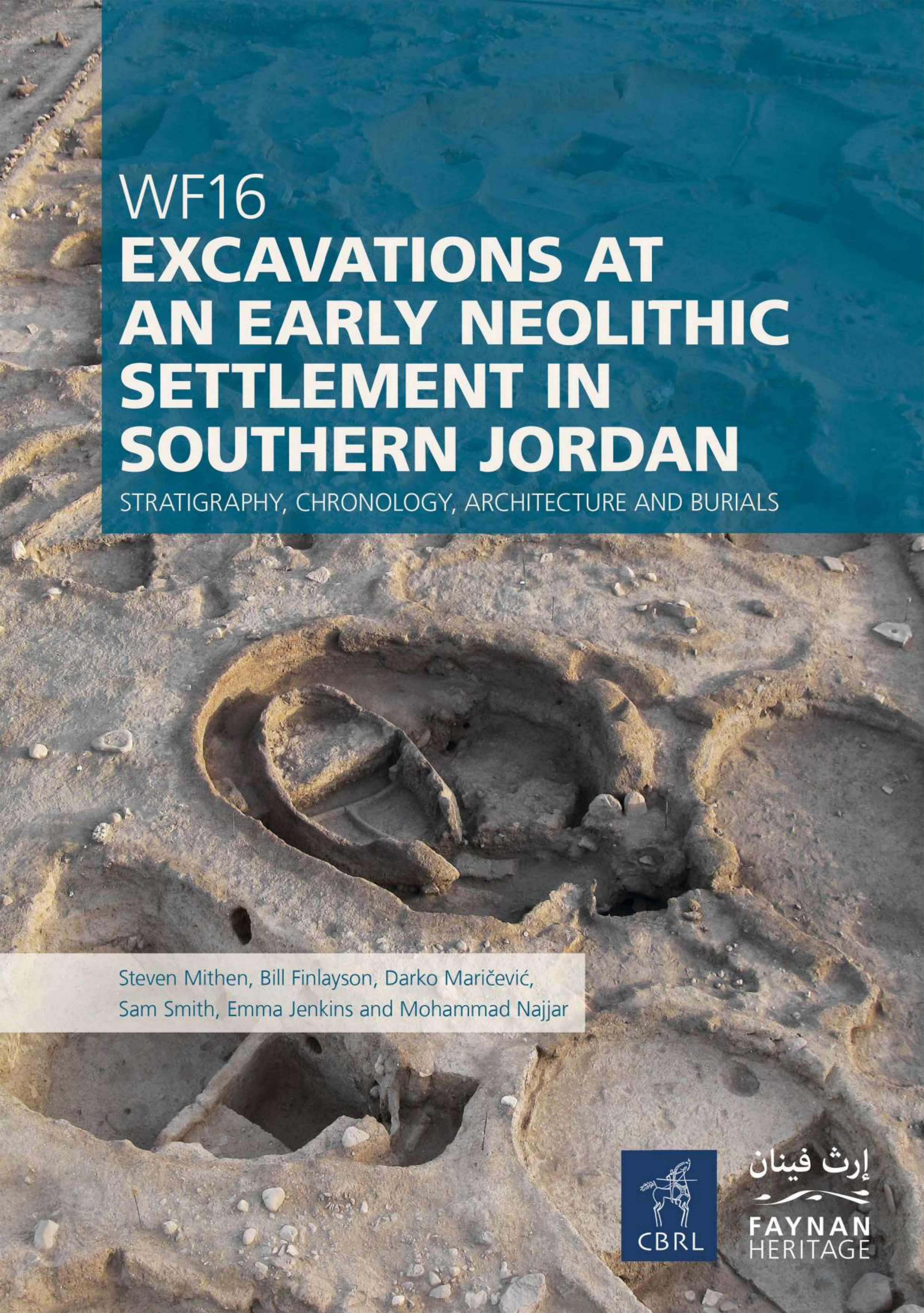

WF16

EXCAVATIONS AT AN EARLY NEOLITHIC SETTLEMENT IN SOUTHERN JORDAN

STRATIGRAPHY, CHRONOLOGY, ARCHITECTURE AND BURIALS

Steven Mithen, Bill Finlayson, Darko Maričević,
Sam Smith, Emma Jenkins and Mohammad Najjar

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contributions from

Karen Wicks, Sam Allcock, Sarah Elliott and Pascal Flohr

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Cover image:
WF16 Structures O45, O12, O11, O116, O72 and O85 towards the end of the 2010 field season

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Dedication

This volume is dedicated to

Ghazi Bishah and Fawwaz al-Khraysheh

Two former distinguished Director Generals of the Department of Antiquities of Jordan who gave generous support to the WF16 Excavation Project

Contents

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2008 team


2009 team


2010 team

Acknowledgements

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Part 1

Introduction

1. This volume

During the course of a 1996 archaeological survey in Wadi Faynan, Southern Jordan (Figure 1.1), a scatter of chipped and ground stone artefacts was discovered on the surface of a knoll close to the juncture of Wadis Faynan and Ghuwayr (Figures 1.2, 1.3; Finlayson and Mithen 1998). This was designated as the archaeological site of WF16. A test excavation in 1997 identified WF16 as having type artefacts of the Pre-Pottery Neolithic A, notably El-Khiam points. That led to an archaeological evaluation between 1998 and 2003 that established WF16 as having the potential to contribute towards our understanding of the Pre-Pottery Neolithic A, a critical phase in the long-term process of Neolithisation in the Levant (Finlayson and Mithen 2007). As a result, an open area excavation was undertaken during the course of three field seasons; spring 2008, 2009 and 2010 (Mithen *et al.* 2010; 2011; Finlayson *et al.* 2011).

This volume describes the stratigraphy, chronology, architecture and burials of WF16 as established by the 2008–2010 excavation and the 1997–2003 evaluation. Companion publications will document, analyse and interpret the finds from the excavation, notably the material culture, animal and plant remains and human skeletal material. A further publication will synthesize all the evidence from WF16 and consider its archaeological significance for understanding Neolithic lifestyles and the process of Neolithisation in the Southern Levant.

The 2008–2010 excavation at WF16 was made possible by a 2007 funding award from the Arts and Humanities Research Council to the University of Reading (grant AH/E006205/1) with the Council for British Research in the Levant as a Project Partner. That enabled three field seasons of excavation to be undertaken in the spring of 2008, 2009 and 2010. The 2010 field season was also supported by a grant from the Wenner Gren Foundation.

The leadership team for this excavation was: Steven Mithen as Academic Director, Bill Finlayson as Field Director, Sam Smith as Project Manager, Emma Jenkins as Data Manager, Darko Maričević as Senior Site Supervisor, and Mohammad Najjar acted as Assistant Field Director. While having these specific roles, decisions regarding excavation strategy and methodology, interpretation and the preparation of this volume were undertaken as a group.

Part 1 of the volume is constituted by this introduction and the required background. Chapter 2 establishes the rationale for the excavation by reviewing the process of Neolithisation in the Levant and the key questions that required addressing through archaeological fieldwork and laboratory analysis. It is written from the perspective of 2015 rather than 2006 when the WF16 excavation project was first proposed, the discoveries made elsewhere within that interval having provided the excavation of WF16 with added significance. Chapter 3 summarises the potential significance of WF16 as identified by the 1997–2003 evaluation. It states the aims of the 2008–2010 excavations at WF16, framing these as seven key research questions. In Chapter 4 we provide a description of the excavation and data recording methods that were employed.

Part 2 of this volume consists of Chapters 5–38. These describe the stratigraphy and contexts; they list the finds that were made and the samples that were taken for further analysis. Each chapter describes a demarcated area of the settlement (as explained in Chapter 4) for which an interpretation is provided at the end of each chapter.

Part 3 undertakes the analyses of three types of data recovered from the excavation relevant to establishing the chronology of the settlement and its architecture: a sample of chipped stone (Chapter 39); the radiocarbon dates, including those acquired from the 1997–2003 evaluation (Chapter 40); and a sample of the sediments (Chapter 41).

Figure 1.1 Location of WF16 in Southern Jordan.

We provide our conclusions in Part 4. This begins by drawing on evidence from the stratigraphy, chipped stone and radiocarbon dates to propose a chronology for settlement activity that we divide into three cultural phases (Chapter 42). It then draws on the stratigraphy, contexts and sediment analyses to describe the architecture at WF16, and how this developed through the three cultural phases of the settlement (Chapter 43). In the following chapter, we draw on together the evidence about burial and mortuary practice at WF16 (Chapter 44).

Finally, we provide an overview of our current interpretation of WF16, this being prior to the post-excavation analyses of the material culture, fauna, archaeobotanical remains, and the human skeletal evidence (Chapter 45). In this chapter, we return as far as possible to address the research questions that we had set out in Chapter 3.

Figure 1.2 A view looking southeast along Wadi Ghuwayr towards the Jordanian Plateau, showing the WF16 knoll in relation to the wadi bed.

Figure 1.3 A view over the Wadi Faynan landscape looking west towards Wadi Araba, showing the location of the PPNB settlement of Ghuwayr 1 and WF16.

Figure 1.4 The knoll of WF16, viewed from the south (Photo: Richard Tipping).

2. Neolithisation in the Levant: the archaeological context for the WF16 excavation

2.1 Introduction

The Levant is the region covering modern day southern Turkey, Syria, Lebanon, Jordan, Israel and the Occupied Palestinian Territories, often referred to as the western arm of the Fertile Crescent. It is frequently divided into the Northern and Southern Levant by an east–west line from the Mediterranean coast across the Damascus Basin (Goring-Morris and Belfer-Cohen 2011). This region had been first colonised by *Homo* at least 1.5 million years ago and by *Homo sapiens* soon after 50,000 years ago. While domesticated plants and animals had appeared by the Pre-Pottery Neolithic B at 10,200 cal BP, human communities may not have become entirely dependent on these until the start of the Pottery Neolithic at 8400 cal BP.

Such societies and their predecessors led to the spread of Neolithic lifestyles into adjacent regions of Anatolia, North Africa and southern Iraq, and then further afield, either by the transition of ideas or human dispersal. This subsequently gave rise to the earliest civilisations in Mesopotamia, Egypt and the Indus Valley. It is quite evident, therefore, that understanding when, how and why sedentary farming communities arose in the Levant are three of the most important questions addressed by prehistorians.

Childe (1951) provided the most elaborate definition of the Neolithic, identifying 10 key traits, as recently summarised by Zeder (2009a, 13): (1) an agricultural economy based on domesticated plants and animals; (2) exponential population growth; (3) storage of surplus and a system of delayed returns of productive resources; (4) sedentism; (5) trade networks focussed on non-essential items; (6) decentralised social mechanisms for the coordination of collective activities; (7) associated and enabling magico-religious traditions that focus on the promotion of fertility; (8) ground-stone implements; (9) pottery, and (10) weaving implements like spindle whorls. Zeder (2009a) describes this as Childe's 'bauplan', his blueprint for the Neolithic.

Childe imagined these traits forming a single Neolithic package. This was largely because he was focussed on Europe where, in 1951, this appeared to be a viable interpretation of the evidence; today we would emphasise diversity within the European Neolithic. Following Childe (1951), such diversity soon became apparent within the Levant: Kenyon's 1950s excavations at Jericho identified deposits containing only some of Childe's Neolithic traits leading to her notion of the 'Pre-Pottery Neolithic' (Kenyon 1957).

Now that we have a global perspective on the Neolithic, we fully recognise that Childe's Neolithic traits can develop independently of each other and in quite different chronological orders from one region to another (Mithen 2003). The development of farming economies, involving animal and plant domestication, is now understood as a much slower and more complex process than Childe had envisioned, with a long period of low-level food production occurring between entirely hunter-gathering and entirely farming economies (Smith 2001). Moreover, archaeologists in the Levant now stress the central role of technologies other than those prioritised by Childe, notably the manufacture of lime-based plaster and the construction of monumental stone, pisé and mudbrick architecture.

In this light, the idea of a 'Neolithic Revolution' within the Levant has been replaced with that of long-term evolutionary change, often characterised by the inelegant term of 'Neolithisation' (Finlayson 2013; Goring-Morris and Belfer-Cohen 2011; Zeder 2011). This does not imply that the cultural and economic change was necessarily always slow and steady: there are likely to have been pulses of more rapid change against a background of gradual cultural evolution, and within a context of

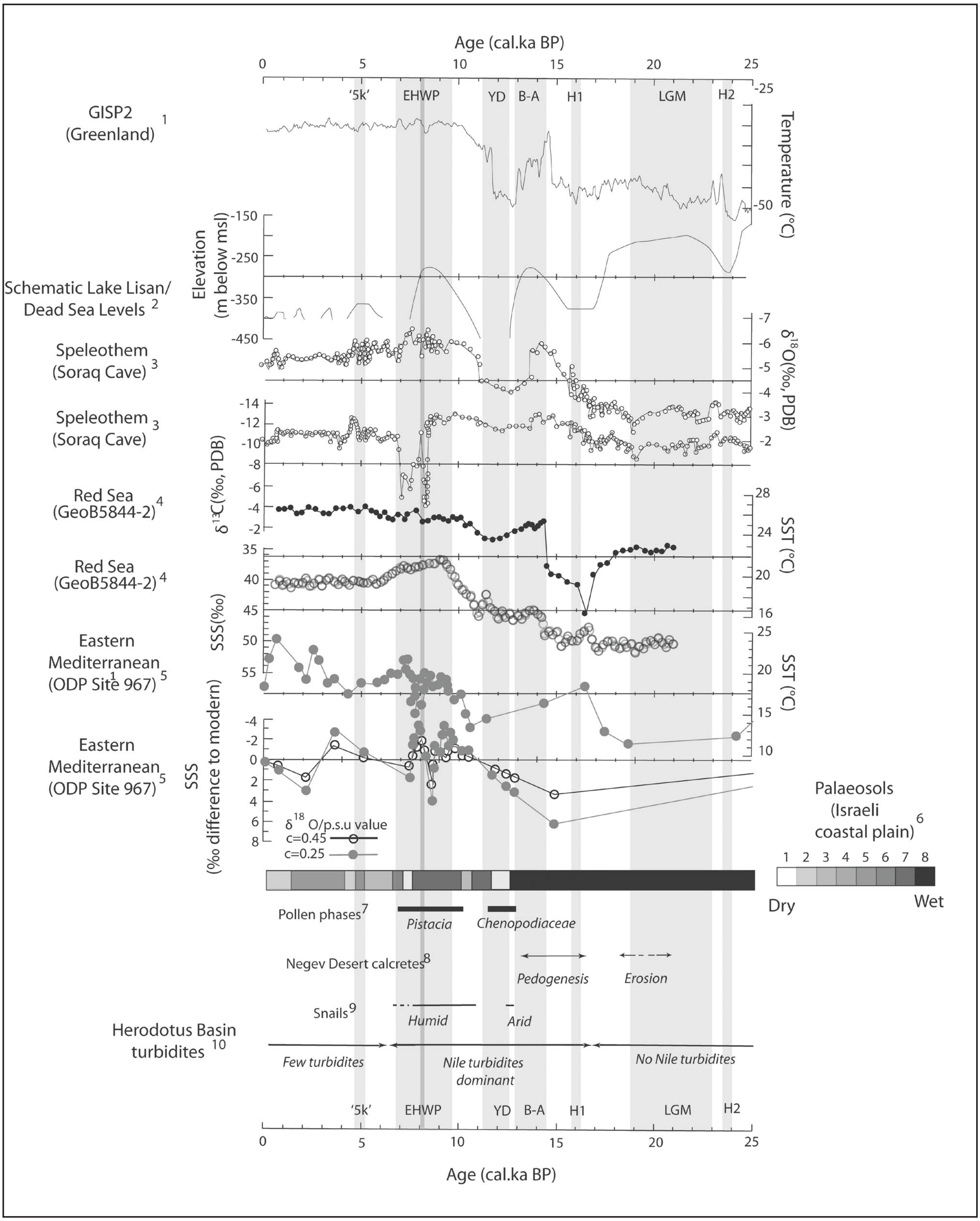


Figure 2.1 Compilation of terrestrial and marine palaeoclimatic proxy data for the Levant and eastern Mediterranean. Also shown is the ice-core record from GISP2 (Greenland) (After Robinson et al. *2011).*

climatic and environmental change (Figure 2.1). The start of this process can arguably be extended back to at least the Last Glacial Maximum at 23,000–19,000 years ago; it developed through the conventionally defined periods of the Epipalaeolithic, especially its late (Natufian) phase (15,000–12,000 cal BP), the Pre-Pottery Neolithic A (PPNA, *c.* 12,000–10,500 cal BP), Pre-Pottery Neolithic B (PPNB, 10,500–8400 cal BP), and the Pottery Neolithic (8400–7600 cal BP) (Finlayson 2013). Within this sequence the PPNA might constitute a distinctive pulse of cultural and economic change, perhaps a tipping point within the Neolithisation process. We note, however, that the value of these cultural-historical units has become increasingly problematic as the cultural and economic diversity within each unit has become apparent.

An inevitable consequence of this long-term view is that there could not have been a single cause for Neolithisation, such as climate change, population pressure or social aggrandisement: the task we face is untangling a matrix of multiple causes and consequences. One essential requirement for this task is to acquire new data by excavation at settlements that fall within this long-term process of Neolithisation, and perhaps especially within the PPNA: WF16 provides one such site.

2.2 Neolithisation during the Epipalaeolithic

The Epipalaeolithic period (*c.* 24,000–12,000 cal BP) encompassed a diverse array of hunter-gatherer adaptations to the varying environments and climates of the Levant, ranging from the thickly wooded, rolling hills of the Mediterranean zones to the deserts of the Jordanian plateau, Negev and Sinai (Goring-Morris 1995) (Figures 2.1, 2.2). Such ecological diversity may itself have been a significant enabling factor for Neolithisation. Climatic amelioration following the Last Glacial Maximum (*c.* 23,000–19,000 cal BP) appears to have led to a proliferation of hunter-gatherer communities throughout the region, all using a technology based on bladelets and collectively referred to as the Kebaran culture.

Stylistic differences between stone artefacts have led some archaeologists to identify a number of cultural-historical entities following the Kebaran, such as the Mushabian and Ramonian (Goring-Morris 1995; Goring-Morris and Belfer-Cohen 2011). Even at this early stage of the Epipalaeolithic, incipient notions of territory, property and ownership may have been present, and these may have played a significant role in later stages of Neolithisation.

