morris, *forthcoming*). This appears to be the end of native pottery production in Devon until the 10th century.

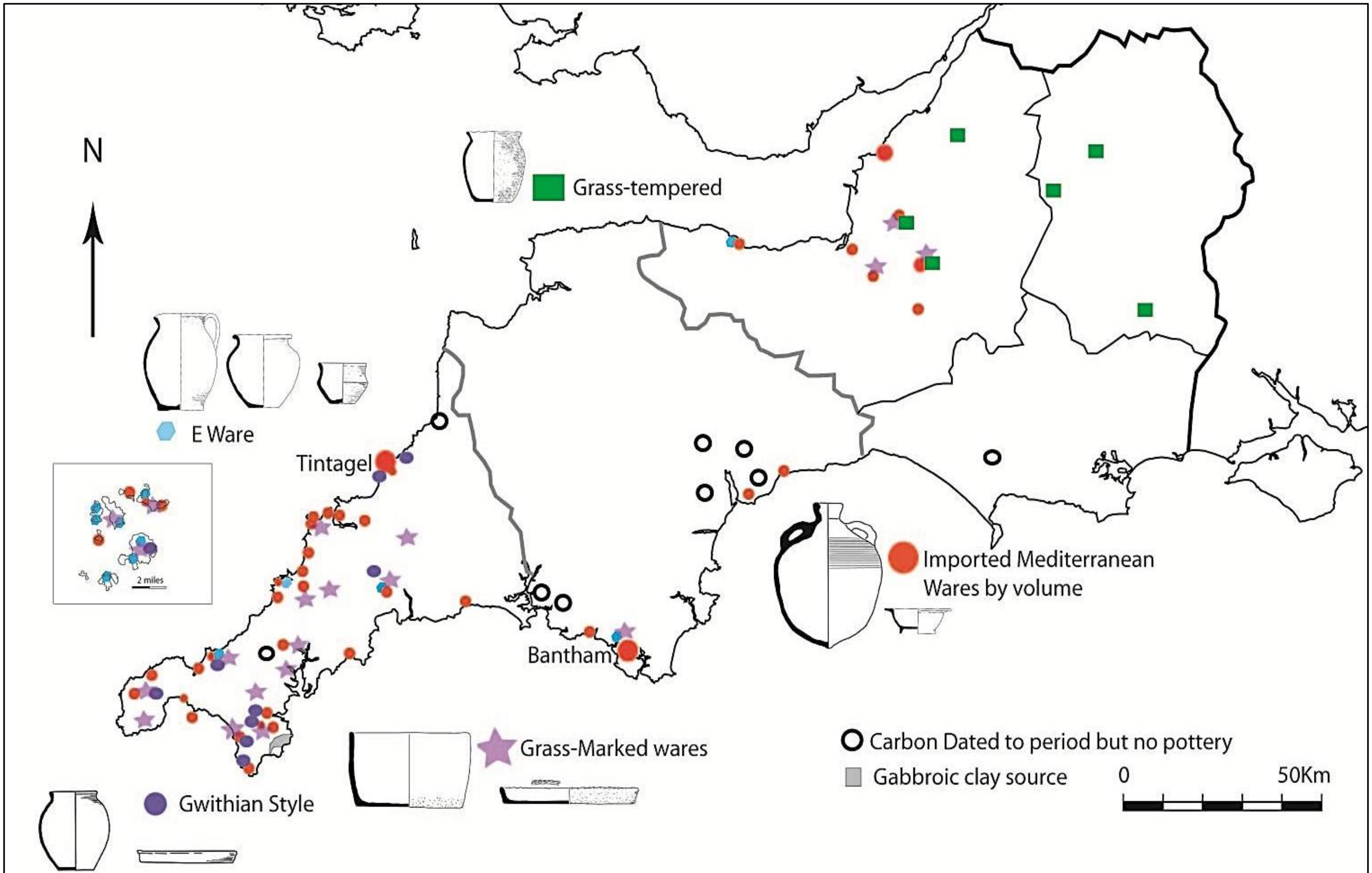


Figure 4:1 Depicting the consumption of pottery in the South West of England during the post-Roman period (Source: complied and drawn by Author)

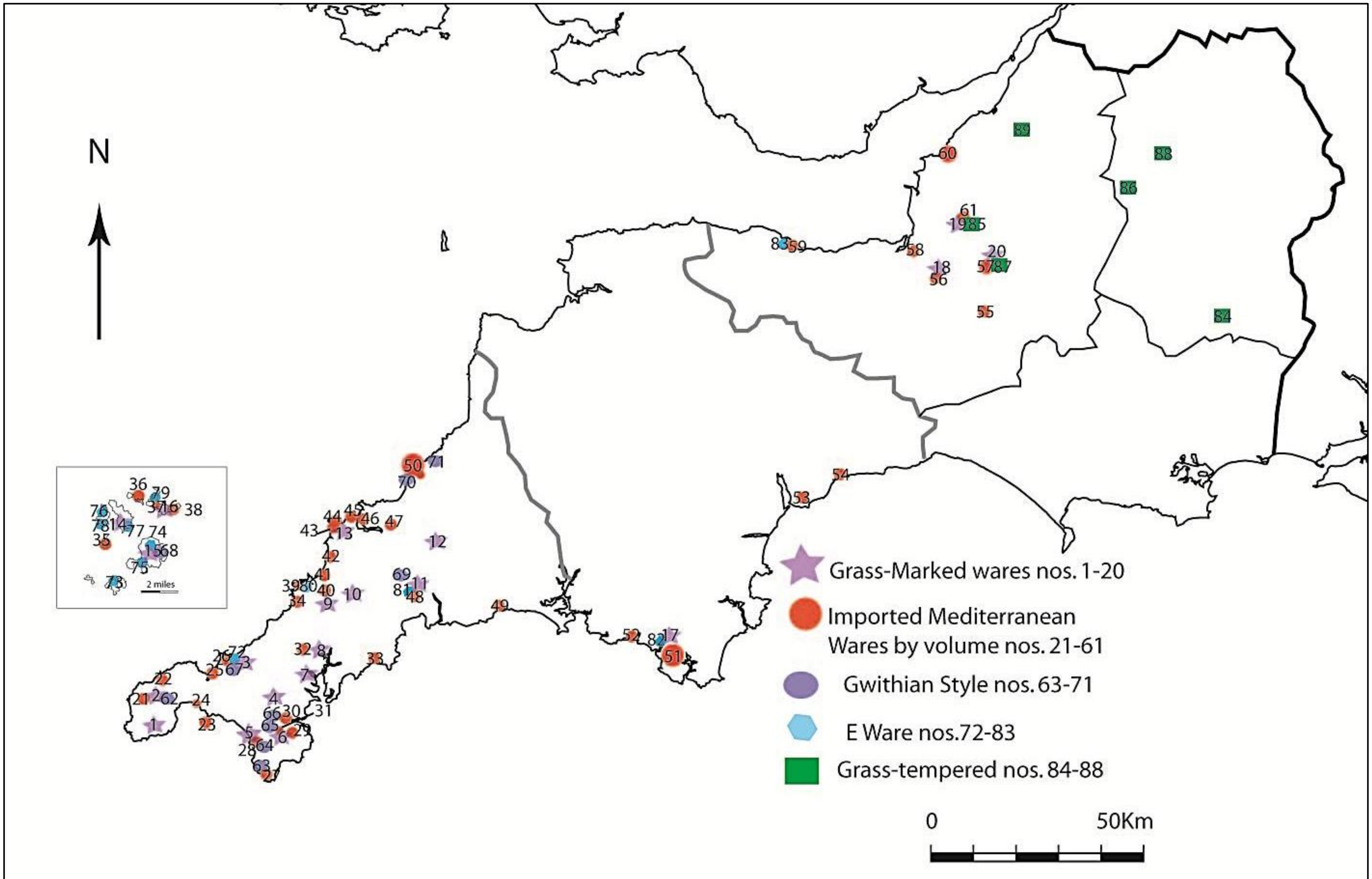


Figure 4:2 Numerical index of place names and references as depicted in Fig 4:1, information avaliable on following page (Source: complied and drawn by Author)

Grassmarked wares 1-20

1. Sanctury, Bosleven, Cornwall (Hutchinson 1979).
2. Trevells, Paul, Cornwall (Hutchinson 1979).
3. Gwithian, Cornwall (Thomas 1968b).
4. Merther Uny, Cornwall (Hutchinson 1979).
5. Gunwalloe, Lizard, Cornwall (Hutchinson 1979).
6. Boden Vean, Cornwall (Gossip 2009).
7. Tremough, Cornwall (Gossip and Jones 2007).
8. Nancemere, Truro, Cornwall (Gossip *pers. comm*.).
9. Hay close, Cornwall (Jones *pers. comm*.).
10. Penhale Round, Cornwall (Thorpe *pers. comm*.).
11. Trethurgy, St.Austell, Cornwall (Quinnell 2004).
12. Scarcewater, Cornwall (Thorpe *pers. comm*.).
13. Padstow pipeline, Cornwall (Thorpe *pers. comm*.).
14. Tresco, Isles of Scilly, Cornwall (Taylor and Johns *Forthcoming*).
15. Hugh Town, St.Marys, Isles of Scilly, Cornwall (Thomas 1968b).
16. Tean, Isles of Scilly, Cornwall (Thomas 1968b)
17. Bantham, Devon (May and Weddell 2002).
18. Cannington cemetery, Somerset (Rahtz 1974).
19. Cadbury-Congresbury, Somerset (Alcock 1995).
20. Glastonbury Tor, Somerset (Rahtz 1974).

Imported Mediterranean wares 21-61

21. Carn Euny, Cornwall (Christie 1993).
22. Porthmeor, Cornwall (Thomas 2005).
23. St. Michael’s Mount, Cornwall (Campbell 2007).
24. Penwith College, Cornwall (Thorpe *pers. comm*.).
25. Hayle Towans, Cornwall (Thomas 2005).
26. Gwithian, Cornwall (Thomas 2005).
27. Carngoon Bank, Cornwall (McAvoy *et al* 1980).
28. Mullion, Cornwall (Thomas *pers. comm*.).
29. Halligye, Cornwall (Thomas 2005).
30. Grambla, Cornwall (Quinnell 2004).
31. Gear Farm, Cornwall (Gossip *pers. comm*.).
32. Richard Lander School, Cornwall (Gossip 2005).
33. St Michael Caerhays, Cornwall (Campbell 2007).
34.Perran Sands, Cornwall (Thomas 2005).
35. Samson, Isles of Scilly, Cornwall (Campbell 2007).
36. St.Helens, Isles of Scilly, Cornwall (Campbell 2007).
37. Mays Hill, St Martins, Isles of Scilly, Cornwall (Campbell 2007).
38. St Martins, Isles of Scilly, Cornwall (Campbell 2007).
39. Newquay, Cornwall (Thomas *pers. comm*.).
40. Hay Close, Cornwall (Thorpe *pers. comm*.).
41.Watergate Bay, Cornwall (Thomas *pers. comm*.).
42. Trenance, Cornwall (Thomas *pers. comm*.)
43. Padstow pipeline Cornwall (Thorpe *pers. comm*.).
44. Padstow pipeline, Cornwall (Thorpe *pers. comm*.).
45.Padstow, Cornwall (Campbell 2007).
46. Rock, Cornwall (Thomas 2007).
47. Killibury, Cornwall (Campbell 2007).
48. Trethurgy, Cornwall (Quinnell 2004).
49. Duloe, Cornwall (Thomas *pers. comm*.)
50. Tintagel, Cornwall (Barrowmen *et al* 2007).
51. Bantham, Devon (May and Weddell 2002).
52. Mothecombe, Devon (Turner and Gerrard 2004).

53. High Peak, Devon (Pollard 1966).

54. Seaton, Devon (Thomas *pers. comm*.).

55. Cadbury Castle, Somerset (Campbell 2007).

56. Cannington, Somerset (Rahtz 1974).

57. Glastonbury Tor, Somerset (Rahtz 1974).

58. Burtle, Somerset (Thomas *pers. comm*.).

59. Carhampton, Somerset (Campbell 2007).

60. Walton Bay, Somerset (Campbell 2007).

61.Cadbury-Congresbury, Somerset (Alcock 1995).

Gwithian style 62-71

62. Goldherring, Cornwall (Guthrie 1969).

63. Carngoon Bank, Cornwall (Thomas 2005).

64. Boden, Cornwall (Thorpe *pers. comm*.).

65. Halligye, Cornwall (Thorpe *pers. comm*.).

66. Gweek, Cornwall (Thorpe *pers. comm*.).

67. Gwithian, Cornwall (Thomas 2005).

68. St. Mays Hill, Tean, Isles of Scilly, Cornwall (Thomas 2005).

69. Scarcewater, Cornwall (Thorpe *pers. comm*.).

70. Tintagel pipeline, Cornwall (Thorpe *pers. comm*.).

71. Tintagel pipeline, Cornwall (Thorpe *pers. comm*.).

Eware

72. Gwithian (Thomas 2005).

73. St.Agnes, Isles of Scilly, Cornwall (Taylor *pers. comm*.).

74. Bar point, St Mary's, Isles of Scilly, Cornwall (Thomas 2005).

75. Cricket pitch, St Mary's, Isles of Scilly, Cornwall (Taylor *pers. comm*.).

76. Mirror site, Bryher, Isles of Scilly, Cornwall (Thomas 2005).

77. Dial Rocks, Tresco, Isles of Scilly, Cornwall (Thomas 2005).

78. Sturton, Bryher, Isles of Scilly, Cornwall (Thomas 2005).

79. Mays Hill, St Martins, Isles of Scilly, Cornwall (Thomas 2005).

80. Kelsies, Cornwall (Campbell 2007).

81. Trethurgy, Cornwall (Qunniell 2004).

82. Bantham, Devon (May and Weddell 2002).

83. Carhampton, Somerset (Campbell 2007).

Grass-tempered wares 84-89

84. Downton, Wiltshire (Fowler 1966).

85. Cadbury-Congresbury, Somerset (Alcock 1995).

86. Westbury, Wiltshire (Fowler 1966).

87. Glastonbury Tor, Somerset (Rahtz 1974).

88. Ogbourne, Wiltshire (Fowler 1966).

89. Bath, Somerset (Gerrard pers. comm.).

Figure 4:3 Amphora neck recovered from Bantham (Reed and Bidwell, 2007, Fig 1).

The post-Roman pottery assemblages in Devon are generally associated with 'trading sites' producing 5th-8th-century imported vessels such as Amphorae and African Red Slip ware (Fig 4:3). These sites are few in number and are limited to Bantham (Griffith, 1986; Griffith and Reed, 1998; May and Weddell, 2002), High Peak (Pollard, 1966) and Mothecombe (Turner and Gerrard, 2004). Small amounts of native pottery have been found on sites by radiocarbon to this period, as at Bantham AD 605±90 (May and Weddell, 2002) and Mothecombe (Turner and Gerrard, 2004), and this suggests that a limited amount of pottery was in circulation. In the case of Bantham, the native material has been identified as Gabbroic pottery from Cornwall (May and Weddell, 2002, 421), though Taylor's petrographic analysis of the six sherds revealed a strong granitic element to the fabric, suggesting the practice of mixing clays (Bidwell and Reed *forthcoming*). However, these sites are the exception to the rule as the majority of absolute dated post-Roman sites in Devon do not have any pottery, e.g. Kenn AD 420-660 (Weddell, 2000), Hayes Farm AD 390-630 (Simpson *et al.*, 1989) and Raddon Hills AD 540-710 (Gent and Quinnell, 1999).

4:3:2 Wessex

The situation in Wessex is to some extent similar, with the presence of a limited amount of imported wares. However, the context and distribution of these wares is different and Rahtz (1974, 96) has posited the existence of a locally made grass-tempered ware. As stated, the context of the imported wares suggests a different pattern of consumption as they are generally found on re-occupied hillforts and not the coastal 'emporia' as in Devon. The main sites found to have 5^{th} -6^{th}-century pottery are the Cannington cemetery (Rahtz *et al*., 2000, 295), Cadbury Castle (Alcock, 1995), Cadbury-Congresbury and Glastonbury Tor (Rahtz *et al*., 2000). Accessible from the Severn Estuary, Campbell suggests a similar import model to that of Devon and Cornwall (Campbell, 2007, 118). The absence of E-ware at these sites has led Campbell (2007, 118) to suggest they were part of a different cultural group, as E-ware is only found in Somerset at Carhampton on the coast.

The existence of local grass-tempered handmade pottery in this period has yet to be substantiated. As with Devon, Dorset had a thriving native pottery industry during the Romano-British period, with the mass-production of wheel-made Black Burnished ware 1 near Poole (Farrar, 1973). Its consumption and distribution seem to have been entirely reliant on the Roman military, and it went out of use in the 4^{th} century (Gerrard, 2004; Holbrook and Bidwell, 1991). Similarly, post-Roman domestic sites such as Brent Knoll have been identified through radiocarbon dates but have not produced any pottery (Hollinrake and Hollinrake, 1992).

The rest of Wessex has produced little pottery for this period apart from occasional finds of grass-tempered pottery. This fabric type is one of the most commonly found throughout England in this period and is thought to be either a sub-Roman development adopted by the Anglo-Saxons or one brought to England by them (Hodges, 1981, 55).

Some grass-tempered sherds thought to be of 5^{th} -6^{th} century have been found at Ogbourne, Westbury and Downton in Wiltshire but these are unfortunately unstratified (Fig 4:4) (Fowler, 1966). Hodges originally suggested that the forms found at Westbury, and the Petersfinger pot, can be dated to the 6^{th} century and stated “they were made by West Saxon potters moving north from the Southampton area” (1981, 55). Hodges’s statement highlights the often confusing cross-cultural nature of pottery, as the ‘West Saxons’ (or *Gewisse*) originated in the upper Thames region and Southampton remained ‘Jutish’ until the 7^{th} century. However, his hypothesis is now over thirty years old, making the validity of his statement questionable in relation to the more recent work of Alan Vince (Vince, 2005).

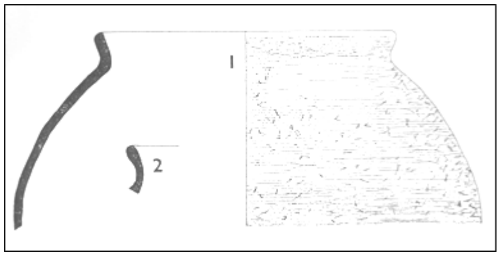


Figure 4:4. Grass-tempered pottery from Westbury in Wiltshire (1/3 scale) (After Fowler, 1966, Fig 1).

More generally, the pottery from Wessex is similar in style to Anglo-Saxon pottery found at Portchester Castle and Chalton in Hampshire which is dated to the 5th -6th centuries (Fig 4:5) (Cunliffe, 1972, 1976). There is also evidence of chaff-tempered pottery in Gloucestershire at Frocester dating to around AD 430-660 (Price, 2000). This pottery is most likely imitating ceramic traditions in the east of England where organic or grass-tempered pottery is common on Anglo-Saxon sites (Vince, 2005).

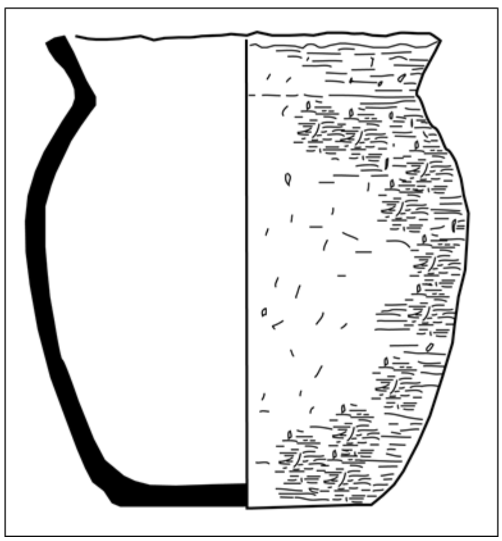


Figure 4:5. Portchester Ware dating to the 5th -6th from Portchester Castle in Hampshire (1/4 scale) (After Cunliffe, 1976, Fig 104).

Therefore, Wessex in this period represents a meeting of the two modes of ceramic consumption from the 4th – 6th centuries: with the Anglo-Saxon organic-tempered ceramics in the east of the region and the imported wares typical of Cornwall in the west. The possible overlap of imported wares and organic-tempered pottery in Somerset, the singular presence of organic-tempered pottery in Wiltshire and an aceramic Dorset presents an interesting range of reactions to the uniformly inferred social stimuli of the Roman departure.

4:3:3 Pottery in the national context

An understanding of the broader ceramic traditions of this period is essential to assess the impact of national ceramic traditions upon the South West. The dominant ceramic tradition is thought to have been influenced by the arrival in the early 5th century of Anglo-Saxon Rhineland styles, which expanded from the Thames basin into south, eastern and north-eastern England (Hurst, 1976, 292; Vince, 2005). Pottery was handmade with local production and consumption (Hamerow, 1993a). The lack of ceramic distribution and preference for local production appears to be typical of Anglo-Saxon settlements of this period.

The new Anglo-Saxon pottery consisted of highly decorated cremation urns and undecorated pots for cooking, the former dominating assemblages of this period (Hurst, 1976). The pottery fabrics are typically organic-tempered in the south and south-east, whilst areas north of the Thames tend to dominated by mineral-tempered fabrics, with some containing igneous rock fragments (Vince, 2005, 225). Hamerow (1994, 11-12) has suggested that the organic-tempered pottery found in the *Grubenhaüser* at Mucking in Essex is very similar to pottery found at Roskem in Belgium from the 5th century. The domestic assemblages from Mucking in Essex and West Stow in Suffolk demonstrate the characteristic globular domestic forms which remained unchanged from the 5th to 7th centuries (Fig 4:6) (Hamerow, 1993a; Hirst and Clark, 2009; West, 1985). The relatively static Anglo-Saxon forms and organic-tempering presents problems in its typological value in the dating of similar pottery found in Wessex (Hurst, 1976).

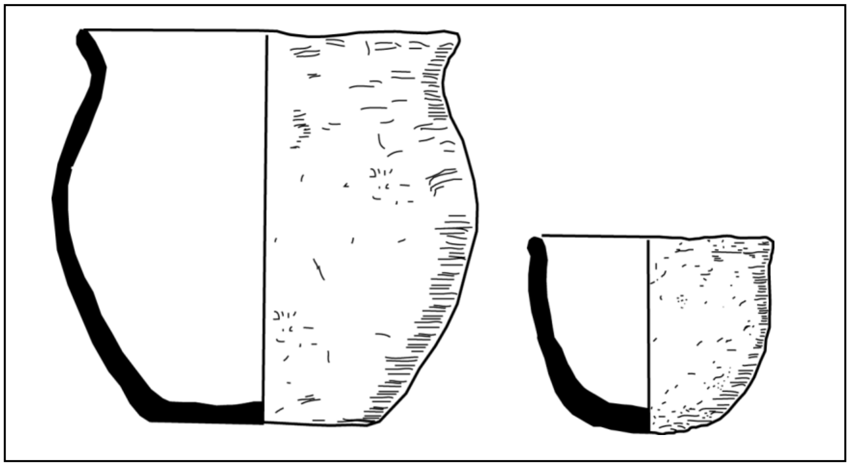


Figure 4:6. Grass-tempered pottery from Mucking (1/4 scale) (After Hurst, 1976, Fig 7.3).

4:3:4 Charnwood pottery production

The exception to this ceramic trend is Charnwood ware from the Charnwood Forest in Leicestershire which *was* distributed. Dating from the 5th -7th centuries, its distinctive inclusions enabled its distribution to be identified as far north as East Yorkshire and as far south as the English Channel. Petrographic analysis has demonstrated that the inclusions in the Charnwood pottery contain rock fragments unique to the Mountsorrel granodiorite outcrop (Williams and Vince, 1997; Young *et al.*, 2005, 31). This clay source was used for the production of both domestic and cremation vessels, with some vessels deposited within inhumation burials (Williams and Vince, 1997, 219). The discovery of over 2000 Charnwood cremation urns in the area has led some to suggest that the pottery was distributed and exchanged via networks associated with religious occasions (Williams and Vince, 1997, 219). The Charnwood pottery is the only other example of long distance trade and exchange in pottery in this period comparable to the Gabbroic pottery in Cornwall. Despite its considerable geographical distribution it did not make it as far as the South West.

4:3:5 Cornwall

The observable trends in ceramic production and consumption in Devon and Wessex are in stark contrast to Cornwall in this period. The evidence from excavated post-Roman sites in Cornwall demonstrates the consumption of imported Continental and Mediterranean wares, along with the continued production of native Gabbroic pottery (Thomas, 2007).

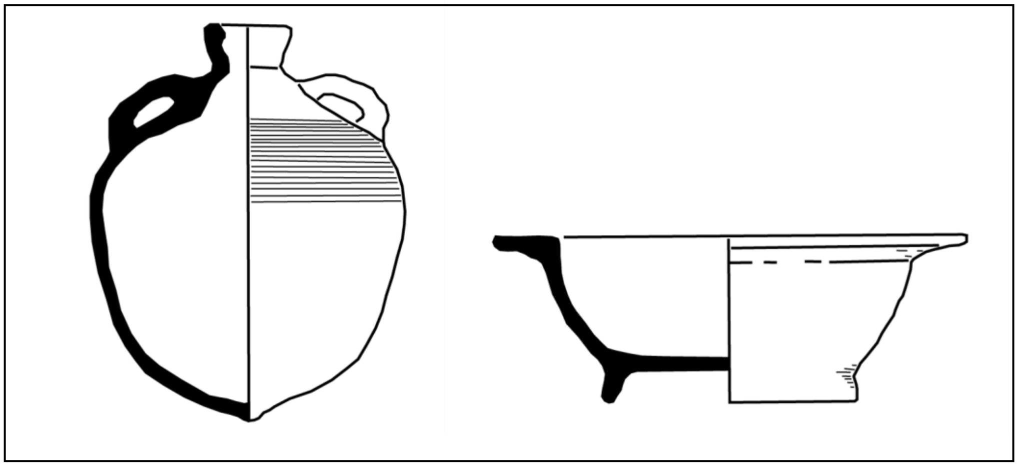


Figure 4:7. Amphorae and African Red Slip ware bowl, typical wares that constitute Mediterranean imports throughout the South West (not to scale) (After Campbell, 2007, Fig 7-11).

The archaeological evidence, and hence most of the discussion, dwells on the importance of imported Mediterranean and Continental wares in the South West after the Roman occupation (Campbell, 2007). These imports have been heavily used for dating evidence and proof of continuing contacts through trade (see below). These are the Mediterranean wares, including: Late Roman Amphorae, Phocaean and African Red Slip wares (Fig 4:7) (Campbell, 2007; Peacock, 1986a). These wares have been found at coastal 'trade' sites or 'emporia' such as Tintagel (Thomas, 1988) and Gwithian (Thomas, 1958a) in Cornwall; Bantham in Devon (Griffith and Reed, 1998; May and Weddell, 2002), and enclosures inland such as the Cannington and Cadbury-Congresbury hillforts in Somerset (Rahtz, 1974, 96).

4:3:5:1 Imported Mediterranean pottery

The South West, and Cornwall in particular, is renowned for its imported Mediterranean pottery in the post-Roman period, most notably at the site of Tintagel (Barrowmen *et al.*, 2007; Radford, 1939; Thomas, 1988a). The social and economic function of Tintagel has been debated for the past 40 years, variously claimed to be a royal/monastic centre, an elite trading centre or site for elite feasting practices (Barrowmen *et al.*, 2007; Radford, 1939; Thomas, 1988a). Imported pottery is, however, more generally found on coastal sites in

Devon and Cornwall (Campbell, 2007), although sherds are found on inland at sites like Trethurgy (Quinnell, 2004). Thomas points out that of the 72 sites in Cornwall that have produced imported pottery, only 11 have no contemporary native wares, therefore 85% of these sites were consuming both native and imported pottery (2005). Although Devon has fewer sites with a less overall bulk than Cornwall, the site at Bantham has produced a greater quantity of imported pottery, by weight, than Tintagel (Reed and Bidwell, 2007). Interestingly, both Tintagel and Bantham have produced a remarkably small assemblage of native pottery (Thorpe, 2007). Whilst this result is typical for Devon, Cornwall was producing and consuming large amount of native pottery making it conspicuous by its absence in Devon. The absence of E-ware (see below) at Tintagel and its presence at Bantham, suggests the two sites may have had differing social and/or economic functions.

The context of the imported wares in Wessex suggests a different pattern of consumption as they are generally found on re-occupied hillforts like Cadbury-Congresbury and South Cadbury (Alcock, 1995; Rahtz *et al.*, 2000). All these sites are accessible by water from the Severn Estuary and it has been suggested that this reflects the same coastal import practice seen in Devon and Cornwall (Campbell, 2007, 118).

4:3:5:2 E-Ware

Another, less common, type of imported pottery found in the South West is E-ware, which was produced in France from the middle of the 6th to the early 8th century, with its peak in Britain around the early 7th century (Fig 4:8) (Campbell, 2007, 46). Campbell has suggested that this pottery was imported as containers for produce consumed by tradesmen who left the empty vessel at their ports of call throughout Atlantic Britain (2007, 51). The presence of three sherds of E-ware at Bantham in Devon is unique in the county, and could suggest it was connected to the Atlantic trade network (Bidwell and Reed, *Forthcoming*). More generally, E-ware is typically associated with coastal sites, as at Gwithian and The Kelsies, with one residual sherd from Trethurgy (all in Cornwall), and a considerably higher percentage on the Isles of Scilly (Campbell, 2007, 121). In Wessex, E-ware has only been found on one site at Carhampton in Somerset (2007, 118).

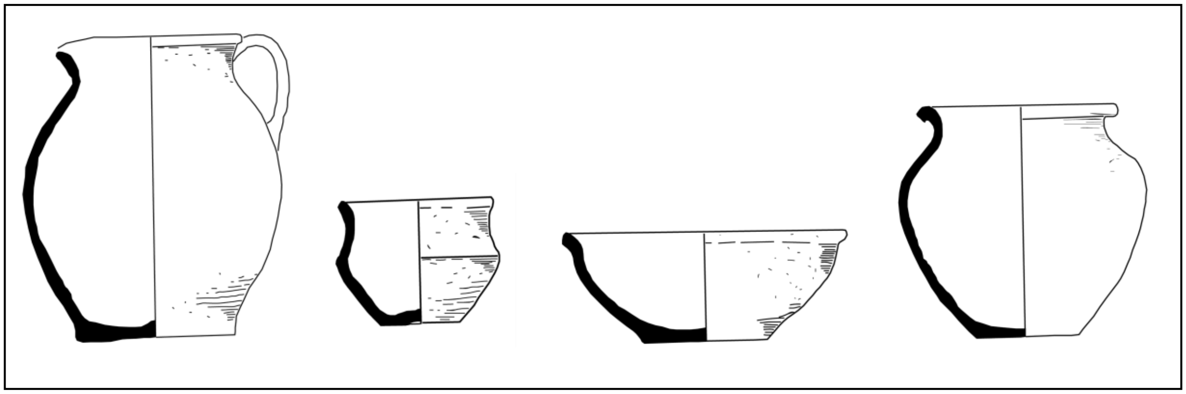


Figure 4:8. E-ware forms (not to scale) (After Peacock and Thomas 1967, fig 10).

4:3:5:3 Native production

It is apparent that in contrast with the rest of the South West, and most other regions in England, Cornwall did not experience the same decrease or complete abandonment of ceramic production. As Quinnell states, whilst the standard of manufacture declined, “a hiatus in the use of pottery has not been demonstrated” (2004, 111). New regional styles developed with the introduction of Grass-marked pottery in the 5th – 6th centuries and simpler forms such as the Gwithian Style (Quinnell, 2004, 111). The same range of imported wares as found in Devon and Wessex are found in greater quantities and on a wider range of settlements, in particular the Continental E-ware (Campbell, 1996, 2007).

Both imported and native wares are found on rounds and coastal sites and are generally consumed in the same way that imported Amphorae and Samian ware were during the Romano-British period, suggesting continuity in social traditions. The settlement evidence for this period suggests that people were abandoning rounds in the 6th century, and moving to coastal or estuarine locations in the 7th- 8th century (see Chapter 3).

The native pottery that emerges in this period is unique to the region and was first identified by Thomas (1956 1958a 1959 1960 1968b). There are no known kiln sites for Gwithian style or Grass-marked pottery and both wares are not always present on the same site, but the presence of gabbroic material in the fabric strongly suggests they were produced in Cornwall. It is important to highlight at this point that ‘gabbroic material’ refers to the distinctive clay whose source has been petrologically established by Peacock (1968) as being unique to the Lizard Peninsula. This unique clay source and its cultural significance are discussed further in Chapters 1 and 6, but in summary this unique clay was the main material used in all pottery production in Cornwall from the Neolithic period onwards (Peacock, 1968 1969b 1988).

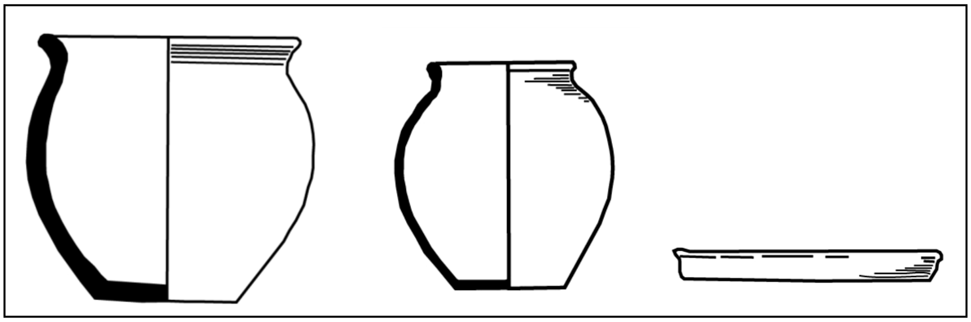


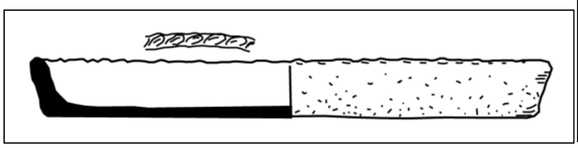
Figure 4:9. Gwithian style jars and platter (1/4 scale) (After Guthrie, 1969, Fig 12).

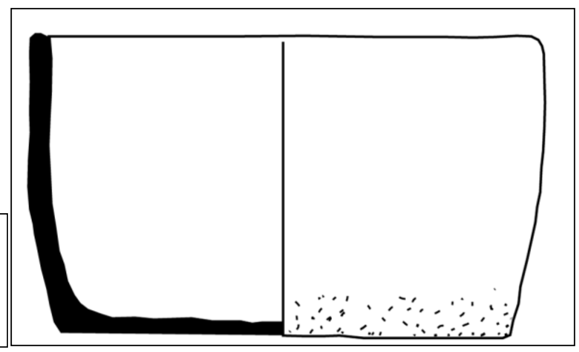
4:3:5:4 Gwithian Style

The Gwithian-style vessels, first identified at Gwithian, are thought to be a sub-Roman development of the native Romano-British forms (Fig 4:9) (Quinnell, 2004). Recent research suggests there are around 20-30 different forms within this ware and that it represents a period of ceramic experimentation (Carl Thorpe *pers. comm.*). It is currently thought to have been in use between the mid-5th and the late 7th century AD (Thorpe and Thomas, 2007, 45). This pottery is handmade and low-fired, with forms including jars and platters with sanded bases in a gabbroic fabric, except for on the Isles of Scilly where a granitic-derived fabric was used (Quinnell, 2004, 127; Thomas, 1968b, 322). The practice of sanding the bases is not seen in earlier periods in the region and has received little discussion, although there are parallels with the *Schlicklung* or sand surface treatment as seen at Mucking in the 5th century (Hamerow, 1993b, 31-38).

The Gwithian-style jars typically have an everted rim with a generally globular form, whilst the platters are flat-bottomed with short, near-vertical sides with slashed decoration on a flat rim, much like a pie dish (Thorpe and Thomas, 2007). The Gwithian-style platters were a new ceramic form in the region replacing the Romano-British flanged bowls, perhaps suggesting a change in the preparation or serving of food (Thorpe and Thomas, 2007, 45).

The distribution of this ware is generally restricted to the west of Redruth at Gwithian and Goldherring (Guthrie, 1969). However, recent excavation at Boden and re-evaluation of pottery from Carngoon Bank and Halligye, all of which are on the Lizard Peninsula, have expanded the known corpus, its distribution and dating, with a vessel from Boden radiocarbon dated to AD 590-670 (Gossip, 2011). There is also one redeposited and undated sherd of Gwithian Style from Scarcewater near St Austell in east Cornwall, which is considerably outside its current distribution (Taylor and Jones, *forthcoming)*. This ware is seen to go out of use during the 7th century, being replaced by Grass-marked ware. However, two Gwithian-style vessels with grass-marking on the base have been found on Teän in the Isles of Scilly, and these have been dated to between AD 600-770, suggesting that the later Gwithian-style forms began to be grass-marked (Ratcliffe and Straker, 1996).





Left Figure 4:10. Grass-marked platter (1/4 scale) (After Thomas, 1968b, Fig 72).
Right Figure 4:11. Grass impressions on base of Grass-marked cooking pot (1/4 scale) (After Thomas, 1968b, Fig 70).

4:3:5:5 Grass-marked Ware

The second and more common Grass-marked ware was also handmade and low-fired but came in a new and distinctive form, with impressions of chopped grass on the base and lower portion of the vessels (Figs 4:10 and 4:11) (Thomas, 1968b). The grass impressions on the base and lower body are generally thought to prevent vessels adhering to surfaces prior to firing, which represents a new production technique (Thorpe and Thomas, 2007, 45). It should be made clear that Grass-marked pottery is not *grass-tempered*, and none of the wares produced for this period in Cornwall incorporate organic-temper (Hutchinson, 1979). This ware was produced in two main forms: the straight-sided cooking pots, often found with sooted bases, and the platters which had an upright rim much like a plate. The singular use of a platter and cooking pot suggest a communal 'stew' based menu, which is reflected by the dominance of the 'stew pot' in the rest of England in this period (Hagen, 2006).

Both forms occasionally had diagonal slashed decoration on the rim (Fig 4:10). The earliest known absolute date for this ware was recently established as AD 510, the example found at Penhale Round (Nowakowski *pers. comm.*), with another date at Gwithian from AD 650-780 (Thorpe and Thomas, 2007, 46). The latest date in this chronology is from the 9th-10th-century site of Gunwalloe/Winnianton (Wood, 2010b). Other absolute dates suggest this ware was in use throughout the intervening period with dated examples from Boden (Gossip, 2009) and Hayclose (Jones, *forthcoming*) and Tresco (Taylor and Johns, *forthcoming, 33*).

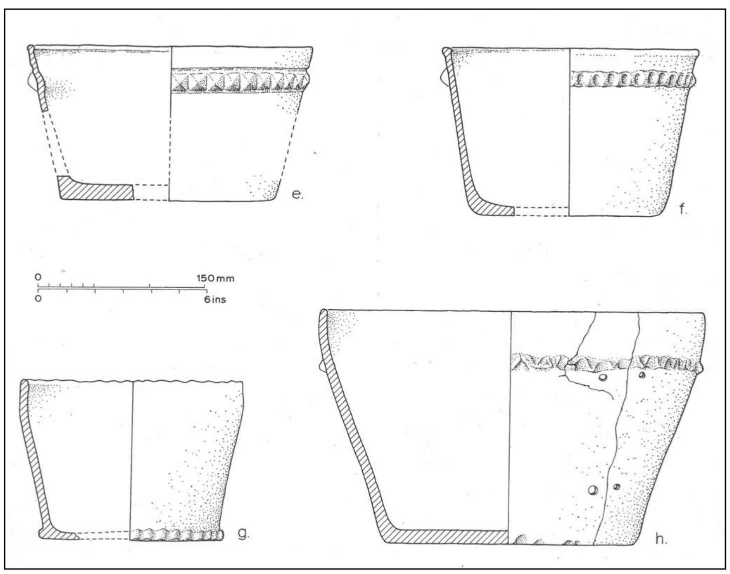


Figure 4:12. Souterrain ware (Lynn, 1978, Fig 1).

The origin of this ware remains a contentious issue. Thomas (1960, 5) suggests that the form and grass-marking tradition derives from Ulster in north-east Ireland. He also points out that the appearance of Grass-marked pottery in the 6th century coincides with the possible period of inscribed stones in Cornwall, suggesting a link with Ireland or Irish settlers in Wales at this time (Thomas, 1991, 87). A Late Iron Age type of vessel with a similar form and grass-marking has been found in Wicklow and Tyrone with a date range from AD 360 to 600 (Pearce, 1978, 37). The form of Grass-marked pottery has some parallels with 8th-9th-century

Souterrain ware in Northern Ireland (Fig 4:12) (Armit, 2008; Lynn, 1978), which has the same upright sides and diagonal slashing decoration on the rim (Thomas, 1968b). Armit (2008, 1) has recently suggested that this ware may be the result of cultural connections with Scotland, which suggests a more north-western distribution rather than southwards to Cornwall. However, as Bruce-Mitford (1997, 71) has pointed out, Souterrain ware was also grass-tempered and Grass-marked pottery is not. The distribution of the Grass-marked ware does not extend eastwards beyond Bodmin, although some sherds in a gabbroic fabric have been found in Somerset on the cemetery at Cannington, also at Glastonbury Tor and Cadbury Castle (Rahtz, 1974, 99).

4:3:6 Summary: 4th-6th century

In summary, the ceramic evidence in the South West from the 4th -6th century demonstrates different practices in each region. Interestingly, the ceramic evidence from Cornwall and Somerset in Wessex show a similar practice of using native handmade pottery alongside imported wares possibly in the context of re-occupied hillforts or rounds. The presence of Grass-marked sherds at Cannington and Glastonbury Tor could tentatively suggest a cultural affinity or trade links with Cornwall. There are further trends in the apparently aceramic counties of Devon and Dorset where native pottery production and consumption are absent, although south Devon has produced some imported wares. The native wares produced in Wiltshire demonstrate that pottery traditions were active, possibly imitating or adopting Anglo-Saxon traditions from eastern England. Cornwall is demonstrably the only region with an unbroken pottery tradition from the Romano-British period onwards, producing firmly established new wares which are consumed in large quantities.

4:4 Emerging industries: the 7th -9th century

The 7th to 9th centuries in the South West saw the re-emergence of pottery production in the east and new forms developing in the far west, with a visible geographical gap in between. This period in the rest of England is one of ceramic recovery and the beginning of small-scale production centres. There have been no imported wares found in the South West, but elsewhere imports from the Rhineland and France have been found at early *wic* sites such as Hamwic near modern Southampton (Brown, 2002), and to a lesser extent in eastern England

(Hurst, 1976). It is also the period in which the use of the slow-wheel in pottery production begins, although in most areas the production of handmade organic-tempered pottery continues unchanged (Laing, 2003, 76). This period did not seem to affect Devon either way as there is no evidence of pottery production or consumption on the sites dated to this period.

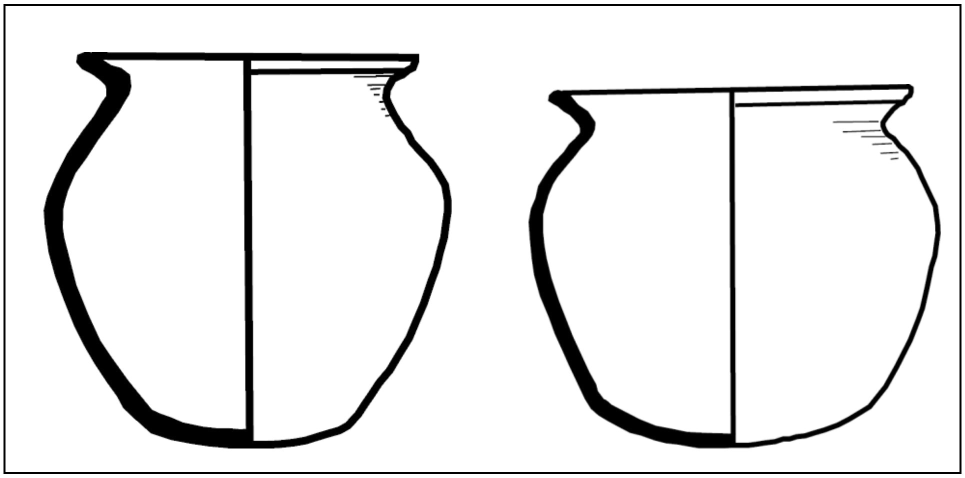


Figure 4:13. Crockington-type Ware Kiln assemblage found in Shaftesbury (not to scale) (After Carew, 2008, Fig 8).

4:4:1 Wessex

Wessex in this period provides evidence for the emergence of pottery production on a scale to serve local needs. The recently excavated kiln at Shaftesbury in Dorset has an absolute date from the late 7th century, containing local copies of the Crockerton-type ware (Fig 4:13) (Carew, 2008; Whittingham, 2008, 83). The form is similar to Ipswich wares (see below) from the east of England, but limited to jars with everted rims and rounded bases with occasional slash decoration around the shoulder of the vessel (Whittingham, 2008). The kiln is located within what later became the corn market of the Abbey precinct, which documentary sources suggest was established by King Alfred in AD 888 (Whittingham, 2008). However, it is clear from other evidence that Shaftesbury was a well-established settlement prior to this date (Keen, 1984, 212). Whittingham (2008, 82) suggests that this kiln site may have been used into the 9th century, therefore inferring some form of patronage. The potters sourced local clays to reproduce a ware first found 20 miles north at Warminster in Wiltshire (Smith, 1997), suggesting an adherence to a regional style that was made locally to cater to the needs of the community. This one example presents a different mode of production but also highlights the lack of pottery production elsewhere in Wessex. It is possible that people continued to use organic-tempered wares typical of the post-Roman period until the 8th century but due to the static form the pottery dating has been problematic. Brown (2003, 25) has noted that wheel-thrown traditions appear to be restricted to the Danelaw region, and Wessex continued with an adherence to hand-made pottery as an expression of cultural identity.

4:4:2 Pottery beyond the South West: scales of pottery production

The continuity in pottery production seen in Cornwall (see below) is not representative of the rest of England in this period. Pottery differs greatly in its mode and scale of production throughout most regions of the country. The use of the slow-wheel emerged in the 7th century with the production of Ipswich and Whitby-type ware, whilst the contemporary Maxey-type ware was still hand-made (Hurst, 1976, 284). In Wessex and Berkshire hand-made grass-tempered pottery was still being made until the 11th century (Laing, 2003, 76). This perhaps demonstrates the diversity in pottery traditions amongst the peoples of England at the time.

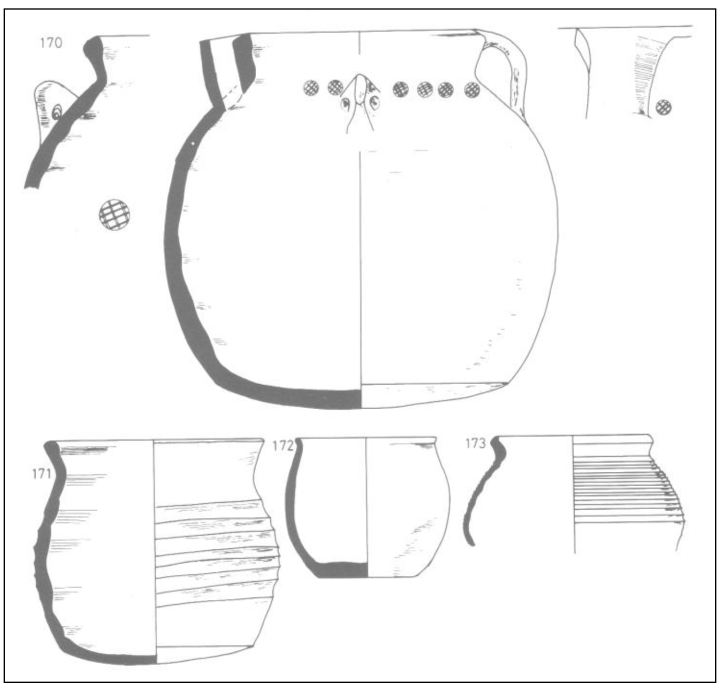


Figure 4:14. Ipswich ware forms (1/5 scale) (After Hurst, 1976, Fig 17).

4:4:3 Wheel-made pottery production

The production of Ipswich ware in Suffolk from the late 7th to early 8th century was unique, as demonstrated by its (suggested) elite patronage, its method of production, the wide range of forms, and its widespread distribution outside its production centre (Fig 4:14) (Newman, 1992, 27; Vince, 2005, 226). Ipswich ware was wheel-made and well-fired in updraft kilns, the forms were generally small squat cooking pots, bowls, lamps, bottles and pitchers with stamped decoration, (Blinkhorn, *forthcoming;* Hurst, 1976, 301).

Its distribution appears to be dictated by coastal and estuarine trade and has now been found as far north as York and as far south as Canterbury (Vince, 2005, 226). However, while widespread in East Anglia, Ipswich ware is rarely encountered in Essex, and even then, usually in small quantities (Blinkhorn, 1999). Given the geographical proximity of Ipswich, it seems likely that cultural or political factors were more important in Essex than trade or availability in the distribution of this material.

Other wares imitated Ipswich ware such as Whitby-type ware cooking pots dating from AD 650-850 produced at Whitby in North Yorkshire and distributed to other monastic sites such as Jarrow and Monkwearmouth on the north-east coast (Hurst, 1976, 305). These two production centres demonstrate a link with specific social situations, as Whitby-type ware is linked to ecclesiastical networks and Ipswich to the early *wic* site. This could also be seen in London and Hamwic, who produced small amounts of hand-made pottery. This period also saw the re-establishment of imported (Frankish) wares coming into England from the continent, but these did not influence the local pottery styles (Brown, 2003, 26).

4:4:4 Hand-made pottery production

The production of Maxey-type ware demonstrates that hand-made pottery could achieve a similar distribution. This shell-tempered bucket-like form was distributed from its source in Cambridgeshire to Lincolnshire and the south-east Midlands (Hurst, 1976; Vince, 2005). The Hamwic ware from Hampshire is also hand-made from around the 8th century (Brisbane, 1998; Timby, 1988a). It has been found in Dorset and Somerset with a couple of examples in Devon and Cornwall (Allan, 1984; Allan and Langman, 1998-9). This is considered to be the earliest pottery production centre on the south coast and closest to the South West, although (as discussed above) the new kiln site at Shaftesbury demonstrates that this picture is changing. The differing modes and social contexts of production seen in the rest of England in this time suggest that no one tradition had uniformly been established, but that production was moving towards centralised mass-production and distribution within urban centres.

4:4:5 Cornwall

In Cornwall the production of Gwithian Style declines and a new form of pottery, the Bar-lug Cauldron, emerges, whose distribution is entirely coastal or estuarine (Fig 4:15). Otherwise, the production of pottery in Cornwall in this period continues as it did in the post-Roman period, with Grass-marked ware being used until the 10th century, although variations in the traditional gabbroic fabric have been noted (as discussed further in Chapter 8).

4:4:5:1 Bar-lug pottery

The form of the new Bar-lug vessel is thought to be an evolution of Grass-marked cooking pots with the addition of lugs, hence the name (Fig 4:17) (Thomas, 1968b; Thorpe and Thomas, 2007). However, recent analysis suggests that it may have been a later addition to the existing Grass-marked ware tradition (Thorpe *pers. comm*.). Bar-lug pottery is yet to be scientifically dated via residue analysis, therefore its dating is based on stratigraphic or relative dates. It was identified at Gunwalloe and later classified by Thomas based on the assemblage at Gwithian. The initial date for this ware was recently obtained from a stratigraphically secure context at Gwithian yielding a radiocarbon date of AD 650-780 (Thorpe and Taylor, 2009). The latest carbon date for this ware is AD 856-996 from Gunwalloe, with other examples from relative dated 11th century contexts in Cornwall. This strongly suggests that Bar-lug and also Grass-marked pottery was in production for around five hundred years.

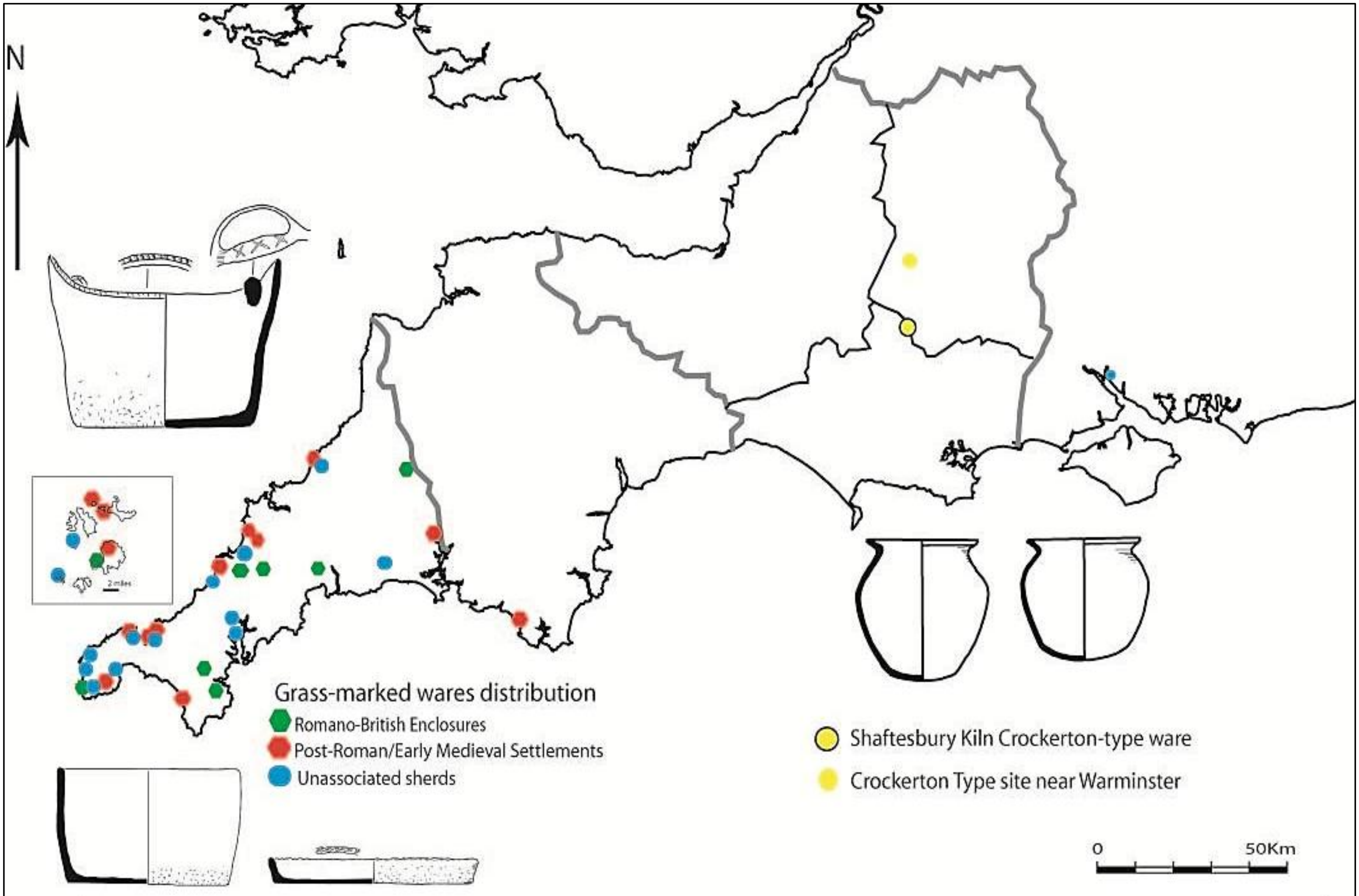


Figure 4:15 Showing the ceramic evidence in the South West of England between the 7th - 9th centuries (Source: complied and drawn by Author)

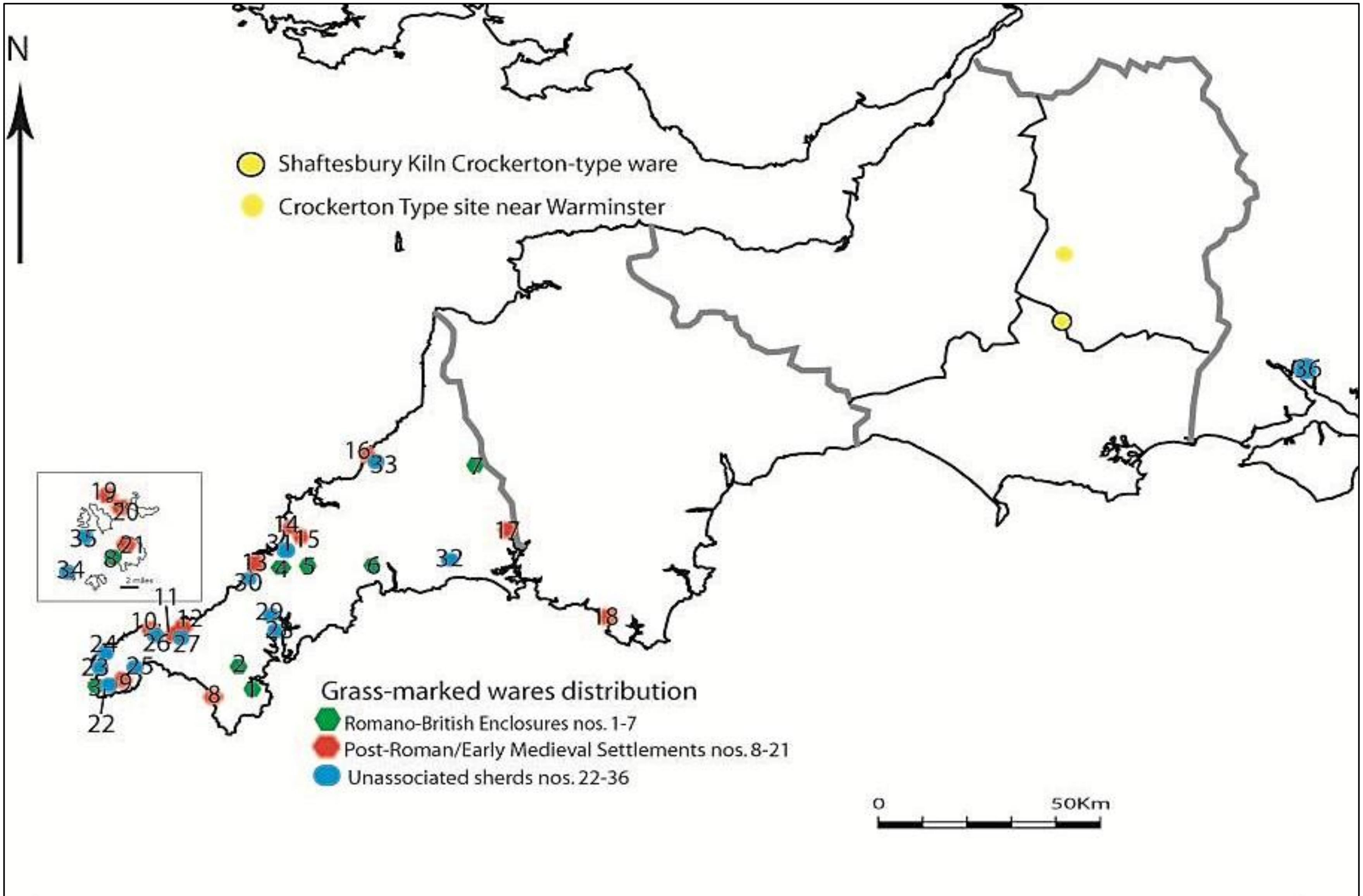


Figure 4:16. Numerical index of place names and references as depicted in Fig 4:15, information avaliable on following page (Source: complied and drawn by Author)

Romano-British Enclosures
1. Boden Vean St Anthony-in-Meneage, Cornwall (Gossip 2009)
2. Merther Uny, Cornwall (Hutchinson 1979)
3. Mean Castle, Cornwall (Hutchinson 1979)
4. Hay Close, Cornwall (Thorpe *pers. comm*.)
5. Penhale Round, Cornwall (Nowakowski *pers. comm*.)
6. Trethurgy, Cornwall (Quinnell 2004)
7. Killibury, Cornwall (Thomas *pers. comm*.)

Post-Roman and early medieval settlements
8. Gunwalloe, Cornwall (Thomas 1963)
9. Sanctury Bosleven, St Buryan, Cornwall (Thomas 1968b)
10. Hellesvean, Cornwall (Hutchinson 1979)
11. Phillack Towans, Cornwall (Hutchinson 1979)
12. Gwithian, Cornwall (Thomas 1968b)
13. Perran sands, Cubert (Hutchinson 1979)
14. Mawgan Porth, Cornwal (Bruce-Mitford 1997)
15. Lanvean, Cornwall (Hutchinson 1979)
16. Tintagel pipeline, Cornwall (Thorpe *pers. comm*.)
17. Calstock, Cornwall (Smart *pers. comm*.)
18. Bantham, Devon (May and Weddell 2002)
19. St.Helens, Isles of Scilly, Cornwall (Thomas *pers. comm*.)
20. Tean, Isles of Scilly, Cornwall (Thomas 1968b)
21. Hugh town, St Mary's, Isles of Scilly, Cornwall (Thomas 1968b)

Unassociated sherds
22. St Buryan, Cornwall (Thomas 1968b)
23. Boscaswell, Cornwall (Hutchinson 1979)
24. Chun Castle, Cornwall (Thomas 2007)
25. Penwith College, Cornwall (Thorpe *pers. comm*.)
26. Higher Tregena, Cornwall (Hutchinson 1979)
27. Hayle castle, Cornwall (Thomas *pers. comm*.)
28. Tremough, Cornwall (Gossip *pers. comm*.)
29. Trelissick, Cornwall (Taylor and Thorpe 2008)
30. Kelsies, Cornwall (Hutchinson 1979)
31. St Columb Minor, Cornwall (Hutchinson 1979)
32. Duloe, Cornwall (Hutchinson 1979)
33. Trevia, Cornwall (Hutchinson 1979)
34. Annet, Isles of Scilly, Cornwall (Thomas 2005)
35. Samson, Isles of Scilly, Cornwall (Thomas 2005)
36. Southampton, Hampshire (Brown 2002)

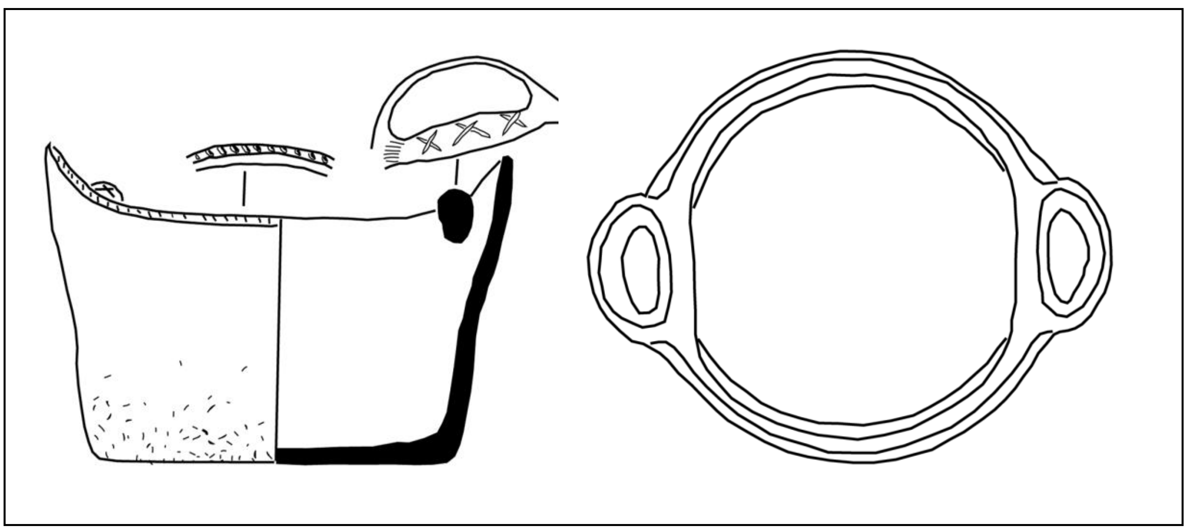


Figure 4:17. Bar-lug vessel view from above (not to scale) (After Thomas, 1968b, Fig 73).

The largest assemblages of this material come from Mawgan-Porth (Bruce-Mitford, 1997) and Gwithian (Thomas, 2005), although around 20 settlement sites and a further 30 find spots have also produced Bar-lug pottery. The quantity of Bar-lug and Grass-marked pottery retrieved from settlements suggests that, per household, the consumption of pottery is perhaps greater than amounts seen elsewhere in England. Another point for consideration is the ratio between the time invested in production and the rate of consumption. The size and weight of a Bar-lug cooking pot makes the quantity of vessels deposited over a short phase look extravagant in comparison to pottery produced elsewhere in England in this period. This suggests that not only the skill but also the time was available to produce this pottery.

Figure 4:18. Showing the Bar-lug pot (Authors Photograph)

The Bar-lug vessels are a large hand-made, high-fired coarse-ware with grass-marked flat bases and straight-sided profile, with an average height of 0.30m (Fig 4:18). The rim was pulled out at two opposite points to form an ear around and above the rim line (Bruce-Mitford, 1997, 72), and a clay bar inserted along the original rim circumference, bowing inwardly, with two thumb impressions on the exterior (Bruce-Mitford, 1997, 72). The clay bars often have abraded indentations on the underside confirming their use as a suspension aid, the lugs are thus thought to protect the cord from burning whilst it was suspended over a fire (Fig 4:19) (Hutchinson, 1979, 81). Occasionally, a slash, ‘nicking’ or ‘piecrust’ decoration is seen on the rim and bar of the lug, suggesting these vessels were intended to be viewed from above (Fig 4:17), and it has been suggested that a lack of decoration is indicative of a later production date (Thorpe *pers. comm.*). This form represents a similar eating practice as the rest of England in this era, as the dominance of large cooking pots is thought to represent a diet of stew or gruel (Hagen, 2006; Magennis, 1999). An analysis of Bar-lug cooking pots carried out by Hutchinson found the remains of carbonized cereal gruel (1979, 83).

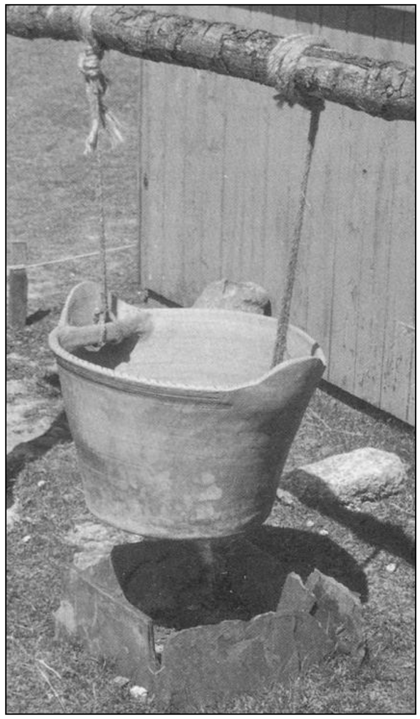


Figure 4:19, Possible method of suspension (Thorpe and Thomas, 2007, Fig 13).

4:4:5:2 Origin of Bar-lug

The distribution of this ware and the quantities found suggest its consumption within Cornwall was high and its production was constant. Its distribution does not appear to extend further east than the Tamar Estuary until the 10th century (Hutchinson, 1979), with some outliers in the Channel Islands on Alderney (Kendrick, 1930), a handful of sherds from Southampton Castle (Peacock, 1986b) and the Isles of Scilly, where large quantities have been excavated (Thomas, 1959). Dunning in (1959) suggested its possible presence in east England at a site in Barking in Essex and St Neots in Cambridgeshire, although conclusive evidence was never provided.

The origins of this form remain a contentious issue. Thomas (1959, 106; 1968b, 316) suggested cultural influences from Frisian and Irish traders in the 9th century. Bruce-Mitford, in reference to Kendrick's work, cited the presence of similar forms at Hedeby in Denmark (Fig 4:20) (Hubener, 1959) and Lund in Sweden, or a northern Germanic influence (1997, 71; Kendrick, 1930). Jope (1963, 337) highlights the point that whilst some Flemish towns were receiving tin from Cornwall in the 10th century, the northern distribution of Bar-lug would suggest Frisians travelling all the way around Cornwall rather than using the more practical southern ports.

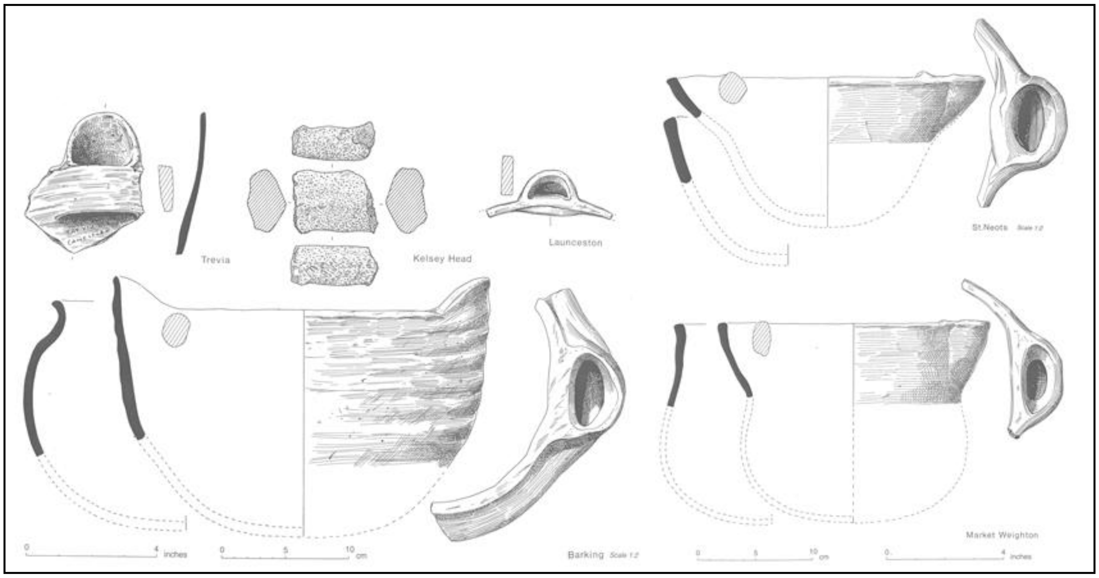


Figure 4:20. Possible Bar-lug forms from outside Cornwall (Bruce-Mitford, 1997, Figs 20 and 15).

All the non-Cornish examples cited above have rounded bases, are made in a different fabric, all date roughly to the 8th-9th centuries and there is no clear evidence for trade with Cornwall in this period. These points of contention, and the early 7th-century date for Bar-lug in Cornwall, strongly suggest that the form was a native evolution of the Grass-marked cooking pot and developed in isolation.

The form of Bar-lug pottery does not change during the 7th -11th centuries, which makes dating problematic. It is, however, clear that it stopped being produced in the 11th century (Hutchinson, 1979). Turner (2006, 80) suggests that some Bar-lug sherds post-date the Norman Conquest, such as at Mawgan-Porth with its relative date from a coin of AD 910, but that generally they are pre-Conquest vessels. A recent radiocarbon date of AD 856-996 acquired by the author from a stratified midden at Gunwalloe/Winnianton has provided the first carbon date and thus evidence for its use into the 10th century (Wood, 2010b, 16). This pottery seems to have been the standard household ware into the 9th and 10th centuries, as residual sherds have been found in the Norman phase of Launceston Castle (Brown *et al.*,

2006) and Southampton Castle (Peacock, 1986b). Archaeological evidence suggests that more typically Norman/medieval forms replaced Bar-lug pottery after this date (Todd, 1987, 285).

4:4:6 Summary: 7th to 9th century

The 7th to 9th centuries in the South West once again demonstrate diversity in the mode of pottery production, whilst simultaneously representing unity in the development of new ceramic forms. The production of Crockerton-type ware perhaps represents the emergence of centralised production centres similar to Ipswich ware, thus forming part of the wider development in ceramic production in England. This adherence or reflection of change in the pottery traditions of the 7th century seems to represent a wholesale shift for the first time in almost 200 years.

Cornwall's isolation and unique pottery tradition has always been viewed as bucking the trends observed in the rest of the country, but the development of the Bar-lug form does represent an equal level of ceramic innovation in the 7th century. The form of the vessels produced in Cornwall may have been different to those of Wessex, but the motivation to alter their ceramic traditions in the 7th century after centuries of stagnation suggests similarity a similar response to a new era. Therefore, it is possible to say that ceramic traditions in the South West changed around the 7th century and that this was the beginning of a re-emergence of pottery production in Wessex and a new style of pottery for Cornwall. The continuous presence of pottery in Cornwall throughout this period is of especial value due to the lack of pottery in Devon and elsewhere, and that value can be translated into social and cultural indicators of change.

4:5 The re-emergence of production: 9th to 11th century

The 9th to the 11th centuries in the South West see the beginnings of centralised-production and uniform styles being adopted throughout. The adoption of the sagging base cooking pot heralded the first sign of unity in native pottery forms for several centuries (Fig 4:21). The late 10th century appears to have been a turning point in pottery production and distribution, laying the foundations of production for around the next 400 years.

The model of elite patronage suggested for the production and distribution of Ipswich ware appears to be responsible for the developments in Wessex and Devon, with production starting in the old Roman towns and cities, early *wic* and later *burh* settlements and distributed along their associated networks. This became possible due to the changing social and economic structures of the region, nowhere more apparent than in Cornwall. The absence of early centralised market or urban centres in that county resulted in the majority of early towns being planted in the post-Conquest period (see Chapter 3) (Beresford, 1967, 400). The new market towns linked the county together via a new market network that, for the first time, offered a comparable settlement and communication system to engage with the rest of the South West. As a result, this era of pottery production and consumption in the South West has more tangible and obvious links to known social and economic changes related to pre- and post-Conquest events.

4:5:1 Devon

The establishment of pre-Conquest urban centres in Devon by King Alfred in the late 9th century essentially broke the 400 year aceramic deadlock, making society once again visible. The burh at Exeter was founded in AD 893, followed by *burhs* at Barnstable, Lydford and Halwell (later Totnes) (Highham, 2008, 174). This soon saw the production of coinage, although only Exeter produced pottery (Allan *pers. comm*.). The first pottery identified in Exeter, prior to the production of its own, was the hand-made chert- and limestone-tempered wares derived from Upper Greensand deposits and thought to originate in the Blackdown Hills (Allan, 2003a; Allan *pers. comm*.). This chert- and limestone-tempered pottery, now generally termed chert-tempered ware, was widely distributed in south Somerset and throughout Devon with some reaching as far as Launceston Castle in Cornwall (Brown *et al.*, 2006, 270). This ware is commonly encountered on pre-Conquest urban sites, perhaps suggesting that the founders of these sites had to import ceramics due to the lack of local production (Allan *pers. comm*.).

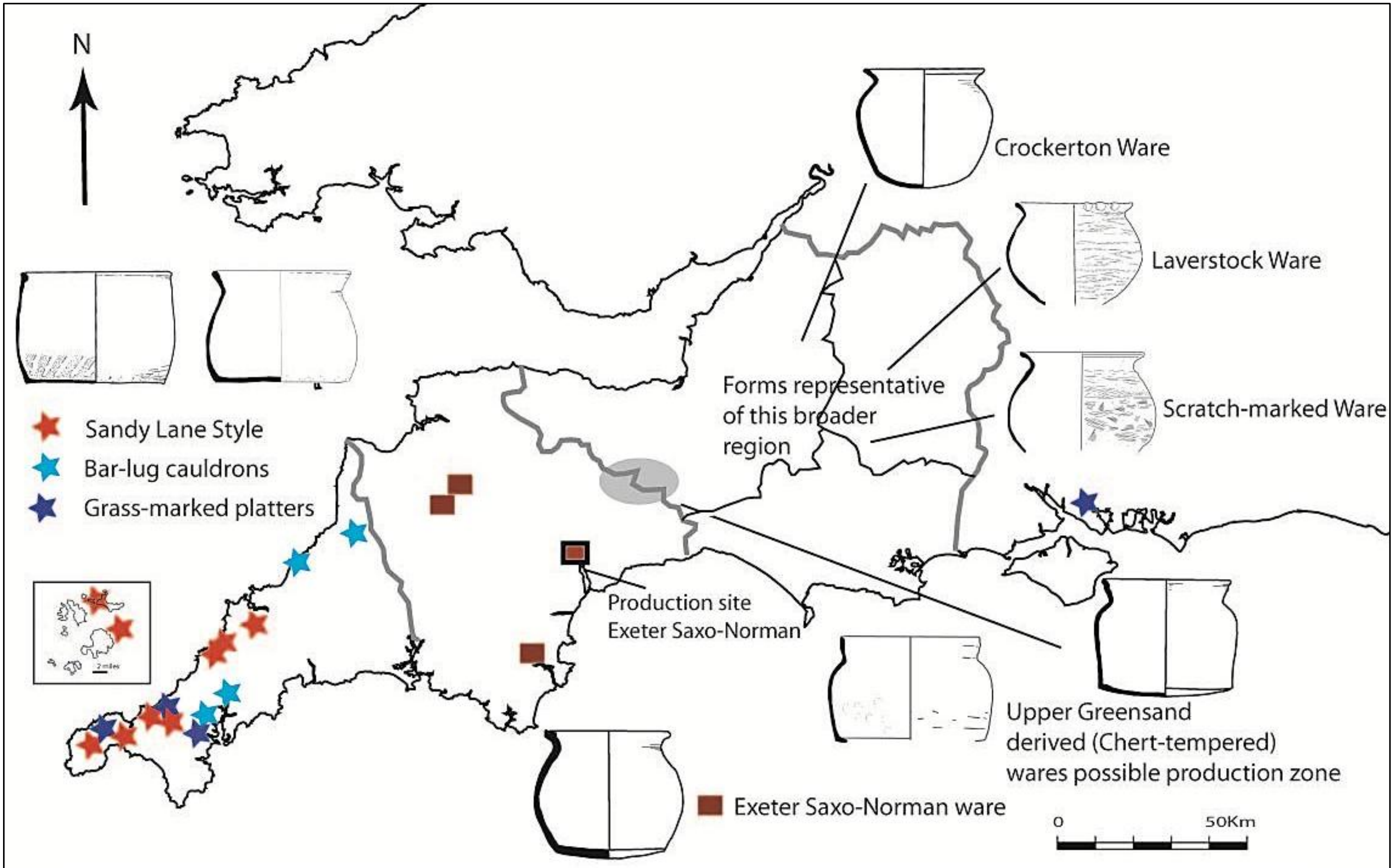


Figure 4:21 The wares produced in the South West of England between the 9th and the 11th centuries (Source: complied and drawn by Author)

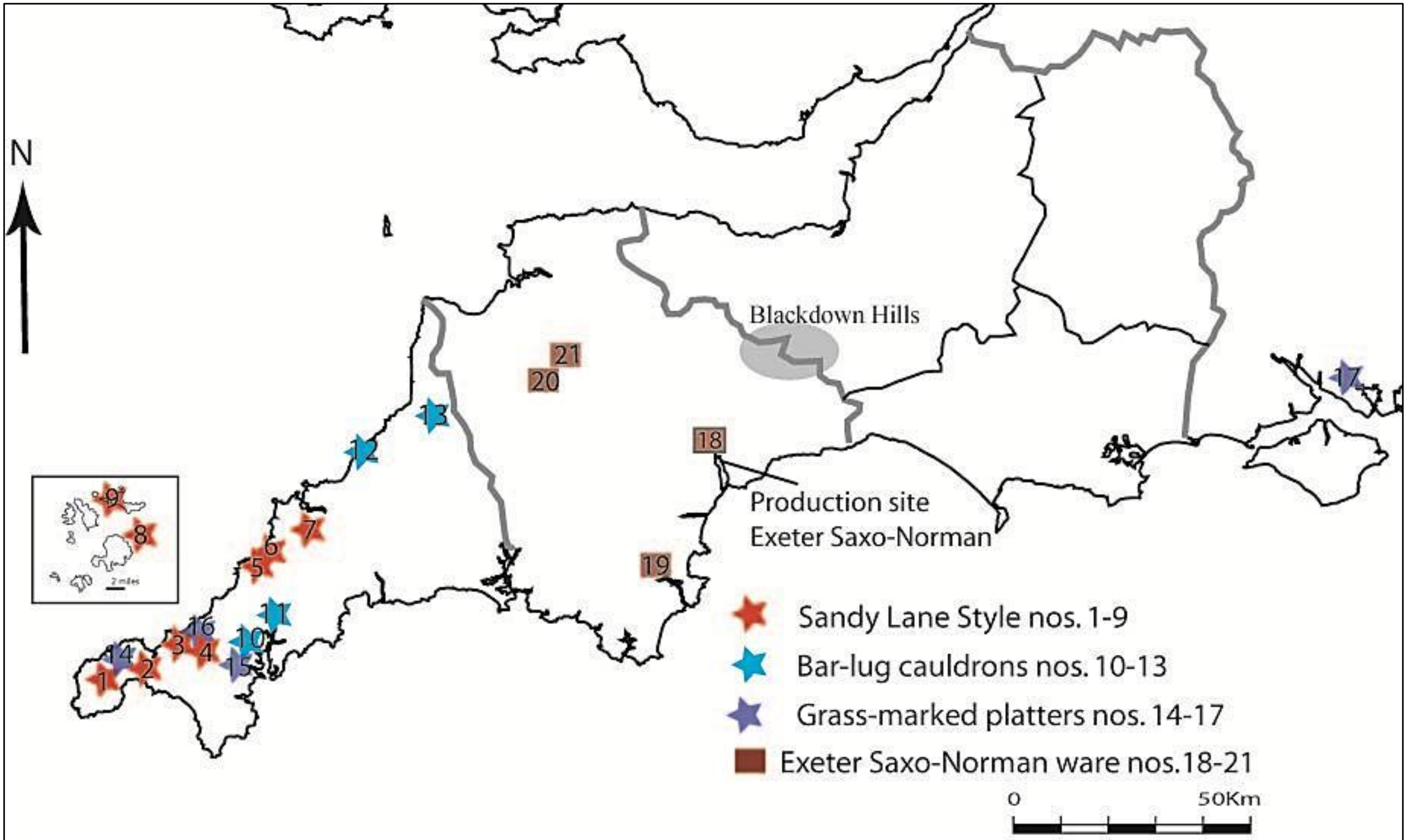


Figure 4:22 Numerical index of place names and references as depicted in Fig 4:21, information avaliable on following page (Source: complied and drawn by Author)

Sandy Lane Style

1. Old Lanyon Farm, Cornwall (O'Mahoney 1994b)

2. Chapel Jane, Cornwall (Russell and Pool 1968)

3. Crane Godrevy, Gwithian, Cornwall (Thomas 2005)

4. Fenton Ia, Cornwall (Thomas 1968b)

5. Lanvean, Cornwall (Hutchinson 1979)

6. Padstow pipeline, Cornwall (Thorpe *pers. comm.*)

7. Penhale Round, Cornwall (Thorpe *pers. comm.*)

8. St.Helens, Isles of Scilly, Cornwall (Hutchinson 1979)

9. St Nicholas Priory, Tresco, Isles of Scilly, Cornwall (Thomas 1991)

Bar-lug cauldrons

10. Trelissick, Cornwall (Taylor and Thorpe 2008)

11. Pydar St. Truro, Cornwall (Allan and Langman 1998-9)

12. Mawgan-Porth, Cornwall (Bruce-Mitford 1997)

13. Launceston Castle, Cornwall (Brown et al. 2006)

Grass-marked platters

14. Old Lanyon Farm, Cornwall (O'Mahoney 1994b)

15. Tremough, Cornwall (Gossip *pers. comm.*)

16. Crane Godrevy, Gwithian, Cornwall (Thomas 2005)

17. Southampton, Hampshire (Timby 1988a)

Exeter Saxo-Norman ware

18. Exeter, Devon (Allan 1984)

19. Totnes, Devon (Allan 1984)

20. Lydford, Devon (Allan 1984)

21. Oakhampton Castle, Devon (Allan 1984)

The excavation of a kiln site at Bedford Garage in Exeter, originally thought to be 14th century in date (Fox and Dunning, 1957), has now been dated by Allan (1984, 27) via stratigraphic relationships with imported pottery to the late 10th century. This kiln produced wheel-made cooking pots with sagging bases in a range of sizes, with a small percentage of the vessels having spots of glaze (Fig 4:23) (Allan, 1984, 29). The distribution of Exeter Saxo-Norman ware was very limited, with only a very small number of sherds turning up at Totnes and Okehampton Castle; it is otherwise only found within Exeter (Allan, 1984, 6).

Exeter Saxo-Norman ware belongs to a different tradition than other south-western wares, and while it is generally not comparable to Saxo-Norman wares in southern England, it may be analogous with products from northern France (Allan, 1984, 30; Hurst, 1977, 77). It is possible that this pottery represents the establishment of French potters in Exeter, a practice which has also been suggested at Castle Neroche in Somerset (Davison, 1972) and at Stampford in Lincolnshire (Kilmurry, 1980). This suggests that the art of potting had been all but lost in Devon, which is, of course, entirely consistent with that county's aceramic past. This may also hint at the lack of social connectivity between Devon and the other counties, who were producing very specific vessel forms – for instance, Allan (1984, 31) has highlighted that no Laverstock wares (Wiltshire) or any other inland sources have been found in Exeter.

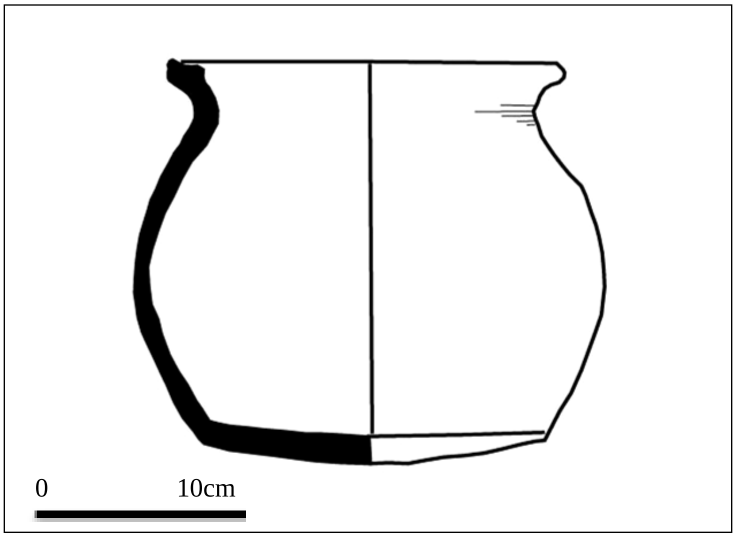


Figure 4:23. Exeter Saxo-Norman ware (After Allan 1984, Fig. 8).

In comparison to Wessex, pottery production in Devon was in its infancy, which suggests that there was little demand in the region for pottery prior to the 10^{th} century. This is supported by the importation of pottery for use in Exeter after its foundation and the limited consumption of Exeter Saxo-Norman pottery outside the city. The pottery consumption of North Devon only reached comparable levels to Exeter in the 13^{th} century (Allan *pers. comm*.). The Exeter Saxo-Norman ware stopped being produced around the 13^{th} century, when cheaper imported Continental pottery and metal cauldrons begin to dominate the household assemblage (Allan *pers. comm*.).

4:5:2 Wessex

The connection between the foundation of *burhs* and increased pottery consumption is seen first in Wessex then later in Devon. This is perhaps related to a similar Anglo-Saxon trend occurring in eastern of England. The growing urban population of Anglo-Saxon *burhs* in Wessex has consequentially resulted in a greater quantity of pottery production. The evidence of this can be seen at Old Sarum, Wareham, Shaftesbury, Wilton and Ilchester, along with many more potential urban production sites.

These growing urban centres offer a new insight into the mode of pottery production in this period in the South West. Often pottery was initially sourced from external production centres, eventually instigating the need for production within them, as witnessed at Exeter. The availability of deeply stratified urban archaeological deposits also enables a structured view of not only chronologies but also distribution and social networks between centres. This locus of investigation has revealed a generalised pattern in urban pottery consumption in Wessex and Devon, firstly, the initial use of the local or Chert-tempered Upper Greensand coarse-ware pottery produced in the Blackdown Hills, and secondly the establishment of their own production sites within the bounds of the settlement. There is some evidence for Chert-tempered ware being used during the construction phase at both Launceston and Tintagel Castle in the 10th -11th century, presumably brought to the site by its builders (Saunders, 2006; Thorpe, 2007, 266).

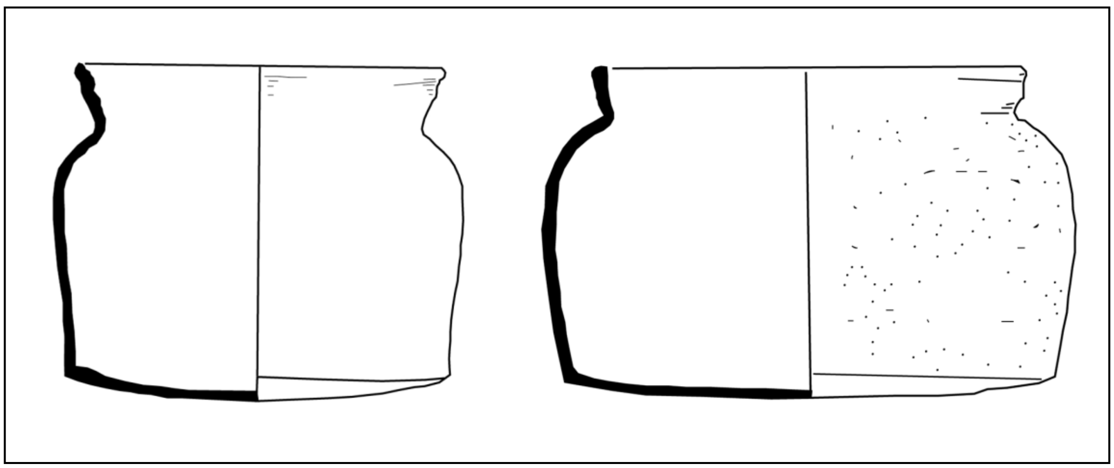


Figure 4:24. Chert-tempered or (Upper Greensand) (1/4 scale) (After Allan, 1984, Fig 15).

4:5:2:1 Chert-tempered ware (also known as Upper Greensand)

Chert-tempered ware appears in the late 10th century and supplying early urban centres from east Cornwall to east Somerset from an unknown production site north of the Blackdown Hills (Fig 4:24) (Allan *et al* 2010; Allan, 2003a; Gutiérrez 2009, 113). Petrographic analysis has been used to determine the source area (Taylor, 2003) and the ware has become an invaluable indicator of 11th-century activity. This unknown production site appears to have operated into the 13th century, its situation most likely determined by a number of factors, as the Blackdown Hills went on to see medieval and post-medieval pottery production (Allan, 2003a). The full distribution of this ware throughout the south west is beyond the scope of this study, but future research will undoubtedly reveal the location of the source and the true extent of the pottery produced.

Examples have been found at the non-urban site, on rural farmstead excavated at Brent Knoll in Somerset that was owned by Glastonbury Abbey (Gutiérrez 2009). The majority of sites that consumed Chert-tempered ware were urban sites with links to either a pre-Conquest royal or monastic settlement. The site at Brent Knoll also produced pottery that has been petrographically identified as originating from the Quantocks in north Somerset, which has not currently been identified elsewhere (Gutiérrez, 2009, 112). This possibly provides evidence that agricultural communities had access to a similar network available to urban centres at this time in the South West, although it only forms a small proportion of assemblages.

4:5:3 Production trends in the South West

It has been suggested that this process was not uniform throughout the South West and that in Cornwall, and to a lesser extent in Devon, the adoption of the wheel and glazing was much slower, being a century behind the east of England (Brown *et al.*, 2006, 282). The dynamic relationship between short-term production for local consumption in the foundation phases of *burhs* and towns, and the large amounts of wheel-thrown vessels suggesting specialisation appears on other urban centres, perhaps demonstrates a trend in the social mechanism of production in this period.

Wessex and Devon seem to adhere to a similar process of ceramic regeneration. Cornwall, on the other hand, is at a disadvantage in terms of comparative study, as no *burhs* were founded in the county. There is, however, evidence for a link to the Devon *burhs*, as a coin of Aethelred II coin minted at Lydford and found at Mawgan-Porth, whose ceramic assemblage is solely composed of Bar-lug pottery (Bruce-Mitford, 1997). Although this connection is rather tenuous, it does suggest there was some physical network connecting a *burh* and a

Cornish settlement, but one in which the exchange of pottery was of no importance.

4:5:4 National trends

The archaeological evidence of a revival in ceramic production in the South West is generally overshadowed by its prolific neighbour, Hampshire, whose wares have dominated the regional lists of southern England in this period since Hurst's review in 1976 (Hurst, 1976, 286). The rest of England witnesses an explosion of production sites and new wheel-made wares whose growing distribution reflects the increased consumption by the population.

4:5:5 Cornwall

The later examples of Grass-marked pottery reinforce its initial cultural malleability, as it was once again used alongside new forms. At Old Lanyon Farm in west Cornwall, heavily-sooted slightly developed forms of Grass-marked platters were being used (O'Mahoney, 1994b, 154). The cooking pots found were also grass-marked, but thought to represent a new form, termed Sandy-Lane ware (see below). The same fabric was later used to produce wheel-finished, thicker vessels consistent with later Sandy-Lane forms, dating to the 12th-13th centuries in a granitic fabric (O'Mahoney, 1994b, 155). However, the fabric of the majority of Sandy Lane Ware is gabbroic and is restricted to the West Penwith area of Cornwall. Unfortunately, the assemblage at Old Lanyon Farm cannot be regarded as stratified and the dating of these wares is dependant on their form (O'Mahoney, 1994b, 160).

4:5:5:1 Bar-lug and the Norman connection

The pottery produced in Cornwall from the 10th -11th century represents the birth of new forms on old sites, and the curation of old forms on new sites. Both developments are associated with the Norman occupation of the region. Bar-lug pottery continues to be produced, being found at Launceston Castle, Truro and Mawgan Porth. This later Bar-lug pottery does not feature the same grass-marked base as in earlier periods (Thorpe and Taylor, 2009). Grass-marked ware also continues, with examples found at Gwithian and Old Lanyon Farm in west Cornwall (O'Mahoney, 1994b; Thorpe and Thomas, 2007) and also

Southampton in Hampshire (Timby, 1988a). The Bar-lug pottery from Launceston Castle was found in the Norman construction layers along with Chert-tempered wares (Brown *et al.*, 2006, 281). The fabric of those 195 sherds is divided between gabbroic, highly micaeous igneous and a mix of the two (Brown *et al.*, 2006, 269), perhaps suggesting that some west Cornish vessels were brought to the castle and subsequently copied. The Bar-lug sherds may be residual, but suggest that native pottery in Cornwall was available for consumption by incoming Norman workers and/or settlers, which did not happen in Exeter during its reoccupation.

The significance of this last phase of Bar-lug pottery production is that it coincides with the foundation of Norman markets centres and settlements. In addition to Launceston Castle, the discovery of an almost complete Bar-lug vessel in Truro below 12th-century deposits supports such a link (Allan and Langman, 1998-9). Truro was the site of a Norman castle founded around AD 1140 by the Earl Richard De Lucy, associated with the estuarine settlement of Newham (Beresford, 1968, 413; Shepard, 1976). There is also evidence of Grass-marked and non-Grass-marked Bar-lug pottery at Trelissick, only a few miles down the Fal estuary from Truro (Taylor and Thorpe, 2008; Thorpe and Taylor, 2009). The Bar-lug pottery from Trelissick is the first pottery to be associated with a *tre* place name (see Chapter 3). It is also the first example of decoration in the form of a cross incised on the outer lug surface, perhaps indicating a Christian influence (Fig 4:25). A second has recently been excavated in a sunken house at Gunwalloe.

Figure 4:25. Incised cross on external surface of Bar-lug from Trelissick (Author's Photograph).

However, Bar-lug pottery is not present on all Norman sites in Cornwall, as only Chert-tempered ware is associated with the construction of Tintagel Castle (Freeman, 2007, 258). Chert-tempered ware was also found on the chapel site of Lammana, near Looe (O'Mahoney, 1994a, 116). The evidence suggests that Bar-lug pottery *and* Chert-tempered wares were being used during the foundation of the Norman planted market and administrative centres. However, the production of Bar-lug pottery did not continue beyond this initial phase of occupation, which witnessed the end of 500 years of production in Cornwall.

4:5:5:2 Bar-lug goes to Hiberno-Norse Ireland

However, the link between Bar-lug pottery and Norman settlers does not end in Cornwall. It appears that long after Bar-lug pottery stopped being used in Cornwall, it turns up in the 11th-12th century high status longphorts of Waterford, Dublin and possibly Wexford in Ireland (Barton, 1988; Hurley and Scully, 1997). These sites were initially founded by Vikings, and later developed into Hiberno-Norse towns in the early 10th century and subsequently came under Anglo-Norman rule (O'Sullivan *et al*., 2008). Substantial quantities of Bar-lug pottery have been found in a rectangular wooden house fronting onto a street in Waterford. It contained around 898 sherds of pottery, relating to four phases of occupation (Fig 4:26) (Hurley and Scully, 1997, 329). This is the largest assemblage of Bar-lug pottery anywhere in the 10th-11th century.

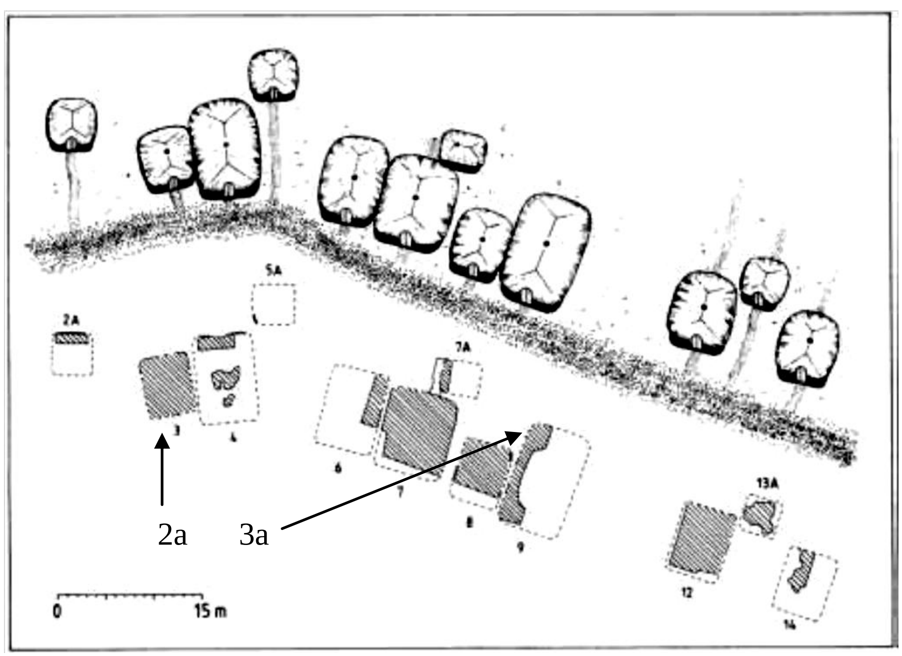


Figure 4:26. Reconstruction of houses fronting Peter street, house numbers 3 on far right and 2a far left contained Bar-lug pottery and are associated with bone working (Hurley and Scully, 1997, Fig 55).

The sherds have grass-marking on the base and lower portion of the body and internal charring. Interestingly, there is one example of an externally decorated lug with incised lines (Fig 4:27). This could be paralleled with the decorated lug found at Trelissick and Gunwalloe in Cornwall, perhaps representing a later Norman trait of Bar-lug ware. The fabric of the vessels from Waterford is described as "very coarse and includes gravel temper", which suggests a non-gabbroic fabric (Gahan and McCutcheon, 1997, 289), but the fabric is not local to Waterford and thus may represent pottery brought from Cornwall (McCutcheon *pers. comm.*).

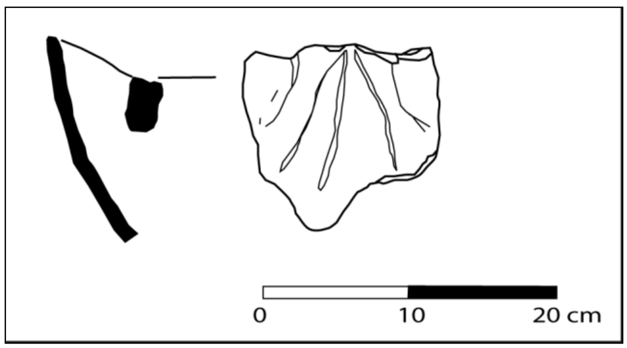


Figure 4:27 Incised lines on external surface of Bar-lug from Waterford, Ireland (After Gahan and McCutcheon, 1997, Fig 11.1).

The phases of this house, named PS3, have been dated by dendrochronology to between AD 1080 and 1155 (Brown, 1997, 647). This would make it a contemporary of Launceston Castle and Truro. The Bar-lug pottery was found in association with pottery from Normandy, Bristol, Stamford, Bath and South-East Wiltshire (Gahan and McCutcheon, 1997, 330). There are also some vessels similar in form to Sandy Lane style 1, although confirmation would require further detailed examination of the Waterford assemblage. The pottery from the house was found in floor layers, backyard areas, pathways and rubbish pits, suggesting Bar-lug pottery was an everyday item utilised as any other vessel.

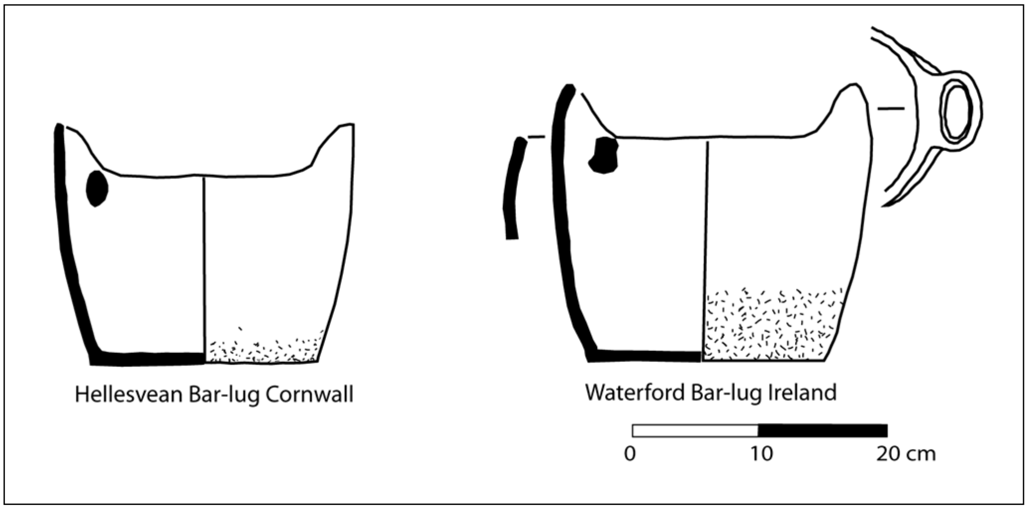


Figure 4:28 Showing the similarity in form between the Bar-lug pottery from Hellesvean in Cornwall and Waterford in Ireland (Wood, 2010a, Fig 2).

The clearly defined house-plots are thought to represent individual households of merchants, craftsmen and families living in a cosmopolitan trading centre (Hurley, 1998, 2010). It is possible that the concentration of Bar-lug pottery in house plot PS3 could represent a Cornish merchant or family who brought their own pottery or traditional pottery styles with them. The similarity between Cornish and Waterford forms confirms this relationship (Fig 4:28). There are also some examples of Bar-lug pottery a little further up the coast from Waterford at the port of Wexford (McCutcheon *pers. comm.*). The Bar-lug pottery comes from a small house in that longphort town dated to the pre-12th-century phase of occupation.

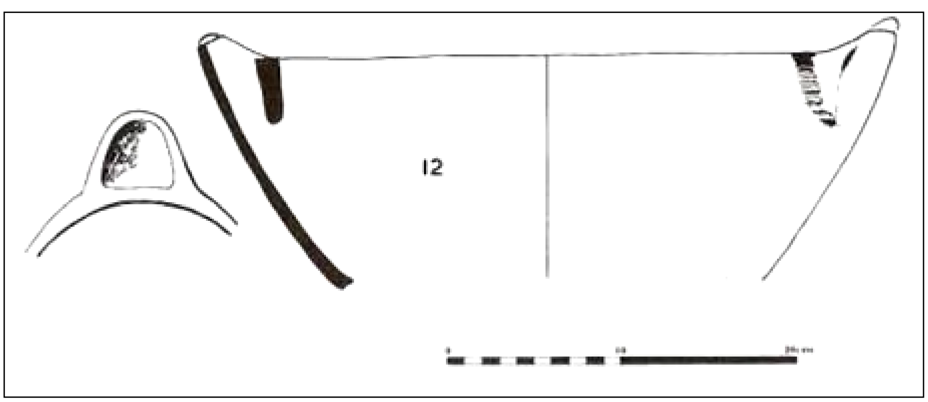


Figure 4:29. Bar-lug pottery from Dublin Castle with rounded base (Hurst, 1988, Fig 16).

The distribution of Bar-lug pottery in Ireland extends up the east coast to Dublin, where

Hurst (1988) identified several sherds associated with Dublin Castle excavated in 1961-2. However, this example had a grass-marked rounded base which appears to be a very confusing mix of the Scandinavian and Cornish ceramic traditions (Fig 4:29). The fabric of this is not igneous and contains an organic temper and internal charred food residues (Hurst, 1988, 291).

The presence of Bar-lug pottery in the Anglo-Norman phases of coastal Hiberno-Norse trading centres offers a tangible link between Cornwall and Ireland associated with Norman trade (Wood, 2010a). The presence of Bar-lug pottery in Ireland has until now gone unrecognised, and has implications that now challenge the role of Cornwall in the 11th and 12th centuries. The discovery of this pottery, otherwise unique to Cornwall, demonstrates the first material culture link between Cornwall and Ireland, not only for this period but all those preceding it (Wood, 2010a). The earlier date of Bar-lug pottery in Cornwall strongly suggests a movement from Cornwall and not from Ireland or the Continent.

4:5:5:3 Sandy-Lane ware

Sandy-Lane ware represents an entirely new form in the ceramic sequence for Cornwall, and appeared around the 10th century in three distinct styles (Thorpe and Thomas, 2007). Thomas (1960) identified this ware at Gwithian, which had a relative date of the late 10th–11th century. He proposed that Sandy-Lane ware was a developmental bridge between the Grass-marked Bar-lug and the traditional medieval forms with everted rims and sagging bases (Thomas, 1964a, 48). Later he states that “they represent the final stage of a long sequence of local, hand-made, west Cornwall cooking-pots commencing with the crude ‘grass-marked’ ones” (Thomas, 1968a, 56). The distribution of this ware is limited to West Penwith and also represents the last usage of gabbroic clay in pottery production.

Sandy-Lane Style 1 forms are undecorated hand-made cooking pots with vertical finger marks on the inside and grass-marking on a flat base. The sides are vertical or sloping inward and generally thin in comparison to their size (Fig 4:30) (Nowakowski *et al.*, 2007, 48; Thomas, 1964, 49). It is uncertain if Sandy Lane Style 1 includes grass-marked platters (Thorpe *pers. comm.*).

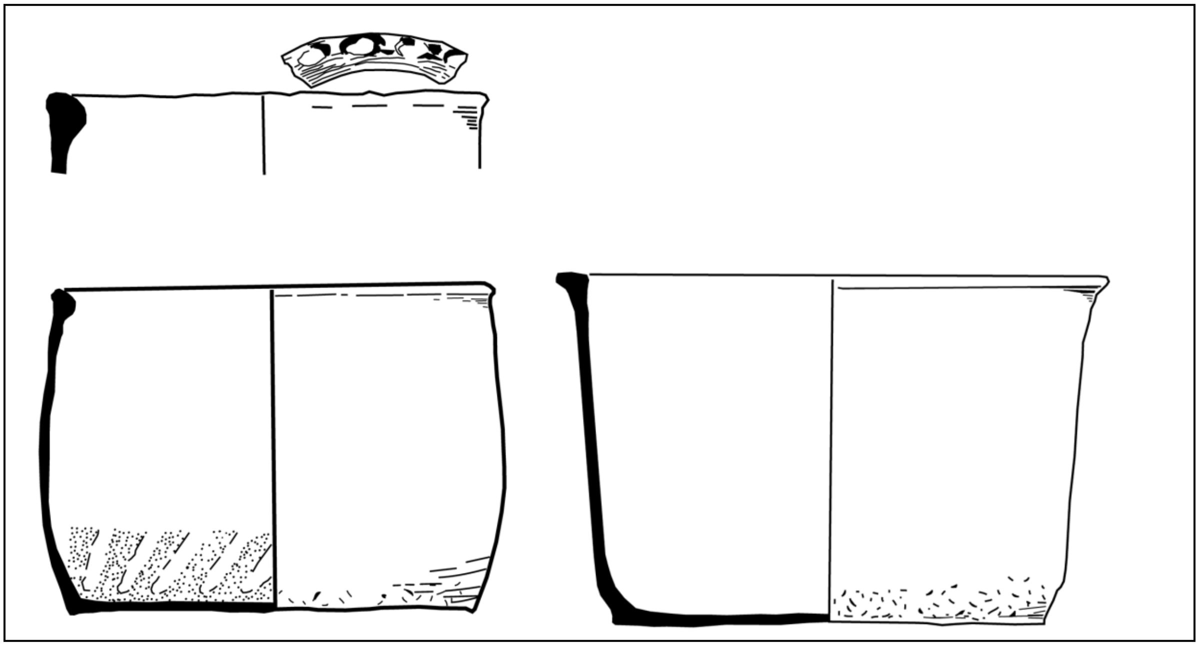


Figure 4:30. Sandy Lane style 1 cooking pots from Gwithian (1/3 scale) (After Thomas, 1964a, Fig 17).

Style 2 is described as a transition between native traditional forms and dates to AD 1100-1150 (Fig 4:31) (Thomas, 1968a, 1991, 88). These vessels are hand-made shouldered jars with flared sides and a grass-marked flat base, although some examples have sagging bases (Nowakowski *et al*., 2007, 48). The distinctive feature of this style is the everted rim and drag marks on the exterior that tentatively suggest the use of a slow-wheel, suggesting to Nowakowski *et al.* (2007) the adoption of traditions synonymous with medieval pottery. However, Preston-Jones and Rose (1986, 176) suggest that Sandy-Lane Style 1 and 2 are in fact 12th-century in date and not 10th-11th-century due to its growing association with later excavated sites. They also suggest that the relationship between the two is problematic as it is based on typology and not stratigraphy (Preston-Jones and Rose, 1986, 176).

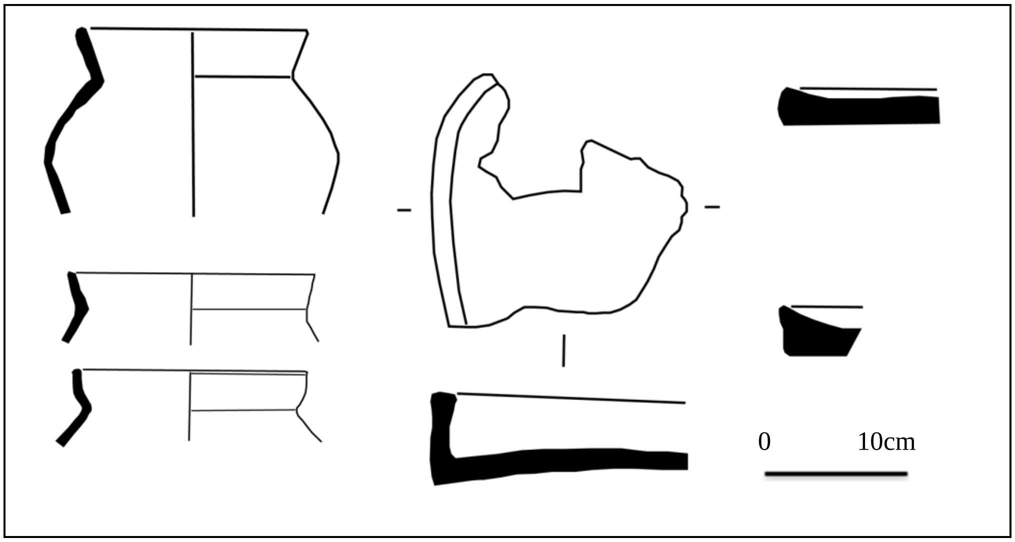


Figure 4:31. Sandy Lane style 2 from old Lanyon Farm (not to scale) (After O'Mahoney, 1994b, Fig 11-12).

This argument is further confused by the recent suggestion by the author of a possible variant of Sandy Lane Style 1 in Waterford, Ireland. The vessels found in Waterford date to the late 11th early 12th centuries in a context with Bar-lug pottery, an association that is not typical of Cornish assemblages (Gahan and McCutcheon, 1997). The possible presence of a Sandy Lane Style 1 variant and Bar-lug in an Irish Anglo-Norman trading longphort could suggest an alternate context of use, deposition or as yet undiscovered relationship in Cornwall (Fig 4:32).

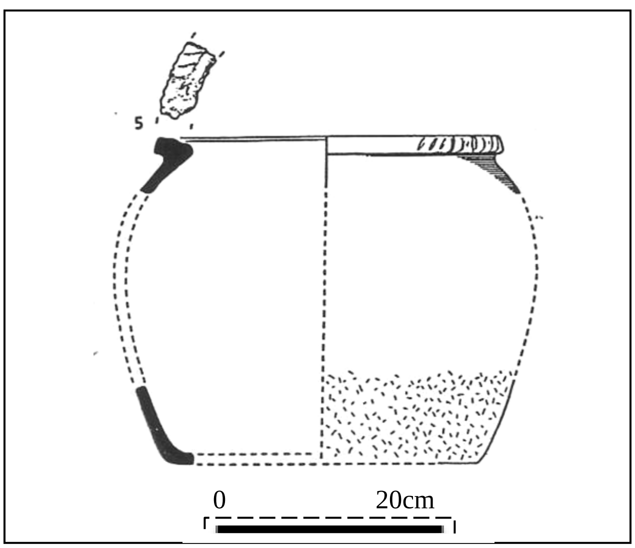


Figure 4:32. Possible variant of Sandy Lane 1 with grass-marked base and lower body from Waterford in Ireland (Gahan and McCutcheon, 1997, Fig 11:1).

The distribution of Sandy Lane Style 1 and 2 vessels from the Isles of Scilly contains several possible 12th-century sites (Thomas, 1991). The pottery was found near the entrance to the Priory of St Nicholas on Tresco, founded in AD 1120, which supports a late date (Thomas, 1991, 88). The assemblage from Chapel Jane near Zennor in west Cornwall has provided a large collection of diagnostic forms for Style 2 and 3 (Russell and Pool, 1968). The site is thought to be a pre-Conquest hermitage that later became a chapel, finally abandoned in the 14th century (Russell and Pool, 1968).

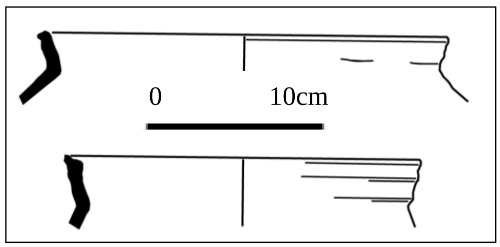


Figure 4:34. Sandy Lane style 3 from Old Lanyon Farm (After O'Mahoney, 1994b, Fig 12).

Sandy Lane Style 3 forms are 12th -13th-century wheel-thrown cooking pots without grass-marking (Fig 4:34) (Thomas, 1964a, 50), and have very similar forms to Saxo-Norman pottery found throughout the South West. This style is a shouldered jar with flared sides and a distinctive sagging base whose rim can be everted, beaded or upright with ribbing (Nowakowski *et al*., 2007, 48). Thomas (1968a, 57) suggests the end of grass-marking is due to the introduction of sagging bases, making the practice unfeasible, but a near complete Style 2 vessel has been found with a grass-marked sagging base (Nowakowski et al., 2007). Sandy Lane Style 3 has been found at Gwithian in contexts with Bunnings Park/Stuffle Ware and other granitic medieval coarse-wares which confirms its late 12th-13thcentury date (Nowakowski *et al*., 2007, 49).

Sandy Lane ware has been found on both secular and ecclesiastical sites. The secular sites include Gwithian, thought to be part of the pre-Conquest and later Domesday manor of Conarton, and Old Lanyon Farm. The ecclesiastical sites include Chapel Jane, the Priory of St Nicholas on Tresco and also Merther Uny near Wendron (Thomas, 1968c), which may indicate a possible link with the early Christian society of Cornwall. These later forms, found on both domestic and ecclesiastical post-Conquest sites, suggest there is a strong connection with new social hierarchies in Cornwall associated with the Norman occupation. However, the restricted distribution of this material, and the continued use of gabbroic clay, calls into question its role as an indicator of a regional social marker.

The Cornish ceramics of the 12th-century are dominated by coarse-wares such as Bunning Park/Stuffle Ware, which are generally hand-made and wheel-finished thin-walled vessels in a granitic fabric (Austin *et al.*, 1989). Some examples at Old Lanyon Farm have grass-marking on the base, which O'Mahoney suggests represents an early variant possibly originating in west Cornwall (O'Mahoney, 1994b, 156). Granitic coarse-wares, such as the Lostwithiel and St Germans ware, dominate all pottery assemblages from this date onwards (Allan, 2003b).

4:5:6 Summary: 9th to 11th century

During the 9th-11th centuries the social context of pottery production in the South West can, for the first time, be explored through both the extensive ceramic assemblages and the appearance and survival of documentary records. It is apparent that each of the three regions under consideration supported differing modes of pottery production and produced different responses to the Norman Conquest. The process of enculturation is made visible by the use of specific pottery on many sites such as at Launceston and Tintagel in Cornwall and Exeter in Devon. The chert-tempered ware may represent a 'conquerors pottery' that travelled with the Normans as they subdued the South West. Pearson (1982) states that the sheer increase in production and consumption in the 11th-century suggests that the status of pottery in Somerset changed due to the economic, political and administrative climate of the post-Conquest period. In Ilchester "the conquest either directly or indirectly affected the traditional and new sources of material and pottery production in this area" (Pearson, 1982, 177).

The later production of wares at urban centres such as Shaftesbury and Ilchester, and the increasingly demand for such goods enabled the first potteries to be established in these areas, potteries that in many cases lasted centuries. More importantly, the humble 'sagging base' cooking pot did what no previous vessel had done before: it unified the ceramic record of the South West for the first time in six centuries.

4:6 Summary

In summary, the three phases of pottery production and consumption outlined above form a unique and continuous sequence that offers a rare glimpse into a period usually regarded as disparate and fragmented. This comprehensive synthesis of pottery has highlighted the significance of the presence and absence of pottery in each region. Cornwall's ceramic resource exemplifies the continuity, scale, social context and traditions of the region, making wider comparison with the South West a vital aspect of understanding the social structure and interconnectivity of the region in a period where synthesis is rare. The points highlighted in this synthesis, when considered in the context of the theoretical approach and the themes of this study, will enable the significance of the data to be discussed in the context of not only Cornwall but the England as a whole.

In this study, the Cornish pottery sequence outlined above is represented by ceramic assemblages from three excavated sites on the Lizard Peninsula. The next chapter will introduce the physical and historic environment of this study region, and the archaeological sites themselves, to establish the context of the assemblages.

Chapter 5: The Lizard Peninsula,

Home to the Research Sites and Their Assemblages

5.1 Introduction

This chapter provides an introduction to the archaeology and setting of the three archaeological sites on the Lizard Peninsula whose assemblages have been sampled for this thesis. It also introduces the historic and physical landscape of the Lizard offering an invaluable social and physical background to which the three sites are intrinsically associated. This chapter will therefore introduce and discuss the three sites, Trebarveth, Carngoon Bank and Winnianton, from which ceramic assemblages have been selected. It will summarise the nature of recovery, any associated analyses carried out (e.g. environmental data) and both current and past interpretations of the evidence. This will provide the reader with an informed perspective on the relevance of this material and these sites to the research question and possible limitations of the data.

These sites must be viewed not only within their archaeological context, but within that of the physical and historic landscape Therefore, it is necessary to introduce The Lizard Peninsula which forms the study region prior to any discussion of the archaeological sites incorporated in this research.

5:2 Location of The Lizard

The Lizard Peninsula is the most southerly part of mainland Britain, stretching out into the sea where the English Channel meets the Atlantic Ocean (Fig 5:1). The historic landscape of the peninsula shares much in common with the rest of the county (see below). The most notable difference is the lack of urban centres. There are no towns on the Lizard, the closest being Helston to the north-west. As Herring (1995a, 2) has pointed out, the main settlements on the Lizard (St Keverne, Cadgwith and Coverack) are technically more remote than those of Bodmin Moor. He argues The Lizard is effectively an island, cut off from the north by the Helford estuary and the Helston Downs.

The nearest urban centre, Helston, is one of the five earliest towns founded in Cornwall, with records of a market there dating back to 1086 AD. This market town was established by the Church and after 1066 was held by the Count of Mortain (Preston-Jones and Rose, 1986). The main access route for The Lizard runs north-west to south-east between Helston and St Keverne, a route first recorded in medieval documents (H.E.S., 1994; Herring, 1995b). Yet as this route is marked by standing stones and burial mounds Hartgroves (*pers. comm.*) has suggested it might have been in use far earlier.

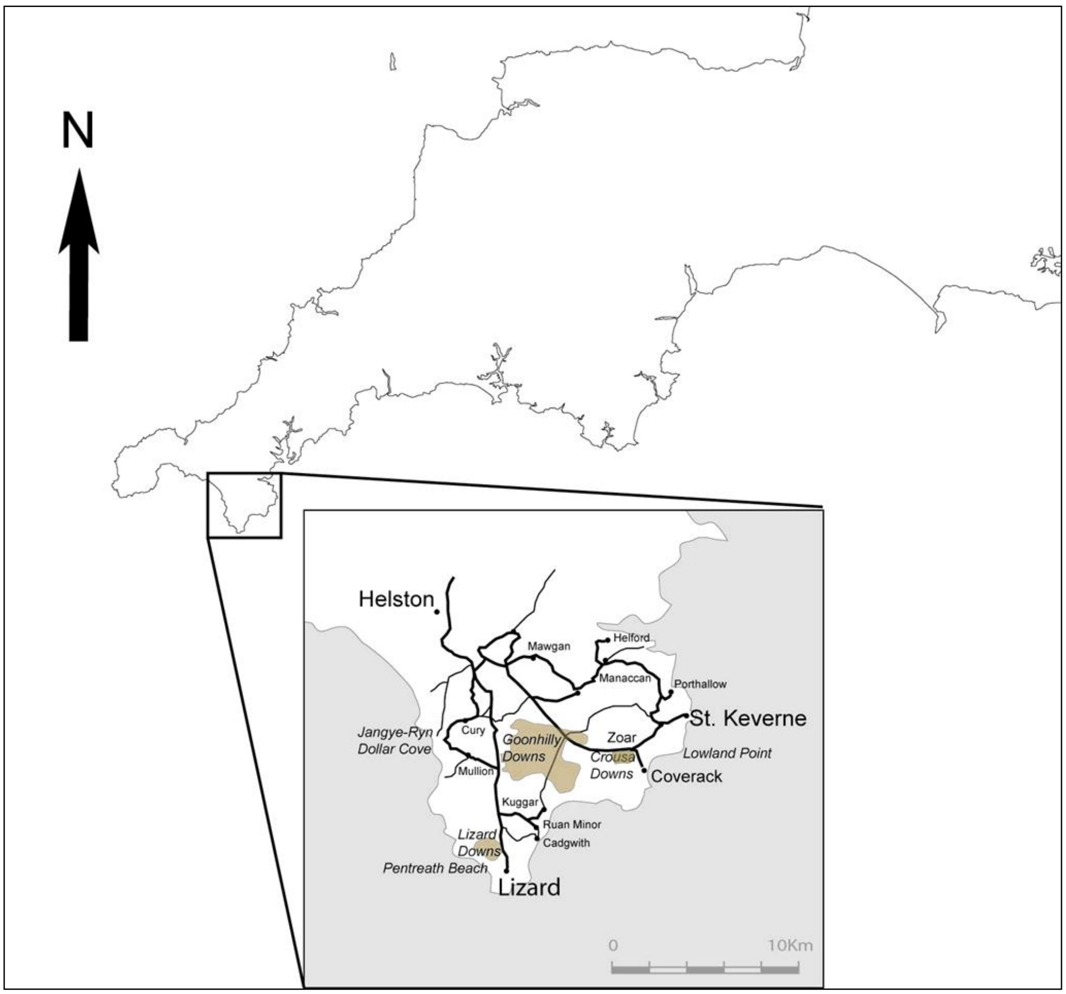


Figure 5:1. The Lizard Peninsula in Cornwall (Author's Illustration).

5:3 The historic landscape of The Lizard Peninsula

The historic landscape resource forms a vital source of evidence for this thesis towards a greater understanding of the social context of settlement and subsistence over the 4th-11th

century AD. It situates the practices of settlers on the Lizard with the rest of Cornwall enabling parallels to be drawn between the two.

The landscape of Cornwall was the subject of the first and pilot Historic Landscape Characterisation, carried out by the Cornwall Historic Environment Service (H.E.S., 1994); (Herring, 1998). This review has facilitated a greater understanding of how past peoples have shaped the landscape in order to aid its conservation for future generations.

The overall character of The Lizard has been described by the Historic Landscape Assessment as “a flat to gently undulating peninsula with a rocky, indented coastline and high cliffs” (H.E.S., 1994, 33). The majority of the agricultural land is now pasture with some arable land, dissected by small rivers that form narrow valleys. The exposed nature of the peninsula means that woodland areas are restricted to the steep slopes of the river valleys (H.E.S., 1994, 33).

Extensive field survey in combination with data from the National Mapping Programme, has revealed that some elements within the landscape remain substantially unaltered since the Neolithic (H.E.S., 1994, 12), with remains of Neolithic and Bronze Age agricultural field systems visible at Trebarveth on Lowland Point (Fig 5:3) (Johns and Herring, 1996; Mercer, 1986). On the whole, and in common with much of Cornwall and beyond, the landscape is a complex palimpsest of ancient and modern elements, with a mixture of open and enclosed land populated by dispersed settlement.

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5:3:1 Upland rough ground

These areas of high ground are characterised by impoverished soils supporting heath and scrub vegetation (H.E.S., 1994, 143). They now represent a valuable ecological resource and are designated as national nature reserves, but are regarded as low-grade (grade 4 or 5) agricultural land.

The upland heath of Goonhilly Downs is on a flat windswept plateau containing both waterlogged peat bogs and dry scrub areas (H.E.S., 1994, 33). However, the historic landscape assessment has recognised that these areas are “a product of prehistoric human intervention and maintained through medieval and early modern land use system” (H.E.S., 1994, 144).

Domesday Book records manors such as Winnianton, demonstrating that some of these same areas contained valuable pasture, a point later reiterated in the 1530's by Leland (1906). The early medieval parish boundaries draw further attention to the importance of the upland rough ground for summer grazing and the cutting of turf for fuel, which may also have been a consideration in prehistory. These upland resources were so important that, as the manorial system developed, the Goonhilly Downs were divided up into seven triangular allotments, one for each parish (Herring, 1995a, 8).

The exposed nature of areas such as Goonhilly Downs have also been utilized for their wind-power, possibly as early as the late 17th century, as demonstrated by documentary and extant evidence for windmills (Douch, 1963). The Goonhilly Satellite Earth Station is the latest use of the moor.

5:3:2 Lowland

The lowland areas are generally productive agricultural regions where settlements, fairs and churches are usually located. As stated above, the fertility of the land was dependant on the underlying geology, with the valleys as lush refuges with the densest concentration of settlements.

It has been suggested by Johns and Herring (1996, 85) that this landscape can be characterised by continuity of settlement, as all but two of the abandoned rounds or Romano-British enclosed farmsteads in the vicinity of St Keverne are near extant settlements, with many rounds surviving as enclosed orchards, as for example at Lestowder, Tregaminion and Treloyan (1996, 85). Lestowder is supposedly of great importance as the place-name element of *lys* meaning court and the personal name element has traditionally associated it with the 6th-century King Teudar, suggesting it may have been a high status site and administrative centre (Johns and Herring, 1996, 85; Padel, 1985, 150-278)

It has been suggested that those settlements bearing a place-name incorporating the pre-Norman element *tre*, possibly meaning 'farming estate' (see Chapter 3), are post Roman and early medieval in origin (Herring, 1996; Padel, 1985, 1988; Turner, 2006a, 2006b), and it has been noted that those *tre* sites thought to be early medieval in date do tend to cluster at the 90-95m contour mark (Johns and Herring, 1996:86).

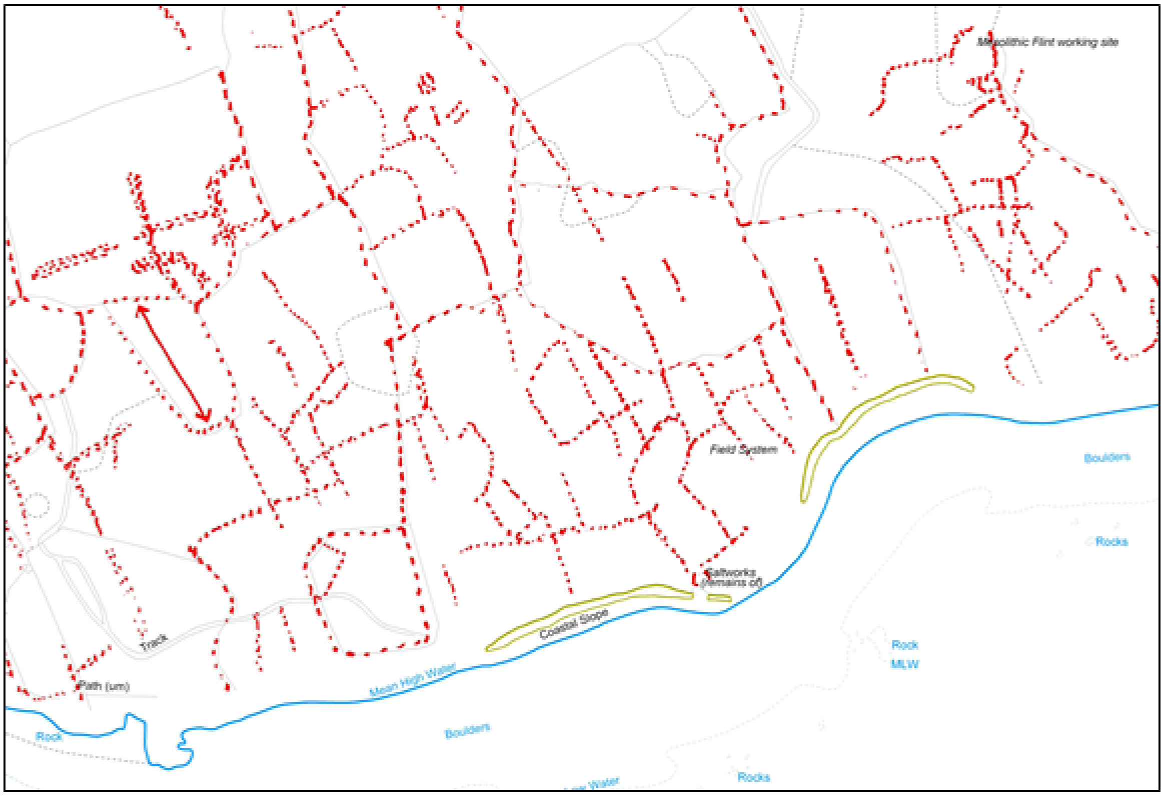


Figure 5:3. Showing the extant and suggested locations of Bronze Age field systems at Trebarveth (N.M.P. Historic Environment Service, Cornwall).

Landscape surveys have demonstrated that a number of field systems in the lowland areas were constructed in the Bronze Age and were later adapted for use in later periods, with the majority transformed into typically medieval forms (Herring, 1996). However, traces of prehistoric fields have been identified by the National Mapping Programme, as at Trebarveth (Fig 5:3). The field systems around Trebarveth and on Lowland Point were examined in detail during the 1996 historic land characterization of that area (Johns and Herring, 1996). The report identified a parallel reeve-type field system orientated north-west to south-east, which began on the coastal strip and eventually spreading inland towards the Tors of Crane Carrick Crags (Johns and Herring, 1996, 81). It is thought that these were winter fields and that the rough upper ground was used for summer grazing (Johns and Herring, 1996, 81).

5:3:3 Coastal shores

The coast has always performed a vital role in the subsistence strategies of settlements from Prehistory to the present day. Their distinguishing attribute is unenclosed sloping ground beyond enclosed fields but above the cliffs, generally forming a narrow band of land that meets the beaches below (H.E.S., 1994, 148). This zone sees the highest concentration of small settlements originating in the later medieval and post-medieval periods, such as Church Cove, Cadgwith and Poltesco (H.E.S., 1994, 34).

The cliffs on Lizard Point are perhaps the most significant headland on the western approaches, being the first part of Britain seen by any seagoing traffic arriving from the west (Herring, 1995a). The original name of the headland was ‘Predannack’, meaning ‘the headland of the British’, suggesting its early importance in the seafaring past of the region (Herring, 1995a, 9). The extensive exploitation of the sea, shore and cliff heaths provided many resources, most obviously fishing (typically for pilchards but also seals and shellfish). The beaches provided sand and seaweed for agricultural improvement of the land, and the cliff heaths were important grazing areas for sheep, cattle and ponies along with ‘furze’ for fuel (H.E.S., 1994, 34).

The potential of the many coves for landing a boat is seen in the later medieval development of ports, and possibly in earlier periods. Many coves in the 18th and 19th centuries were home to shallow-draft boats and gigs for pilchard fishing, as well as rescue work for those ships in difficulty on the perilous shallow rocks called the Manacles off the coast from Lizard Point (Herring, 1998). This reliance on the sea is seen throughout all periods of occupation, evidence of which can be seen in the many shell-middens and fishing weights found on Iron Age cliff castles such as Lankidden (Smith, 1987), Chyhalls and Little Dennis (Herring, 1995a, 10), as well as Gunwalloe (Hogg, 1930).

5:3:4 Summary: Landscapes

These physical and historical landscapes are undeniably an integral part of understanding the context in which past peoples subsisted on the Lizard Peninsula. This review highlights the diversity of natural resources available to its inhabitants, and the sites selected (below) are representative of these practices.

5:4 Documentary records

The first reference to the Lizard Peninsula is given by Ptolemy AD 125-150, who calls it the *Promontorium Dumnonium* or the ‘promontory of Dumnonii’ (Orme, 2010, 1). The origin of the peninsula’s current name is ‘lys+ardh’ meaning ‘court at a high place’ (see Chapter 3:3:1) (Padel, 1985, 278).

The only surviving Anglo-Saxon charters that refer to the peninsula focus on a small group of estates in or near St Keverne, recounted in three documents dating to the late 10th century. The first charter, dated to AD 967, refers to land at Leseagne and Penard granted by King Edgar to his *comes* Æthelweard (Sawyer, 1968, S775). The second charter, dated to 977, refers to land at Traboe, Trevalack and Grugwith in St Keverne, with Trethewey in St Martin-in-Meneage, were granted by King Edward the Martyr to the same Æthelweard (Sawyer, 1968, S832). In AD 1059, the same lands of Traboe Trevalack, Grugwith and Trethewey were granted by King Edward the Confessor to Bishop Ealdred (Sawyer, 1968, S0127).

Hooke has interpreted the information contained within these charters as evidence for a proto-estate of *tref* landholdings held as part of the larger ecclesiastical estate (1999, 101). The figure below shows the possible pre-conquest manors and Saxon route-ways indicating the existence a complex landscape (Fig 5:4) (Hooke, 1999).

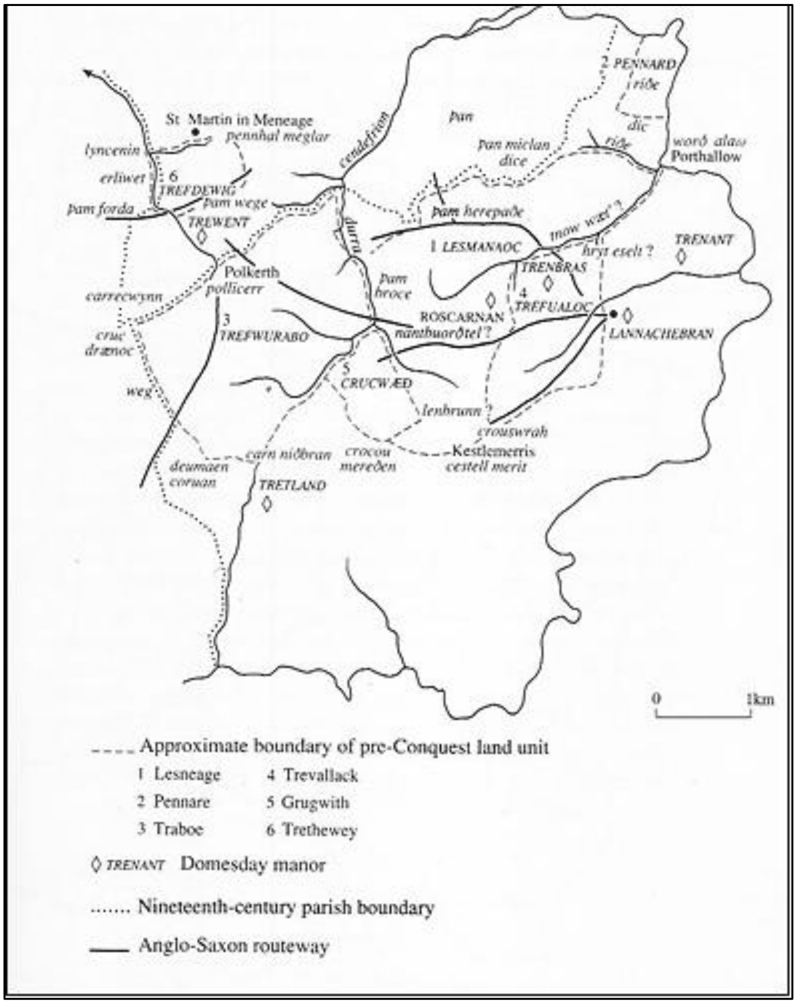


Figure 5:4. Hooke's view of 10th century estates in the Parish of St Keverne, showing routeways and manors (After Hooke, 1999, map 14.6).

These charters refer to a stone cross at *crouswrah* or 'the witches' cross', which later appears to have given its name to the modern 'Crousa' on the Goonhilly Downs, though that cross no longer exists (Hooke, 1999, 103). The Goonhilly Downs are thought to have been a woodland or hunting ground, but Leland's account in the early 16th century suggests any woodland had been lost by the 11th century, as "the wild beasts, however, had departed when Malmesbury wrote the saints life in 1100 AD, and the wood which had defied the blasts which now sweep this region is no more" (Leland, 1906). Borlase also comments in 1872 that "not a copse of wood can be found" (Borlase, 1754).

5:4:1Maps

Figure 5:5. John Norden's map dated 1610 showing churches at 'Wynnyton' and 'St Keverne' (After Halliday, 1969, p224-225).

Figure 5:6. Joel Gascoyne's map of the Lizard Peninsula in 1699 (After Ravenhill and Padel, 1991, map 1A).

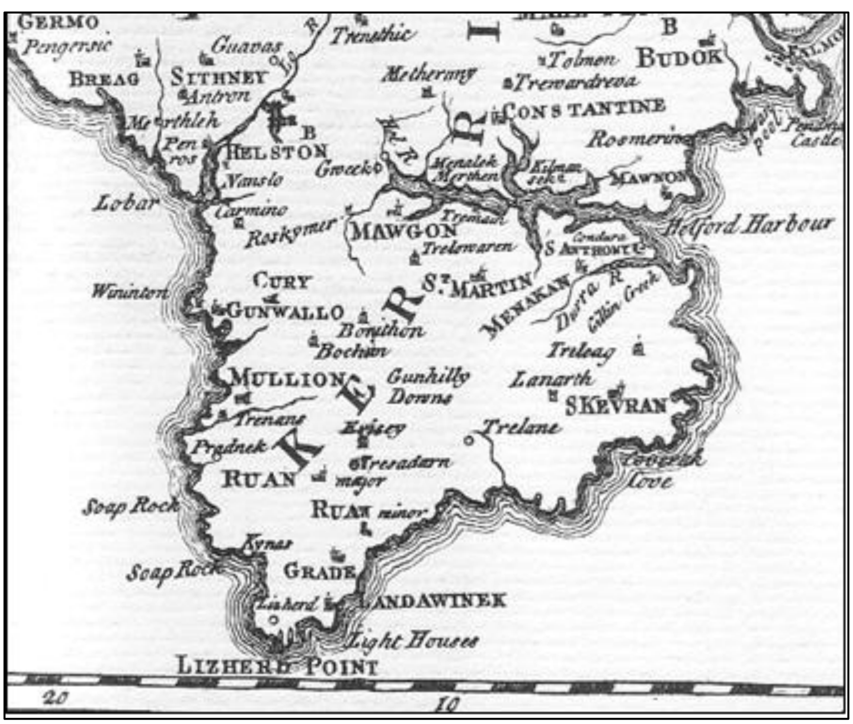


Figure 5:7. Borlase map of Lizard Peninsula 1872 (After Borlase, 1754, map 1).

The maps above show the continuity in settlement locations respecting the constraints of the topography such as Goonhilly Downs. The settlement of St Keverne is prominent as are the numerous churches. Note that the site *Wynnyton* by 1699 is called Gunwalloe.

5:4:2 Domesday

Ravenhill suggests that the Domesday folios for Cornwall lack the attention to detail that characterised some other counties, perhaps due to the laziness of the commissioners or Cornwall's remote location (1999). There are 26 entries for manors in Cornwall and only one urban place noted at Bodmin, despite there being two castles and four markets (Ravenhill, 1999, 107). The recording and arrangement of the data imposes severe limitations on interpretation, and Domesday cannot be relied upon to provide even a rough estimate of population density or make inferences about social structure, for example, craftsmen, fishermen or miners are not mentioned despite their probable existence at this time (Ravenhill, 1999, 107).

The Lizard Peninsula is recorded as falling within the hundred of Winnenton, owned by the King and held by the Count of Mortain, and is now the modern hundred of Kerrier (Salzmann, 1924; Williams and Martin, 2002). The lands of the King in Cornwall are listed as being 12 manors, a total of 600 plough-lands, about 300 ploughs and 1000 men, with the value and renders amounting to around £130 (Salzmann, 1924, 56). The King and the Count of Mortain seized eight of the earlier ecclesiastical manors. St Keverne is the only monastery listed on the Peninsula (Salzmann, 1924).

The Domesday entry for the hundred of Winnenton lists 36½ hides saying:
"Thence the King has of his geld 36s. for 6 hides. And the King and his Barons have in demesne 12 and a half hides. Of these the King 7 hides in demesne (dominio), and St Achabran [St Keverne] 1 hide and St Constantine half a hide and Bishop of Exeter 4 hides. Besides this demesne (excepto isto dominio) the men of the Count have 15 hides which, according to the testimony of the English, have never rendered geld. And for 3 hides of Harold's land, which B[alduin] the Sheriff holds (servant) under the King's hand, the King has not had geld" (Salzmann, 1924, 62).

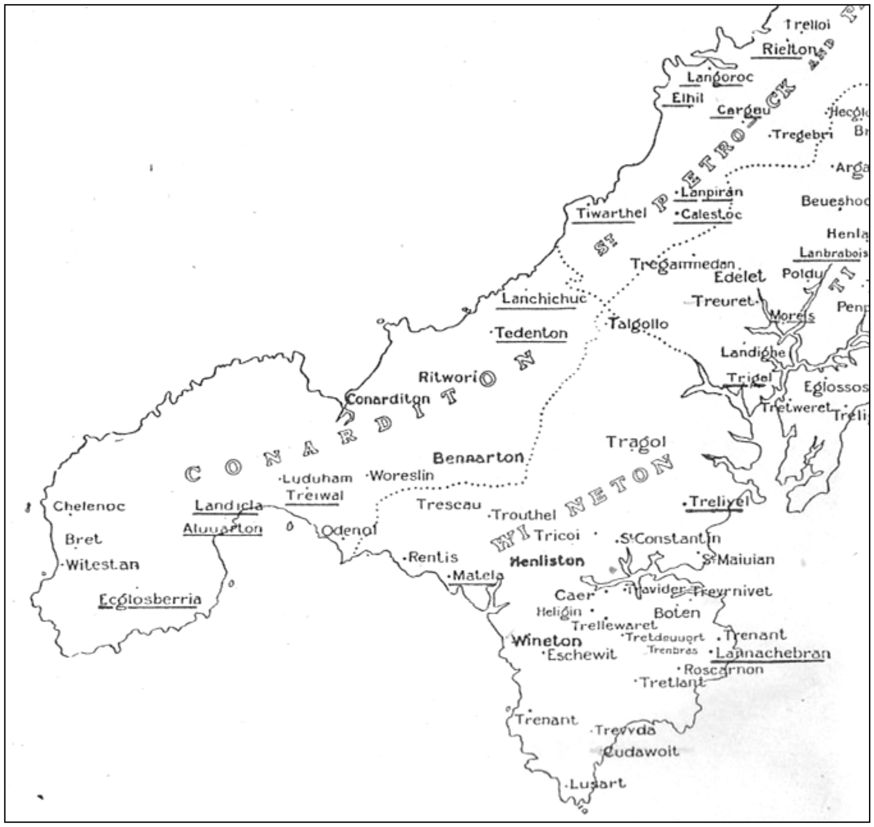


Figure 5:8. Showing the location of manors listed in Domesday with in the hundred of Wineton on the Lizard Peninsula, manors of ecclesiastical tenants are underlined (After Salzmann, 1924, map 1).

There are 14 manors recorded on the Lizard Peninsula, all of which are shown on the map (above, Fig 5:8) (Salzmann, 1924, 63-64). The majority of the manors are on the eastern side of the peninsula, with the Royal manor of Winnenton covering the land to the west whose size is indicated by its significantly larger taxable value (Roffe, 2000). There is one manor owned by St Achebran (St Keverne), held by Canons of St Achebran and called Lannachebran, said to have *"11 acres of land. 7 teams can plough this. There the Canons have 8 beasts and 30 sheep and 20 acres of pasture. And it is worth 5s yearly, and when the Count received the land it was worth 40s"* (Salzmann, 1924, 72). The Count of Mortain held the remaining 12 Manors in demesne (Salzmann, 1924).

The difference between the eastern and western manors listed by Domesday may be a result of a bias in the Exon account, which frequently went into great detail concerning lands held by the Church and the Count of Mortain, but was much less detailed when it came to the lands of the King (Roffe, 2000). Roffe has suggested that those lands were recorded by a different scribe in Exeter, perhaps done at a different time or biased for personal gain (2000, 130).

5:4:3 Ecclesiastical landscapes

St Keverne was the principle religious house until the Reformation (Fig 5:9). The name derives from St Acheobrann, an unknown figure but possibly from Brittany (Orme, 2010). In 1291 there were 12 ecclesiastical parishes recorded: Mawgan-in-Meneage, St Martin-in-Meneage, Budock, St Anthony-in-Meneage, Cury (annexed by Breage), Gunwalloe (annexed by Breage), Mullion, Ruan Minor, St Keverne, Landewednack, Grade and St Samson (Orme, 2010, 28-29). Gunwalloe and Cury are the only parishes to be subordinated to a church outside the Lizard Peninsula, but this occurred after the 12th century.

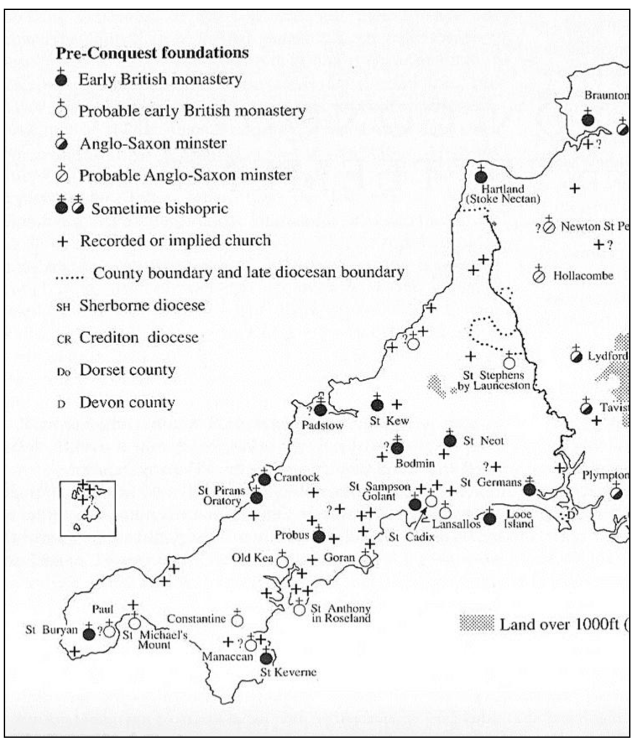


Figure 5:9. Pre-Conquest ecclesiastical centres in Cornwall (After Hooke, 1999, map 14.1).

Orme suggests that these parishes grew up organically over a period of time from when the early monasteries and churches were founded (2010, 27). St Keverne was staffed by clergy before the Norman Conquest, whose parish size was the result of their superior status in earlier times, or else were strong enough to annex other lands (Orme, 2010). In 1204 St Keverne, or rather the manor of Lannachebran, was given to the Cistercian Abbey of Beaulieu in Berkshire by King John and given the special privilege of being a sanctuary (Doubleday and Page, 1973, 140). In 1268 it is recorded as a 'Nan(s)clegy', a leper house that survived until perhaps 1481, but is not mentioned in the Bishop of Exeter's Register (Orme, 2010, 195).

A review of the place-name evidence, and the form and layout of current parish boundaries, supports an earlier territorial arraignment of the landscape with its origins in the Church. As discussed in Chapter 3, the *lys* 'court' and *menege* 'monks land' elements suggest that the eastern half of the Lizard Peninsula was part of an early ecclesiastical estate presumably with its own 'high court' or 'court of the monks land' as suggested by the name 'Lesneague' (see Chapter 3:3:1). The parish of St Keverne is the largest and may also have included the Meneage parishes (Mawgan-in-Meneage, St Martin-in-Meneage, Manaccan and St Anthony-in-Meneage) which could have been smaller land grants to individual monastic communities (Fig 5:10). The most obvious feature of the parish boundaries is that each parish contains a section of coastline, fertile lowland and rough upland grazing, with most of the parishes meeting at a Late Neolithic menhir, the 'Dry Tree Stone', on the top of the Goonhilly Downs. One exception is Landewednack, which has its own area of rough grazing on the Lizard Downs. The other exception is most telling, as the parish of Gunwalloe does not conform to this pattern, implying it is a late subdivision of one of the other parishes.

A hypothetical chronology of landholding can be suggested, with the earliest and largest estate belonging to the post-Roman monastery at St Keverne, with the settlements of the western Lizard under secular ownership. It is possible that the West Saxon conquest, and the acceptance of the English Church in Cornwall at the end of the 8th century, could have weakened ecclesiastical landholders, as represented by the granting of lands in St Keverne parish to Anglo-Saxon secular and ecclesiastical elite who did not reside in the region. The possible destabilisation of the post-Roman ecclesiastical estate could have provided an opportunity for the native secular elite to establish their own estate boundaries prior to the 10th century, perhaps resulting in the slicing up of the Lizard as seen in the current parish boundaries. The Norman occupation of Cornwall saw Winnianton, an existing 9th-century settlement, become a Royal administrative centre. The boundaries of the modern parish of Gunwalloe strongly suggest it was carved out of the parish of Cury. This palimpsest of ownership remains hypothetical, but offers a glimpse at possible social structures in the post-Roman period in this region.