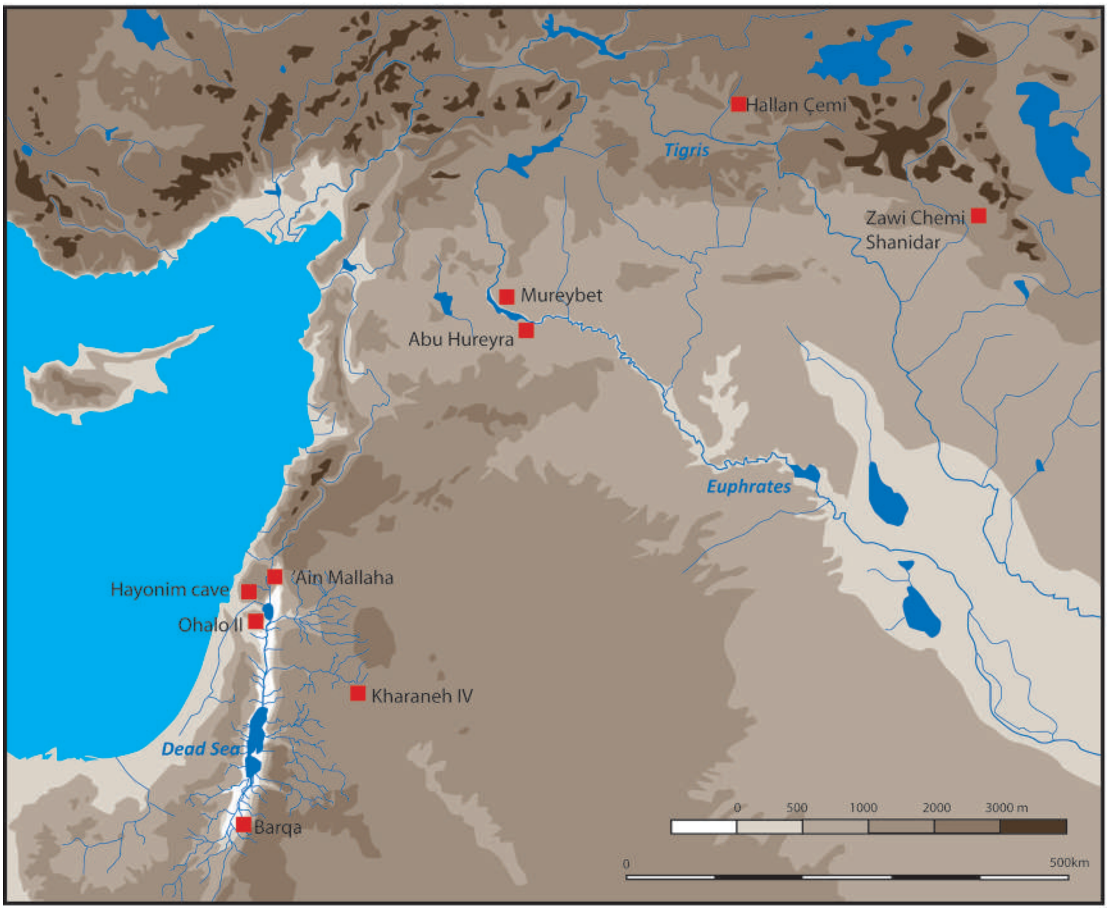


Figure 2.2 Epipalaleolithic sites referred to in the text.

A notable feature of the Epipalaeolithic to the east of the Jordan Valley is the presence of what appear to be aggregation sites, such as Kharaneh IV (Martin *et al.* 2010). If the extensive accumulations of discarded artefacts at such sites do indeed represent aggregations, or perhaps persistent returns to favoured places by a single group for relatively long periods of residence, this could only have been made possible by a temporary abundance of plant and animal resources (Maher *et al.* 2012). Such aggregations might be seen as a prelude to sedentism, this becoming enabled by an increasingly sophisticated exploitation of wild resources and environmental change that extended the availability of these resources and hence the duration of settlement.

Throughout the Epipalaeolithic hunter-gatherers appear to have exploited a diversity of wild plants. This is especially evident at Ohalo II (24,000–22,000 cal BP) in the Southern Levant where a wide variety of wild cereals, legumes, nuts and fruits have been recovered (Nadel and Hershkovitz 1991). Similarly, and somewhat later, at Abu Hureyra (14,500–12,000 cal BP) in the Northern Levant, a case has been made for the emergence of a domestic strain of rye between 13,000–12,000 cal BP (Hillman 2000; Hillman *et al.* 2001). Re-evaluations of the Abu Hureyra evidence suggest that it is unlikely that a morphological domesticate had appeared by this time (Fuller 2007) although cultivation played a significant role in the economy (Willcox and Stordeur 2012).

During the following Natufian period (15,000–12,000 cal BP) there appears to have been a general increase in the consumption of wild cereals (Weiss *et al.* 2004), which would accord with the increased quantity, size and diversity of grinding stones, mortars, pestles and pounders as found in the Southern Levant during this period (Bar-Yosef and Valla 1991). However, the story is not straightforward, because Natufian mortars and pestles are not ideally suited for grinding small seeds (Olszewski 1991). Equally, arguments that Natufian blades with sickle gloss provide evidence for the intensive harvesting of wild cereals have been disputed because their use-wear analysis suggests the cutting of reeds (Anderson-Gerfaud 1983).

In addition to intensive plant exploitation the Natufian has several other features that appear integral to Neolithisation. The most striking is the strong possibility that some Natufian communities were fully sedentary, or at least considerably more sedentary than their predecessors. This would have only been possible in the most favourable ecological circumstances: for those settlements with an abundant and naturally renewable supply of wild plants and animals to exploit in their vicinity. This may have been the case during the Bølling-Allerød interstadial (14,500–13,000) for settlements such as ‘Ain Mallaha (Valla *et al.* 1999) and Hayonim cave (Bar-Yosef 1991) at which we find several potential markers of sedentism including cemeteries, stone-built architecture, structures for communal activities and — more controversially — evidence for storage. Natufian sedentism remains, however, a topic of considerable debate (e.g. see Belfer-Cohen and Bar-Yosef 2000; Byrd 2005a; Boyd 2006).

The Natufian has a substantial increase in the frequency of figurines, decorated objects and burials when compared to preceding Epipalaeolithic cultures, with some burials being richly adorned (Bar-Yosef and Belfer-Cohen 1998). Although such artefacts and burials are thought unlikely to indicate formal social stratification, they may reflect the development of notions about property, wealth and territory with long-term significance for the later stages of Neolithisation.

It has been argued that the development of the Early Natufian settlements with their indications of sedentism and elaborate material culture might demonstrate a relationship with climate (Byrd 2005a). The increased rainfall and warmth of the Bølling-Allerød interstadial may have enhanced the biomass and enabled settlement at resource-rich localities to be extended in time prior to resource overexploitation. When placed into a global perspective the Natufian appears as one of several examples of Late Pleistocene and Early Holocene hunter-gatherers, who took the opportunity to reduce the extent of their mobility, whenever ecological conditions allowed (Mithen 2003). This argument has been supported for the Southern Levant region by the observation that after 13,000 cal BP, which marks the advent of the Younger Dryas period, there was a return to greater mobility in the Late Natufian, inferred from reduced architectural complexity and material culture.

This argument relies on the assumption that the Younger Dryas was a period of relative cold and aridity which reduced plant and animal biomass, forcing communities to return to a mobile hunter-gatherer lifestyle (Byrd 2005a). Bar-Yosef (2011) questioned whether this cultural shift was caused by the onset of the Younger Dryas, proposing that it occurred several hundred years prior to this event, dating the cultural shift at *c.* 13,000 and the onset of the Younger Dryas at *c.* 12,600 cal BP. With the current challenges facing radiocarbon dating of the Early Neolithic, such as calibration and old wood issues (Wicks *et al.* 2016), holding such chronological distinctions with confidence is problematic.

Furthermore, the character of the Younger Dryas in the Southern Levant remains to be established: the extent of aridity and consequences on plant biomass may have been less than that conventionally assumed (primarily on the basis of its character in Northwest Europe; e.g. Liu *et al.* 2013; Lisker *et al.* 2010; Hartman *et al.* 2016; Cheng *et al.* 2015). Moreover, some Natufian communities continued to occupy their settlements throughout the onset and peak of the Younger Dryas, such as at Nahal Ein Gev II (Grosman *et al.* 2016).

Recent fieldwork has revealed a range of Epipalaeolithic sites in the Barqa dunefield, which is located *c.* 11 kms to the east of WF16. Sites here represent Early, Middle and Late Epipalaeolithic activity that appears to be associated with seasonal wetland environments. Of particular relevance are a Late Natufian occupation that has been radiocarbon dated to 13,452–13,114 cal BP and the presence of a Ramonian/Terminal Ramonian chipped-stone assemblage that indicates links between the Faynan region and the Negev during the Epipalaeolithic (Smith *et al.* 2016).

A relationship between Southern Jordan and the Negev may also be evident from the Harifian, a cultural entity within the Late Natufian of the Negev and northern Sinai with a distinctive point type (Goring-Morris 1991). This Harifian variant may provide a direct antecedent for the PPNA of Southern Jordan and the people of WF16 (Finlayson *et al.* 2011a).

In the Northern Levant, it is during the Younger Dryas that settlements with substantial architecture arise. Most notable is Hallan Çemi in Southeast Anatolia (12,500 cal BP) with two large semi-subterranean structures suggestive of communal activity and sedentism (Rosenberg and Redding 2000). Hallan Çemi provides possible evidence for the earliest stages of pig domestication, in the form of reduced tooth size (Rosenberg and Redding 2000), which, if correct, is likely to have arisen from the process of pig commensalism (Zeder 2009b). Zawi Chemi Shanidar in Iraq (*c.* 12,500 cal BP) is also significant, with evidence for feasting and a ritualistic use of raptors' wing bones and feathers, which may provide a precursor for the symbolic role of wild animals in the Neolithic of the Northern Levant.

The possible presence of a domesticated strain of rye at Abu Hureyra (Hillam *et al.* 2001) would have arisen from the cultivation of wild stands, such as by weeding, watering and protecting them from pests and herbivores. Such activity has been proposed as a deliberate attempt to mitigate the environmental impact of the Younger Dryas and hence sustain a degree of sedentism (Mithen 2003). Whether such cultivation occurred remains contentious; rejecting the claim for a domesticated strain of rye at Abu Hureyra substantially weakens this argument (Fuller 2007).

While Abu Hureyra, Hallan Çemi and Zawi Chemi Shanidar are important sites, our knowledge of the Epipalaeolithic within the Northern Levant is significantly more limited than that further south. It is evident, however, that in both regions hunter-gatherer behaviour presaged that conventionally identified as 'Neolithic'. This may have embedded attitudes about the manipulation of wild plants and animals, sedentism, property and community based activity, all of which may have then played a key role in Neolithisation during the Early Holocene.

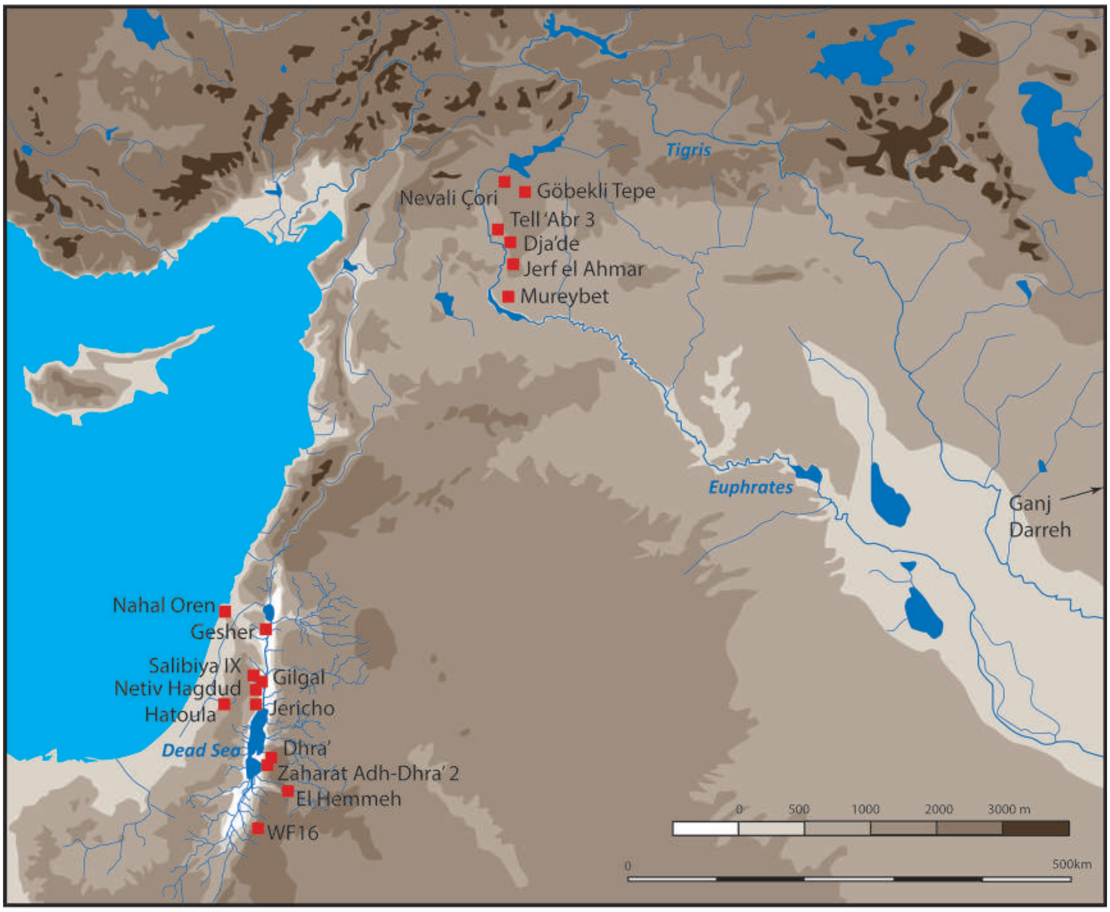


Figure 2.3 Pre-Pottery Neolithic A sites in the Levant referred to in the text.

2.3 Neolithisation during the Pre-Pottery Neolithic A (PPNA)

The PPNA, found throughout the Levant and in Cyprus (Figure 2.3), is defined by distinctive new artefact types, notably El-Khiam points, although even these appear at some Harifian sites. It also displays shifts in the frequencies of artefacts, for example, microliths are less common than in the Natufian. The variety of architectural forms expands considerably during the PPNA, with the size of settlements and depth of deposits suggesting a greater degree of sedentary behaviour.

The PPNA falls within the first millennium of the Holocene — although some argue for its appearance within the last few centuries of the Pleistocene (Byrd 2005a; Kuijt and Goring-Morris 2002; Mithen and Finlayson 2007a; Finlayson *et al.* 2011b). Precise dating remains contentious due to a variety of factors including unreliable radiocarbon samples and challenges posed by the calibration curve. Blockley and Pinhasi (2011) recently attempted to cleanse the PPNA radiocarbon database by rejecting all problematic dates, leaving a sample of 89 dates for the Later Epipalaeolithic (Natufian) and PPNA. By undertaking a Bayesian analysis they proposed that the beginning of the PPNA falls within a range of 11.78–11.42 ka cal BP, coinciding with the start of the Holocene, rather than being located within the Younger Dryas.

Throughout much of the Levant, the PPNA shows similarities to the Natufian, especially with regard to architecture — predominately oval, semi-subterranean, structures — burials, technology and the absence of explicit signs of social ranking. As exposed in the 1997–2003 WF16 evaluation, structures in what may be the earliest horizon of the site have striking similarities with the Harifian of the Negev (Finlayson *et al.* 2011a).

The start of the Neolithic has often been linked with climate change and the subsequent environmental impacts (Byrd 2005a). The conventional start of the PPNA is approximately contemporary with the increased warmth and wetness that marks the end of the Younger Dryas at 11,600 cal BP (Blockley and Pinhasi 2011). But the dating evidence remains limited and in a similar manner to the Late Natufian commencing before the Younger Dryas, the earliest PPNA communities may commence prior to the start of the Holocene (Kuijt and Goring-Morris 2002; Mithen and Finlayson 2007a; Finlayson *et al.* 2011b). One possibility is that the cultural elaboration evident in the PPNA is the manifestation of cultivation practices that had initially been adopted to cope with the cold climatic conditions of the Younger Dryas and which produced abundant yields in the more amenable Early Holocene environments (Mithen 2003; Bar-Yosef 2011). However, if we accept the recent work that challenges the notion of an arid Younger Dryas, as noted above, this argument is significantly weakened.

Following Kenyon's discoveries at Jericho (Kenyon and Holland 1981), knowledge about the PPNA accumulated slowly until the 1980s and 1990s when several sites underwent excavation, notably Nahal Oren (Noy et al. 1973), Hatoula (Lechevallier and Ronen 1994), Netiv Hagdud (Bar-Yosef and Gopher 1997), Salibiya IX (Enoch-Shiloh and Bar-Yosef 1997), Gilgal (Bar-Yosef *et al.* 2010) and Gesher (Garfinkel and Dag 2006). These were all clustered in the Mediterranean zone on the western side of the Jordan Valley.

Jericho remained unique by having monumental structures, its tower and wall, and in the quantity of obsidian within its artefact assemblage. It has been interpreted as being at the top of a settlement hierarchy (Kuijt 1994). When combined with the number of other sites excavated in its vicinity, it was not unreasonable for some archaeologists to conclude that the Mediterranean zone of the Southern Levant was central to the development of the Neolithic (Kuijt and Goring-Morris 2002).

That view became challenged during the 1990s as PPNA sites with spectacular architecture and artworks were discovered in northern Syria and southern Turkey, notably at Jerf el Ahmar (Stordeur *et al.* 1997), Göbekli Tepe (Schmidt 2006), Dja'de (Coqueugniot 1999), Nevali Çori (Hauptmann 1999), and Tell 'Abr 3 (Yartah 2004). The results of earlier excavations in this region were also published, notably Mureybet (Ibáñez 2008). Such discoveries revealed a new dimension to the PPNA, especially in its final phase as it evolved into the EPPNB, there being no equivalent in the Mediterranean zone for the cultural complexity evident in the Northern Levant. Most notable was the extent of monumentality seen at Göbekli Tepe, now generally understood as primarily EPPNB rather than PPNA, and the extent of visual symbolism at Göbekli Tepe and Jerf el Ahmar. Perhaps not surprisingly, the spectacular PPNA archaeology of the Northern Levant has led to it being designated by some as the 'Golden Triangle' of Upper Mesopotamia where the Neolithic arose (Aurenche and Kozlowski 2001).

Such developments in the Northern Levant suggested substantial population growth. This may have also been the cause behind the colonisation of Cyprus in the PPNA, with the most likely origin being the littoral region of the Northern Levant (Manning *et al.* 2010).

Although with far less dramatic finds, the PPNA archaeological record of the Southern Levant on the eastern side of the Jordan Valley was also extended during the 1990s. The PPNA site of Dhra' underwent renewed excavation, revealing a much larger site and a more complex architectural history than had been anticipated (Finlayson *et al.* 2003). Three new PPNA sites were discovered on the eastern side of the Wadi Araba, south of the Dead Sea: WF16 (Finlayson and Mithen 1998; Finlayson and Mithen 2007), Zahrat edh Dhra' 2 (ZAD 2) (Edwards *et al.* 2002) and El Hemmeh (Makarewicz *et al.* 2006).

Of these, WF16 was located just below the Mediterranean zone that extends to the south of Jordan along the western edge of the Jordanian escarpment, suggesting that the PPNA had evolved over a wide region. Seeking to preserve the preeminence of the Mediterranean zone, Kuijt and Goring-Morris (2002, 371) suggested that WF16 and other such Southern Jordanian sites were 'smaller hamlets and seasonal camps', an interpretation that does not accord with the finds from the 1997–2003 excavations (Finlayson and Mithen 2007). Goring-Morris and Belfer-Cohen (2011) have more recently described the location of WF16 as 'anomalous' — by which we assume they mean that it is not located within the Mediterranean zone. They suggest that WF16 may have served as a node in a procurement and exchange network of valued materials, such as obsidian, malachite, bitumen and seashells.

These recent discoveries have confirmed that the PPNA forms a distinctive cultural entity throughout the Levant by the sharing of diagnostic artefacts, such as El-Khiam points, while also displaying high degrees of geographical variation. This is perhaps most dramatic between the Northern and Southern Levant, with the former showing marked elaborations in art and monumentality.

There is considerable variability within the PPNA chipped stone assemblages of the Southern Levant, suggesting to some the presence of at least two cultural facies: the Khiamian and the Sultanian (Echegaray 1966; Crowfoot Payne 1976). These variations have been open to multiple interpretations, as reviewed by Kuijt (2001) and Sayej (2004), including those of successive cultural phases (e.g. Ronen and Lechevallier 1999), site-functional variation within a single settlement pattern (e.g. Nadel 1990), intra-site spatial variation in artefact discard patterns (e.g. Mithen and Finlayson 2007b), and a consequence of taphonomy (e.g. Garfinkel 1996).

Although the PPNA is designated as 'Neolithic', it is evident that the Neolithisation process was incomplete and on-going throughout this period (Finlayson 2013). While the quantity, diversity and size of mortars and pestles suggest the intensive processing of plants, there are no unequivocal examples of morphologically domesticated cereals or legumes within the PPNA (Nesbitt 2002). The intensity of plant gathering, processing and storage is likely to have increased over that found within the Natufian in light of storage facilities in the Southern Levant at Dhra' (Kuijt and Finlayson 2009) and dedicated processing areas in the Northern Levant at Jerf el Ahmar (Wilcox and Stordeur 2012).

Since morphologically distinctive domestic traits may have taken several thousand years to evolve, and in light of their appearance soon after 10,000 cal BP, a strong case can be made for intensive cultivation during the PPNA: planting, weeding, watering, pest control and so forth. The case for plant cultivation in the PPNA has also been made on the basis of weed floras (Colledge 2001), concentrations of wild barley and wild oats at Gilgal, and of wild lentils at Netiv Hagdud (Weiss *et al.* 2006). Kislev *et al.* (2006) suggested that the presence of seedless figs at Gilgal indicate artificial manipulation of tree crops (but see Lev-Yadun *et al.* 2006; Zeder 2009).

In light of this compelling evidence for plant cultivation and the absence of domesticates, PPNA communities most appropriately fall into the category of 'low-level food producers' (Smith 2001). Bar-Yosef (2011) is content to describe them as 'farmers', noting that it is the economic practice that is critical not the domesticated, or otherwise, status of the plants being cultivated. All such interpretations remain problematic because, despite the significant number of new PPNA sites discovered since the 1980s, plant remains and storage facilities continue to be scarce. As such, inferences about the absence of domesticated cereals and legumes and cultivation of wild strains are made on the bases of small samples.

A similar argument for resource manipulation can be made regarding the exploitation of wild animals. Gazelle remains the most prominent animal at the majority of PPNA sites when faunal remains are present (Tchernov 1994). Equids, wild boar, *Capra* and a wide variety of small game and birds are typically found within PPNA assemblages; the *Capra* show no morphological signs of domestication. Those signs — a reduction in body size, tooth size, horn shape and demographic profile — are themselves open to various interpretations (Zeder 2009b) and, like those of plant domestication, may only become evident after a prolonged period of wild animal herds being manipulated. Unusually for PPNA sites, *Capra* is the most frequent taxa in the sample from the 1997–2003 excavations at WF16, this most probably this reflects the local environment (Carruthers and Dennis 2007; Mithen and Finlayson 2007b). Kill-off patterns suggest some form of selective culling of wild animals, possibly some form of herd management (Finlayson *et al.* 2014).

Somewhat stronger evidence for the management of wild herds comes from Ganj Dareh in the Zagros Mountains at the beginning of the 10th millennium cal BP (Zeder and Hesse 2000) and at Çayönü at the end of the 11th millennium cal BP (Arbuckle 2014). While these dates are after the PPNA, this might be a consequence of the absence of suitable PPNA faunal assemblages to analyse — those with a sufficiently large sample size of potential domesticates, notably wild goat — rather than a chronological trend.

On the basis of demographic patterns in wild goats from the Middle PPNB in the Southern Levant, Horwitz (2003) suggested that this region might have been an independent centre for domestication. The genetic evidence supports this interpretation by pointing to multiple domestication events for goats (Luikart *et al.* 2001).

Sedentism is often inferred for PPNA sites on the basis of the same type of evidence cited for Natufian sedentism: the scale of the architecture, volumes of refuse and plant processing equipment. Increased sedentary behaviour may be indicated by more formal patterns of discard behaviour than seen in the Epipaleolithic (Edwards 1989). It remains the case, however, that formal identifications of sedentary behaviour at a single settlement via a suite of seasonal indicators that demonstrate year-round occupation remain absent.

Monumental architecture may be another indicator of sedentism, while also reflecting community-level activity as required for the construction and use of such buildings. Such activity is often mediated by ritual and, while an integral part of Neolithisation, is potentially independent of the transition from hunter-gathering to farming. Up until the discoveries within the Northern Levant at Jerf el Ahmar and Göbekli Tepe, the PPNA tower at Jericho was the only example of such activity. In the Southern Levant, the Jericho tower has now been joined by the large tiered and decorated structure at WF16, announced by Mithen *et al.* (2011) and fully described within this volume.

Göbekli Tepe situated on the Middle Euphrates, in a region identified through DNA research as a likely origin of domesticated wheat (Özkan *et al.* 2002), has the most striking monumental architecture. The interpretation and chronology of its circular enclosures and stone pillars are undergoing considerable revision based on new radiocarbon dates, stratigraphic assessment and the identification of similar enclosures at other sites in the region (Schmidt 2005; Dietrich *et al*. 2013). Whether Göbekli Tepe was a dedicated ritual sanctuary, or the locality for both ritual and domestic activities, remains a matter of debate (Banning 2011 and commentators).

The iconography at Göbekli Tepe and Jerf el Ahmar concentrates on naturalistic animal and stylised human representations. Whether this reflects the emergence of a new ideology in the PPNA of the Northern Levant, or merely the materialisation of long-existing beliefs and ideas remain unclear. One is tempted to draw links with the presence of raptors at the Epipalaeolithic site of Zawi Chemi Shanidar (Solecki 1977). The prominent phallic imagery of Göbekli Tepe is also found at PPNA sites in the Southern Levant, such as at WF16 (Mithen *et al.* 2005), but naturalistic art is notably rare in that region.

2.5 Neolithisation in the Pre-Pottery Neolithic B (PPNB)

Although the PPNB is conventionally defined by a set of traits including domesticated resources, rectangular architecture and a skull cult, it is a period of considerable economic and cultural diversity during which Neolithisation remained an on-going process with different rates and impacts in different regions. There was a proliferation of settlements (Figure 2.4) and an increase in their size throughout the region, suggesting significant population growth. This was, no doubt, enabled by the relatively warm, wet and stable conditions of the Early Holocene period.

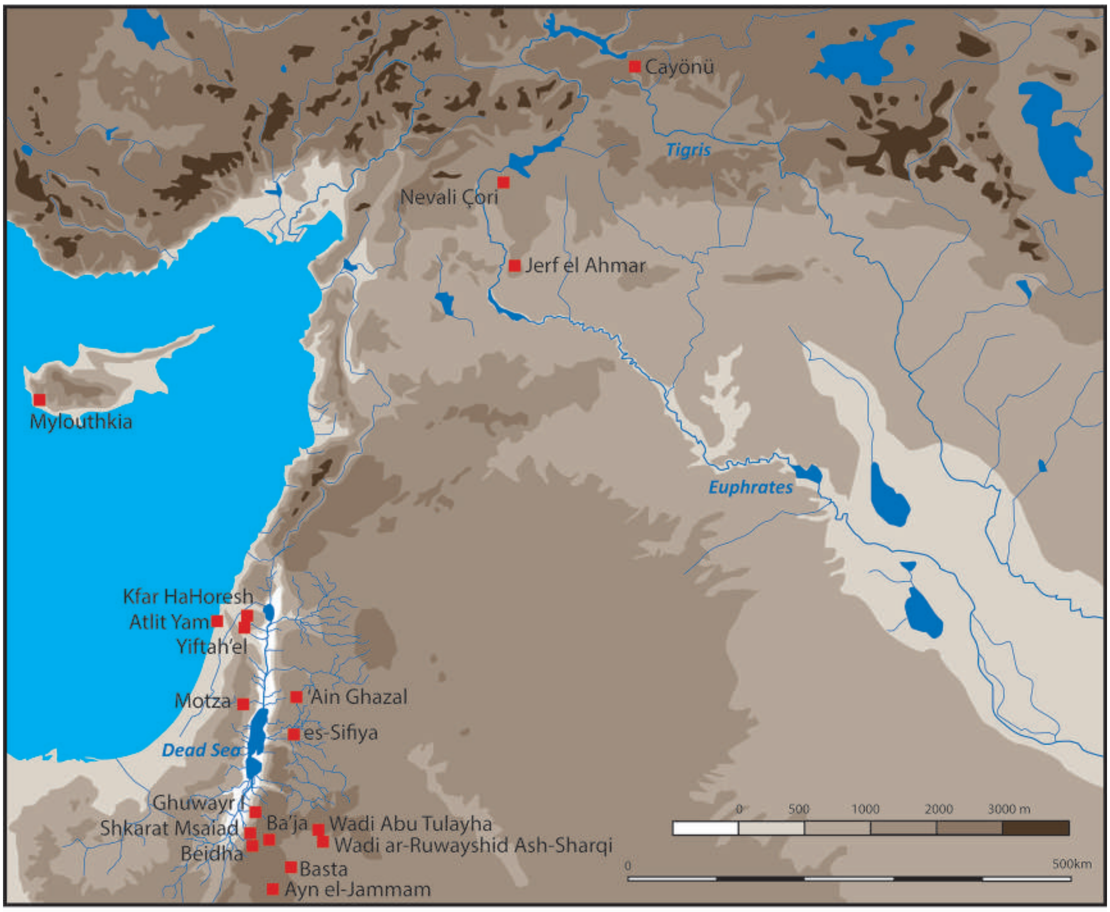


Figure 2.4 Pre-Pottery Neolithic B sites in the Levant referred to in the text.

In the Northern Levant there is a clearly defined transition of architectural forms, from the sub-circular forms of the PPNA to the rectangular forms of the PPNB, this being documented at Jerf el Ahmar (Stordeur 2015) and used to define the Early PPNB (EPPNB) (Kuijt and Goring-Morris 2002). Until recently, an equivalent EPPNB was unknown in the Southern Levant, or at least claimed to be ambiguous (Kuijt 2003). Excavations at Motza, however, a settlement located between Jerusalem and Tel-Aviv, has identified an EPPNB presence (Khalialy *et al.* 2007), suggesting that evidence from elsewhere in the Southern Levant should be re-evaluated (Finlayson *et al.* 2011a).

Many PPNA settlements in the Southern Levant appear to be abandoned with limited, if any, traces of cultural continuity into the PPNB. Goring-Morris and Belfer-Cohen (2011) attribute this abandonment to a mix of causes including over-exploitation of the immediate surroundings and the impact of disease arising within crowded settlements. There is, however, some evidence for PPNA–PPNB settlement continuity in the south of Jordan where the PPNA leads directly into an early MPPNB, for example at Beidha, and at Shkarat Msaied where circular architecture remains the predominant form (Finlayson and Makarewicz 2017).

In the Northern Levant, the Middle PPNB (MPPNB) maintains the same emphasis on community buildings, monumental and zoomorphic art as seen at Göbekli Tepe and Jerf el Ahmar in the Late PPNA and EPPNB. Sites such as Nevali Çori and Cayönü suggest substantial increases in population size, and a continuity of ideology and ritual themes that emerged within the PPNA, some of which become highly elaborate, such as the attention paid to the dead as in the Cayönü 'charnal house' (Verhoeven 2002).

The MPPNB in the Southern Levant provides a complex mix of architectural styles. Just within Jordan, the MPPNB architecture in the northern and central regions is rectilinear (Rollefson 2001), while it is circular at Beidha (Byrd 2005b) and Shkarat Msaied (Jensen in press) in the south. The chronological evidence remains limited, however, with the possibility that the circular architecture in the south may be relatively early (Finlayson *et al.* 2014). There is evidence for a localised evolution of rectilinear architecture at Beidha (Byrd 2005b).

LPPNB architecture continues to be varied: circular architecture continues in the more arid areas, such as in the Jafr basin (Fujii 2007); elsewhere buildings are constituted by multiple rectilinear components, while some settlements provide two-storey structures. There is a proliferation in the number of sites, most notably on the eastern side of the Jordan Valley and in the east–west wadis leading from the Jordanian plateau to the Wadi Araba. Some of these settlements grew to a considerable size. Those of 'Ain Ghazal (Rollefson and Simmons 1987), es-Sifiya (Mahasneh 1997), Ayn el-Jammam (Waheeb and Fino 1997) and Basta (Nissen 1990) have been described as PPNB 'mega-sites' (Bienert 2004) with proposed populations of up to 2000. These settlements are located at spring sites at, or near, the boundary between the area where rain-fed agriculture is possible and the more arid lands to the east along the Jordanian plateau. While these Late PPNB settlements are often described as villages (e.g. Simmons 2000) or even as proto-urban settlements (e.g. Bienert 2004), their organisation suggests that they were a very distinctive mode of agglomerative settlement, unique to themselves and not the original pattern for modern village life.

Other PPNB sites suggest specialist activities: Ghuwayr I appears to have been located at a critical route-way between the Wadi Araba and the Jordanian Plateau; Ba'ja was located within a narrow, winding wadi that suggests either ritual or defensive reasons, or for access to localised raw materials (Gebel 2004).

With regard to mortuary practices, the removal of skulls from primary burials becomes prominent within the MPPNB, with their eventual reburial together as skull caches (Kuijt 1996; 2000). In parts of the Southern Levant some skulls were selected for plastering, modelling the face and, on some occasions, cowrie shells were used for eyes, as at Jericho. Human figurines, limestone masks and half-size human statuettes testify to elaborate ritual activity (Kuijt and Goring-Morris 2002; Mithen 2003). MPPNB Kfar HaHoresh on the western side of the Jordan valley has been described as a 'mortuary-cum-cult' site (Goring-Morris and Horwitz 2007). It is notable that skull plastering, and the manufacture of plaster figurines, does not appear to be found in Southern Jordan (Makarewicz and Finlayson 2017). Ritual practices appear to change in the LPPNB. Skull plastering and under-floor burial cease, while shrines are constructed, possibly first seen at Beidha still within the MPPNB. Two LPPNB temples have been described at 'Ain Ghazal (Rollefson 2000; 2005).

The PPNB was a period of considerable technological development. This has long been recognised in stone tool technology, architecture and the scale of lime plaster production. Water management is now recognised as especially important with the discovery of wells at Mylouthkia on Cyprus (Peltenberg *et al.* 2000) and at Atlit Yam (Galili and Nir 1993), now submerged, off the coast of Israel. The discovery of 'barrages' to trap wadi flow and enhance infiltration at Wadi Abu Tulayha and Wadi ar-Ruwayshid Ash-Sharqi in the Jafr Basin (Fujii 2007) is especially important, as it suggests further developments in the changing relationships with resources — the domestication of water being linked to that of animals and plants.

The economic basis of the MPPNB and LPPNB cultural developments was domesticated plants with a mix of hunting, herding and, towards the end of the PPNB, fully domesticated goat and sheep. Nesbitt (2002) identifies domesticated barley and wheat throughout the Levant by 10,000 cal BP, with different varieties most likely emerging in different locations (Willcox 2005). Genetic evidence supports the notion of multiple centres, identifying independent domestication events for barley in the Southern and the Northern Levant (Badr *et al.* 2000; Morrell and Clegg 2007). Genetic evidence points to the origin of domesticated lentils in the Northern Levant, somewhere in southeastern Turkey or northern Syria, from where they rapidly spread down the Jordan Valley, with a huge seed cache of lentils being recovered from the LPPNB site of Yiftah'el in northern Israel at *c*. 8800 cal BP. Chickpeas and fava beans were most likely domesticated within the same regions of the Northern Levant within the PPNB, although the genetic and archaeological evidence is more challenging to interpret (as reviewed by Zeder 2009).

As noted above, the earliest known clear evidence for the management of morphological wild goat herds is from Ganj Dareh in the Zagros Mountains at around 10,000 cal BP. Zeder (2009) proposes that this was the outcome of a long-term hunting tradition within this region, followed by goats being moved out of their natural habitat into the lowlands, as fully domesticated herds by 9000 cal BP. The management of wild goats and sheep appears to have been occurring in other regions of the Levant during the PPNB, with the emergence of morphologically domesticated animals only towards the end, or even after, this cultural period. Whether herd management arose through independent innovation or the spread of practices from the Zagros remains unclear, but it had become pervasive throughout the Southern Levant by 9500 cal BP. Nevertheless, throughout the MPPNB there remained a significant reliance on wild animals, these constituting 50% of the fauna from 'Ain Ghazal with the domesticated or otherwise nature of the goats from that site remaining open to debate. Pigs and cattle appear to have become domesticated in the Northern Levant by around 10,000 cal BP, but did not spread into the Southern Levant until after 8500 cal BP for pigs and 8000 cal BP for cattle (Zeder 2009).