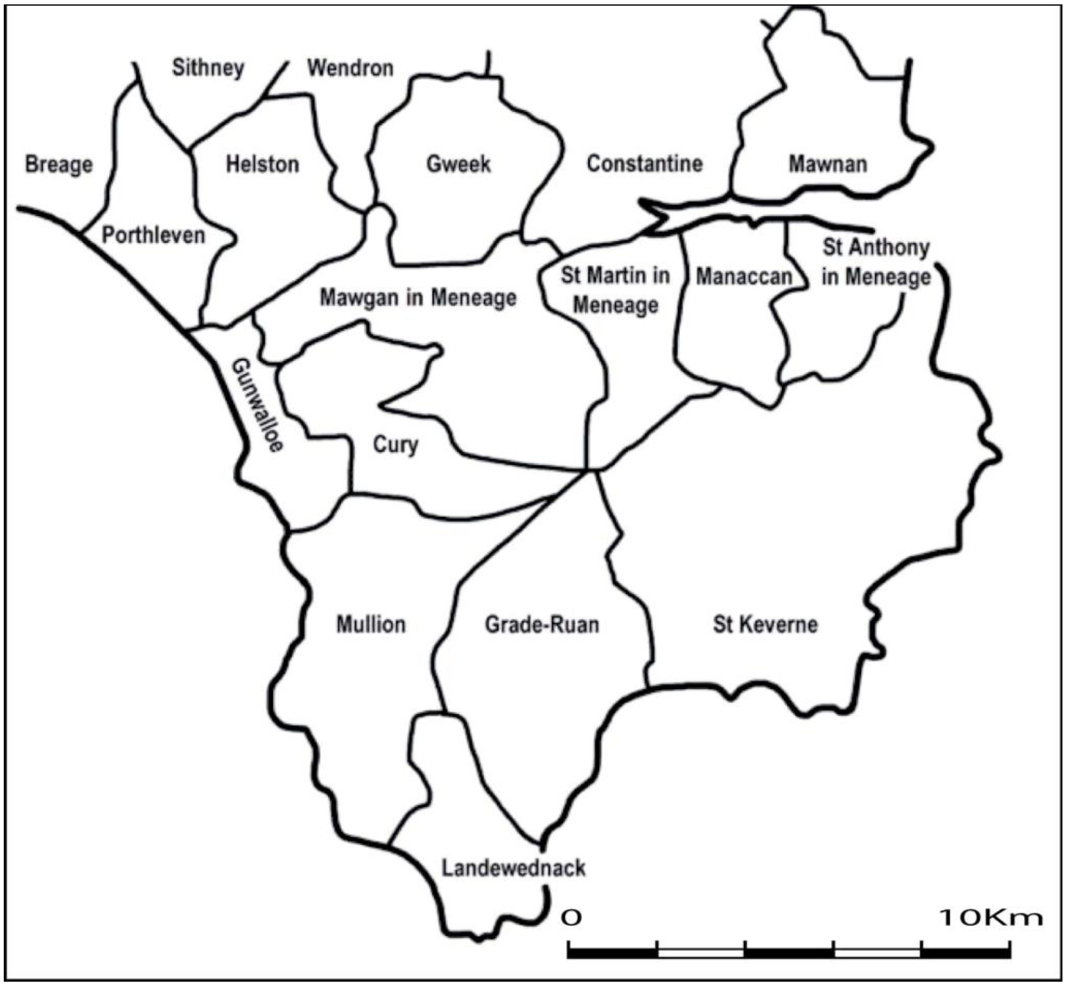


Figure 5:10. Showing the palimpsest of land ownership on the Lizard Peninsula (Author's Illustration).

5:4:4 Summary

The documentary records and maps confirm that the Lizard Peninsula experienced similar processes of social and economic change to those felt throughout Cornwall, making it broadly comparable. The documents also suggest that the first estates were ecclesiastical in nature and recognised as such by the Anglo-Saxon kings, with the appropriation of those estates in the post-Conquest period.

The apparent divide between the ecclesiastical lands of St Keverne in the east and the contemporary occupation of Winnianton to the west suggests a different form ownership or control. The lack of documentary evidence of for the western side of the peninsula in the Anglo-Saxon charters could be due to a dispersed population with no unified estate pattern or elite figures worthy of note. However, the elevation of Winnianton in the post-Conquest period to the administrative centre of the largest Royal post-Conquest manor in Devon and Cornwall, suggests a site of some importance.

The information discussed above needs to be stressed in the context of this thesis because it provides tangential evidence for aspects of society that can not be seen through the pottery or settlement evidence alone. It also provides documentary evidence which could be used to support a case for the significant role of early ecclesiastical communities.

5:5 The Archaeological sites under investigation

The Lizard Peninsula has been chosen for its geological diversity and the presence of archaeological sites occupied during the 4th-11th centuries. The Peninsula is also the source of the gabbroic clay, along with a range of other similarly unique clays with specific geological origins whose location is broadly identifiable. This microcosm of the Cornish landscape, together with its unique geological footprint, makes it an ideal area for comparative study.

The timescale of this research, spanning the 4th–11th centuries, eliminates the possibility of using a single site, as continuously occupied sites of this date are not a feature of Cornish archaeology (see Chapter 3). Therefore, three sites representative of this chronological time frame have been selected. It is hoped that the representative selection of these sites in terms of period, ceramic assemblages and physical location will enable conclusions to be extend beyond the study region to Cornwall as whole.

The archaeological resource on the Lizard Peninsula has supplied this research with three ideally suited archaeological sites from which to acquire the data necessary to address the research question. The varied nature of their investigation and recovery, between the early

19th-century and the 2010, requires specific details to be addressed within a uniform structure providing a homogenous archaeological record to enable future comparison. Details of the sites are limited to their physical and geological situation, the history of their investigation, any scientific analysis applied and methods of recording and recovery.

The sites have been chosen based on criteria that will provide the range of information required and are comparable to other sites in the county. These criteria are: the period of occupation; physical location in the landscape; possible subsistence strategies; and, most importantly, their geological situation in relation to the gabbroic clay source. The unique geological signature of each site, due to the geological diversity of The Lizard, will play an essential role in determining if the occupants of the sites sourced their clay locally or travelled to the gabbroic outcrop (Fig 5:2). These elements, combined with the range of forms present in the ceramic assemblages from each site, present an ideal source of data. The archaeological sites are evenly distributed along the most commonly settled fertile lowland belt, with access to similar subsistence resources (Fig 5:11).

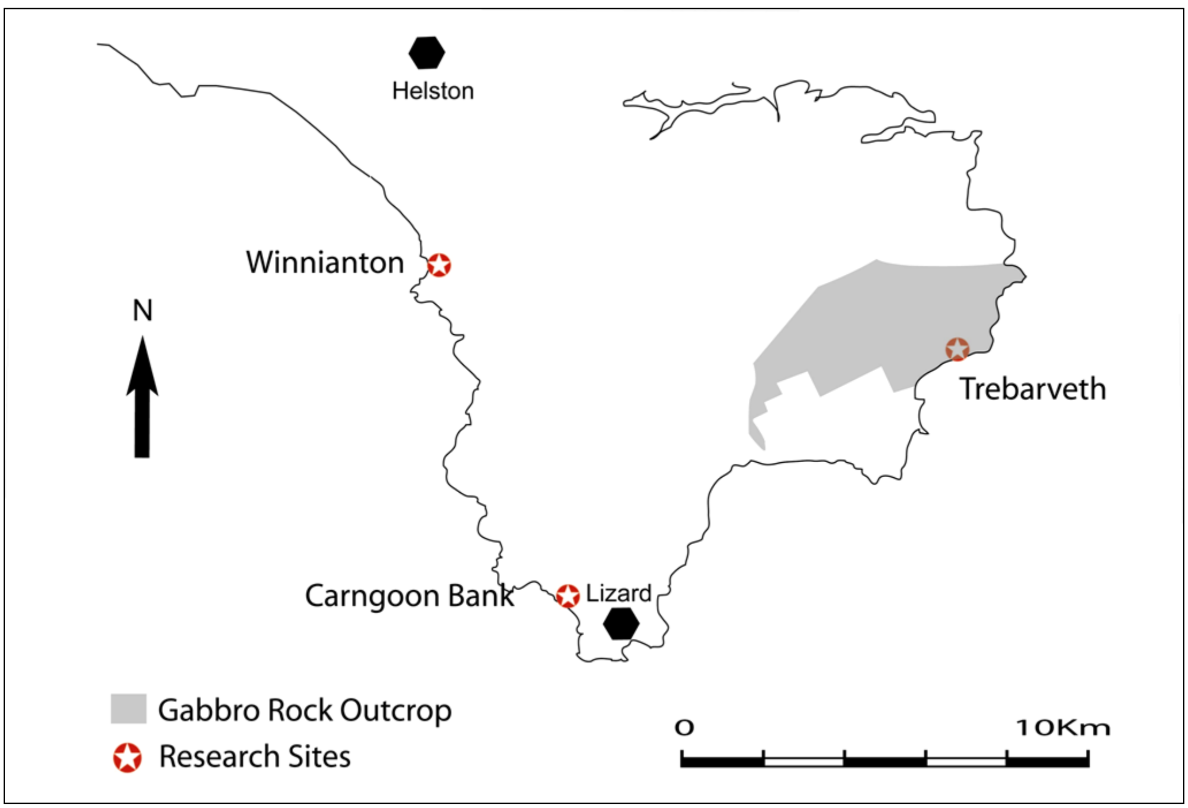


Figure 5:11. Location of Carngoon Bank, Winnianton and Trebarveth on The Lizard Peninsula (Author's illustration).

The three sites are Trebarveth, Carngoon Bank and Winnianton, have a combined date-range that spans the 1st millennium AD (Fig 5:12). The assemblages from each site are representative of the ceramic epochs for Cornwall explored elsewhere (see Chapter 4), which despite the poor typological dating evidence, do demonstrate a relative chronology. The site of Trebarveth has a typical Romano-British assemblage, Carngoon Bank appears to represent the Romano-British and early post-Roman assemblages, providing an interesting cultural intersection. Finally, Winnianton has recently been proven to date between the 8th to late 10th centuries, providing an assemblage of pottery typical for the relatively poorly understood early medieval period in Cornwall.

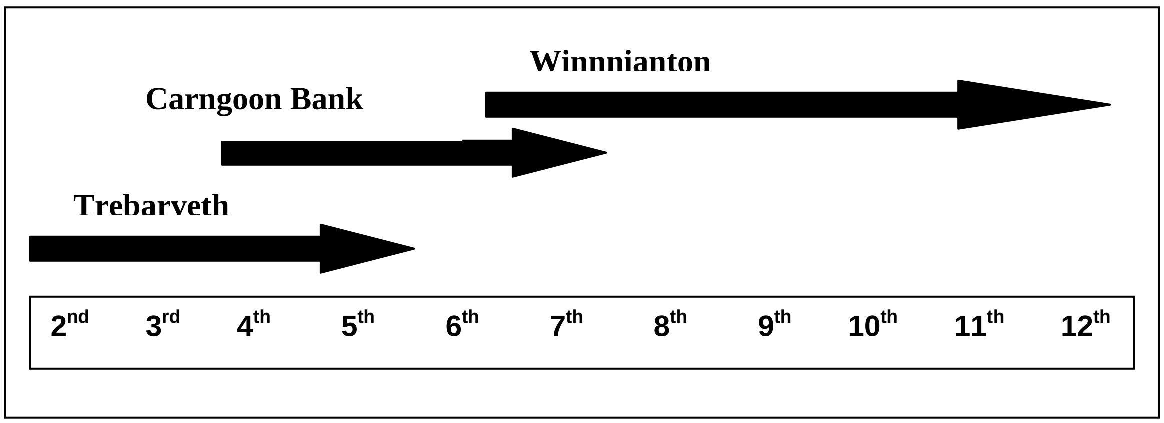


Figure 5:12. The length of occupation for each archaeological site and its ceramic assemblage (Author's Illustration).

5:5:1 Intended aims

The period under investigation is of fundamental developmental importance to the region and the South West as a whole, as it witness the decline of the dispersed homesteads of the Romano-British period and the creation of towns and markets as a result of Norman influence in the 11th century.

The aim of investigating data from all three settlements is to create the first robust material culture sequence to span the 4th–11th centuries in the South West of England. This will be achieved by drawing together the many aspects of society as seen in substance strategies and daily life at Trebarveth, Carngoon Bank and Winnianton, through the singular necessity to source clay for pottery. The main strength of this approach is that the utilisation of multiple sites with differing subsistence strategies and overlapping occupation periods can provide a dynamic archaeological resource capable of incorporating different levels of society in action. This will enable broader conclusions to be drawn, conclusions that could not be supported by the analysis of a single settlement site such as Gwithian alone (Nowakowski, 2007). The assemblages from these three sites contain the full range of ceramics outlined in Chapter 4, allowing a robust temporal framework to be created, upon which the data recovered can be modelled.

The importance of introducing the nature, situation, and archaeological potential of these sites is essential to support their suggested relevance, and by extension that of the ceramic assemblages used in this research. The three sites have been subject to numerous casual interventions formal investigations over the years. The varied nature of investigation and recovery necessitates that specific details be addressed in a uniform structure, in order to provide a homogenous archaeological record to enable future comparison. Therefore each section will address: their physical and geological situation, other known archaeological sites in the area, the history of their investigation, any scientific analysis applied, and methods of recording and recovery.

5:5:2 Trebarveth

The archaeological site at Trebarveth is located near the village, and within the parish of St Keverne on the eastern side of the Lizard Peninsula [SW7960 1931] (Fig 5:13). The name means *tre* 'farmstead' and *perveth* 'middle' or 'middle farmstead', and is thus unlikely to date to the Romano-British period (Padel, 1985, 803), but could refer to its early medieval situation in relation to the ecclesiastical estate of St Keverne (see Chapter 3:4:16). The site is most commonly associated with rocky headland of Lowland Point, which is dominated by a steep scarp outcrop of gabbro rock called the Crane Carrick Crags. The Romano-British houses lie on a raised beach between these landscape features. The underlying geology is part of the Lizard Series Gabbro, with outcrops of Treleague quartzite and wind-blown loess deposits (Barton, 1969).

Figure 5:13. The area within which sites T1, T2, and T3 are situated (Aerial Photo Historic Environment Record, Cornwall County Council).

5:5:2:1 Subsistence

Peacock has suggested the settlement was primarily concerned with the production of salt, possibly on an industrial scale given the large quantities of Briquetage pottery found there (Peacock, 1969c). However, the production of salt in the Romano-British period is generally thought to be a seasonal activity (Lane and Morris, 2001). It has also been suggested that the extant Bronze Age field system adjoining the settlement was utilised for arable agriculture, possibly in combination with pastoral farming (Johns and Herring, 1996). The large structures adjoining the houses were interpreted by Pearce-Serocold and Maynard (1949) as cattle pounds, which may indicate a pastoral element to their subsistence strategies; yet the evidence is inconclusive, and they may have had many functions. The surrounding cliff heaths would have provided ideal grazing for cattle and sheep, and the anciently enclosed fields supported local farms up until they were abandoned in the 1930s (Johns and Herring, 1996).

5:5:2:2 Chronological considerations

Trebarveth represents the beginning of the ceramic sequence under research. The site at Trebarveth is thought to have been occupied from the 2^{nd} through to the 6^{th} century, as established through the relative dating of native ceramic forms and imported pottery (Johns and Herring, 1996, 83; Thomas, 1958b, 15). The sub-oval or round form of the structures excavated here can be paralleled elsewhere in Cornwall for this period, as at Trethurgy, Grambla and Porth Godrevy (Quinnell, 1986, 2004; Sanders, 1972). The pottery from the site reflects what is considered to be a typical Romano-British assemblage (excluding the Briquetage). The fabric of the pottery has been identified by Peacock as being gabbroic and typical of this period (see Chapter 6 for further discussion). The domestic assemblage is typical of the Romano-British period throughout Cornwall, with a range of local forms and a small amount of imported Mediterranean wares such as African Red-Slip ware (Carlyon, 1985; Peacock, 1969a, 1977; Quinnell, 2004; Thomas, 1960). This site is taken to represent the baseline usage of gabbroic clay to which later trends can be compared.

5:5:2:3 The Site

The settlement is comprised of generally oval or roughly circular houses, often associated with oval or circular enclosures of a similar date. All the houses have hearths against the northern side of their interior walls with an entrance to the north or north-east. They all have thick stone walls 1.5- 2m wide and there is little evidence for internal post holes. All the houses produced pottery typical of the region and dating to the Romano-British period. In addition to the native wares, Hut T1 produced African Red Slip ware dating to the mid 6^{th}-century and Hut T2 produced cup-lug vessels thought to be 5^{th} century in date. The assemblages from Hut T3 and Hut T1 also included Briquetage vessels, which were used in the production of salt, strongly suggesting that farming was not the only occupation practiced.

5:5:2:4 Excavation of the site

This site is perhaps the least cohesive in terms of its archaeological archive, a direct result of sporadic excavation in the early twentieth century and the poor curation of the archive. The houses dubbed ‘site T1’, ‘T2’ and ‘T3’ were excavated by various amateur and professional archaeologists over an extended period (Figs 5:14 and 5:15).

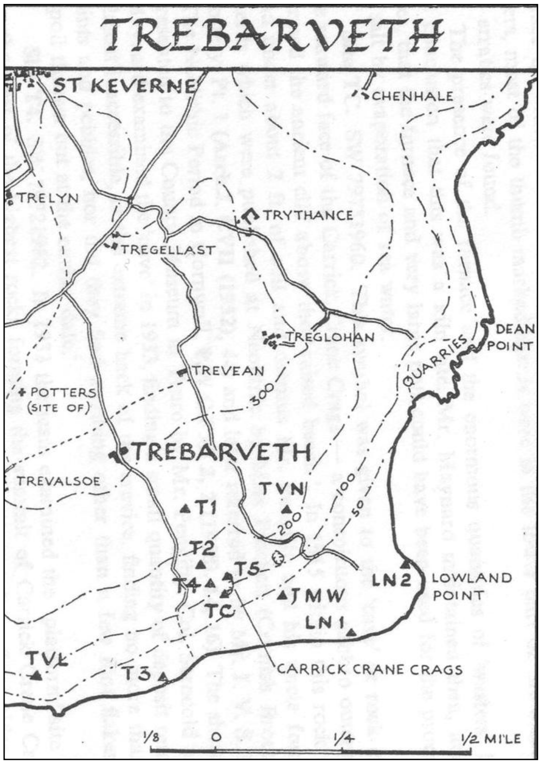


Figure 5:14.. Dowson’s map of sites at Trebarveth (Dowson, 1968, Fig 2 A.).
Figure 5:15. Maynard’s original map draw in 1939 from which Dowson created hers (Held at Royal Cornwall Museum).

The first excavation was carried out by Maynard and Pearce-Serocold in 1925 after the landowner Mr. Pengelly told them of the hut circles in his fields. A series of excavations were carried out from 1925 to 1939 by Perarce-Serocold, Maynard, Dr. Favell and others. The publication of the work was problematic as there had been many directors over the years, resulting in a dispersed archive no-one was prepared to collate and write up (Dowson, 1968, 11). However, in 1949 Pearce-Serocold and Maynard brought together enough material to publish an overview of T1, and Patchett summarised the finds discovered (Pearce-Serocold and Maynard, 1949). In 1969 Peacock excavated T3 to establish if it was a kiln site for domestic pottery (1969c).

This complex history of excavation and paper archive, comprised of notebooks, letters and drawings, makes an overview of the context of the ceramic assemblages difficult to establish. A comprehensive synthesis of the archive for T1, T2 and T3 was undertaken to evaluate the potential of each associated ceramic assemblage. This process enabled Hut T1 to be selected for representative sampling and analysis. The synthesis of Huts T2 and T3 are not directly relevant to this study and have been relegated to Appendix 1.

5:5:2:5 Site T1.

This site is the furthest inland [SW 79631987], above the Crane Carrick Crags at the top of the slope (Figs 5:14 and 5:15) (Dowson, 1968, 13). It was the first site at Trebarveth to be excavated in 1925, during which a small trench was opened. The remaining deposits were removed in 1939 in order to confirm a stratigraphic relationship between the bead rim and cup-lug pottery forms found there (Pearce-Serocold and Maynard, 1949, 170). The structure consisted of a circular stone wall roughly 6.40m in diameter with an entrance to the north, described as having a stone slab. There are two associated larger open enclosures to the north-east (Dowson, 1968, 13; Pearce-Serocold and Maynard, 1949, 170). The circular structure referred to as Hut A, had large amounts of collapsed stone overlaying the interior surface, presumably from the walls of the structure. The two larger enclosures or ‘cattle pounds’ were not excavated and their exact dimensions are unknown, although they were thought too big to roof over.

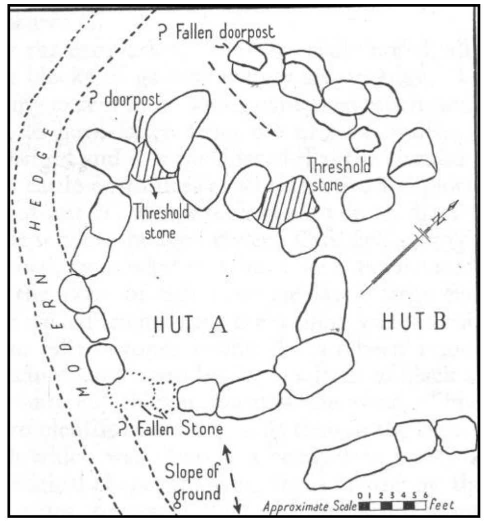


Figure 5:16. Sketch of T1 showing the site as surveyed in 1925 by an unknown person (held at Royal Cornwall Museum).

Figure 5:17. A published plan (Pearce-Serocold and Maynard, 1949, Fig 1) The hedge boundary orientates the sketches, although it is difficult to pick out direct similarities.

The best records for the site are from Maynard's excavation in 1939, which investigated the north-western side of the house (Figs 5:16 and 5:17). All details below are estimates based on the note-books and sketches made by Maynard, currently stored at the Courtney Library archives in Truro.

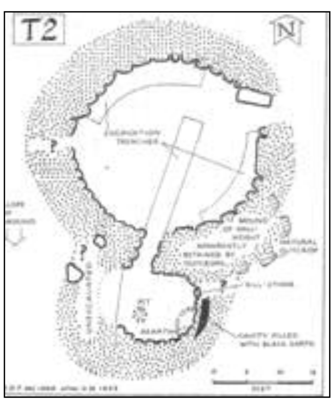
There were three trenches. Trench B was orientated east-west and extended from the wall inwards, being 1.21m wide and around 3.0m long. Trench C was of a similar size and orientation at the southern end of the house. Finally, Trench B/C was dug later, joining Trenches B and C; it was orientated north-south and was 2.62m long and roughly 1.50m wide. Original illustrations suggest that the internal deposits were around 0.38m deep, sitting on the 'rab' or subsoil which was then subsequently overcut, making the total depth of the trenches 0.8m. The stratigraphy was comprised of five main layers: the turf (0.07m), old spoil (0.07m), black/brown humus (0.15m), top hearth (0.03m) and bottom hearth (0.04m). These layers appear to have spread throughout the area excavated and are consistently of the same depth.

Few internal features were identified. The hearth appears to have lain directly up against the north-east wall; it was roughly 0.45×0.45m across with a stone-block base enclosed by upright curb stones. The hearth deposits had a higher concentration of burnt material and produced the majority of the pottery, including numerous cup-lug sherds which are noted as being sealed within this layer. There were some imported wares present which Patchett calls ‘fine red ware’ comparative to the material found at Tintagel and presumably therefore African Red-slip ware, although the location of the pottery in the T1 deposits is not certain (Pearce-Serocold and Maynard, 1949, 173). Thomas suggested a rough date for this pottery of around AD 550 (1958b, 15).

The total ceramic assemblage weighs 36,871kg, with Briquetage making up 34% or 12,401kg of that total. The high proportion of domestic ceramics made Hut T1 the best option of a representative sample as the others had large quantities of Briquetage.

5:5:2:6 Huts T2 and T3

Sites T2 and T3 are located further down the slope and are broadly similar in style to Hut T1 as the figures below demonstrate (Figs 18 and 19).



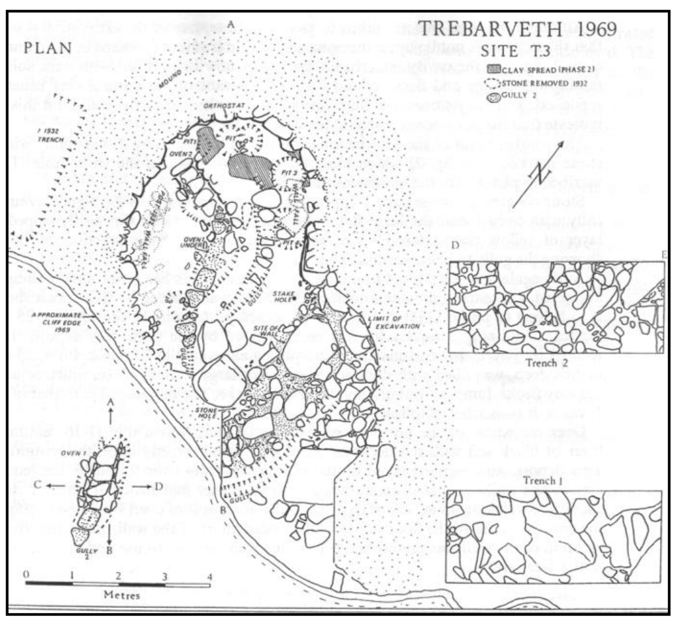


Figure 5:18. T2 showing structure and excavation trenches, illustrated by Dowson from Maynards note books (1968, Fig 2 B).

Figure 5:19. T3 after excavation by Peacock in 1969 (1969c, Fig 17).

5:5:3 Carngoon Bank

The site of Carngoon Bank is situated near the southern tip of the Lizard Peninsula [SW 69581306] in the parish of Landewednack (Mc.Avoy *et al.*, 1980). The ancient place-name element *carn* 'a rock tor' and *goon* 'downland or unenclosed pasture' (Padel, 1985, 108), describes to this day the nature of the area. The excavated site is situated on a slope between a moorland plateau to the north and the cliffs of Pentreath Beach 350m to the south-west (Fig 5:19) (Harris *et al.*, 1979, 6; Mc.Avoy *et al.*, 1980; Rose, 1979a). The nearest access to the sea is 600m away to the south at Caerthillian Cove. The underlying geology is comprised of bastite serpentine with occasional inclusions of granite, banded gneiss quartz and hornblende schist (Flett, 1974).

5:5:3:1 Subsistence

The excavated evidence suggested to Mc.Avoy that the site was involved in the production of salt, due to the large amounts of Briquetage recovered, although this was thought to be a seasonal activity (1980). The small area of the excavation could not establish if the site was part of the larger settlement or not. The numerous gullies excavated indicate the presence of a field system associated with the site, possibly connecting it to a wider farming community (Mc.Avoy *et al*., 1980). Unfortunately, no conclusive dating evidence was found in the gullies to support this (Mc.Avoy *et al.*, 1980, 40). The historic land characterisation assessment locates the site on the edge of *anciently enclosed land* and *upland rough ground* (Fig 5:20) (H.E.S., 1994). Such locations seem to have been favoured by Romano-British settlements across Cornwall, either because of ready access to varied resources, or else the coincidence of preservation.

5:5:3:2 Chronological considerations

Carngoon Bank represents a transitional period in which both a late Romano-British and early medieval range of ceramic forms are present. The survival and use of an oval structure into the 6th or 7th centuries makes it comparable with several sites around Cornwall such as Castle Dore, Grambla and Trethurgy (Quinnell, 2004; Rahtz, 1971; Saunders, 1972). The mix of Romano-British jars, bowls, storage vessels and imported Mediterranean Amphorae, along with the Bar-lug and Grass-marked wares, represents an excellent opportunity to further understanding of this period.

5:5:3:3 Excavation of the site

The archaeological remains were discovered when large quantities of Briquetage were uncovered during grassland clearance prior to agricultural use (Rose, 1979a). Limited excavation was carried out by the Cornwall Committee for Rescue Archaeology and the Lizard Field Club in 1978, which recovered pottery dating to the 4th century (Rose, 1979a, 134, 1979b, 3). This led to further investigation by the Central Excavation Unit in 1979 (Rose, 1979a, 134).

Figure 5:20. Location of site near Lizard Village (Mc.Avoy et al., 1980, Fig 11).

There were also several phases of Prehistoric occupation on the site, including a Bronze Age platform and pits containing flint and pottery dated to1310±140 cal BC, and some Iron Age activity (Mc.Avoy *et al.*, 1980, 33). The Iron Age phase of the site consisted of an irregular depression within which a number of 4th–3rd-century BC sherds in a hornblende schist fabric (Mc.Avoy *et al.*, 1980, 35).

The Romano-British phase of the site was more extensive. A large oval pit 12m long contained other, smaller pits cut into its base and is thought to have been sump (Mc.Avoy *et al.*, 1980, 35). The lower fill of the depression produced large fragments from a single amphora, along with various other types of Romano-British vessels (Mc.Avoy *et al.*, 1980, 35). The date of the amphora has recently been reviewed and Thomas now considers it to be 5th to early 6th century in date (Thomas *pers. comm.*). Upslope from the depression was a 'Briquetage dump' and a cobbled working area with mounds of clay, suggesting the area was associated with salt production (Fig 5:21) (Mc.Avoy *et al.*, 1980, 36).

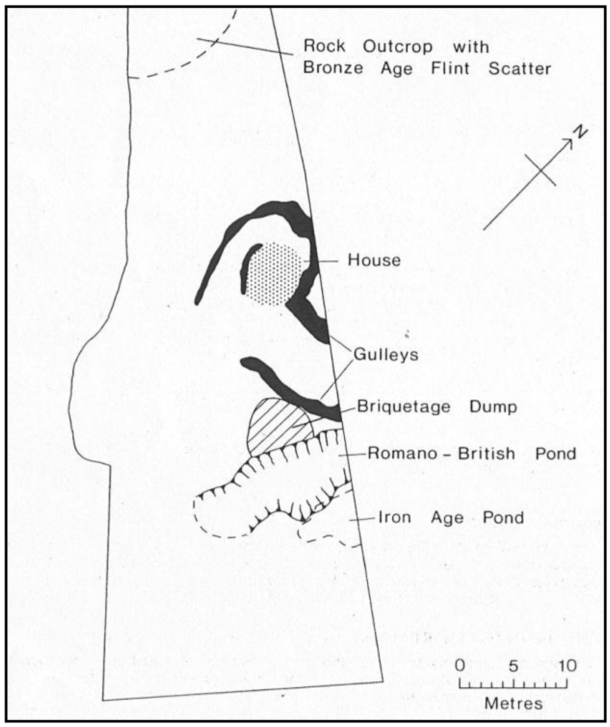


Figure 5:21. Showing the outline of the Romano-British house and associated features (Harris et al., 1979, Fig 1).

The post-Roman Structure [63] was situated further upslope and had four phases of use as defined by a series of layers (see Appendix 2 for details of phasing) (Mc.Avoy *et al.*, 1980, 38). The structure was sub-rectangular in shape, with three defined walls, one of which had stone footings, and an opening to the south defined by a line of postholes (Fig 5:21) (Mc.Avoy *et al.*, 1980, 38). The extent of the structure is thought to have been defined by a drainage gully 0.45m in depth, giving the interior a surface area of approximately 64m²

(Mc.Avoy *et al*., 1980). The numerous small pits, scoops and stakeholes make any interpretation of internal structure difficult. Mc.Avoy suggests that due to the total absence of daub fragments or stone debris the structure had walls of turf or earth-bank upon which the rafters were placed, so the roof required no internal supports (1980, 38). If so, the walls would have occupied the space 2m wide between the gully and the interior that was found to be completely devoid of features (Mc.Avoy *et al.*, 1980, 38).

Rectangular stone and clay-lined hearths were constructed in Phases One and Two, along with other clay-lined pits (see Appendix 2 for details) (Mc.Avoy *et al.*, 1980, 39). A fragment of a rotary quern, a stone pendant, a clay bead and a rubbing stone strongly suggests a domestic function for this structure (Mc.Avoy *et al.*, 1980). Phase Three is represented by a sequence of stakeholes and a clay-loam floor surface containing a spindle whorl (Mc.Avoy *et al.*, 1980, 38). In the final phase of occupation there is little demonstrated activity, with only four stakeholes attributed to this phase (Mc.Avoy *et al*., 1980). However, this phase is perhaps the most important as it produced Grass-marked vessel and three sherds with stamped decoration, currently consistent with a 6th century or possibly later date (Mc.Avoy *et al.*, 1980, 38). Salt production is thought to have continued into the post-Roman period, possibly on the site of the Romano-British Briquetage dump area, represented by some contemporary deposits of Briquetage in all phases of the structure (Mc.Avoy *et al.*, 1980, 59).

It has been suggested the continuing need for salt was the reason why the site continued to occupied (1980, 59; Peacock, 1969c; Pearce, 2004; Quinnell, 1986). Yet as Rose highlighted, the logistics of carrying sea water up a steep cliff path would present a significant limiting factor in comparison to a site like Trebarveth (Fig 5:22) (1979c, 1). The question of its unusual situation was explored by Rose, who suggested three possible answers: firstly, that salt production was a seasonal or small-scale and carried out on an existing agricultural settlement; secondly, that there were land tenure constraints or restricted access to the sea; and finally that the daily social practices made the distance inconsequential (Rose, 1979c, 2).

Despite this, Mc.Avoy proposes that it was a seasonal salt production site and that the existence of sumps dug into the base of the oval depression indicate it was occupied during the drier summer months (1980, 59). Rose challenged this hypothesis, suggesting that either the Briquetage had been brought to the site (as a container for salt), or that the site produced Briquetage vessels for salt-works elsewhere (1979c, 2). He supported this by arguing that the site had adequate local clay and fuel sources and that the layers 7 and 8 could equally be interpreted as the *in situ* or dumped remains of ceramic production (Rose, 1979c, 2). He also suggested that thin-section analysis would be needed to establish if the clay used was not gabbroic, and if so that would imply the Briquetage was made on site (Rose, 1979c, 2). Both Mc.Avoy and Rose do agree that it is an industrial site and that the structure uncovered was part of a contemporary settlement (1980; 1979c).

Figure 5:2. Aerial view of the site highlighting an oval enclosure possibly associated with the site (Cornwall County Council licence 2008).

The archaeological evidence from Carngoon Bank suggests that the rectangular structure was occupied intermittently up until the 6th century (Mc.Avoy *et al.*, 1980, 59). It is one of a handful of sites, such as Trethurgy and Grambla (Miles and Miles, 1973; Quinnell, 2004; Sanders, 1972), where a Romano-British site may be occupied into early medieval period

(Preston-Jones and Rose, 1986, 139).

5:5:4 Winnianton

The archaeological site at Winnianton near the village of Gunwalloe is situated on the western side of the Lizard Peninsula [SW 65982062]. Its name clearly establishes its date and social context as *Winnian* referring to St Winwaloe (also in Gun*walloe*), a 6th-century Breton saint and *tun*, Old English place-name element for a settlement or estate, presumably indicating the name post-dates the Anglo-Saxon conquest of Conrwall.

This study will refer to the research site as Winnianton and not Gunwalloe, so as to locate them both more accurately and avoid confusion. The exact location of the excavations that produced the pottery analysed is not clear, and many of them will have either been lost or have eroded from the cliff face (Fig 5:23). The accepted location lies in the area directly behind Jangye-Ryn or Dollar Cove, where archaeological material continues to erode from the cliff face by Winnianton Farm. The site is situated on the Devonian Gramscatho Beds, and the underlying geology is composed of contorted Devonian slaty-shales, hornblende schist and granite (Barton, 1969; Bromley, 1976; Kirby, 1979).

Figure 5:23. Showing the possible extent of the site and the surrounding landscape features (Cornwall County Council licence 2008).

The site is on a level area above the cliff backed by agricultural land sloping upwards to the north-east. A headland to the south-east separates the site from Church Cove, behind which a broad valley contains extensive marshland, with a river that issues out onto the beach (Fig 5:24).

Figure 5:24. River valley behind site (Author's Photo).

5:5:4:1 Subsistence

The severe erosion of the site makes direct comparison with its hinterland, as the true size and extent of the settlement is not known. Documentary and environmental evidence can, to some extent, provide a reasonable picture of subsistence at Winnianton. The environmental analysis carried out by Caradoc Peters has demonstrated that barley was being grown in the area around the time the site was occupied, with faunal evidence for cattle, sheep, horses, pigs and domestic fowl (1986, 1987). The excavated middens have produced the remains of shellfish and fish from the tidal zone, indicating the resources of the sea were also exploited (Peters, 1986, 1987).

The entry for the manor of Winnianton in Domesday Book, assumed to be on the site of the current Winnianton Farm, indicates an established agricultural landscape (Williams and Martin, 2002). The entry indicates the lands of Winnianton were extensive, and the manor was the largest in Cornwall:

> "The King holds Winnianton. There were TRE 15 hides. There is land for 60 ploughs. Of this, 1 hide is in demesne, and there are 2 ploughs; and the villains have 3 hides and 24 ploughs. There are 24 villians and 41 coliberts and 33 bordars and 14 slaves. There are 6 acres of meadow, pasture 4 leagues long and 2 leagues broad, [and] woodland 1 league long and half a league broad. It renders £12 weighed and assayed."

(Williams and Martin, 2002, 341)

Therefore, it can be supposed that the inhabitants of Winnianton practiced arable and pastoral agriculture and made extensive use of the seafood available.

5:5:4:2 Chronological considerations

The finds from the structures and shell middens at Winnianton bring the pottery sequence into the early Christian and later post-Conquest era. The use of Bar-lug and Grass-marked pottery indicates the site was occupied from the 7th century through to the 9th century or later, with an assemblage of cooking pots and platters and no imported pottery at all. There are fewer sites of this type in Cornwall, and only a small number of these, such as Gwithian and Mawgan-Porth, having received any investigation at all (Bruce-Mitford, 1997; Guthrie, 1960; Thomas, 1956, 1960). However, the quantity of this type of pottery, in relation to the size of the sites excavated, makes Bar-lug and Grass-marked pottery proportionately the most abundant ware in the South West for the 7th-century. The production of Bar-lug and Grass-marked ware may extend into the 11th-12th century, as seen at Launceston Castle and in excavations at Southampton (Platt *et al.*, 1975; Saunders, 2006) (see Chapter 4). This implies that it was the last extensively used native hand-made pottery in Cornwall before the influx of wheel-turned medieval vessels.

In the immediate area, a Bronze Age urn was found in the sand dunes to the east of the site (Hartgroves and Harris, 1985), and just to the south a bank and ditch encloses a cliff castle recorded located by the ordinance survey in 1959 (Fig 5:25) (Cotton, 1959, 119; Dowson, 1969, 125; Page, 1906; Pool and Thomas, 1973). The tithe map and apportionment lists the field name as ‘the castle’ in 1840, and an earlier estate map and lease record the existence of a “house called Choycastle adjoining Gunwalloe Church” (CRO RH/9/2/10/1, dated 1796).

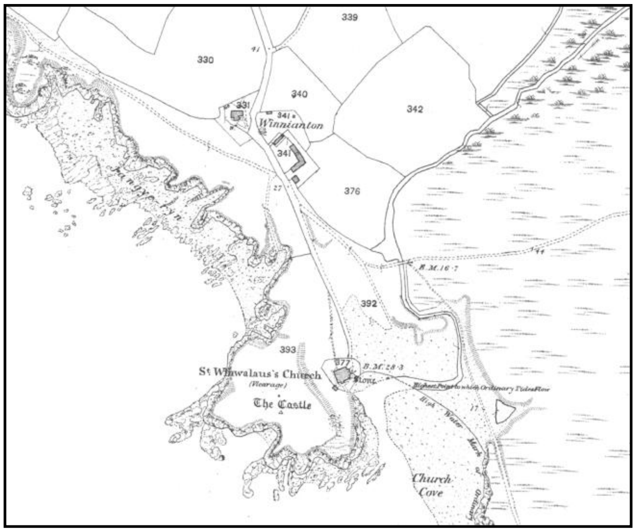


Figure 5:25. 1880 OS map 1:2.500 scale, showing the cliff castle earthworks and surrounding features (Historic Environment Service OS).

The present church at Gunwalloe is situated behind the cliff castle within a semi-circular enclosure wall; the current building is 14th or 15th century in date. There is a reference to the chapel of 'St Wynwola iuxta Carmynow' on the site in AD 1433 (Doble, 1940; Henderson, 1956, 192), with an earlier reference to the 'Eecclesia de Winiton' in AD 1219 (Gover, 1948, 548). There is a 13th-century detached bell tower with a pyramidal roof adjacent to the church and cut into the bedrock of the cliff castle, and the semi-circular enclosure may be consistent with a post-roman 'lann' site, supporting an early Christian presence (Doble, 1940; Dowson, 1969). There are also two early medieval stone wheel-head crosses within the churchyard and an 11th-century stone font in the church (Doble 1940). Finally, there is a reference in AD 1732 to a holy well, now lost to coastal erosion (Figs 5:26 and 5:27) (Cummings, 1875, 182; Langdon, 1999, 67).

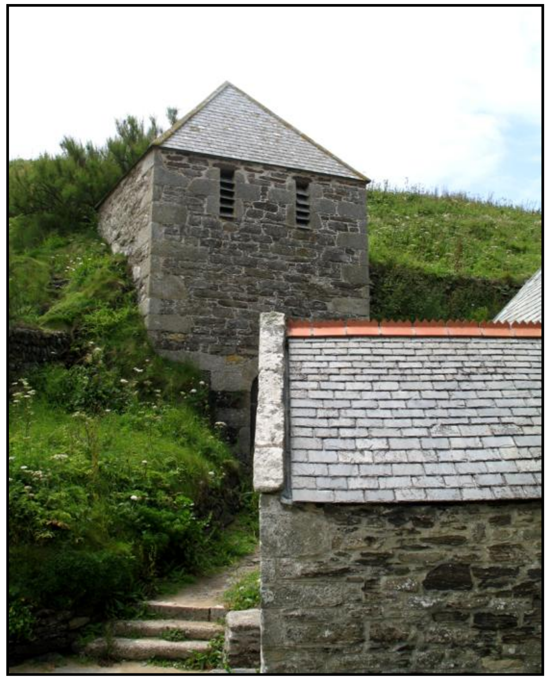
 

Figure 5:26. The Early Medieval stone cross (Author's Photo).
Figure 5:27. The 13th c detached tower (Author's Photo).

5:5:4:3 Excavation of the site

The site has experienced severe coastal erosion due to the soft and yielding nature of its Devonian slate bedrock and thin topsoil underlain with layers of windblown sand. It can be estimated the coastline has retreated approximately 70m in the last 200 years, and it continues to disappear with each winter storm. Erosion of the site led to its discovery, as pottery and other material is frequently recovered from the beach below the site (Dowson, 1969).

There have been many investigations on the site since 1909, and the scale and aim of this work have generally been exploratory or rescue. The layers of windblown sand have created a post-depositional environment conducive to good preservation, and thus artefacts such as bone and shell survive. The work carried out has only been published as brief notes or summaries of observations. Thus the assemblage used in this research is a composite of all past investigations and my own excavations on the site. Previous excavations have failed to obtain absolute dates for the site, although recent work by the author has provided the first radiocarbon date for the site. Prior to this the dating evidence relied on ceramic typology, and, to some extent, historical documents.

Evidence for a settlement here was first noted in 1909 by Rogers, who observed pottery, sea shells and animal bones appearing in the cliff face (1910, 240). On further investigation he suggested the pottery and material were similar to that of the settlement at Gwithian on the north coast of Cornwall (Rogers, 1910). He describes his discovery as being "close to the castle", by which it is assumed the univallate cliff castle known to have been a prominent earthwork at the time (Pool and Thomas, 1973).

The first archaeological investigation on the site was carried out by Hogg in 1929 (1930). He revealed and recorded a 70" or 1.7m section of the cliff-face which included stone walls, clay floors, hearths and midden material (Fig 5:28) (Hogg, 1930, 325). He ascertained that the remains extended inland some distance and that there were at least three 'levels' (Hogg, 1930, 325). The lowest level revealed walls constructed of rounded boulders with no bonding material and a hearth containing burnt pottery and large amounts of charcoal, with a general spread of bone and shells found within that structure (Hogg, 1930, 325).

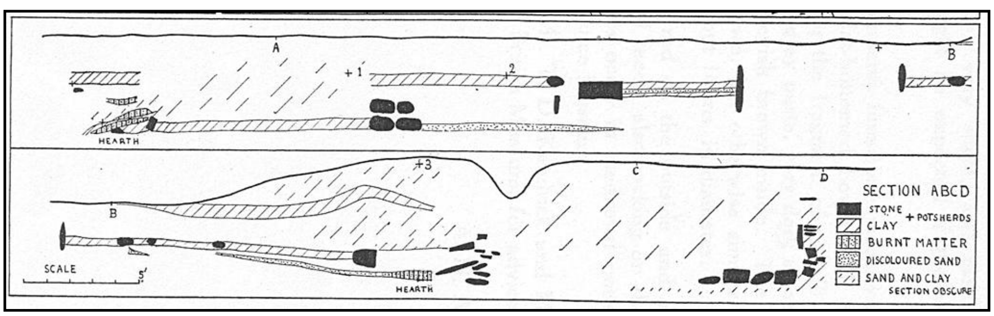


Figure 5:28. Hogg's section drawings from 1930, depicting stone walls and floor surfaces (After Hogg, 1930, plate 10).

The next layer was separated from the first by two feet of windblown sand containing thin clay floors and burnt layers that seem to respect the underlying location of the hearth. These walls were constructed of angular slabs of stone with bonded with clay, which he suggested were retaining walls for the blown sand (Fig 5:28) (Hogg, 1930). This form of construction is also seen in the 2010 excavation (see below). Hogg also suggested that the structures were made of wood as the walls he found appeared insubstantial and there was no evidence of stone having being robbed (1930).

The highest level showed ephemeral traces of possible clay floors and large quantities of limpet shells, bones and pottery. The pottery sherds came from large hand-made flat-bottomed bowls with flat rims. Hogg commented that the bases had impressions of “grass, reeds and also sacking” (Hogg, 1930, 326). He concluded that the site was of a ‘Dark Age’ settlement, possibly a precursor to Domesday Manor of Winnianton (Hogg, 1930).

The first archaeological excavation on the site was carried out by Jope and Threfall in 1947 [at (Nat. Grid 10/659207)], who uncovered habitation levels, hearths and dry-stone walled structures between layers of windblown sand (1955-56, 136). They believed these structures were the remains of the Anglo-Saxon Royal Manor of Winnianton, and that further excavation would corroborate this (Jope and Threfall, 1955-56, 136). The references in Domesday book to the agricultural economy of the manor as being both pastoral and arable appeared to be supported by the discovery of sheep, ox, dog and bird bones, and also “a number of seed and grain impressions on the pottery”(Jope and Threfall, 1955-56, 136-137). They also reported a large amount of shellfish remains such as limpets. The pottery recovered was comparable in form to that of Mawgan Porth (Bruce-Mitford, 1997) and Hellesvean (Guthrie, 1954, 1960).

They concluded that both the forms of the walls and pottery found were similar to those at Mawgan Porth, and thus dated to between AD 850 and 1050 (Bruce-Mitford, 1997). The author has confirmed this with a radiocarbon date of 856-996 AD (GRA-39254) from a midden recorded in the cliff face that contained Bar-lug and Grass-marked pottery, indicating the site may well be contemporary of Mawgan Porth, explaining the similar rectangular building styles.

In 1977, the construction of the National Trust car park for the beach at Church Cove (Johnson, 1978, 4), along with pottery frequently found in the process of digging new graves for the church (Peters, 1986), resulted in a renewed interest in the site. In both 1985 and 1986, Peters carried out fieldwork to extract environmental data for his BA and MA degrees in Archaeology, the results of which have not been published (Fig 5:29) (Peters, 1986, 1987, 1988, 4).

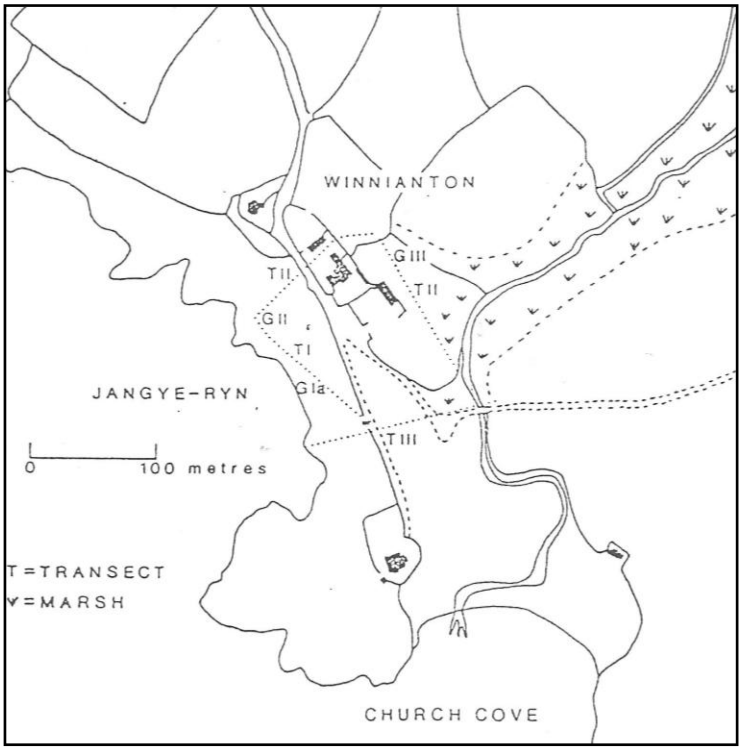


Figure 5:29. Peters Map plotting the locations of transects to retrieve molluscs and pollen (Peters, 1987, Fig 3).

The archaeology recorded in the trenches and pit section drawings shows a stratigraphic sequence containing: a dry-stone wall, an area of charcoal, shell, bone and Bar-lug and Grass-marked pottery and a midden in the form of a long ditch, along with a small iron bell possibly late-Roman or early medieval in date (Fig 5:30) (Peters, 1986, 6). The mollusc *Cernuella virgata* was found in midden deposits, and as this species was introduced during the Romano-British period it provides and *terminus post quem* for this feature (Peters, 1987, 69).

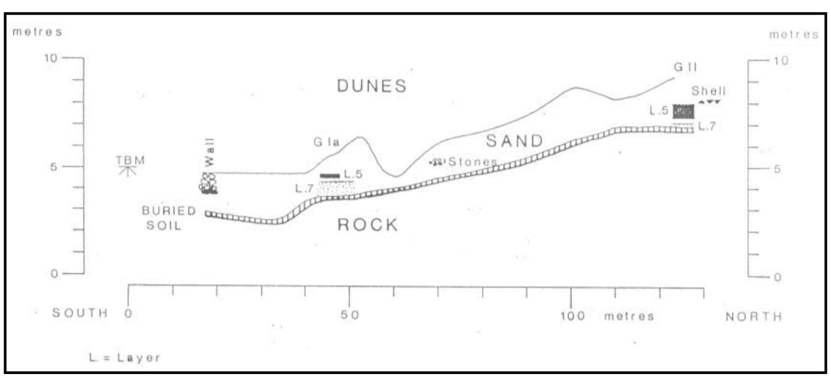


Figure 5:30. Peters section drawing of transect 1 showing occupation layers and stone walls (Peters, 1987, Fig 4).

The environmental evidence from the molluscs collected in trench GIa suggested “a succession from possible plough-soil to rapid sand accumulation at the level of the archaeology to the present day stable dune pasture” (Peters, 1988, 26). The results from GIII suggest a sequence from marshland to a drier swamp followed by a sparsely vegetated swamp and finally desiccated marshland, after which there was a period of recovery culminating in the currently rejuvenated marshland (Peters, 1988, 26). This suggested to Peters that “overgrazing and human settlement may have caused the second phase of sand accumulation”. He therefore concluded that the location of the settlement had been selected due to its infertility in an effort to avoid using more productive land (1988, 26). He suggests that the ‘Dark Age’ settlement may have shifted to the current location of Winnianton Farm to avoid the encroaching sand-dunes (Peters, 1988, 26).

The environmental analysis carried out by Peters gives a clear picture of the subsistence strategy in action at the site during its occupation (1987). Analysis of the bones in the midden deposits confirm that cattle, sheep, horses, pigs and domestic fowl were being consumed along with limpets and the bones of fish commonly found in shallow coastal waters (Peters, 1987, 7). The organic material recovered included cultivated barley and wheat, along with wild foods such as blackberries and hazelnuts (Peters, 1987, 77). A sherd of pottery from the midden had a cloth impression on its base, further suggesting a well-established settlement involved in a range of domestic activities.

The most recent investigations on the site have been undertaken by the Author as part of this study and wider research aims for the region in association with the National Trust and Cornwall Archaeological Society. Rescue recording began in February 2008 when a midden was revealed in the cliff face above Jangye-ryn cove containing Grass-marked pottery, charcoal, bone, shell and burnt stone (Figs 5:31 and 5:32). Charcoal used for AMS dating resulting in a date of 856-996 (GRA-39254).

Figure 5:31. Picture of the midden in the cliff section February 2008 (Author's Photo).

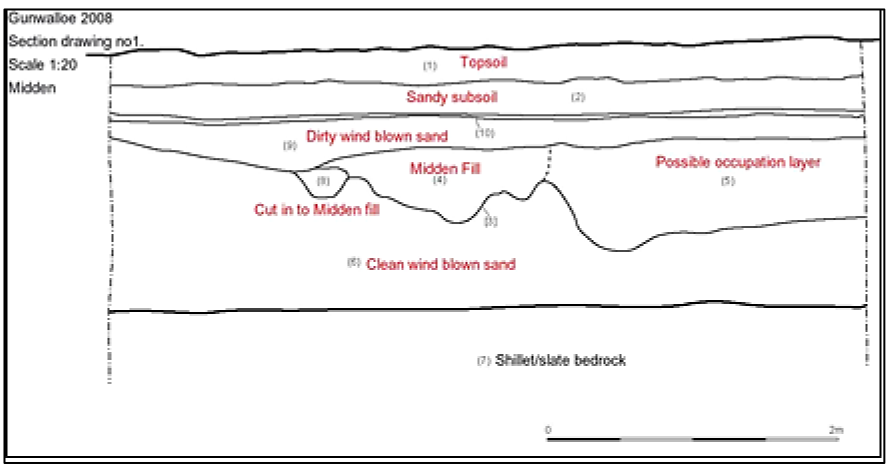


Figure 5:32. Section drawing of midden (Author's Illustration).

Investigation by geophysical survey was carried out revealing possible circular features and large areas of disturbance (Wood, 2010b). These were investigated through targeted excavation directed by the Author in July 2010. The excavation identified a midden, a possible hearth, clay floor surfaces, pits filled with charcoal, occupation layers and a section of a clay-bonded revetted stone wall very similar to previous excavations. The midden produced sherds of Grass-marked cooking pots, dishes and Bar-lug cauldrons, along with evidence of a very varied diet including limpets, mussels, cockles, winkles, crab, fish, chickens, sheep, pigs and cows (Figs 5:34 and 5:33).

Figure 5:33. Grass-marked pottery sherd (Author's Photo).

Figure 5:34. Fish Jaw bone (Author's Photo).

The distribution of pottery and bone across the site, identified in many stratigraphic layers, suggest many phases of occupation and that middens were continually disturbed and the material redeposited. The most significant discovery was the exterior of a clay-bonded revetted stone wall running north-south whose exterior was reinforced with midden material. (Fig 5:35). The foundation of the house was cut into earlier midden material, below which was a layer of wind-blown sand overlying another midden layer, suggesting many phases of occupation, the end of which was indicated by the interior filled with windblown sand. Pottery found within the midden layers strongly suggest an early medieval date of 8th -9th century.

Figure 5:35. Sunken house with clay-bonded revetted stone walls Gunwalloe 2011 (Author's Photo).

Earthwork features suggest the wall is part of a rectangular structure roughly measuring 3×6m in extent. The earth bank behind the revetted wall and sunken floor would have given the impression of a house only visible as a roof sitting on the sand-dunes, an ideal home to protect its occupants from its exposed coastal location.

The results of environmental analysis have provided evidence to support the mixed subsistence strategies suggested above and the many phases of occupation. The results of the soil-micromorphology confirms the inclusion of organic material in the midden deposits (Ben Pears *pers. comm*). The 3.0m column of sand sampled also provided mollusc evidence of Catholic species during the occupation phase, suggesting a mixed open countryside (Tom Walker *pers. comm.*).

It is now possible to estimate, based on current and previous investigations, that the possible area of occupation stretched over 370 metres along the coast from the church and up to 100 metres inland, with around 70 metres already lost to the sea through erosion (Fig 5:36). This would make Winnianton the largest 7th-9th-century rural settlement currently known in

Cornwall and Devon, suggesting it was a settlement of great importance, excavations in 2011 will illuminate this further.

It is possible that this community began with its earlier association with the 6th-century saint Wynwola, who may have established a church on the site of the current structure. The rock-cut bell tower could provide evidence of an early hermitage, as was typical of an early Christian presence. The settlement may have grown up around the church and was later known as the Domesday manor of Winnianton.

Figure 5:36. The site of Winnianton possibly stretching from the church below the headland along the entire coastline visible in this image and inland somewhat further (H.E.S. Cornwall County Council).

5:6 Summary

The Lizard Peninsula makes an ideal study area, encapsulating as it does the settlement forms, physical landscapes, ceramic assemblages and cultural shifts seen across Cornwall. The upland, lowland and costal landscapes offer comparison with the whole of Cornwall, and the historic landscape is fortunate to have some of the best historical documentation in the county, as well as excavated sites providing archaeological evidence.

The chronological span and development of each site in terms of changes in settlement form, subsistence and perhaps way of life, is representative of the wider region. The pottery assemblages reflect this, with the vessels found at Trebarveth representing the end of the Romano-British tradition, which at Carngoon Bank is joined by the post-Roman transitional Grass-marked wares. The Bar-lug and Grass-marked pottery assemblage at Winnianton opens a new era of ceramic forms. The analysis of these assemblages will provide valuable archaeological evidence that will be used to answer the research objectives of this study. Chapter 6 will now highlight the importance of the ceramic evidence and illustrate the methods that will provide the data. The methodology presented will challenge previous approaches and address new avenues of research into ceramic studies through a detailed programme of macroscopic and microscopic analysis.

Chapter 6: METHODOLOGY

6:1 Introduction

This chapter will detail the methodology used in the collection of the data. This chapter will also undertake a critical analysis of the wider issues of pottery studies and scientific analysis that have contributed to the development of ceramic studies in Cornwall, and which have informed and prompted the methodology developed for this study. The techniques and research aims of previous work with clay sourcing and usage will also be discussed, putting into context their results and the applicability of their methods.

6:2 The methodology

This study employs a rigorous, systematic and staged methodological process. In outline, it will:

1. Undertake a detailed macroscopic analysis of the entire assemblages from each site,
2. Identify preliminary fabric groups,
3. Select appropriate sampling units,
4. Establish representative sampling strategy for microscopic analysis,
5. Perform microscopic petrographic analysis,
6. Validate macroscopic fabric groups,
7. Identify geological provenance using existing clay samples,
8. Perform statistical analysis of results.

The results will be discussed in Chapter 8. The methodology outlined above is explicitly relevant to the intended research aims providing scientific data capable of comprehensive investigation and academic scrutiny. The combination of detailed macroscopic and microscopic analysis, and the incorporation of existing unpublished data, will provide a unique resource of data from which to form interpretive frameworks. There are many criteria upon which the relevance and validity of this methodology can be justified:

- It will be the first analysis of Cornish ceramics utilising the principles of ceramic petrology, rather than a geological petrological perspective.

- It will challenge Peacock's pioneering hypothesis for explaining raw material provenance and distribution of ceramics.

- It will be the first comprehensive programme of petrological analysis to cover three settlement sites with an equal focus on gabbroic and non-gabbroic fabrics.

- Contrary to past research methodologies it will include both detailed macroscopic characterization by hand of the entire assemblage and microscopic petrological analysis.

- It will for the first time combine unpublished petrological data from clays sampled by Morris on a settlement situated close to their context of use; whilst utilising the extensive data set produced by Harrad covering the Lizard Peninsula.

- The use of specific site-based and regional data will provide a unique assessment of local and regional scales of clay usage.

- It will synthesize the unpublished petrological data with that of my own forming the most extensive and comprehensive data set subjected to a specific research question on ceramics of this period.

This collection of unique and innovative approaches combined with the execution of the methodology proposed above will produce new data that will assert new interpretive avenues. The deployment of this methodology will change the conceptual frameworks of ceramic studies in Cornwall and the future connotations of gabbroic pottery in the South West. A more detailed consideration of the issues outlined above will now follow.

6:3 The importance of being gabbroic

As discussed in Chapter 1, the ceramic analyses carried out in Cornwall have focused on and highlighted the importance of gabbroic-derived clays. It has also outlined the issues and themes approached, demonstrating how its perceived importance has grown over the past 50 years and what has been done to investigate it. The questions span millennia within Cornish ceramics, but it is important to identify what the current questions are and what conclusions have been drawn to date.

6:3:1 Production

In 1987, an article by Quinnell entitled 'Cornish gabbroic pottery: the development of a hypothesis' suggested that "pottery had been manufactured on the gabbroic areas of the Lizard Peninsula from the early Neolithic through at least to the end of the Roman period, and that in certain periods – the earlier Neolithic, the later Iron Age and the Roman – these gabbroic clays had been the only major source for Cornish ceramics" (1987, 10). There is now evidence from typological and petrological analyses that this could be extended beyond the Romano-British and into the post-Roman period (Carlyon, 1985; Johns and Herring, 1996; Peacock, 1988; Quinnell, 2004).

Peacock's original description of the gabbroic fabric is:

> "Feldspar is usually predominant and occurs as angular fragments up to 5mm, normally altered and often intensely saussuritized so that the composition cannot be determined. They frequently exhibit a brownish colour in plain polarised light. Scattered throughout are rare fragments of markedly fresher plagioclase feldspar with well-developed polysynthetic twinning. The amphibole fragments range up to 3mm across and, while some of the grains are composed of a single crystal, they usually consist of fibrous aggregates. They are often cloudy due to the alteration and are colourless or pale green altering to pale brown due to the firing…..Rare fragments of green hornblende altering to brown are present in some sections. Pyroxene is occasionally present and very rarely it is fringed with amphibole giving rise to a uralic texture. Magnetite is often present and is abundant in some sections. Quartz occurs as

> small grains but is often comparatively scarce, though, exceptionally, large (1-2 mm) grains of quartzite can be seen. Accessory minerals include occasional grains of tourmaline, serpentine, olivine, and zoisite."

(Peacock, 1969a, 43)

The general consensus has been that the pottery was produced on the Lizard Peninsula close to the clay source. However, several years of extensive fieldwalking in the area by the Cornish Archaeology Society could not locate a kiln site (Smith, 1987, 61). This may be due to the fact that the majority of the clay-bearing areas are not under cultivation, being predominately heath and rough ground (Smith, 1987). Their inaccessibility also limited the areas available for clay-sampling during Harrad's research (2003, 52). This is perhaps why, in an effort to narrow the search, the focus over the past ten years has moved towards establishing the exact geological area where the clay originated. Harrad's results, however, have not been utilised and the search for the production-site is currently at a standstill. A more current hypothesis is that the clay was exhausted in the post-Roman period, thus leaving no possible evidence for extraction (Thorpe *pers. comm*).

One could suggest the reason for this is that pottery may have been produced within a settlement context and that household production was the norm, thus explaining the occasional admixture fabrics and the lack of production centres. It has been suggested that in certain periods the clay itself was transported, perhaps due to seasonal or periodical extraction (Parker-Pearson, 1990, 19). This theory has arisen because non-gabbroic inclusions have been identified in the 'gabbroic' fabrics. In relation to Parker-Pearson's work on Bronze Age Cornish ceramics, four possible explanations have arisen (Quinnell, 1998-9, 24): firstly, there is a natural variation in the gabbroic clays (Parker-Pearson, 1990); secondly, pottery was made near the gabbroic outcrop and accidentally incorporated other minerals (Woodward and Cane, 1991, 133); thirdly, gabbroic clays were running out and local gravels or clays were added (Christie, 1986, 98); finally there was a deliberate inclusion of other raw materials as temper or for non-technical reasons (Quinnell, 1998-9, 6). The possible inclusion of crushed, heat-fractured gabbroic stone for tempering, thus presenting a gabbroic fabric, was suggested by Wood (1999). She considered that moving gabbroic clay from source to the Bronze Age site of Trevisker 30 miles away was unfeasible and that local clays added crushed gabbroic stones, specifically selected for potboilers due to their thermal properties (Wood, 1999). However, Harrad discounted this theory as her thin-section analysis showed that gabbroic Trevisker pottery contains weathered gabbroic mineral inclusions and not rock fragments (2000).

6:3:2 Distribution theories

Peacock's original theory relies on an early analogy with the trade in Neolithic Group 1 axe-heads to the north of The Lizard (Gibson and Woodward, 1997, 167; Peacock, 1969a, 1988; Quinnell, 1987). The provenance for Neolithic Hembury 'F' wares was reinforced by the similarity of its distribution pattern to the stone axes that originated from the same area (Gibson and Woodward, 1997, 21). The existence of an axe trade network supposedly enabled the pottery to 'piggyback' on the axes, initiating the gabbroic clay-source tradition (Bradley and Edmunds, 1993). Peacock's theory was based on production at a single centre and the circulation of pottery within existing trade networks.

However, the discovery of an unfired lump of gabbroic clay at the post-Roman settlement at Gwithian strongly suggests pottery production within the settlement area (Thomas *et al.*, 2007; Thorpe and Thomas, 2007, 47). The accidental or intentional inclusion of addition of non-gabbroic inclusions in pottery seen across many periods also supports this. These divergent fabrics have often been explained as subgroups or admixtures within the gabbroic range (Quinnell, 2004). The percentage of gabbroic pottery identified on different sites across many periods demonstrates the relative amounts that were being transported.

Quinnell has stated that 95% of all pottery produced in the Romano-British period was made from gabbroic clay, and this seems to change in the 6th century AD when gabbroic vessels become scarce (1986, 129), such as at Trethurgy 92%, Reawla 85% and Carvossa 81% (2004, 108). This differs on the Isles of Scilly where the Romano-British assemblage at Halangy-Down on St Mary's contains both granitic and gabbroic fabrics (Ashbee, 1996), perhaps suggesting a different strategy. Harrad found that 32% of pottery fabrics from the Late Bronze to early Iron Age site of Bodrifty, in the far west of Cornwall, were from granitic-derived clays available near the site (2003, 239). She suggests this is due to a political or social upheaval which restricted access to the gabbroic clay source (Harrad, 2003, 284). She also noted that 21% of pottery from a Late Iron Age site on the north coast, was a mixture of granitic-derived and gabbroic clays, with 7% composed of pure granitic-derived clays and the remaining 72% being gabbroic-derived (Harrad, 2003, 221).

The diachronic variations in the fabrics of Cornish ceramics since the Neolithic may have great bearing on this study and are discussed further in Chapter 8. The ceramics selected to provide data for this research methodology have specifically focused on a transitional phase in British and European history (Dark, 1994; Hinton, 2003; Preston-Jones and Rose, 1986; Turner, 2006). This has also been identified as a period in which Cornish pottery maintained continuity of production (Thomas, 1960) (see Chapter 4).

6:3:3 The social or technical conundrum

The single most important question is: why was gabbroic clay from a remote peninsula the main clay source used in pottery production throughout the county for thousands of years from the Neolithic to the post-Roman period?

Harrad has highlighted this by stating that "[t]he dominance of one small region in pottery production is highly unusual in prehistoric Europe, and extraordinary when the practice persists over three millennia" (2003, 40). The enduring answer has been that it was either technologically superior or that it had an intrinsic social significance. The technological preference is the established answer, whilst a socially-motivated hypothesis has received little attention. This perhaps because the consensus finds it difficult to believe any social significance could span over 5000 years and four very different, culturally-specific eras.

An exploration of the social significance of the clay would require a more subjective approach to elucidate any deeper meanings not immediately apparent in the data. In the past, approaches of this nature have been extremely tentative, with an emphasis on themes such as peripheral landscapes, the significance of water or natural features in the prehistoric landscape, features or concepts that were presumably important to these societies (Bradley, 2000). The dominance of gabbroic pottery from the start of the Neolithic must consequentially mean that the technological superiority of the clay had already been established before production began, despite the many adequate clay resources in the county. The social or technical conundrum will be discussed further in Chapter 8.

6:3:4 Strengths and weaknesses

The questions and hypotheses introduced above have both strengths and weaknesses in their applicability within archaeology. The undeniable strength of gabbroic clay in archaeology is its potential to provide definitive evidence for ceramic production and distribution. The enduring ‘gabbroic hypothesis’ has encouraged sustained petrological analysis, as finding proof for the usage and transportation of this material affords a unique archaeological insight into the practices of past peoples.

The weakness of the hypothesis is the limited scope of the questions asked. The research agenda established by Peacock over 50 years ago continues to dominate research, consequently neglecting other issues of a more social and individual site-centred approach. Quinnell and Taylor have moved on to try and ascertain whether there are diachronic variations within the gabbroic fabrics over time (2004, 108-109). The majority of her fabric analyses on the classification of variants or ‘dirty fabrics’ has focused on the Bronze and Iron Age periods (Quinnell, 2004, 58). Yet arguably this new approach is still centred on the identification of gabbroic clays and not the motivation or process behind the variation. Harrad’s extensive programme of clay sampling and related geological survey could have been the starting point for establishing a tangible link between the pottery and the people using it. Instead, it ultimately led to another detailed set of data that, whilst providing a much needed resource, has not opened up many new interpretative avenues. This resource provides this study with invaluable data which is undoubtedly a significant strength.

Ultimately, the ‘gabbroic hypothesis’ in archaeology has been used to support very simplistic distribution and trade models without exploring ‘why’. In addition, the focus on the gabbroic clays to the near-exclusion of non-gabbroic material has been detrimental to the broader understanding of ceramic production in Cornwall.

Shifting from a gabbroic-centred approach towards an appreciation of the role of non-gabbroic fabrics on a site-by-site basis will highlight new avenues of research. A review of non-gabbroic fabrics could open up a new field of unused data that has until now been overlooked as unclassified, non-gabbroic, admixtures or 'dirty fabrics' in reports. Many archaeologists have acknowledged there are numerous adequate sources of clay in Cornwall that are technically capable for use in pottery production, but any desire to explore this question has always been diminished by the focus on understanding gabbroic clays. Perhaps it is time to investigate the 'other' clays, as Morris has tentatively attempted at Carngoon Bank (*1980*). The occurrence of these unclassified fabrics in assemblages, from Prehistory up to the post-Roman period, could be of great relevance in testing and developing Parker-Pearson's diachronic hypothesis by comparing the ratio of non-gabbroic local to gabbroic pottery over time. There is a great need to relate this archaeological resource to the rest of Britain as the scope of past research and interpretations has largely been internalised and rarely addressed to the wider concerns of the related period.

6:3:5 Summary

A review of the past and contemporary ceramic studies in Cornwall has highlighted how the 'gabbroic hypothesis' came in to being and has demonstrated how it has dominated any discussion, and not just in Cornwall. A critique of previous analysis has challenged the direction in which the field is currently heading and introduced avenues perhaps overlooked. If past assemblages are to be reviewed and move forward, not only are new questions needed, but more importantly new viewpoints from which to set them in the wider concern of ceramic studies within Britain and the period.

6:4 National context

The issue over local small-scale and centralised large-scale utilisation of clays is becoming a growing issue in archaeological ceramic studies in Britain. Knight *et al.* have utilised Peacock's gabbroic model in drawing similarities with 'local' vs. 'non-local' granodiorite-tempered prehistoric pottery production in the East Midlands (2003). Although on a smaller scale, they too have observed a pattern of long-term clay sourcing from a particular geological location (Knight *et al*., 2003). It is also distributed over a reasonably large area, despite the many locally available clays (Knight *et al.*, 2003). This has inevitably led to similar conclusions: that it was either technically superior for bonfire firing or that it had a social importance (Knight *et al.*, 2003, 119). This once again highlights the importance of challenging Peacock gabbroic model because it is still being applied uncritically, and is encouraging the same technical over social research question 50 years on.

As discussed in Chapter 4:3:6: the Charnwood pottery is another good example. Vince established that the Anglo-Saxon pottery from Charnwood Forest was of great importance in understanding the early and middle Anglo-Saxon periods (5^{th}-9^{th} centuries) in the East Midlands (2001), see Chapter 8 for further discussion.

The provenancing of local and regional clays was also looked at by Sheridan, who carried out petrological and chemical analysis on eleven Neolithic sites in Northern Ireland (1989). The programme of clay sampling she initiated around the selected sites, and the site-by-site comparison she undertook, demonstrated that the clay was sourced locally for small-scale local consumption for both domestic and funerary usage (Sheridan, 1989, 128). She suggests that in relation to other Neolithic ceramic studies in Britain, the patterns of gabbroic pottery movement suggested by Peacock and Sofranoff represent the exception rather than the rule (Sheridan, 1989, 129). At this time it certainly *appears* that the production and distribution of gabbroic pottery is exceptional, but the necessary synthetic work to put gabbroic pottery in its wider context in a critical way remains to be done.

Peacock's work with provenancing rock inclusions in pottery is frequently referred to. Vince has rated Peacock's work on Neolithic, Iron Age and Roman pottery as a "classic example" of successful petrology (1989, 163). A study of equivalent detail for the medieval period is the analysis of the Malvern Chase potteries in Hereford and Worcester by Vince (1989, 163), but petrological analysis in medieval ceramic studies is often biased towards research questions focused on distribution and trade, modelling emerging urban centres and economies across Europe, and perhaps forgetting the possible social element inherent in production.

Another example is the Neutron activation analysis of Grey ware and Calcite gritted ware in the north-east of England in the 4th AD (Evans, 1989). It demonstrated that in the 2nd-early 3rd century AD two or three local kilns supplied Grey ware for the region (Evans, 1989). However, this was overtaken in the later 3rd- 4th AD by Calcite gritted ware produced at a single kiln site, though not an evolution of market centre production but possibly the result of a 'military contract'(Evans, 1989, 160). This scientific ceramic analysis highlights that centralised production is not necessarily a result of an evolving specialisation or growing market centres (Evans, 1989, 161). This is frequently reiterated in ethnoarchaeological studies, which highlight the intrinsic relationship between pottery production and its wider social and economic context as discussed in Chapter 2.

The contemporary British examples above highlight just a few approaches to investigating periodic changes in clay souring and the possible motivation behind such practices. Interestingly, each of these ceramic studies were based on Peacock's 'gabbroic model' but struggled to maintain it. There seems to be an ongoing and dynamic relationship between the identification of local and non-local clay usage underlying most British ceramics studies. The reassessment of Peacock's model is of national significance because it has been used for many years throughout Europe to support simplistic distribution patterns and evidence of social structures (see Chapter 8).

6:5 Geology

The Lizard Peninsula is made up of ancient section of oceanic crust dating to the Upper Palaeozoic period in the middle Devonian (360 Ma) which was shunted, around the end of the Devonian period (375 Ma), onto the Gramscatho Basin which represented the main body of Cornwall at that time (Davies 1984; Barton 1969, Kirby, 1979, Selwood *et al* 1998). The Lizard complex is composed of igneous and metamorphic rocks making it one of the most geologically diverse areas in the UK (Davies 1984; Barton 1969).

The rocks of the Lizard are the oldest in Cornwall, with extensive deposits of Ophiolite or 'serpentine' rocks that formed part of the Earth's oceanic crust and mantle and were later subjected to uplift and erosion (Fig 5:2) (Barton, 1969; Kirby, 1979).