As with plants, genetic evidence suggests multiple domestication events. When taken together with the archaeological evidence, the domestication of sheep and goats has striking similarities to that of plants with both involving a long period of manipulation of morphologically wild strains. The result appears to have been the emergence of diverse economies throughout the Levant, with varying proportions of wild and domesticated resources, and differing dependencies on particular plant and animal types depending upon the local environments.

The farming economy of the PPNB appears to have undergone significant change between 9000–8900 cal BP when the LPPNB appears to collapse, resulting in a more dispersed settlement pattern during the following PPNC and Pottery Neolithic phases (Rollefson and Köhler-Rollefson 1993). The large PPNB mega-sites become partially, or even wholly, abandoned with the appearance of a more dispersed settlement pattern. Transhumant economies develop within the more arid regions. Whether this abandonment arose from long-term deterioration of soil productivity, erosion of soils caused by over-grazing, decimation of tree cover by over-exploitation of wood for fire and lime production, and/or the spread of disease and social tension, are all matters of considerable debate (Campbell 2010; Rollefson and Köhler-Rollefson 1989; Goring-Morris and Belfer Cohen 2011). Recent work indicates that such changes are not closely linked to climate change, as far as can be established with current dating evidence (Flohr *et al.* 2016): neither the 9.2 Ka BP nor the 8.2 Ka BP climatic events appear to have had any impact on the Pre-Pottery and succeeding Pottery Neolithic economies.

The PPNC was initially identified at 'Ain Ghazal as a Southern Levantine transitional phase between the PPNB and the Yarmoukian Pottery Neolithic (Rollefson and Simmons 1986). It is marked by the production of much smaller 'projectile' points than within the PPNB and an abandonment of the sophisticated naviform flint technology that had been used to produce large regular blades. New types of 'corridor buildings' appear at 'Ain Ghazal, these being similar to those at Beidha, which had suggested that Beidha Phase C was PPNC in date (Rollefson 2001), although evidence now suggests that at Beidha the corridor buildings and large open public buildings appear earlier, around the end of the Middle PPNB (Purschwitz 2017; Finlayson and Makarewicz 2018). Public architecture continues in the PPNC with the 'great wall' and the 'walled street' from 'Ain Ghazal (Rollefson 2001). With the exception of 'Ain Ghazal, the PPNC is not very well known, although identified by Rollefson at a number of Jordanian sites including as-Sifiya, Ghuwayr 1, Basta, and by the excavators at 'Ain Jammam (Waheeb and Fino 1997). Nomadic pastoralism appears to develop during the PPNC, notably in the Black Desert region of modern day Jordan (Rollefson *et al.* 2014).

2.4 Neolithisation in the Pottery Neolithic

The Pottery Neolithic in the Southern Levant (8400–7600 cal BP, Figure 2.5) may come close to Childe's 1951 conception of the Neolithic. The new dispersed settlement pattern that emerges from the abandonment of the PPNB mega-sites is best known at Wadi Ziqlab in Jordan, where it is interpreted as reflecting a new economy based on domesticated plants and animals (Banning 1996). The settlement change can be seen locally in Wadi Faynan: after thousands of years of settlement at the mouth of the Wadi Ghuwayr, at either PPNA WF16 or PPNB Ghuwayr 1, the Neolithic settlement moves out to the middle of the alluvial plain to the site of Tell Wadi Feinan (Najjar *et al.* 1990). If both WF16 and Ghuwayr 1 are located in a typical hunter-gatherer location, with access to diverse environments, on a communication route from Wadi Araba to the Jordanian Plateau and with commanding views over the surrounding landscape, Tell Wadi Feinan is located at the best spot to grow crops. Other significant changes in food production technology may also have begun in the Pottery Neolithic. Research at Pottery Neolithic Dhra' has suggested that midden material was no

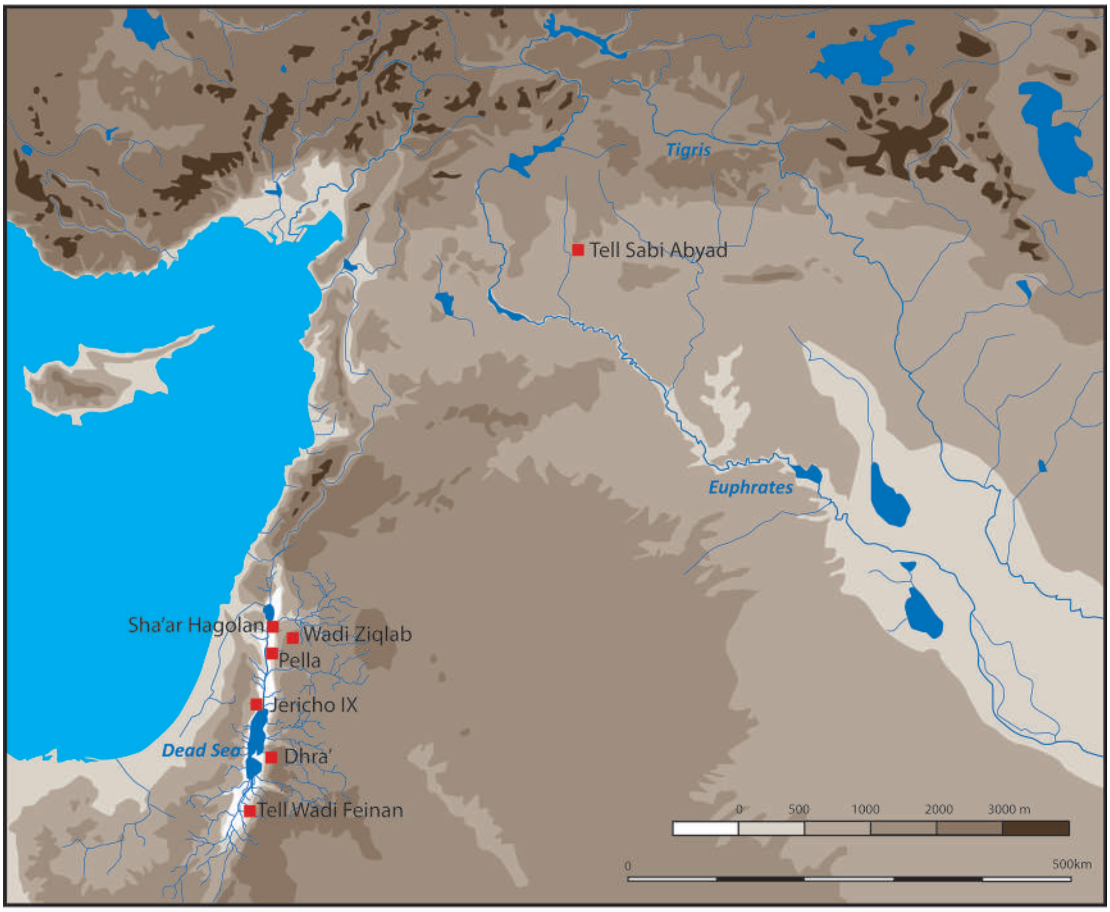


Figure 2.5 Pottery Neolithic sites in the Levant referred to in the text.

longer stored on site, but was used to fertilise the soil and that check dams, or terrace walls, were constructed to retain soils (Kuijt *et al.* 2007).

A few larger sites complement the distributed and relatively small settlements of the Pottery Neolithic. One such site is Tell Sabi Abyad in the Northern Levant (Syria), although Verhoeven and Akkermans (2000) argue that this may not be a single-phase occupation, but a series of smaller settlements placed, over time, adjacent one to another. Sha'ar Hagolan in the Southern Levant (Israel) has an elaborate settlement plan, one that would have required considerable community-level planning (Garfinkel 2004). The rarity of larger Pottery Neolithic settlements might be because they are at the base of long tell sequences, and hence buried by Chalcolithic and Bronze Age activity. This is the case at one of Jordan's best investigated tell sites, Pella, which has Pottery Neolithic material as the earliest occupation level (Bourke 2007). Even the relatively small site of Tell Wadi Feinan shows this occupational sequence.

It has been argued that regionalisation increases during the Pottery Neolithic, for example between Yarmoukian and Lodian/Jericho IX regions in the Southern Levant (Rollefson 2001). However, this may simply reflect the potential for greater visibility of pre-existing regional identities via the new plastic material of pottery. As described above, regional variation is typical throughout the Pre-Pottery Neolithic.

The Late Pottery Neolithic is defined in a number of differing ways, with scholars disagreeing about what to consider Late Neolithic and what to include in the Chalcolithic (cf. Banning 2007). Regardless of the terminology employed, this phase remains relevant to the process of Neolithisation because it is during the Late Pottery Neolithic/Early Chalcolithic that crops such as the olive and the grape, and animals such as the donkey, become domesticated (Finlayson 2013). It is perhaps not until this point that we can really see the full adoption of a farming lifestyle, based on an integrated crop and animal regime, with a settlement pattern designed around food production. Neolithisation provides the foundations for the emergence of societies with social hierarchies, metallurgy and incipient urbanism in the Chalcolithic and Early Bronze Age.

2.5 The PPNA in the midst of Neolithisation

Neolithisation is a catch-all term that acknowledges the complex interplay between changing social relations, technology, ideology, economy and the environment between 24,000 and 7600 years ago in Southwest Asia. While the term usefully captures the complexity of these variables, it is merely descriptive and requires archaeologists to unpack the matrix of multiple causes and consequences. As evident from the above review Neolithisation started soon after the Last Glacial Maximum and accelerated through the Late Pleistocene and Early Holocene, possibly related to the climatic and environmental changes of this period. As such, the PPNA is situated in the midst of Neolithisation, making it especially important in our understanding of how, when and why mobile hunter-gatherers transformed into sedentary farmers in the Levant.

A decade ago it was possible to characterise the PPNA period as having a generic set of features which formed a cultural historical phase of the Neolithic (e.g. Kuijt and Goring-Morris 2002). The recent accumulation of evidence as summarised in this chapter has made this problematic. The extent of sedentism, cultivation of wild plants, herd management and technological innovation, all varied markedly, not only between the Southern and Northern Levant, but within each of these regions, as did the nature of social organisation and ideology. As such, the current requirement is to gain in-depth understandings of individual PPNA settlements and settlement patterns within particular localities, acknowledging that these were subject to regional influences arising from the spread of people, ideas and technology, and processes common to the whole of the Levant, including climate change and — most likely — demographic growth. As is always the case in archaeology, attempting to differentiate between local innovation and cultural diffusion is particularly challenging.

When dealing with any individual PPNA settlement, or a cluster of settlements within a locality, the key questions to address include the following:

What was the degree of sedentism? This term is widely acknowledged as difficult to define (how long does one have to remain in one place to be sedentary?) and perhaps even more difficult to identify archaeologically — as the debates about Natufian sedentism cited above demonstrate, but few question that an increased degree of sedentism was a key theme of Neolithisation and that it is related, in a manner that remains unclear, to changes in economy and society. While sedentism has been described as a ‘point of no turning back’ in the Neolithisation processes, the Late Natufian may demonstrate that this was not the case — if this period does indeed represent a return to high mobility following Early Natufian sedentism. Moreover, there are numerous ethnographic and archaeological examples from around the world of people engaged in the cultivation of both wild and domesticated plants while maintaining a mobile lifestyle.

Identifying sedentism, or whatever temporal pattern of residence existed, is an archaeological challenge, requiring the interpretation of multiple lines of evidence. Ideally we require both seasonal indicators of occupation, coming from animal and plant remains and microstratigraphic analysis of sediment accumulations that can indicate periods of activity and abandonment. Unfortunately, AMS radiocarbon dating is unlikely to ever provide sufficient resolution to make a significant contribution, even when a large number of dates are available and Bayesian analytical techniques are applied.

When and why did community-scale activity, possibly involving a centralised authority, arise? The monumental tower at Jericho and enclosures at Göbekli Tepe imply community-scale activities, or rather those at a supra-community-scale involving more people than would have routinely been present at any one settlement. The tiered structure at WF16, fully reported in this volume, may fall into the same category. The Jericho and Göbekli evidence suggests that such aggregations may have been at least partially driven by ideology and ritual, but the functional consequences arising from such gatherings, including the exchange of material and ideas, are central to the Neolithisation process and require further consideration. Securing information from excavation is crucial, notably by placing such structures into the archaeological context of their settlement and locality, and recovering data from within the floors of such structures via micro-debitage and geochemical analysis.

What was the nature of ideology and mortuary practices in the PPNA? While gaining further insights into community-scale (and supra-community-scale) activities will enable further insights to be gained into PPNA social organisation and ideology, these also need to be pursued by further study of PPNA burials and material culture. The former are especially rare, with the complete absence of cemeteries, constraining both our understanding of mortuary practices within the Neolithisation process and the PPNA demography of a local community, or region. With regard to material culture, the PPNA shows marked similarities throughout the Levant within the gross characteristics of its chipped stone technology, but with subtle variations at a regional and local level. Symbolic representations have become markedly different between the Northern and Southern Levant with a much higher proliferation of zoomorphic imagery in the former.

What was the extent of plant cultivation and herd management in the PPNA? Further information regarding the economic basis of PPNA settlements is absolutely essential if we are to understand the process of Neolithisation. While the earliest domesticated plants and animals currently come from the PPNB, substantial evidence has recently accumulated for plant cultivation in the PPNA within both the Northern and Southern Levant, while evidence for the management of wild herds comes from the Zagros Mountains, the Northern Levant and possibly even from WF16. Such evidence is to be expected because the emergence of domesticated strains would have required an extensive period, perhaps two millennia, of manipulation of their wild progenitors. Developments in genetic analysis have been of particular interest because they support the idea of multiple and geographically diverse origins for domestic strains of both plants and animals. Such genetic interpretations confirm a view that the current evidence from the archaeological record is partial and biased. The dilemma we face is the limited number of suitable faunal and botanical assemblages for analysis from PPNA sites: those of a sufficient size and which come from well-dated horizons with an understanding of their discard and taphonomy.

What technological developments occurred during the PPNA? While the long-standing debate regarding the Khiamian and Sultanian in the Southern Levant may have been resolved (Edwards and Sayej 2007), we remain poorly informed about other types of technological development. For instance the recent discoveries of what appear to be grain storage facilities at Dhra' and Jerf el Ahmar have highlighted the limited extent of our knowledge of architectural design and construction methods during the PPNA, whether for storage, domestic, or other activities. Similarly, the recent discovery of Pre-Pottery Neolithic wells (Atlit-Yam, Mylouthkia) and dams (Wadi Abu Tulayha, Dhra') have emphasised the likely need for enhanced water management within communities engaged in plant cultivation and with longer residence times.

Were there specialist craft-persons within the PPNA? Technological developments are closely related to social structure, especially with regard to the emergence of specialist craft-persons and/or sites within a settlement pattern. They are also related to patterns of regional trade and exchange that was central to the flow of ideas and people throughout the Levant. The extent to which craft specialisation, as appears evident in the PPNB, might have arisen in the PPNA remains unclear. As noted above, Goring-Morris and Belfer-Cohen (2011, S201) have suggested that WF16 may have served as a node in a procurement and exchange network of valued materials, such as obsidian, malachite, bitumen and seashells.

While further data about all of these issues — sedentism, communual activity, ideology, economy and technology — is of prime importance, the most desirable evidence would be to recover these within a well-dated, stratified sequence that extends across one or both of the traditional boundaries of the Epipalaeolithic/PPNA, and of the PPNA/PPNB. Whether such sites exist remains unknown: Goring-Morris and Belfer-Cohen (2011, S202) argue that there was a 'breakdown' between each of these periods and hence we should not expect to find long-term continuity at any one settlement or locality. We remain unpersuaded that the archaeological record is sufficiently understood to support this interpretation.

The need for substantial improvements in absolute dating of PPNA settlements is of paramount importance. The last decade has witnessed a considerable refinement in our understanding of global climate change, and its regional and local environmental consequences within the Levant. While there remains a great deal more to do, exploring the relationship between environmental and cultural change requires similar refinements in our knowledge of archaeological chronology. This can only be gained by securing a sufficiently large number of suitable samples for AMS dating — identified plant or bone specimens from discrete contexts with known formation processes — and which can then be subjected to Bayesian analysis to aid in their interpretation.

While such chronological enhancements will improve our ability to explore the relationship between climate and culture change, they should also help with unravelling the complex interplay between social, economic and technological change. The length of the transition process encompassing a range of climate changes, the environmental diversity, and an increased understanding that hunter-gatherers routinely modify their environment, make any quest for a prime mover fruitless. But the questions remain, however, of how and why did this process begin and develop at this particular time and place in human history?

When considering how to progress our understanding of Neolithisation, one is tempted to lapse into a wish list for the characteristics of a PPNA site that one would hope to excavate — a temptation to which this chapter has perhaps succumbed. One would ideally require a site with deep stratigraphy, organic preservation, rich material culture and which can be placed into its local and regional environmental context. Fortunately, the 1997–2003 evaluation of WF16, a PPNA site located in Wadi Faynan, revealed a site with those characteristics, thereby providing the potential for furthering our understanding of Neolithisation.

3. Archaeological potential of WF16 and aims of the 2008–2010 excavation

Archaeological evaluation of the artefact scatter discovered within Wadi Faynan in April 1996 involved surface collection, test pitting and the excavation of three trial trenches (Figure 4.1; Finlayson and Mithen 2007), complemented by a geophysical survey (Astin and Mansfield 2007). The trenches were located on exposed structural remains, small arcs of walling, at the peripheries of the artefact scatter: Trench 1 at the southern-edge of the knoll, just before a colluvium-filled gully and immediately north of the land climbing to crags of porphyry bedrock; Trench 2 at the northern edge of the knoll immediately before a steep drop to the wadi floor; Trench 3 on the easternmost knoll where archaeological deposits were relatively shallow above the porphyry (Figures 4.1 and 4.2).

The on-site archaeological evaluation of WF16 was supported by an archaeological survey throughout Wadi Faynan (Mithen *et al.* 2007) and a study of landscape evolution (Tipping 2007). The evaluation revealed that WF16 had the following characteristics, all described in detail in Finlayson and Mithen (2007):

- Deeply stratified deposits, up to two metres in depth, covering a minimum chronological range between 11,600 and 10,200 cal BP, effectively the entire period of the PPNA (Finlayson and Mithen 2007; Mithen and Finalyson 2007a). This is unique for a PPNA site in the Southern Levant, enabling issues concerning the origin of the PPNA and the transition to the PPNB to be explored at a single site.
- Good faunal preservation, potentially better than at any other known PPNA site in the Southern Levant. The evaluation recovered identifiable large mammal bones at a density five times greater than at Netiv Hagdud, which previously had the best-preserved faunal remains from the PPNA (Carruthers and Dennis 2007). Microfauna (Edwards and Martin 2007) and bird bones (Rielly 2007) were shown to be preserved at WF16, both of which are especially useful for exploring the palaeoeconomy and palaeoenvironment of archaeological sites, along with the seasonality of occupation.
- Charred plant macro-fossils (Kennedy 2007), wood charcoal (Austin 2007) and phytoliths (Jenkins and Rosen 2007) are all present at WF16, providing further lines of evidence to establish the palaeoeconomy, palaeoenvironment and seasonality of occupation at WF16.
- A rich and diverse array of material culture, including chipped- and ground-stone artefacts (Pirie 2007; Shaffrey 2007), bone artefacts (Finlayson 2007), stone and shell beads (Critchley 2007; Céron-Carrasco 2007), and figurative and geometric art (Shaffrey 2007).
- Numerous and well-preserved human remains within primary and secondary, single and multiple burials, providing an opportunity to explore patterning between age, sex and burial custom (Roberts 2007).
- Several architectural styles, including walls constructed from pisé, stone built walls, and those with a double skin of stones, associated with variable artefact assemblages. With the presence of good stratification, these provide an opportunity to tease apart chronological and intra-site spatial variation within a PPNA settlement (Finlayson and Mithen 2007; Mithen and Finlayson 2007b).
- Large, partitioned structures appearing to have internal partitions revealed by geophysical survey (Astin and Mansfield 2007) of a scale not

previously seen within the Southern Levant, other than the Jericho tower.

With such characteristics, WF16 appeared to be a site that could provide data to effectively address those questions concerning the PPNA specified in Chapter 2, and which can be summarised as:

1. What was the extent of sedentism at WF16? How did this change during the course of the settlement period?
2. To what extent were wild plants cultivated and wild animals managed at WF16? Had the process of domestication begun and can any chronological development be ascertained from the stratified deposits?
3. What range of activities occurred at WF16 and how were these spatially organised within the settlement? Were there dedicated areas for the production of beads, stone tools, food processing and so forth?
4. To what extent were the cultural and economic developments evident at WF16 derivative of those occurring elsewhere within the Southern Levant or within the Levant as a whole? Were there elements of innovation at this particular site or locality within the Southern Levant?
5. What were the antecedents of WF16 in Wadi Faynan? Other than at Barqa, no trace of Epipalaeolithic activity has been located within the wadi, suggesting that this might either be directly below the PPNA deposits at WF16, or be completely absent.
6. Was there a gradual transition to a PPNB-like culture in the later phases of WF16, or a complete cultural hiatus between the PPNA and PPNB in Wadi Faynan?
7. What are the dates and functions of the large structures revealed by geophysical survey — if indeed these are structures rather than geologically induced anomalies?

The size and quality of the material culture, burials, faunal and botanical assemblages acquired from the 1997–2003 evaluation indicated that a large-scale excavation had the potential to secure data to address such questions. The potential of WF16 for such research also arose from two additional factors.

First, research undertaken within the *Water, Life and Civilisation* project at the University of Reading between 2005 and 2010 (Mithen and Black 2011) contributed further information regarding the palaeoenvironmental context of WF16. Robinson *et al.* (2006) synthesised all available sedimentological data from terrestrial and marine contexts concerning environmental change over the Late Pleistocene to the mid-Holocene for the Southern Levant, while climatic and hydrological modelling were undertaken for the both Wadi Faynan itself (Smith *et al.* 2011) and the wider region (Robinson *et al.* 2006; Brayshaw *et al.* 2011). When combined with palaeoenvironmental evidence acquired from the 1997–2003 evaluation and associated vegetation survey within the locality (Mithen *et al.* 2007), considerable progress has been made in establishing the local and regional environment of WF16.

Second, WF16 is located a mere 500 m from the PPNB site of Ghuwayr I that had undergone extensive excavation during the 1990s (Simmons and Najjar 2006). The WF16 archaeological evaluation demonstrated the likelihood of a probable 500-year gap between final activity at WF16 and initial activity at Ghuwayr I (Mithen and Finlayson 2007); however, as this was based on a limited number of radiocarbon determinations the possibility of chronological continuity cannot be dismissed. By sharing the same locality, and hence the same access to raw materials, water sources and ecological zones, the proximity of WF16 and Ghuwayr I provides a unique opportunity to explore continuity and change between the PPNA and PPNB, whether or not there had been population continuity between the two settlements.

Given the results of the archaeological evaluation, the *Water, Life and Civilisation* palaeoenvironmental studies and the proximity of Ghuwayr I, WF16 was recognised as having considerable potential to contribute towards our understanding of the PPNA at WF16 and hence Neolithisation as a whole.

To adequately address the seven questions summarised above, relatively large-scale excavation using meticulous techniques and carefully designed sampling strategies was required. The aim of the 2008–2010 excavation was to apply such methods to recover sufficiently large samples of finds — animal bones, plant remains, artefacts, burials, architecture — with full contextual information and chronological resolution.

4. Excavation, sampling, recording and analytical methodologies

4.1 Funding, personnel and field seasons

Once funding for the excavation had been secured, the initial decision was simply the size and placement of the trench, or trenches, at WF16. Here the dilemma was the need to excavate a sufficiently large spatial extent, without knowing the depth of deposits outside the immediate area of the 1997–2003 trial trenches. As such, we faced the risk of opening too large an area to be able to establish the complete stratigraphic sequence within the time and resources available for the excavation. It was decided that that risk was of less significance than failing to understand the extent of intra-site spatial variation in architecture and assemblage composition. Consequently a decision was made to excavate a single trench on the central knoll of WF16. This was 40 m x 15 m, connecting the two trial trenches that had previously been excavated at the southern (Trench 1) and northern (Trench 2) extents of the knoll (Figures 4.1, 4.2). It was agreed that if the remains were particularly dense, rich, or deeply stratified the excavation would sample from the evidence exposed in plan.

The three field seasons were of approximately six weeks duration: March and April 2008, 2009 and 2010. The project employed five excavation supervisors (Samantha Hemsley, Darko Maričević, Nick Pankhurst, Gareth Rees and Lisa Yeomans), one surveyor (Cordelia Hall), three finds supervisors (Geraldine Crann, Rosa Campos Blade and Milena Vasic) and eight site assistants (Sarah Elliott, Pascal Flohr, Matt Gittins, Sarah Henley, Tom Lyons, Ben Sharp, Cecile Tvetmarken and Dan Wheeler). During the central four weeks of each excavation season between 12 and 15 University of Reading undergraduate students participated in the excavation as volunteers, along with a small number of associates of the field team, notably members of the Mithen family, Sue, Hannah, Nick and Heather. The excavation and finds processing teams were both assisted by the local Rashaydah, ‘Azazma and Sa‘ideen Bedouin workmen with Abu Fawwaz, Abu Sael and Juma Ali Zannoun playing key roles. Each excavation season was supported by a representative from the Department of Antiquities of Jordan: Haroun Amarat in 2008, Ashraf al-Khreysheh in 2009 and Hani Fallahat in 2010.

The team was based at the Wadi Faynan Camp, located at the juncture of Wadi Faynan and Wadi Dana, where an Ecolodge had been constructed between 2005 and 2008. Accommodation, washing facilities and meals were partially bought-in from the Ecolodge and partially organised by the project itself at the Wadi Faynan Camp. A field laboratory was established within the buildings adjacent to the Ecolodge maintained by the Council for British Research in the Levant.

4.2 Single context planning, dry sieving, bulk finds and small finds

The 40 m x 15 m trench was initially divided into 5 m x 5 m grid squares. Surface bulk finds were recorded according to grid square, while the positions of surface small finds were recorded in 3D by total station. Approximately 10–20 cm of overburden was removed according to grid square in two spits (Figure 4.3, Chapter 5). Due to the erosion and mixing of deposits caused by the wind, winter rains, goats’ hooves, roots, burrowing animals and, no doubt, a variety of other processes, the overburden on the site was in essence a loose layer of churned up archaeology. This had been stripped of any meaningful contextual information by these post-depositional processes. Only features with substantial stone components had occasionally kept their shape in the otherwise amorphous soil matrix of the overburden,

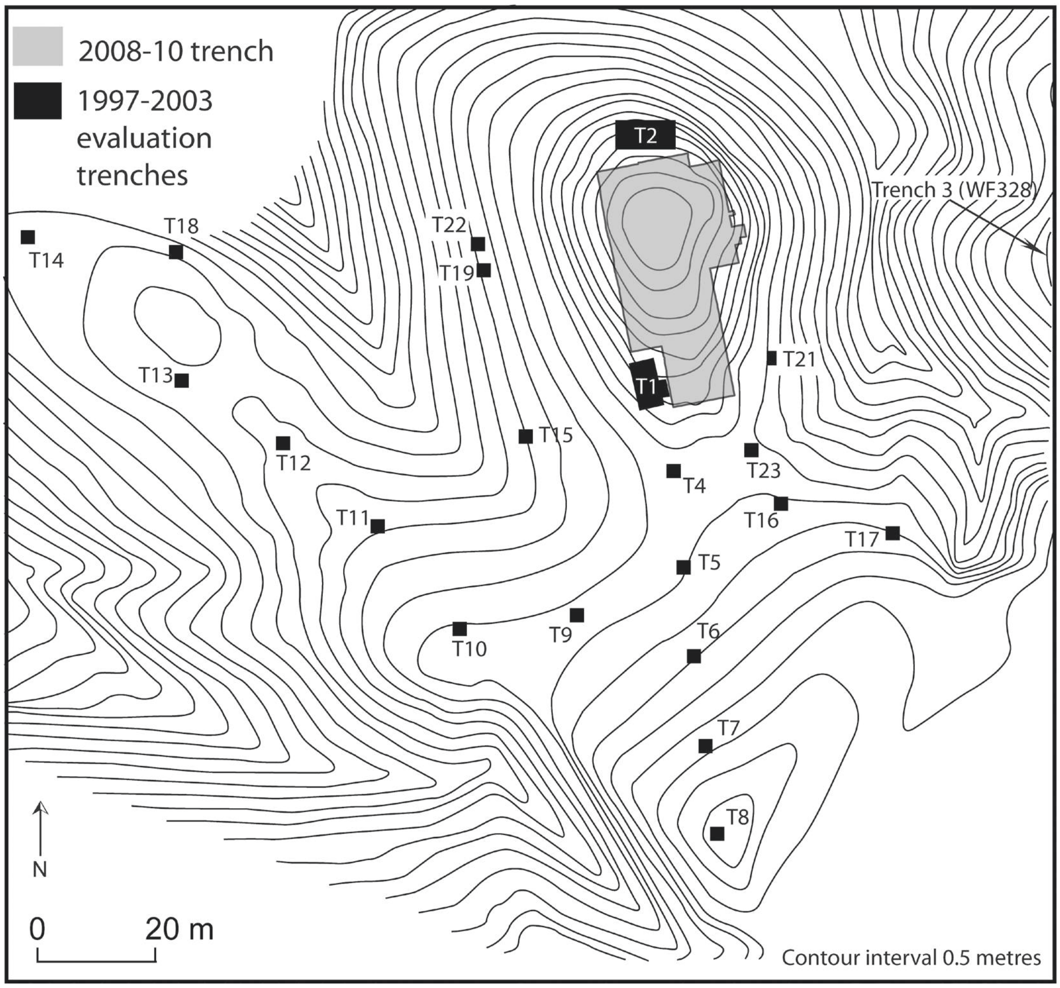


Figure 4.1 Location of the 2008–2010 trench in relation to the 1997–2003 evaluation trenches.

Figure 4.2 Google earth image from 2004 with visible backfilled evaluation trenches and test-pits in relation to the outline of the 2008–2010 excavation trench and the excavations at the PPNB settlement of Ghuwayr 1. Graves of the robbed Byzantine cemetery can also be seen.

Figure 4.3 Excavating the overburden, March 2008.

that having been designated as Horizon O111 (see section 4.4 below for use of the 'O' prefix). In order to provide a small sample of material to characterise the mixed deflated horizons, a single 1 m square was sampled for sieving from each 5 x 5 m square.

Apart from the excavation of the overburden (Horizon O111) in two spits, a single context planning method was implemented throughout the course of the excavation. Single context planning was developed in the 1970s by MOLAS (Museum of London Archaeological Services) and initially developed for use on urban sites with complicated stratigraphy (Spence 1990). The basic recording unit is a *context.* This is fundamentally an event in time that has been preserved in the archaeological record, or possibly of multiple events that have become archaeologically indistinguishable. A context can be either positive, such as a wall or a deposit, or negative, such as a cut. A pit, for example, must have at least two contexts: the pit cut and the pit fill. Contexts can be the result of either cultural or natural processes such as erosion or deposition.

A total of 1397 contexts were identified during the course of the WF16 2008–2010 excavation. Each context was given a unique number and recorded using a context sheet (Figure 4.4). When contexts were deposits they were planned prior to excavation at 1:20, while each negative context was recorded after the removal of fills. All contexts were photographed using a digital camera.

Human skeletal remains had their own recording sheet (Figure 4.5). This had a diagram of a skeleton for excavators to shade in all observable elements in each individual burial, as well as a number of specific fields to describe elemental position and surface modifications. A three-dimensional record was made of the location of small finds associated with the skeletal remains. Geo-referenced photographs

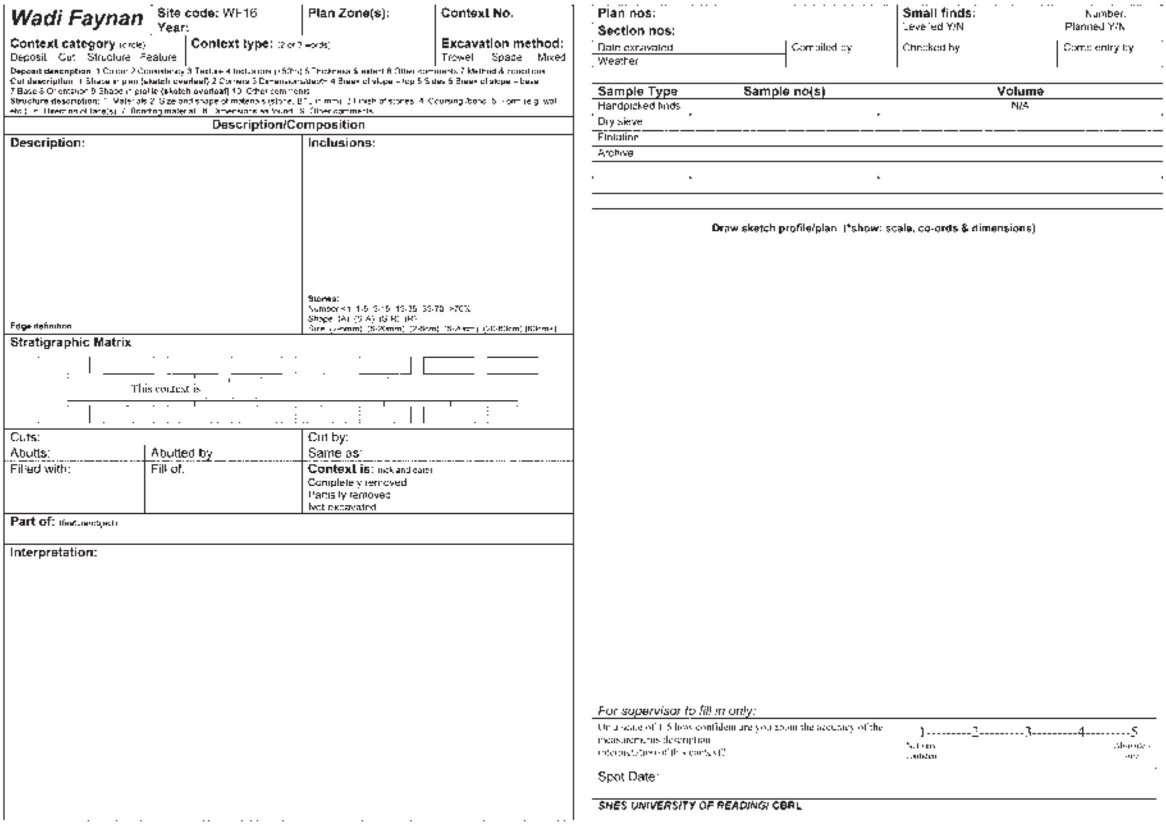

Wadi Faynan
Site code: WF16
Year:
Plan Zone(s):
Context No.
Context category (circle)
Deposit Cut Structure Feature
Context type:
Excavation method:
Trowel Spade Mixed
Description/Composition
Description:
Inclusions:
Edge definition
Stratigraphic Matrix
This context is
Cuts:
Cut by:
Abutts:
Abutted by
Same as:
Filled with:
Fill of:
Context is:
Completely removed
Partially removed
Not excavated
Part of:
Interpretation:
Plan nos:
Section nos:
Small finds:
Levelled Y/N
Planned Y/N
Number:
Date excavated
Weather
Compiled by
Checked by
Comp. entry by
Sample Type
Sample no(s)
Volume
Handpicked finds
N/A
Dry sieve
Flotation
Archive
Draw sketch profile/plan (*show: scale, co-ords & dimensions)
For supervisor to fill in only:
Spot Date:
SHES UNIVERSITY OF READING/ CBRL

Figure 4.4 WF16 context recording sheet.