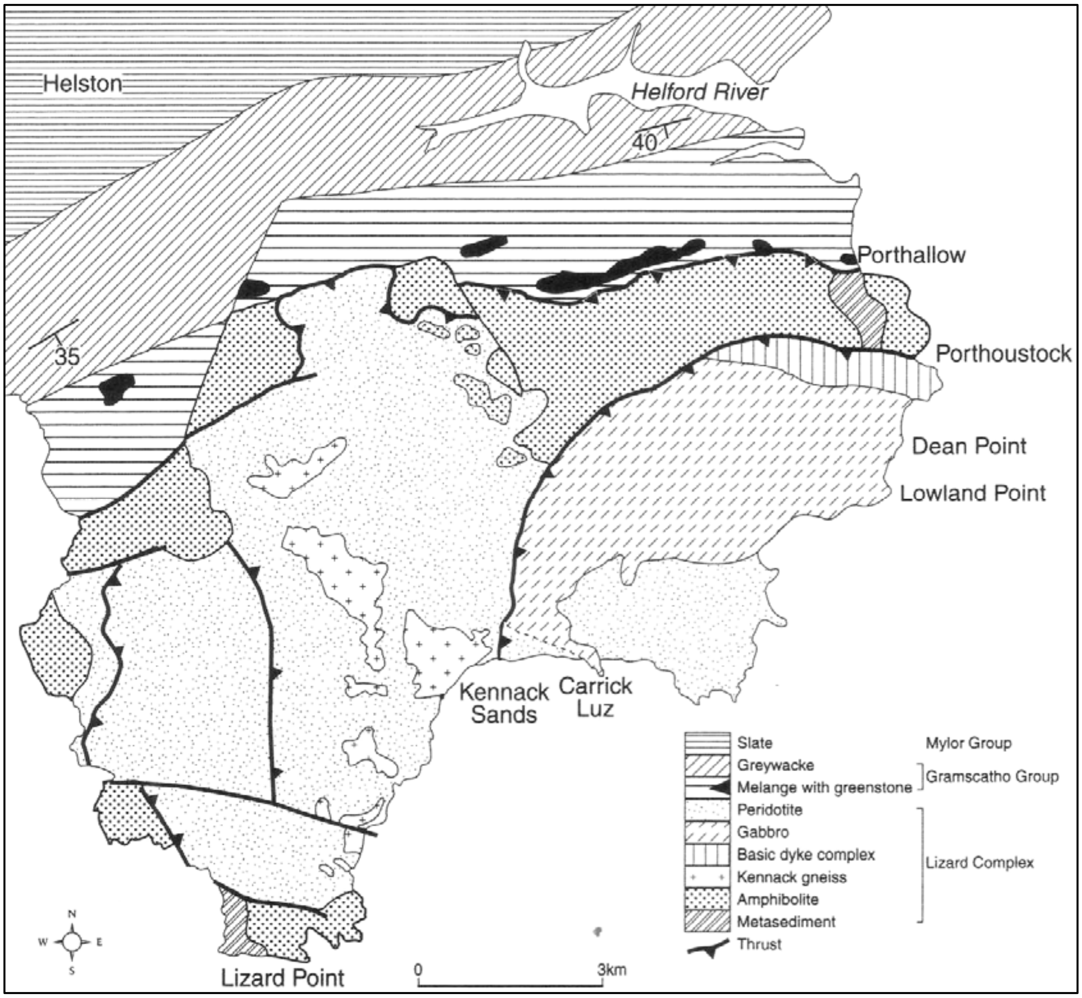


Figure 6:1 Geological map of the Lizard Peninsula (After Selwood et al 1998, fig 3:1).

6:5:1 Lithologies

The Lizard is dominated by peridotite, amphibolite and gabbro, with significant areas of granitic material and metasediments (Andrews 1998, 22). The complex can be described as having two tectonic units separated by a thrust zone running from Kennack sands to Porthoustock (Fig 6:1) (Andrews 1998, 22).

The unit to the east of the thrust zone is called the Crousa Downs Ophiolite which is the oceanic crust preserved characterised by the gabbro rock (Andrews 1998, 22). It is the unique source location of gabbroic clay and the study site of Trebarveth. Andrews basic description of the gabbro is “variably altered with amphibole and sericite replacing clinopyroxene and plagioclase” (Andrews 1998, 24). There are other components such as peridotite which can be found in many areas of the Lizard giving the geological region its distinctive variety of rich colours as seen in serpentine rock. There are also discreet deposits of windblown loessic deposits on found on lowland point (Harrad 2003).

The unit to the west of the thrust zone is more complex with many faults and strong internal deformation presenting a far more diverse geology (Andrews 1998, 23). Peridotites form most of the western unit thrust over amphibolites which make up one third and finally metasediments such as the schists found near Carngoon Bank close to Lizard Point.

The Gramscatho Basin to which the Lizard complex is joined is formed of low-grade metasediments divided by thrusts which divide it into the Porthscatho Formation, Mylor slate Formation, Porthtowan Formation, Dodman Formation, Roseland Breccia Formation, Carne Formation and Pendower Formation (Shail 1998, 41). The Portscatho Formation most concerns this study as it is the location of Winnianton. The underlying geology is dramatically different from the lizard complex being composed of poorly sorted sandstones and muddy sandstones (Shail 1998, 43).

These geological outcrops are of huge relevance to the archaeological sites and assemblages under analysis because each outcrop contains a distinctive suite of minerals, geology-specific minerals that ultimately found their way into the clays used in pottery production. The site at Carngoon Bank is situated on the interface between the peridotite, metasediments and serpentines, Winnianton sits on rocks of the Gramscatho basin, and Trebarveth is located on the gabbro.

The topography of the Lizard reflects these differing geological formations, with serpentine forming a flat plateau and the gabbro and hornblende schists gently rolling hills (H.E.S., 1994, 33). The geology has also influenced the exploitation of this landscape. The best agricultural land is considered to lie above the hornblende-schist and gabbro outcrops, with rich free-draining soils that are easy to work and suitable for any crop (agricultural land classification, grade 2 and 3) (Johns and Herring, 1996, 18). In contrast, the soils of serpentine geologies are much less productive (grade 4 and 5), and before agricultural improvement were largely avoided, resulting in islands of fertile farming land bounded by moorland such as the Goonhilly Downs (Herring, 1995a, 3).

The most culturally important natural resource on The Lizard was the gabbroic clay, which outcrops over an area of 7km² on the south-eastern side of the peninsula (Fig 5:2) (Peacock, 1988; Quinnell, 1987). The work of Quinnell has demonstrated that this clay was used for potting throughout Cornwall, from the Neolithic period to the 10th century AD (1987, 2004) (see Chapter 6).

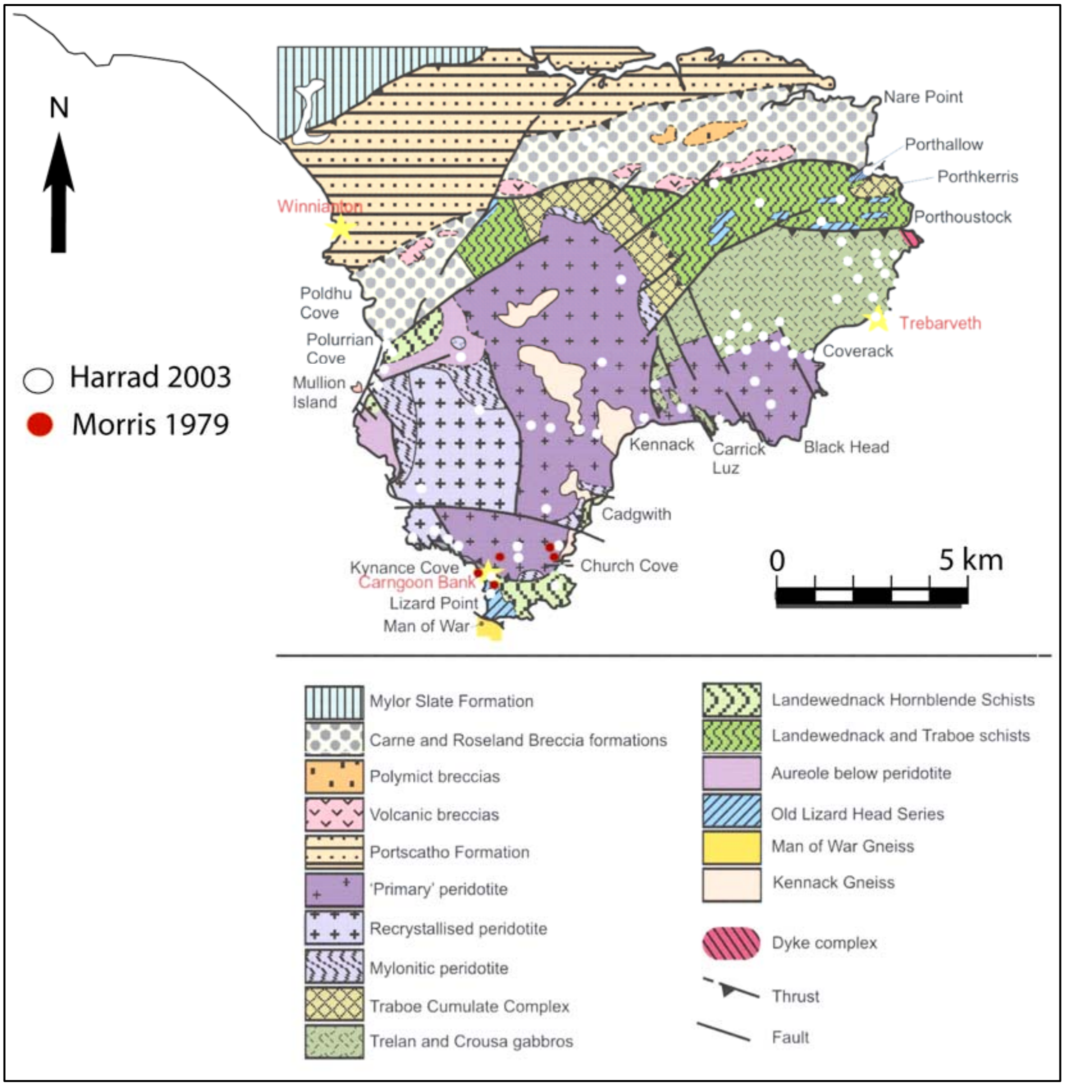


Figure 6:2 Location of Harrad and Morris soil samples in relation to local geology (Author's Illustration).

6:5:2 Clays

Clays are formed over long periods as a result of chemical weathering of rocks usually due to natural acidic solvents in water that percolate through rock. This is called a primary clay or Kaolin which is found where it formed, when this clay is transported through alluvial action it is called a secondary clay which are commonly found near lake and rivers and more traditionally used for pottery production.

Both primary and secondary clays can be found on the Lizard Peninsula. Lucy Harrad used soil maps in combination with geological maps to locate primary clays for sampling as part of her research (Fig 6:2). Harrad (2003) found that gabbroic clay was formed through the chemical and mechanical weathering of underlying rock. Her research found that the majority of suitable clays were residual, found near their parent rock, and that the clays identified in valleys were too fine and unsuitable for potting (Harrad 2003, 137). Clay has been identified in association with serpentine outcrops, the Crousa Gravels, Kennack gneiss and other locations suggesting gabbroic clay is not the only source available (Harrad 2003, 137).

6:6 The methodology

The primary objective of this methodology was be to investigate the practice of sourcing clays for pottery production through compositional fabric analysis. This was be done in an effort to establish if separate but contemporary clay-sourcing strategies were employed within a single settlement. The conclusions drawn from this analysis were used to explore and understand past choices and attempt to identify the motivation behind them as being social or technical. The methodology employed generated the data that was used to address the theoretical concerns outlined in Chapter 2, towards commenting on the broader social ramifications of choice in the clay-sourcing practices of post-Roman and early medieval Cornwall.

This methodology was build upon previous research carried out on gabbroic pottery and clays, with the intention of re-orientating the focus towards a people-centred approach to usage and production. This methodology has included the first application of comprehensive petrographic analysis of thin-sections using a representative sampling strategy on Cornish pottery. All previous thin-section analysis has been performed by geologists (Peacock, Williams and Taylor) working within a geological petrology methodology. This study has instead been orientated towards the late Alan Vince’s archaeological line of enquiry in petrological analysis. The use of a ceramic-focused petrographic methodology will change the way ceramic analysis is currently approached in the region.

The production processes incorporate many intrinsic stages and, to include them all, would be beyond the scope and focus of this research. Therefore, only the initial stages of production were under investigation: specifically, clay selection, extraction and processing. As discussed above, these have significant analogous value in understanding the direct and indirect influences of social and economic contexts of change that affect technological choices in pottery production. It has been proven, by many ethnoarchaeologists, that despite the use of either a contextually deterministic (Gosselain, 1992; Stark *et al.*, 2000) or an agent-centred (Arnold, 2000; Costin and Hagstrum, 1995; Rice, 2005) approach, petrological analysis can identify the composition, origin and pre-production treatment of clays (see Chapter 2).

6:6:1 Suitability and systematic methods

This methodology is rigorous and systematic, and has proceed with clearly defined stages, as outlined above and discussed in more detail below.

The methodology outlined below has been formulated to extract the necessary data through a suite of analytical techniques that provided the evidence to address the research aims of this study. The methodology employed has attempted to identify and define the composition of the pottery fabrics studied, and explore any evidence of clay processing. The investigation of these two research foci requires a systematic programme of analysis using a comprehensive framework of data retrieval. The information collected has been the result of a fabric analysis, which concerns the examination and classification of pottery using the characteristics of the clay from which the vessel is made (Orton *et al.*, 1993; Rice, 2005). The characteristics under investigation are the inclusions within the fabric and not the matrix of the clay itself. This information has been retrieved through a macroscopic analysis involving an examination of the pottery with the naked eye during which certain diagnostic details have been noted.

The aim of the macroscopic characterisation was to identify fabric groups within each assemblage, establish the proportion of those fabrics within them and to use this data to select representative samples for microscopic analysis. The microscopic characterisation has two main aims: firstly, to establish if the macroscopic fabric groups can be validated at a petrographic level, and secondly, to identify the mineral and rock fragment inclusions within the fabric groups towards locating the clay source exploited. The microscopic analysis has provided the petrographic data that can be compared to Harrad and Morris's clay sampling data and the local geology in an effort to provenance the clay source used in production. The groups are then determined as being from either a gabbroic or non-gabbroic clay source. Once these were scientifically determined, the ratio of gabbroic to non-gabbroic fabric groups for each site will be statistically calculated.

6:6:2 The character of the evidence

Compositional fabric analysis was carried out on the assemblages from the sites of Trebarveth, Carngoon Bank and Winnianton, 17,157 sherds in total, with a combined weight of 193,958kg. The sites have a unique spatial relationship to the gabbroic clay source, underlying geological signature (Fig 6:3) and span the relevant archaeological periods required based on the form of the vessels and associated excavated remains (see Chapter 5 for detail).

The nature and character of the ceramic assemblages used in this research are of great importance as they form the basis upon which this methodology has been employed and all conclusions derived. It is therefore necessary to introduce and discuss their nature and current situation to highlight any inherent limitations or problems relating to the data and their treatment prior to the macro- and microscopic analysis. There are three main concerns with the assemblages which are the quality of the excavation techniques used to recover the and record the sites, the differing size of the assemblages from each site and the location of one study site on top of the gabbroic clay source making the definition of local clays difficult to establish.

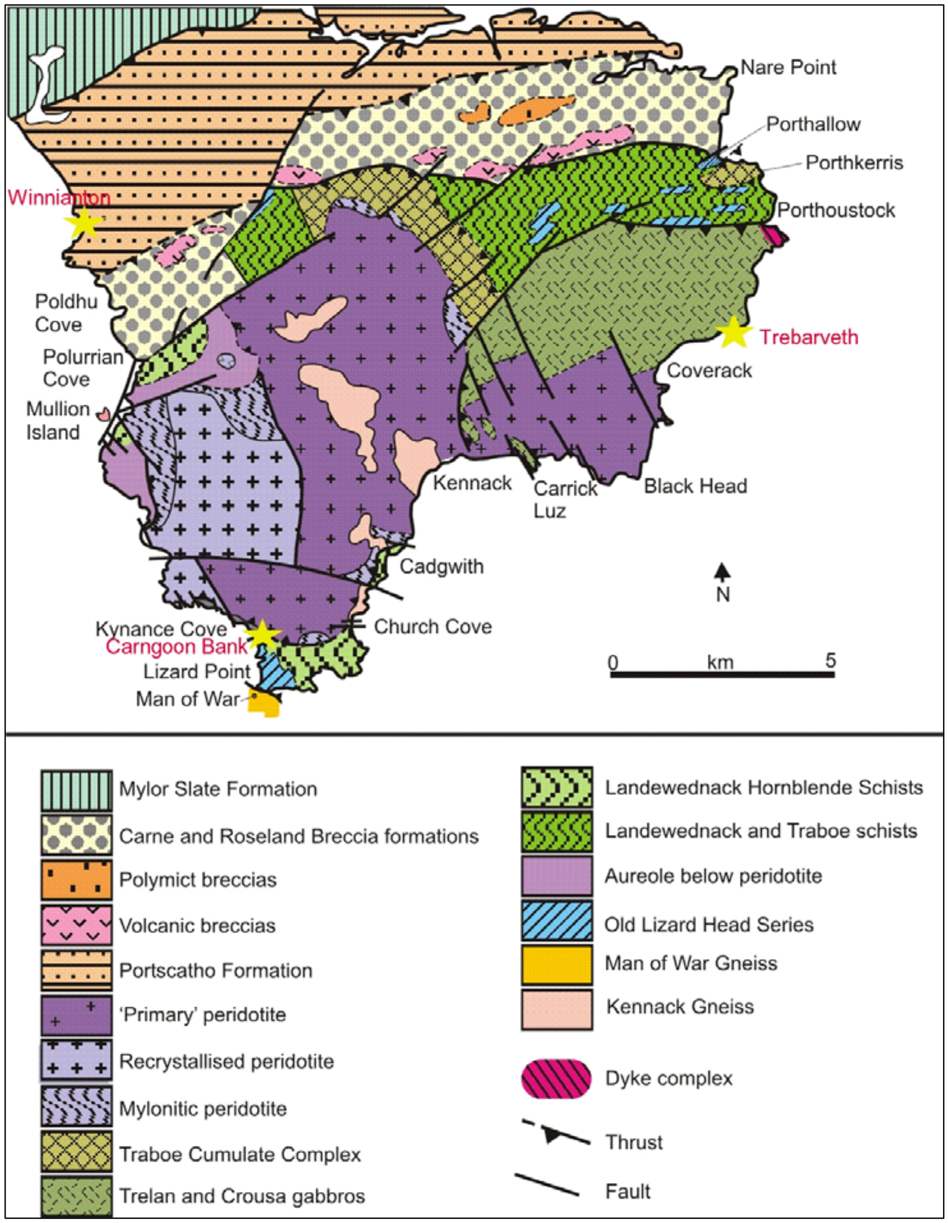


Figure 6:3 Demonstrating the geologically distinct underlying bedrock specific to each site, offering an ideal opportunity to easily identify clays local to each site (After Shail, 2010 forthcoming, Fig 10.4).

As outlined in Chapter 5 and Appendices 1 and 2, the level of recording varies in quality in direct relation to the era in which the sites were excavated. The disproportionate level of recording seen at Carngoon Bank in comparison to the other two sites is a concern. Trebarveth and Winnianton did not receive the same level of recording in the recovery of their assemblages in comparison to Carngoon Banks excavation by a commercial unit in the

1979. This study has combated this by viewing each assemblage as broadly representative of the period which is typified by the pottery styles and house forms which are well dated on numerous sites throughout Cornwall. The research objectives of this study are able to accommodate broader date ranges for each site and their assemblages as they are concerned with general fabric trends over a long time period. This approach diminishes the importance of the contextual information of each sherd found, as the focus is upon the assemblage as a unit of data from *a* site of a particular period which can then be compared to the other site assemblages.

The relative size of the comparative assemblages from the three sites differs greatly consequently making the microscopic sample for each site different. This has been combated in two ways, firstly a comparable ‘sample unit’ was identified that forms a common element on all three sites (see Chapter 6:7:3 below); secondly, a representative sampling strategy was employed to offer equal accountability within each assemblage making the size of the samples taken for microscopic analysis uniform and suitable for statistical interpretation (Chapter 6:7:4).

Another concern is that Trebarveth is situated on the gabbroic clay outcrop, which makes the projected ratios of local and non-local clay problematic. This has been addressed by considering in detail the exact provenance of clays identified in comparison to Harrad’s samples taken near the site to establish how local is local; and if the ratios of gabbroic clay are representative of general trends within Romano-British assemblages in Cornwall as a whole or not.

6:7 Staged methodological process

6:7:1 Macroscopic analysis

The validity of the data is reliant on the rigorous examination of each sherd, identifying characteristics using a standardised set of criteria within a systematic framework. It has endeavoured to achieve the highest degree of scientific analysis possible at this level. The characteristics under investigation have been established by taking into consideration two points: firstly, a realistic evaluation of what the nature and condition of the assemblages are able to provide in terms of information, and secondly, an informed selection of which characteristics can accommodate the demands of the research aims.

The nature and the condition of the material in these assemblages reflect in some cases the period of their excavation, the implications of which have been discussed above. Overall, the condition of the pottery is good, there is limited abrasion and the surfaces are stable making them suitable for comprehensive analysis.

The compositional fabric analysis has collected data on ceramic inclusions, textural information and wall thickness. These components have been broken down into sets of detailed objective units of information. The suitability and standard of the analytical methods employed at this stage are paramount as they form the foundation of all further work and inferences. Therefore, it is important to outline the techniques and conventions used in performing this analysis. The terminology and visual estimation charts used to convey the details of the macroscopic analysis are defined in Appendix 3.

6:7:1:1 Ceramic inclusions

The characterisation of inclusions included an analysis of their colour, shape, cleavage/habit, and hardness. These visually determined qualities were established using a standardised frame of reference. The colour of an inclusion is often the first frame of reference for identification, as colour can relate to the properties of a particular mineral (Pough, 1996). This relied on previous experience, mineral identification reference guides and consultation when needed. The shape of an inclusion can refer to an identifiable property of a mineral or the weathering processes it may have experienced (Rice, 2005). This has been estimated in reference to Powers scale of roundness and sphericity (1953, 118) see Appendix 3. The cleavage or habit of an inclusion is another diagnostic property of minerals and were described in reference to mineral identification material (MacKenzie and Adams, 2007; Wicander and Monroe, 1995). The hardness of a mineral inclusion were estimated using the Mohs hardness scale (see Appendix 3) (Rice, 2005, 356). This required scratching the surface of inclusions with different mediums in accordance with Mohs criteria (Orton et al., 1993).

The available data at a macroscopic level is greatly enhanced by viewing inclusions in the section of a clean or fresh break (Orton *et al.*, 1993, 136). Therefore, a small corner of the sherd was broken off using snub-nosed pliers when necessary. The visual characterisation was be performed using an illuminated hand-lens with 40X magnification and a magnifying daylight lamp with 1.75X magnification for less detailed examination.

While the identification of minerals at a macroscopic level is not conclusive, Peacock and others have established that a basic level of characterisation can be achieved. The identification of minerals during the macroscopic analysis has been guided by Peacock's key to the identification of inclusions in pottery (1977, 30-32). This method of macroscopic analysis is a widely accepted practice used as standard for most preliminary ceramic analysis and processing for around the past 30 years.

6:7:1:2 Textural information

The textural information refers to the microstructure and habit of the inclusions within the sherd as a unit of data, concerning the shape, sorting and percentage of inclusions within it.

The macroscopic means of establishing these details, such as shape, is similar to recording inclusions as explained above. The size of the inclusions was measured using vernier callipers when they were greater than 1mm. This contributed to an understanding of the degree to which the clay was processed, possibly indicating the use of an additional temper. The sorting of inclusions was be estimateded using Barraclough's inclusion sorting chart (1992), to establish if the inclusions in the fabric are well, moderately, poorly or very poorly sorted (Barraclough, 1992) (see Appendix 3). This reflects the level of processing employed at the clay preparation stage, from which technical capabilities can be inferred. The percentage or quantity of inclusions can also refer to the use-related properties of a pot, for example: its performance during and after production, such as forming, drying, firing or intended function. This was achieved using the particle size chart as recommended by Rice with an estimated range of between 1% -30% inclusion density (2005, Fig 12.2) (see Appendix 3).

6:7:2 Identify preliminary fabric groups

A vital element in the collection of macroscopic data is a standardised recording system that facilitated the ease of reference during and after the formation of fabric groups. The macroscopic data for each sherd was therefore recorded in a form specifically developed for this research (Table 6:1). The fields listed in the table directly relate to the elements of fabric characterisation as detailed above.

Table 6:1. Macroscopic fabric recording table filled as an example of how the elements will be recorded.

Fabric	**TF5**				
Colour	**BROWN YR 7.5 4/4**				
Hardness			Soft	Hard	Very hard
Feel		Harsh	Rough	Smooth	Powdery
Wall			**7-15 mm**		
Sorting			**POOR**		
Inclusions	Description		Frequency	Size range	Rounding
Eg. FELDSPAR	**OFF WHITE**		**3-5 %**	**1- 5 mm**	**S-ANGULAR**
Eg. QUARTZ	**CLEAR**		**1%**	**2-8 mm**	**ROUNDED -**
Eg. RED IRON?	**RED IRON/CLAY PELLET**		**RARE**		**W-ROUNDED**
Eg. BLACK	**SHINEY (HORNBLENDE?)**		**< 1%**	**1 mm**	**ANGULAR**

The combination of data on ceramic inclusions, textural information and wall thickness provided the information necessary to create the fabric groups. The colour of the sherds exterior surface were determined using a Munsell Chart to offer as an objective representation as possible (Munsell.Color.Company, 1975). This macroscopic level of analysis was applied to all the material in all three ceramic assemblages, in order to provide an overview of the varying usage of particular fabric groups that could translate into trends in clay selection or production.

The macroscopic analysis was carried out twice on all assemblages in an attempt to reduce subjectivity at this stage of data collection. The first phase comprised of a rapid initial assessment of the possible fabric groups; the second phase critically reassessed these groups, by justifying their observable criteria through the process of detailed fabric characterisation as outlined above and the completion of the macroscopic recording chart.

6:7:3 Sample units

The method of selecting samples for microscopic analysis is of great importance. As not all the sherds can be sampled, the process by which sherds were selected is crucial. Thus the next stage of the macroscopic phase of analysis was to establish the relative proportions of each fabric group identified within each assemblage. This allowed a representative sample to be taken (see below).

The employment of a representative sampling strategy is essential for microscopic analysis and necessitates a comparable 'sample unit' for all three sites. The sample unit selected for microscopic analysis was a single domestic structure, a unit selected due to the over-representation of the industrial ceramic vessels used in salt production at Trebarveth and Carngoon Bank. The disproportionate quantity of industrial to domestic vessels within the Trebarveth and Carngoon Bank assemblages would have made comparison between the total assemblages problematic. The inclusion of industrial vessels would also limit any broader comparison to ceramic assemblages throughout the study region and beyond. The sample unit of a single domestic structure is therefore suggested as an adequate representation of a common social unit which can be compared to other chronological periods and regions.

6:7:4 Representative sampling strategies

As stated, a representative sampling strategy is of critical importance. Thus a predetermined sampling strategy was defined prior to any analysis to avoid any bias. The sampling strategy for this research is based on contemporary standards in ceramic analysis as outlined by Rice (2005, 326). She recommends "a frame of reference incorporating the variability of the entire collection in order to establish a context for interpreting the analytical results" (Rice, 2005, 326).

Once compositional fabric groups were established at a macroscopic level, a sample was taken for thin-sectioning and microscopic analysis. The sampling strategy involved selecting a representative sample of sherds from each fabric group: relative to their size, variety of forms, variations in inclusion density and size of inclusions within the sample unit. The number of sherds selected for thin-sectioning was determined by how many fabric groups are identified and the quantity and variation within each group. The manufacture of polished thin-sections was carried out by technicians at the Camborne School of Mines (CSM) laboratory on the University of Exeter Tremough Campus in Cornwall.

The sherds were recorded by weight and quantity for each fabric group and for each site. Additional information, such as archaeological context or feature and vessel form, was also recorded. This data was entered into a Microsoft Excel programme to enable the processing of the results. The quantity of each fabric group was used to establish its percentage within each site assemblage. This enabled a statistically correct sample to be taken from each fabric group.

6:7.5 Microscopic petrographic analysis

The microscopic analysis was the next stage in the data collection process. Its main aim was to verify if the fabric groups established at a macroscopic level could be retained at a petrographic level. The second objective was to provenance the derived clays or temper used, thorough a comparison with the existing Harrad and Morris collections, and samples obtained as part of this project along with the underlying geology of the sites. This involved a detailed identification of the mineral components and possible rock fragments within the matrix of the pottery.

The identification of minerals in thin-section differs little from the basic principles of macroscopic analysis, which again require a detailed description of the colour, shape and cleavage/habit. However, the use of a polarizing microscope equipped with a rotating stage and two polarizing filters, significantly improves accuracy and the potential range of diagnostic details, providing objective data. This process, called polarized-light microscopy, which as discussed in Chapter 1:5:2 is a well-established technique and is commonly used in petrography to analyze mineral inclusions in pottery and provenance them (Freestone, 1995).

To identify the minerals correctly, the description must include additional details (as outlined by MacKenzie and Adams, 2007, 10), such as:

- Describing the shape of the crystal
- Noting the colour and any change in colour of the crystals on rotation of the stage in plane-polarized light (Pleochroism).
- Note the presence of one or more cleavages.
- Recognise differences between minerals in the refractive index if transparent.
- Observe the interference colours with crossed-polars and identify the maximum interference colour (Birefringence).
- Note the relationship between the extinction position and any cleavages or traces of crystal faces
- Observe any twinning or zoning of the crystals
- Observe any alteration of minerals present

This list enabled the identification of minerals that were listed in the table below.

This process of petrographic analysis provided fields of data which were recorded in a readily understandable format that could be used for reference in later interpretation. The methodology developed for the microscopic analysis has identified specific fields that enabled the research question to be answered. The fields are displayed in the table below as: *fraction*, *rock fragment*, *mineral*, *shape*, *frequency* and *other details* (Table 6:2).

Table 6:2. Example of microscopic analysis recording table.

Site	Trebarveth	Description	**Eg. HN1** (HN1) Moderately sorted fabric. Oxidised exterior with reduced core and interior. Inclusions aligned vertically.			
Slide	51					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
E.g. Coarse		Altered plagioclase feldspar	Rounded	Frequent		Fuzzy, broad size range
E.g. Coarse		Altered serpentine	Angular	Rare		
E.g. Fine		Altered plagioclase feldspar	Rounded	Frequent		Some mica intergrowth

The term *fraction* refers to the size modifiers used to divide the inclusions in a fabric by size therefore, *coarse fraction* is >1-2mm, *fine fraction* is <0.5mm and the micromass is <0.1, which is too fine to identify minerals and is only listed as being either optically active or not. The importance of recording the optical activity of the micromass is that it relates to the temperature the vessel was fired at. If the micromass is active it was fired below 900°C, if not it has been fired higher than this (Rice, 2005, 431). The shape and frequency of inclusions will be determined using estimation charts as used for the macroscopic analysis (see Appendix 3).

These protocols in describing minerals do not require their immediate identification. The geological knowledge required to positively identify minerals in thin-sections is not a skill that can be acquired during this research. Therefore, the microscopic analysis performed was restricted to a detailed description and development of criteria, with which to compare other thin-sections from that assemblage with the aim of identifying groups. This level of classification was sufficient for the aims of the methodology, which were to identify groups through the characterisation of inclusions. The classification of minerals and rock fragments was carried out under the supervision of Dr. Robin Shail, Peter Frost and technicians at the Camborne School of Mines.

6:7:6 Validate macroscopic fabric groups

The process of validating whether the macroscopic fabric groups identified can be maintained after the microscopic analysis relied on a simple comparison of results. The macroscopic criteria for each fabric group were compared to the results of the microscopic analysis and critically asses if the macroscopic fabric grouping were valid. The validation of macroscopic groups directly related to the applicability of the interpretation from the microscopic results in relation to the entire assemblage for each site.

6:7:7 Identify geological provenance

The positive identification of minerals present provided data for provenance analysis to estimate the source of the temper or clays used in the vessels production. The fabric groups established through microscopic analysis were then compared to clay samples to establish if the clay or tempering material was from a regional or ‘local’ or ‘on site’ source. The data required to provenance the fabrics identified relied on clay sampling previously carried out by Harrad and Morris (see Chapter 1), which have already received microscopic petrological analysis. Harrad (2003) collected over a hundred samples 67 of which were consulted as part of this research. She used soil composition and geological charts of the Lizard Peninsula to target areas with potentially distinct clay sources (Harrad 2003).

Morris identified areas within a 600 meter radius that may contain clay deposits and sampled those she was able to gain access to (see Chapter 1). These existing data, in the form of written descriptions and thin-section slides, were used as a reference collection with which to compare the data from this research. Therefore, the subsequent method of comparison was the presence or absence of minerals between the data collected as part of this research and the unpublished data. Due to the time scale and scope of this research a program of clay sampling was not feasible. Therefore, this methodology relies heavily on the clay sampling of Harrad and Morris which has been attested to by David Peacock as being carried out to a very high standard.

6:7:8 Statistical analysis of results

Once the fabric groups were established through microscopic analysis and the provenance of the clays used in their production had been investigated, the ratio between gabbroic and non-gabbroic fabrics was estimated for each site. The values presented refer to their percentage in relation to the entire assemblage and not the quantity of sherds or vessels present, as the assemblages differ in size. The ratio from each site was established using descriptive statistics which are displayed as percentages in pie charts created in Microsoft Excel. The aim was to identify similarities or differences between the proportionate exploitation of local and regional or gabbroic clay resources. The mean ratio of clay sources exploited was intended to highlight the continuance or decline in the use of gabbroic clays. Therefore, the ratio between gabbroic and non-gabbroic fabric groups on each site was the intended outcome of the data and this will be scientifically established through macro- and microscopic petrological analysis.

6:8 Summary

This Chapter has described in detail the methodology that will be employed to retrieve the data with which to address the research objective of this study. The critical analysis of the wider issues of pottery studies in Cornwall has demonstrated the potential of this study towards expanding our understanding beyond processual quantatitive methods and interpretations employed by Peacock and other since him. This methodology will now put into action the staged process of data collection and the results of its application will be presented in the next chapter.

Chapter 7: DATA

7:1 Introduction

In this chapter the data collected from the analysis of the pottery assemblages are presented to the reader. The data is split into two sections: firstly, the results of the macroscopic analysis, and secondly, the results of the microscopic analysis. These two levels of analysis will be presented on a site-by-site basis. This will be followed by a comparison of the two levels of analysis and discussion of the implication of these results.

The purpose of the macroscopic characterisation was to identify fabric groups within each assemblage, to establish the proportion of those fabrics within each assemblage, and to use this data to select representative samples for microscopic analysis. The microscopic characterisation had two main aims: firstly, to establish if the macroscopic fabric groups could be validated at a petrographic level; and secondly, to identify the mineral and rock fragment inclusions within the fabric groups in order to locate the clay source exploited.

The identification of the minerals and rock fragments was achieved through a comparison with existing clay samples from the Lizard Peninsula, obtained and microscopically analyzed by Harrad and Morris (Harrad, 2003; Morris, 1980). The results of this comparison will enable the fabric groups identified on each research site to be placed into a 'local' or 'non-local' categories. The term 'local' in this context refers to an area within a one mile radius of the settlement, whilst 'non-local' refers to a source any distance further away. The implications of these results, and the data and process of enquiry, will then be discussed in relation to the research question of this study.

7:2 Macroscopic fabric characterisation

The macroscopic analysis involved characterising the fabric of 17,157 sherds with a combined weight of 193.958kg from Trebarveth, Carngoon Bank and Winnianton, using the techniques explained in Chapter 6:7:1. The aim of this analysis was to identify distinct fabric groups within each ceramic assemblage based on the surface texture, hardness and colour of the sherd and, more importantly, the identification and sorting of the inclusions present. These details were recorded using a table, as summarised below in Table 7:1. All tables recording the Fabric group characterisation are presented in Appendix 4.

Table 7:1 Example of table used to record fabric groups within ceramic assemblages.

Fabric	SGS Carngoon Bank			
Colour	BROWN YR 7.5 5/4			
Hardness		Soft	Hard	Very hard
Feel	Harsh	Rough	Smooth	Powdery
Wall		7-10 mm		
Sorting		POOR		
Inclusions	**Description**	**Frequency**	**Size range**	**Rounding**
FELDSPAR	OFF WHITE	2-3%	1-2mm	ROUNDED
MUSCOVITE	WHITE SILVER	2-3%	<1mm	LATH
BIOTITE	BROWN	2%	<1-2 mm	LATH
QUARTZITE	WHITE	1%	1-2 mm	S-ANGULAR
ROCK-FRAG	BLACK/WHITE GRANULAR	1%	1-10 mm	S/W-ROUNDED
FERROUS	BLACK SHINEY	1%	<1 mm	W-ROUNDED

The information presented below represents the macroscopic fabric characterisation of the sample unit and not the total ceramic assemblage examined for each site, as stipulated in Chapter 6:7:3. The terminology used is defined in Appendix 3.

7:3 Macroscopic fabric identification

The macroscopic analysis identified a total of thirteen fabric groups determined by the criteria set out in Chapter 6:7:1. The quantities of pottery discussed will be by weight as the number of sherds is not an accurate representation of their presence within the fabric groups for each site.

7:3:1 Trebarveth

The total assemblage macroscopically analyzed at Trebarveth is 36.871kg, separated into industrial ceramics (12.401kg) and domestic ceramics (24.470kg). The sample unit chosen was the assemblage from Hut 1 which is representative of the Romano-British period. The total assemblage from Hut 1 is 15.581kg of pottery, within which five main fabric groups could be identified. The five macroscopic fabric groups are HN1; HN IRON; HN MICA;

GRANITIC and METALLIC, 1 % or 0.091kg of this assemblage could not be assigned to a particular group.

7:3:2 Carngoon Bank

The total assemblage macroscopically analyzed at Carngoon Bank is 151.441kg, separated into the industrial (88.520kg) and the domestic ceramics (21.710kg). The sample unit chosen was Phase 4 of Structure [63] which contained 13.738kg of domestic pottery, from which six fabric groups have been identified. Phase four of Structure [63] was selected because it is representative of the post-Roman period. The macroscopic fabric groups identified are HN1; HN IRON 2; DRS; SR; SGS and METALLIC.

7:3:3 Winnianton

The Winnianton assemblage is the smallest, with 2.474kg of domestic pottery in total, within which four fabric groups have been identified. An additional assemblage of 1.644kg has been used in the discussion of the macroscopic data for comparison, but was not included in the primary data collection. The sample unit for this site is a house, although due to the ephemeral nature of the early medieval structure, the middens associated with the structure have also been included to provide a complete review of the ceramics used and possibly produced on the site. The macroscopic fabric groups are HN2; MICA; SOFT GREEN and CHUNKY.

7:4 Macroscopic analysis results

The thirteen macroscopic fabric groups are described below, detailing the main aspects that characterise each group, which are derived from the recording tables seen in Table 7:1. The tables containing the entire data can be found in Appendix 4. The specific conventions and terminology used have been inserted in the *glossary of petrological terms* in Appendix 3

7:4:1 HN1 Fabric group [Trebarveth and Carngoon Bank]

The fabric group HN is generally oxidised, ranging in colour from brown to a yellowish-red throughout the sherd. There are a few examples that have a slightly reduced reddish-brown core. The pottery is hard with a rough surface texture, with inclusions often protruding through the surface. The fabric is poorly sorted with most inclusions falling between 1-3mm in size and the larger quartz and feldspar inclusions ranging between 1-7 mm. The most distinctive visual element of the fabric is the amount of inclusions, and in particular the abundance of soft white sub-angular flecks of feldspar which dominate the surface and cross section. Identification of this fabric is generally based on the feldspar inclusions, which represent 70% of the inclusions.

The fabric is composed of feldspar, quartz, quartzite, amphibole, ferrous material and occasional black and white rock fragments. The most dominant inclusion is the off-white feldspar pieces ranging between sub-angular to rounded in shape and from 1-7mm in size. The second most frequent inclusions are quartz and quartzite. The clear quartz is angular to sub-angular in shape and is generally between 1-3 mm in size, although pieces 10mm in size were noted at Trebarveth. The quartzite is white with occasional instances of red staining and is generally sub-rounded to rounded in shape. Quartz and quartzite together make up around 20% of the total fabric matrix. Another distinctive inclusion is the occasional black lustre of amphibole or hornblende pieces, generally small between 0.5-1mm. These present a single cleavage and can appear as sheets with rounded edges or angular fragments. There are rare occurrences of well-rounded to rounded ferrous pieces either silvery black and magnetic or an oxidised red colour generally 1-2mm in size. The oxidised red pieces from Trebarveth may be clay pellets made of crushed ceramic material added as grog. There are also rare occurrences of sub-angular black and white granular or crystalline rock fragments between 2-7mm in size, most frequently found at Carngoon Bank.

7:4:2 HN2 Fabric group [Winnianton]

The fabric group HN1 is similar to the HN Fabric group at Carngoon Bank and Trebarveth, but is instead reduced throughout and has larger inclusions with almost equal amounts of quartz and feldspar. The pottery is hard with a rough surface texture due to the large protruding inclusions. The fabric is yellowish-brown in colour and reduced throughout and poorly sorted, although it has a similar density of inclusions to that of HN, generally less than 1-4mm in size. There are abundant inclusions of the sub-angular to rounded soft off-white/yellow feldspar pieces generally 1-4mm in size. There are frequent inclusions of angular clear or rose-tinted and red-stained quartz grains generally between 1-5mm in size. There are also frequent sub-angular to rounded sheets of black amphibole (possibly hornblende) generally between 1-2mm in size.

7:4:3 HN Iron 1 Fabric group [Trebarveth]

The fabric HN Iron is hard with a rough surface texture due to inclusions protruding from the surface. The fabric is brown and oxidised throughout, although some have a reduced core. It is poorly sorted with most inclusions being between 1-2mm, whilst quartz, feldspar and rock fragments can reach up to 4-5mm in size. It is distinguished by abundant white flecks of feldspar and shimmering black pieces. There are frequent sub-angular to rounded soft off-white/white pieces of feldspar between 1-4mm in size. The frequent angular clear or white pieces of quartz and/or quartzite are generally between 1-5mm in size. There is the occasional black lustre of hornblende, 1-2mm long sheets with rounded edges. Occasional silver/black ferrous pieces which are sub-rounded to well-rounded are found, generally 1-2mm in size. There are rare occurrences of angular dark red-brown rock fragments generally 4-5mm in size and also rare occurrences of well-rounded red ferrous or clay pellets 2mm in diameter.

7:4:4 HN Iron 2 Fabric group [Carngoon Bank]

The fabric HN Iron 2 is essentially similar to the Trebarveth HN Iron, presenting the same surface colour and texture and vessel wall thickness, but with a more reduced core. It differs in appearance due to the more reduced fabric with the absence of amphiboles or hornblende, less quartz and the addition of black and white rock fragments similar to those seen in the HN Fabric. The voids seen in the HN Iron 2 are possibly similar in shape, texture and colour to the pellets seen in the Trebarveth fabric, perhaps representing their loss. The fabric is poorly sorted and distinguished by the high frequency of white flecks and black ferrous pieces. The dominant inclusion is sub-rounded off-white feldspar generally between 1-3mm. There are frequent well-rounded silver/black ferrous pieces between 1-6mm in diameter. Occasional sub-rounded black and white rock fragments 3-4mm in size and occasional well-rounded metallic/rust-stained voids 1mm in diameter. There are rare occurrences of sub-angular clear quartz generally between 2-6mm in size.

7:4:5 HN Mica Fabric group [Trebarveth]

This fabric group is generally oxidised throughout, being brown in colour, although some are reduced. It is hard with a harsh surface texture due to angular inclusions protruding from the surface. The fabric is poorly sorted with most inclusions being between 1-4mm in size. It is similar to the Granitic Fabric group but is distinguished by an equal abundance of shimmering biotite mica and feldspar, whilst lacking in quartz and muscovite. The most frequent inclusions are laths of black/brown biotite mica less than 1mm in length and sub-angular to rounded soft off-white pieces of feldspar generally between 1–4mm in size. There are occasional angular clear/white pieces of quartz generally 1–4mm in size. There is a rare occurrence of well-rounded black/brown ferrous pieces generally 2mm in diameter.

7:4:6 Granitic Fabric group [Trebarveth]

The Granitic Fabric is hard and brown in colour with harsh surface texture due to the density of protruding inclusions. The fabric is oxidised throughout and poorly sorted with inclusions ranging between 0.5-4mm. It is distinguished by large amounts of shimmering biotite mica and white pieces of quartzite. There are frequent fine laths of black/brown biotite generally less than 1mm in length and equally frequent angular white pieces of quartzite some with red staining, generally between 1-4mm in size. Almost as frequent as the above are laths of golden muscovite mica 0.5mm in length. There are also frequent sub-angular to rounded off-white pieces of feldspar between 0.5-2mm in size. Finally, rare occurrence of well-rounded black ferrous pieces generally 2mm in size can be seen.

7:4:7 Mica Fabric group [Winnianton]

The Mica Fabric is hard with a brown oxidised surface with a darker brown reduced core and a rough surface texture. The fabric is fairly sorted with inclusions ranging between 0.5-3mm whilst the quartz can be up to 5mm. It is distinguished by the shimmering appearance presented by the predominant muscovite mica and the presence of hornblende. The most abundant inclusions are the laths of silver muscovite generally less then 1mm in length. There are frequent inclusions of sub-angular off-white feldspar generally 1–3-mm in size and frequent sub-rounded clear and red-stained quartz grains generally 1–5mm in size. There are also occasional brown biotite mica laths generally between 1-2mm in length and occasional rounded black amphibole, possibly hornblende pieces, uniformly 1mm in diameter.

7:4:8 SGS Fabric group [Carngoon Bank]

The fabric SGS is hard with a brown oxidised surface and core and a rough surface texture. The fabric is poorly sorted with inclusions ranging in size between 1-3mm. It is distinguished by its shimmering golden appearance due to the amount of muscovite on the surface and the large obtrusive black and white rock fragments set in a fine oxidised matrix. The most frequent inclusions are white/silver laths of muscovite mica generally less than 1mm in length and frequent rounded off-white feldspar pieces generally 1-2mm in size. There are also frequent brown laths of biotite mica between 1-2mm in length. There are occasional sub-angular white quartzite pieces generally 1-2mm and occasional well-rounded black ferrous pieces less than 1mm in diameter. The largest inclusions are the occasional sub- to well-rounded black and white granular rock fragments generally between 1-10mm in diameter.

7:4:9 DRS Fabric group [Carngoon Bank]

The DRS Fabric is a fine hard fabric with a reddish-brown oxidised surface and core. The surface texture is harsh and sandy due to the fine fabric matrix. The fabric is fairly sorted and most inclusions are uniformly 1mm in size, with quartzite and rock fragments being the exception reaching up to 5mm in diameter. It is distinguished by its fine dark reddish sandy exterior with frequent large quartzite and rock fragments protruding. There are abundant sub-rounded off-white/yellow feldspar inclusions uniformly less than 1mm in size. There are also abundant well-rounded or occasionally polished white quartzite pieces between 1-5mm in diameter. There are frequent black sub-rounded amphibole pieces generally less than 1mm in size and frequent well-rounded iron-stained voids which are uniformly less than 1mm in diameter. There are occasional sub-rounded clear quartz grains uniformly 1mm in size and occasional sub-angular to rounded black and white rock fragments between 1-5mm in size. There are also rare occurrences of white laths of muscovite generally less than 1mm in length.

7:4:10 Metallic Fabric group [Carngoon Bank and Trebarveth]

The Metallic Fabric is very hard, oxidised and reddish-brown in colour with a harsh surface texture. The fabric is poorly sorted with most inclusions ranging between 1-3mm in size; the rock fragments can reach up to 5mm. It is distinguished by its hard almost vitrified shimmering metallic red surface with generally large protruding inclusions and large voids and pits in the surface. The most frequent inclusion is black/brown laths of biotite mica 1-3mm in length. There are frequent black and white sub-angular to rounded rock fragments generally 1-5mm in size. Occasional rounded off-white feldspar pieces uniformly 1mm in size and occasional sub-rounded clear quartz grains generally 1-2mm in size. There are rare occurrences of well-rounded dark red/black pellets generally 2-3mm in diameter and rare angular black ferrous pieces uniformly 1mm in size.

7:4:11 Soft Red Fabric group [Carngoon Bank]

The Soft Red Fabric is red in colour and oxidised throughout with a soft powdery surface texture. The fabric is very poorly sorted with sparse inclusions uniformly 1 mm in size with the exception of the rock fragments which can be up to 5mm. It is distinguished by its powdery shimmering surface with frequent ferrous spheres and voids, along with large protruding black and white rock fragments. The most abundant inclusions are laths of white/grey muscovite mica 1 mm in length. There are frequent sub-rounded white quartzite pieces uniformly 1mm in size, and frequent sub-rounded black and white granular rock fragments which are between 2–5 mm in diameter. There are rare occurrences of sub rounded lustre black amphibole pieces uniformly 1 mm in size and rare brown laths of biotite mica 1 mm in length. There are also rare occurrences of well rounded red pellets with a dark halo surrounding them uniformly 1 mm in diameter.

7:4:12 Chunky Fabric group [Winnianton]

The Chunky Fabric group is hard, reduced and greyish-brown in colour with a harsh surface texture due to the size on the inclusions protruding from the surface. The fabric is poorly sorted with very large inclusions ranging between 1-9mm in size. It is distinguished by the great density of inclusions and the numerous large rock fragments. There are abundant sub-angular to sub-rounded black/brown amphibole pieces, possibly hornblende, which are generally between 1-5mm in size. An equally frequent inclusion is the angular off white/grey feldspar pieces generally between 1-4mm in size. There is an occasional presence of sub-angular clear or grey-tinted quartz grains generally between 1-3mm in size. There are rare occurrences of well-rounded light green sedimentary rock fragments uniformly 9mm in diameter and rare angular black (hornblende) and clear (quartz) rock fragments uniformly 5mm in diameter.

7:4:13 Soft Green Fabric group [Winnianton]

The Soft Green Fabric is hard, reduced and brown in colour with a harsh surface texture due to the abundant dense rock fragments protruding from the surface. The fabric is very poorly sorted with inclusions ranging in size from 1-10mm. It is distinguished by the green/grey soft sedimentary pebbles combined with shimmering frequent rock fragments. The most frequent inclusion is the sub-rounded off-white feldspar pieces uniformly 1mm in size. There are frequent laths of brown biotite mica generally 1mm in length. There are occasional rounded clear or red-stained quartz grains generally 2-3mm in size and occasional well-rounded green/grey sedimentary pebbles generally between 1-6mm in diameter. There are rare occurrences of angular black and clear rock fragments uniformly 4mm in size and rare angular black/red rock fragments possibly hornblende and/or serpentine generally 10mm in size. There are also rare occurrences of rounded silver/black ferrous pieces generally less than 1mm in size.

7:5 Discussion of Fabric groups

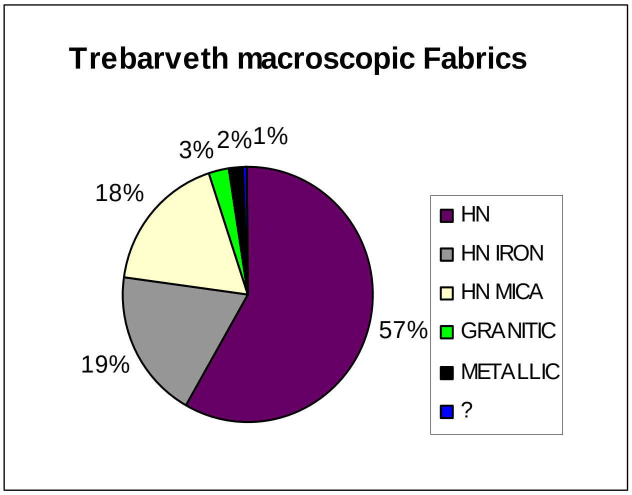
The fabric groups arising from the macroscopic analysis demonstrates the variability present within site assemblages and the collection as a whole. However, the group of fabrics with the HN prefix (HN1, HN2, HN Iron1, HN Iron2 and HN Mica) exhibit similar compositional traits. The justification for grouping these fabrics together is the consistent presence of abundant white feldspar and the occasional or rare presence of quartz, giving these sherds a distinctive white-flecked appearance. The Metallic Fabric identified at Trebarveth and Carngoon Bank could represent another broader fabric group, distinguished by its highly-fired shimmering bronzed appearance. The other fabric groups described (above) represent unique combinations of mineral inclusions and rock fragments which cannot be grouped together based on results of the macroscopic analysis.

7:5:1 Trebarveth

The results of the macroscopic analysis at Trebarveth demonstrate that the HN Fabric grouping dominates the assemblage from Hut 1 (Table 2), and this also reflects the general trend across the entire assemblage from the site. As displayed in the graph below, the HN grouping represents 94% of the assemblage whilst the Granitic Fabric group represents only 3% and the Metallic Fabric 2% (Graph 7:1). The remaining 1% represents fabrics which could not be assigned to a fabric group. This closely mirrors the fabric ratio for the whole site, as the HN Fabric grouping represents 96% of the total assemblage as seen in Graph 1 in Appendix 6.

Fabric	Weight
HN	9.056 kg.
HN Iron	2.920 kg.
HN Mica	2.836 kg.
Granitic	0.442 kg.
Metallic	0.236 kg.
Unknown	0.091 kg.

Table 7:2. Quantities of fabric types at Trebarveth Hut 1.



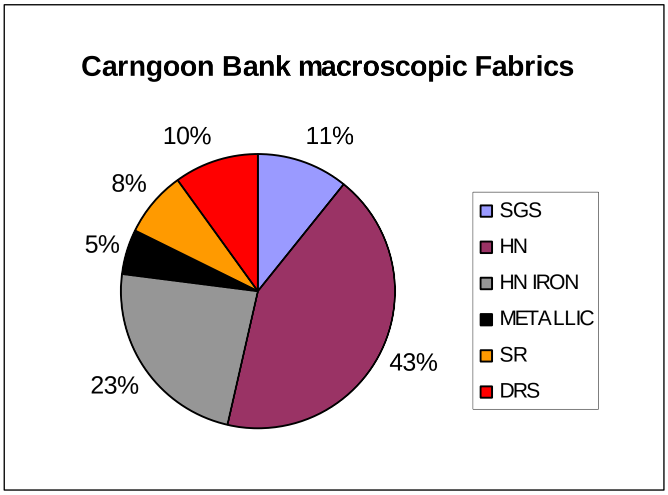
Graph 7:1. Percentages of fabric groups at Trebarveth Hut 1.

7:5:2 Carngoon Bank

The results of the macroscopic analysis at Carngoon Bank demonstrate that, once again, the HN Fabric group is the dominant fabric within Phase 4 of the house, representing a total of 66% (Table 7:3 and Graph 7:2). This accurately reflects the usage of this fabric in the house, as the average percentage over all four phases is 64% (see Graph 2 in Appendix 6). The SGS Fabric has the second highest proportion with 11%, followed by DRS at 10%, SR at 8% and Metallic at 5% (Graph 7:2). The HN group represents a constant throughout all four phases of the house, whilst the other fabrics fluctuate over time. The Metallic Fabric is very common in Phase 1 and gradually decreases, whilst SR only appears in Phase 2 and gradually increases. The remaining DRS and SGS appear in Phase 2 and continue at the same rate.

Fabric	Weight
SGS	1.477 kg.
HN	5.879 kg.
HN Iron	3.226 kg.
Metallic	0.718 kg.
DRS	1.387 kg.
SR	1.051 kg.

Table 7:3. Percentages of Fabrics at Carngoon.



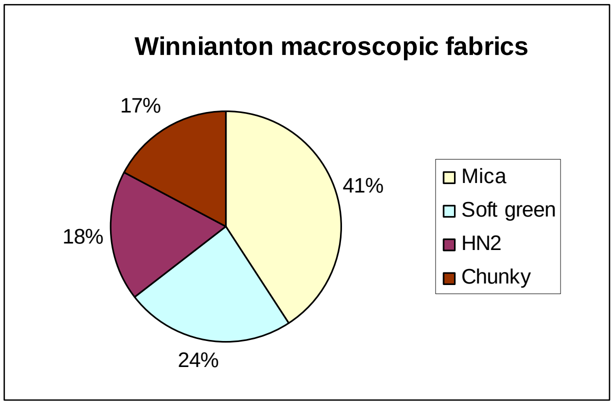
Graph 7:2. Percentage of fabric group represented at Carngoon Bank.

7:5:3 Macroscopic Results Winnianton

The results of the primary macroscopic analysis at Winnianton present a very different picture to that of Trebarveth and Carngoon Bank. The results show that the Mica Fabric is the most common, representing 41% of the assemblage, followed by Soft Green with 24%, and HN2 with 18%, which is almost level with the Chunky Fabric at 17% (Graph 7:3). The table below demonstrates that, in comparison to the other sites, the HN Group is significantly lower with HN2 representing only 18% of the assemblage (Table 7:4). The remaining fabrics are very different in terms of their inclusions, with far higher amounts of micas and quartz.

Fabric	Weight
Mica	0.993
Soft Green	0.573
HN2	0.443
Chunky	0.420

Table 7:4. Percentages of fabrics from Winnianton.

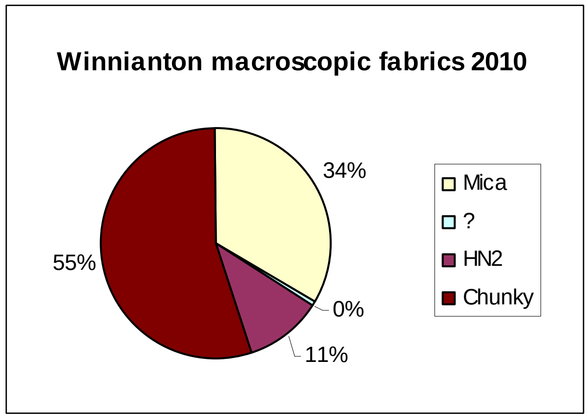


Graph 7:3. Percentage of fabric groups represented in the primary Winnianton assemblage.

Additional data from the macroscopic analysis of the 2010 assemblage, recovered after the primary macroscopic analysis had been completed, shows a decrease in the HN2 fabric and the absence of Soft Green fabric (Table 7:5 and Graph 7:4). The dominance of the Chunky fabric group over HN2 differs greatly from the primary assemblage, whilst the Mica group is essentially similar. This assemblage offers another perspective on the ceramics of Winnianton at the macroscopic stage, however, due to its late discovery it could not be utilised in the microscopic analysis.

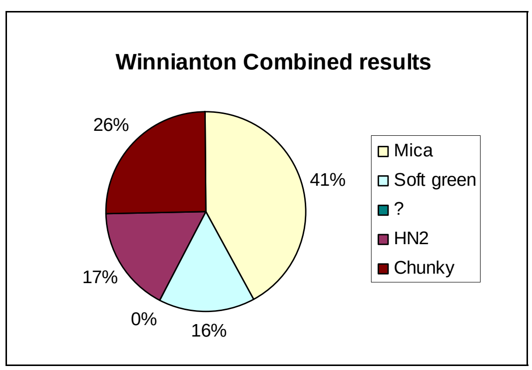
Fabric	Weight
Mica	0.554
?	0.007
HN2	0.178
Chunky	0.905

Table 7:5. Percentages of fabrics from Winnianton 2010 assemblage.



Graph 7:4. Percentages of fabrics represented in the 2010 Winnianton assemblage.

Despite their differences the combined results of both assemblages from Winnianton mirror the primary results with Mica Fabric dominating the assemblage.



Graph 7:5. Combined with data from 2010 excavation.

7:6 Samples selected for microscopic analysis

The macroscopic results were used to establish the correct ratio of fabrics to thin-section for microscopic analysis, as explained in Chapter 6:7:4. The number of sherds selected reflects their proportion within their site assemblage to adequately represent the fabric group as demonstrated in the table below (Table 7:6). In total, seventy-seven sherds were thin-sectioned and subjected to petrographic analysis to determine their constituents. These were distributed over the three sites: Trebarveth had sixteen slides; Carngoon Bank had fifty slides; and Winnianton had eleven slides (Table 7:6). It should be noted that the due to the similarity between the combined and primary data for Winnianton, the samples selected should be representative of both assemblages.

Table 7:6. Demonstrating the amount of sherds selected for thin-section microscopic analysis note some fabrics are found on two sites.

Fabrics	HN1	HN2	HN Iron 1	HN Iron 2	HN Mica	Granitic	Mica	SGS	DRS	Metallic	Soft Red	Chunky	Soft Green
Trebarveth	7	0	4	0	3	1	0	0	0	1	0	0	0
Carngoon Bank	13	0	0	7	0	0	0	11	8	6	5	0	0
Winnianton	0	3	0	0	0	0	3	0	0	0	0	3	2

7:7 Microscopic Analysis

The microscopic analysis involved the detailed petrographic study of each of the seventy-seven thin-section slides using a polarizing microscope as previously outlined in the methodology (Chapter 6:7:5). This was carried out at the Camborne School of Mines laboratory under the guidance of Dr Robin Shail and Peter Frost who specialise in the geology of the Lizard Peninsula. The data collected from each slide are displayed in tables which provide specific details and can be referred to in Appendix 5. The microscopic results are presented by archaeological site, within which the fabrics are discussed. The terminology used to convey the details of the macroscopic analysis is defined in Appendix 3.

The aim of the microscopic results is to validate the macroscopic fabric groups at a higher level of analysis and provenance the minerals and rock fragments identified during the petrographic analysis. The thin-section samples described below were analysed by macroscopic fabric group by site. As a result of the microscopic analysis, the macroscopic fabric groups, where necessary, have been subdivided or regrouped into new microscopic fabric groups.

The description of the new microscopic fabric groups and the validated macroscopic fabric groups that follows addresses the rationale behind their validation or alteration, and includes a description of the microscopic fabrics identified and their distinguishing features. The number of the individual samples representing each fabric group will be given and described in relation to other samples in that group. Finally, each microscopic fabric group will suggest a possible geological origin for the minerals and rock fragments identified.

7:8 Microscopic results for Trebarveth

7:8:1 HN1 Fabric group

The macroscopic sample identified feldspar, quartz, quartzite, ferrous red pellets and hornblende. The microscopic samples found that all of these minerals were present but the ferrous red pellets were not. The microscopic analysis identified rock fragments in all seven samples, and these were not found during the macroscopic analysis.

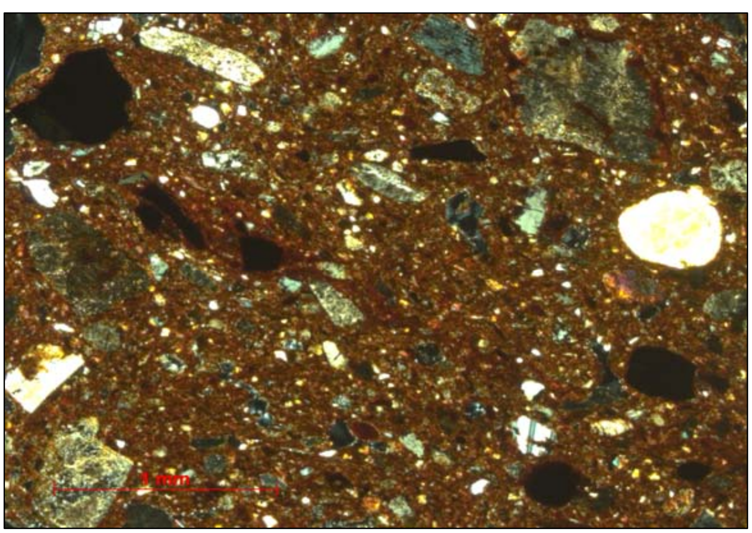
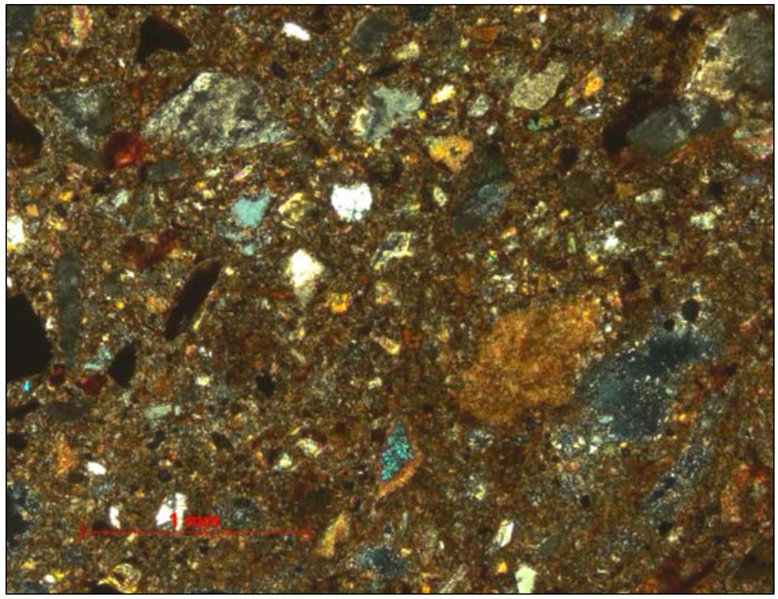


Figure 7:1 HN1 Fabric from Trebarveth pottery Slide 56 (Author's Photomicrograph).

Figure 7:2 Harrad's Clay sample from Dean Quarry near to Trebarveth LH Slide 18 (Author's Photomicrograph).



It would appear that the seven samples representing the HN1 Fabric group validate the macroscopic fabric grouping despite the presence of rock fragments (see flowchart 7:1 below). All seven slides have the same mineral composition and are of an oxidized fabric (Fig 7:1). However, slides 56 and 57 differ slightly, representing a finer fabric with no rock fragments and include the addition of rounded quartz conglomerate grains (Fig 7:1). The remaining five samples (slides 51, 52, 53, 54 and 55) are defined by the predominance of altered well-rounded clinopyroxene and altered plagioclase feldspar, compared to quartz inclusions which are generally restricted to the micromass and within the rock fragments (Fig 7:3). The majority of rock fragments are composed of pyroxene, quartz and plagioclase feldspar, sometimes represented in differing quantities. The other minerals present in most samples are small amounts are olivine, biotite and amphibole. A minor presence of K-feldspar (slides 51, 52, 55 and 56), and a single instance of serpentine (slide 52) should also be noted (Fig 7:3).

The minerals and rock fragments identified in fabric group HN1, suggest a mafic-derived source. The rare occurrence of non-mafic minerals such as K-feldspar and serpentine are consistent with clay samples taken in the Dean Quarry area, based on a comparison with the Harrad clay sample collection (Fig 7:2) (2003, 400, 409).

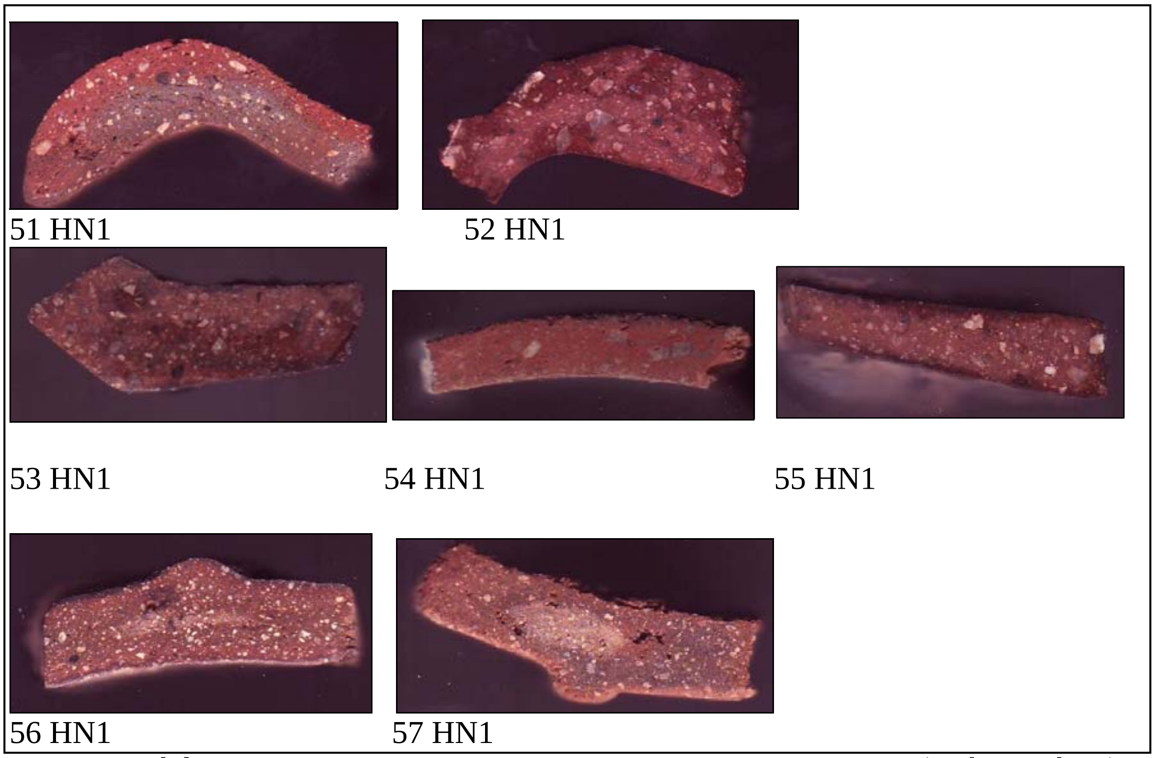


Figure 7:3 Slides 51 HN1, 52HN1, 53HN1, 54HN1, 55HN1, 56HN1, 57HN1 (Author's Photo).

7:8:2 HN Iron 1 Fabric group

The macroscopic sample identified feldspar, dark reddish-brown rock fragments, hornblende, quartz, ferrous pieces and red pellets. The microscopic samples found all of the elements listed above except for the dark reddish-brown rock fragments (Fig 7:4). In addition to this, the microscopic analysis found plagioclase feldspar, K-feldspar and amphibole rock fragments, which would have appeared black and white in hand sample. There is also a minor presence of micas.

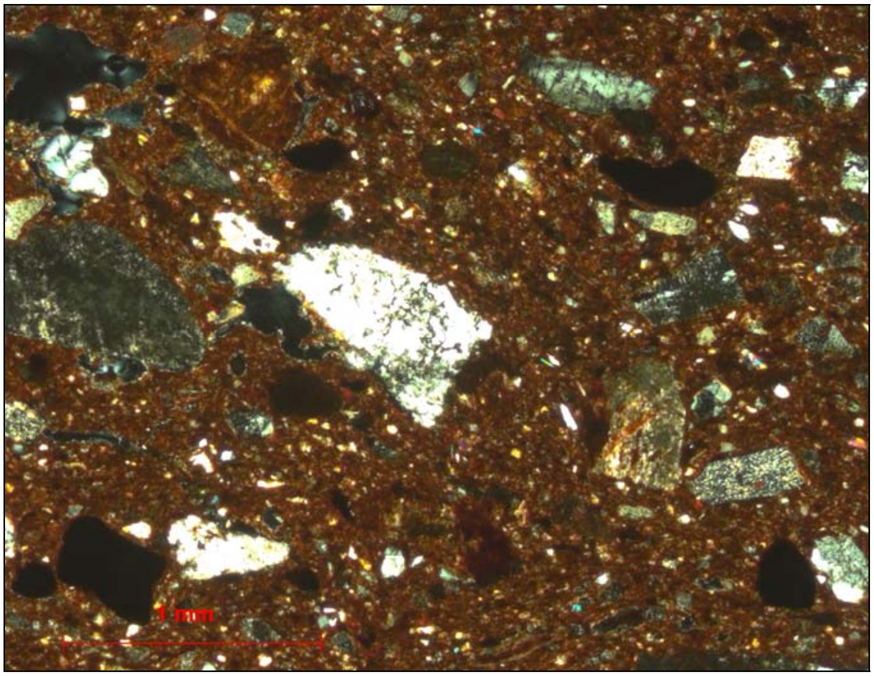


Figure 7:4 HN1 Iron Fabric from Trebarveth Slide 60 (Author's Photomicrograph).

The composition of the four of microscopic samples is similar enough to validate the macroscopic fabric group HN Iron (see flowchart 7:1 below). However, slide 59 is not representative of the fabric group. It has a reduced core and oxidised outer surface, distinguished by abundant 0.001mm rounded quartz pieces, suggesting the presence of loess in the clay (Fig 7:5). As a result, slide 59 now represents a new fabric group called HN1 Loess (Fig 7:6). The fabric of remaining slides 58, 60 and 61 is fine or well-sorted and oxidised throughout (Fig 7:5). It is distinguished by the comparatively high number ferrous opaque pieces within the Trebarveth assemblage, which can be seen macroscopically as black pieces. This fabric also has K-feldspar, plagioclase feldspar and amphibole rock fragments, and frequent well-rounded angular and composite quartz pieces.

The presence of clay pellets in this fabric group is suggestive of a particular production method. The other reoccurring inclusions identified in all representative samples are clinopyroxene, hornblende, micas and epidote group minerals. There are also erratic minerals such as singular examples of serpentine in slides 60 and 61 and chlorite in slide 61, which occur too infrequently to be diagnostically significant.

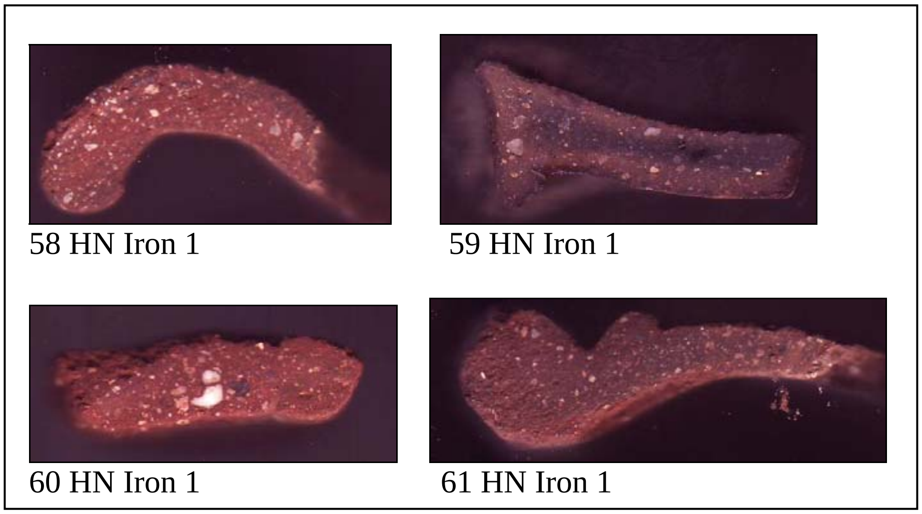


Figure 7:5 Slides 58HN Iron 1, 59 HN Iron 1, 60 HN Iron 1, 61 HN Iron 1 (Author's Photo).

The minerals and rock fragments present suggest that the HN Iron 1 Fabric group contains both mafic- and igneous-derived minerals. This fabric group could represent a Mafic/Grantic admixture. However, after comparison with the Harrad clay sample collection a possible source at Dean Quarry has been established (Harrad, 2003, 400-409). The frequent ferrous pieces are difficult to locate although they are a common element of most clays and may represent a fluvial deposit conducive to ferrous accumulation. The HN1 Loess Fabric group may derive from a combination of the Harrad clay sample from Dean Quarry and that of Lowland Point, the latter of which contains Loess particles (Fig 7:7) (Harrad, 2003, 400-402).

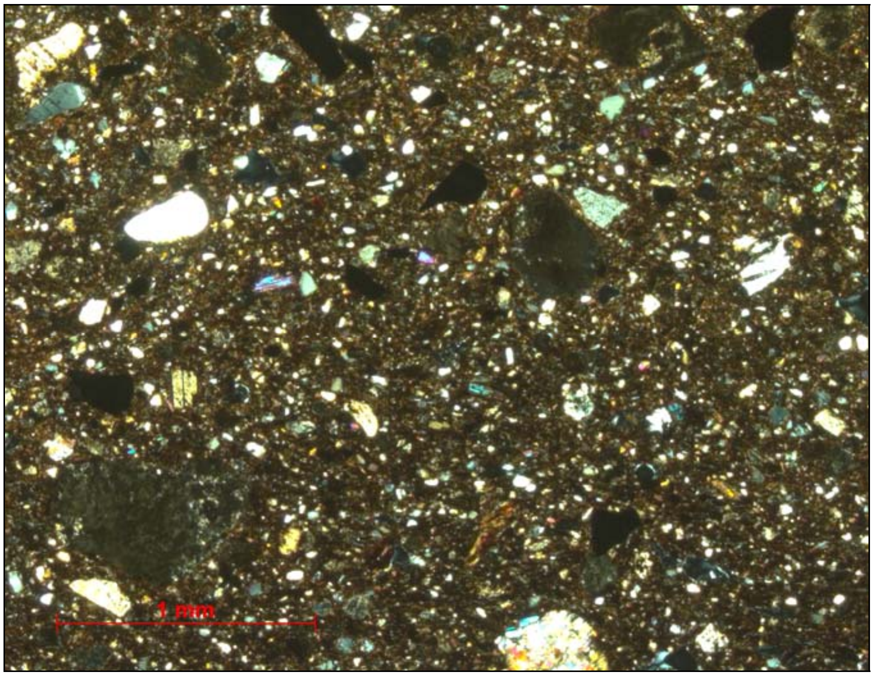


Figure 7:6 HN1 Loess from pottery sample Trebarveth Slide 59 (Author's Photomicrograph).