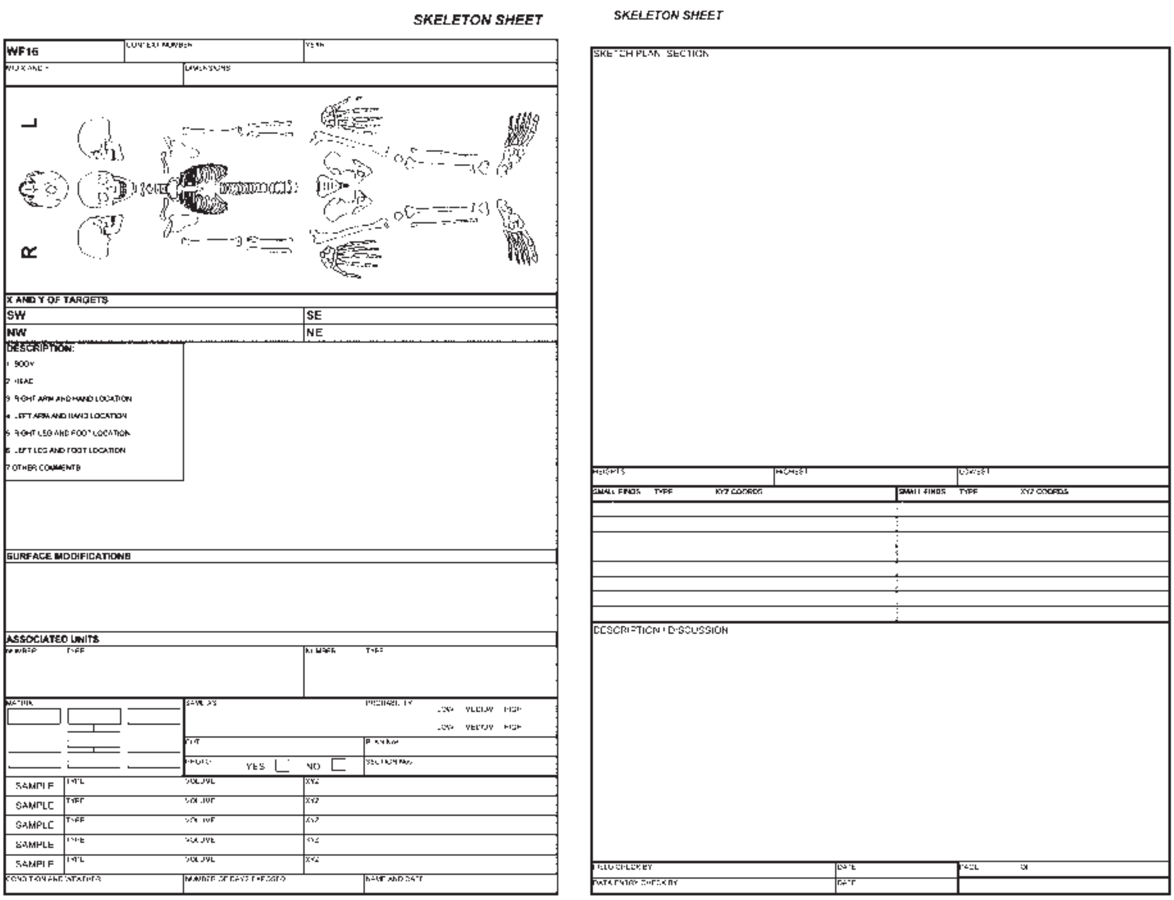

SKELETON SHEET
WF16
L
R
X AND Y OF TARGETS
SW
SE
NW
NE
DESCRIPTION:
SURFACE MODIFICATIONS
ASSOCIATED UNITS
SAMPLE
SAMPLE
SAMPLE
SAMPLE
SAMPLE
SKETCH PLAN SECTION
DESCRIPTION / DISCUSSION

Figure 4.5 WF16 human skeletal remains recording sheet.

Figure 4.6 Dry sieving at WF16.

were taken throughout the excavation of human skeletal remains to provide detailed information on the positions of the bones, and to assist with subsequent analysis of the often very fragile and poorly preserved remains.

The trench was divided into four areas, each managed by an excavation supervisor with two or three assistants, a number of student volunteers and experienced Bedouin workmen. Other than the majority of the overburden and samples taken for flotation, archiving, phytolith, sedimentological, structural and microphological analyses (see section 4.3 below), all excavated sediment was dry sieved through a 2 mm mesh on site (Figure 4.6). The overburden was sampled by dry-sieving the sediment from the one square metre samples located in the southwest corner of each of 5 m x 5 m grid squares (a 4% sample). The quantity of sediment sieved for each context was recorded using calibrated buckets; a total of 1580 samples were dry-sieved during the course of the excavation, constituting 179,060 litres of sediment. The sieve residue was sorted off-site for finds (Figure 4.7).

During the course of the excavation, any artefacts identified as being of a fragile nature, or of particular importance, such as an incised stone plaque or a shell bead, had their three-dimensional coordinates recorded, were included on the single context plan, extracted from the sediment and given a Small Finds number. Inevitably, there was some degree of subjective judgement on the part of the excavation supervisors as to which objects were particularly fragile or important.

4.3 Sampling methods

Flotation

A comprehensive sampling strategy was employed for the extraction of plant remains, microfauna, and small artefacts by flotation. A 30-litre flotation sample was taken from each context and processed using a flotation machine. If 30 litres were not available, then the whole context deposit was taken for flotation. If the context was especially large (greater than 60 litres) or if it appeared to be especially rich in botanical remains or microfauna, multiple samples were taken for flotation. In total, 1935 samples were floated during the three field seasons, constituting 28,215 litres of sediment.

Figure 4.7 Sorting sieve residue at WF16.

One flotation machine was used in 2008 with a second being constructed for the subsequent two seasons to allow the number of samples taken to be processed. Each machine consisted of a 55 gallon oil drum and two settling tanks (Figure 4.8). Due to extreme water shortages in Wadi Faynan, water was recycled using a pump, with 0.25 µm meshes being placed at various points within the recycling system to prevent contamination. Each barrel was cleaned daily, with the whole system being fully cleaned every week and refilled with fresh water. A 300 µm mesh was placed inside the barrel to catch the heavy residue and mesh bags with chiffon sides and a base made of 0.25 µm mesh were used to catch the light fraction (Figure 4.9). Both the light fraction and the heavy residue were dried in a specially designed drying tent out of direct sunlight. After drying, the light fraction was re-bagged, entered into the project database (see section 4.4 below), and crated for storage.

Heavy residue sorting

The heavy residue was sieved into 4 mm, 2 mm and 1 mm fractions and sorted for finds by trained local Bedouin men. The 4 mm fraction was 100% sorted with the principal finds being: bone, chipped stone, ground stone, shell, green stone, beads and charcoal. In 2008 the smaller fractions, 2 mm and 1 mm, were usually sub-sampled for sorting using a riffle box. The size of the sample sorted for the smaller

Figure 4.8 Flotation at WF16.

Figure 4.9 Drying flots and flotation heavy residue at WF16.

fractions could range from 12.5% to 100% depending on the amount of sample originally taken. For samples up to 30 litres, the default percentages for 2 mm and 1 mm fractions were 50% and 25% respectively, and for samples over 30 litres 2 mm was sub-sampled, 25% or 12.5% for the 1 mm fraction. This protocol did vary to some extent, depending on the size of the sample; for example, if a sample was only five litres, all fractions were sorted to 100%. This sub-sampling was undertaken to enable a complete evaluation of all excavated deposits.

In 2009, the protocol was altered so that heavy residue from the 2 mm and 1 mm fractions was only sorted from the following context types: burial fills, make-up/foundation, midden, occupation deposits, floors, external surfaces and dumped deposits. Further changes were made in 2010 when the 1 mm fraction was not sorted. This is because scanning of the 1 mm fractions from previous years had demonstrated that the 1 mm fraction contained very little of interest, while being both time consuming and costly to sort. Instead, this material was stored in the eventuality that a specialist may require it for study in the future.

Archiving

Archive samples of approximately 1 litre were taken from each context so that future chemical, or any other form of analysis, can be conducted if required, or for any other reference purpose. Brown paper bags were used to store the archive samples, with a total of 1187 being taken during the course of the three field seasons; constituting 1307 litres of sediment. Note that not all contexts could be sampled, cuts for example have no material to sample.

Sampling for phytolith analysis

A total of 341 samples for the extraction of phytoliths were taken from selected contexts. Burial fills were always sampled, while other contexts such as hearths, pits and intact floors were chosen at the supervisors' discretion. Approximately 4 g of sediment was taken from within the selected context using a clean trowel.

Sampling for sediment analysis

Altogether 321 pisé and plaster samples, of 10–20 g each, were taken over the three years of excavation for sediment analysis involving particle size determination, x-ray fluorescence, x-ray diffraction, magnetic susceptibility, loss on ignition and pH determination. Samples were taken from walls and floors across the site, and from notable deposits such as concentrations of plaster within burials. Multiple samples were taken from selected contexts, such as floors, to investigate spatial variation in geochemical composition. Eight sediment samples were taken off-site, in a transect across the floor of the wadi, to provide control samples for comparison with those from within the settlement. The analytical methods for the sediments are described in Chapter 41.

Sampling for structural analysis

Overall, 266 lumps of pisé were collected as 'structural' samples (Figure 4.10). These were selected from amongst the large numbers of pisé lumps as potentially being diagnostic of building techniques, such as by having a moulded shape or by carrying impressions of plants and timbers.

Sampling for micromorphological analysis

Thirty-three block samples for micromorphological analysis were taken during the 2009 and 2010 excavation seasons (Figure 4.11). The contexts selected for sampling were mainly floor deposits and pits. Floor deposits were taken to examine re-plastering events that were difficult to establish macroscopically and to explore the nature of occupation by analysing the micro-residues. Samples were taken from the base of pits and other similar features to examine the formation of the deposits within these features.

Figure 4.10 'Structural' sample of pisé from the excavation of Structure O45.

The samples were cut into Kubiena tins from exposed sections that had been both drawn and photographed and packed securely with the top clearly marked.

Eleven of the 33 blocks taken during the course of the excavation were used for micromorphology analysis. Thin section preparation followed the University of Reading's standard protocol. This involved initially oven drying the samples until they lost less than 1% moisture in a 24-hour period. The blocks were then contained within tins for impregnation with resin. These were placed in a vacuum overnight to remove all the air from the pores. Resin was then added while under vacuum, and allowed to penetrate all pores. The samples were then dried in an oven for 18 hours at 70˚C before being cut using a diamond circular saw to a 1 cm slice. The samples were then left to dry on a heat pad overnight, which was often followed by additional surface impregnation with resin of any pores that had not been impregnated fully in the vacuum. Once the surface impregnation had dried, grinding flattened the surfaces. The glass slides themselves were also prepared by grinding prior to mounting the samples. Once mounted, the samples were re-ground to approximately 60–40 microns and then hand-finished to 30–40 microns. Detailed observation and description were carried out for each individual layer, within each sample, in plain polarised and cross-polarised light (ppl and xpl) at a variety of magnifications (x40, x100, x400). Descriptions were made following Courty *et al.* 1989 and Bullock *et al.* 1985 and included in the relevant chapters that follow.

Sampling for radiocarbon dating

Wood charcoal was extracted from the dry-sieve residue in large quantities. Additional charred material, possibly containing charred seeds and fruits, was obtained from the flots and heavy residue sorting. In addition, charcoal samples were selected by hand during excavation and carefully sealed within foil and rigid containers as potential samples for radiocarbon dating. Such samples tended to be twig charcoal from sealed contexts such as hearths, floors and burials. Of these samples, 349 were taken during the course of the excavation.

The selection from within these samples and the other collections of charcoal for radiocarbon dating was made by first identifying the particular contexts we wished to date. Preference was given to those that formed a well-defined stratigraphic sequence within a single structure (or 'Object' — see section 4.4 below). We then searched the database for charcoal samples from those contexts. The samples were inspected to locate either well-preserved twig charcoal or charred seeds or fruits, ideally those which could be identified to species. Once a final selection was made, these were submitted to Beta-Analytic for dating. Available funding allowed 25 radiocarbon AMS dates to be acquired, which supplemented the 21 AMS dates secured from the 1997–2003 evaluation (Mithen and Finlayson 2007a). The methods for analysing the radiocarbon dates are described in Chapter 39.

Sampling chipped stone

Samples of chipped stone were taken for in-field analysis from selected contexts as a means to support the establishment of a chronology of WF16 by enabling the identification of types and techniques culturally diagnostic of the PPNA, or the presence of earlier or later prehistoric activity. In total, a sample of 22,925 pieces of chipped stone (4.4% by weight of the total chipped stone recovered during the three excavation seasons) was studied using the methods described in Chapter 39. Samples of chipped stone were taken from 14 of the most thoroughly excavated structures on the site, aiming to provide both chronological

Figure 4.11 Placement of a kubiena tin (from Structure O75) for micro-stratigraphic analysis.

and spatial coverage of the excavated sequence. The sample of chipped stone from each of these structures was selected by targeting bulk finds drawn from dry sieve samples deriving from key contexts (e.g. occupation horizons). The aim of this approach was to provide a representative sample of the excavated stratigraphic sequence. Samples were only drawn from bulk finds recovered through dry sieving, and no chipped stone recovered from flotation (heavy residue) was included. Chipped stone small finds were included in the sample only where they were recovered from sampled contexts. The cataloguing and analytical methods for the chipped stone are described in Chapter 39 along with the overall interpretation, while summary statements are included within relevant chapters.

1.4 Data management using the IADB

The WF16 Project made use of the Integrated Archaeological Database (IADB) to digitally record, store and manipulate all site records (see http://www.iadb.co.uk/i3/help.php). The IADB was originally designed by the Scottish Urban Archaeological Trust and then developed at York Archaeological Trust under the direction of Mike Rains. The IADB provides a data-management tool and allows digital versions of excavation records to be made easily accessible for use in post-excavation analysis. It has been developed to cater for numerous types of data including single context plans, photographs and written documents. A version of the generic IADB was customised for the WF16 project, being designed to meet the needs of its whole lifetime, from excavation recording, through post-excavation analysis, to dissemination and archiving (Figure 4.12).

Contexts and *Finds* are the two foundations for the IADB. Context records within the IADB include: context type and category, the description of the context, its stratigraphic position and links to other stratigraphically related contexts, a single context plan, photographs, brief interpretation and links to all finds and sample records associated with that context. For skeletons, each recording sheet was scanned into the IADB in facsimile view, providing an exact scanned copy of the original.

The generic IADB provides a large number of categories for finds. The following were used for the WF16 excavation for both bulk and small finds: Chipped stone, Ground stone, Other stone, Worked bone, Unworked animal bone, Human bone, Bone beads, Stone beads, Marine shell beads, Marine shell other, Land shell, Bitumen, Clay, Pisé/Plaster, Textile, Basketry, Wood, Plant residue, Glass, Metal and Other.

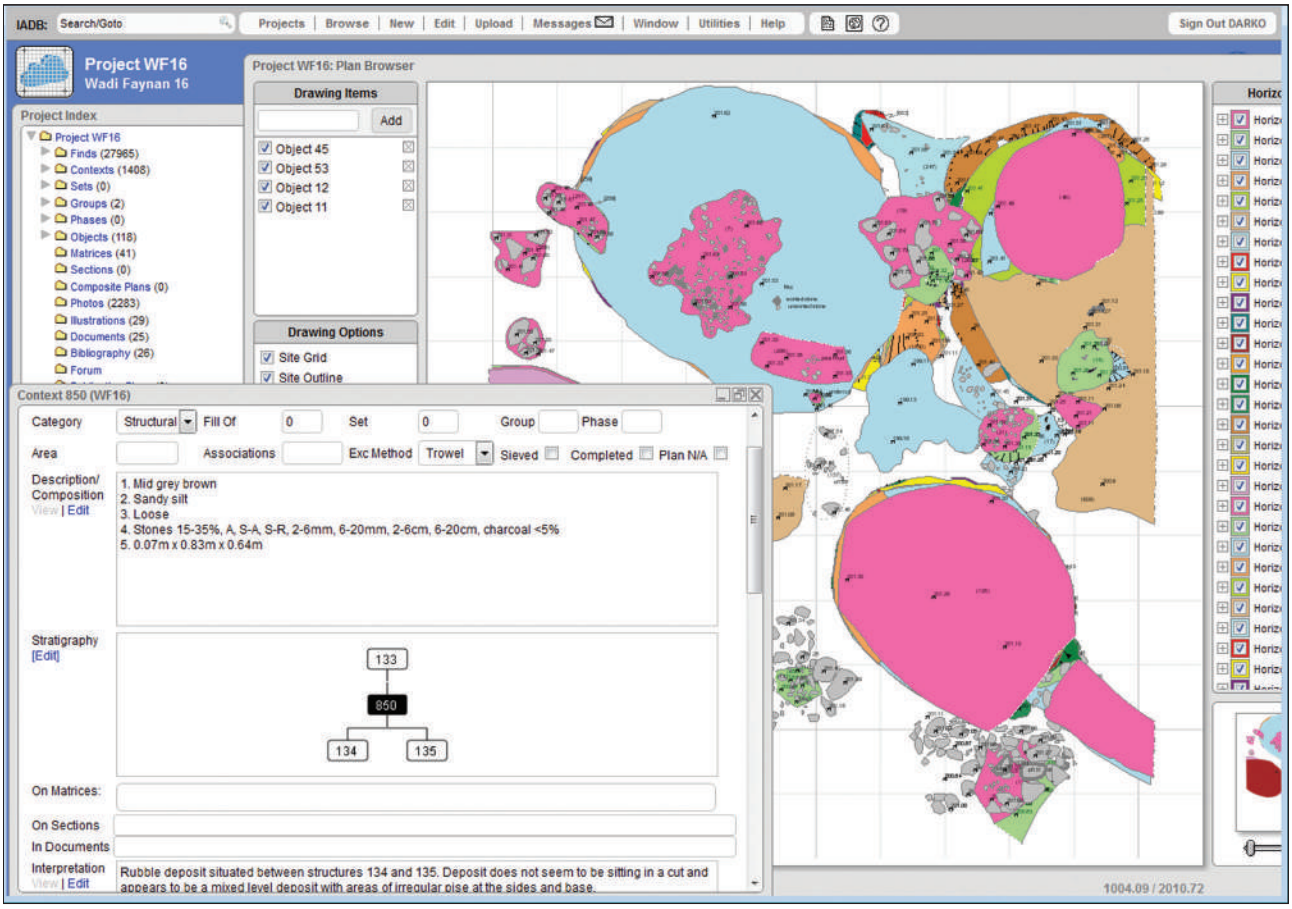


Figure 4.12 Screen dump of IADB.

Bulk finds, entered as either individual items or bags of the same category, had their contexts and weights recorded (Figure 4.13). Small finds had a photographic image and their 3D coordinates entered, along with their contexts, weights and short written description. Sub-categories were used in some cases. Stone beads, for instance, were further divided into green stone, quartz and 'other'.

The IADB provides multiple facilities for grouping and tagging contexts, finds and other records so that different levels of enquiry can be created. It also has the capacity for designing powerful queries, and it can generate stratigraphic matrices. As such, it was an ideal tool for use in the large, complex excavation of WF16. Grouping of contexts into 'Objects' was one of the IADB tools, which deserves a special mention, as it was an important tool for the organisation of data and the interpretation of the archaeology on the site.