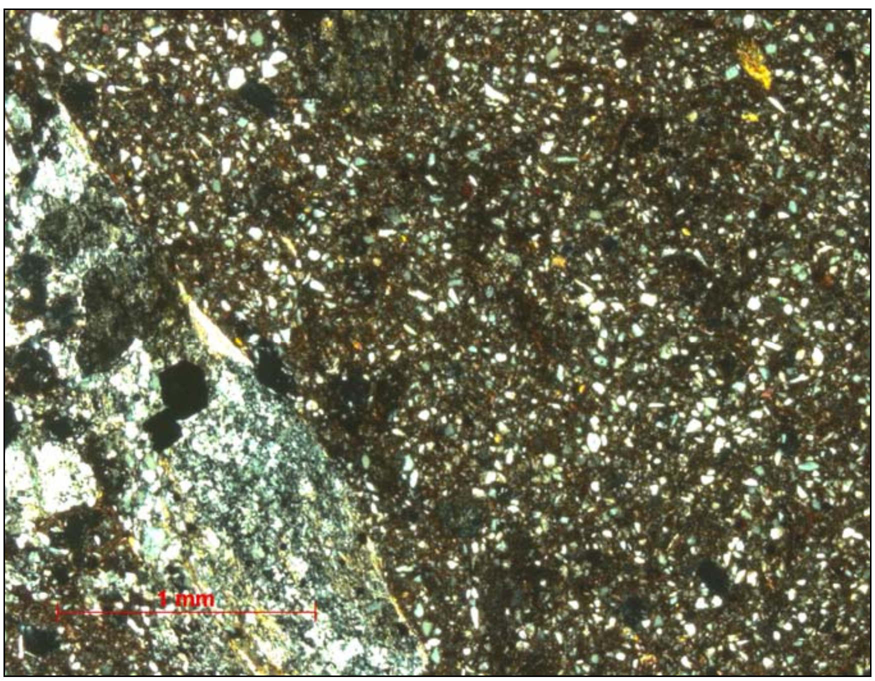


Figure 7:7 Harrad's clay sample from Lowland Point classified by her as Loessic (Author's Photomicrograph).

7:8:3 HN Mica now Garnet Fabric group

The macroscopic sample identified feldspar, quartz, biotite and black ferrous pieces. The microscopic samples of this fabric do contain these minerals, but cannot validate the macroscopic identification. The microscopic analysis found the components of slides 64 and 62 cannot be assigned to the broader HN group or present enough micas to sustain its current grouping. The remaining slide 63 has been reassigned to HN Iron Fabric group, due to the large quantity of ferrous opaque pieces (see flowchart 7:1 below).

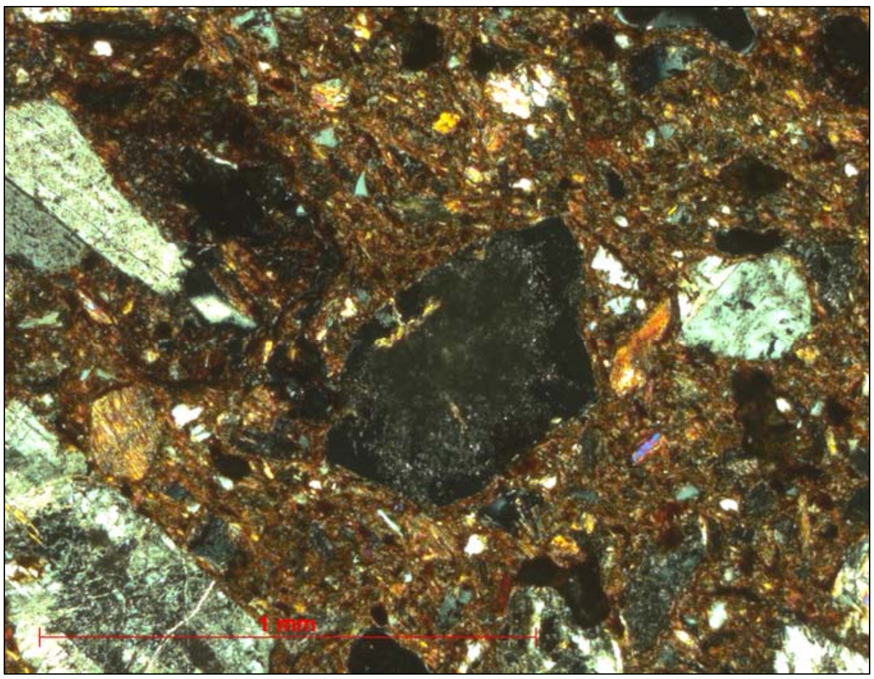


Figure 7:8 Garnet Fabric from Trebarveth, Garnet in centre of image as five-sided black mineral with mica schist intergrowth Slide 64 (Author's Photomicrograph).

The microscopic analysis has produced a new fabric group based on slides 64 and 62, now termed Garnet (Fig 7:8). The fabric is poorly-sorted and oxidised throughout, with slide 64 presenting a coarser version than slide 62 (Fig 7:9). This new fabric group is distinguished by the presence of garnet inclusions in the fine fraction, rock fragments and a clay pellet. The rock fragments are composed of quartz, garnet, plagioclase feldspar and muscovite; the same minerals are also present in the clay pellet. The quartz in the Garnet Fabric is particularity distinctive due to metamorphic deformation resulting in the formation of composite, stretched and conglomerate quartz pieces. The other main components to this fabric are altered and unaltered plagioclase feldspar, K-feldspar and muscovite mica. The minor inclusions identified are amphibole, pyroxene, biotite and ferrous opaque pieces. The minerals and rock fragments in the Garnet Fabric group do not readily suggest a source location, although it is certainly *not* a group of minerals commonly found in the Trebarveth area.

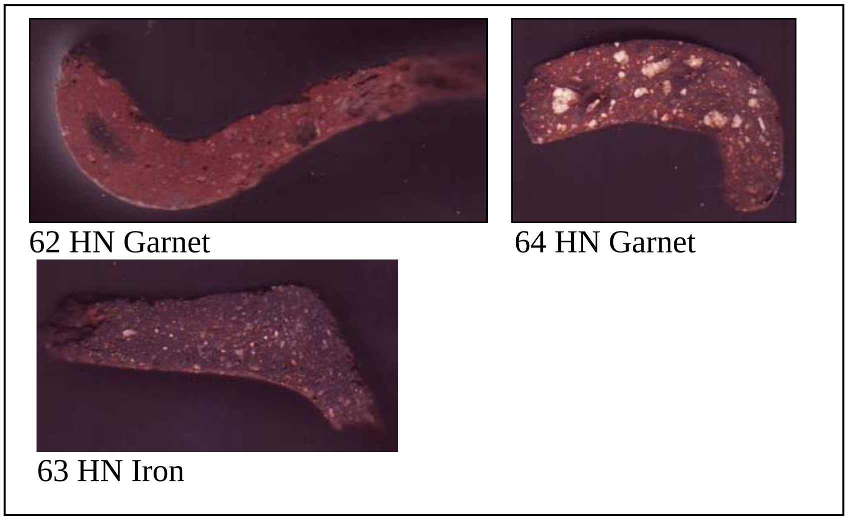


Figure 7:9 Slides 62 Garnet, 64 Garnet, 63 HN Iron (Author's Photo).

7:8:4 Metallic Fabric group

The macroscopic sample identified biotite, black and white rock fragments, feldspar, quartz, dark reddish pellets and ferrous pieces. The microscopic analysis found most of these inclusions, apart from the black and white rock fragments and biotite. The absence of biotite may be due to the misidentification of muscovite, which could have appeared brown in hand sample due to the high firing and iron content. The dark reddish pellets are most likely the numerous hematite pieces identified. The microscopic analysis can validate the macroscopic fabric grouping (see flowchart 7:1 below).

Figure 7:10 Slide 65 Metallic (Author's Photo).

The Metallic Fabric is represented by slide 65 and is well sorted, oxidised throughout and possibly highly fired (Fig 7:10). The microscopic analysis established that the micromass is dominated by large quantities of 0.001mm quartz grains suggesting a loessic clay. The distinguishing inclusions for this fabric group are the numerous quartz and plagioclase rock fragments, K-feldspar and muscovite. There are rare rounded clay pellets which contain quartz inclusions. There are frequent hematite inclusions in contrast to the presence of ferrous opaque pieces. The minerals and rock fragments in the Metallic fabric group suggest an igneous rock source with the inclusion of loess clays (seen in slide 59), indicating an origin at lowland point as suggested by Harrad's samples (2003, 401-402).

7:8:5 Granitic Fabric group

The macroscopic sample identified feldspar, quartzite, biotite, muscovite and ferrous pieces. The microscopic analysis found the above minerals except for muscovite and can not entirely validate the macroscopic fabric results (Fig 7:11) (see flowchart 7:1 below).

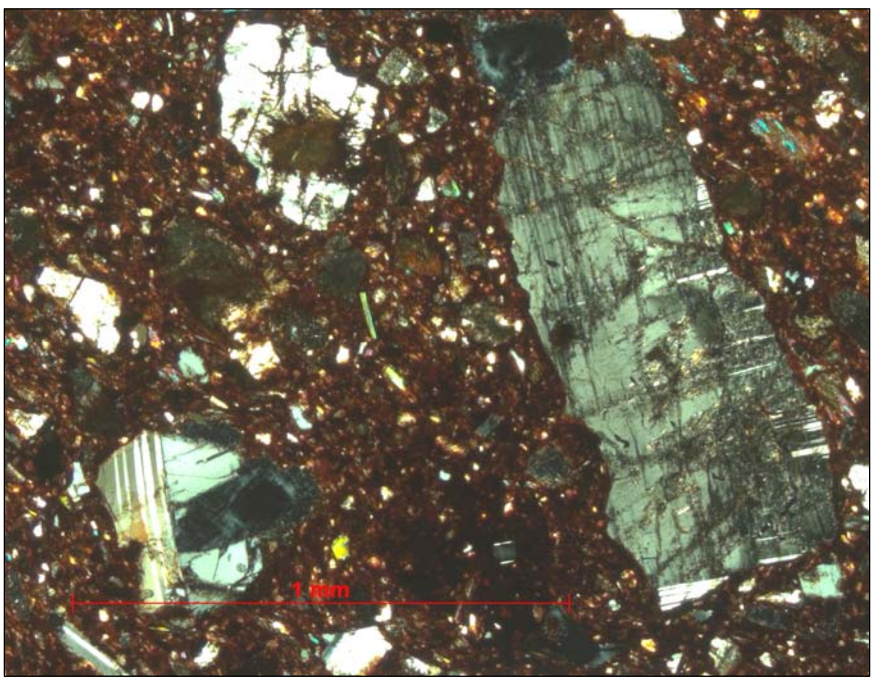
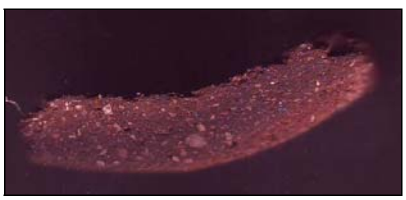


Figure 7:11 Granitic Fabric from Trebarveth showing three K-Feldspar/Quartz/Plagioclase Fledspar rock fragments Slide 66 (Author's Photomicrograph).

The fabric is represented by slide 66 and is poorly sorted, oxidised and cannot be attributed to another fabric group from Trebarveth due to its composition (Fig 7:12). The fabric has a higher proportion of plagioclase feldspar than quartz but not enough pyroxene to indicate a mafic source and not enough K-feldspar to derive entirely from a granitic source. The distinguishing feature of the fabric is the quartz, plagioclase and chlorite rock fragments, which are also seen in the fine fraction. The presence of angular quartz, composite or conglomerate quartz pieces and biotite overshadows the small quantities of K-feldspar and pyroxene (Fig 7:13).



66 Granitic

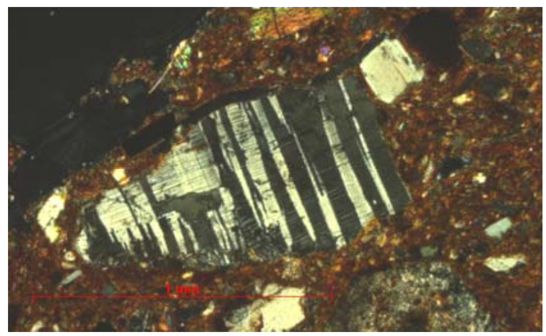
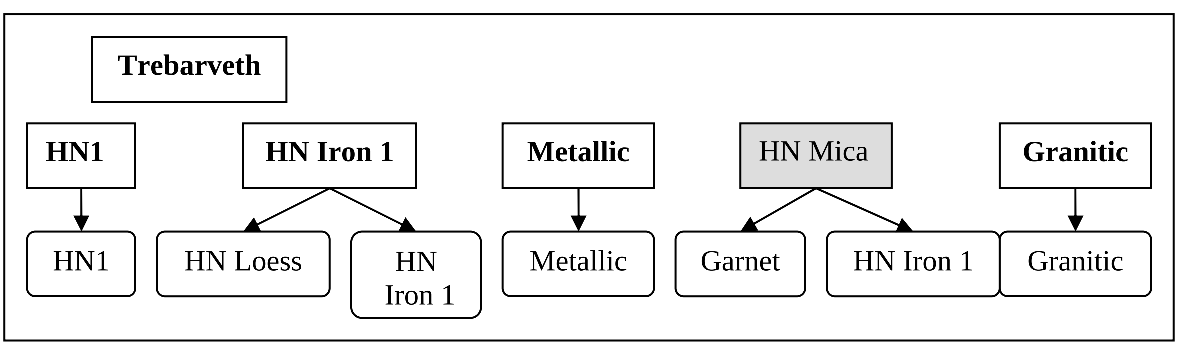


Figure 7:12 Left, Slide 66 Granitic Fabric (Author's Photo).
Figure 7:13 Right, piece of K-fledspar perthite in Granitic Fabric Slide 66 (Author's Photomicrograph).

The minerals and rock fragments in the Granitic Fabric suggest an igneous source; however, the term granitic is difficult to support due to the lack of K-feldspar and low ratio of quartz to plagioclase feldspar. The origin of the igneous source is unknown, however, based on Harrad's clay samples it is not local to the area (Harrad, 2003).



Flowchart 7:1. Drawing showing the macroscopic origin and formation of new microscopic fabric groups. The shading shows the redundant fabric group (Author's illustration).

7:9 Microscopic Results for Carngoon bank

7:9:1 HN1 now HN3 Fabric group

The macroscopic sample identified feldspar, quartz, quartzite, black and white rock fragments, amphibole and ferrous pieces. The microscopic analysis has found all these minerals. The rock fragments could represent the quartz and plagioclase with either amphibole, olivine or biotite which would look black and white in hand sample. The thirteen samples analysed produced ten samples that are broadly comparable with the HN Fabric group, although the remaining three samples are large storage vessels and may represent a sub-group of this fabric. Therefore, the microscopic fabric grouping validates in general the macroscopic grouping (see flowchart 7:2 below). However, in comparison to other fabrics in the HN grouping, these samples have additional inclusions of a reddish-brown mudstone and a quartz/mica sandstone or conglomerate. These inclusions do not form a consistent element in the fabric, but their occasional presence requires some consideration as they do not appear in HN1 from Trebarveth or HN2 from Winnianton. Despite these additions the fabric remains broadly similar to the HN grouping. Therefore, the HN Fabric at Carngoon Bank has a distinct fabric group named HN3. The three samples representing the storage vessels cannot be assigned to the HN3 Fabric group due to the higher quantity of quartz and form a sub-group named HN3 Admixture.

The samples representing the HN3 Fabric grouping are slides 3, 5, 6, 8, 10, 11, 13, 14, 16 and 17, of which seven are oxidised throughout with poorly-sorted fabrics (Fig 7:14). The remaining three slides 13, 14 and 9 are also poorly sorted but are reduced throughout (Fig 7:14).

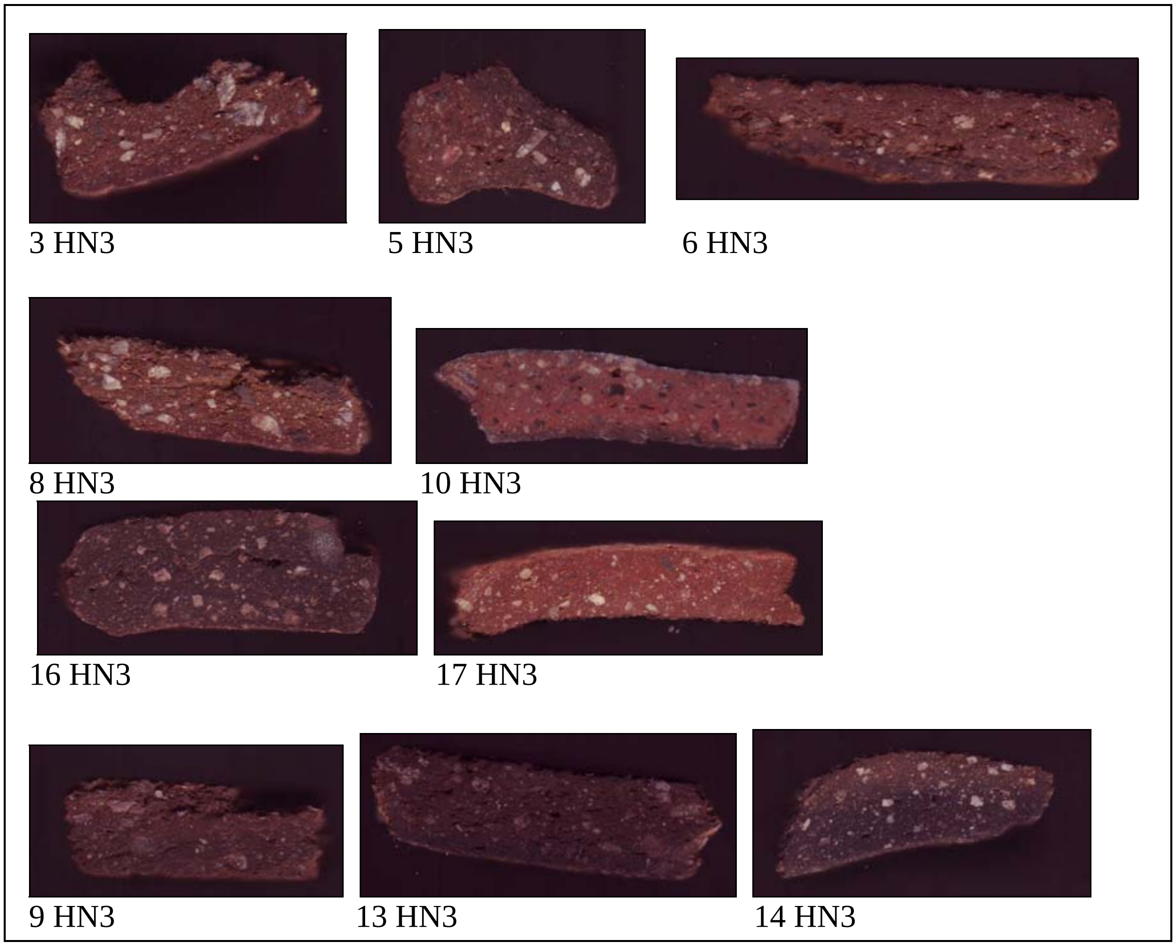


Figure 7:14 Slides 3 HN3, 5 HN3, 6 HN3, 8 HN3, 9 HN3, 10 HN3, 13 HN3, 14 HN3, 16 HN3, 17 HN3 (Author's Photo).

The fabrics show great mineral diversity and the following grouping is based on the reoccurring frequency of particular minerals. These samples are defined by the higher ratio of the altered and unaltered plagioclase feldspar to quartz, and the presence of clinopyroxene, amphibole and/or olivine (Fig 7:15 and 7:16). The majority of rock fragments contain quartz and plagioclase feldspar, occasionally with the addition of either clinopyroxene or olivine. The accessory minerals present in most samples are biotite, ferrous opaque pieces, K-feldspar and tremolite. As discussed above, there are occasional pieces of a reddish-brown mudstone and quartz/mica sandstone or conglomerate inclusions, which occur either individually or in conjunction, forming at most an occasional presence within the fabric. There are also anomalous minerals such as a piece of garnet in slide 16, a fragment of quartz/mica schist in slide 13 and pieces of altered serpentine in slide 6. Slide

16 has rare clay pellets in the fabric containing altered plagioclase feldspar, serpentine and tremolite.

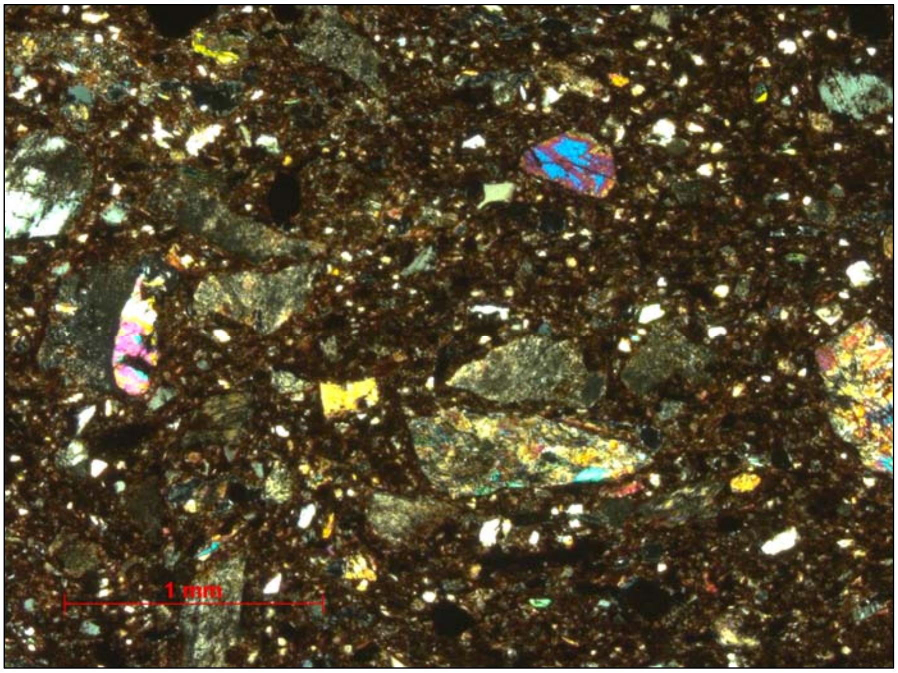


Figure 7:15 HN3 Fabric Carngoon Bank showing Olivine with blue/pink birefringence in upper right and mid left, Slide 16 (Author's Photomicrograph).

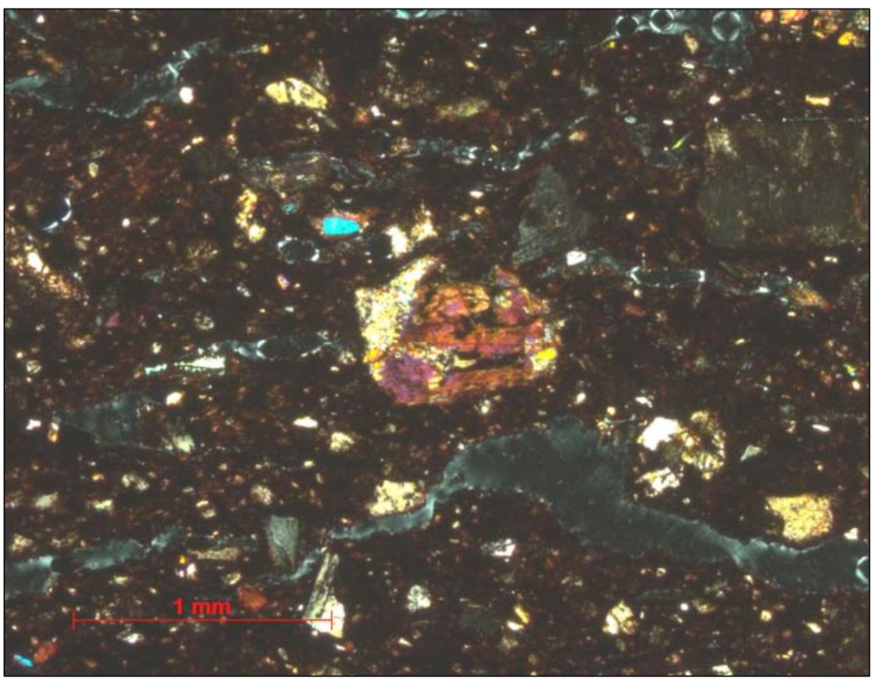


Figure 7:16 HN3 Fabric from Carngoon Bank with example of Pyroxene in central view, Slide 13 (Author's Photomicrograph).

7:9:2 HN3 Admixture Fabric group

The remaining three slides (11, 12 and 15) represent a divergence from the rest of the fabrics in this group; interestingly, these are more robust vessels with a greater wall thickness than the rest of the sherds (Fig 7:17). This sub-group contains all the minerals seen in HN3, but is distinguished by the higher ratio of quartz to plagioclase feldspar. Therefore, these samples are termed HN3 Admixture and represent a similar mafic-derived source to HN3, with a higher proportion of quartz-rich rock-derived material.

11 HN3 Admixture   12 HN3 Admixture   15 HN3 Admixture

Figure 7:17 Slides 11 HN3 Admixture, 12 HN3 Admixture, 15 HN3 Admixture (Author's Photo).

The minerals and rock fragments identified in the HN3 Fabric suggest a mafic-derived source with the addition of mudstone and sandstone, possibly locally sourced. The precise location within the mafic outcrop is unknown as it does not match known samples. Therefore, the HN3 Admixture Fabric, having both high levels of clinopyroxene and other associated mafic minerals in relation to a high quartz content, suggests an admixture of mafic and a quartz-rich rock. The location of both is unknown, although quartz veins can be found in the vicinity of the site.

7:9:3 HN Iron Fabric now redundant

The macroscopic sample identified feldspar, quartz, black and white rock fragments, ferrous pieces and iron-stained voids. The microscopic analysis confirmed the presence of the minerals and rock fragments listed above, although the presence and nature of the iron-stained voids could not be ascertained. Despite the apparent similarity between the macroscopic and microscopic results, the microscopic results found that the HN iron Fabric group could not be validated (see flowchart 7:2 below).

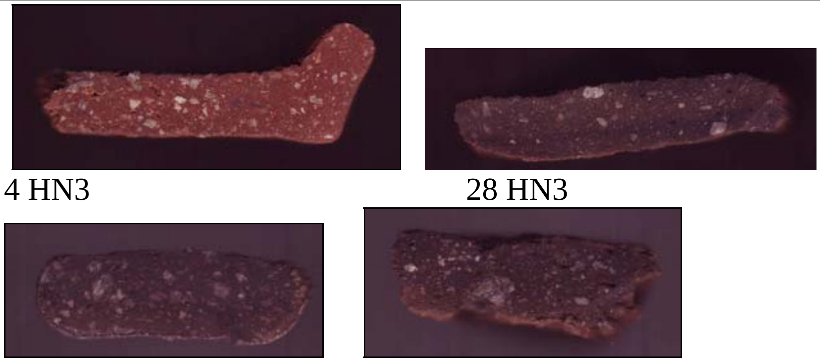


Figure 7:18 Slides 4 HN3, 24 HN3, 28 HN3, 29 HN3 (Author’s Photo).

As the name would suggest, the presence of iron-rich inclusions or evidence of their absence (the iron-stained voids), is essential to the definition of HN Iron first identified at Trebarveth. Unfortunately, neither of these were found to be frequent in the samples analysed. The quantity of ferrous opaque pieces is no higher than in most pottery samples analysed from Carngoon Bank. It would appear that the HN Iron Fabric group can only be found at Trebarveth and is not present at Carngoon Bank. The microscopic analysis has instead established that the samples assigned to the HN Iron Fabric group fall into two groups. Four of the samples (slides 4, 24, 28 and 29) (Fig 7:18) can be assigned to the HN3 Fabric group, two samples slides 26 and 27 have been assigned to the HN3 Admixture Fabric group (Fig 7:19). The remaining sample slide 25 can be loosely compared with the Hornblende Fabric group.

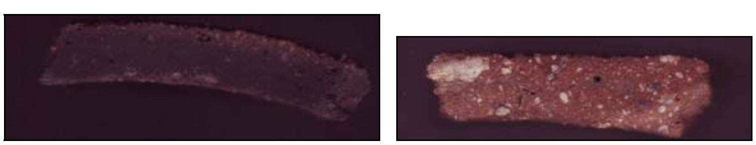


Figure 7:19 Slides 26 HN3 Admixture, 27 HN3 Admixture (Author’s Photo).

7:9:4 Metallic now Hornblende and Serpentinite Fabric groups

The macroscopic sample identified black and white rock fragments, feldspar, quartz, red pellets, biotite and ferrous pieces. The microscopic analysis of six samples found the minerals and rock fragments listed above. The black and white rock fragments contain frequent quartz, plagioclase feldspar and hornblende pieces and the red pellets are possibly weathered hematite. The microscopic results can validate the macroscopic fabric grouping for five of the samples, but it can not retain the title of Metallic (see flowchart 7:2 below).

The title Metallic has been defined by the fabric group from Trebarveth as containing frequent quartz and plagioclase rock fragments, K-feldspar and muscovite; the Carngoon Bank Metallic fabric has a very different mineral composition. Therefore, based on the nature of the samples previously representing this group the fabric will now be called Hornblende.

19 Hornblende 20 Hornblende

21 Hornblende 22 Hornblende 23 Hornblende

Figure 7:20 Slides 19 Hornblende, 20 Hornblende, 21 Hornblende, 22 Hornblende, 23 Hornblende (Author's Photo).

<u>Hornblende Fabric Group</u>

The new Hornblende Fabric group is defined by the frequent quartz, plagioclase feldspar and hornblende rock fragments and their derived minerals seen in slides 19, 20, 22, 21 and 23 (Fig 7:20). These are set within an oxidised well-sorted fabric, with abundant 0.001mm fine quartz in the micromass, possibly representing wind-blown loess deposits.

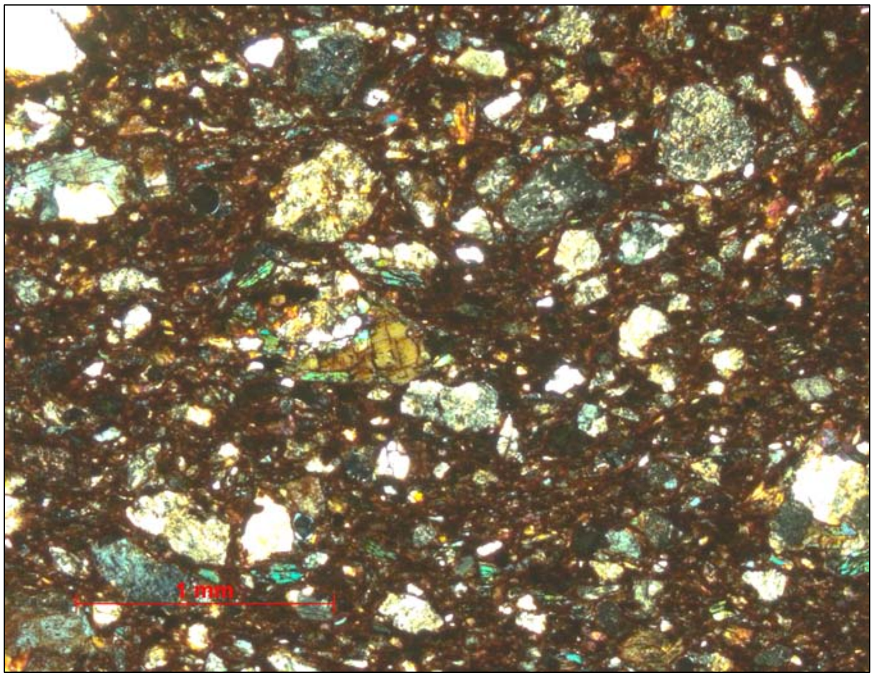


Figure 7:21 Hornblende Fabric at Carngoon Bank with a typical rock fragment highlighted Slide 23 (Author Photomicrograph).

The consistent presence of well-rounded hematite pieces is also distinctive. The other minerals commonly found in this fabric are quartz (often polycrystalline), hornblende, plagioclase feldspar, weathered hematite pieces, muscovite and biotite, with rare occurrences of sandstone fragments and olivine (Fig 7:21). There are rare occurrences of chlorite in slide 20 (Fig 7:22) and a piece of serpentine in slide 22. The clay pellets identified in this fabric appear to contain serpentine and quartz as seen in slide 21 (Fig 7:23).

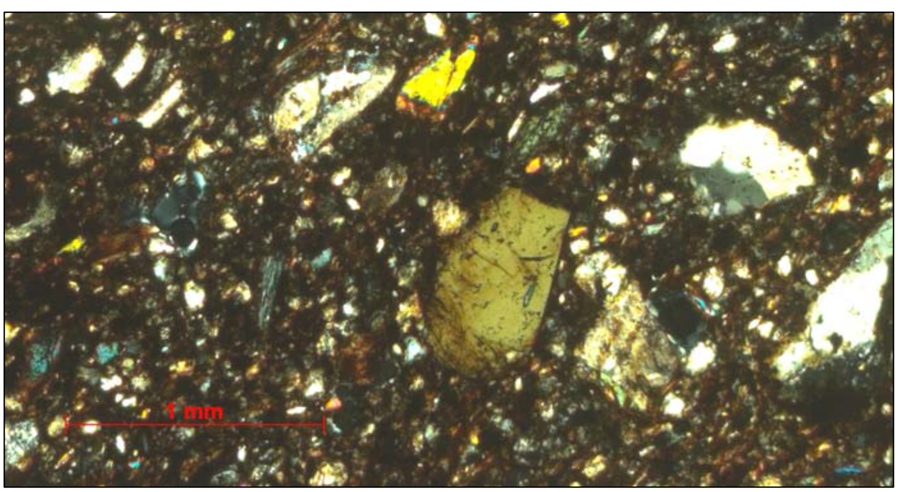


Figure 7:22 Slide 20 from Carngoon Bank showing brownish-green chlorite in centre (Author's Photomicrograph).

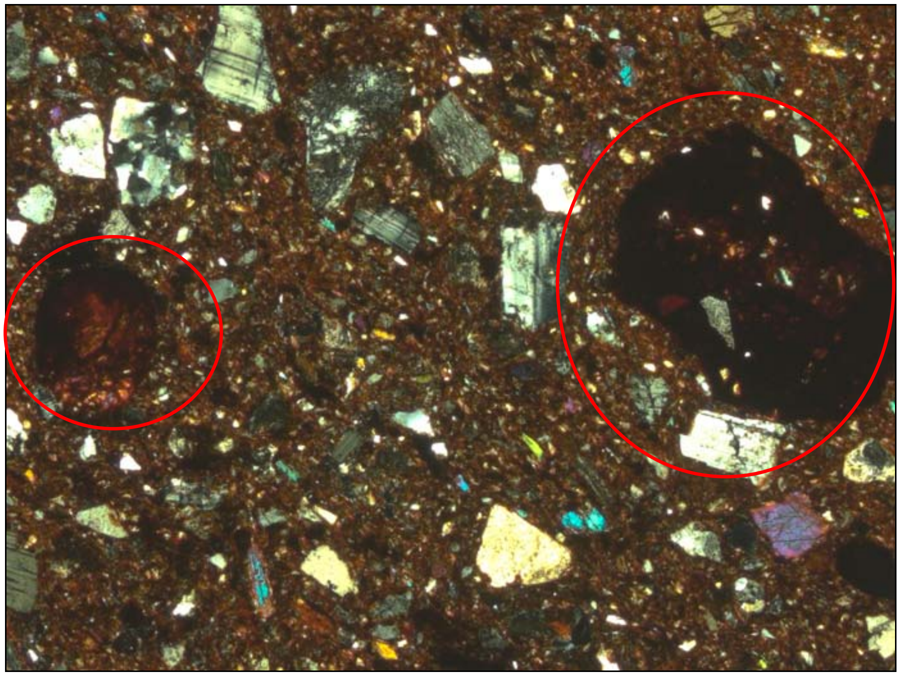


Figure 7:23 Example of well-rounded clay pellets Slide 21 Carngoon Bank (Author's Photomicrograph).

Serpentinite Fabric group

The remaining sample from this group is slide 18, which appears to represent another new fabric group based around the presence of serpentine rock fragments and is accordingly now termed the Serpentinite Fabric group (Fig 7:24).

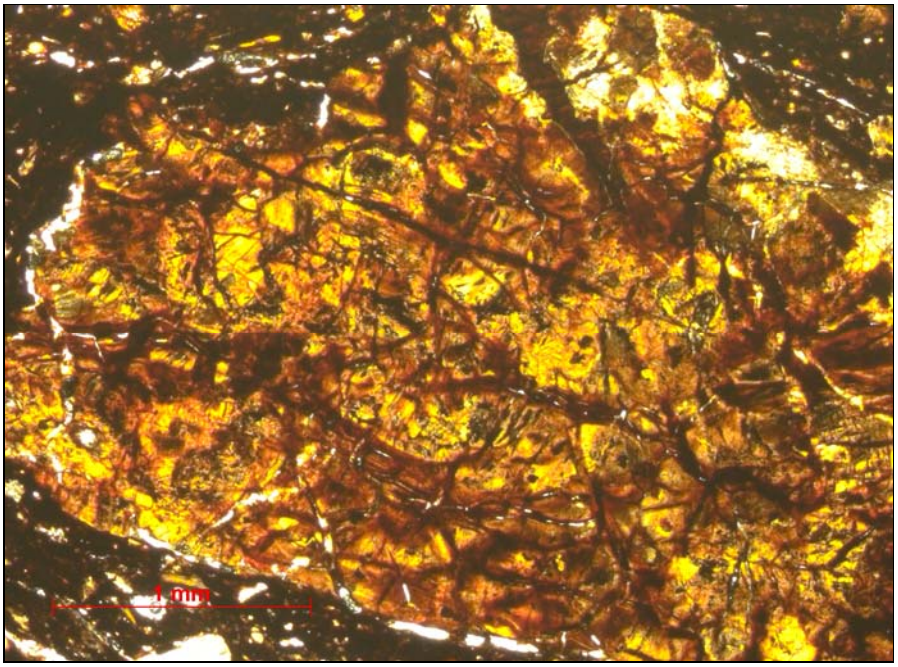


Figure 7:24 Serpentine rock fragment from Carngoon Bank under plain polarised light, Slide 18 (Author's Photomicrograph).

It is well-sorted and oxidised with an abundance of serpentine rock fragments and quartz with occasional plagioclase feldspar and pyroxene (Fig 7:25). There are also rare instances of sandstone fragments, olivine, weathered hematite and one piece of garnet.

Figure 7:25 Slide 18 Serpentinite (Author's Photo).

The two new fabric groups derived from the previously termed Metallic group indicate two different but related geological origins. The minerals and rock fragments in both fabric groups perhaps represent the sites location on a fault line between the hornblende schist and serpentine outcrops (see Fig 7:47 below). The Hornblende Fabric (slides 19, 20, 22, 21 and 23) suggest an igneous rock source, possibly associated with the hornblende schist, and the Serpentinite Fabric (slide 18) could represent the opposing serpentine outcrop. The consistent occurrence of weathered hematite and chlorite, minerals typically associated with the area of the fault line, further supports such a location (Flett, 1946, 41).

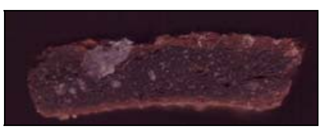
7:9:5 DRS now assigned to Hornblende and Serpentinite Fabric groups

The macroscopic sample identified feldspar, quartzite, quartz, black and white rock fragments, amphibole, muscovite and voids in this fabric group. The microscopic analysis also identified these minerals and rock fragments, the rock fragments probably corresponding to the amphibole, quartz and plagioclase feldspar fragments. However, the unique macroscopic title of DRS cannot be retained as the samples from this group belong in other fabric groupings (see flowchart 7:2 below).


2 Hornblende


31 Hornblende


32 Hornblende


34 Hornblende

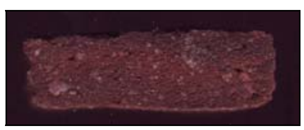

35 Hornblende

Figure 7:26 Slides 32 Hornblende, 31 Hornblende, 32 Hornblende, 34 Hornblende, 35 Hornblende (Author's Photo).

Therefore, the microscopic results cannot validate this macroscopic fabric grouping. The microscopic analysis has demonstrated that slides 2, 31, 32, 34 and 35 (Fig 7:26) can be assigned to the fabric group Hornblende, slides 30 and 33 can be assigned to the Serpentinite Fabric group and the remaining slide 1 has been assigned to HN3 Admixture. The samples assigned to the Hornblende Fabric group have the same quantity of quartz, hornblende and plagioclase feldspar rock fragments in the coarse and fine fraction accompanied by their derivatives (Fig 7:27). There are more occurrences of chlorite pieces in these samples although they adhere to the same frequency as the previous group.

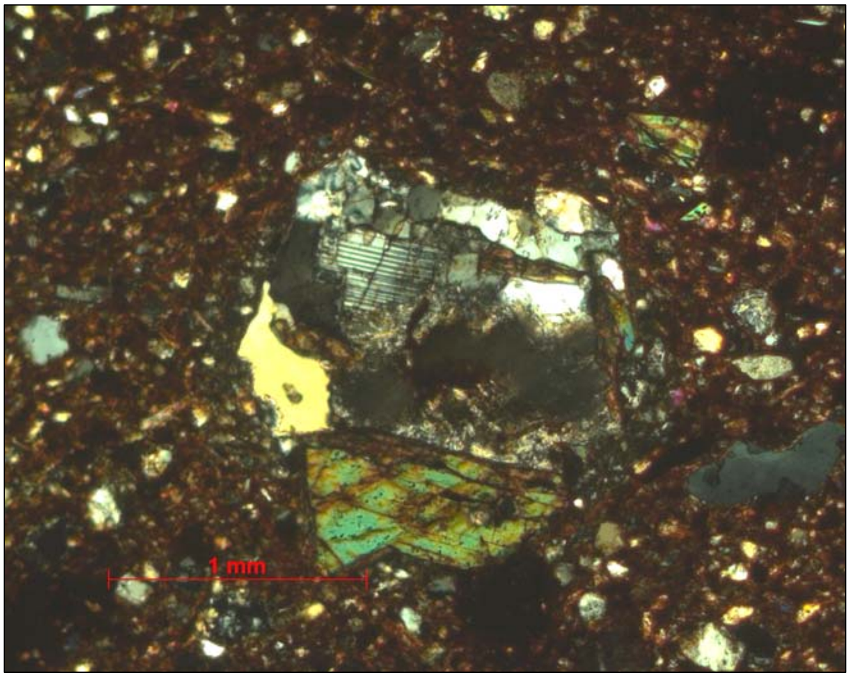


Figure 7:27 Hornblende, plagioclase feldspar and quartz rock fragment, Slide 32 Carngoon Bank (Author's Photomicrograph).

The only difference between these samples and samples originally assigned to this fabric is the appearance and production method of the pottery. The samples analysed are not oxidised and well-sorted: they are sorted to poorly sorted, with slides 31 and 34 having a reduced core and oxidised interior and exterior surface, slide 32 is reduced throughout, and slide 35 is oxidised throughout. This differentiation in firing technique and sorting of inclusions suggests an alternate production method whilst still using the same clay source. This difference accounts for why the two fabric groups were separated during macroscopic analysis.

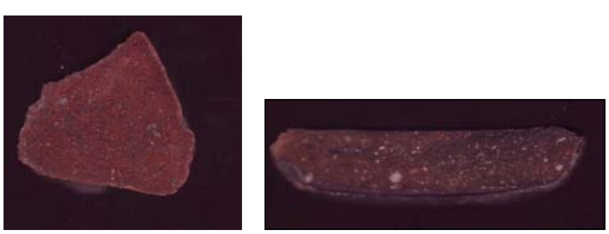

30 Serpentinite 33 Serpentinite

Figure 7:28 Slides 30 Serpentinite, 33 Serpentinite (Author's Photo).

The remaining slides (30 and 33) are well sorted and oxidised, contain slightly less serpentine than the Serpentinite Fabric group described above, and no garnet pieces were identified (Fig 7:28). Despite this, there are enough similarities within the range of minerals and rock fragments identified to assign them to the Serpentinite Fabric group.

The minerals and rock fragments identified in slides 31, 32, 34 and 35 possibly derive from the same hornblende, quartz feldspar rock that typifies this fabric group. The slides 30 and 33 assigned to the Serpentine Fabric group possibly derive from a serpentine rock outcrop with quartz veining.

7:9:6 Soft Red now assigned to Hornblende Fabric group

The macroscopic samples identified black and white rock fragments, quartzite, muscovite, red pellets, biotite and amphibole. The microscopic analysis found all of these minerals and rock fragments. However, the Soft Red Fabric group cannot be validated as a unique fabric group, because the samples analysed must be assigned to the Hornblende Fabric group (see flowchart 7:2 below). The initial distinguishing features of the Soft Red Fabric were the lack of inclusions and the prominence of rock fragments and red pellets. The microscopic analysis has found that the micromass in these samples is uniformly fine and contains a lot of fine quartz, perhaps giving the fabric a finer texture than the formerly named DRS and Metallic Fabrics. The red pellets have been identified as weathered hematite pieces, which are a common accessory mineral associated with the fault line geology previously mentioned (Bromley, 1979; Flett, 1946, 41). The rock fragments identified are the hornblende, quartz and plagioclase feldspar pieces which would appear black and white in hand sample.

Figure 7:29 Slides 36 Hornblende, 37 Hornblende, 39 Hornblende, 40 Hornblende (Author's Photo).

It is clear from the microscopic analysis that all the samples in this group (slides 36, 37, 38, 39 and 40) belong to the Hornblende group described above (Fig 7:29). The fabric of slides 36, 38 and 40 is well sorted with oxidised interior and exterior surfaces and a reduced core, whilst the fabric of slides 37 and 39 is oxidised throughout. The minerals and rock fragments suggest these samples belong to the Hornblende Fabric group. The only difference in this fabric is the more frequent occurrence of quartz mica schist pieces, of which a very large fragment can be seen in slide 37 (Fig 7:30).

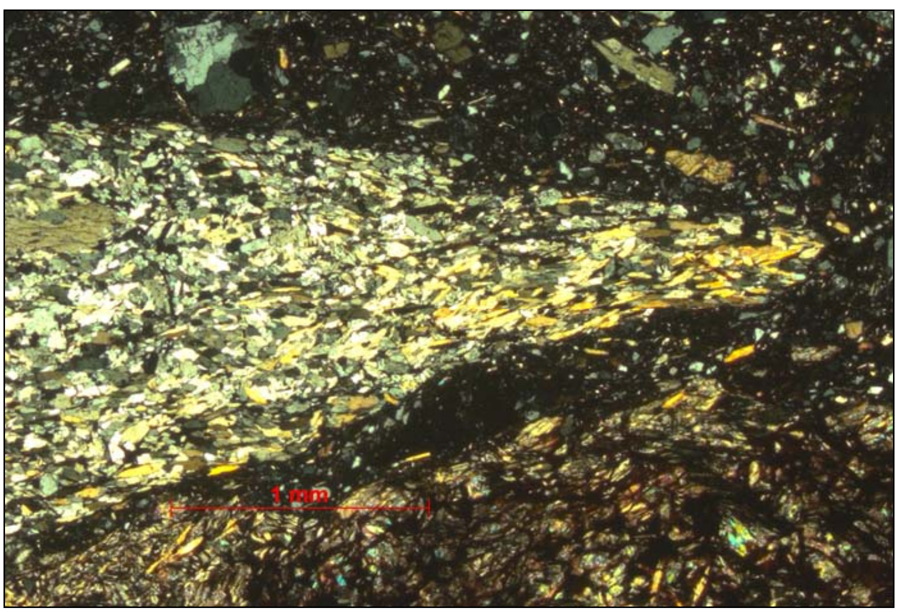


Figure 7:30 Slide 37 showing piece of quartz mica schist Carngoon Bank (Author's Photomicrograph).

7:9:7 SGS now Hornblende, Hornblende/schist and Mica Schist Fabric groups

The macroscopic samples identified feldspar, muscovite, biotite, quartzite, black and white rock fragments and ferrous pieces. The microscopic results found all of the minerals above and generally confirm a coherent fabric grouping, but the SGS Fabric cannot be validated as the samples have been assigned to other fabric groups. Despite the eleven samples matching the macroscopic results, the majority of this fabric group must be further subdivided (see flowchart 7:2 below). The common element of frequent muscovite mica inclusions led to these samples being assigned to the SGS Fabric group.

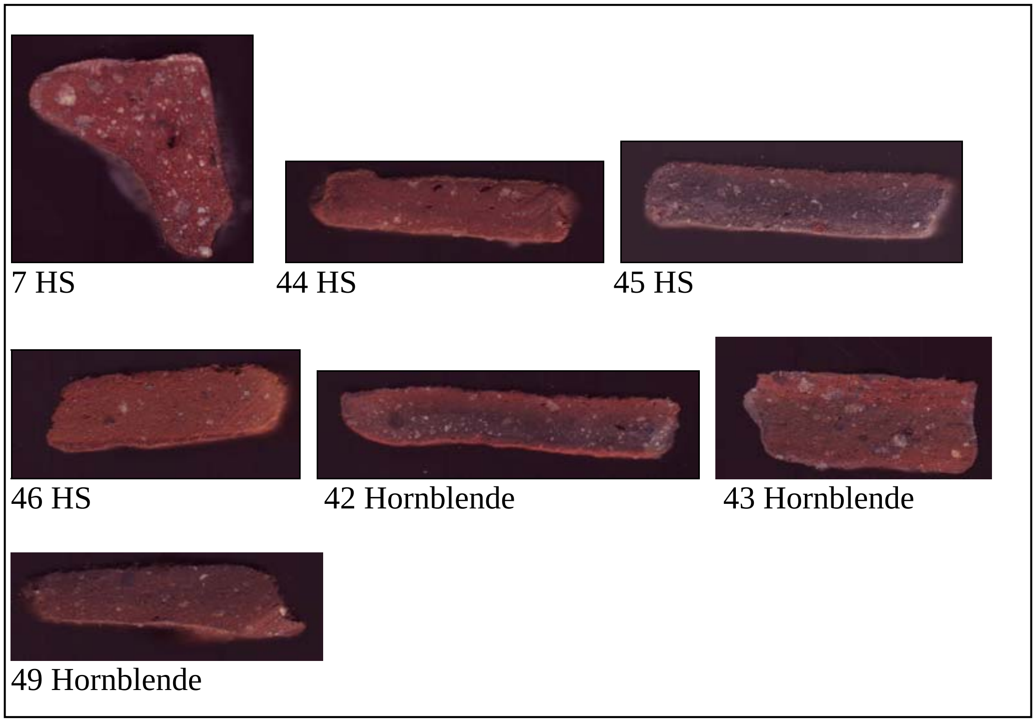
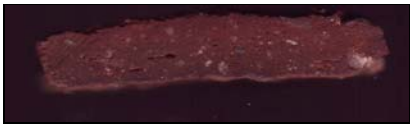


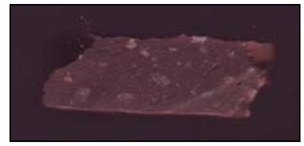
Figure 7:31 Slides 7 HS, 44 HS, 45 HS, 46 HS, 42 Hornblende, 43 Hornblende, 49 Hornblende (Author's Photo).

The group has now been subdivided into the Hornblende/Schist Fabric comprising slides 7, 44, 45 and 46 (Fig 7:31) and the Mica Schist Fabric comprising slides 41, 47, 48 and 50 (Fig 7:32). The remaining slides (42, 43 and 49) are characteristic of the Hornblende Fabric and have thus been assigned to that group as the level of additional mica was not significant (Fig 7:31).



41 Mica Schist

47 Mica Schist



48 Mica Schist

50 Mica Schist

Figure 7:32 Slides 41 Mica Schist, 47 Mica Schist, 48 Mica Schist, 50 Mica Schist (Author's Photo).

Hornblende/Schist Fabric group

The Hornblende/Schist Fabric group is defined by the presence of hornblende, quartz and plagioclase feldspar rock fragments and derived minerals, along with muscovite and biotite mica, polycrystalline quartz and occasional mica schist rock fragments (Fig 7:33). It is a sorted fabric and oxidised throughout with accessory minerals similar to the Hornblende Fabric such as olivine and weathered hematite.

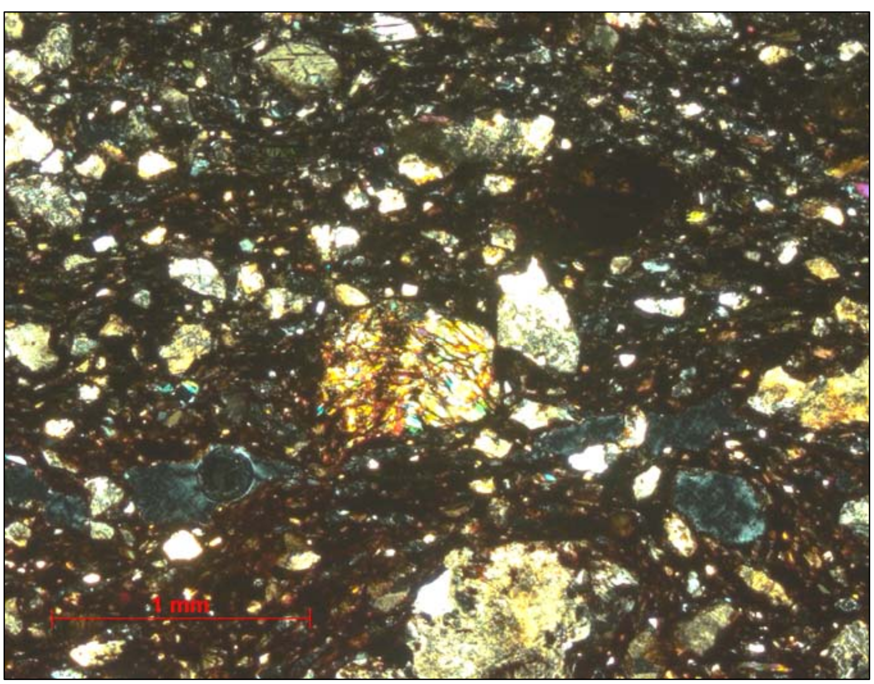


Figure 7:33 Example of Hornblende Schist Fabric Slide 45 Carngoon Bank (Author's Photomicrograph).

Mica Schist Fabric group

The Mica Schist Fabric group is unsurprisingly defined by the presence of mica schist rock fragments and its derived minerals. It is oxidised throughout and well sorted with microscopically-distinguishable slivers of clay containing micas orientated parallel to the vessel's surface (Fig 7:34). This perhaps suggests an alternative method of production to the other fabric groups. The accessory minerals are similar to that of the Hornblende Fabric, including a greater quantity of fine quartz pieces in the micromass. The minerals and rock fragments in the Hornblende/Schist Fabric group are probably derived from the hornblende schist outcrop, whilst the Mica Schist Fabric group perhaps represents a more mica-rich schist outcrop containing less hornblende. Both of these are also associated with the geology of the fault line near the site (Chapter 5:5:2) (Bromley, 1979; Flett, 1946).

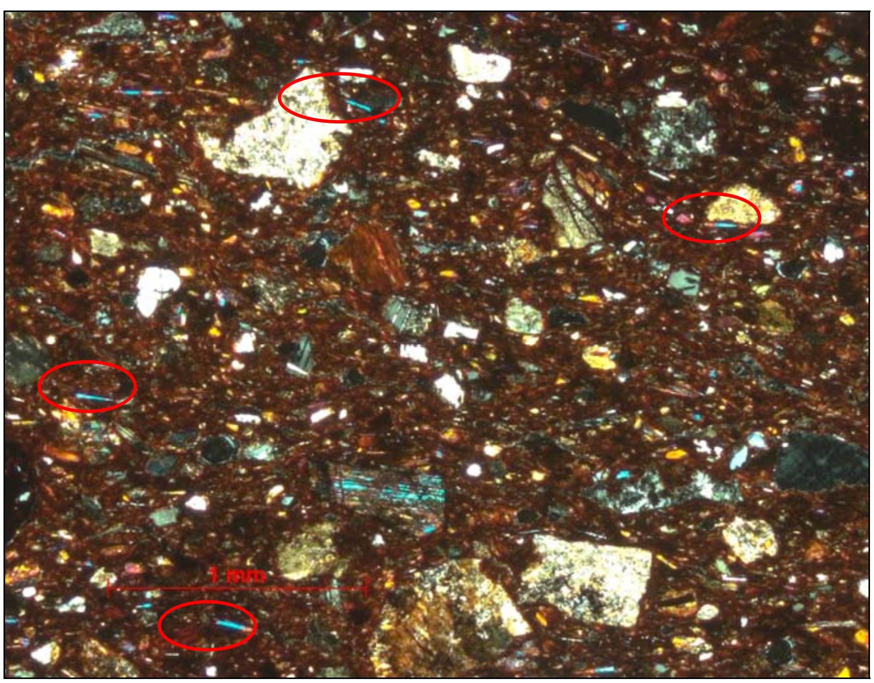
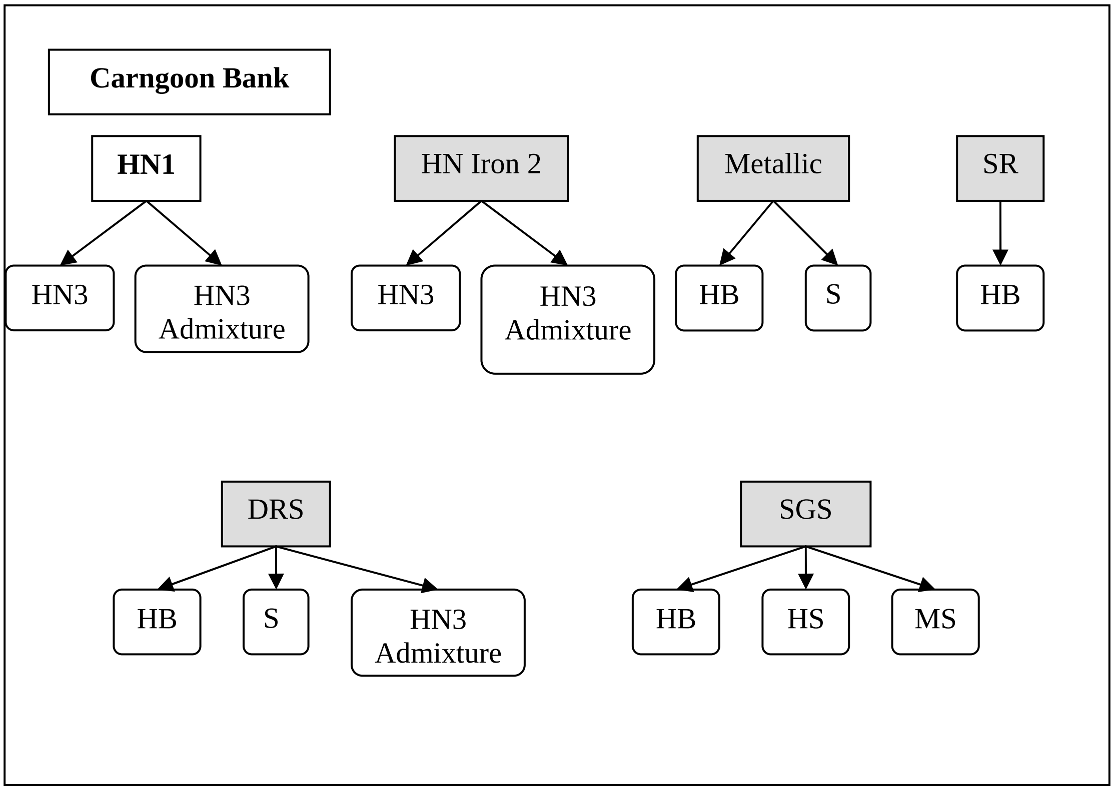


Figure 7:34 Mica Schist Fabric showing the frequent muscovite laths with bright blue birefringence as highlighted Slide 50 Carngoon Bank (Author's Photomicrograph).



Flowchart 7:2. Drawing showing the macroscopic origin and formation of the new microscopic fabric groups. The shading shows the redundant fabric groups (Author's illustration).

7:10 Microscopic results for Winnianton

7:10:1 HN2 Fabric group

The macroscopic sample identified Feldspar, Quartz and black hornblende. The microscopic samples found feldspar and quartz but no hornblende inclusions. However, the pyroxene inclusions may have appeared black in the hand sample. It would appear that the microscopic analysis does not entirely validate the macroscopic results (see flowchart 7:3 below). The two slides representing this group have a differing set of minerals. Slide 67 has an abundance of inclusions in a poorly-sorted reduced fabric with large amounts of sausserised plagioclase feldspar and clinopyroxene with few quartz grains (Fig 7:35). A large rock fragment containing clinopyroxene and altered and fresh plagioclase feldspar may be a mafic rock fragment. Therefore, slide 67 can be retained in the HN2 Fabric group.

However, slide 68 has fewer inclusions in a sorted oxidised fabric with less plagioclase feldspar and more quartz grains along with an organic inclusion, and therefore has been assigned to the Chunky Fabric group.

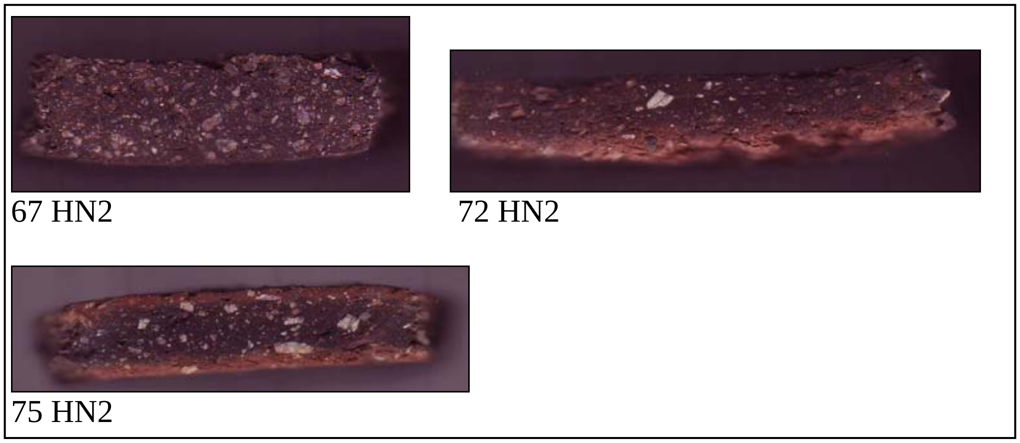


Figure 7:35 Slides 67 HN2, 72 HN2, 75 HN2 (Author's Photo).

The fabric group HN2 represented by slides 67, 72 and 75 (Fig 7:35), contains minerals and rock fragments that suggest a mafic-derived source despite the occasional presence of K-feldspar and quartz which are, as discussed earlier, broadly consistent with the HN Fabric grouping (Fig 7:36).

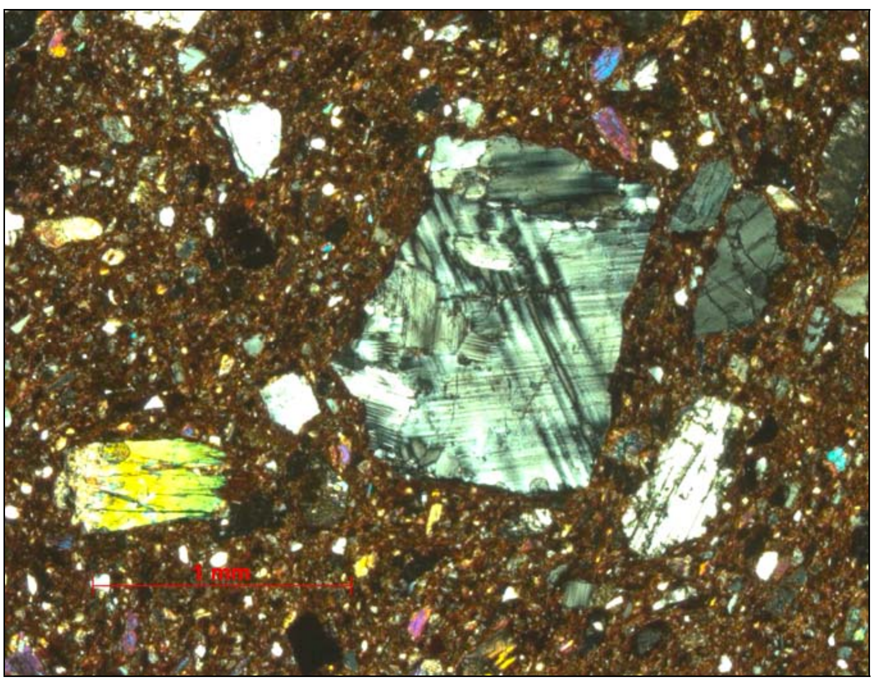


Figure 7:36 Example of K-feldspar and quartz rock fragment in centre of image Slide 72 Winnianton (Author's Photomicrograph).

7:10:2 Chunky Fabric group

The macroscopic sample identified feldspar, quartz, hornblende, red rock fragments, sandy rock fragments and black and white rock fragments. The microscopic samples found this range of minerals are present, although the rock fragments represented are difficult to match to the macroscopic examples. There are rock fragments in the three slides, the quartz and plagioclase feldspar rock fragments (Fig 7:37) and biotite and quartz schist, the latter of which could appear black and white in the hand sample. The well-rounded altered feldspar pieces may have appeared as sandy rock fragments in the hand sample, but the red rock fragments could not be identified.

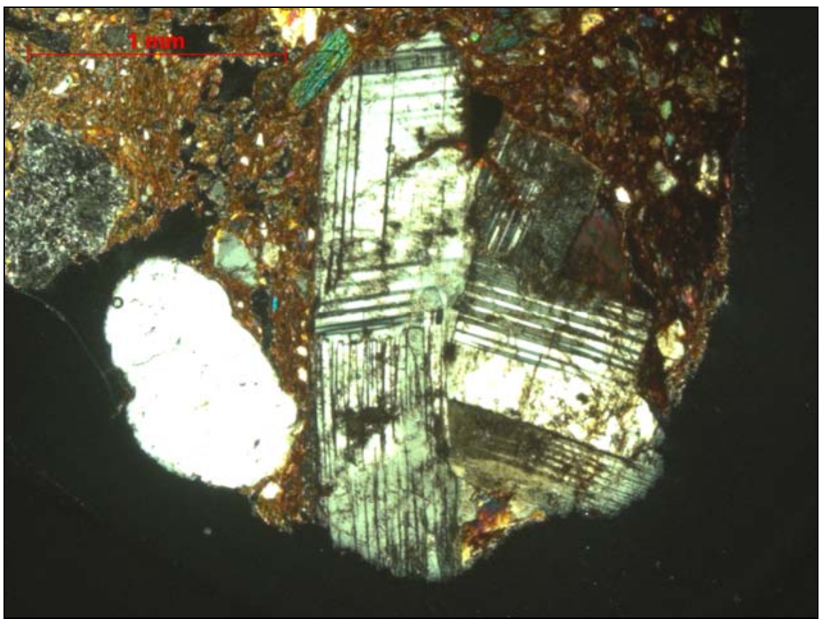


Figure 7:37 Example of Chunky Fabric group with rock fragment containing plagioclase feldspar and quartz, with a well-rounded quartz grain (sand) to the left and greenish blue lath of biotite mica top centre; Slide 74 Winnianton (Author's Photomicrograph).

It would appear that the microscopic fabric group validates the macroscopic fabric grouping (see flowchart 7:3 below). However, slides 69 and 77 can be assigned to the same microscopic fabric group, distinguished by the presence of organic inclusions, fresh plagioclase and K- feldspar and small rounded pieces of altered feldspar and quartz of a similar size suggesting sand (Fig 7:37). Both slides also have rare pieces of shale or slate.

Slide 69 has a reduced poorly-sorted fabric, whilst slide 77 has an oxidised sorted fabric. However, slide 74 has a reduced poorly-sorted fabric and differs from the others in having large amounts of fresh plagioclase feldspar and muscovite and biotite micas and a generally higher proportion of inclusions with a greater diversity than seen in slides 69 and 77 (Fig 7:38). This range of inclusions suggests that slide 74 can be assigned to the Mica Fabric group.

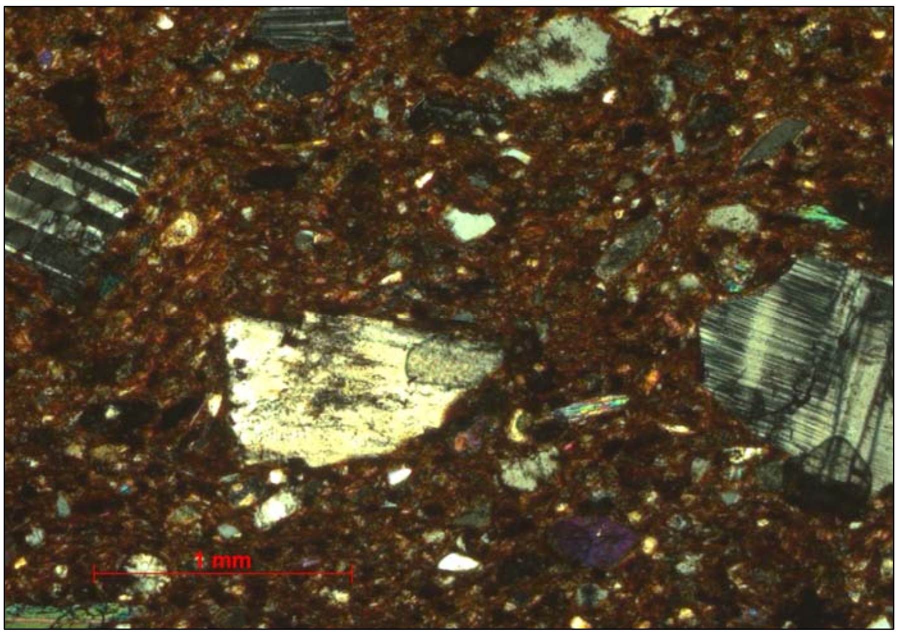
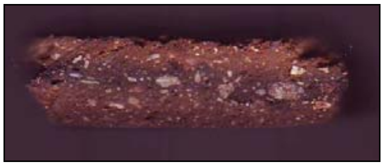
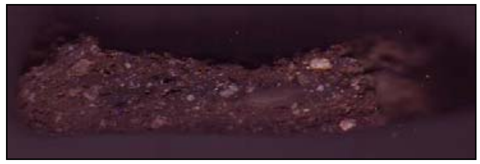


Figure 7:38 Slide 69 Winnianton showing plagioclase (left) and K-feldspar (right) along with biotite mica (bottom left) (Author's Photomicrograph).

The fabric group Chunky is thus represented by slides 68, 69 and 77, which suggest a granitic-derived source due to presence of plagioclase and K- feldspar in relation to a higher proportion of quartz (Fig 7:39). The granitic-derived minerals found in many of the samples may derive from the rhyolite component of the Portscatho formation. The quartz conglomerate rock fragments perhaps validate this, as this does not appear in other fabric groups (Fig 7:40).The constituents of rhyolite are K-feldspar, plagioclase feldspar and quartz with biotite and amphibole as accessory minerals. The weathering of this igneous rock into the sandstone matrix of the Portscatho formation provides possible evidence of a local source. The river channel behind Gunwalloe has extensive alluvium deposits derived solely from the Portscatho Formation; the nearest rock outcrop is of dolerite to the east of the river (Shail *pers. comm*.). It is possible that the dolerite could provide the pyroxene and amphibole elements to some of the fabrics, but this is a tenuous link.


68 Chunky


69 Chunky

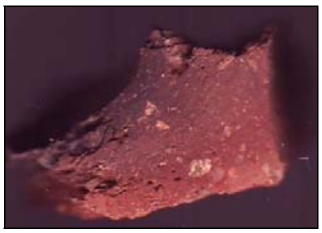

77 Chunky

Figure 7:39 Slides 68 Chunky, 69 Chunky, 77 Chunky (Author's Photo).

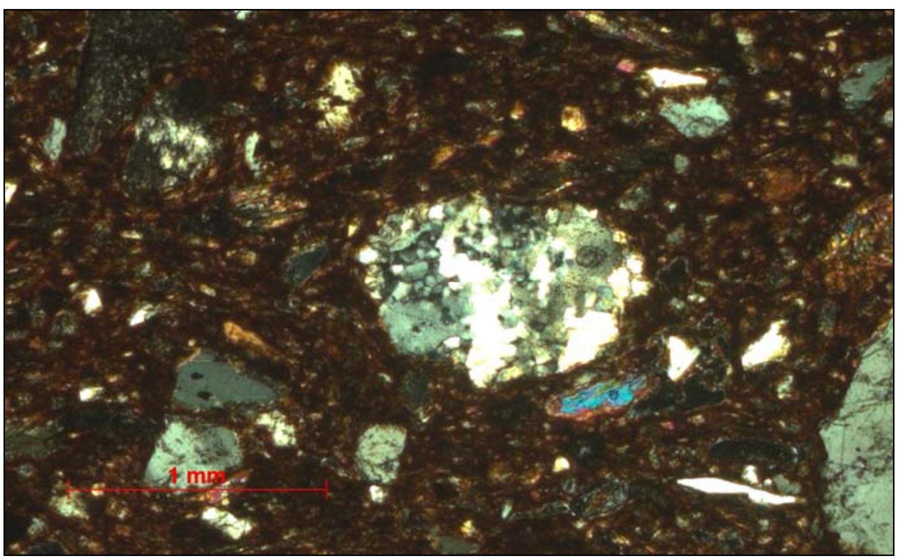


Figure 7:40 Example of Winnianton quartz conglomerate rock fragment in centre of view, supporting an igneous ryolitic alluvial deposit (Author's Photomicrograph).

7:10:3 Soft Green Fabric group now redundant

The macroscopic sample identified feldspar, quartz, green rock fragments, black and white rock fragments, metallic pieces and black and red rock fragments. The microscopic samples found all of the above apart from the black and red rock fragments. Despite this, the microscopic analysis cannot validate the Soft Green Fabric group, as the two samples must be assigned to separate fabric groups found at Winnianton.

The two samples representing this fabric group do not have comparable mineral assemblages and cannot confirm this as a unique fabric group. Slide 73 has a reduced poorly-sorted fabric containing chlorite and feldspar rock fragments and large tremolite inclusions. It contains large quantities of muscovite and plagioclase feldspar, but has no olivine and markedly less clinopyroxene than slide 72. Slide 72 has a reduced poorly-sorted fabric containing no chlorite rock fragments but retaining the Tremolite. It has less muscovite, quartz and plagioclase feldspar, but larger quantities of clinopyroxene and olivine than slide 73. It is clear from the microscopic analysis that the two samples in this group belong in separate fabric groups (see flowchart 7:3 below). The fabric of slide 72 presents a similar range of inclusions to HN2, whilst the predominance of muscovite in slide 73 requires it to be assigned to the Mica Fabric group.

7:10:4 Mica Fabric group

The macroscopic samples identified plagioclase feldspar, quartz, biotite, muscovite and black metallic pieces. The microscopic samples found confirm this, with the addition of schist and igneous rock fragments. Therefore, the macroscopic samples validate the four microscopic samples analysed (see flowchart 7:3 below).

70 Mica 71 Mica 76 Mica

Figure 7:41 Slides 70 Mica, 71 Mica, 76 Mica (Author's Photo).

This fabric group is the most consistent of the four fabric groups at Winnianton with slides 70, 71 and 76 presenting a similar assemblage of inclusions (Fig 7:41).

This fabric is distinguished by the abundance of quartz, micas and feldspar in relation to the absence of clinopyroxene. There are frequent occurrences of igneous and/or schistose rock fragments (Fig 7:42) and rounded quartz grains. The samples also represent a range of vessel types, all with a reduced poorly-sorted fabric. However, slide 75 is oxidised and very poorly sorted containing less rock fragments and less muscovite and quartz, whilst having a greater quantity of clinopyroxene and olivine and has been assigned to the HN2 Fabric group.