Objects were used as the key organisational unit for the excavation. These are meaningful groups of contexts that define a distinct entity within the site. Objects were created through the judgement of the excavation supervisors on the basis of site stratigraphy and archaeological interpretation, and aided by the manipulation of data within the IADB. Objects were frequently those contexts that constituted a structure or feature — for example pisé walls and the sequence of floors and deposits they enclosed. Another class of Objects were spaces between such structures. Inevitably, there was some degree of subjectivity in identifying which contexts belong within one Object rather than another, while some Objects were entirely embedded within other Objects. We stress that Objects are entirely artificial constructs to manage archaeological data; they have no bearing on how the Neolithic occupants of WF16 may have conceived of their settlement and structures within it.

As no internet was available in the field, a copy of the IADB was hosted on a local server. Each day supervisors entered their context record sheets directly into the IADB and created Objects as and when they were believed appropriate. All single context plans were digitised into the IADB in the field. At the end of each season the supervisors' reports and any other important documents were uploaded into the IADB as documents for easy access by all team members. In the first year all site photos were uploaded into the IADB in the field, in the second and third seasons this was done after the end of the field season. All sample and finds records were entered directly into the IADB.

4.8 Excavation programme 2008, 2009 and 2010

Having positioned the 40 m x 15 m trench to cover the central area of the WF16 knoll, connecting Trenches 1 and 2 from the 1997–2003 evaluation, removal of the overburden at the start of the 2008 field season revealed the outline of numerous pisé walled structures throughout the trench, only 10–20 cm below the surface. Several burials were immediately exposed; the majority were in shallow cuts, although truncated by the deflation of the site, and were associated with material culture and burial practices consistent with those of the Pre-Pottery Neolithic as known from elsewhere. Others were within much deeper graves cut through the Neolithic archaeology and were assessed, on the basis of the associated finds and the grave construction involving undercut burial chambers capped by stone lintels, to be Nabataean or Byzantine in date. Excavation of these burials slowed the anticipated rate of excavation in terms of exploring the pisé-walled structures.

A large area of midden deposit was exposed immediately below the overburden at the northeast corner of the trench, this being designated as Midden O60. Lacking any internal structure, Midden O60 was divided into a series of 1 m squares to maintain spatial control of finds and excavated in 10 cm spits, with flotation samples being taken from each square and spit.

By the end of the field season numerous pisé walled structures had been defined within the trench, and the midden

Figure 4.13 Recording of small finds within the WF16 field laboratory.

deposits were producing large quantities of animal bone and debris from the manufacture of artefacts (Figure 4.14).

Excavation proceeded throughout the entire trench during the 2009 field season. Resources were concentrated on the excavation of selected semi-subterranean structures, which appeared to be relatively late within the sequence (e.g. Structures O11, O12, O45, O53, O56, O84, O64 and O14), as well as continued excavation of Midden O60 in the northeast corner. Excavation reached the base of Midden O60 to reveal a mud-plaster surface associated with several pits and hearths, which was later named Surface O91. Below this was a certain amount of demolition debris followed by occupation deposits resting on top of a fine mud-plaster floor with linear mouldings and grinding stones set within low platforms. It became evident that the midden had accumulated above the floor of what appeared to be a large semi-subterranean, sub-circular structure, one third of which lay beyond the eastern edge of the trench. This structure was designated as Structure O75 (Figures 4.15 and 4.17).

The identification of this large structure was recognised as being of considerable archaeological importance, nothing like it having previously been discovered in the Southern Levant. Funding from the AHRC award was insufficient to enable an extension of the trench and to allow its complete excavation. Fortunately, this was made possible by an award from the Wenner Gren Foundation.

During 2010, the trench was enlarged to the east to encompass the easternmost wall of Structure O75. During the course of the excavation of this extension, a new substantial structure (Structure O100) was identified inside the eastern part of the interior of Structure O75. The quantity of work at the northern end of the trench reduced that which could be undertaken elsewhere. Progress was made, however, on a number of structures. The most notable was that designated as Structure O45 that was found to have especially well preserved structural evidence (Figure 4.16).

Figure 4.17 provides the plan of the trench at the end of the 2010 field season. While progress had been made throughout the whole trench in excavating the Neolithic deposits, at no location within the trench was the base of these reached. This was the acknowledged risk of the excavation strategy adopted and consequently the presence or otherwise of *in-situ* Epipalaeolithic deposits at WF16 remains unknown: hence, a further phase of excavation is required. A short post-excavation field season was undertaken in October 2010 to complete the flotation, heavy residue sorting and storage of finds.

The quantity and diversity of finds from the 2008–2010 excavations at WF16 are substantial (Tables 45.1 and 45.2). These include 2700 kg of chipped stone (2.7 metric tonnes), 480 kg of animal bone, 842 beads, 187 pieces of worked bone, including awls, points and needles, 153 pieces of decorated stone, and in the order of 40 burials, some containing remains of multiple individuals. Additional finds are being identified as this material is sorted. All of

Figure 4.14 The trench from the south at the end of 2008 field season. Structure O19 is in the immediate foreground. For the Object designation of the other exposed features see Figure 4.17.

Figure 4.15 The trench from the north at the end of 2009 field season. Structure O75 is at the left of the image, its floor exposed in the front of the section through Midden O60. For the Object designation of the other exposed features see Figure 4.17.

this material has detailed contextual information and the potential to be placed within a fine-grained chronology. In this volume we present the stratigraphic and contextual information, quantification of finds, and analyses of the sediment and chipped-stone samples secured from the 2008–2010 excavation. We combine this data with that from the 1997–2003 archaeological evaluation (Finlayson and Mithen 2007) to describe and interpret the architectural and burial evidence, to analyse the radiocarbon dates, propose a chronological history for WF16 and provide an overall interpretation for the archaeological evidence.

4.9 This report

The organisation of Part 2 of this report — Stratigraphy and Contexts — draws on the structure of the recording system described above. Chapters 5–38 each bring an account of the excavation of a spatially and stratigraphically defined archaeological entity, the majority of which were recognisable as coherent structures. For example, Chapter 14 deals with the excavation of Structure O45, where 'O45' designates the fact that all excavated contexts related to this structure were grouped as Object 45 in the IADB. In other instances it made sense to describe certain stratigraphic horizons separately, even if they did not form a structural unit. Such examples include Chapter 6, which deals with the excavation of Antique Burials O99 and Chapter 37, which deals with Surface O91. Once again, 'O99' and 'O91' indicate that the contexts described in these chapters belong to Objects 99 and 91. The chapters are ordered, broadly speaking, from south to north. In this way the entire excavation was covered both spatially and stratigraphically.

Part 3 of this volume — Data Analyses — begins by analysing the chipped stone samples (Chapter 39),

Figure 4.16 The trench from the south at the end of the 2010 field season. Structure O45, with its internal construction, is in the centre of the image. For the Object designation of the other exposed features see Figure 4.17.

the radiocarbon data (Chapter 40) and the sediments used in construction (Chapter 41). In Part 4, it draws on these analyses to establish a site chronology and cultural phasing (Chapter 42), to describe the architecture (Chapter 43), and examines the Neolithic burials (Chapter 44). We conclude with an overview of what has been learnt about the archaeological site of WF16 and the PPNA of the Southern Levant (Chapter 45).

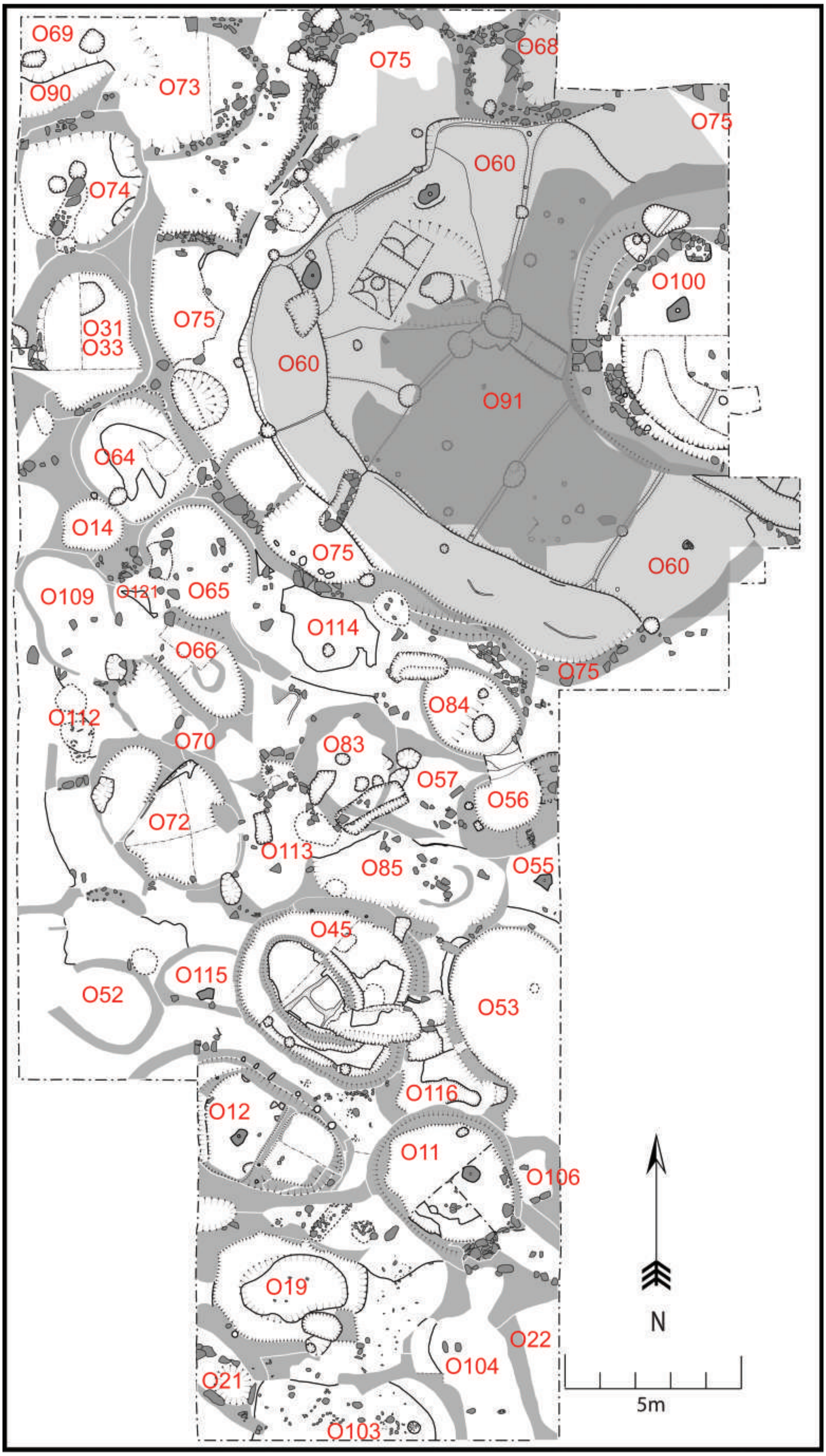


Figure 4.17 Plan of WF16 at cessation of excavation, April 2010.

Part 2

Stratigraphy and Contexts

5. Horizon O111

5.1 Definition and relationship with underlying stratigraphy

This chapter describes the uppermost deposits and features excavated at WF16 between 2008 and 2010, designated as Horizon O111 (Figure 5.1) and often referred to as the 'overburden'. Surface inspection indicated that this horizon had been heavily disturbed by a variety of natural and anthropogenic processes, including erosion by wind and rain, burrowing by rodents and insects, trampling by goats, and a variety of human activities, such as recent Bedouin tents, fireplaces and the digging of pits. Clusters of stones, arcs of stones and what appeared to be short stretches of walls were exposed on the surface along with mortars, some of which had evidently been recently repositioned. The same range of features had been evident in 1997 (Finlayson and Mithen 2007: figure 6.5), following which two arcs of stones (Features F1 and F8) had been selected for excavation, leading to the 1997–2003 Trenches 1 and 2 (Finlayson and Mithen 2007: figure 6.5). When the knoll was inspected in 2007, further erosion and disturbance had exposed additional features and destroyed/buried some of those that had previously been visible.

The 40 m x 15 m trench of the 2008–2009 excavation, extended by a further 20 m x 5 m in 2010, confirmed that a wide array of taphonomic processes had resulted in the loss of structural and contextual information within Horizon O111, while retaining a substantial collection of artefacts. While a number of the upper contexts associated with earlier structures were visible on the surface, for example the large stones in wall (543), part of the outer wall of Sturcture O75, erosion had destroyed any meaningful relationships between these and O111. A number of features were discovered within Horizon O111, which lacked stratigraphic links with the undisturbed deposits below. The features within Horizon O111 were clustered in the northern half of the trench, which is towards the top of the knoll (Figure 5.1), which could be an indication of a difference in the level of erosion between the top and the sides of the knoll. Two types of features stood out in particular: a group of curvilinear stone alignments, similar in appearance to Features F1 and F8 excavated in Trenches 1 and 2, and a group of elongated cut features filled with stone rubble. The base of Horizon O111 was demarcated by the appearance of consolidated archaeological sediments within which artefacts and features were partially or entirely *in situ*.

5.2 Description of the excavated deposits

Once the 40 m x 15 m trench had been positioned and the surface features recorded, the overburden was excavated using 5 m grid squares for the spatial control of retrieved bulk finds and samples (Figure 5.2A; Figure 3). The depth of the overburden ranged between 0.10 m and 0.20 m across the site. It was excavated in two spits. The first spit (1) was excavated over the entire area of the 2008–2009 trench. The equivalent spit in the 2010 extension of the trench, in the northeast part of the site, was divided into four grid squares and recorded as contexts (789), (790), (791) and (792) (Figure 5.2A). The nature of the overburden was effectively uniform across the trench consisting of loose greyish brown sandy silt with a wide range of inclusions ranging from gravel to wadi boulders, and considerable quantities of artefacts.

The second spit of the overburden had the same composition, but for recording purposes was provided with five different context numbers, (62), (123), (186), (187) and (793), relating to different areas of the site grid (Figure 5.2B). Three of four 5 m squares within the

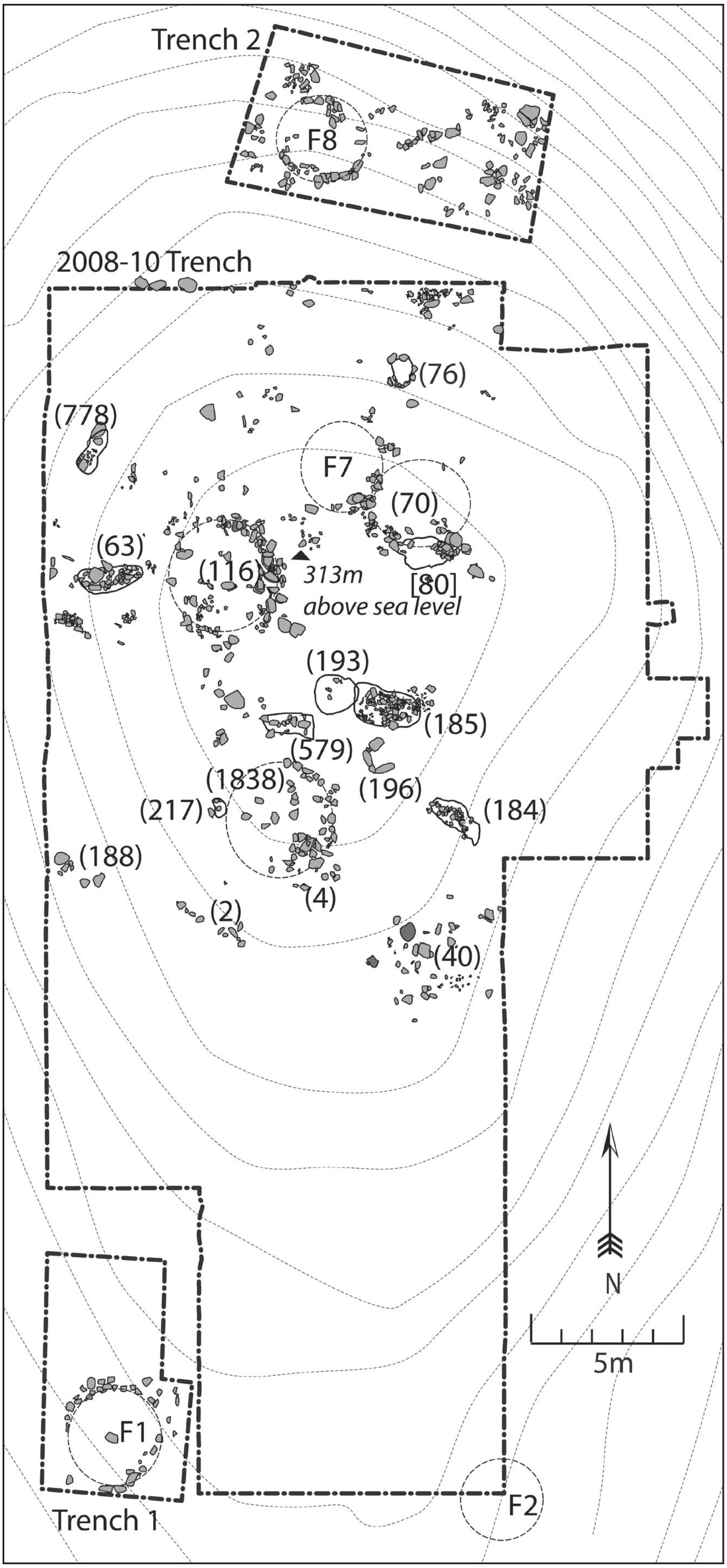


Figure 5.1 Plan of features recorded in Horizon O111 in relation to the evaluation Trenches 1 and 2 encompassing features F1 and F8 and the topography of the site. Contours are at 0.5 m intervals.