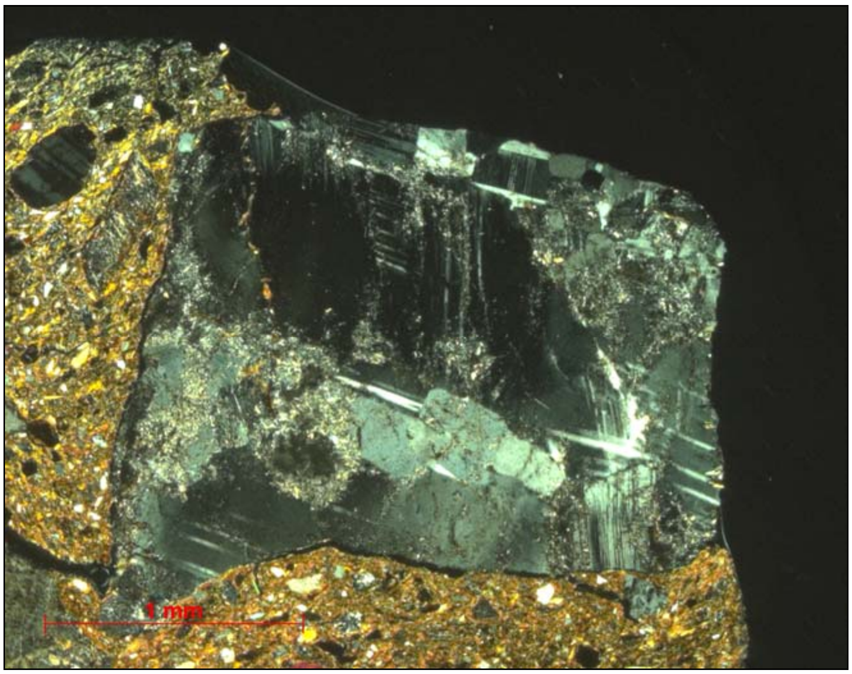
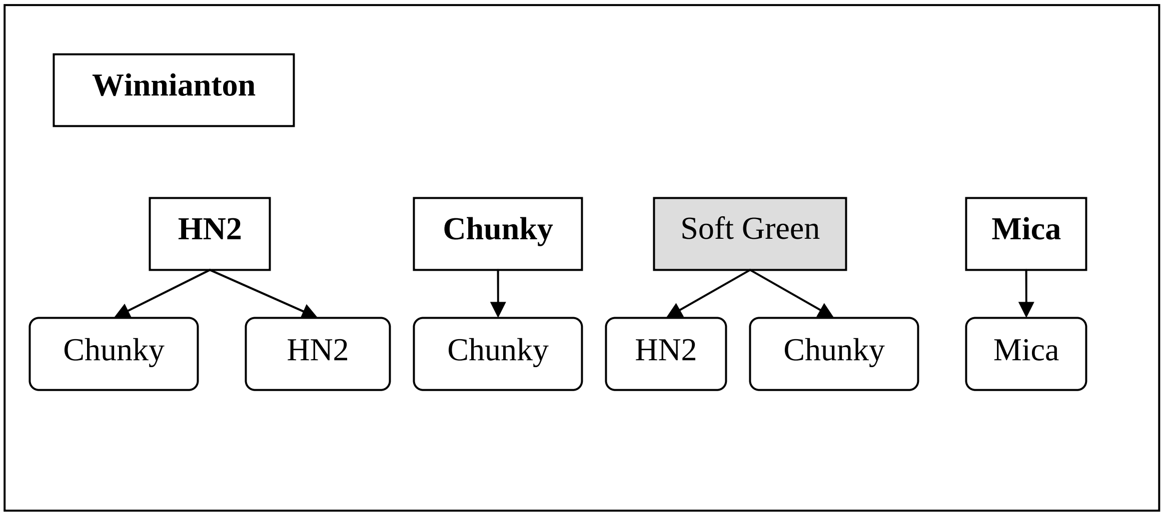


Figure 7:42 Igneous rock fragment containing plagioclase feldspar, K-feldspar and quartz Winnianton (Author's Photomicrograph).

The fabric group Mica suggests an igneous-derived source as identified in slides 70, 71 and 76, and is most likely derived from the same rhyolite component of the Portscatho formation as the Chunky Fabric, perhaps combined with a mica schist rock source.



Flowchart 7:3. Drawing showing the macroscopic origin and formation of the microscopic fabric groups. The shading shows redundant fabric groups (Author's illustration).

7:11 Summary of Microscopic results

The microscopic analysis has established that not all the macroscopic fabric groups can be validated at a higher level of analysis. The results have shown that out of the original thirteen macroscopic fabric groups only seven can be maintained. This demonstrates that each fabric is unique to its site even within the HN fabric group. The microscopic analysis has identified seven new fabric groups within the previous groups making a total of sixteen fabrics covering all three sites. The seventy-seven samples have been reorganised in the table below to demonstrate their distribution amongst the remaining macroscopic and new microscopic fabric groups (Table 7:7).

Table 7:7. Demonstrating the redistribution of samples over the revised fabric groups.

Fabrics	HN1	HN2	HN3	HN3 Ad	HN Iron 1	QG	G	Metallic	HN1 Loess	HS	Mica	MS	Serp	HB	Chunky
Trebarveth	7	0	0	0	4	2	1	1	1	0	0	0	0	0	0
Carngoon Bank	0	0	14	6	0	0	0	0	0	4	0	4	3	19	0
Winnianton	0	3	0	0	0	0	0	0	0	0	5	0	0	0	3

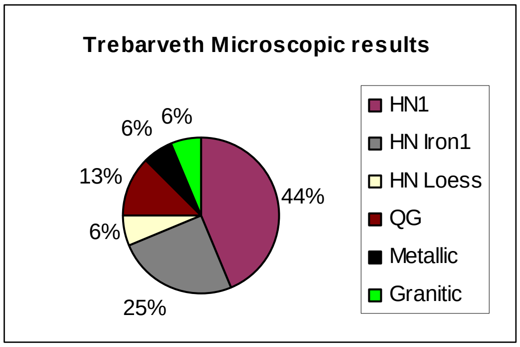
7:12 Revised ratios of fabric groups

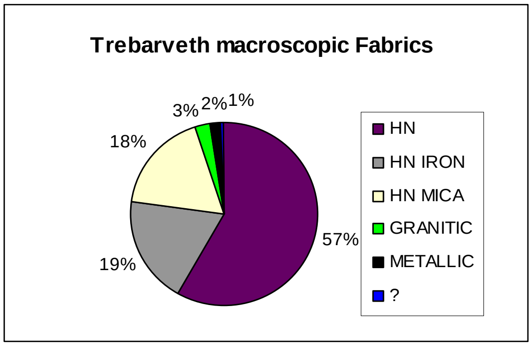
The ratio of fabric groups below refers to the thin-section samples and not a proportion of the assemblage as displayed in the macroscopic fabric ratios for each site. The importance of displaying the ratios of the microscopic fabrics is of relevance in relating it back to the macroscopic fabric groups. However, the microscopic results present a problem, as the generation of more fabric groups for each site makes it difficult to relate the updated findings to the original macroscopic fabric ratios within the assemblages. The quantity of samples analysed was based on their representative proportions within the assemblage. The new fabric groups are thus not accurately represented. However, the necessary subdivision, replacement and removal of fabric groups has in most cases occurred within the fabric groups to which they were originally assigned, which does make conversion between the groups possible.

7:12:1 Trebarveth

Understanding of the samples from Trebarveth has not changed dramatically as a result of the microscopic analysis, and has only experienced some subdivision within the original HN Iron 1 Fabric group. This represents a good correspondence between the two levels of analysis, with the HN Fabric grouping continuing to dominate the assemblage.

The HN1, Granitic and Metallic Fabrics retain their own compositional character. The HN Iron 1 Fabric gained a subgroup (HN1 Loess) and HN Mica was removed as it was composed of HN1 and a newly formed Garnet fabric group. The HN1 Loess perhaps represents an on-site clay source as Harrad's sample from Lowland point demonstrates: loess inclusions are specific to the underlying alluvial deposits beneath Trebarveth. These results do not significantly alter the macroscopic results and only differ in the addition of a new HN Fabric and the discovery of a new unique fabric containing Garnet. The removal of HN Mica Fabric has not significantly affected the results, as one sample was absorbed into HN Iron and the remaining two into the new Garnet Fabric. The graph below demonstrates the new fabric ratios based on the samples analysed (Graph 7:6), and also the initial macroscopic fabric groups for comparison (Graph 7:7).

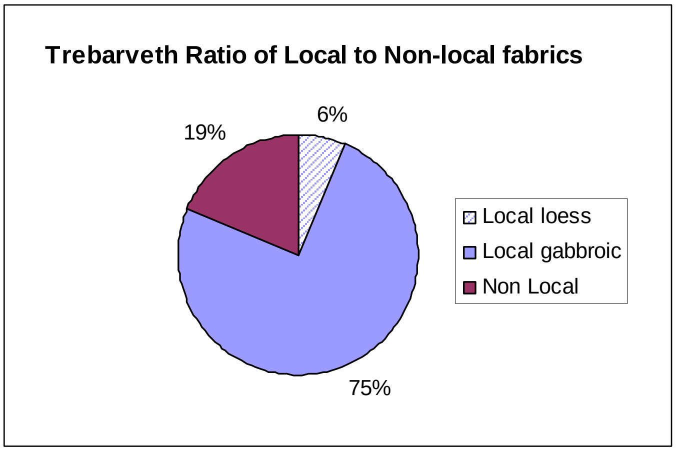




Graph 7:6. Microscopic fabric group ratios based on the thin section samples.

Graph 7:7. Macroscopic fabrics for comparison.

The dominance of the HN Fabric grouping at Trebarveth appears to be a defining characteristic of the assemblage. This fabric represents a geological signature typical of gabbroic pottery found elsewhere in Cornwall, as identified by Harrad. The HN1 Loess represents a very specific on-site clay source, which, whilst classed as gabbroic-derived, represents clay only found in Lowland point area. The results of the combined data demonstrate that gabbroic-derived clay was predominantly used for pottery production at Trebarveth (Graph 7:8), but included both local and non-local gabbroic clays.

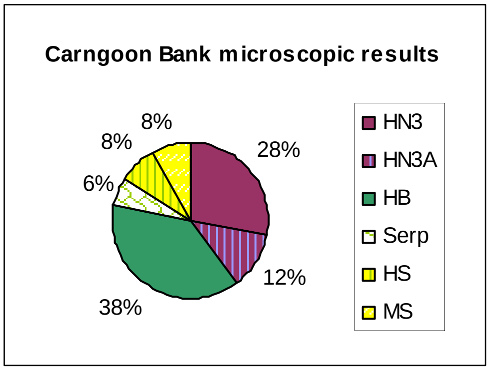


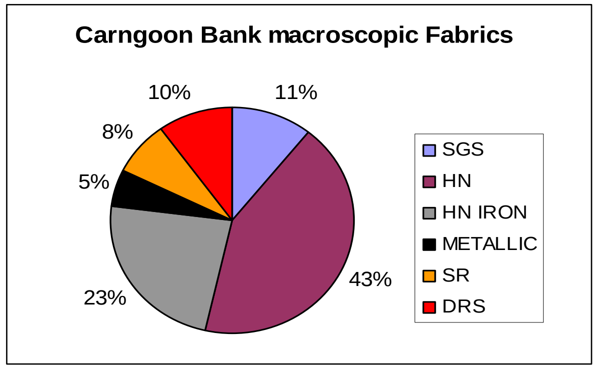
Graph 7:8. Demonstrating the proportion of 'Local' to 'Non-Local' geological material used in pottery production at Trebarveth based on the thin-section slides analysed.

7:12:2 Carngoon Bank

The samples from Carngoon Bank have remained relatively unchanged in the HN Fabric grouping, with only the addition of an admixture fabric. Although, it must be acknowledged that not all macroscopic fabric groups could be validated at a microscopic level which has important ramifications for the representative sampling strategy which will be discussed further below. The remaining four fabric groups from the site have been discarded, to be replaced by Hornblende (HB), Hornblende Schist (HS), Mica Schist (MS) and Serpentine (S). Interestingly, all four original fabric groups contained the Hornblende Fabric. Although this confusing reorientation of fabric groups appears to generate increasing complexity, it also provides clarity in other aspects. The Hornblende Fabric provides a unifying factor amongst the original SGS, DRS, SR and Metallic Fabrics, essentially forming a new, stronger grouping that represents a formidable non-HN Fabric within the assemblage.

However, relating this new pattern back to the macroscopic fabric ratios is problematic, as quantities cannot simply be divided and statistically transferred to form new fabric ratios. A direct transfer can only be made with the DRS and SR Fabrics, which both proved to belong to the HB Fabric. Unfortunately, this cannot be done with the SGS, SR and Metallic groups because they are subdivided within their groups. Therefore, the SGS Fabric cannot represent HB, HS and MS because their proportions within the entire assemblage are unknown. The redundant Metallic group now represents HB and S creating the same problem. The graph below represents the new distribution of microscopic fabric groups amongst the samples (Graph 7:9) and (Graph 7:10) represents the initial macroscopic fabric groups for comparison.

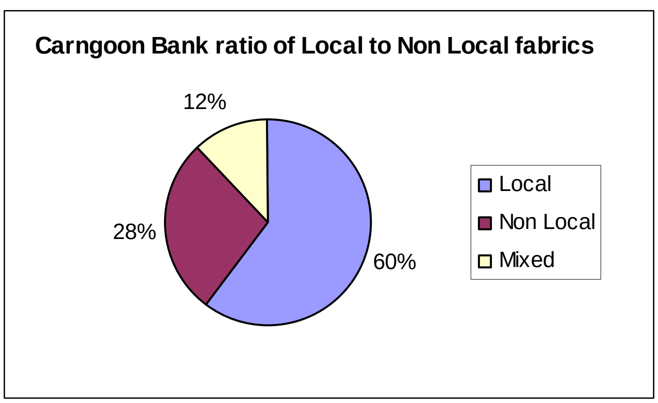




Graph 7:9. Microscopic fabric group ratios based on the thin-section samples.

Graph 7:10. Macroscopic fabrics for comparison.

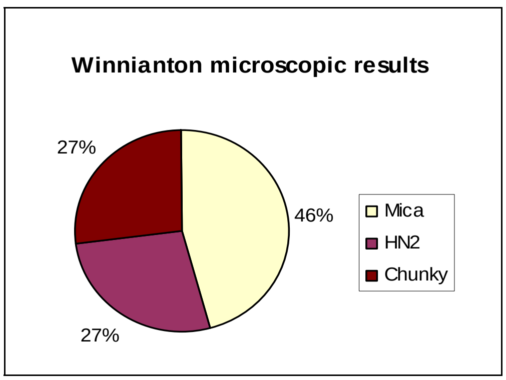
Despite the statistical turmoil this subdivision has caused, the four new fabric groups do represent a homogenous entity in their own right, as they all contain minerals and rock fragments that are specific to the geological situation of Carngoon Bank. Therefore, the loss of the original fabric groups and the discovery of new ones have produced two distinct fabric groupings with HB, HS, MS and S representing the geological signature of Carngoon Bank, and HN and HN Admixture representing geological material from elsewhere. If the geological element of the data, as determined by the microscopic results, is presented the two groups demonstrate the dominance of the local geological signature (Graph 7:11).

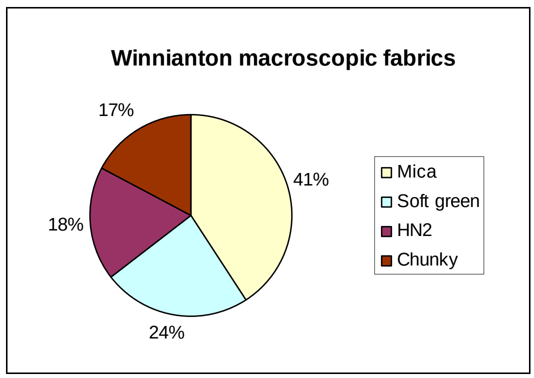


Graph 7:11. Demonstrating the proportion of Local to Non-Local geological material used in pottery production at Carngoon Bank based on the thin-section slides analysed.

7:12:3 Winnianton

The samples from Winnianton have not changed apart from the removal of one fabric group whose two samples were assigned to other fabric groups from the site. The removal of the Soft Green Fabric from the Winnianton assemblage is problematic as it represented 24% of the macroscopic fabric ratio. Also, the reassignment of its two samples to both the Mica and HN2 fabric groups infers a dramatic mineralogical difference. The HN2 Fabric appears to represent the HN Fabric grouping with a predominance of plagioclase feldspar and pyroxenes. The remaining fabrics appear to be igneous in nature and most likely derive from the weathered rhyolitic components that form the underlying geology of the site. The reassignment of the two samples to such geologically opposed fabric groups is essentially resolved by the equal division of the macroscopic Soft Green fabric which does not significantly bias one group against the other. The graph below demonstrates the new fabric ratios based on the thin-section samples (Graph 7:12) and (Graph 7:13) represents the initial macroscopic fabric groups for comparison.

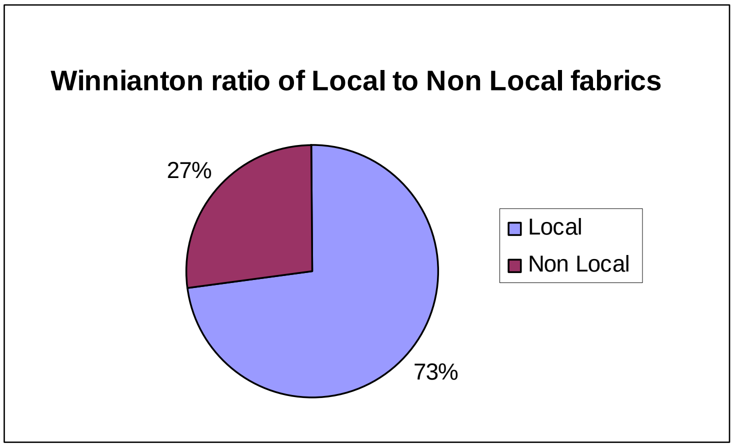




Graph 7:12. Microscopic fabric group ratios based on the thin section samples.
Graph 7:13. Macroscopic fabrics for comparison.

It should be noted that these adjusted fabric ratios, showing a higher quantity of the Chunky and Mica Fabrics, compare favourably with the macroscopic analysis of the 2010 assemblage, perhaps supporting the dominance of these groups at Winnianton.

The results demonstrate a marked division between the use of local igneous and non-local mafic-derived materials for pottery production or usage at the site of Winnianton. The locally derived material makes up 73% of the total assemblage, with only 27% being non-local (see Graph 7.14).



Graph 7:14. Demonstrating the proportion of Local to Non-Local geological material used in pottery production at Winnianton based on the thin-section slides.

7:13 Origin of clays sources

The provenance of the clays used to produce the pottery found at the three sites has been established using a combination of the known underlying geology of the settlement sites and the clay samples collected by Harrad and Morris (as introduced in Chapter 6:3:3:) (Fig 7:43).

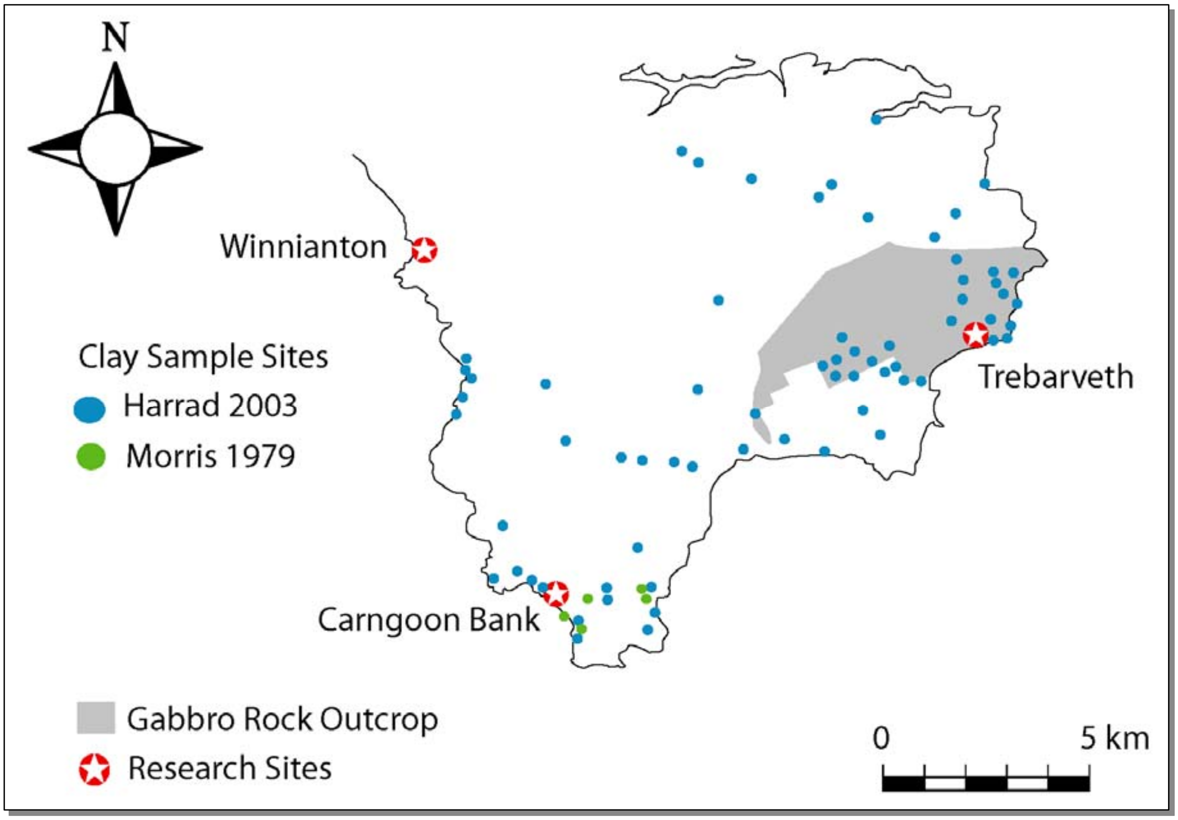


Figure 7:43 Map showing the location of clay samples taken by Harrad and Morris (Author's illustration).

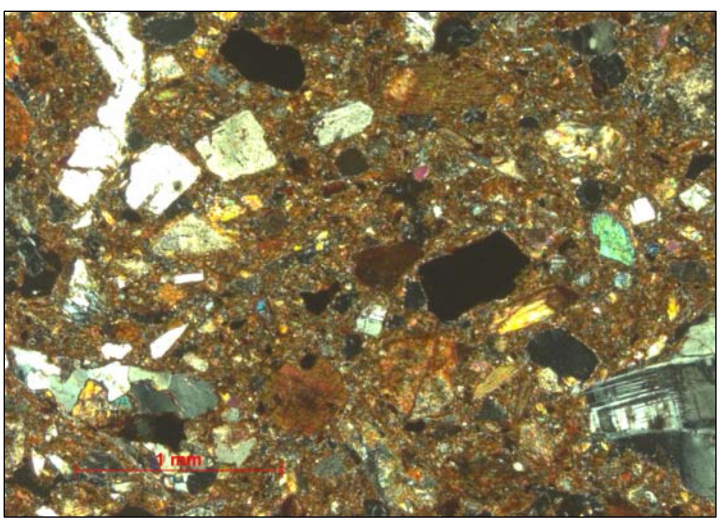


Figure 7.44 Harrad's Zoar clay sample LHS 34 (Author's Photomicrograph).

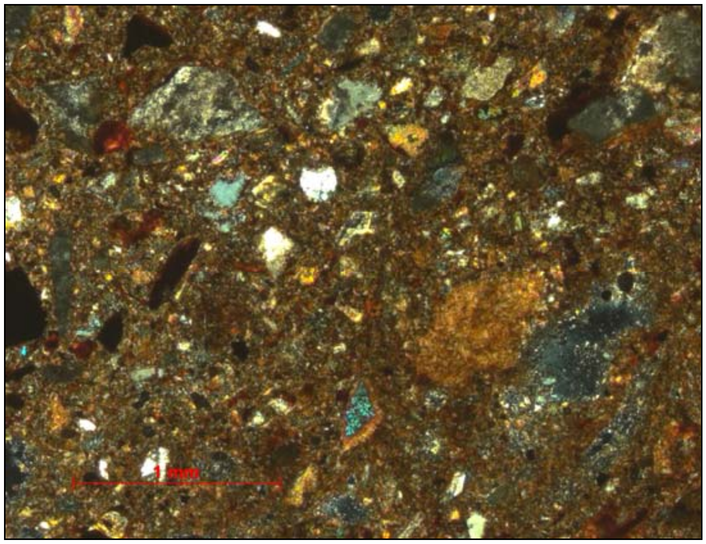


Figure 7.45 Harrad's Dean Quarry clay sample LHS 18 (Author's Photomicrograph).

The clay samples collected by Harrad have enabled the origin of the Trebarveth HN1 fabric to be located at Zoar on the Crousa Downs (Fig 7:44) and Dean Quarry (Fig 7:45), which is roughly one mile east of the site. The Harrad Dean Quarry thin-section slide 18 displayed the range of minerals and rock fragments seen in the thin-sections from the site, which surprisingly included rare pieces of K-feldspar and quartz (2003, 409). The presence of K-feldspar and quartz is uncharacteristic for a gabbro-derived clay and would have created ambiguity as to the origin of the clay used if not for the existence of Harrad's samples.

The result of the direct comparison between the HN1 fabric and the Dean Quarry clay samples, identified by Harrad as Gabbro-derived, is that the HN fabric grouping is gabbroic clay. This discovery suggests that HN fabric grouping is represented on all three sites. However, it must be made clear that gabbroic clay is only classed as 'local' clay at Trebarveth, whereas at Carngoon Bank and Winnianton it would be classed as non-local.

Another fabric identified during the microscopic analysis was HN Loess, whose origin was once again determined by Harrad's clay samples as being gabbroic loess clay. Her thin-section slides 21 and 22, extracted from Lowland point, contained abundant fine quartz in the micromass which is typical of loess deposits (Harrad, 2003, 401-402). The location of the clay samples is roughly 250m east of the site (Harrad, 2003, 401). No comparison could be found for the Granitic and Garnet fabric groups to enable a source location to be established.

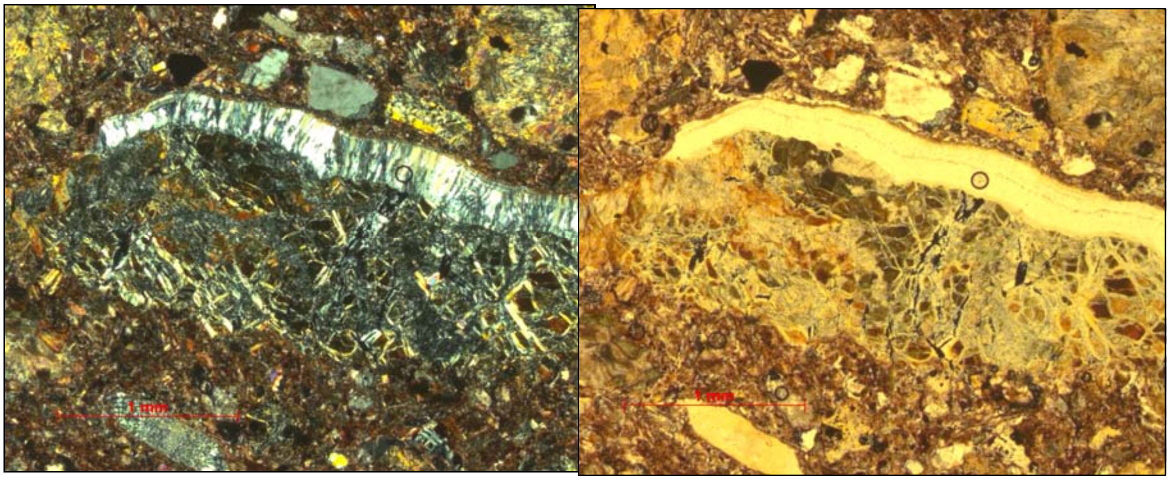


Figure 7:46 Harrad Slides 17 clay sample from Landewenack (Author's Photomicrograph).

The microscopic results from Carngoon Bank were also compared with the Harrad and Morris clay samples (Harrad, 2003; Morris, *1980*). This determined that both sets of samples can confirm a local origin for the Hornblende, Hornblende Schist, Mica Schist and Serpentine fabric groups. The clay samples taken by Harrad from Landewednack slides 16 and 17 were extracted roughly 600m south-east of the site (Fig 7:46) (Harrad, 2003, 398-399). Harrad's slides contained the same hornblende, quartz and plagioclase feldspar rock fragments and determined that the clay was derived from a bastite serpentine/hornblende schist parent rock (Harrad, 2003, 398). The clay samples taken by Morris were extracted from the valley bottom below Carngoon Bank that opens out on to Pentreath beach, a drainage ditch near the site and clay deposits outcropping at Church Cove roughly a mile to the east (Morris, *1980*). The samples were targeted to identify the nature of clays produced along the Landewednack hornblende schist and serpentine fault line (Fig 7:47) (Bromley, 1979).

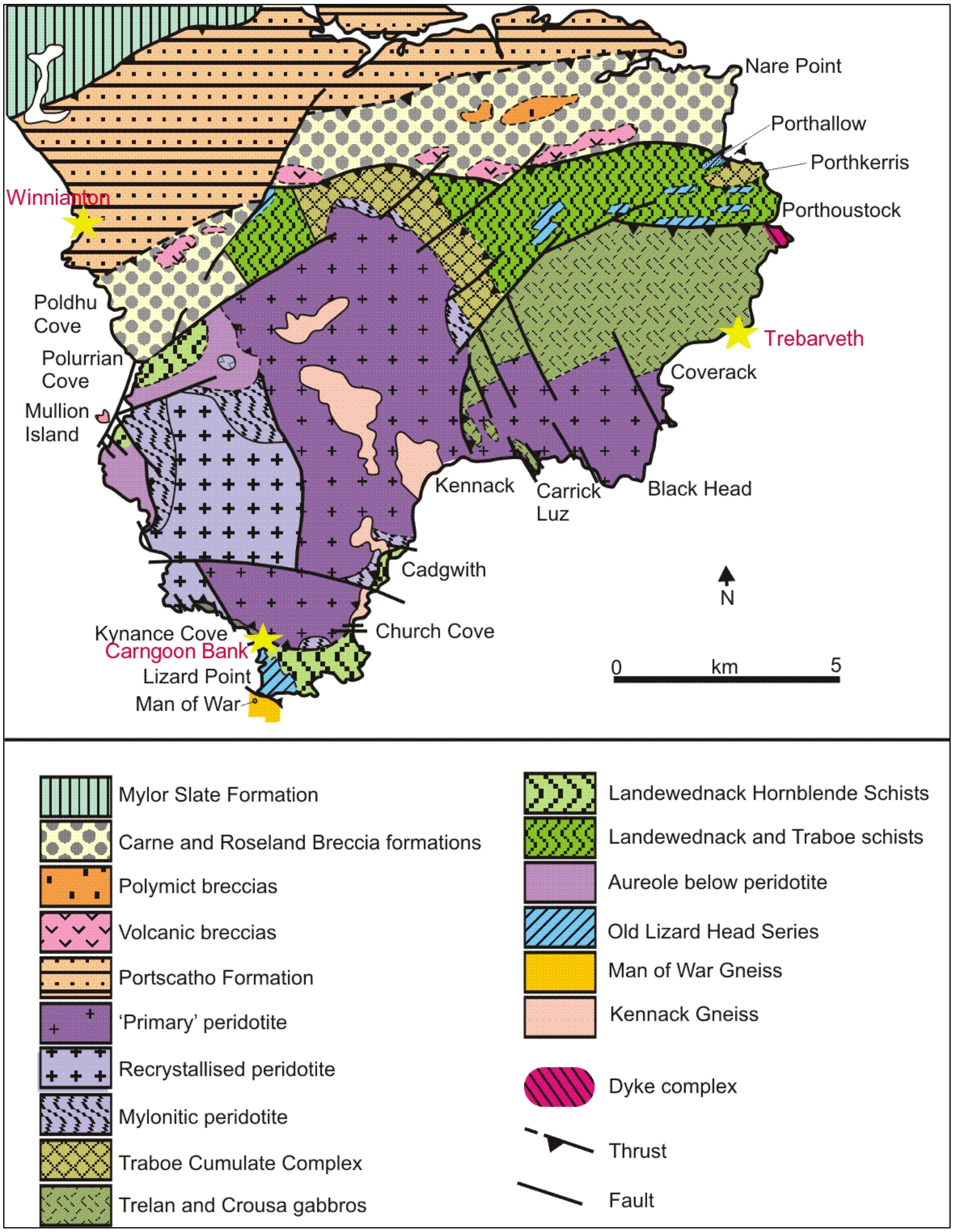


Figure 7:47 Geological Map of the Lizard Peninsula with locations of Trebarveth, Carngoon Bank and Winnianton (After Shail, 2010 forthcoming , Fig 10.4).

The microscopic fabric groups HB and HS from Carngoon Bank match the Morris clay samples from a drainage ditch near the site (slide 1008) and the clay at Church Cove (Fig 7:48) (slide 1012) (Morris, *1980*, *11*). The MS microscopic fabric group matches the Morris clay sample from south Pentreath beach (Fig 7:49) (slide 1011) (Morris, *1980*, *11*).

In addition to this, the Morris samples from the unfired clay mounds (slides 1033-1045) found within the settlement at Carngoon Bank are all from the Church Cove clay source (Morris, *1980*, *12*). This evidence not only confirms the local origin of the clay used, but also that the clay was brought to the site specifically for pottery production (Morris, *1980, 5*). The Serpentine fabric identified also matches a sample by Morris (slide 1010) (Morris, *1980, 12*). The combination of the Harrad and Morris clay sample collections verifies the provenance of the HB, HS, MS and S fabric groups. The HN3 and HN3 Admixture can be assigned to broader mafic samples identified by Harrad, but no specific sample has been matched directly.

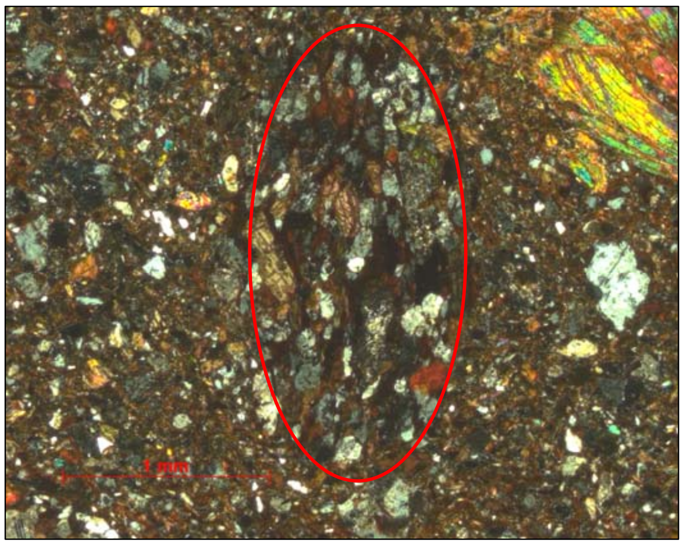


Figure 7:48 Morris clay sample slide 1012, showing a distinctive Hornblende rock fragment (Author's Photomicrograph).

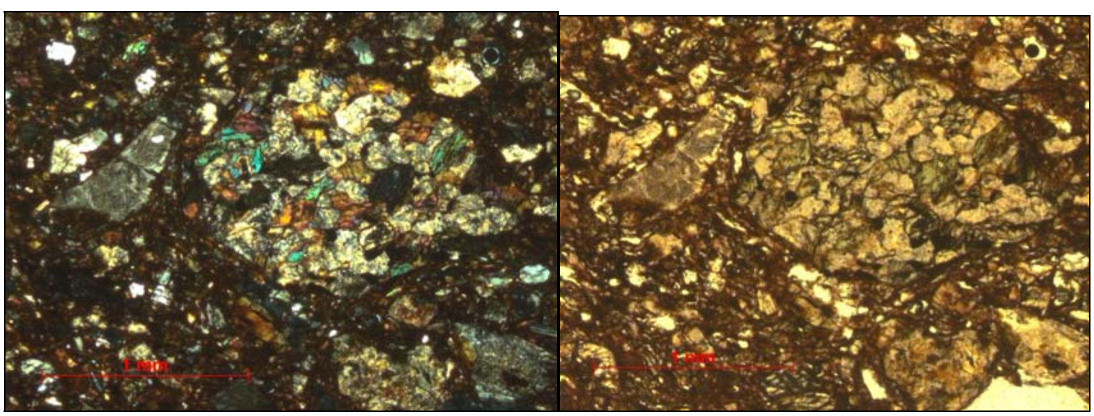


Figure 7:49 Carngoon Bank slide 23 Hornblende rock in under crossed (left) and plane polarised light (right) which highlights the structure of the rock fragment and brow- green hornblende within them (Author's Photomicrograph).

The microscopic results from Winnianton could not be compared to the Harrad and Morris collections because no samples were taken near to the site. The aim of both these clay sampling projects was to understand clays formed of the Lizard Complex geology whose boundary is around two miles south of Winnianton. The site is situated on the Portscatho formation, formerly part of the Gramscatho Beds, which are not part of the Lizard Complex (Fig 7:47) (Shail, 2010 *forthcoming*). Three samples were therefore taken by the author for comparative purposes.

The combination of the complete physical removal from the diverse Lizard Complex geology, and the uniform nature of the Portscatho formation, does provide its own distinctive geological signature. The Portscatho formation is composed of well-bedded mudstones, sandstones and graded sandstone-mudstones containing weathered rhyolite and greywacke minerals such as quartz, feldspars, micas and occasionally amphiboles (Shail, 1992). The nearest igneous rock outcrop is of dolerite to the east of the river and it is possible that the dolerite could provide the pyroxene and amphibole elements to some of the fabrics. The river channel that opens onto beach near Winnianton at Church Cove has extensive alluvium deposits derived solely from the Portscatho formation (Shail *pers. comm.*).

Unfortunately, the three clay samples taken for this study did not provide a comparative mineral assemblage to that of the Mica or Chunky fabrics. The clay outcropping on the beach below the site and the samples taken a mile up the river channel, contained abundant sub-rounded rectilinear pieces of mudstone and sandstone which are not found in the Winnianton samples. It is possible that other alluvial deposits in a river channel two miles to the south or further inland may have been used, but without further clay sampling this cannot be proven. Despite this, the suite of derived minerals from the Portscatho formation offers the most likely source of the clays used in the production of the pottery found at Winnianton.

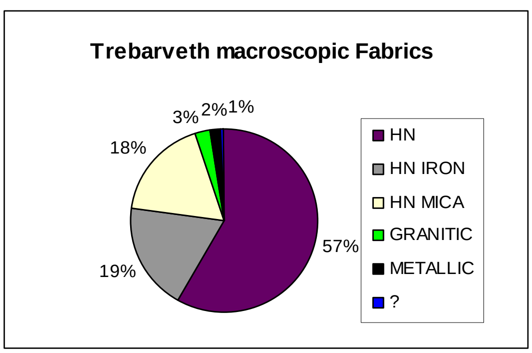
The microscopic fabric groups suggest that there is a correspondence between the geology of the area and the igneous mineral and rock fragments identified. The inclusions identified in the fabric groups Chunky and Mica are seemingly compatible with a rhyolite-derived clay source. The HN2 fabric is most likely derived from a mafic region, although the fabric does not match any of Harrad's clay samples exactly.

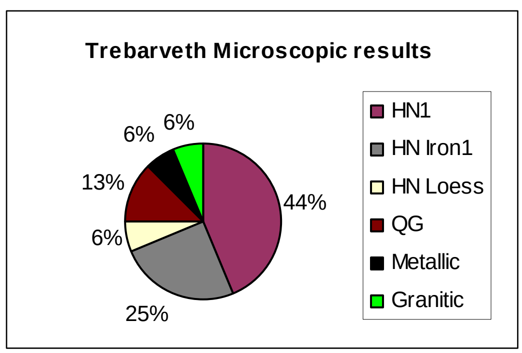
7:14 Conclusion of Results

The conclusion of the combined macroscopic and microscopic analysis suggest that the sourcing and usage of clays on the Lizard Peninsula was diverse and is representative of trends over the chronological range of the three sites. The HN fabric group, present on all three sites, has been identified as gabbroic clay, the use of which appears to decline over time. The conclusions for each site are discussed below.

7:14:1 Trebarveth

It would seem that at Trebarveth the local HN fabric represents the local gabbroic clays, and it was the primary clay used for pottery production on the site. It must also be acknowledged that HN1 Loess is a 'truly' local clay whose source underlyies the settlement site. The graphs below demonstrate that despite the slight differences between the macro and microscopic levels of analysis, the gabbroic clay was dominant (Graphs 7:15 and 7:16). Interestingly, the entire industrial Briquetage assemblage from the site is also made from gabbroic clay (see Graph 3 in Appendix 6).

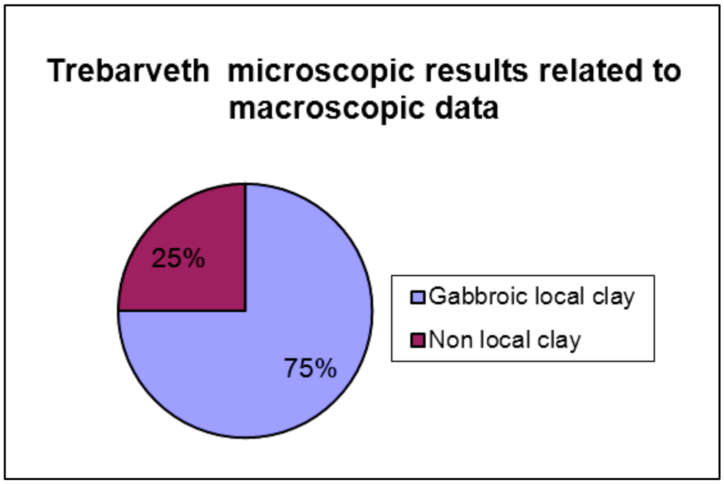




Graph 7:15 and 7:16 showing the macroscopic and microscopic results for Trebarveth.

The graph below relates the results of the microscopic data to the macroscopic results, enabling a more complete overview of the usage of clays at Trebarveth to be gained (Graph

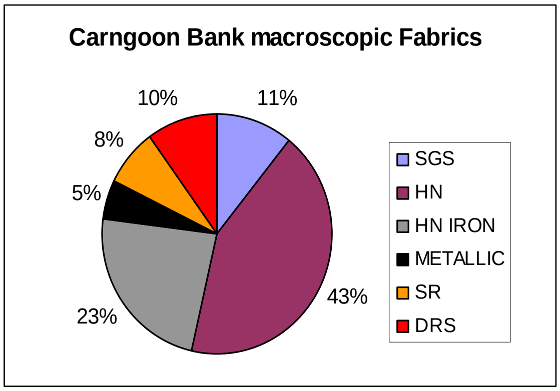
7:17). It mirrors the microscopic results, demonstrating the success of this analysis. The graph presents the combination of the macro- and microscopic results and demonstrates that, as above, the gabbroic local clays are used more than non-local clays.

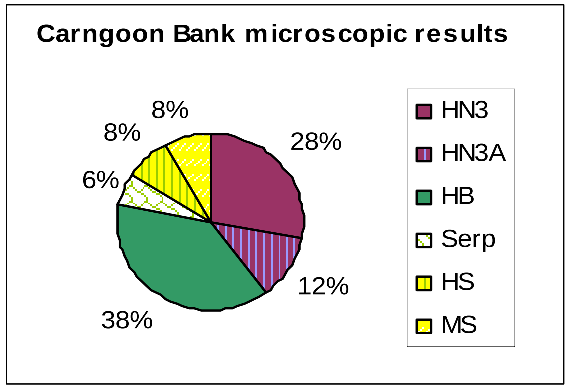


Graph 7:17. Showing the relation of microscopic results to the macroscopic data for Trebarveth.

7:14:2 Carngoon Bank

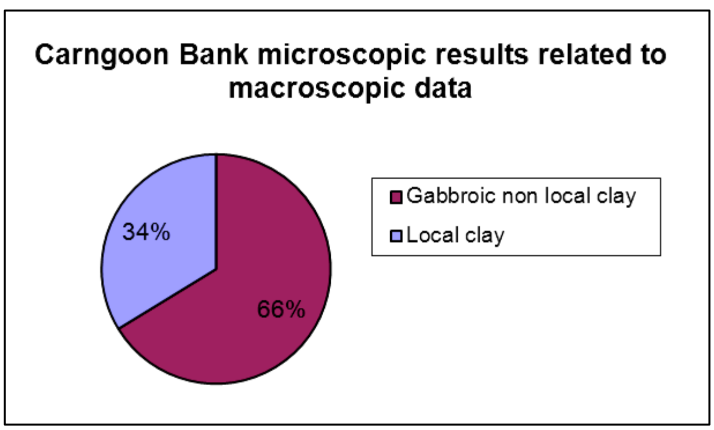
The results from both levels of analysis are divergent, as the macroscopic analysis suggests that HN or gabbroic clay at 66% was used more than local clays at 34% The microscopic analysis clearly shows that local clay at 60% was used more than gabbroic at 40% (Graphs 7:18 and 7:19). The removal of the macroscopic HN Iron fabric and its inclusion into the HN3 and HN3 Admixture fabrics does not alter the data to any great degree. The apparent increase in local clays in the microscopic conclusions is the result of the proportion of samples selected for thin-section. Therefore, the graph of the microscopic results is representative of the proportion of slides analysed and not the large quantities in the total macroscopic analysis. This highlights the importance and success of the representative sampling strategy employed in this methodology, as the size of the SGS sample has enabled the variability of this group to be related which may not have been identified if a smaller sample was taken.





Graphs 7:18 and 7:19. Showing the macroscopic and microscopic results for Carngoon Bank.

The Graph below shows that the HN gabbroic fabric retains its position, whilst the remaining groups, due to their reorientation, can only be shown as one local fabric group. It has related the microscopic data back to the macroscopic results for the entire assemblage and enables a true picture of the usage of different clays on the site (Graph 7:20). This combined data suggests that gabbroic clays were selected over the local clays for domestic pottery production. Interestingly, the industrial Briquetage vessels were made from the local clays and not gabbroic clay as Morris concluded (see Graph 4 in Appendix 6) (Mc.Avoy *et al*., 1980). This suggests that the potters did not transport clay far and were more concerned with practical considerations, whilst the domestic pottery shows a specific selection of non-local gabbroic clay.

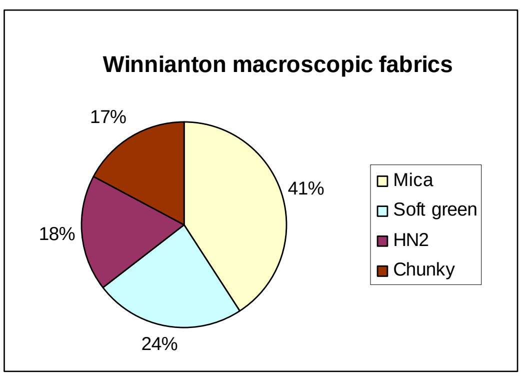


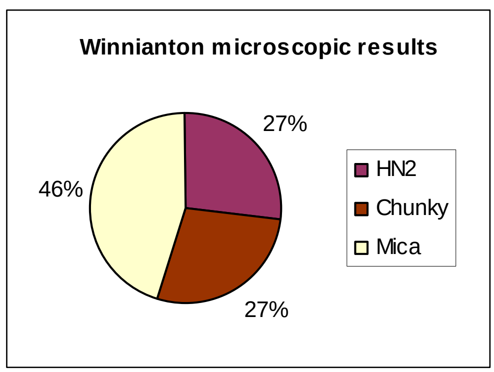
Graph 7:20. Showing the relation of microscopic to the macroscopic data for Carngoon Bank.

The extraction of local clays by the potters for domestic vessels suggests another aspect to the practice of extraction. The differing proportions of hornblende, mica schist and a combination of the two strongly suggest the extraction of clays from differing areas in the same clay source. This suggests that although the clay source was local, the extraction location was not fixed and they utilised the entire alluvial deposit available, the interpretation of this practice will be discussed in the following chapter.

7:14:3 Winnianton

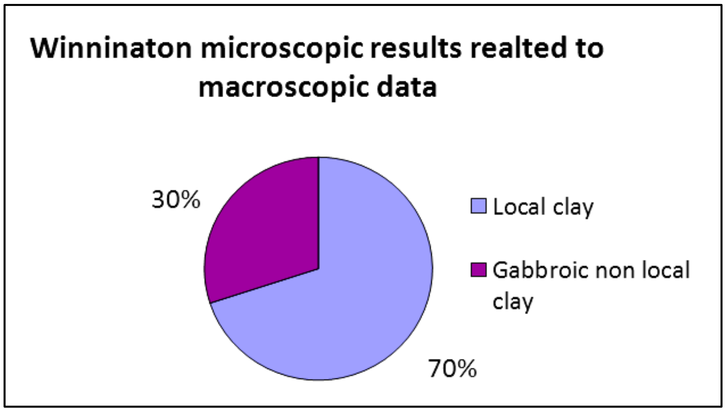
The implications of the microscopic results on the macroscopic fabric ratios are not dramatic and have not altered the original results significantly (Graphs 7:21 and 7:22). The removal of the Soft Green Fabric group has now been equally divided between a local and a non-local clay resulting in a slight increase in both. The data demonstrates that the local igneous clays were utilised significantly more than the gabbroic clays.





Graphs 7:21 and 7:22. Showing the macroscopic and microscopic results for Winnianton.

The graph below relates the microscopic data back to the macroscopic results, which appears to supports the conclusion that local clays were used more often than the non-local gabbroic clay (Graph 7:23).



Graph 7:23. Showing the relation of microscopic results on macroscopic data for Winnianton.

7:15 Conclusion

The aims set out at the beginning of this chapter have been addressed and the results presented. The macroscopic characterisation identified thirteen fabric groups from which seventy-seven samples were taken for thin-section, representing the proportions of each fabric. Unfortunately, not all the macroscopic results could be validated at a microscopic level. The microscopic analysis found that only seven out of the thirteen macroscopic groups could be validated. The microscopic analysis identified a further seven fabric groups as a result of the subdivision, removal and replacement of macroscopic groups. As a result of this, the samples selected, based on the macroscopic fabric proportions, are not representative for all the fabrics analysed. The graphs in section 7:12 demonstrate the result of the redistribution of the macroscopically selected thin-sections samples among the new microscopic fabric ratios. The results of the comparison between the two levels of analysis suggest that the ratio of samples is disproportionate for individual new fabric groups. Therefore, the ratio of fabrics represented by the thin-section samples cannot be directly related to specific macroscopic fabric groups.

However, this has highlighted the importance and success of the representative sampling strategy of this methodology. The proportionate sample of SGS has enabled the variability within this group to be identified, in previous work a non-gabbroic fabric would receive limited sample at the microscopic stage. It is perhaps a cautionary note for analysis that does not include a representative sampling strategy. The microscopic results have proven that not one fabric is seen on more than one site, which contradicts previous work suggesting that gabbroic pottery is uniformly part of one fabric group throughout Cornwall. The diversity of fabric types suggests that gabbroic fabrics are far more variable than previously thought and that admixtures may not all be visible macroscopically, calling into question the gabbroic pottery classification over the past 40 years. It could be suggested that the diversity among gabbroic and local fabric groups confirms that pottery was made on settlement sites and not a single production centre or to a specific regional recipe which in essence supports local production.

The petrological identification of the minerals and rock fragments present in the pottery successfully located most of the clays utilised. This was done through a comparison with the database generated by Morris and Harrad, the known underlying geology and the samples taken by the author near Winnianton. The identification of the HN fabric grouping as gabbroic clay has contributed a vital aspect to the data in relation to the research question. The successful separation of local and non-local clays used in relation to the each site, based on the petrological results, will enable interpretation of the clay-sourcing traditions in action on the Lizard Peninsula from the Romano-British to early medieval period. The implications of this will be discussed in the next chapter.

The successful identification of local and non-local clays has also enabled an important relationship between the macroscopic and microscopic results to be defined, one that is not affected by the diminished representative sampling. The microscopic analysis found that only one sample out of the seventy seven crossed the local to non-local fabric divide, being reassigned from granitic to gabbroic. Therefore, the macroscopic fabric ratios are still representative of the relationship between local to non-local clays used in pottery production on each site. This has revealed that whilst the direct macro-micro fabric relationship has been lost, the more pertinent data relating to the ratio of gabbroic to local fabrics identified on each site is still valid.

The conclusion of the data analysed is that local clays were exploited on each site in differing proportions and that non-local clays are represented in each assemblage. It is clear from the combination of both levels of analysis that the ratio of local to non-local vessels from the site assemblages presents a particular trend which changes over time. The utilisation of the local and non-local clay sources also represents another trend in procurement that relates to the usage of gabbroic clay. The exploitation of local clays on each site suggests that they were suitable for ceramic production. The ratio of gabbro-derived clays used across the three sites suggests that its use declined over time.

The results from the three sites spanning the Romano-British to early medieval period display very different trends in clay sourcing, but are all united in the usage of the enigmatic gabbroic clay. This element of unity provides a unique opportunity to view changes over time and, as the data presented here has demonstrated, the tradition of using gabbroic clay was in decline by the early medieval period. The results and interpretation of this data will be discussed in the next chapter in relation to raw-material spatialisation theory and contextual grounding of this study towards its utilisation in addressing the research objectives outlined in Chapter 1.

Chapter 8: CHANGING THE FABRIC OF SOCIETY?

8:1 Introduction

The structure of the discussion that follows emphasises the bottom-up approach of this study, with its firm foundation in the primary data, reiterating the point that pottery, or more specifically clay, lies at the tangible root of society. This chapter will work its way back through these issues and themes, beginning with an interpretation of the data followed by a discussion of the methodology used to appropriate it.

These interpretations are then related back to the theoretical raw-material spatialisation perspective of this study that have been informed and influenced by the interplay of data and theory. It is only then that we can open up these interpretations to the wider contextual discussion of macro- and micro-sociological models, allowing them to be situated within models concerning the changing structure of society. This model of society can then be compared and contrasted with the accepted view of society in Cornwall between the 4th and 11th centuries, firmly embedding it in the regional and national context of social change and allowing a truly holistic answer to the research question to be formulated. The significance of this interpretation, together with the results, are then discussed and the potential for further research outlined.

8:2 The results of the petrographic analysis

The ceramic evidence, as laid out in Chapter 7, demonstrates that the use-ratio of locally to non-locally sourced clays changes at some point between the 4th and 11th centuries at the three study sites on the Lizard Peninsula in Cornwall. The diachronic changes observed in the ceramic fabrics identified may seem incidental, but as will be discussed, put in the context of the end of a 5000 year old tradition it assumes far greater social significance.

8:2:1 Trebarveth

At the beginning of this chronological sequence, the fabric of the pottery at Trebarveth shows that gabbroic clay was used for the majority of the ceramics produced. Gabbroic clay is found within 1km of this 2nd-5th century settlement and is thus a *local* clay source, but the presence of loess in one of the gabbroic fabrics identified (slide 59), indicates that the definitive Romano-British clay source at Zoar identified by Harrad as being typical was not the only clay source used. It demonstrates that despite being on top of the regional gabbroic clay source, clays found on or near the settlement site were being extracted making them truly local clays perhaps representing the on average 5% of fabrics in assemblages of this period found in Cornwall that are not Gabbroic (Chapter 7:14:1). Further petrographic analysis would be required to establish the extent to which these truly local loessic-gabbroic clays were used on this site, as macroscopic analysis alone cannot distinguish loessic from non-loessic gabbroic fabrics. Harrard (2003, 167) concluded that the loessic-gabbroic clay from lowland point, above which Trebarveth was situated, was suitable for potting, but the same clay was not found in the Bronze Age or Late Iron Age pottery analysed during her study. Further work, beyond the remit of this study, on the briquetage assemblage would also be invaluable, as briquetage clay is typically sourced at the site of salt production. The location of Trebarveth in the gabbroic clay-source area is methodologically problematic, particularly in terms of making a distinction between *local* and *non-local*, but the availability of on-site loessic-gabbroic clay, and its limited presence in the samples, indicates that an off-site gabbroic clay source was preferentially selected. The origin of the Granitic and Garnet pottery fabrics identified is unresolved, their presence must indicate individual vessels brought on to the site from elsewhere. The composition of the clays would not preclude a Cornish source.

The point to emphasis is that the demand for very local clays, even at a site on the gabbro itself, was overshadowed by the use of the non-loessic gabbroic clays that have been identified in Romano-British pottery assemblages across Cornwall. The source of *that* material, according to Harrad (2003, 285), is at Zoar on the Crousa Downs some three miles to the east of Trebarveth (see Chapter 6:2).

8:2:2 Carngoon Bank

Compared to Trebarveth, the later 4th-7th century settlement at Carngoon Bank demonstrates that there had been some change in the use-ratio of gabbroic to local clays.

The data demonstrates that the potters at Carngoon Bank still chose to use gabbroic clay for the majority of their domestic wares, but over 25% of the pottery was now being made from local hornblende, serpentinite and schist-derived clays. The macroscopic analysis of the associated briquetage assemblage shows the majority of this material was also made of local clays and not gabbroic clay. It seems probable that local clays were extracted at multiple locations from the nearby alluvial deposits below the site that Morris identified through clay sampling (Morris, *1980*). Local clays could have been selected for practical utility, with gabbroic clays invested with a greater significance and preferentially selected for domestic vessels. The choice may come down to a technological preference related to the differing form and function of domestic pottery and briquetage. Yet it is reasonable to assume that a clay intended for long periods of boiling and reducing sea water to salt blocks was technically capable of performing a similar role in a domestic context. Equally, one could suggest that the occupants of Structure [63] procured gabbroic vessels or clay separately, perhaps because they were only skilled enough to make briquetage or that there was a more specific social practice relating to the usage of gabbroic clay.

8:2:3 Winnianton

Further up the coast and somewhat later in date, the ceramics at the 7th-11th century early medieval settlement at Winnianton demonstrates a significant decrease in the use of gabbroic clay. The evidence suggests that potters at Winnianton preferred non-gabbroic clays, and when gabbroic clays were used they were generally mixed with local clays. This suggests a very different set of circumstances to that of Trebarveth and Carngoon Bank, intimating that a major shift in ceramic traditions had taken place. The validity of such a comparison could be called into question because of the dramatic changes in ceramic forms seen in the 8th-century (see Chapter 4), but as the same forming techniques and firing methods were used at all three sites the strength of this counter argument is diminished. The preferential selection of local igneous-derived clays over gabbroic clays indicates that a more insular practice of selection and extraction now predominated. This in turn suggests that there had been a change in clay-sourcing practice or that the sourcing gabbroic clay had become more difficult. The varying proportion of gabbroic clay in mixed fabrics has variously been explained as the result of natural variation in the clay source, accidental admixture, the deliberate inclusion of materials for non-technical reasons and even clay rationing, suggesting that the source itself had begun to run dry (see Chapter 6). All of these are valid hypotheses, but testing these hypotheses required an appropriate methodology to be devised to investigate them.

8:3 Methodology

The methodology employed in this study sets out to challenge and expose the underlying assumptions of previous research and explore new avenues of inquiry by investigating clay-sourcing practices for production through compositional fabric analysis. The results of this work have proven that the answers lie in the detail of the often overlooked petrographic addenda of pottery reports. The development and detail of Peacock's *Gabbroic Model* reflects both his training as a geologist, and the era of archaeology into which it was born. Harrad also took a scientific archaeometric approach to the data, and came to the similar conclusions that processual archaeologies traditionally produce (2003). This is not to say that processual methodologies are wrong or flawed, only that the interpretive scope is limited, with an over-emphasis on data collection at the expense more subjective, post-processual perspectives. This study combines the rigorous techniques and sampling strategies of processual archaeologies with the theoretical interpretive scope of post-processual archaeologies. Peacock's identification of gabbroic clay in the 1960s gave birth to a research 'tradition' rather than pose a research question, and this tradition has survived for over 50 years. The preference for gabbroic clay that he identified has dominated discussion, but interpretation has rarely progressed beyond Peacock's original conclusion that the clay was utilised on account of its technical superiority. This has undoubtedly stifled innovation in the use of that body of data. That the ceramic evidence could be used to answer other questions, such as its selection in relation to a social preference or significance, has barely been mooted. Such issues were largely avoided by previous methodologies, which often struggled to bridge the gap between physical properties and theoretical concepts, if indeed they addressed the struggle at all. It has been the goal of this study to use the data as a means of answering research questions from a bottom-up social perspective, and not merely restrict the results to data processing.

The absence of an adequate methodology in the past has *led* data collection in both commercial and academic spheres for much of the past 50 years, supporting, and not challenging Peacock's original conclusions. The resulting inherent bias in the petrographic data collected over this period therefore represents the outcome of a research question based on tradition, one that has largely excluded non-gabbroic clays. The arbitrary microscopic sampling strategy employed in the region concerning gabbroic pottery, assumed that a macroscopic identification of gabbroic fabrics was adequate, due to its distinctive appearance, and has resulted in sample sizes being smaller than needed.

This study has demonstrated the benefits of a representative sampling strategy which has concluded that traditionally termed gabbroic fabrics varied between sites and that the fabrics were unique to each settlement. The microscopic results have proven that not one fabric is seen on more than one site, which contradicts previous work suggesting that gabbroic pottery is uniformly part of one fabric group throughout Cornwall. The diversity of fabric types suggests that gabbroic fabrics are far more variable than previously thought and that admixtures may not all be visible macroscopically. These site specific gabbroic fabrics would have been classified under a general gabbroic clay fabric group if not for this strategy and detailed petrographic analysis, perhaps calling into question the validity of the analysis of gabbroic assemblages throughout Cornwall. This study has contributed a more nuanced approach to site-specific fabrics providing a different understanding of the local/nonlocal continuum compared to previous studies that have been overly focused on clay sourcing. As with many regions in England, Cornwall has suffered from the absence of a defined and frequently updated ceramic research design, something which the author is now tackling in collaboration with the Medieval Pottery Research Group (Boyle, 2011). This analysis has opened up the data from previous studies to scrutiny by addressing these underlying assumptions and using the data to explore different questions.

8:4 Challenging the Gabbroic model

Crucially, this challenge to Peacock's gabbroic model has important implications beyond Cornish archaeology, because his model has been applied wholesale to explain similar clay-sourcing practices identified elsewhere. The unique signatures of the Charnwood clay source in Leicestershire, and the Granodiorite temper source in the East Midlands, demonstrate that some other specific clays and tempers could achieve a regional distribution (see Chapter 6:5). Partly as a result of the *Gabbroic Model*, together with a general reluctance within ceramic studies to challenge it, the scope of these English studies has not yet developed beyond a question of distribution established through petrological analysis and arguments about technological superiority. Things are, however, beginning to change: for example Blinkhorn has suggested the distribution of Charnwood pottery is more likely to be linked to social significance related to Anglo-Saxon burial traditions and kinship networks (Blinkhorn, 1997) (Blinkhorn *pers. comm*.). This study has gone beyond the traditional question of distribution and trade so typical of these early medieval petrographic analyses towards a bottom-up social perspective.

8:4:1 Technical Superiority

The technical superiority of gabbroic clay has to be questioned and reassessed, as this seems to have been the main, usually only, interpretation of its use. The question of technical superiority has been addressed in the past but has never been incorporated into general discussions. An early investigation into its technological properties was carried out by Coleman-Smith in 1971 as part of an experiment into the bonfire firing techniques (1971). After using a range of clays he concluded that gabbroic clay was “the most suitable for the variable temperature and thermal shock likely to be experienced by bonfire-fired ware” the reason for which was never defined scientifically (Coleman-Smith, 1971, 7). Quinnell (1987, 12) has suggested that further detailed experiments are needed to establish whether the thermal shock properties of gabbroic vessels could also withstand cooking on an open fire.

Harrad (2003, 40) points out that most of the Prehistoric pottery found is low-fired and consequentially soft and friable, suggesting that high temperatures were not a great concern in their performance. Harrad’s (2003, 41) own experiments with clay from Lowland Point, near Trebarveth, established its heat threshold and found that it performed well at firing temps up to 1050ºc. These results did also demonstrate that gabbroic clays do not hold any technological advantage over other Lizard clays (Harrad, 2004) or the abundant granitic-derived clays which are widely available and easily accessible throughout Cornwall. It is indeed ironic that her scientific analysis has legitimised the suggestion that gabbroic clay is no better than any other clay in Cornwall, essentially contradicting the conclusion of her own thesis. Further work is clearly required: the analysis of physical properties by rigorous scientific testing is, after all, the one thing processual archaeological methodologies are best suited for.

8:4:2 The rise of the wheel

The pro-technical argument also includes other hypotheses, such as the suggestion that the demise of gabbroic clay usage was due to the growing use of the wheel and that the clay may not have been suitable for this means of production for some reason (Harrad, 2003, Thorpe *pers. com*). However, examples of wheel-made or wheel-turned gabbroic vessels have been found on a few sites, such as Carngoon Bank (Mc. Avoy *et al*., 1980), and the larger inclusions, as with other clays, could readily be removed to produce a finer, more malleable material. In addition, the production of wheel-thrown or wheel-turned pottery did not become widespread in Cornwall until post-1066 Norman pottery forms were introduced; before this the vast majority of pottery was hand-made, making a production-related decline improbable.

8:4:3 Usage

Yet another hypothesis relates to usage, that gabbroic vessels were used as containers for transporting goods such as salt (Harrad, 2004; Lane and Morris, 2001). Vessels designed for the transport of goods can generally be identified by their form and weight, which are good indicators of its distribution potential and use. It is generally thought that an unrestricted orifice indicates frequent access synonymous with storage or cooking, whilst a restricted orifice is indicative of transportation (Rice, 2005, 241). Amphora are a good example of vessels that have been designed with transportation as a primary consideration, with a narrow neck and opening (Peacock, 1986). In contrast, gabbroic pottery of all periods displays a range of forms, with no single form that could be associated with use as container dominating the group. The Bar-lug and Grass-marked vessels under investigation in this research are straight-sided cooking pots and slightly lipped platters (Thomas, 1960). The Briquetage forms found at Carngoon Bank and Trebarveth are not thought to have been used as containers for the transportation of salt (Mc.Avoy *et al.*, 1980, 52), as their weight and rectangular form would make them difficult to transport (Lane and Morris, 2001; Mc.Avoy *et al.*, 1980, 52). In addition, as most salt production sites have produced piles of freshly-broken fragments, it seems likely that the Briquetage vessels were broken on site to extract their contents. The contention that gabbroic vessels were containers for regionally-specific products is therefore difficult to support, and what possible benefit could there be to using clay of a specific type? The fact that gabbroic clay is not technically superior to granitic or other clays, together with the fact that it seems unlikely it was ever used as a container for transportation, reinforces the contention that a social motivation lies behind its choice as a raw-material.

The data from this study brings into focus the importance of the non-gabbroic clays which have been noted in the past but usually overshadowed by the quest to establish the continuing importance of gabbroic clay. Ironically, the use of non-gabbroic clays can tell us far more, which is something Parker-Pearson unknowingly highlighted (see Chapter 6:4:1). Interestingly, he also suggested that the mixing of gabbroic and local clays could relate to themes of regional identity and/or land ownership and allotment (Parker-Pearson, 1990). This strongly non-technical explanation confirms the validity of exploring a social context rather than a technical property.

This new interpretive direction, moving away from Peacock's *Gabbroic Model*, resonates with the other work introduced in Chapter 2 concerning the social significance and role of raw materials in society, such as Moore's Malvern stone (2007), Lazzari's obsidian (2010)and Bradley's Langdale stone (2000) (see Chapter 2).

8:5 Theoretical perspective

The materiality and affordances of pottery are well known and established in archaeological discussion, but clay is often seen as a passive element simply attributed technological properties and economic value, only gaining importance when formed into a pot. Lazzari (2010) and Moore (2007) (Chapter 2:9) have suggested raw materials can have their own materiality and meaning beyond their traditional affordances. Clay is one such raw material, and when viewed a raw-material spatialisation perspective we can realise its potential to challenge more traditional top-down social models. The results of this study suggest that gabbroic clay should be viewed as performing a particular role(s) in society as a *social resource*.

Gabbroic clay could enable people to transcend their everyday temporal context and experiences in the world and the past life-world, by using the clay as an indicator of the social knowledge stock representing society or a belief system for which there was no other indicator or symbol. Evidence of this can be seen in its utilisation since Prehistory to reify and maintain a shared reality of the region that can be manifested in physical form. This would reinforce Parker-Pearson's hypothesis that the mixing of local and gabbroic clay may have been a conscious act of consolidating the everyday local and distant regional life-worlds. This could be interpreted as the potters actively constructing their social identity in which an understanding of the distant/hidden life-world and the everyday life-world exists, producing not only pots but reality. Thus the production of pottery using gabbroic clay becomes a socially significant performance integral to the maintenance of society. The use of the gabbroic clay, either as an admixture or in its pure form, may have reminded people of their shared regional macro-network within the socialised landscape of Cornwall. Therefore, the importance of gabbroic clay was based on its social value, not its technical affordance. It was the social properties of the clay that were important, not its thermal shock capacity, as originally proposed by Peacock.

The physical isolation of the clay source on the Lizard Peninsula may have made its acquisition and distribution difficult. This builds on the overarching question of choice, because it adds a significant logistical challenge and a very real obstacle to its extraction and transportation which has never been fully explored. In most ethnographic studies, the mode of raw material distribution is determined by factors of time and effort, which could include a division of labour, or gender, involving one individual or many. The Niger potters, discussed in Chapter 2 clearly saw the extraction of clay as a symbolic and spiritually informed process that required specific groups to be excluded and specific practices to be carried out. Only when this had been achieved was the clay then free to be circulated and used (Chapter 2:7:2). At the very least the people that extracted the gabbroic clay would need to know where to dig and how to extract the clay, and this suggests that either clay extraction was commonly practiced, perhaps throughout Cornwall, or that it was delegated to a specific informed group. This level of knowledge would have to be passed on through the generations, which over the millennia may have imbued the location of the gabbroic clays with a paramount importance in the socialised landscape. The source of gabbroic clay would then have become a node in the socialised landscape, linking people with a place where the origin of traditions and kinship were physically expressed and open to personal experience.

The principles of the life-world, as outlined in Chapter 2, have been used to develop a model specific to the role possible of gabbroic clays in Cornish society using the data collected (Chapter 7). This 'circle of reality' has been developed during the process of this study to show the interconnectivity of socialised people, raw materials and the networks inherent to any society.

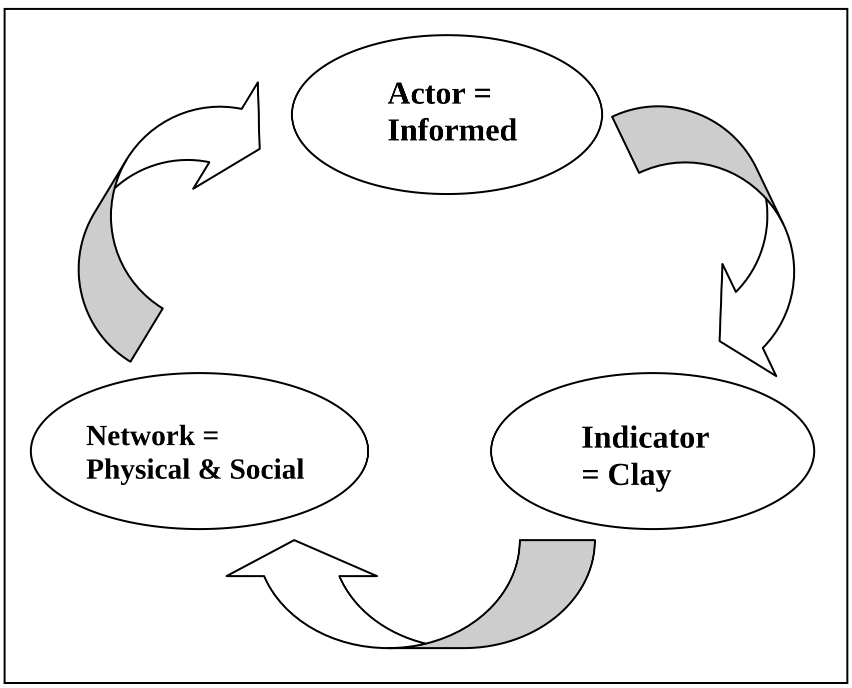


Figure 8:1. The Circle of Reality (Author's illustration).

8:5:1 The Circle of Reality

The circle of reality is made of three elements. The *actor* is an informed member of a reality created and maintained by the society in which s/he exists. The *indicator* is the clay source which forms a vital tool in the construction and maintenance of a life-world reality, as outlined in Chapter 2:8:2. The *networks* are composed of the macro-regional and micro-local levels which are physically manifested by the movement of people within the socialised landscape, possibly for trade and exchange (see Chapter 2:11). The *networks* are also social, involving communication to reinforce and maintain regional kinship bonds and an awareness of the world outside the everyday.

This structure is important, as the creation of reality is a self-perpetuating circle with each element relying on the other. If one is removed, the mechanism for maintaining society collapses (Fig 8:1) (Chapter 2:8). The implications of this are significant. If the macro-network collapses, the informed actor cannot circulate the indicator (the gabbroic clay) into the everyday micro-network to produce a tangible object (a pot) reinforcing their social reality. It is arguable that without a tangible representation of a shared social reality, that reality becomes hard to maintain through oral tradition or shared historical knowledge alone. For example, the survival of the oral traditions of the Australian Aborigines required a physical journey to be made to those places in the landscape that helped reinforce their shared social reality or 'The Dreaming' (see Chapter 2:8:3). If access to those places was restricted or cut off entirely, their importance began to dwindle as each generation of oral dissemination finds it harder to reinforce their reality without physical evidence which can be experienced by the next generation. As is made clear by the *circle of reality*, it becomes apparent that the removal of one indicator could have much the same effect.

The ability of clay to embody social significance and meaning is supported by ethnographic research (see Chapter 2:7), which demonstrates that it can exert political power within a society and even have a role in belief structures. Gosselain and Livingstone-Smith (2005) revealed clay-sourcing can be related to rituals and taboos, and Neupert (2000) has shown that the social power of clay is open to manipulation in the appropriation of political power. The control of raw material sources to gain power over a society is nothing new in archaeology, but this practice is typically equated with *economic* rather than *social* value. The intangible *social* importance of gabbroic clay certainly suggests a culturally constructed value which could represent part of a belief system or social tradition, and this could in turn make the physical control or access to gabbroic clay of great importance.

Removing or controlling an economic resource or raw material in circulation is one thing, but the ability to manipulate a society's beliefs and traditions is far more powerful.

This practice of manipulation, leading to social and political control, has been used frequently in the past and more recently in the colonial oppression of native peoples (Chapter 2:8:1). As already discussed, the re-categorisation by Western society of socially significant pieces of material culture as 'fetishistic' objects, that is, to impose our Cartesian view of the world on others, is a powerful tool in undermining the structure of society especially when concerning belief systems. The selection of a single clay source and its use over millennia certainly fulfils the definition of a ritual act, and if we identify this act(s) with the physical manifestation of a shared reality through the production of pottery, gabbroic clay certainly represents a *totemic material*. Gabbroic clay must therefore embody a belief system or tradition based on kinship, real or attributed, perhaps representing a regional tradition that, over time, fostered and maintained a social identity through its role in society. It is this interpretation that allows us to make new observations about the research question at the heart of this study: how then does gabbroic clay relate to social change in Cornwall from the 4th to 11th century?

8:6 Merging pots and people

To answer that question we must first identify and explore the role gabbroic clay played within the social system or structure through the archaeological evidence. This has been achieved through the use of micro and macro socio-technical models of social and physical networks, as outlined in Chapter 2:11. Networks in society represent the integration of several levels of cultural complexity which are routinely practiced by organised societies to enable the movement of goods and ideas (Cicourel, 1981). The archaeological evidence demonstrates that pottery containing gabbroic clay is found throughout the region, strongly suggesting the existence of a mechanism for trade and/or exchange (see Chapter 4). The presence of unfired gabbroic clay excavated at Gwithian, and the failure to discover any production sites at or near the clay source, suggests that is was the clay rather then the pottery that was moved (see Chapter 6:4:2). The data has demonstrated that ceramic fabrics were specific to each of the three research sites, suggesting a practice of mixing of local and gabbroic clays. Using the mechanics of macro and micro networks, a possible model for the social structure(s) in operation can be depicted in the diagram below (Fig 8:2).

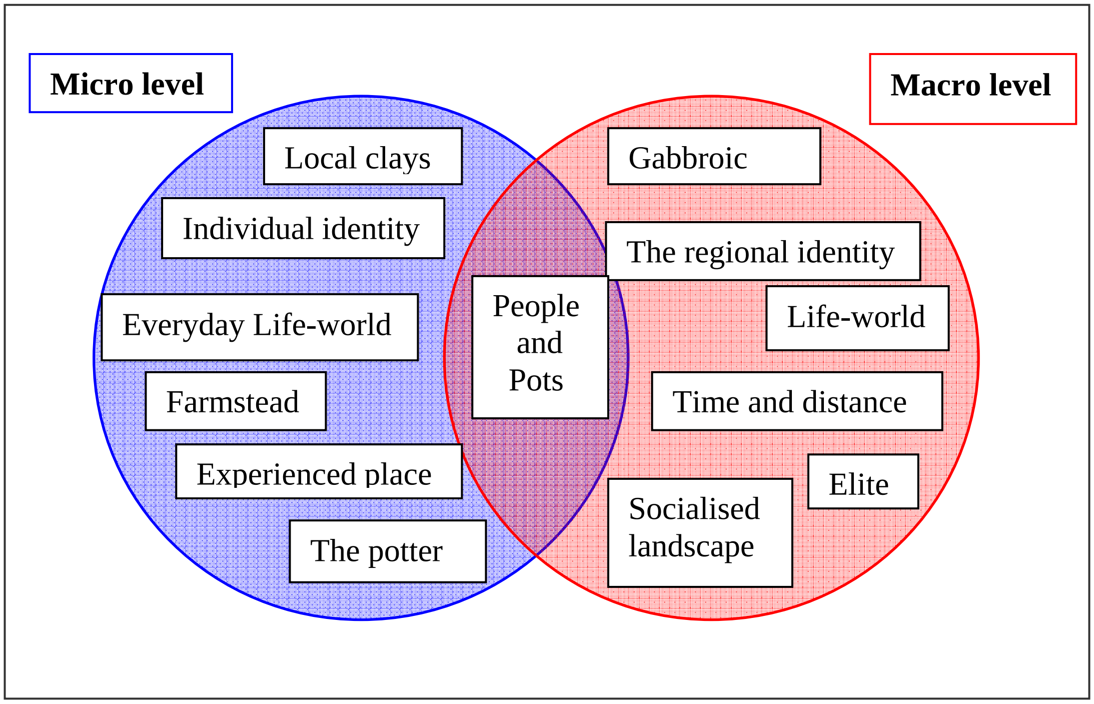


Figure 8:2. Model of society with balanced Macro and Micro level networks or sphere of interaction (Author's illustration).

When in balance these levels represent a society where neither holds a position of dominance over the other. This is, of course, rare in most organised societies as hierarchies and social identity are often maintained at a regional level, making micro-level networks vital but subordinate. It is more common for one level to dominate over the other, periodically representing the compromise of the social structure and thus change. This, then, is the proposed model of society: macro-level networks of regional interaction maintain a shared society reality with micro-level networks representing the everyday experienced life of the individual. Thus it is possible to comment on social change in relation to the data.

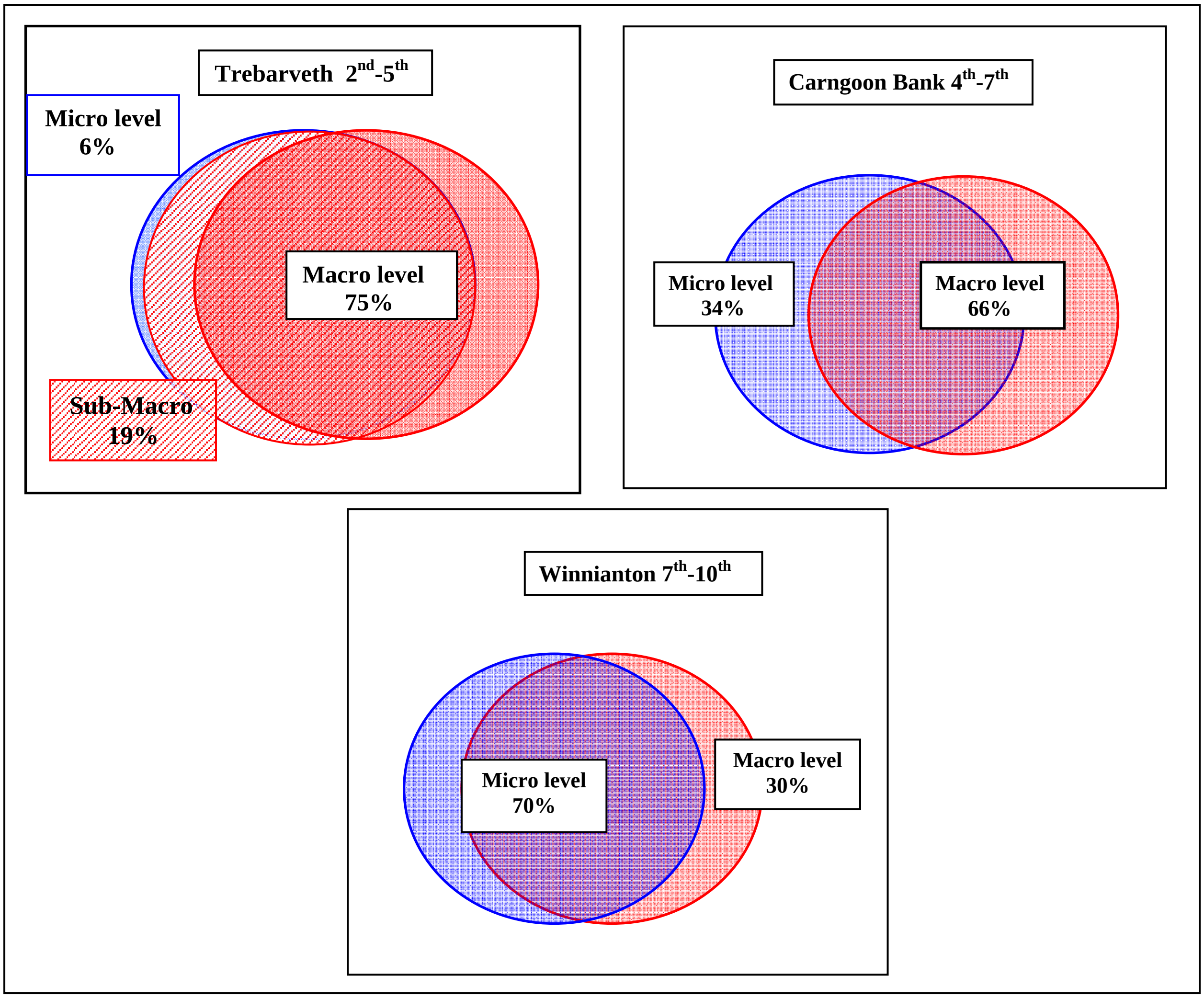


Figure 8:3. Models of social structure for each site showing how macro (red) and micro (blue) eclipse each other (Author's illustrations).

Figure 8:3 shows the fabric ratio of local-micro to gabbroic-macro clays for the three study sites, using the percentage values of the fabric groups as determined in Chapter 7. These ratios, mapped over the three research sites, presents a method of modelling society over the chronological period in question.

8:6:1 Trebarveth

The first site in the chronology is Trebarveth. This has the most complex, and interesting, set of results, as a distinction must be drawn between the local gabbroic and local loessic-gabbroic clay. The gabbroic clay, represented in 75% of the samples, has been assigned to the macro-level clay identified by Harrad; the loessic-gabbroic clay represents the on-site micro-level of society with 6%, and the non-local clays represented at sub-macro-level with 19%. As the source of the non-gabbroic sub-macro clays is unknown, it is difficult to interpret their relationship to the micro- and macro-levels in this model and thus they remain an enigmatic anomaly. The proportion of gabbroic clay in the samples is representative of data from other Romano-British assemblages in Cornwall (see Chapter 6:4:2). The quantity and distribution of gabbroic clay across the region could thus be interpreted as a stable trade-and-exchange network, by extension representing a stable social structure and economy. Therefore, gabbroic macro-level kinship networks indicate social stability within the region. The interpretation of the Trebarveth model suggests that the macro-level overshadows the micro-level of society at this site.

8:6:2 Carngoon Bank

The picture presented by the data from Carngoon Bank is easier to interpret as there are two clear levels, with the macro-level gabbroic clay represented by over two thirds of the pottery sampled. This suggests that the macro-level of society was dominant over the micro-level, once again emphasising the strength of a regional identity. However, it also demonstrates that there had been a 28% increase in the micro-level, and by extension possible local/individual identity, which is a significant increase on Romano-British Trebarveth. This may indicate significant social changes were occurring. The interpretation of these results would suggest that although a shift or change in levels/society was taking place, the macro-level regional identity continued to be dominant.

8:6:3 Winnianton

A few of centuries later, a significant change in pottery fabrics is evident at Winnianton, with local clays represented in 70% of the samples. The micro-level of society had clearly begun to overtake the long-established macro-level. This is a 36% increase on Carngoon Bank, and more importantly a 64% increase on Trebarveth. The proximity of this site to the gabbroic clay source makes its graduated decline of great interest as pottery of the same period from Mawgan Porth (Bruce-Mitford, 1997) is entirely igneous-derived with no trace of gabbroic clays, as indeed is the possible post-Conquest Trelissick example (see Chapter

4:5:6). In contrast, the pottery from Truro and Launceston castle seems to be a mixture of local and gabbroic clays (see Chapter 4:5:6). These other examples cannot provide proof positive of a county-wide fabric shift, but it does at least suggest Winnianton is representative.

While this variation makes generalisation difficult, it does at least indicate differing clay-sourcing strategies, particular to each settlement, were now in force. This could be interpreted as the rise of micro-networks and local identity at a settlement level, indicating the absence or decline of a regional macro identity and kinship network at this time. The dominance of the micro-level at Winnianton represents a reversal of the Trebarveth macro-model, suggesting that the social and economic network supporting the distribution of gabbroic clays was breaking down throughout the region.

This view of social change is only visible through the ceramic record as there are very few forms of contemporary material culture available across this period for comparison within Cornwall and the South West in general. Metal work, faunal remains, stone work and glass are limited in the South West due to poor preservation conditions or their general absences in the archaeological record. In the east of England items such as weaponry and brooches (Hines 1997) have been used to look at social change, but these are characteristically from high status groups and limited to specific regions or imported from the continent. This range of material culture could be interpreted as unrepresentative of the entire population making its applicability in representing mirco and macro spheres problematic. Whilst admittedly limited in scope for other forms of material culture in the South West, pottery is a universal form of material culture that operates at all levels of society and on the three study sites perhaps provides evidence for social change.

8:6:4 Summary

The evidence from these three sites suggests that there was a decline in the use of gabbroic clay over the chronological range of this study. Trebarveth represents the strong regional identity and macro-level kinship networks operating in the Romano-British period, a regional identity which can be seen to be decaying at the post-Roman settlement at

Carngoon Bank and was finally overtaken at Winnianton by more local networks. As discussed, such a decline is not unprecedented, but in those earlier examples the social significance of the gabbroic clays reasserted itself. In the early medieval period gabbroic clay usage on the Lizard Peninsula did not recover, and it ceased to be utilised as a primary clay source.

8:6:5 A working hypothesis

A working hypothesis, based on the interpretation presented above, is that a strong macro-regional trade-and-exchange network existed in the Romano-British period, and this represents social and economic stability based on kinship networks that were maintained through the consumption of gabbroic clay. It is clear that by the early medieval period, people were far more reliant on local micro-networks, indicating that the earlier regional networks had collapsed, or that a choice had been made *not* to express kinship relationships through the medium of the totemic gabbroic clay. However, this is working hypothesis based on an analysis of the data in conjunction with a theoretical approach and ethnographic analogies, and it must be situated in the thematic and chronological context of Cornwall to validate this discussion.

8:7 Change in context

The end of the Romano-British period and the transition to the early Middle Ages is synonymous with change, witnessing: the end of Roman Britannia; the coming of the Anglo-Saxons; the formation of the English Kingdoms; and conquest by the Normans (see Chapter 1:5:3). Discussion often boils down to the how and the why of social change and more importantly evidence for it. The archaeological evidence in Cornwall supports *change*, but the how and why are still very much hypothetical.

8:7:1 The 4^th^-6^th^ centuries AD

The archaeological evidence for the Romano-British period in Cornwall suggests that life continued much as it had done during the Late Iron Age. Society was almost wholly rural and composed of extended family groups living in enclosed rounds dispersed across the upland landscape, practicing a mixture of arable and pastoral farming whilst producing their own pottery and metals and occasional purchasing amphora and exotic goods (see Chapter 3:4:7). There is little trace of the centralised control mechanisms as seen elsewhere in Roman Britain in the form of towns and roads. The presence of amphora and other items of Roman material culture demonstrate that the population had access to Roman goods but had little interest in cultural convergence (see Chapter 3:4:5). The residents of Trebarveth expanded on the typical subsistence package by producing salt for export, possibly to be traded for exotic goods such as African Red-slip ware. Other settlements may have produced tin and copper. This all suggests that a strong native social structure and economy survived and prospered during the Romano-British period, which we can equate to a typical macro-level network model as seen at Trebarveth.

The dramatic change in settlement patterns in Cornwall in the 5th century, with the abandonment of courtyard houses in the far west of the county followed by the rounds across the region a century later (see Chapter 3:4), is *not* reflected in pottery production or consumption. It has been suggested that the new Grass-marked platters are contemporary with this shift as they have been found in the abandonment phases at Penhale Round amongst others, and on the new settlement forms that appear (see Chapter 4:3:9). The Grass-marked platters are the only forms to stay the same over this period as all Romano-British forms die out. Carngoon Bank is representative of this transitional era as it has produced both the Grass-marked platters and imported 5th- 6th-century amphora, and was abandoned in the late 7th century. The increased incidence of local clays in pottery fabrics could be interpreted as evidence for the beginning of a shift in ceramic traditions at this time, and witness to the decline of the strong Romano-British macro-networks.

8:7:2 The 7th-9th centuries AD

It would seem that society in Cornwall was affected by the wider social changes felt in Britain and beyond, but contrary to the rest of Britain it did not abandon its pottery tradition. The 7th century saw the beginning of an entirely new range of pottery unique to Cornwall, comprised of Bar-lug cauldrons along with Grass-marked platters and cooking pots. The function of these vessels seems similar to those of the Anglo-Saxon east, and are assumed to reflect a diet of stew or gruel. The unique form of this Cornish material suggests it did, however, develop in isolation, with an evolution of existing native wares using gabbroic clay towards a more defined function, different in style if not function from the more Germanic material that gradually travelled westward into Wessex but no further. This may well reflect Cornwall's physical and cultural isolation from the rest of the South West, and note in this context the apparently aceramic buffer-zone of Devon, which, from the 5th to 10th century, has produced no evidence of an indigenous pottery tradition (see Chapter 4).

Chapter 4 challenges the established assumption that the post-Roman and early medieval South West was a heterogeneous entity entirely lacking in shared social and economic trajectories. Devon alone stands out as being quite different, cut off from the counties to its east and west as having no evidence of pottery production or consumption. Surprisingly, Cornwall and the rest of the South West appear to share similar responses to external change, if manifested in slightly different ways. The new Anglo-Saxon forms of pottery adopted in modern Somerset, Dorset and Wiltshire from the 7th century onwards are mirrored in the same period by ceramic innovation in Cornwall, with the development of Bar-lug cauldrons. More importantly, the pottery forms in both areas appear to reflect similar cooking traditions, despite entirely different settlement traditions and cultural backgrounds. Perhaps if Devon had not formed such a *terra incognita*, Cornwall may well have adopted more similar ceramic forms and/or would not have been labelled as being so very different in the post-Roman period as past research has determined.

Thus far the distribution of Bar-lug pottery is entirely coastal and/or estuarine, and this has been interpreted to represent a settlement shift in favour of these areas. The few unenclosed settlements that have been excavated demonstrate that people were using just as many pots as in earlier periods, generally disposed of in middens (see Chapter 3:4:12). The general form of the structures excavated show that an entirely new practice of sunken houses with revetted walls had developed, a development that mirrored the *Grubenhäuser* of the Anglo-Saxon settlements, again suggesting that there might have been some cultural contacts. The liminal location of these 7th-century settlements could be interpreted to represent a breakdown of overland networks in favour of easier access along waterways, as evidenced by the unfired gabbroic clay found at Gwithian and more recently discovered in post-Roman phases at Calstock on the Devon Cornwall border (see Chapter 6:4:2). The seaborne distribution of E-ware from France, found all along the ‘Atlantic fringe’, heralds the arrival of new Continental networks of trade and communication that not only brought pottery but increasing Christian influences.

8:7:3 Impact of Christianity

The 5th-6th century inscribed stones and crosses mark the arrival of Christian influences in Cornwall, and the limited documentary evidence suggests that Christianity was well established by the 7th century. There are references to chapels and ecclesiastical houses from the 8th- 9th century, when Cornwall is recorded as accepting the constituency of the English Church under Wessex. There is documentary and place-name evidence for a monastic community centred on St Keverne (Olson, 1980, 87-88; Orme, 2010). The historic landscape of the Lizard Peninsula, as detailed in Chapter 5:4, demonstrates the significant influence and legacy of Christianity in the formation of estates and apparently new ways of structuring landholding. The frequent references to ‘monks land’ and ‘courts’, perhaps even giving The Lizard its name (*lys-ard* or high-court), combined with Anglo-Saxon charters recognising the presence of estates and taking lands from them, strongly suggest the importance of the region within Cornwall. Is it then coincidence that the chosen location for this Christian centre was on top of the totemic gabbroic clay source? The answers may lie in the form and nature of Christianity that came to Cornwall.

The high number of unique and Celtic saint dedications in Cornwall is indicative of influences from Ireland, Wales and in particular Brittany. The occasional documentary references to saints or pilgrims such as Samson travelling through Cornwall to access this ‘Celtic Christian’ region, offers the only glimpse of Cornwall in this period and reveals very little. The site at Winnianton is later, dating to between the late 8th and 10th century, but derives its name from a 6th-century Breton saint to whom the nearby church is dedicated (see Chapter 5:6:4). The form of the settlement at Winnianton is broadly comparable for the region, although recent excavations tentatively suggest it maybe the first example of an unenclosed village. Additionally, it is a reasonable assumption that the settlement was associated with the foundation of a Breton ecclesiastical house nearby, possibly under the current church, or associated with the Breton monastery at Landévennec (Chapter 5).

Christianity has been used by archaeologists and historians of this period to formulate models of society based on its known hierarchical structures and its influence on its congregation (see Chapter 1:5:6). Christianity had a significant impact on post-Roman societies, shaping new social systems and hierarchies among the predominantly rural populations across the country, perhaps forming foci where there were none before (see Chapter 3 for discussion). It brought with it a new ideology that may have impacted on regional traditions and beliefs, but which could often be incorporated to ease the transition into a new faith (Blair, 2005, 71; Carver, 2009). Bede talks of advice given to clergy on converting the pagans by putting up Christian idols in pagan temples; this is backed up with archaeological evidence of churches built on top of Roman mausoleum such as Lullingstone in Kent (Blair, 2005, 71). St Samson talks of Christians in Cornwall still practicing pagan ways and baptises them. Winnianton is the first example of an excavated 8^{th}-10^{th}-century unenclosed village, perhaps representative of a (borderline) Christian community brought together under a Breton cleric and the cult of St Winwaloe. It could be suggested that the use of gabbroic clay with its totemic properties may have been seen as a pagan tradition and vilified or seen as a fetishistic material. As discussed in Chapter 2:8:1 the process of Christian conversion actively discouraged practices they saw as pagan such as the carving of Maori totem-poles in 18^{th} century New Zealand, why not then the acquisition of a raw-material. This may be reflected in the increase in non-gabbroic clays used in the ceramics produced at Winnianton, suggestive not only of their adherence to the new Christian traditions but also their isolation from the regional kinship network.

The inference that regional macro-networks had collapsed in Cornwall, leaving fragmented micro-networks in its place, appears contrary to developments in the rest of England, where towns and minsters were developing and ruling elites controlled large areas. This is reflected in some areas in the type and distribution of the pottery being produced, with wheel-thrown Ipswich ware centrally produced and widely distributed. In this instance it would seem that Cornwall was distinctive. The region as a whole seemed to lack any form of centralised authority as discussed in Chapter 3:4:9, perhaps further supported by the account of Samson's 7^{th}-century journey through Cornwall during which there was no suitable ecclesiastical houses in which to stay (John, 1981). This is corroborated by Bishop Aldhelm's 7^{th}-century account on travelling to 'dire Devon through comfortless Cornwall' (Orme, 2010, 4). This seems contrary to the evidence of established monastic communities at St Keverne and other sites such as St Buryan of a contemporary date. Samson and Aldhelm's comments may actually reflect a lack of elite houses devoted to the Christian faith or centres in the landscape from which to engage the population, which supports the idea of disconnected independent farmsteads perhaps represented by the *tre* sites (Chapter 3).

It is these unrecognised ecclesiastical communities that exert the most significant social and economic influence on Cornwall in this period, as the Saxon Charters referring to St. Keverne hint at (see Chapter 5:5). It appears that the landowning ecclesiastical houses formed estates and markets certainly by the 8^{th} and 9^{th} centuries in order to gain revenue (see Chapter 5:5). This may have necessitated the creation of new networks that could have been modelled on past networks or were more likely dictated from the new Christian centres, creating new pathways across the socialised landscape. Hooke's map (Fig 5:8) demonstrates this by depicting route-ways linking ecclesiastical estates named in the Saxon Charters (Hooke, 1999). Despite the influence of a Christian lifestyle/influence, pottery continued to be produced and consumed at the same rate using the same methods and forms but in a new range of fabrics apparently specific to each settlement. This would suggest that the region was not unified under one authority or cultural tradition, yet people continued the strong tradition of ceramic production.

How, then, is this reflected in the pottery evidence? The end of the old totemic gabbroic-clay tradition and the location of the early Christian centre at St Keverne may not be coincidental. The petrographic evidence supports the status of gabbroic clays within society, and also indicates that its source(s) was frequently visited and would have been an importance place in the socialised landscape. The source was imbued with the social significance of the gabbroic clay, a node in the socialised landscape from which the regional macro-network derived its key social resource. At the very least people extracting gabbroic clay for transportation all over the region would have offered the early ecclesiastics a captive audience and an opportunity to 'spread the word of God'. Perhaps the Christian message hitched a ride on the back of the gabbroic clay. This interaction would have had far-reaching repercussions, not only for clay sourcing strategies and the traditions of Cornish potters, but also the construction of a new way of life and social structure.

8:7:4 Norman Impact

The establishment of the ecclesiastical estates on the Lizard may have provided a template familiar to the Saxon Kings of Wessex, who after 'conquering' Cornwall begin granting lands mainly in areas known to have been owned by early monastic centres (see Chapter 5:5:3). One could argue that these estates were taken because they existed in a form familiar in organisation and structure to Saxon estates, suggesting that any possible secular estates did not follow the same structure. The prominence of ecclesiastical estates was still evident at the time of the Norman Conquest, as once again they are the focus of the most substantial land grants. An ideal example is the transference of the estates of St Keverne to Winnianton, which became the royal hundredral manor for taxation in the late 9th or 10th century (see Chapter 3), and subsequently the largest Norman royal manor in Devon and Cornwall. This transference of ecclesiastical estates (and also markets) to important secular or royal landholders is a familiar pattern throughout the county.

The effects of this period of social change are reflected in the ceramics of Cornwall, not only in the continuing decline in gabbroic clay-sourcing but more importantly the decline in production. The long tradition of de-centralised pottery production and consumption saw a dramatic change around the same time that the Norman's established the first true markets centres, secular estates and an infrastructure linking it to the rest of the South West. The effect of this on Cornish pottery production was devastating: pottery production declined for the first time in Cornwall's long ceramic tradition, unlike the rest of Britain where the re-emergence of mass pottery production is instigated by new urban centres. The new Sandy Lane ware copied the Saxo-Norman vessel forms, similar to those that had been produced in the rest of the South West (excluding Devon) for over two centuries. These hand-made vessels, typically made from granitic clays, offer the few examples of production in this period. The rare occurrences of Bar-lug vessels are seen in the immediate foundation phases of Norman sites such as Launceston and Truro, which were quickly replaced by pottery produced in the rest of the South West (see Chapter 4:5:2). This concludes the epic tale of pottery production in Cornwall along with their regional identify and kinship networks whose Neolithic origins had weathered every social change only to expire with the foundation of the urban Cornwall we see today.

8:9 Summary

The evidence from the Lizard Peninsula demonstrates the increasing importance of local clays coinciding with the arrival of Christianity in the 6th century, an importance that increased in the late 8th-9th century when the documentary evidence indicates Cornwall accepted the Saxon King and Canterbury. This initially represents change at a micro level between individual communities. Gabbroic clays continued to be used in some areas of Cornwall but not others, and from this we may infer a social choice in the selection of clay and identity which essentially destabilised regional kinships. The Norman establishment of new market centres, networks and systems of landholding/control in the 11th-century is related to economic macro-level change, which is reflected not in the fabric of the pottery but in its declining production and form.

A summary and suggested chronology has been drawn below to illustrate the complex tapestry of evidence upon which this study has drawn and highlight its relationship to the national context of social change (Fig 8:4).

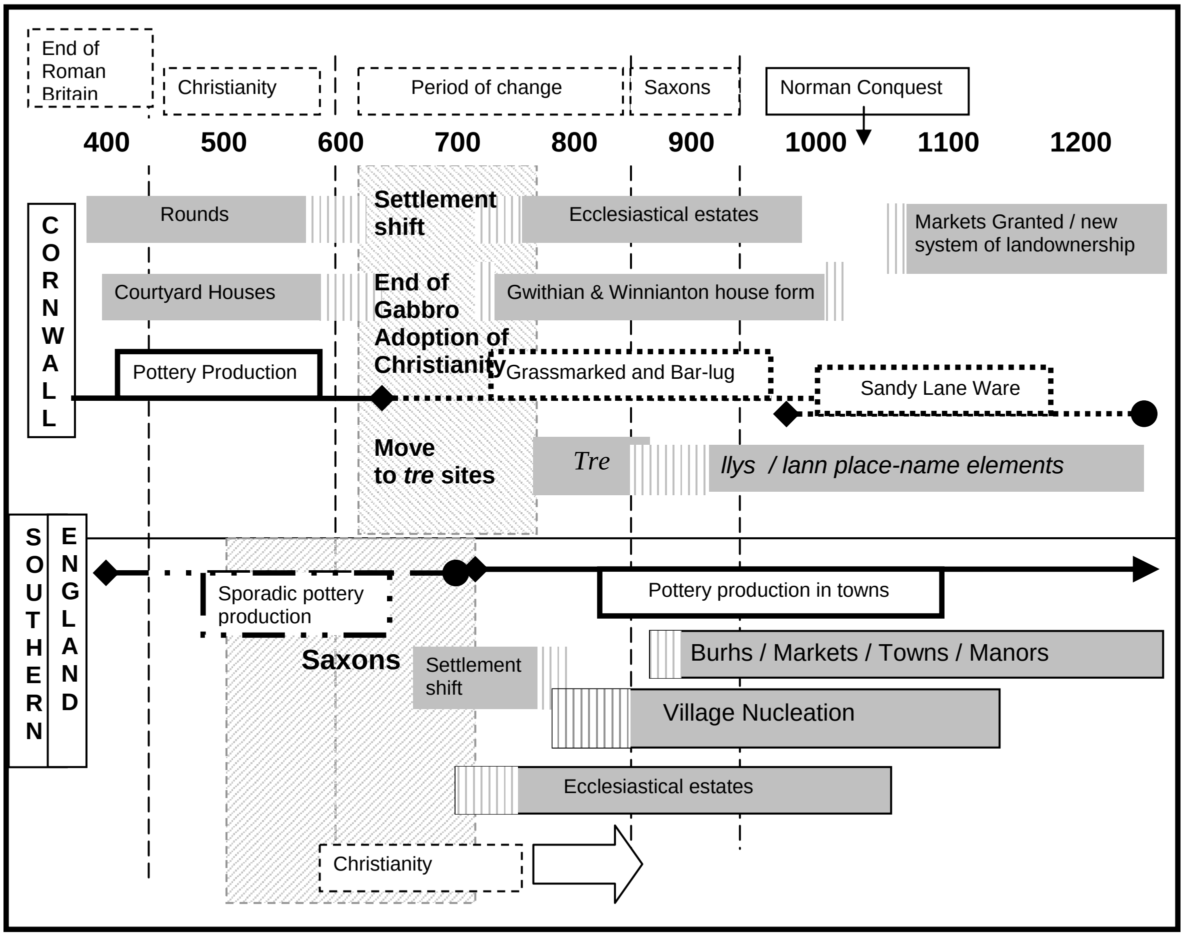


Figure 8:4 Diagram showing summary and chronology based on evidence utilised in this study, situating Cornwall in the national context (Author's Illustration).

Thus, the end of gabbroic clay usage appears to coincide with two major external events. Firstly, the widespread adoption of Christianity in the late 7th-8th-century may have eroded the importance of the macro-regional networks by undermining the totemic social importance of gabbroic clay, without which their shared reality could not be maintained and resulted in the collapse of the regional kinship networks. Secondly, the Norman establishment of the first market centres, networks and landownership/control within a rurally dispersed population in the 11th-century, created new nodes of social interaction and produced new networks motivated by economic and territorial concerns. The chronological separation of these two events affected two different spheres of life: the first targeted the foundation of their beliefs and traditions related to identity, and the second, social structure and its economy. This demonstrates that the fabric of ceramics in Cornwall were related to social and not economic/technical concerns, proving that ceramic fabric changes could represent social change. The opportunity to view two known catalysts such as religion and Conquest through the fabric of the pottery in everyday use across an entire region provides a unique opportunity to explore change, observe what levels of society were affected and in what ways.

In a very literal sense, the fabric of life in Cornwall changed forever, but life continued in a different form.

8:10 National significance

The significance of this study in relation to the national context of social change is Cornwall's ability to demonstrate the effects of change through material culture evidence. It is clear that nationally the manifestations and process of social change from the post-Roman period onwards varies between different regions. The ceramic barometer of social change in Cornwall is unique because of the inherent importance of gabbroic clays supporting the diverse ways in which change was expressed through material culture. There is no medium able to convey more about human nature, practice and being in the world than clay, this study has shown that identities go deeper than the form of a pot suggesting archaeology must look deeper into the details of the ceramic record already available. The strong theoretical standpoint of this study has uniquely informed the process of petrography and demonstrated that with the freedom to ask new questions new answers can be found.

The future applications of the unique raw-material spatialisation approach of this study, could offer a strong foundation on which to ask bigger social questions of petrographic data. The idea of clay fabrics being a metaphor that can encapsulate a society is of relevance to other post-Roman clay sources identified such as Charnwood, offering an interpretive tool based on petrographic data. The application of this strongly theoretical approach with its feet firmly planted in primary data could initiate a new way of looking at the same static forms such as the Anglo-Saxon organic-tempered wares across the Thames basin and beyond. The Anglo-Saxon practice of organic-tempering has never been a logical choice for technical improvement, so perhaps the accepted link between the forms and technology used in their Germanic homelands has a deeper social meaning reinforced through an everyday practice of adding grass as temper, making the intangible tangible. The relatively limited ceramic resource found outside Cornwall could be of greater value if the idea that society is represented within the fabric of the pottery itself is accepted.

8:11 Conclusions

This study set out to explore whether social change can be seen in the ceramic fabrics of rural communities in Cornwall from the 4th - 11th century. Social change refers to alteration in the social structure of a society, a change in its nature, its social institutions, social behaviour and social relations. There are models and hypotheses for addressing the question of social change, but finding archaeological proof through the material remains of the post-Roman and early medieval periods is challenging. This study has started at the very foundation of society, with a social practice that reinforced its *structure* and *relationships* and maintained its *nature* through the repeated *behaviour* required to make pottery in every home. The selection of totemic *clay* situated in a realm of social choice motivated by traditions with the goal of reproducing not only pots but reality itself in material form. The use of gabbroic clays became a socialised tradition developed over thousands of years through daily practice forming a physical metaphor for a regional identity and shared reality. The source location formed the primary node in the socialised landscape which required a physical presence and journey for its procurement.

Utilising the raw-material spatialisation perspective gabbroic clay represents the other, the distant, the unknown through which an awareness of the world outside the experienceable sphere of life available to an individual is accessed. The physical utilisation of this totemic clay demonstrated an affiliation to this macro-level of society through kinship networks conferring social stability within the region. The local clay represents the individual's sphere of life which is a constructed reality of the known world, the act of mixing this clay with gabbroic binds their everyday world and the regional identity/society into a tangible object that represents at once the distant and unknown and the local/known life-worlds.

The clay-sourcing strategies practiced to achieve this directly relate to these vital aspects of society in rural communities providing the archaeological evidence. The evidence has proven that there are changes in the ceramic assemblages of Cornwall from the 4^{th}-11^{th} centuries. A tradition spanning 5000 years ended along with its shared reality and kinship networks, becoming a region of individual rural communities who chose not to maintain their identity through past practices because society no longer needed to. It was replaced by new traditions and practices which embodied a reality constructed with new indicators and informed by new experiences guided by a Christian way of life and social organisation. External forces such as Christianity and the Norman Conquest were the key contextual catalysts in this process of change that formed a new Cornwall. The change in clay sourcing practices over 5000 years and the impact of Christianity and the Norman occupation have been acknowledged in past research. However, little archaeological data to support these broad statements has been presented due to a lack of synthesis of previous work and a limited period scope in not viewing society stretching across periods. The analysis of 4^{th}-11^{th} century pottery and theoretical scope of this study has provided the last piece of a 5000 year old puzzle which happened to be the key to unlocking the enigma of gabbroic clay in Cornish society, possibly back to its origins in the Neolithic, offering a comprehensive indicator of social change like no other.

This discussion will now be concluded by the following chapter, which will return to the objectives of this study and address whether this study has achieved what it set out to do and the national significance of the findings.

Chapter 9: CONCLUSION

This study set out to develop a theoretical approach and a methodology to investigate whether social change could be explored through ceramic fabric analysis, focusing on pottery production in the rural communities of Cornwall from the 4^{th}-11^{th} century AD, viewed within the national and international context.

It has indeed determined that social change can be explored through the ceramic fabrics of pottery in Cornwall from the 4^{th} -11^{th} century. It is clear from the ceramic evidence that the diachronic fabric changes seen across the three sites in question coincide with periods of social change in Cornwall, specifically the growth of Christianity and the impact of the Norman occupation of Cornwall. The gradual shift from regional gabbroic clays to locally-sourced clays demonstrates a significant divergence from a regional tradition that underpinned the identity and social reality of peoples over time. This demonstrates that Peacock's gabbroic model of clay selection motivated by technological choice is now redundant and that petrographic analysis can move beyond simplistic provenancing for economic and trade distribution models.

The program of research has provided an innovative view of an entirely rural population, shedding new light on the effect of social change at each level of everyday life through pottery production and use. Its approach in identifying micro- and macro-level networks of interaction has provided a more balanced perspective of society over this period.

The theoretical raw-material spatialisation approach of this study has highlighted the tangible social reality of pots and provided material evidence for its presence through petrographic analysis. The idea that social reality can be expressed and maintained through the practice of sourcing and using a raw material such as clay breaks new ground in the field of ceramic research, encouraging us to look beyond the cultural façade of form and decoration traditionally used to achieve this aim.

This research has proven that there are observable changes in society that coincide with external factors seen throughout Britain and Europe. The ceramic evidence from Cornwall confirms a link with the rest of the South West, and the country as a whole, around the 7^{th}-8^{th} century. The production of a new pottery form in the Grass-marked and Bar-lug vessels coincides with the re-emergence of widespread pottery production in Wessex and areas of eastern and south-eastern Britain. This period also marks the initial decline of the gabbroic clay sourcing tradition and an increasing utilisation of local clays. Settlement shift in Cornwall also indicates changes to social structures and the nature of subsistence, being a reflection of wider settlement trends across Britain.

The external factors that provoked or contributed to this change remain unclear, but the role of the Church is self evident. Expression of social change in Cornwall may differ to elsewhere in the country but there are clearly parallels that demonstrate *a* connection between different regions united by their vulnerability to external change at a time of uncertainty.

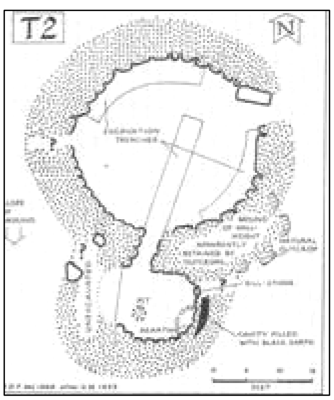
In summary, this thesis has presented three significant contributions to national discussions of social change in this period; First, that the selection of a clay source is a social choice and should be interpreted so as an indicator of social, and not merely technical or economic, change. Secondly, evidence for social change can exist behind the façade of seemingly static pottery traditions that typify the 6^{th}-7/8^{th} centuries in most parts of the British Isles. Finally, the theoretical raw-material spatialisation perspective introduced here can offer a new way of looking at the period and the interpretation of petrographic analysis.

APPENDIX 1

Trebarveth: Additional site information for T2 and T3

Site T2.

This site is lower down the slope from T1 at SW 7968 1970 and excavated in 1932 (Figs 1 and 2). This revealed two roughly circular adjoining structures the larger of the two was roughly 8.20m by 7.60m in diameter with 1.90m wide stone walls and stone facing on the interior (Maynard note books). The entrance to the enclosure is described as having a stone slab in the east-facing entrance. Interestingly, the courtyard houses of West Penwith generally have east facing entrance ways and are of a similar construction (Wood, 1997, 102). The smaller adjoining structure to the south was oval and of a similar construction measuring roughly 4.50m long by 3.60m wide orientated east-west, with a north-facing entranceway lined with stone slabs leading into the larger structure (Dowson, 1968, 13).



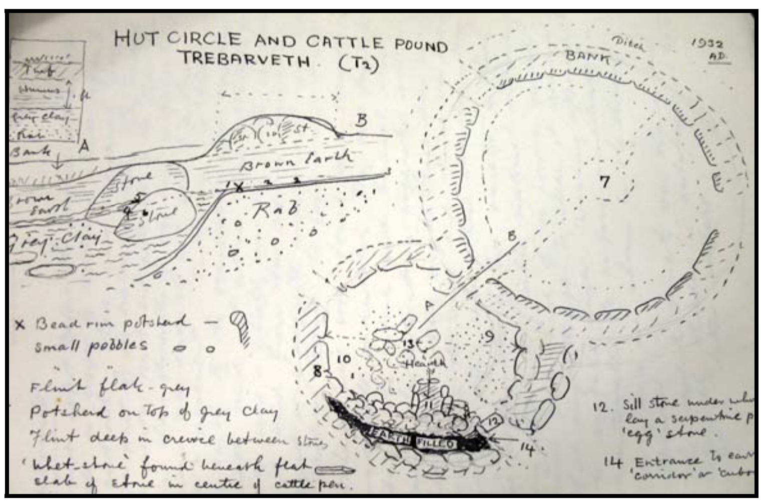


Figure 1. and 2. T2 showing structure and excavation trenches, illustrated by Dowson from Maynards note books (1968, Fig 2 B), and a sketch from Maynard in 1932 showing the stratigraphy (Held at Royal Cornwall Museum).

The larger structure was excavated by a series of trenches, one across the centre, one across the entrance joining the two structures and two others which followed the internal walls

(Dowson, 1968, 13). A few pottery sherds and pebbles were found around 0.40m below the surface, along with a stone slab in the centre with a whetstone under it (Dowson, 1968). The trench in the entranceway produced bead rimed pottery sherds and some pieces of flint in a deeper deposit. The smaller structure had two-thirds of its interior removed, which included the hearth area and entranceway to the larger structure, along with three trenches over the top of the stonewalls (Dowson, 1968).

The interior of the small structure was covered with stone from the collapsed walls which sealed a black or grey earth deposit referred to as the ‘occupation level’ (Dowson, 1968, 13). The excavation revealed a circular hearth up against the south-east side of the internal wall which was burnt and of thicker stone and it had a clay-bonded stone base and upright curb stones. The excavators suggested the presence of a narrow entrance way or small cupboard directly to the left set into the wall with a ‘sill stone’(Dowson, 1968, 15). There was also a pit in the floor surface and a group of stones in the centre interpreted as a post support. A large quantity of pottery was found in amongst and beneath the fallen stones, an iron knife blade of uncertain date and an egg-shaped serpentine stone (Dowson, 1968, 15). The context of the pottery is less-clear for T2, but the depth of the deposits appear to be similar to T1.

Site T3.

This site is the furthest south sitting on the cliff edge at SW7960 1931 excavated in 1931 by Dr. Favell and Col. Hurst, and later by Peacock in 1969 (Figs 5:14 and 5:15 in main body of text Chapter 5) (Dowson, 1968; Peacock, 1969c; Thomas, 1958b). It is a single oval stone walled structure 6.00m long by 4.00m wide orientated north-south whose entrance was presumably to the south but has since been lost over the cliff (Dowson, 1968). Dr. Favell and Col. Hurst carried out a rescue excavation to remove the interior of the structure after noticing a 2.20m long and 0.30m deep spread of pottery in the cliff edge (Dowson, 1968, 15). The collapsed stone and peaty soil were 0.60m deep going down onto a stone slab floor set into yellow clay (Dowson, 1968, 16). The internal features included a ‘kiln flu’ later interpreted as a gully, and a stone lined ‘kiln’ or ‘hearth’(Peacock, 1969c). An exterior trench 1.20m wide and 3.00m long was cut butting the south-east wall of the structure which revealed a layer of topsoil, black soil and a grey clay layer (Dowson, 1968, 16). The two soil layers produced large quantities of ‘better-made’ pottery with a few sherds laying on top of the grey clay (Dowson, 1968, 16).

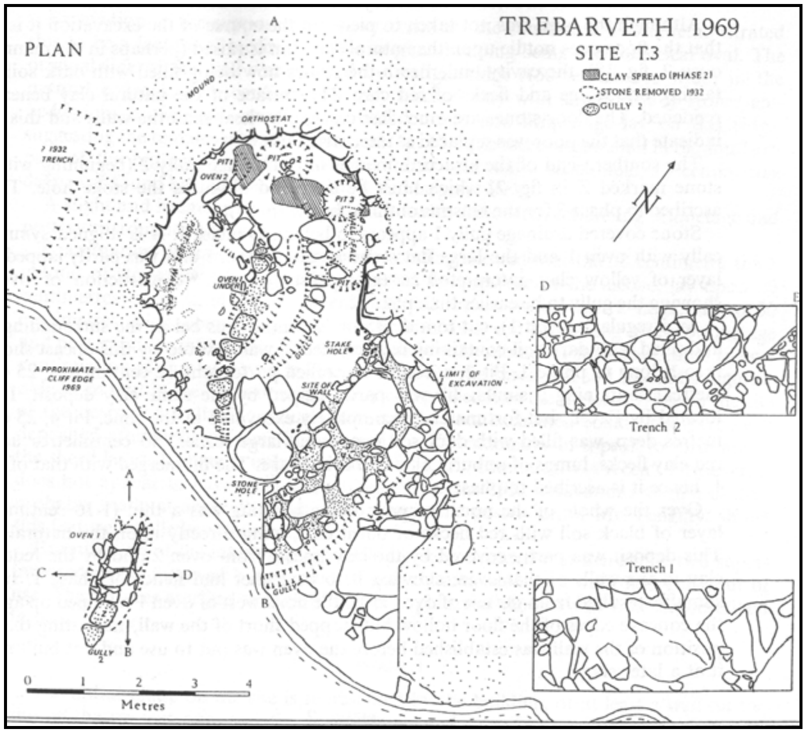


Figure 3. Showing T3 after excavation by Peacock in 1969 (1969c: Fig 17)

Peacock’s excavation in 1969 discovered that not all the internal area had been excavated and was able to put in two trenches; one on the eastern side of the structure being 4.75m long by 2.00m wide and a trench over one of the associated field boundaries (Fig 3) (1969c, 50). The field boundary trench did not establish their relationship to T3 (Peacock, 1969c, 62). A recent survey reported that there is no archaeological proof that the field system was connected to the Romano-British house at Trebarveth, but that they probably used the existing Bronze Age field system still extant today (Johns and Herring, 1996, 85).

The trench within the structure found that after the removal of stone previously interpreted in 1939 as structural features, underlying unexcavated deposits provided between 0.20m and 0.50m of dark earth containing pottery and Briquetage (Peacock, 1969c, 52). The excavation rediscovered the stone lined kiln/oven and gully, in addition to a stake-hole, pits and flooring (Peacock, 1969c). Peacock identified two phases of the stone lined kiln and three phases to the occupation of the structure (1969c, 51).

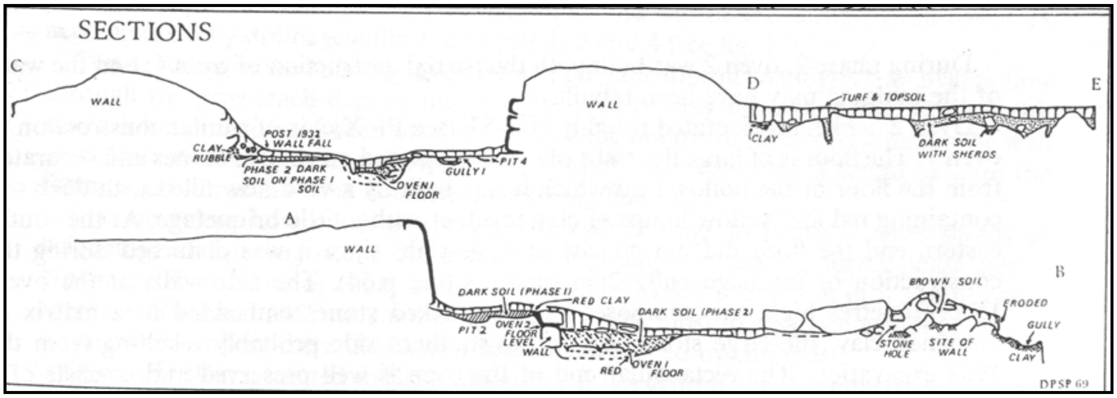


Figure 4. Stratigraphy within T3 (Peacock, 1969c, Fig 17)

Phase one of the structure represents the construction of the house, the earliest oven, drainage gully and pits 1, 2, and 4 (Fig 4) (Peacock, 1969c, 51). The oval structure was built onto the yellow clay having cut through a grey clay leach deposit, which was later used as building material. The early oven was set into a natural hollow 1.00m wide, 1.75m long and 0.40m deep, whose use resulted in the natural yellow clay being burnt (Peacock, 1969c, 51). The gully was cut into the yellow clay and covered with stone slabs running north-south and aligned with the oven. Several roughly circular pits containing dark soil and flecks of red clay were found ranging from 0.12m -0.25m deep.

Phase two consisted of the construction of a new stone lined oven and a stone slab floor; there were also several spreads of deposits containing black earth, red clay flecks and pieces of yellow clay (Peacock, 1969c, 52). The stone lined oven was 1.00m long and 0.50m wide and built over the location of the earlier oven; it was orientated north-west south-east forming a stone box a little larger than the earlier oven.

Phase three represents a period of use that did not require the use of the oven, also when the second stone lined drainage gully was cut and the walls of the structure reinforced (Peacock, 1969c, 54). In the process of reinforcing the walls large quantities of Briquetage fragments were incorporated in the packing matrix. The oven appeared to be deliberately in filled with yellow clay, pottery and dark earth, a 0.30m deep pit was cut into the material from its original construction in phase two which contained fragments of burnt daub with wattle impression (Peacock, 1969c, 54).

The excavation produced almost 450 kg of Briquetage from the trenches outside the structure making up 97% of the assemblage with the remaining 3% representing domestic pottery forms (Peacock, 1969c, 56). The Briquetage has been classified as being made of gabbroic clay, local to the site and that its main function was the production of salt on an industrial scale (Mc.Avoy *et al.*, 1980; Peacock, 1969c). The structure is unusual as it combines several features of different type of houses generally associated with the Romano-British period. The oval shape of the house can be paralleled with others at Porth Godrevy (Fowler, 1962), Halangy Down (Ashbee, 1996) and Bosgreege (Russell and Pool, 1963), whilst the internal stone covered gullies are a particular feature of the courtyard houses of West Penwith such as Chysauster (Christie, 1993) and Porthmeor (Hurst, 1936).

APPENDIX 2

Carngoon bank: Additional site information

A large oval depression [102] was found at the bottom of the slope 12.00m long by 7.00m wide and 0.80m in depth (Fig 5:20) (Mc.Avoy *et al.*, 1980, 35). The oval depression was interpreted as a pond with a retaining clay bank on its southern downward side thought to have supplied the site with water (Mc.Avoy *et al.*, 1980, 35). In the base of the oval depression were two pits [590] and [593], one rectangular the other circular, both of which were vertically sided and may have been timber lined (Mc.Avoy *et al.*, 1980, 35). The function of these pits is suggested by Mc.Avoy *et al* as being extra sumps in a time of drought (1980, 35).

Immediately upslope was a working area [69], with a partially cobbled surface (210), which produced the largest quantity of Briquetage excavated on the site (Mc.Avoy *et al.*, 1980, 35). Below the cobbled surface and upslope from the pond were dark clay deposits which contained Briquetage and charcoal (Mc.Avoy *et al.*, 1980, 36). These clay deposits were later sealed by four distinct mounds (34), (44), (214) and (760) of Briquetage fragments (Mc.Avoy *et al.*, 1980, 36). The working area was delineated upslope by a gully [755] full of Briquetage fragments which may have drained it and fed into the depression below [102] (Mc.Avoy *et al.*, 1980, 36).

The first phase of the rectangular Romano-British structure is defined by the original cut of the gully, a series of clay lined pits and a flat based rectangular pit. The rectangular pit was 2.60m long by 0.70m wide and 0.30m in depth containing ash, charcoal and many small beach pebbles (Mc.Avoy *et al.*, 1980, 39). In phase two a central sub-rectangular hearth or oven 1.50m long by 0.70m wide and 0.30m deep was found with a burnt clay lining (Mc.Avoy *et al.*, 1980, 39). This phase produced many clay lined pits, most with a large serpentine rock at their base, whose function was unclear (Mc.Avoy *et al.*, 1980, 39). A fragment of a rotary quern and a stone pendant were found in one pit and another held two hammer-stone's and stone palette; other finds associated with this phase are a fired clay bead and a rubbing stone (Mc.Avoy et al., 1980).

The activity in phase three suggests a new phase of construction which consisted of twenty stake-holes that did not form any specific pattern, and the presence of a clay loam floor surface upon which a spindle-whorl was found (Mc.Avoy *et al.*, 1980, 38).

The activity on this site suggests that it was used from the Bronze Age until the later 6th century AD or possibly later. The construction of the Romano-British structure and the re-cutting of the depression [102] suggest a continued importance in the site well into the post-Roman period.

The reason for the sites continued occupation has been suggested by Mc.Avoy and others as being associated with its industrial function as a salt manufacture site similar to Trebarveth (1980, 59; Peacock, 1969c; Pearce, 2004; Quinnell, 1986).

The size and shape of the rectangular ovens are similar to those at the salt producing site at Trebarveth (Peacock, 1969c). However, Mc.Avoy points out that the Carngoon Bank pits lack the stone lining and oven furniture present at Trebarveth (1980, 59).

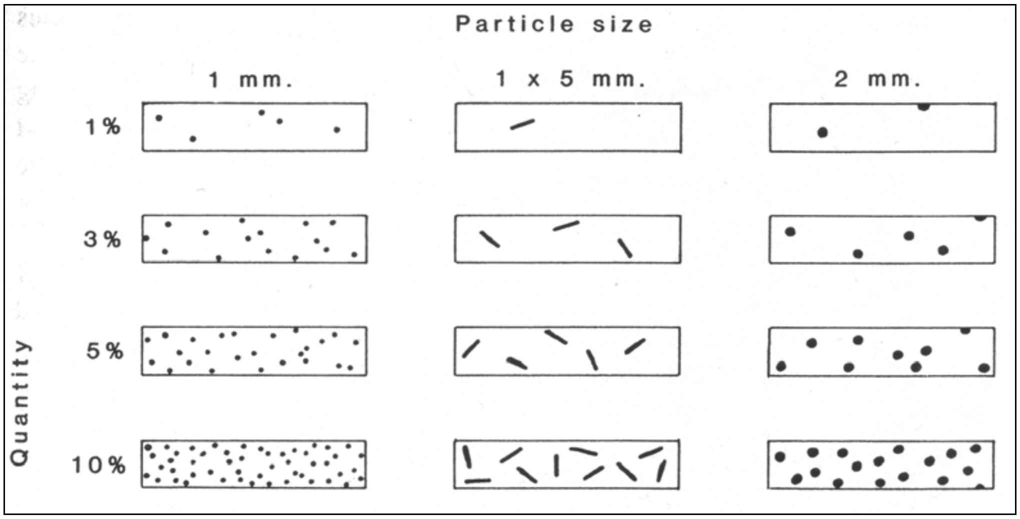
This is supported by the large deposits of Briquetage situated in working area [69] and the presence of Briquetage fragments in all phases of the structure occupation (Mc.Avoy *et al.*, 1980, 59).

APPENDIX 3

Petrology terminology

<u>Macroscopic terms</u>

Inclusion frequency
Using estimation chart as below for guidance (Rice, 2005, 349, Fig 12.1)



Terms used in this study

Predominant = 3% upwards

Frequent = 2-3%

Occasional = 1%

Rare = less than 1%

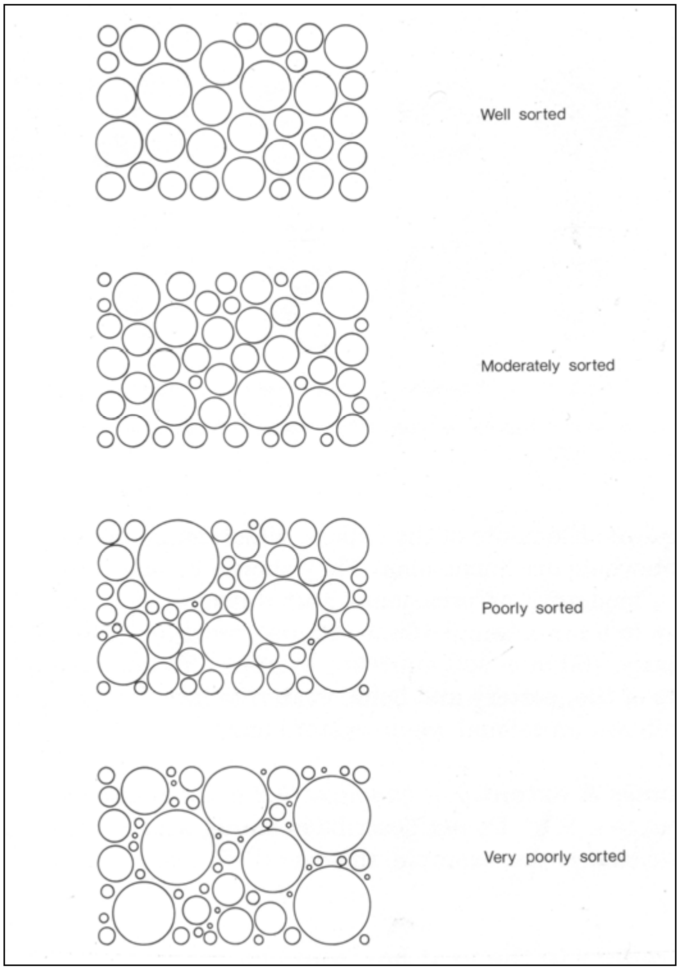
Sorting of inclusions- using Folk 1968 estimation chart (Folk, 1968, 170)

Very poorly sorted

Poorly sorted

Fairly sorted

Well sorted



Firing

Oxidized = Fired in an Oxygen rich environment

Reduced = Fired in an Oxygen poor environment

Surface texture defined by (Orton et al 1993, 245)

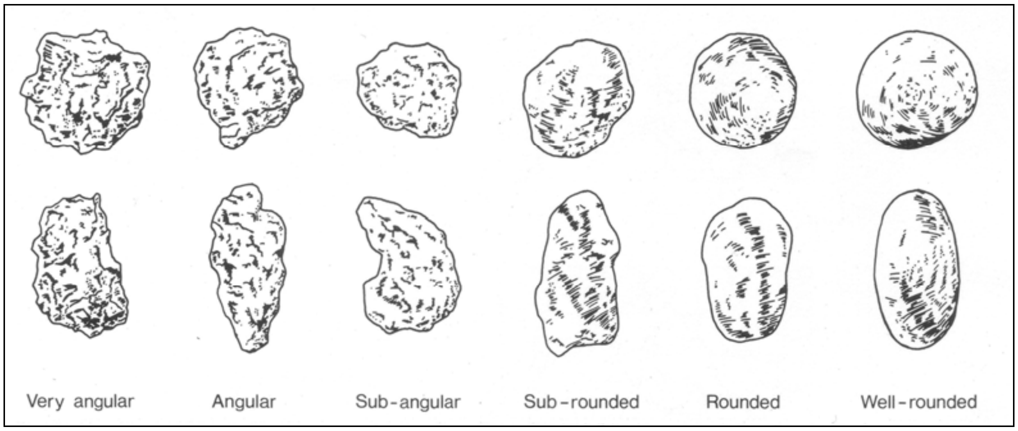
Harsh = Feels abrasive to the finger

Rough = Irregularities can be felt

Smooth= No irregularities can be felt

Powdery = Leaves fine ceramic dust on finger

Shape of inclusions- using Powers roundness scale (Orton *et al.*, 1993, 239).



Very Angular   Angular   Sub-Angular   Sub-rounded   Rounded   Well rounded

<u>Microscopic terms</u>

Inclusion frequency (After Whitbread, 1995, 379)

Terms used

Predominant = 70% upwards

Frequent = 30-50%

Few = 5-15%

Rare = 0.5-2%

Very Rare = <0.5%

Degree of optical activity- (After Whitbread, 1986, 382)

Optically active = Isotropic low fired ceramic minerals in micromass retain optical properties

Optically inactive = Anisotropic high fired ceramic mineral in micromass lost optical properties

Size Modifiers

Used to separate groups of inclusions in thin section

Coarse Fraction = > 1-2mm

Fine Fraction = <0.5mm

Micromass = <0.1mm

APPENDIX 4

Macroscopic recording charts

Trebarveth Macroscopic Tables

Fabric	**HN**				
Colour	**BROWN YR 7.5 4/4**				
Hardness			Soft	Hard	Very hard
Feel		Harsh	Rough	Smooth	Powdery
Wall			**7-15 mm**		
Sorting			**POOR**		
Inclusions	Description		Frequency	Size range	Rounding
FELDSPAR	**OFF WHITE**		**3-5 %**	**1- 6 mm**	**S-ANG/ROU**
QUARTZ + QUARTZITE	**CLEAR WHITE**		**1%**	**2-10 mm**	**ROUNDED - S-ANGULAR**
RED IRON?	**RED IRON/CLAY PELLET**		**RARE**		**W-ROUNDED**
BLACK	**SHINY (HORNBLENDE?)**		**< 1%**	**1 mm**	**ANGULAR**

Fabric	**HN IRON**				
Colour	**BROWN 7.5 YR 5/4**				
Hardness			Soft	Hard	Very hard
Feel		Harsh	Rough	Smooth	Powdery
Wall			**6-7 mm**		
Sorting			**POOR**		
Inclusions	Description		Frequency	Size range	Rounding
FELDSPAR	**OFF WHITE OR SHINY FRESH**		**3%**	**1-4 mm**	**ANGULAR**
ROCK-FRAG	**DARK/ RED BROWN**		**RARE**	**4-5 mm**	**ANGULAR**
BLACK	**SHINY SHEETS (HORNBLENDE?)**		**2 %**	**1-2 mm**	**SUB ANGULAR**
QUARTZ + QUARTZITE	**CLEAR/ WHITE**		**2-3 %**	**1-5 mm**	**ANGULAR**
BLACK	**SILVER/BLACK IRON**		**1-2 %**	**1-2 mm**	**S/W-ROUNDED**
PELLET	**RED IRON OR CLAY**		**RARE**		**W-ROUND**

Fabric	**GRANITIC**				
Colour					
Hardness			Soft	Hard	Very hard
Feel		Harsh	Rough	Smooth	Powdery
Wall					
Sorting					
Inclusions	Description		Frequency	Size range	Rounding
FLEDSPAR	**OFF WHITE**		**2%**	**< 1-2 mm**	**SUB ANGULAR**
QUARTZITE	**WHITE/ RED STAINING**		**3%**	**1-4 mm**	**ANGULAR**
BIOTITE	**BLACK/BROWN**		**3%**	**< 1 mm**	**LATH**
MUSCOVITE	**GOLDEN**		**2%**	**0.5 mm**	**LATH**
BLACK	**IRON**		**RARE**		**W-ROUNDED**

Fabric	**HN MICA TREBARVETH**				
Colour	**BROWN 7.5 YR 4/4**				
Hardness			Soft	Hard	Very hard
Feel		Harsh	Rough	Smooth	Powdery
Wall			**5- 7 mm**		
Sorting			**POOR**		
Inclusions	Description		Frequency	Size range	Rounding
FELDSPAR	**OFF WHITE**		**3%**	**1 – 4 mm**	**S-ANG/ROU**
QUARTZ	**CLEAR/ WHITE**		**1%**	**1- 4 mm**	**ANGULAR**
BIOTITE	**BLACK/BROWN**		**3%**	**<1 mm**	**LATH**
BLACK	**BLACK/BROWN IRON**		**RARE**	**2 mm**	**W-ROUNDED**

Fabric	**METALIC**				
Colour	**REDDISH BROWN 5YR 4/3**				
Hardness			Soft	Hard	Very hard
Feel		Harsh	Rough	Smooth	Powdery
Wall			**5 –10 mm**		
Sorting			**POOR**		
Inclusions	Description		Frequency	Size range	Rounding
ROCK-FRAG	**BLACK/WHITE**		**2%**	**1-5 mm**	**S-ANGULAR-ROUNDED**
FELDSPAR	**OFF WHITE**		**1 -2 %**	**1 mm**	**ROUNDED**
QUARTZ	**CRYSTAL CLEAR**		**1 -2 %**	**< 1- 2 mm**	**S-ROUNDED**
RED PELLET/ IRON	**DARK RED/BLACK, SOFT**		**RARE-1%**	**2-3 mm**	**W-ROUNDED**
BIOTITE	**BLACK/BROWN LATH**		**2-5%**	**1-3 mm**	**LATH**
IRON ORE	**BLACK SHINY**		**RARE**	**1 mm**	**ANGULAR**

Carngoon Bank Macroscopic Tables

Fabric	**SGS**				
Colour	**BROWN YR 7.5 5/4**				
Hardness			Soft	Hard	Very hard
Feel		Harsh	Rough	Smooth	Powdery
Wall			**7-10 mm**		
Sorting			**POOR**		
Inclusions	Description		Frequency	Size range	Rounding
FELDSPAR	**OFF WHITE**		**2-3%**	**1-2mm**	**ROUNDED**
MUSCOVITE	**WHITE SILVER**		**2-3%**	**<1mm**	**LATH**
BIOTITE	**BROWN**		**2%**	**<1-2 mm**	**LATH**
QUARTZITE	**WHITE**		**1%**	**1-2 mm**	**S-ANGULAR**
ROCK-FRAG	**BLACK/WHITE GRANULAR**		**1%**	**1-10 mm**	**S/W-ROUNDED**
IRON	**BLACK SHINY**		**1%**	**<1 mm**	**W-ROUNDED**

Fabric	**HN1**				
Colour	**BROWN YR 7.5 4/4**				
Hardness			Soft	Hard	Very hard
Feel		Harsh	Rough	Smooth	Powdery
Wall			**7-15 mm**		
Sorting			**POOR**		
Inclusions	Description		Frequency	Size range	Rounding
FELDSPAR	**OFF WHITE**		**3-5%**	**<1 – 7mm**	**S-ROUNDED**
QUARTZITE	**WHITE/RED STAIN**		**1-2 %**	**1-2 mm**	**S-ROUNDED**
QUARTZ	**CLEAR**		**RARE**	**1 mm**	**ANGULAR**
AMPHIBOLE	**BLACK/SHINY CLEAVAGE**		**1%**	**<1-2mm**	**S-ANGULAR/ ROUNDED**
ROCK FRAG	**BLACK/WHITE CRYSTALLINE**		**1 %**	**2-7mm**	**S-ANGULAR**
IRON	**BLACK/SILVER**		**1%**	**1 mm**	**ROUNDED**

Fabric	**DRS**			
Colour	**REDDISH BROWN 5 YR 4/4**			
Hardness		Soft	Hard	Very hard
Feel	Harsh	Rough	Smooth	Powdery
Wall		**6-8 mm**		
Sorting		**FAIR**		
Inclusions	Description	Frequency	Size range	Rounding
FELDSPAR	**OFF WHITE/YELLOW**	**3-5 %**	**<1 mm**	**S-ROUND**
QUARTZITE	**WHITE SOMETIMES POLISHED PEBBLES**	**3%**	**1 – 5 mm**	**W-ROUNDED**
ROCK-FRAG	**BLACK AND WHITE GRANULAR**	**1%**	**1- 5 mm**	**S-ANGULAR /ROUNDED**
AMPHIBOLE	**BLACK SHINY/CLEAVAGE**	**2%**	**<1 mm**	**S-ANGULAR**
VOIDS	**IRON STAINED**	**2-3%**	**<1 mm**	**W-ROUNDED**
MUSCOVITE	**WHITE**	**RARE**	**<1 mm**	**LATH**
QUARTZ	**CLEAR**	**1%**	**1 mm**	**S-ROUNDED**

Fabric	**METALLIC**			
Colour	**REDDISH BROWN 5YR 4/3**			
Hardness		Soft	Hard	Very hard
Feel	Harsh	Rough	Smooth	Powdery
Wall		**7 –14 mm**		
Sorting		**POOR**		
Inclusions	Description	Frequency	Size range	Rounding
ROCK-FRAG	**BLACK/WHITE**	**2%**	**1-5 mm**	**S-ANGULAR-ROUNDED**
FELDSPAR	**OFF WHITE**	**1 -2 %**	**1 mm**	**ROUNDED**
QUARTZ	**CRYSTAL CLEAR**	**1 -2 %**	**< 1- 2 mm**	**S-ROUNDED**
RED PELLET/ IRON	**DARK RED/BLACK, SOFT**	**RARE-1%**	**2-3 mm**	**W-ROUNDED**
BIOTITE	**BLACK/BROWN LATH**	**2-5%**	**1-3 mm**	**LATH**
IRON ORE	**BLACK SHINY**	**RARE**	**1 mm**	**ANGULAR**

Fabric	**SOFT RED**			
Colour	**RED 2.5YR 5/8**			
Hardness		Soft	Hard	Very hard
Feel	Harsh	Rough	Smooth	Powdery
Wall		**7 mm**		
Sorting		**V-POOR**		
Inclusions	Description	Frequency	Size range	Rounding
ROCK-FRAGS	**BLACK/WHITE GRANULAR**	**1 %**	**2-5 mm**	**S-ROUNDED**
QUARTZITE	**WHITE**	**2%**	**<1-1mm**	**S-ROUNDED**
MUSCOVITE	**WHITE/GREY**	**10%**	**<1-1 mm**	**LATHS**
RED PELLETS	**SOFT PELLETS WITH DARK HALO**	**RARE**	**1 mm**	**W-ROUNDED**
BIOTITE	**BROWN**	**RARE**	**<1 mm**	**LATH**
AMPHIBOLE	**BLACK SHINY**	**RARE**	**1 mm**	**S-ANGULAR**

Fabric	**HN IRON**			
Colour	**BROWN 7.5 YR 5/4**			
Hardness		Soft	Hard	Very hard
Feel	Harsh	Rough	Smooth	Powdery
Wall		**6-7 mm**		
Sorting		**POOR**		
Inclusions	Description	Frequency	Size range	Rounding
FELDSPAR	**OFF WHITE**	**5%**	**1 -3 mm**	**S-ROUNDED**
QUARTZ	**CLEAR**	**RARE**	**2- 6 mm**	**S-ANGULAR**
ROCK-FRAG	**BLACK/WHITE**	**1%**	**3-4 mm**	**S-ROUNDED**
IRON ORE	**SILVER / BLACK**	**2%**	**1-6 mm**	**W-ROUNDED**
VOIDS	**METALLIC INTERNAL COLOURING / RUST**	**1-2%**	**1 mm**	**W-ROUNDED**

Winnianton Macroscopic Tables

Fabric	**MICA**			
Colour	**BROWN 10YR 5/3**			
Hardness		Soft	Hard	Very hard
Feel	Harsh	Rough	Smooth	Powdery
Wall		6-9mm		
Sorting		**FAIR**		
Inclusions	Description	Frequency	Size range	Rounding
FELDSPAR	**OFF WHITE/LATHS**	**2-3%**	**1-3mm**	**SUB-A**
QUARTZ	**CRYSTAL/RED STAINING**	**2%**	**1-5mm**	**SUB-R**
BIOTITE	**BROWN/SHINY FRESH**	**1%**	**1-2 mm**	**LATH**
MUSCOVITE	**SILVER/ CLEAR SMALL**	**3%**	**< 1mm**	**LATH**
BLACK	**(HORNBLENDE)? CLEAVAGE**	**1%**	**1 mm**	**ROUNDED**

Fabric	**SOFT GREEN**			
Colour	**BROWN 7.5 YR 4/2**			
Hardness		Soft	Hard	Very hard
Feel	Harsh	Rough	Smooth	Powdery
Wall		**9-11 mm**		
Sorting		**V-POOR**		
Inclusions	Description	Frequency	Size range	Rounding
FELDSPAR	**OFF WHITE**	**1-2 %**	**1mm**	**S-ROUNDED**
QUARTZ	**CRYSTAL/RED STAINING**	**1%**	**2-3 mm**	**ROUNDED**
GREEN	**SEDIMENTARY GREEN/GREY PEBBLES**	**1%**	**1-6 mm**	**W-ROUNDED**
ROCK-FRAG	**BLACK + CRYSTALS**	**RARE**		**ANGULAR**
METALLIC	**SILVER/BLACK MAGNETITE?**	**RARE**	**< 1mm**	**ROUNDED**
ROCK-FRAG	**BLACK + RED (HORNBLENDE + SERPENTINE?)**	**RARE**	**10 mm**	**ANGULAR**

Fabric	**CHUNKY**				
Colour	**GREYISH BROWN 2.5YR 5/2**				
Hardness			Soft	Hard	Very hard
Feel		Harsh	Rough	Smooth	Powdery
Wall			**11 mm**		
Sorting			**POOR**		
Inclusions	Description		Frequency	Size range	Rounding
FELDSPAR	**OFF WHITE/GREY FRESH**		**3%**	**1-4 mm**	**ANGULAR**
QUARTZ	**CRYSTAL/ GREY SMOKY**		**2%**	**1-3 mm**	**S-ANGULAR**
BLACK	**BLACK/BROWN ONE CLEAVAGE (HORNBLENDE SCHIST?)**		**3%**	**< 1-5 mm**	**S- ANG/ROUN**
RED ROCK	**CRYSTALLINE? DEEO RED MOTTLED CRUST/INTERNAL LAMELLA STRUCTURE**		**1%**	**2 mm**	**S-ROUNDED**
SANDY ROCK	**SEDIEMTARY PEBBLE, CLOSE GRAINED, SLIGHT GREEN TINGE**		**RARE**	**9 mm**	**W-ROUNDED**
ROCK-FRAG	**BLACK (HORNBLEDE) AND QUARTZ**		**RARE**	**5 mm**	**ANGULAR**

Fabric	**HN? (HN1)**				
Colour	**YELLOWISH BROWN 10YR 5/4**				
Hardness			Soft	Hard	Very hard
Feel		Harsh	Rough	Smooth	Powdery
Wall			**10 mm**		
Sorting			**POOR**		
Inclusions	Description		Frequency	Size range	Rounding
FELDSPAR	**OFF WHITE/ YELLOW**		**5%**	**<1-4mm**	**S-ANG/ROU**
QUARTZ	**CRYSTAL WHITE/ SOME RED/ROSE**		**3%**	**1-5 mm**	**ANGULAR**
BLACK SHINY	**CHUNKS ONE CLEAVAGE FLAT SHEETS (HORNBLENDE?)**		**2%**	**<1-2 mm**	**S-ANG/ROU**

Appendix 5
Microscopic data tables

Trebarveth

Site	Trebarveth	Description	**HN1** (HN1) Moderately sorted fabric. Oxidised exterior with reduced core and interior. inclusions slightly aligned vertically.			
Slide	51					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Rounded	Frequent		Fuzzy, broad size range
Coarse		Altered serpentine	Angular	Rare		
Coarse		Quartz	Sub rounded	Rare		Rock frag conglomerate
Fine		Altered plagioclase feldspar	Rounded	Frequent		Some mica intergrowth
Fine		Biotite	Laths	Frequent		
Fine		Olivine	Sub-angular	Few		Fresh
Fine		Clinopyroxene	Rounded	Few		Leaching clay minerals. High pleo brown-yellow, dark 2nd order XP. One cleavage. Could be altering to biotite
Fine		Plagioclase feldspar	Angular	Few		Simple twinning
Fine		K-feldspar	Angular	Few		Microcline
Fine		Opaque	Rounded	Few		Black iron
Fine		Serpentine altering to mica	Well rounded	Few		
Fine		Quartz	Sub-rounded	Few		
Fine	X		Angular	Rare	Quartz	
					Olivine	
					Altered feldspar	

Site	Trebarveth	Description	**HN1** (HN1) Poorly sorted fabric. Oxidised			
Slide	52					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Rounded	Frequent		Remnant simple twinning. Leaching clay minerals
Fine		Altered plagioclase feldspar	Rounded	Frequent		
Fine		Quartz	Angular	Few		
Fine		Quartz	Well rounded	Few		Some conglomerate
Fine		K-feldspar	Sub-rounded			Microcline. Altering fuzzy, leaching clay minerals
Fine		Olivine	Angular	Few		
Fine		Opaque	Angular	Few		Iron
Fine		Biotite	Chunky laths	Few		Rounded
Fine		Clinopyroxene altering	Well rounded	Few		Extruding clay minerals, boundaries merging
Fine		Pyroxene (altered)	Rounded	Rare		
Fine		Serpentine (altered)	Well rounded	Rare		
Fine		Plagioclase altering to Sericite	Rounded	Rare		Fine grained white mica, could be the serpentine altering to mica?
Fine	X		Well rounded	Rare	Quartz	
					Clinopyroxene altering to biotite	

Site	Trebarveth	Description	**HN1** (HN1) Poorly sorted fabric. Oxidised			
Slide	53					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Rounded	Rare	Quartz	Cracked quartz
					Plagioclase feldspar	
Coarse		Quartz	Angular	Rare		
Fine		Plagioclase feldspar	Angular	Frequent		Simple twinning and oscillatory zoning. Altering. Leaching clay minerals
Fine		Biotite	Chunks rounded	Frequent		Weathered
Fine		Quartz	Sub-angular	Few		Cracked
Fine		Opaque	Angular	Few		Iron
Fine	X		Angular	Rare	Quartz	Both minerals are old
					Pyroxene	
Fine		Plagioclase feldspar altering to Sericite	Rounded	Rare		Leaching clay minerals

Site	Trebarveth	Description	**HN1** (HN1) Well sorted fabric. Oxidised			
Slide	54					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Angular	Rare	Quartz	
					Plagioclase feldspar	
					Blue acicular crystals? Melilite?	Could be Zoisite? Random directions, clear in PPL, blue in XP.
					Biotite	
Coarse	X		Well rounded	Rare	Clinopyroxene	Altered
					Quartz	
					Plagioclase feldspar	
Coarse		Altered plagioclase feldspar	Sub-angular	Rare		Fuzzy
Coarse		Quartz	Sub-rounded	Rare		
Fine		Altered plagioclase feldspar	Sub-angular	Frequent		Remnant simple twinning
Fine		Quartz	Sub-rounded	Few		
Fine		Biotite	Chunky	Few		Some have quartz attached
Fine		Opaque	Round	Few		Black iron
Fine		Olivine	Sub-angular	Rare		
Fine		Amphibole? (possible)	-	Rare		Small and rough

Site	Trebarveth	Description	**HN1** (HN1)Poorly sorted fabric. Oxidised			
Slide	55					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Rounded	Frequent		Remnant simple twinning. occasional biotite attached
Fine		Plagioclase feldspar	Sub-angular	Frequent		Simple twinning
Fine	X		Sub- angular	Few	Quartz	
					Plagioclase feldspar	Leaching clay minerals
Fine		Pyroxene	Rounded	Few		Altered leaching clay minerals and boundaries merging
Fine		Biotite	Chunky	Few		Rounded
Fine		Opaque	Angular	Few		Black iron
Fine		Olivine	Sub-angular	Few		
Fine	X		Rounded	Rare	Quartz	
					Plagioclase feldspar	
					Biotite	
Fine		K-feldspar	Sub-angular	Rare		Microcline
Fine		Quartz	Sub-angular	Rare		
Fine		Plagioclase altering to mica	Angular	Rare		

Site	Trebarveth	Description	**HN1** (HN1)Fine fabric but poorly sorted. Oxidised			
Slide	56					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Sub-rounded	Frequent		Fuzzy
Fine		Quartz	Angular	Frequent		Small all the same size. One is pebble well rounded
Fine		Plagioclase feldspar	Angular	Few		Simple twinning
Fine		Opaque	Angular	Few		Black iron
Fine		Plagioclase altering to muscovite	Rounded	Few		Leaching clay minerals
Fine		Biotite	Lath	Few		
Fine		Quartz	Well rounded	Few		
Fine		Clinopyroxene	Rounded	Rare		
Fine		Quartz conglomerate	Well rounded	Rare		
Fine		Olivine	Rounded	Rare		Altering to mica
Fine		Amphibole	Sub-rounded	Rare		Non pleo
Fine		K-feldspar	Angular	Rare		Microcline

Site	Trebarveth	Description	**HN1** (HN1) Poorly sorted fabric Fine fabric. Oxidised			
Slide	57					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Sub-angular	Frequent		Remnant simple twinning
Coarse		Pyroxene	Rounded	Few		
Coarse		Quartz conglomerate	Well rounded	Rare		Leaching clay minerals
Fine		Quartz	Rounded	Few		Yellow
Fine		Biotite	Laths	Few		
Fine		Plagioclase feldspar	Angular	Few		Simple twinning
Fine		Amphibole	Rounded	Rare		Altering, old
Fine		Opaque	Angular	Rare		Black iron
Fine		Olivine	Rounded	Rare		Altering

Site	Trebarveth	Description	**HN Iron** (HN Iron) Well sorted fabric. Oxidised			
Slide	58					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Rounded	Frequent		
Coarse		Quartz	Well rounded	Few		
Coarse		Quartz	Angular	Few		
Fine		Quartz composite	Well rounded	Frequent		
Fine		Opaque	Sub-rounded	Frequent		Black iron
Fine		Plagioclase feldspar	Angular	Few		
Fine		Tremolite	Rounded	Few		
Fine		Clinopyroxene	Rounded	Few		
Fine		Clay pellet	Rounded	Rare	Clinopyroxene	X2
					Quartz	
					Altered plagioclase	
Fine		Epidote Group	Well rounded	Rare		Melilite or Zoisite, blue acicular needles, clear in PPL
Fine		Amphibole (hornblende)	Rounded	Rare		
Fine		Muscovite	Laths	Rare		Large laths
Fine		Biotite	Laths	Rare		
Fine		K-feldspar	Rounded	Rare		Microcline

Site	Trebarveth	Description	**HN Iron Loess** (HN Iron) Well sorted fabric, Oxidised exterior and interior surface with reduced core.			
Slide	59					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Quartz composite	Rounded	Frequent		Many planes,
Coarse		Altered plagioclase feldspar	Rounded	Frequent		Remnant simple twinning
Fine		Opaque	Rounded	Frequent		Black iron
Fine		Plagioclase feldspar	Angular	Few		Simple and polysynthetic twinning
Fine		Biotite	Chunky lath	Few		
Fine		K-feldspar	Rounded	Rare		Microcline
Fine		Olivine	Rounded	Rare		Leaching clay minerals
Fine		Clinopyroxene	Lath	Rare		Could be altered plagioclase to Sericite. No pleo. Clear PPL leaching clay minerals.
Fine		Tremolite	Rounded	Rare		Random Acicular crystals Only two.

Site	Trebarveth	Description	**HN Iron** (HN Iron) Fine Moderately sorted fabric. Oxidised. Inclusions aligned vertically			
Slide	60					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Angular	Few	K-feldspar	
					Altered plagioclase feldspar	fuzzy
Fine		Opaque	Angular-well rounded	Frequent		Black iron
Fine		Quartz	Sub-angular	Few		Broad size range, 2 planes
Fine		Quartz	Well rounded	Few		Pebbles, BEACH SAND. Broad size range
Fine		Plagioclase feldspar	Sub-angular	Few		Simple and polysynthetic twinning. Some altering
Fine		K-feldspar	Sub-angular	Rare		Microcline
Fine		Amphibole	Rounded	Rare		Very altered
Fine		Serpentine	Well rounded	Rare		Fuzzy
Fine		Muscovite	Laths	Rare		
Fine		Biotite	Chunky	Rare		Alteration product
Fine		Tremolite	Well rounded	Rare		

Site	Trebarveth	Description	**HN Iron** (HN Iron) Poorly sorted fabric. Oxidised. Loads of K-feldspar			
Slide	61					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Sub-angular	Frequent	Plagioclase feldspar	
					K-feldspar	
					Amphibole	
Coarse		Quartz	Sub-angular	Frequent		
Fine		Quartz composite	Angular	Frequent		
Fine		K-feldspar	v-angular	Frequent		
Fine		Plagioclase feldspar	Angular	Frequent		
Fine		Opaque	Rounded	Frequent		Black iron
Fine		Amphibole (hornblende)	Rounded	Few		
Fine		Clay pellet	Rounded	Few		
Fine		Plagioclase feldspar altering to Sericite	Rounded	Few		
Fine		Clinopyroxene	Sub-rounded	Few		
Fine		Altered serpentine	Well rounded	Rare		Possibly
Fine		Muscovite	Lath	Rare		
Fine		Epidote Group	Angular	Rare		Melilite or Zoisite, only 2
Fine		Chlorite	chunky lath	Rare		Green in PPL, pleo, XP 2nd order, like muscovite but green

Site	Trebarveth	Description	**Garnet** (HN Mica) Poorly sorted fabric. Oxidised			
Slide	62					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Sub-rounded	Occasional		Fuzzy
Coarse	X		Sub-rounded	rare	Plagioclase feldspar	Muscovite intergrowth or
					Altered plagioclase feldspar	Alteration product
					Muscovite (intergrowth)	
					Quartz (composite)	
					Clinopyroxene	
					Garnet	
Fine		Quartz (stretched)	Rounded	Frequent		
Fine		Muscovite	Lath	Few		
Fine		Opaque	Sub-angular	Few		Black iron
Fine		Plagioclase altering to Sericite	Rounded	Few		
Fine	X		Well rounded	Few	Quartz (sandstone)	
					Pyroxene	
Fine		Epidote Group	Angular	Rare		Melilite or Zoisite
Fine		Altered serpentine	Well rounded	Rare		
Fine		Amphibole	Rounded	Rare		
Fine		Garnet	Well rounded	Rare		Only three, one with mica intergrowth.
Fine		Clinopyroxene	Rounded	Rare		

Site	Trebarveth	Description	**HN Mica** (HN Mica) Moderately sorted fabric. Reduced			
Slide	63					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Quartz	Angular	Rare		Many planes composite
Coarse		Plagioclase feldspar	Rounded	Rare		Simple twinning. Leaching clay minerals.
Fine		Plagioclase feldspar	Angular	Frequent		Simple twinning. Leaching clay minerals broad size range.
Fine		Quartz	Angular	Few		
Fine		Muscovite	Laths	Few		Large laths
Fine		Plagioclase feldspar altering to Sericite	Rounded	Few		
Fine		Opaque	Sub-angular	Few		Black iron
Fine		Biotite	Lath	Few		
Fine		Hornblende	Angular	Rare		
Fine		Chlorite with muscovite	Angular	Rare		
Fine		Clay pellet	Well rounded	Rare		
Fine		K-feldspar	Angular	Rare		
Fine		Clinopyroxene	Rounded	Rare		

Site	Trebarveth	Description	**Garnet** (HN Mica) Poorly sorted fabric. Oxidised			
Slide	64					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Sub-angular	Frequent		Fuzzy
Fine		Plagioclase feldspar	Angular	Frequent		Simple twinning
Fine		K-feldspar	Angular	Frequent		Microcline
Fine		Plagioclase altered to Sericite	Rounded	Frequent		
Fine		Opaque	v-angular	Frequent		Black iron
Fine		Muscovite	Lath	Few		Large laths
Fine		Quartz	Sub-rounded	Few		
Fine	X	Clay pellet	Sub-rounded	Rare	Garnet	Boundaries merging
					Quartz	
					Muscovite	
Fine		Pyroxene	Rounded	Rare		Pink in PPL pleo, yellow XP
Fine		Biotite	Chunky lath	Rare		
Fine		Garnet	Well rounded	Rare		Quartz growth inside
Fine		Amphibole	Rounded	Rare		

Site	Trebarveth	Description	**Metallic** (Metallic) Well sorted fabric. Oxidised			
Slide	65					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Rounded	Frequent	Plagioclase feldspar	Extruded clay minerals.
					Quartz	
Coarse		Altered plagioclase feldspar	Well-rounded	Few		Sometime with mica intergrowth
Fine		Plagioclase feldspar	Rounded	Frequent		Simple and polysynthetic twinning
Fine		Muscovite	Laths	Frequent		
Fine		K-feldspar	Rounded	Few		Microcline
Fine		Quartz	Sub-rounded	Few		
Fine	X		Rounded but angular edges	Few	Altered plagioclase feldspar	Extruding clay minerals all similar size
					Muscovite	
					Quartz	
Fine		Plagioclase altered to Sericite	Rounded	Few		
Fine	X	Clay pellets	Sub angular	Few		Small quartz visable
Fine		Epidote Group	Lath	Rare		Only one, strange alteration product
Fine		Altered serpentine	Well rounded	Rare		
Fine		Opaque	Sub-angular	Rare		Black iron

Site	Trebarveth	Description	**Granitic** (Granitic) Poorly sorted fabric. Oxidised			
Slide	66					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Sub-angular	Frequent		
Coarse	X		Angular	Few	Quartz	Extruded clay minerals
					Plagioclase feldspar	
					Chlorite	
Fine		Plagioclase feldspar	Angular	Frequent		Simple twinning, leaching clay minerals, broad size range.
Fine		Opaque	Rounded	Frequent		Black iron
Fine		Quartz	Angular	Few		
Fine		Chlorite	Rounded	Few		Pieces diamond shaped
Fine		Biotite	Chunky lath	Few		Rounded
Fine		Amphibole	Rounded	Few		Leaching clay minerals
Fine		Pyroxene	Angular	Few		Very small pieces hard to tell, leaching clay minerals
Fine		Plagioclase altered to Sericite	Rounded	Rare		
Fine		Quartz (composite)	Sub angular	Rare		Composite or polycrystalline
Fine		K-feldspar	Rounded	Rare		Microcline. Leaching clay minerals

Carngoon Bank

Site	Carngoon Bank	Description	**HN3 Admixture** (DRS), Fabric poorly sorted Oxidised			
Slide	1					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		rounded	Frequent	Altered Plagioclase feldspar	
					Quartz	
					Sericite or mica?	
Coarse		Muscovite	Lath	Frequent		
Fine		Quartz	Sub-angular	Few		
Fine		Sericite	Rounded	Few		Intergrowth of mica
Fine		Opaque, iron	Well rounded	Few		Black/brown
Fine		Plagioclase Feldspar	Sub-angular	Few		

Site	Carngoon Bank	Description	**Hornblende** (DRS), Poorly sorted fabric Oxidised			
Slide	2					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Sub-angular	Few	Quartz	Extruding clay minerals
					Altered plagioclase feldspar	
					Amphibole	
					Pyroxene	
Coarse	X		Sub-angular	Few	Hornblende	
					Quartz	
					Altered plagioclase feldspar	
Fine		Amphibole	Rounded	Frequent		Hornblende?
Fine		Plagioclase feldspar	Angular	Few		
Fine		Opaque iron	Well rounded	Few		Black balls
Fine		Quartz	Angular	Rare		fresh

Site	Carngoon Bank	Description	**HN3** (HN1) Poorly sorted Oxidised			
Slide	3					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Angular	Rare	Clinopyroxene	
					Plagioclase feldspar	
Fine		Plagioclase feldspar	Sub angular	Frequent		Fresh broad size range
Fine		Quartz polycrystalline	Rounded	Rare		
Fine		Clinopyroxene	Sub angular	Few		
Fine		Altered plagioclase feldspar	Angular	Few		
Fine		Altered clinopyroxene	Sub rounded	Few		Acicular needles replacing it
Fine		Biotite	Lath	Rare		
Fine		Sandstone	Rounded	Rare		Banded quartz mica
Fine		Amphibole	Angular	Rare		

Site	Carngoon Bank	Description	**HN3** (HN IRON) , poorly sorted fabric Oxidised			
Slide	4					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered Plagioclase feldspar	Sub-rounded	Frequent		Fuzzy, polysynthetic twinning
Coarse		K-feldspar, microcline and pericline twinning	Sub-rounded	Frequent		Only slightly altered, range in size from coarse to fine fraction. Plagioclase much more angular
Coarse	X		Sub angular	Rare	Quartz	Leaching clay minerals
					Altered plagioclase feldspar	
					K-feldspar	
Coarse		Clay pellet	Well rounded	Rare		
Fine		Clinopyroxene	Sub angular	Few		
Fine		Tremolite	Sub-angular	Few		Lots of laths together
Fine		Quartz	Angular	Few		v-small
Fine		Muscovite	Laths	Few		
Fine		Biotite	Laths	Rare		
Fine		Amphibole (altering)	Foliated laths	Rare		Leaching clay minerals
Fine		Opaque iron	Well-rounded	Rare		Pellet

Site	Carngoon Bank	Description	**HN3** (HN1) Poorly sorted fabric. Oxidised			
Slide	5					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Plagioclase feldspar	Angular	Frequent		Some altering fuzzy, there is intergrowth between the twinning bands. Shape is angular in both fresh and altered.
Coarse		K-feldspar	Angular	Few		
Coarse		Olivine	Sub-angular	Few		Boundary merging
Coarse		Altering to Serpentine	Rounded	Few	Serpentine, olivine, muscovite ?	Laths in rounded blob, very colourful.
Fine		Plagioclase feldspar	Angular	Frequent		Same as coarse
Fine		Biotite	Sub-rounded	Few		
Fine		Clinopyroxene	Sub-rounded	Few		Weak yellow/brown pleo
Fine		Opaque iron	Sub-angular	Few		Black
Fine		Quartz	Angular	Few		

Site	Carngoon Bank	Description	**HN3** (HN1) poorly sorted fabric. Oxidised			
Slide	6					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Sub-rounded	Frequent		Fuzzy, 3 large, remnant twinning visible, clay minerals extruding.
Coarse	X		Well rounded	Rare	Altered plagioclase	Twinning under olivine
					Quartz	
					Olivine	
Coarse		Quartz	Sub-angular	Few		Altered fuzzy black bits on undulose extinction.
Coarse		Altered serpentine	Rounded	Rare		Fuzzy, cleavages have yellow in PPL. Yellow/brown in XP grey at extinction. Intergrowth of sericite.
Coarse		Clinopyroxene	Well rounded	Rare		
Fine		Plagioclase feldspar	Sub angular	Frequent		Leaching clay minerals
Fine		Clinopyroxene	Well rounded	Few		
Fine		Olivine	Angular	Few		Generally small pieces
Fine		Altered serpentine	Rounded	Few		Boundary merging with clay minerals. altering to muscovite
Fine		Clay pellet	Well rounded	Rare		
Fine		Opaque	Well rounded	Rare		Iron

Site	Carngoon Bank	Description	**Hornblende Schist** (SGS). Moderately sorted fabric. Oxidised. Slide seems to have more in fine fraction than coarse, loads of different minerals, very colourful. (grassmarked platter)			
Slide	7					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Angular	Frequent	Quartz	
					Plagioclase feldspar	
					Altered plagioclase feldspar	
Coarse		Altered plagioclase feldspar	Rounded	Frequent		Some with Sericite intergrowth
Coarse		Altered Serpentine	Rounded	Few		Red/brown with cracks
Coarse	X		Angular	Rare	Altered plagioclase feldspar	
					Quartz	
					Biotite	
Coarse		Clay Pellet	Well rounded	rare		Mica inside
Fine		Muscovite	Laths	Frequent		
Fine		Quartz polycrystalline	Angular	Frequent		Small
Fine		Olivine	Sub rounded	Few		
Fine		Hornblende	Sub-angular	Few		Boundaries merging
Fine		Biotite	Laths	Few		Altering and merging
Fine		Plagioclase feldspar	Angular	Few		Twinning, Fresh pieces
Fine	X		Rounded	Rare	Hornblende	
					Quartz	

Site	Carngoon Bank	Description	**HN3** (HN1) Poorly sorted fabric. Oxidised			
Slide	8					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Sub-rounded	Frequent		Fuzzy, remnant twinning, one piece has quartz in. size quite similar 3%
Coarse		Clinopyroxene	Rounded	Few		
Coarse		Alteration to serpentine	Fuzzy	Few		Random Acicular crystals fanning out, can see outline of old mineral in PPL, can't focus on it. They might have been pyroxenes and this is typical of ultra-mafic rocks.
Coarse	X	Plagioclase feldspar	Rounded	Few	Rock fragment	
Fine		Plagioclase feldspar	Sub-angular	Frequent		Fresh, some beginning to alter, size range in narrow band. A couple with polysynthetic twinning.
Fine		Alteration to serpentine	Fuzzy	Few		Same as coarse fraction
Fine		Quartz	Sub-angular	Few		Similar size range as fine feldspar, slightly weathered.
Fine		Olivine	Sub-angular	Few		
Fine		Opaque	Rounded	Few		
Fine		Clinopyroxene	Rounded	Few		
Fine		Mudstone	Well rounded	Rare		Quartz rich mudstone

Site	Carngoon Bank	Description	**HN3** (HN1) Poorly sorted fabric. Reduced			
Slide	9					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Sub angular	Frequent	Altered plagioclase feldspar	Fuzzy, remnant simple and polysynthetic twinning.
					Quartz	
Coarse		Quartz	Sub-angular	Few		Roughly similar size 1%
Coarse	X		Sub angular	Rare	Altering pyroxene	
					Biotite	
Coarse		Mudstone	Rounded	Rare		Red
Fine		Opaque	Rounded	Frequent		Ferrous
Fine		Biotite	Laths	Frequent		Broad size range and width
Fine		Muscovite	Laths	Few		
Fine		Alteration to serpentine	Rounded	Few		
Fine		Blue?	Lath	Rare		Pleo in PPL, blue/green, XP very dark uniform extinction.
Fine		Amphibole	Sub rounded	Rare		
Fine		Olivine	Angular	Rare		Frags, yellow, clear PPL

Site	Carngoon Bank	Description	**HN3** (HN1) Poorly sorted fabric. Oxidised			
Slide	10					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Plagioclase feldspar	Angular	Frequent		Simple and polysynthetic twinning, Some altering.
Coarse		K-feldspar	Angular	Few		Perthite
Coarse		Altering to serpentine	Sub-angular	Few		More brown in PPL than other samples.
Coarse	X		Well rounded	Few	Quartz	
					Plagioclase feldspar	
Fine		Plagioclase feldspar	Angular	Frequent		Simple and polysynthetic
Fine		Altering to serpentine	Sub-angular	Few		
Fine		Sandstone conglomerate	Rounded	Few		Quartz mica
Fine		Pyroxene	Lath	Few		Leaching clay minerals
Fine		Opaque	Well rounded	Few		Dark red/ brown, clay pellet?
Fine		Quartz	Sub-angular	Few		
Fine		Kyanite?	Angular	Few		Blue/colourless in PPL, dark in XP, could be bubbles
Fine		Kyanite?	Rounded	Few		Blue/green in PPL, dark in XP, could be bubbles.
Fine		Mudstone	Well rounded	Rare		Red biotite quartz
Fine		Amphibole	Lath	Rare		Broad size range
Fine		Biotite	Lath	Rare		

Site	Carngoon Bank	Description	**HN3 Admixture** (HN1) Poorly sorted fabric. Oxidised			
Slide	11					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	s- rounded to rounded	Frequent		Rock frag, Range of sizes
Coarse		Quartz composite	Sub-angular	Few		Rock frag, broad size range
Coarse	X		Sub angular	Rare	Clinopyroxene	Altered and leaching
					Quartz	Clay minerals
					Altering to serpentine	
Coarse	X		Angular	Rare	Quartz	
					Plagioclase feldspar	
Fine		Quartz	Sub-angular	Frequent		
Fine		Clinopyroxene	Angular	Few		
Fine		Plagioclase feldspar	Angular	Few		Fresh, string twinning
Fine		K-Feldspar	Angular	Few		Perthite between lamella
Fine		Biotite	Lath	Few		Varying width
Fine		Opaque	Rounded	Few		
Fine		Altering to serpentine	s-rounded to rounded	Few		Merging boundaries
Fine		Olivine	Angular	Rare		Slightly altered, vary in size and forms generally angular
Fine		Hornblende	Rounded	Rare		
Fine		Mudstone	Rounded	Rare		Red dense
Fine		Sandstone conglomerate	Rounded	Rare		Quartz mica
Fine		Muscovite	Laths	Rare		Very small

Site	Carngoon Bank	Description	**HN3 Admixture** (HN1) Poorly sorted fabric. Oxidised with reduced core			
Slide	12					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X	Quartz composite	Angular	Frequent		Extruding clay minerals
Coarse		Altered plagioclase feldspar	Sub-angular	Few		
Fine		Quartz	Angular	Frequent		
Fine		Plagioclase feldspar	Angular	Few		Fresh, twinning, square rectangular pieces
Fine		Hornblende	Sub-rounded	Few		Some extruding clay minerals, one piece with altering to serpentine in.
Fine		Altering to serpentine	Rounded	Few		
Fine		Opaque	Well rounded	Few		Black oxide iron?
Fine		Biotite	Laths	Few		
Fine		Clinopyroxene	Rounded	Few		Bright pink/orange XP, uniform cleavage, colourless in PPL.
Fine		Sandstone or conglomerate	Well rounded	Few		Quartz mica
Fine		Pyroxene altering	Rounded	Rare		

Site	Carngoon Bank	Description	**HN3** (HN1) Poorly sorted fabric. Reduced. Really degraded minerals.			
Slide	13					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Sub-angular	Frequent		Fuzzy, remnant twinning, broad range of sizes
Coarse		Quartz	Sub-rounded	Few		Not fresh, extruding clay minerals
Coarse		Altered serpentine	Well rounded	Few		Yellow/brown, fuzzy, cracking lines
Fine		Altered plagioclase feldspar	Sub-angular	Frequent		
Fine		Quartz composite	Sub-rounded	Few		
Fine		Tremolite	Acicular ball	Few		Colourful, mass of intergrowth laths and crystals
Fine		Opaque	Well rounded	Rare		Black, iron oxide?
Fine		Blue crystal	Angular	Rare		Blue in PPL, rectangular, darker blue in XP, goes lighter extinction.
Fine		Biotite	Laths	Rare		
Fine		Clinopyroxene	Rounded	Rare		Very eroded, boundary merging
Fine		Amphibole	Well rounded	Rare		Small
Fine	X		Rounded	Rare	Quartz	
					Plagioclase feldspar	Leaching clay minerals
Fine		K-feldspar	Angular	Rare		
Fine		Schist	Sub angular	Rare		Quartz biotite

Site	Carngoon Bank	Description	**HN3** (HN1) Poorly sorted fabric. Oxidised with a reduced core			
Slide	14					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X	Quartz polycrystalline	Angular	Frequent		Rock frag, 2%
Coarse	X	Altered plagioclase feldspar	Sub rounded	Few		Twinning. Fuzzy, merging boundaries
Fine		Quartz	Angular	Frequent		
Fine		Altered plagioclase feldspar	Sub-rounded	Few		Twinning, fuzzy, merging boundaries
Fine		clinopyroxene	Sub rounded	Frequent		Light yellow. Some altered very colourful. Leaching clay minerals. Boundaries merging
Fine		Olivine	Angular	Few		Merging boundaries
Fine		Opaque	Well rounded	Few		Black iron oxide?
Fine		Clay pellets	Rounded	Few		Quartz serpentine inclusions
Fine		Plagioclase feldspar	Hexagon	Rare		Oscillatory zoning, altering fuzzy.
Fine		Sandstone	Well rounded	Rare		Quartz mica
Fine		Biotite	Laths	Rare		Similar shape
Fine		Hornblende	Rounded	Rare		Eroded, 90’ cleavage

Site	Carngoon Bank	Description	**HN3 Admixture** (HN1) Poorly sorted, Reduced			
Slide	15					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Sub-angular	Few	Quartz	2%
				Few	Plagioclase feldspar	Sometimes not every one
Coarse		Altered plagioclase feldspar	Sub-angular	Few		Fuzzy, remnant twinning 1%
Fine		Quartz polycrystalline	Sub-angular	Few		
Fine	X		Angular	Few	Pyroxene	Small pieces
				Few	Altered plagioclase feldspar	
Fine		Opaque	Rounded	Few		Black, iron oxide?
Fine		Altering to serpentine	Well rounded	Few		
Fine		muscovite	laths	Rare		
Fine		Serpentine	Rounded	Rare		Golden yellow
Fine		Clay pellet	Well rounded	Rare		
Fine		Clinopyroxene	Rounded	Rare		Leaching clay minerals
Fine		Hornblende	Sub-rounded	Rare		Bright blue

Site	Carngoon Bank	Description	**HN3** (HN1), Very poorly sorted. Reduced			
Slide	16					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Sub-rounded	Frequent		Fuzzy, remnant twinning
Coarse		Quartz polycrystalline	Angular	Few		Aggregation 1%
Fine		Altered plagioclase feldspar	Sub-rounded	Frequent		Fuzzy, remnant twinning
Fine		Clinopyroxene	Angular	Frequent		
Fine		Quartz	Sub-rounded	Few		Aggregation 1%
Fine		K-feldspar	Angular	Rare		Perthite twinning, fresh.
Fine		Mudstone	Rounded	Rare		
Fine	X	Clay pellet	Angular	Rare	Altering to serpentine	
					Altered plagioclase feldspar	
Fine		Muscovite	Lath	Rare		
Fine		Biotite	Lath	Rare		
Fine		Sandstone	Rounded	Rare		
Fine		Garnet	Pentagon angular	Rare		One

Site	Carngoon Bank	Description	**HN3** (HN1) Moderately sorted fabric Oxidised			
Slide	17					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Sub-angular	Frequent	Altered plagioclase feldspar	2%
					Plagioclase feldspar	Twinning
					Quartz	Aggregation
Coarse		Altered plagioclase feldspar	Sub-angular	Frequent		Fuzzy, remnant twinning
Coarse		Tremolite	Well rounded	Rare		Bright coloured, blurry
Fine		Altered plagioclase feldspar	Sub-angular	Frequent		Fuzzy.
Fine		Plagioclase feldspar	Angular	Few		Fresh, small pieces
Fine		Quartz polycrystalline	V-angular	Few		Small
Fine		Altering to serpentine	Well rounded	Few		Bright coloured, blurry
Fine		Opaque	Angular	Few		Black iron oxide
Fine		Biotite	Rounded laths	Few		Merging boundaries, some laths scattered in matrix.
Fine		Pyroxene	Sub-rounded	Few		Boundaries merging, intergrowth of clay minerals
Fine		Quartz	Well rounded	Rare		Beach sand
Fine		Amphibole	Sub rounded	Rare		
Fine		Sandstone	Rounded	Rare		
Fine	X		Rounded	Rare	Biotite	
					Altered plagioclase feldspar	Rock frag

Site	Carngoon Bank	Description	**Serpentine** (Metallic) Well sorted, Oxidised. really dense section very different from previous. You can see orientation of clay. Coils? (serpentine fabric)			
Slide	18					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Serpentine	Sub-rounded	Frequent		1%, different sizes, quite often altering to colourful.
Coarse		Altering to serpentine	Rounded	Frequent		2%, possibly from olivine, boundaries merging
Coarse	X	Quartz stretched	Angular	Frequent		2%, aggregations, some with plagioclase
Coarse		Altered plagioclase feldspar	Sub-angular	Rare		fuzzy
Fine		Serpentine	Sub-rounded	Frequent		
Fine		Altering to serpentine	Rounded	Frequent		
Fine		Quartz	Angular	Frequent		
Fine		Muscovite	Laths	Frequent		Very thin
Fine		Plagioclase feldspar	Sub-angular	Few		Twinning
Fine		Pyroxene	Well rounded	Few		PPLred/brown non pleo, XP red with arrears of alteration with high birefringence colours
Fine		Olivine	Sub-rounded	Rare		Small
Fine		Garnet	Well rounded	Rare		
Fine		Sandstone	Sub angular	Rare		
Fine		Clay pellet	Well rounded	Rare		Quartz inside
Fine		Opaque	Rounded	Rare		

Site	Carngoon Bank	Description	**Hornblende** (Metallic). Well sorted. Oxidised Thin vessel jam packed with inclusions, mostly rock frags with minerals that have been broken down from them.			
Slide	19					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Sub-rounded	Rare		Two, no twinning,or pleo leaching clay minerals
Coarse	X		Angular	Few	Quartz	1%
					Altered plagioclase feldspar	
					Hornblende	
Fine		Quartz	Angular	Frequent		3%+
Fine		Hornblende	Sub-rounded	Frequent		1% Small,
Fine	X		Sub angular	Frequent	Quartz	
					Plagioclase feldspar	
					Hornblende	
Fine		Sandstone	Rounded	Few		Rectangle
Fine		Altered plagioclase feldspar	Sub-angular	Few		Remnant twinning
Fine		Biotite	Lath	Rare		
Fine		Muscovite	Lath	Rare		
Fine		Quartz polycrystalline	Angular	Rare		
Fine		Plagioclase feldspar	Angular	Rare		

Site	Carngoon Bank	Description	**Hornblende** (Metallic). Moderately sorted fabric. oxidised exterior with reduced core and interior very dense inclusions. Fine quartz in micromass			
Slide	20					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Sub-angular	Frequent	Quartz	1%
					Plagioclase feldspar	
					Hornblende	
					Altered plagioclase feldspar	
Fine		Quartz	Angular	Frequent		Cracked, sometimes leaching clay minerals
Fine		Hornblende	Angular	Few		From rock frags
Fine		Plagioclase feldspar	Angular	Few		From rock frags
Fine		Muscovite	Laths	Few		Thin
Fine		Quartz polycrystalline	Angular	Few		
Fine		Tremolite?	Lath	Rare		3 fibrous lath pieces, high relief in PPL no pleo, XP pink, green and brown, uniform extinction, one cleavage.
Fine		Opaque	Well rounded	Rare		Black/brown iron oxide
Fine		Olivine	Sub-rounded	Rare		Small pieces
Fine		Mudstone	Rounded	Rare		Rectangle
Fine		Chlorite	Angular	Rare		

Site	Carngoon Bank	Description	**Hornblende** (Metallic) poorly sorted. reduced			
Slide	21					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Clay pellets	Well rounded	Few		8 balls, visible in relief with altered **serpentine and quartz in** and plagioclase feldspar.
Coarse		Altering to serpentine	Angular	Few		Merging boundaries
Coarse		Altered plagioclase feldspar	Very angular	Few		
Coarse	X		Angular	Few	Quartz	Aggregation mostly quartz
					Plagioclase feldspar	
Coarse		Plagioclase altering to muscovite	Rounded	Rare		Stripy black/white/pink/blue/yel low piece.
Fine		Clay pellet	Well rounded	Few		Quartz and serpentine in
Fine		Sandstone	Rounded	Few		
Fine		Hornblende	Sub-rounded	Few		
Fine		Muscovite	Laths	Few		
Fine		Plagioclase feldspar	Sub-angular	Few		Twinning, often with intergrowth or alteration
Fine		Olivine	Angular	Rare		Rectangular pieces, 2^{nd} order, cleavage.

Site	Carngoon Bank	Description	**Hornblende** (Metallic) poorly sorted. oxidised			
Slide	22					
Micromass	Active					
Fraction	Rock Fragment	Mineral	Shape	Frequency	Minerals	Details
Coarse	X		Angular	Few	Quartz	1%, range in size, from
					Plagioclase feldspar	3-4mm-1mm, fresh
					Hornblende	
					Altered plagioclase feldspar	
Coarse		Mica schist	Laths	Few		like altering to serpentine but not, Some kind of schist? Muscovite?
Coarse		Amphibole/pyroxene?	Sub-angular	Rare		Black/white, one cleavage.
Fine	X		Angular	Frequent	Quartz	
					Plagioclase feldspar	
					Hornblende	
					Altered plagioclase feldspar	
Fine		Quartz polycrystalline	Angular sub-angular	Frequent		<1% small
Fine		Hornblende	Sub-angular	Few		Lenticular shape, rectangular 2%
Fine		Plagioclase feldspar	Sub-angular	Few		
Fine		Altered plagioclase feldspar	Sub-rounded	Few		Mostly in rock frags
Fine		Muscovite	Laths	Few		
Fine		Serpentine	Sub-angular	Rare		Black/white no colours
Fine		Opaque	Well rounded	Rare		
Fine		Olivine	Angular	Rare		Very small

Site	Carngoon Bank	Description	**Hornblende** (Metallic), well sorted fabric. oxidised			
Slide	23					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Angular	Few	Quartz	Fragments broken off into
					Amphibole	Fine fraction
					Plagioclase feldspar	
Coarse		Serpentine	Sub-rounded	Rare		Acicular crystals forming inside, Very degraded, yellow/red in XP &PPL
Coarse		Altered feldspar	Sub-angular	Few		Fuzzy, yellow/black
Coarse	X		Sub-angular	Few	Plagioclase feldspar	Twinning
					Quartz	
Fine		Hornblende	Sub-rounded	Frequent		2%, strong green pleo,
Fine		Opaque	Well rounded	Few		Black, iron oxide?
Fine		Quartz	Angular	Rare		
Fine		Muscovite	Lath	Rare		
Fine		Biotite	Lath	Rare		
Fine		Altering to serpentine	Sub-rounded	Rare		
Fine		Sandstone	Rounded	Rare		

Site	Carngoon Bank	Description	**HN3** (HN IRON), well sorted fabric Reduced			
Slide	24					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Sub-angular	Rare	Quartz polycrystalline	Leaching clay minerals
					Altered Plagioclase feldspar	Fuzzy
Coarse		Altered plagioclase feldspar	Sub-angular	Rare		Twinning, only two this size
Fine		Opaque	Sub angular	Frequent		
Fine		Altered plagioclase feldspar	Angular sub-angular	Frequent		Fuzzy, leaching clay minerals, similar size, remnant simple and polysynthetic twinning.
Fine		Plagioclase feldspar	Angular	Frequent		Similar size, simple and polysynthetic twinning, some with alteration patches
Fine		Pyroxene	Well rounded	Few		Leaching clay minerals
Fine		Amphibole	Sub angular	Few		
Fine		Altering to serpentine	Sub-angular	Few		Acicular 2nd order crystals, some in altered feldspar
Fine		Quartz	Angular	Few		Small pieces
Fine		Biotite	Lath	Few		Small pieces
Fine		Muscovite	Lath	Few		
Fine		K-feldspar	Angular	Rare		
Fine		Serpentine	Sub-angular	Rare		Slightly altered, obtuse cleavage

Site	Carngoon Bank	Description	**Hornblende** (HN IRON) Poorly sorted , Reduced			
Slide	25					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Angular	Few	Quartz	Some alteration,
					Plagioclase feldspar	Leaching clay minerals
					K-feldspar	
Coarse	X		Sub-angular	Rare	Biotite	Leaching clay minerals
					Quartz	
					Plagioclase feldspar	
Coarse	X		Sub-angular	Few	Altered plagioclase feldspar	fuzzy
					Amphibole	
Coarse		Amphibole (Tremolite?)	Angular	Rare		Obtuse cleavage, weak pleo, 2nd order, uni ext,
Fine		Plagioclase feldspar	Angular	Frequent		
Fine		K-Feldspar	Sub-rounded	Frequent		Microcline, simple and polysynthetic twinning, some altering, broad size range, fine to coarse
Fine		Biotite	Lath rounded	Few		
Fine	X		Angular	Few	K-feldspar	
					Plagioclase feldspar	
Fine		Opaque	Sub rounded	Few		
Fine		Quartz	Sub-angular	Few		
Fine		Pyroxene	Rounded	Rare		Clear in PPL, 2nd order, only one.

Site	Carngoon Bank	Description	**HN3 Admixture** (HN IRON), very poorly sorted fabric. Reduced. Hard to see any of the minerals .			
Slide	26					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Sub-angular to sub-rounded	Frequent		2% fuzzy, very iron stained
Coarse		Plagioclase feldspar	Angular	Few		Simple twinning, most are slightly altered, but are fresher than altered group
Coarse		Quartz	Sub-rounded	Few		
Fine		Muscovite	Laths	Few		
Fine		Opaque	Rounded	Few		
Fine		Plagioclase feldspar	Angular	Few		
Fine		Quartz	Angular	Few		
Fine		Pyroxene	Rounded	Rare		
Fine		Altering to serpentine	Rounded	Rare		Merging boundaries

Site	Carngoon Bank	Description	**HN3 Admixture** (HN IRON) well sorted, Oxidised			
Slide	27					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Angular to sub-angular	Rare	Altered plagioclase feldspar	Some fragments are more fresh with no alteration of
					Quartz composite intrusion	The feldspar and clear twinning
Coarse		Pyroxene	Sub-rounded	Rare		Diamond shaped piece maybe some in fabric.
Coarse		Altered plagioclase feldspar	Sub-rounded	Frequent		Fuzzy, yellow/black
Fine		Quartz polycrystalline	Angular	Few		
Fine		Sandstone	Well rounded	Few		
Fine		Muscovite	Lath	Few		
Fine		Altering to serpentine	Rounded	Few		Boundaries merging
Fine		Biotite	Stubby laths	Few		Could be alteration product
Fine		Opaque	Rounded	Rare		
Fine		Plagioclase feldspar	Angular	Rare		
Fine		Pyroxene	Sub-rounded	Rare		
Fine		Amphibole (hornblende)	Sub-rounded	Rare		Small pieces, similar ratio to pyroxene.
Very Fine		Quartz	Sub-angular	Very Rare		
Very Fine		Plagioclase feldspar	Angular	Very Rare		Fresh, Twinning

Site	Carngoon Bank	Description	**HN3 (**HN IRON) Poorly sorted , Reduced			
Slide	28					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Sub-angular	Frequent		3%, fuzzy, some are well rounded with intergrowth of Sericite inside.
Coarse	X		Well rounded	Rare	Quartz	
					Plagioclase feldspar	
					Alteration product, chlorite	
Fine		Altered plagioclase feldspar	Sub-angular	Frequent		
Fine		Quartz polycrystalline	Angular	Few		
Fine		Plagioclase feldspar	Angular	Few		Fresh, some polysynthetic most simple twinning,
Fine		Sericite in altered feldspar	Acicular	Few		
Fine		Altering to serpentine	Rounded	Few		Ball
Fine		Pyroxene	Sub-rounded	Few		Perfect example of possibly orthopyroxene
Fine		Opaque	Rounded	Rare		
Fine		K-feldspar	Sub angular	Rare		
Fine		Olivine	Rounded	Rare		Merging boundaries
Fine		Amphibole	Sub-angular	Rare		Slightly altered, boundaries merging

Site	Carngoon Bank	Description	**HN3** (HN IRON) . Very poorly sorted . Reduced			
Slide	29					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Plagioclase feldspar	Sub-angular to sub-rounded	Frequent		Shape dependant on level of alteration, 3%> simple twinning all are slightly altered with fuzzy areas.
Coarse		Clinopyroxene	Sub-angular	Frequent		2%<, range of sizes throughout fabric.
Fine		Olivine	Sub-angular	Frequent		
Fine		Quartz	Sub-angular	Few		Very few
Fine		Pyroxene	Rounded	Rare		With alteration to biotite
Fine		Amphibole (hornblende)	Rounded	Rare		Very dark red, but pleo in PPL. Only a couple
Fine		Opaque	Rounded	Rare		

Site	Carngoon Bank	Description	**Serpentine** (DRS) Well sorted. Oxidised fine quartz in micromass			
Slide	30					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Sub-angular	Few		fuzzy
Coarse	X		Angular	Frequent	Quartz	Extruded clay minerals
					Plagioclase feldspar	
					Biotite intergrowth (some with)	
Coarse		Serpentine	Well rounded	Rare		Black/white(altering) blurry
Fine		Altered plagioclase feldspar	Sub-angular	Few		
Fine		Amphibole (hornblende)	Rounded	Few		Obtuse cleavage
Fine		Biotite	Laths	Few		Colourless fibrous mineral,
Fine		Olivine	Angular	Few		
Fine		Opaque	Angular	Rare		
Fine		Clay pellet	Well rounded	Rare		
Fine		Altering to serpentine	Angular	Rare		

Site	Carngoon Bank	Description	**Hornblende** (DRS) Moderately sorted. Oxidised exterior and interior and reduced core. Very dark fabric, very hornblende rich. Fine quartz in micromass			
Slide	31					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Angular	Frequent	Quartz	1%> Range of sizes,
					Plagioclase feldspar	
					Altered plagioclase feldspar	
					Amphibole (hornblende)	
Coarse		Acicular crystals	Rounded	Rare		2^{nd} order, slightly blurry surrounding a black mass (iron oxide)
Fine		Hornblende	Rounded	Frequent		1%>, Green PPL, range of sizes within fine fraction, rounded with rectangle or diamond shape.
Fine		Plagioclase feldspar	Sub-angular	Few		
Fine		Quartz	Sub-angular	Few		
Fine		Altering to serpentine	Well rounded	Few		
Fine		Quartz	Well rounded	Rare		Sand
Fine		Olivine	Angular	Rare		Very small pieces
Fine		Sandstone	Well rounded	Rare		
Fine		Chlorite	Rounded	Rare		

Site	Carngoon Bank	Description	**Hornblende** (DRS) Poorly sorted. Reduced. very like slide 21 & 22, section packed with inclusions.			
Slide	32					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Angular	Few	Quartz	Merging boundaries or
					Hornblende	Black ring around, feldspar
					Plagioclase feldspar	Alteration in smaller pieces.
Coarse		Altered serpentine	Well rounded	Few		Brown/yellow/orange rounded, PPL= yellow/brown, no cleavage, non pleo, XP mottled. Broad sizes
Coarse		Fractured quartz	Angular	Rare		coulourless in PPL, non pleo, XP white, grey black ext.
Fine		Amphibole (hornblende)	Angular	Few		
Fine		Quartz polycrystalline	Angular	Few		Grains
Fine		Plagioclase feldspar	Angular	Few		Simple twinning
Fine		Altering to serpentine	Well rounded	Few		Merging boundaries, one large piece is surrounding a dark mass (iron ox)
Fine		Biotite	Lath	Rare		Small
Fine		Muscovite	Lath	Rare		Small
Fine		Sandstone	Well rounded	Rare		
Fine		Olivine	Sub angular	Rare		Very small
Fine		Chlorite	Rounded	Rare		

Site	Carngoon Bank	Description	**Serpentine** (DRS) Well sorted fabric Oxidised. very fine. lots of black frags (iron oxide)?, no rock frags,			
Slide	33					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Fine		Altered plagioclase feldspar	Sub-rounded	Frequent		Broad size range fine to micromass
Fine		Quartz	Sub-angular	Frequent		Broad size range fine to micromass
Fine		Opaque	Sub-angular	Frequent		Black iron oxide
Fine		Plagioclase feldspar	Angular	Frequent		Lath shaped
Fine		Pyroxene	Sub angular	Few		
Fine		Olivine	Angular	Rare		
Fine		Muscovite	Lath	Rare		
Fine		Pellet	Well rounded	Rare		Brown pellets could be grog
Fine		Biotite	Lath	Rare		Only one
Fine		Serpentine	Well-rounded	Rare		Only two, green PPL

Site	Carngoon Bank	Description	**Hornblende** (DRS), poorly sorted fabric. reduced core oxidised interior and exterior			
Slide	34					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Sub-rounded	Frequent	Quartz	Leaching clay minerals
					Plagioclase feldspar	Lots of rock frags small to
					Altered plagioclase feldspar	Largest.
Coarse		Quartz polycrystalline	Angular	Frequent		
Coarse		Altered plagioclase feldspar	Rounded	Few		Fuzzy
Fine		Plagioclase feldspar	Rounded	Few		Simple twinning some fuzzy
Fine		Olivine	Well rounded	Few		Very small pieces
Fine		Biotite	Rounded lath	Rare		
Fine		Sandstone	Well rounded	Rare		Rectangle
Fine		Opaque	Rounded	Rare		
Fine		Hornblende	Rounded	Rare		Altered
Fine		Altered amphibole	Well rounded	Rare		Only one, hornblende?

Site	Carngoon Bank	Description	**Hornblende** (DRS), poorly sorted fabric, Oxidised. lots of rock frags of all sizes.			
Slide	35					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Sub rounded	Frequent	Quartz	Broad size range from
					Plagioclase feldspar	Medium to largest
					Hornblende	
					Altered plagioclase feldspar	(occasionally)
Coarse		Schist (quartz/mica)	Rounded	Few		
Fine		Quartz	Sub-angular	Frequent		
Fine		Plagioclase feldspar	Rounded	Few		Simple twinning
Fine		Schist (quartz/mica)	Rounded	Few		
Fine	X		Rounded	Few	Quartz	
					Plagioclase feldspar	
Fine		Altered amphibole	Rounded	Few		Very small
Fine		Chlorite	Rounded	Rare		
Fine		Sandstone	Sub rounded	Rare		
Fine		Hornblende	Rounded	Rare		One
Fine		Muscovite	Lath	Rare		

Site	Carngoon Bank	Description	**Hornblende** (SR) well sorted fine fabric. Oxidized exterior and interior with a reduced core Slivers of different clay can be seen running through poorly mixed clay. There are large rock frags and very small minerals, big difference between them. Fine quartz in micromass			
Slide	36					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Rounded	Frequent	Quartz	Extruding clay minerals
					Plagioclase feldspar	Some with no pyroxene
					Hornblende	Feldspar generally altered, medium size to largest inclusions
Coarse		Sandstone	Rounded	Few		Or just quartz, broad size range
Coarse		Altered serpentine	Rounded	Rare		
Fine		Quartz polycrystalline	Angular	Frequent		
Fine		Muscovite	Lath	Few		Very small
Fine		Clay Pellets	Well rounded	Few		
Fine	X		Sub rounded	Few	Quartz	
					Plagioclase feldspar	
Fine		Altered amphibole	Rounded	Rare		Very small piece.
Fine		Altered plagioclase feldspar	Rounded	Rare		
Fine		Chlorite	Rounded	Rare		

Site	Carngoon Bank	Description	**Hornblende** (SR), poorly sorted fabric**.** Oxidized. gradation of all sizes. Mineral inclusions in fine fraction are aligned with vertical axis of pot.(forming techniques) Fine quartz in micromass.			
Slide	37					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Schist (quartz/muscovite)	Angular	Rare		
Coarse	X		Angular	Frequent	Quartz	
					Plagioclase feldspar	Some altered
					Altered plagioclase feldspar	
Coarse	X		Angular	Frequent	Quartz	
					Hornblende	
					Plagioclase feldspar	Small amount of it in rock
Coarse	X		Rounded	Rare	Schist quartz/mica	
					Altered Serpentine	
Fine		Hornblende	Sub-angular	Frequent		
Fine		Quartz	Angular	Frequent		
Fine		Biotite	Laths	Frequent		Long to small laths
Fine		Quartz polycrystalline	Angular	Few		
Fine		Plagioclase feldspar	Angular	Few		Simple twinning
Fine		Clay Pellet (grog)	Well rounded	Few		Darker clay ball with lots of biotite and quartz in, only two pieces,

Site	Carngoon Bank	Description	**Hornblende** (SR), Well sorted fabric. Oxidised exterior and interior with reduced core. Mica laths mostly orientated parallel to vertical axis of pot.. Fine quartz in micromass. Not as much hornblende as others in this fabric.			
Slide	38					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Sub-angular	Rare	Altered plagioclase feldspar	
					Quartz	
Coarse		Opaque	Well rounded	Rare		Iron oxide?
Fine		Muscovite	Laths	Frequent		
Fine	X		Angular	Few	Altered plagioclase feldspar	One frag with pyroxene in
					Quartz	
					Hornblende	
Fine		Schist (biotite/quartz)	Angular	Few		
Fine		Biotite	Laths	Few		
Fine		Chlorite	Angular	Few		
Fine		Pyroxene (Augite?)	Well rounded	Rare		Leaching clay minerals
Fine		Plagioclase feldspar	Angular	Rare		Fresh, clear simple twinning, very small.

Site	Carngoon Bank	Description	**Hornblende** (SR). Well sorted. Oxidized. Fabric with large inclusions then very small of all the same size. Minerals orientated vertical axis. Lots of well rounded iron pellets or grog. Fine quartz in micromass			
Slide	39					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Sub-rounded to rounded	Few	Altered plagioclase feldspar	Leaching clay minerals
					Hornblende	3^{rd} order pink
					Quartz (some)	
Coarse		Clay pellet	Well rounded	Few		Black, grog?
Fine		Muscovite	Laths	Frequent		
Fine		Quartz	Angular	Few		Very small
Fine		Plagioclase feldspar	Sub rounded	Few		Simple twinning, equal amount as quartz
Fine	X		Angular	Few	Quartz polycrystalline	
					Plagioclase feldspar	
Fine		Sandstone	Rounded	Rare		Rectangle
Fine		Amphibole (hornblende)	Rounded	Rare		
Fine		Pyroxene or (orthpyrox)	Rounded	Rare		
Fine		Schist (quartz/ mica)	Rounded	Rare		

Site	Carngoon Bank	Description	**Hornblende** (SR). Poorly sorted fabric. Oxidised interior and exterior with reduced core. Some opaque iron oxide pellets of grog well rounded.. Fine quartz in micromass			
Slide	40					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Sub-angular to sub-rounded	Frequent	Altered plagioclase feldspar	
					Plagioclase feldspar	Fresh simple twinning
					Quartz	Size range largest to
					Pyroxenes	medium
					Amphibole (hornblende)	
Coarse	X		Rounded	Few	Schist Muscovite	Merging boundaries
					Pyroxenes	Leaching clay minerals
Fine		Quartz	Angular	Few		More in micromass
Fine		Plagioclase feldspar	Angular	Few		Fresh and altered, simple twinning
Fine		Sandstone	Angular	Few		
Fine		Muscovite	Laths	Few		
Fine	X		Angular	Few	Hornblende	
					Quartz	
					Altered Plagioclase feldspar	
					Plagioclase feldspar	
Fine		Hornblende	Angular	Few		
Fine		Clay pellet	Well rounded	Few		
Fine		Clinopyroxene	Angular	Rare		
Fine		Opaque	Rounded	Rare		Black iron oxide.
Fine		Chlorite	Angular	Rare		

Site	Carngoon Bank	Description	**Schist** (SGS). Well sorted fabric. Oxidised. Mica vertically aligned. Can see slivers of a different coloured clay in centre.			
Slide	41					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Schist (muscovite)	Rounded	Rare		
Coarse	X		Sub-rounded	Few	Altered plagioclase feldspar	Leaching clay minerals
					Quartz	
					Amphibole	
Fine		Quartz	Angular to sub-angular	Frequent		Polycrystalline
Fine		Muscovite	Laths	Frequent		
Fine		Plagioclase feldspar	Angular	Few		Simple twinning
Fine		Altered plagioclase feldspar	Angular	Few		
Fine		Biotite	Laths	Few		Longer and larger
Fine		Hornblende	Angular	Few		
Fine		Pyroxenes	Rounded	Few		Very small and old
Fine		Opaque	Rounded	Rare		Iron oxide pellet
Fine		Sandstone	Rounded	Rare		

Site	Carngoon Bank	Description	**Hornblende** (SGS), Moderately sorted fabric. Oxidised interior and exterior surfaces with reduced core. Fine quartz in micromass.			
Slide	42					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Sub-rounded	Frequent	Altered plagioclase feldspar	Leaching clay minerals
					Plagioclase feldspar	Broad size range
					Amphibole (hornblende)	
					Quartz	
Coarse		Quartz	Rounded	Frequent		Broad size range >
Fine		Schist (quartz/muscovite)	Angular	Few		
Fine		Amphibole (hornblende)	Rounded	Few		
Fine		Pyroxene	Angular	Few		
Fine		Muscovite	Laths	Rare		

Site	Carngoon Bank	Description	**Hornblende** (SGS), Poorly sorted fabric Oxidised with interior and exterior surfaces with reduced core. With grog pellets.			
Slide	43					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Opaque	Well rounded	Rare		Black with muscovite in, clay pellet.
Coarse	X		Sub-angular	Few	Quartz	
					Plagioclase feldspar	
					Altered plagioclase feldspar	
					Hornblende	
Coarse	X		Sub-angular	Few	Quartz (bad?)	Extruding clay minerals
					Amphibole	Merging boundaries
					Schist (biotite)	
					Schist (quartz/mica)	
Fine		Quartz	Rounded	Frequent		Size medium to small
Fine		Hornblende	Angular Laths	Frequent		
Fine		Opaque	Rounded	Few		Black pellets iron oxide
Fine	X		Sub angular	Few	Quartz	
					Plagioclase feldspar	
					Hornblende	
Fine		Clay pellet	Well rounded	Few		
Fine		Quartz polycrystalline	Angular	Few		
Fine		Muscovite	Laths	Rare		
Fine		? rectangular colourful	Lath	Rare		High 2^{nd} order, clear in PPL, non pleo, has colour radiating inwards.

Site	Carngoon Bank	Description	**Hornblende/Schist** (SGS). Moderately sorted fabric. Oxidised. With three clear inclusion sizes. Jam packed with loads of altering minerals. No alignment of mineral vertically. Sliver of different colour clay in middle. Fine quartz in micromass.			
Slide	44					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Angular	Few	Altered plagioclase feldspar	(becoming mica schist)
					Quartz	Leaching clay minerals
					Garnet	
					Amphibole	This is the black and white rock I have seen in macro
Coarse		Schist (biotite/muscovite)	Sub-angular	Few		Very foliated
Coarse		Schist (mica/amphibole)	Rounded	Rare		
Fine		Quartz	Sub-rounded	Dominant		Very frequent to smallest
Fine		Amphibole	Rounded	Frequent		Good cleavage, weak pleo, clear PPL similar shape, 2^{nd} order colours.
Fine		Muscovite	Laths	Frequent		
Fine	X		Angular	Few	Quartz	
					Plagioclase feldspar	
					Hornblende	
Fine		Plagioclase feldspar	Angular	Few		Simple twinning
Fine		Mudstone	Rounded	Rare		Rectangle
Fine		Olivine	Angular	Rare		

Site	Carngoon Bank	Description	**Hornblende/Schist** (SGS). Poorly sorted fabric. Oxidised interior and exterior surfaces with reduced core. No orientation of inclusions.			
Slide	45					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Schist (mica/quartz)	Sub-rounded	Frequent		
Coarse		Altered plagioclase feldspar	Rounded	Few		
Fine		Muscovite	Laths	Frequent		
Fine		Plagioclase feldspar	Angular	Frequent		Simple twinning
Fine		Hornblende	Rounded	Few		Degraded
Fine	X		Angular	Few	Quartz	
					Plagioclase feldspar	
					Hornblende	
Fine		Quartz polycrystalline	Angular	Few		
Fine		Opaque	Rounded	Rare		Brown/black pellet iron?

Site	Carngoon Bank	Description	**Hornblende/Schist** (SGS). Well sorted fabric. Oxidised. Few large inclusions but lots in fine fraction.. Fine quartz in fine fraction			
Slide	46					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Schist (muscovite/quartz)	Sub-angular	Rare		
Coarse		Schist (mica)	Angular	Rare		
Coarse	X		Angular	Frequent	Quartz	Leaching clay minerals
					Chlorite	
					Altered plagioclase feldspar	
					Hornblende	
Fine		Muscovite	Laths	Frequent		Fine laths
Fine		Schist (quartz/mica)	Angular	Frequent		
Fine		Quartz	Angular	Frequent		
Fine		Amphibole	Sub-angular	Few		
Fine		Biotite	Laths	Few		
Fine		Plagioclase feldspar	Angular	Few		Simple twinning
Fine		Pellet Hematite?	Well rounded	Few		Some with mica in
Fine	X		Angular	Rare	Quartz	
					Plagioclase feldspar	
					Hornblende	
Fine		Olivine	Rounded	Rare		
Fine		Opaque	Rounded	Rare		Pellet iron?

Site	Carngoon Bank	Description	**Mica Schist** (SGS). Moderately sorted fabric. Oxidised. Mica all vertically aligned to pot. Slivers of different clay running through.			
Slide	47					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Rounded	Few	Altered plagioclase feldspar	Leacing clay minerals
					Iron oxide?	
Coarse	X		Rounded	Frequent	Schist (muscovite)	Broad size range
					Altered plagioclase feldspar	
Coarse	X		Rounded	Rare	Altered plagioclase feldspar	
					Pyroxene	
Fine		Muscovite	Laths	Frequent		Fine laths all vertically orientated
Fine		Quartz	Angular	Few		
Fine		Biotite	Sub-angular	Few		Pieces and laths
Fine		Opaque	Well rounded	Few		Iron oxide
Fine		Mudstone	Well rounded	Rare		
Fine		Amphibole	Sub-rounded	Rare		Weakly pleo, 2nd order
Fine		K-feldspar ?	v-angular	Very rare		Only one very small

Site	Carngoon Bank	Description	**Mica Schist** (SGS). Well sorted fabric. Oxidised . Lots of fine quartz in micromass.			
Slide	48					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X Pebble		Well rounded	Rare	Chlorite (forming matrix)	Green in PPL
					Muscovite	
					Altered plagioclase feldspar	Fuzzy ,rounded floating in matrix
					Plagioclase feldspar	Simple twinning
					K-feldspar	Microcline
Coarse		Altered plagioclase feldspar	Rounded	Few		Fuzzy
Coarse		Schist (muscovite	Rounded	Rare		
Fine		Plagioclase feldspar	Sub-angular	Few		Altering
Fine		Schist (muscovite)	Rounded	Few		
Fine		Opaque	Angular	Few		Iron oxide
Fine		Clinopyroxene	Sub-angular	Rare		
Fine		K-feldspar	Sub-angular	Rare		Microcline and altering
Fine		Amphibole	Angular	Rare		

Site	Carngoon Bank	Description	**Hornblende** (SGS). Moderately sorted fabric. Oxidised poorly mixed. Mica orientated vertically to pot. Slivers of different clay running through.			
Slide	49					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Sub-rounded	Few	Quartz	Small crystals
					Plagioclase feldspar	Simple twinning
					Altered plagioclase feldspar	Fuzzy
					Hornblende	Very green in PPL
Coarse	X		Sub rounded	Few	Quartz	
					Altered plagioclase feldspar	
Fine		Quartz	Sub-angular	Few		
Fine		Muscovite	Laths	Few		
Fine		Opaque	Well rounded	Few		Iron oxide
Fine		Amphibole (hornblende)	Sub-angular	Few		
Fine		Sandstone	Rounded	Few		
Fine		Pellet hematite	Well rounded	Few		
Fine		Plagioclase feldspar	Angular	Rare		
Fine		Quartz	Well rounded	Rare		
Fine		Chlorite	Angular	Rare		

Site	Carngoon Bank	Description	**Mica Schist** (SGS). Poorly sorted fabric. Reduced. Badly mixed. Slivers of different clay in centre.			
Slide	50					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Sub-rounded	Frequent		Mica intergrowth, leaching clay minerals.
Coarse		Quartz polycrystalline	Well rounded	Rare		
Fine		Altered plagioclase feldspar	Sub-angular	Frequent		Mica intergrowth
Fine		Plagioclase feldspar	Sub-angular	Frequent		Simple twinning
Fine		Muscovite	Laths	Frequent		
Fine		Biotite	Laths chunks	Frequent		
Fine		Schist (mica)	Rounded	Few		Mica or alteration to mica
Fine		Quartz polycrystalline	Sub-angular	Few		
Fine		Pyroxene	Angular	Few		
Fine		Opaque	Well rounded	Rare		Iron oxide

Winnianton

Site	Winnianton	Description	**HN2** (HN2) Poorly sorted fabric. Reduced. no orientation of inclusions. Very colourful lots of little shards of olivine or pyroxene. One or two cases of K-feldspar and plagioclase together.			
Slide	67					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Sub-rounded	Frequent		Fuzzy, remnant simple twinning. Mica intergrowths
Coarse		Altered K-feldspar	Sub-rounded	Frequent		Microcline, mica intergrowth
Coarse	X		Sub-angular	Rare	Clinopyroxene	Mica intergrowth.
					Plagioclase feldspar	
					Altered plagioclase feldspar	
Fine		Plagioclase feldspar	Sub-rounded	Frequent		Simple twinning
Fine		K-feldspar	Sub-rounded	Frequent		Microcline
Fine		Tremolite	Well rounded	Frequent		From serpentine? Acicular needles all directions
Fine		Quartz	Sub-rounded	Few		
Fine		Altered pyroxene	Well rounded	Few		
Fine		Biotite	Rounded chunky laths	Few		
Fine		Opaque	Angular	Few		Black, rectangles, iron?

Site	Winnianton	Description	**HN2** (HN2) Moderately sorted fabric. Oxidised exterior and interior with a reduced core.			
Slide	68					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Rounded	Few		Fuzzy
Coarse		Quartz	Angular	Few		Broad size range
Coarse		Garnet	Sub-Angular	Rare		Typical shape one side rounded
Fine		Plagioclase feldspar	Sub-angular to angular	Few		Simple twinning
Fine		Opaque	Well rounded	Few		Iron
Fine		Slate/ shale	rounded	Few		Quartz mica conglomerate
Fine		Tremolite or Altering to muscovite	Rounded	Few		From serpentine?
Fine		Clinopyroxene	Well-rounded	Rare		Extruding clay minerals
Fine		Altered serpentine	Rounded	Rare		Brown/yellow
Fine		Organic	Linear	Very rare		Grass?

Site	Winnianton	Description	**Chunky** (Chunky) Poorly sorted fabric. Reduced			
Slide	69					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Rounded	Frequent		Remnant simple and polysynthetic twinning. Extruding clay minerals.
Coarse		Quartz	v-angular	Rare		Lots of planes
Coarse	X		Rounded	Rare	Plagioclase feldspar	Blades of grass
					K- Feldspar	
					Quartz	
Fine		Biotite	Chunky laths	Few		Rounded
Fine		Quartz	Sub-angular	Few		Old spotting
Fine		Plagioclase feldspar	Sub-angular	Few		Simple twinning
Fine		Amphibole	Rounded	Rare		Some very small pieces
Fine		Opaque	Well rounded	Rare		Black iron
Fine		Organic	Linear	Rare		Blade of grass
Fine		Clinopyroxene	Rounded	Rare		3 pieces altered and leaching clay minerals.

Site	Winnianton	Description	**Mica** (Mica) Poorly sorted fabric. Reduced			
Slide	70					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Schist (quartz/mica)	Well rounded	Few		
Coarse	X		Sub-rounded	Rare	Amphibole altering to biotite	Altered rock
					Altered plagioclase feldspar	
					Plagioclase feldspar	Simple twinning
Fine		Quartz	Rounded	Frequent		Sometimes many planes
Fine	X	Clay pellet	Well rounded		K-feldspar	Clay pellet with original
					Quartz	
					Muscovite	inclusions
					Schist (quartz/mica)	
Fine		Plagioclase feldspar	Sub-angular	Frequent		Simple twinning
Fine		Opaque	Sub-rounded	Frequent		Black iron
Fine		Quartz conglomerate	Well rounded	Frequent		Rock frag or vein quartz
Fine		Muscovite	Lath	Few		
Fine		Olivine	Well rounded	Rare		Only one
Fine		Amphibole	Well rounded	Rare		
Fine		Garnet	Well rounded	Rare		Brown in PPL, black in XP 3 pieces
Fine		Tremolite	Well rounded	Rare		

Site	Winnianton	Description	Mica (Mica) Poorly sorted fabric. Oxidised			
Slide	71					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Sub-rounded	Frequent		Fuzzy
Coarse	X	Muscovite	Lath chunky	Few	Quartz	Fresh massive muscovite
					Muscovite	
					Olivine	
					Serpentine	Quartz, serpentine intergrowth
Coarse		Altering plagioclase feldspar to Sericite	Sub-rounded	Rare		Simple twinning, muscovite intergrowth
Coarse	X		-	Very rare	Plagioclase feldspar	Some feldspar is altering
					K-feldspar	Granite?
					Muscovite (intergrowth)	
Fine		Plagioclase feldspar	v-angular	Few		Simple twinning
Fine		Muscovite	Lath	Few		
Fine		Quartz	v-angular	Few		Fresh
Fine		Opaque	Angular	Few		Iron
Fine		K-feldspar	Sub-rounded	Rare		Microcline
Fine		Amphibole	Sub- Rounded	Rare		Chunky laths extruding clay minerals
Fine		Biotite	Laths	Rare		
Fine		Tremolite	Well rounded	Rare		Light brown, pleochroic
Fine		Olivine	Angular	Rare		Only one, yellow in PPL

Site	Winnianton	Description	**HN2** (Soft Green) Poorly sorted fabric. Oxidised. Minerals orientated vertically.			
Slide	72					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Tremolite	Well rounded	Frequent		
Coarse	X		Rounded	Frequent	Altered plagioclase feldspar	Leaching clay minerals
					Quartz	Broad size range
Fine		Clinopyroxene	Well rounded	Frequent		leaching clay minerals
Fine		Olivine	Rounded	Few		Mica intergrowth. Very fractured. Leaching clay minerals. Broad size range.
Fine		Plagioclase feldspar	Rounded	Few		Leaching clay minerals
Fine		K-feldspar	Rounded	Few		Microcline
Fine		Tremolite	Well rounded	Few		From serpentine? Broad size range
Fine		Muscovite	Lath	Rare		
Fine		Opaque	Angular	Rare		Iron

Site	Winnianton	Description	**Mica** (Soft Green) Poorly sorted fabric. Reduced .Generally badly eroded clay			
Slide	73					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Well rounded	Frequent		Mica intergrowth, fuzzy
Coarse	X		Rounded	Rare	Plagioclase feldspar	Pieces many planes
					Amphibole	Simple twinning.
					Opaque (iron)	Leaching clay minerals
					Chlorite	
Coarse	X		Well rounded	Rare	Muscovite	Leaching clay minerals
					Quartz	
					Very altered plagioclase feldspar	
Fine		Plagioclase feldspar	Angular	Frequent		Simple twinning. Leaching clay minerals.
Fine		Muscovite	Lath	Frequent		
Fine		Tremolite	Rounded	Few		From serpentine? Acicular crystal in different directions.
Fine		Opaque	Angular	Few		Black, iron
Fine		Amphibole	Well rounded	Rare		Leaching clay minerals
Fine		K-feldspar	Sub angular	Rare		Microcline
Fine		Biotite	Rounded laths	Rare		
Fine		Clinopyroxene	Rounded	Rare		Altered extruding clay minerals
Fine		Quartz	Well rounded	Rare		BEACH SAND!

Site	Winnianton	Description	**Mica** (Chunky) Poorly sorted fabric. Reduced			
Slide	74					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Sub-angular	Frequent		Fuzzy, remnant simple twinning. Mica intergrowth.
Coarse		Schist (biotite)	Sub-rounded	Few		Lamella banding
Coarse	X		Sub-angular	Rare	Quartz	Leaching clay minerals
					Plagioclase feldspar	Simple twinning, altering
Fine		Plagioclase feldspar	Sub-angular	Frequent		Simple twinning, Perthite?
Fine		Quartz	Sub-rounded	Few		
Fine		Tremolite	Rounded	Few		Linear cleavage. Some acicular random crystals
Fine		Muscovite	Laths	Few		
Fine		Biotite	Chunky laths	Few		
Fine		Amphibole altering to mica	Rounded	Few		
Fine		Opaque	Angular	Few		Black iron?
Fine	X		Well-rounded	Rare	K-feldspar	
					Muscovite	Muscovite intergrowth

Site	Winnianton	Description	**HN2** (Mica) Very poorly sorted fabric. Oxidised interior and exterior with reduced core			
Slide	75					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Altered plagioclase feldspar	Rounded	Frequent		Broad size range massive to small
Coarse	X		Sub-angular	Rare	Quartz (many planes)	Conglomerate
Fine		Quartz	Angular	Few		
Fine		Olivine	Rounded	Few		Altering, extruding clay minerals, broad size range lots of small bits
Fine		Amphibole altering to mica	Rounded	Few		
Fine		Plagioclase feldspar	Angular	Few		
Fine		Tremolite	Rounded	Few		Random Acicular needles
Fine		Biotite	Chunky laths	Few		
Fine		Opaque	Angular	Few		Black iron
Fine		Clinopyroxene	Well-rounded	Few		Leaching clay minerals
Fine		Muscovite	Laths	Rare		

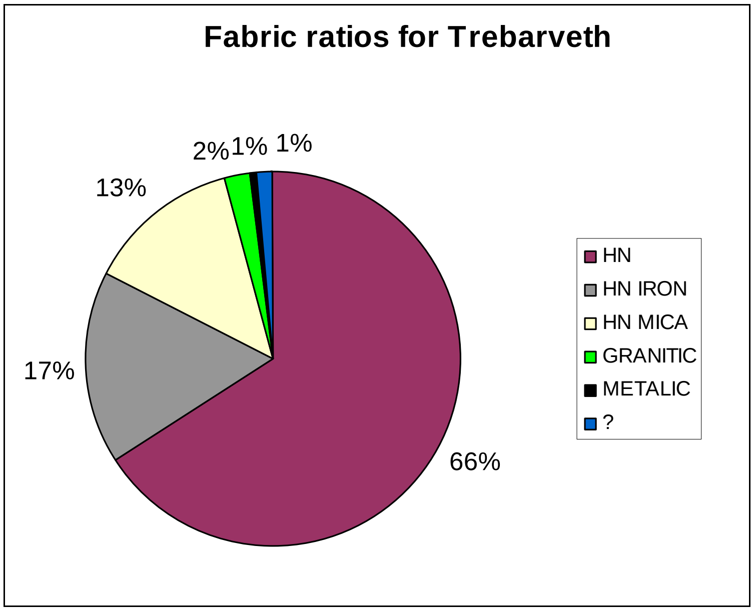
Site	Winnianton	Description	**Mica** (Mica) Poorly sorted fabric. Reduced			
Slide	76					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse	X		Sub-rounded	Frequent	Altered plagioclase feldspar	Leaching clay minerals
					Plagioclase feldspar	Simple twinning, Perthite
Coarse	X		Rounded	Few	Plagioclase feldspar	
					Micas (both altering)	Micas may have been pyroxene
					Quartz	Possible quartz
Coarse	X		Rounded	Few	Quartz (conglomerate)	BEACH SAND!
Fine		Tremolite	Rounded	Frequent		Random Acicular needles, 2nd order, clear in PPL, no pleo
Fine		Plagioclase feldspar	Angular	Frequent		Altering, simple twinning
Fine		Amphibole	Well rounded	Few		Altering
Fine		Muscovite	Laths	Few		
Fine		Schist (mica)	Rounded	Few		
Fine		Quartz	Well rounded	Few		Some BEACH SAND!
Fine		Opaque	Sub-rounded	Few		Black iron

Site	Winnianton	Description	**Chunky** (Chunky) Moderately sorted fabric. Oxidised. With inclusions aligned vertically. Piece of possible burnt grass in section.			
Slide	77					
Micromass	Active					
Fraction	**Rock Fragment**	**Mineral**	**Shape**	**Frequency**	**Minerals**	**Details**
Coarse		Quartz	sub-rounded	Few		
Coarse		Altered plagioclase feldspar	Angular	Rare		Fuzzy, broad size range
Fine		Altered plagioclase feldspar	Rounded	Frequent		Fuzzy
Fine		Pyroxene (clino)	Lenticular rounded	Few		
Fine		Opaque	Rounded	Few		Black iron
Fine	X		Sub-angular	Rare	Quartz	
					Plagioclase feldspar	
Fine		Quartz	Well rounded	Rare		BEACH SAND
Fine		K-feldspar	Angular	Rare		
Fine		Organic	Linear	Rare		Grass

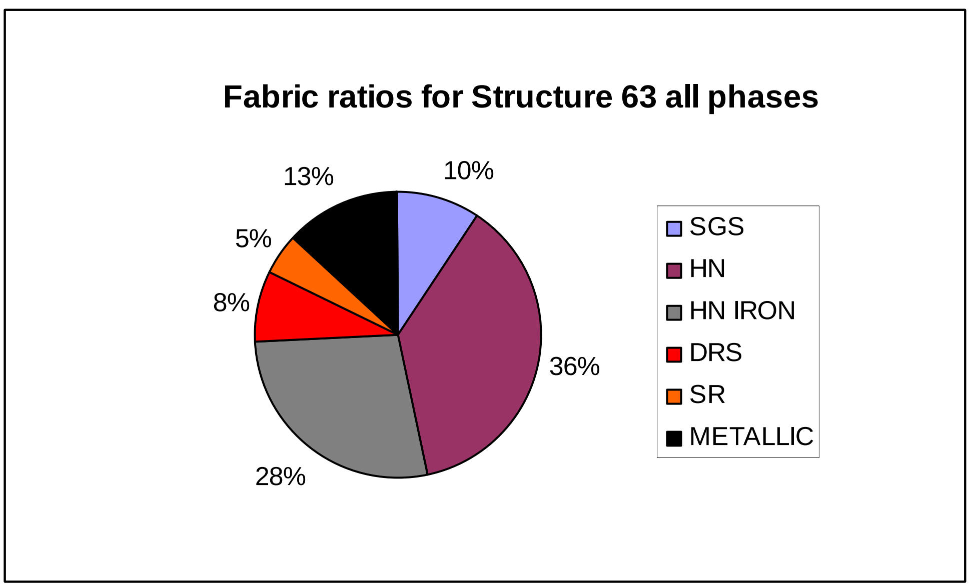
APPENDIX 6

Graphs

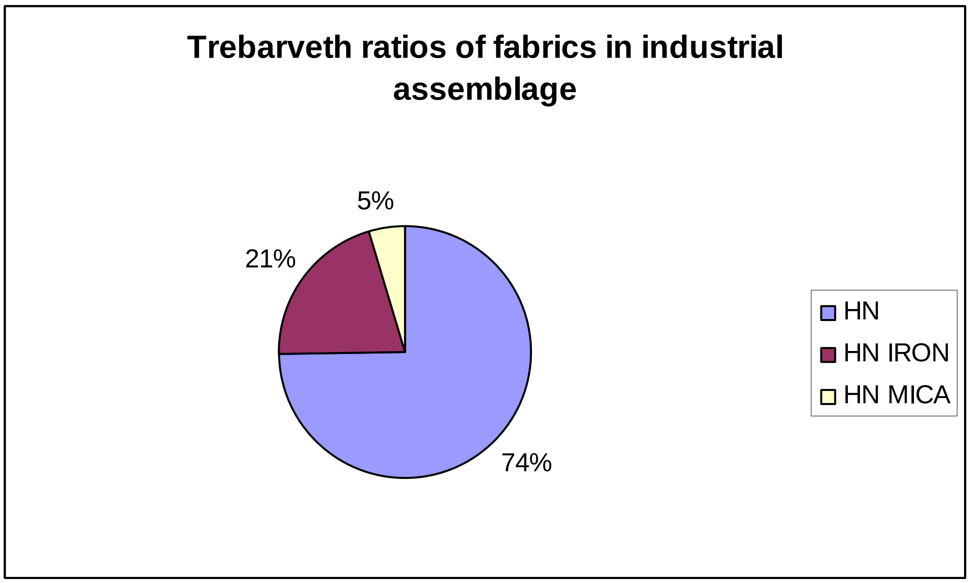
Graph 1 Showing the fabric ratios the entire domestic assemblage for Trebarveth



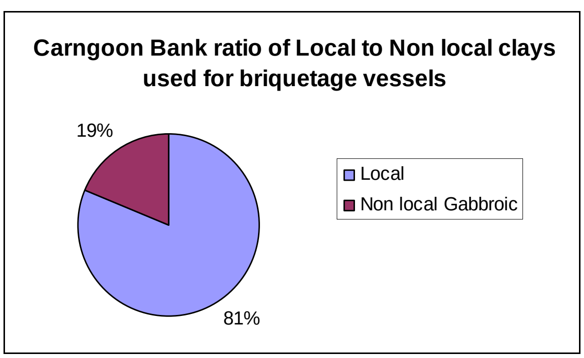
Graph 2 Carngoon Bank showing the fabric ratio for all phases of structure 63



Graph 3 Local to non-local ratio of fabrics macroscopically identified in the industrial briquetage assemblage.



Graph 4 Carngoon Bank showing the proportion of local to non-local fabrics macroscopically identified from the industrial assemblage.



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