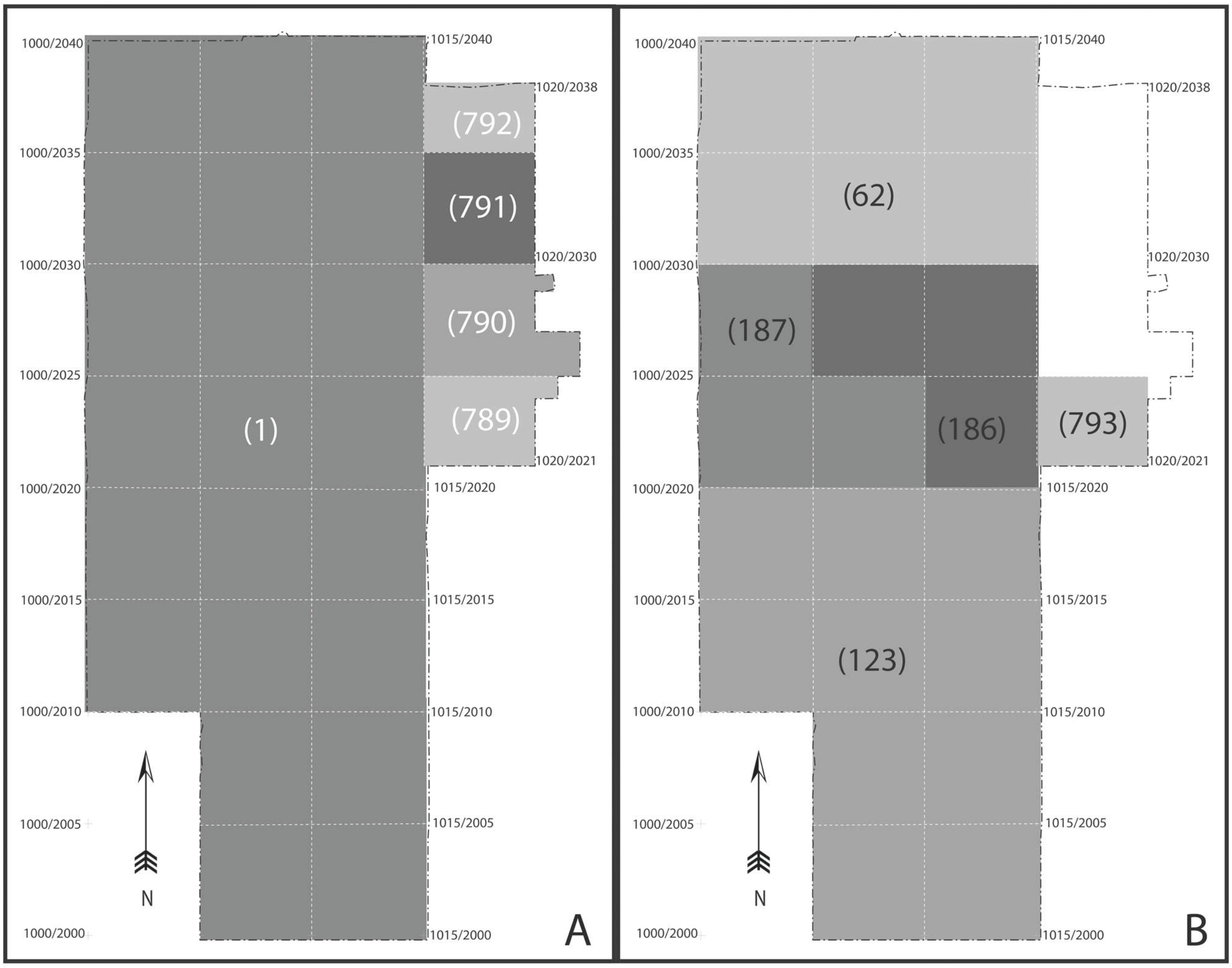


Figure 5.2 Outline of the excavation trench with the site grid showing division of the context numbers used for the overburden deposits: A — first spit, with (789)–(792) covering the 2010 extension and B — second spit.

2010 extension of the trench did not require a second spit due to the higher survival, comparatively, of the walls of Structure O100 in this area. In contrast, an additional third spit of mixed overburden (83), 0.10 m in maximum thickness, was excavated under deposit (62) in four 5 m squares located in the northeast corner of the 2008–2009 trench. Similarly, a 0.05 m thick, third spit of overburden (153), was excavated in the 5 m square located in the southwest corner of the trench below context (123). A deposit of midden material (384) was also located below (62). Slope wash deposit (1162), *c.* 2.5 m x 2.5 m, was excavated below overburden (792) in the 2010 trench extension. The same sampling methodology was implemented in regard to all three spits. This comprised taking a 10 litre flotation sample and a one litre archive sample from a 1 m square in the southwest corner of each 5 m square. Once these had been taken, the remainder of the sediment from the 1 m square was dry sieved (with the exception of 186). Finds from the remainder of the square were handpicked and recorded according to the context number of the spit and the 5 m square they came from. Small finds were given a unique SF number and had their coordinates measured by the total station and any features within the overburden were excavated (Figures 5.3 and 5.4). Table 5.1 describes the contexts excavated within Horizon O111, while Tables 5.2 and 5.3 list the bulk and small finds respectively.

The large volume of the overburden, together with the range and quantity of the artefacts, suggests a long and complex formation history for this deposit. Chipped and ground stone were the most abundant categories of artefacts; organic materials, including charcoal and bone, were present but are likely to have been poorly preserved within the overburden. Amongst the small finds, several incised stone objects were especially striking (Figures 5.5–9).

Although the soft sediment of the overburden lacked stratigraphy, several concentrations of large stones were investigated as possible remains of discrete structures. Some of these concentrations were shown to be no more than random scatters or heaps of stones, such as a cluster of large wadi stones (40) or a small group of stones (188). Others have kept their shape and can be discussed in terms

Table 5.1 Contexts excavated as part of Horizon O111 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
1	mixed greyish-brown sandy silt with variable concentrations of small and large stones and other inclusions	uppermost deflated deposit across the entire trench
2	two partly surviving courses of rounded limestone with no bonding material	part of wall
4	pile of different kinds of rocks 20–60 cm in size, no distinct shape of feature, no finish visible	either a structural dump or disturbed burial marker
40	concentration of large wadi stones scattered within mixed sandy silt	scatter of wadi stones in overburden 123
62	loose to friable mixed mid-grey sandy silt with variable densities of inclusions	second spit of deflated overburden in the northern part of the trench
63	sub-angular to sub-rounded granite, flint, sandstone, porphory alignment of stones without bonding material	rubble fill of elongated feature
64	loose mid-brownish-grey sandy silt with occasional stones and frequent snail shells	fill of elongated feature
65	loose sandy silt with occasional charcoal	disturbed burial fill
66	partial human skeleton	human remains in disturbed burial
68	sub-rectangular elongated cut with near-vertical sides and uneven base	cut of elongated pit
70	curvilinear alignment of stones	part of curved stone wall with no bonding material
71	stone-rich loose greyish-brown sandy silt with orange mottling	accumualtion within a depression
72	diffuse cut	partially defined burial cut
75	loose dark greyish-brown sandy silt with frequent bone and some ashy areas	possible fill of a hearth or stone-lined pit
76	sub-circular arrangement of unworked wadi stones	possible pit lining or stone setting for a hearth or a fire
79	loose mid-brownish-grey sandy silt with occasional stones and animal bone	mixed infill of possible structure
80	irregular sub-oval cut with varied sloping sides and uneven but relatively flat base	rubble filled pit or a construction cut for a stone-built structure
83	loose mid-grey to mid-orangish-brown sandy silt with occasional stones and bone	third spit of mixed deflated overburden in the northern part of the trench
96	loose greyish-brown silty-sand with a high concentration of stones and occasional charcoal	stone rich deflated deposit directly under overburden
116	curvilinear arrangement of wadi stones, predominantly sandstone, including reused cup-holed mortar fragments	part of curved stone wall with no bonding material
123	mixed greyish-brown sandy silt with variable concentrations of small and large stones and other inclusions	second spit of deflated overburden in the middle and southern part of the trench
153	mixed greyish-brown sandy silt with variable concentrations of small and large stones and other inclusions	second spit of deflated overburden in square 1005E/2000N
184	loose light orangish-brown silt packed with large sub-rounded stones	stony fill of elongated pit
185	rubble fill comprised of varying amounts of flint, quartz and sandstone	stony fill of elongated pit
186	friable greyish-brown sandy silt with frequent small and large stones	second spit of deflated overburden in the middle part of the trench
187	friable greyish-brown sandy silt with frequent small and large stones	second spit of deflated overburden in the middle part of the trench
188	small linear cluster of stones	cluster of stones in the overburden

Table 5.1 Contexts excavated as part of Horizon O111 with sedimentary descriptions and interpretations continued...

Context	Description	Interpretation
189	elipitical irregular cut	cut of elongated pit
190	irregular elongated cut with shallow sloping sided and an irregular base	cut of elongated pit
191	collection of unstratified finds colected from the surface around the site	arbitrary number given to faciliate grouping of unstratified finds
193	loose orangish-brown silt with very occasional sub-rounded stones	fill of possible small pit
196	unmodified large stones (granite, sandstone) set on edge to create a 3-sided structure	stone setting for possible hearth
204	firm light yellowish-grey sandy silt with very occasional small stones	fill of possible small pit
209	shallow oval cut with irregular sides and flattish base	possible cut of small pit
217	loose to friable mid-brown silt with very occasional, very small sub-rounded stones	fill of possible small pit
220	sub-oval cut with steeply sloping sides and a base almost entirely formed by top of a large sub-circular stone	possible pit
221	mid- to dark-grey silt containing frequent heat cracked pebbles	mixed redeposited midden material
226	loose pale yellowish-brown silt	silty accumulation within stone setting
384	loose to friable mid-grey silt with frequent sub-angular stones	mixed redeposited midden material
443	dark greyish-brown silt	fill of shallow pit
444	sub-circular shallow cut with uneven base	possible pit or depression within the midden
448	loose mid- to dark-grey silt with frequent stones	mixed redeposited midden material
526	loose dark greyish-brown silt	silty accumulation within stone setting
579	concentration of water rolled stones and several worked stone objects	rubble fill of elongated pit
687	compact mid-greyish-brown sandy silt with occasional stones and charcoal fragments	fill of elongated pit
688	sub-rectangular elongated cut with vertical sides and flat base provided by a mud-plaster surface	cut of elongated pit
778	pisé and stone rubble	rubble fill of elongated pit, unexcavated
788	collection of unstratified finds from spoil heap removal	arbitrary number given to faciliate grouping of unstratified finds
789	loose to medium mid-grey sandy silt	uppermost deflated deposit across the 2010 extension of the trench, same as 1
790	loose to medium mid-grey sandy silt	uppermost deflated deposit across the 2010 extension of the trench, same as 1
791	loose to medium mid-grey sandy silt	uppermost deflated deposit across the 2010 extension of the trench, same as 1
792	loose to medium mid-grey sandy silt	uppermost deflated deposit across the 2010 extension of the trench, same as 1
793	medium/firm mid-brownish to mid-yellowish-grey sandy silt	second spit of deflated overburden in the 2010 extension of the trench
1162	friable mid-greenish-brown sandy silt	slope wash in northeast corner of the trench
1838	curved alignment of stones	part of curved stone wall

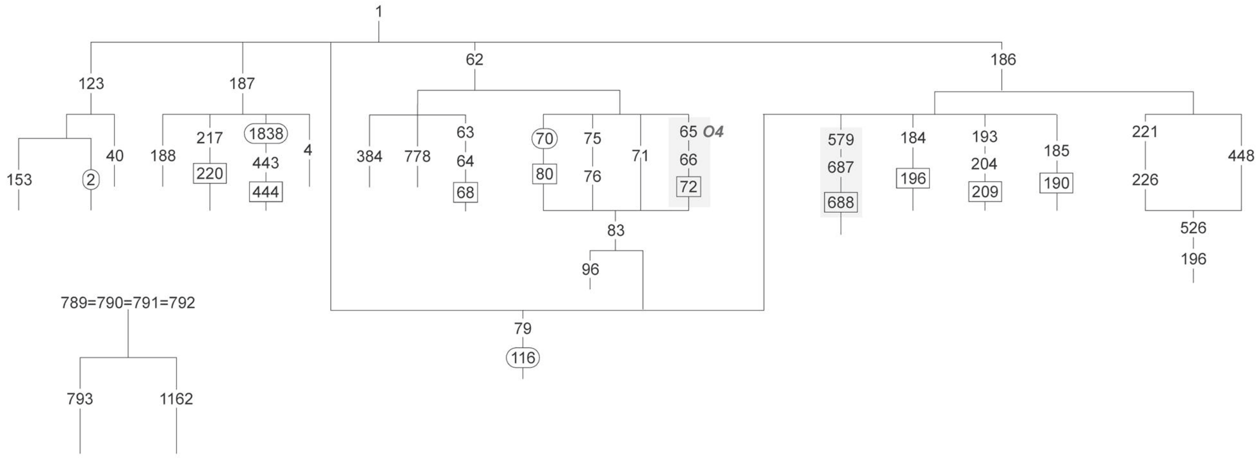


Figure 5.3 Stratigraphic matrix for Horizon O111 over the original extent of the trench.

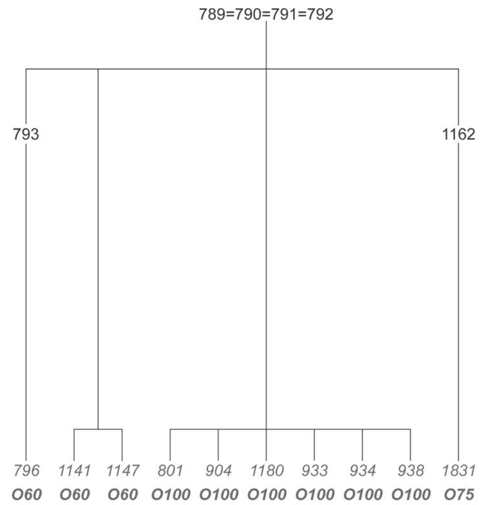


Figure 5.4 Stratigraphic matrix for Horizon O111 over the 2010 trench extension.

of their morphology and spatial relationships, although only occasionally with direct reference to the better-preserved archaeology below them.

Wall (2), for example, was a straight arrangement of stones, 1.35 m long and 0.20 m wide, built in two courses without any visible bonding material (Figure 5.1). A number of curved arrangements of stone clustered in the northern half of the trench, including features (1838), (116) and (70) (Figure 5.10). Curved wall (1838) was contained within overburden (187) and survived to a length of 3.20 m, with its convex side facing eastwards. Its shape is suggestive of a roughly circular structure of *c.* 5 m diameter. At the southern end of the wall there was a heap of stones recorded as context (4). Other stones were scattered within the curved part of the structure, but without any clear patterning. Below the north end of wall (1838), a shallow feature [444] was filled with dark grey-brown silt (443) and contained a polished black stone disc (SF377).

Underlying deposits (83) and (79), curved wall (116) was located 4 m north of wall (1838), (Figure 5.11), which it resembled with regard to its size, shape, construction and orientation. Neither wall had any bonding structure between their stones. Wall (116) was made predominantly from stones ranging in size from 0.1 m x 0.2 m to 0.4 m x 0.5 m. The wall has tumbled, but kept its general outline (Figure 5.11). Three large fragments of cup hole mortars (SF386, SF387, SF388), as well as another ground-stone object (SF389), had been incorporated into the build of the wall. A sub-circular patch (*c.* 3 m diameter) of mid-brown loose sandy silt (79) partly overlay the northern end of wall (116).

Table 5.2 Quantities of bulk finds from Horizon O111 by material and context number.

Object 111	**Volume of sediment (l)**				**Weight of bulk finds per material (g)**										
Context	**Total volume**	**Flot. sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Ground stone**	**Other worked stone**	**Unworked stone**	**Animal bone**	**Human bone**	**Marine shell**	**Other shell**	**Pottery**	**Charcoal**	**Misc.**
1	883.0	350.0	511.0	22.0	61330.5	40289.0	0.0	127.9	1463.7	30.0	49.0	622.0	63.0	10.0	180.0
62	285.0	50.0	230.0	5.0	10033.2	3549.0	144.0	20.0	938.4	34.0	6.0	104.7	0.0	0.0	8.0
64	251.0	30.0	220.0	1.0	682.9	0.0	0.0	0.0	46.8	0.0	0.0	52.8	0.0	0.0	10.0
65	90.0	30.0	59.0	1.0	584.0	50.0	0.0	0.0	128.6	0.0	1.0	33.9	0.0	20.0	0.0
70	310.0	30.0	279.0	1.0	3672.8	0.0	40.8	0.0	374.3	0.0	0.0	45.1	0.0	0.0	0.0
71	181.0	30.0	150.0	1.0	911.1	0.0	0.0	260.0	36.3	0.0	2.0	48.4	0.0	0.0	0.0
75	29.0	10.0	18.0	1.0	229.8	0.0	0.1	0.0	167.5	0.0	0.0	36.1	0.0	0.0	0.0
79	841.0	30.0	810.0	1.0	5633.7	370.0	0.0	51.0	238.6	0.0	20.0	115.7	0.0	0.0	50.0
83	204.0	40.0	160.0	4.0	5525.9	5420.0	60.3	0.0	388.0	0.0	28.0	54.3	0.0	0.0	10.0
96	56.0	30.0	25.0	1.0	1303.1	0.0	0.0	0.0	0.0	27.9	0.0	10.7	0.0	0.0	0.0
123	507.0	220.0	279.0	8.0	37683.1	17390.0	64.2	186.0	1380.3	0.0	10.0	549.6	0.0	60.0	375.0
153	0.0	0.0	0.0	0.0	1360.0	0.0	50.0	0.0	40.0	0.0	0.0	0.0	0.0	10.0	0.0
184	125.0	30.0	94.0	1.0	353.4	40.0	0.5	0.0	16.4	0.0	0.0	27.9	0.0	0.0	0.0
185	131.0	30.0	100.0	1.0	2092.5	950.0	8.5	0.0	186.3	0.0	0.0	200.1	0.0	0.0	30.0
186	0.0	0.0	0.0	0.0	10590.0	5360.0	180.0	10.0	630.0	0.0	0.0	0.0	0.0	20.0	50.0
187	202.0	70.0	129.0	3.0	7160.2	3695.1	100.1	0.0	479.1	0.0	0.0	89.1	0.0	70.0	10.0
191	0.0	0.0	0.0	0.0	21936	6190.0	387.0	15.0	3890	0.0	50.0	0.0	0.0	0.0	10.0
193	61.0	30.0	30.0	1.0	540.4	0.0	1.1	0.0	26.5	0.0	0.0	107.5	0.0	0.0	10.0
204	21.0	20.0	0.0	1.0	200.3	0.0	0.1	0.0	1.8	0.0	0.0	15.6	0.0	0.0	0.0
217	1.0	0.0	0.0	1.0	13.4	0.0	0.0	0.0	1.2	1.0	0.0	8.8	0.0	0.0	0.0
221	191.0	30.0	160.0	1.0	3101.9	260.0	12.5	0.0	495.7	0.0	10.0	36.0	0.0	0.0	0.0
226	21.0	20.0	0.0	1.0	144.9	0.0	4.2	0.0	9.5	0.0	0.0	7.9	0.0	0.0	0.0
448	31.0	30.0	0.0	1.0	1211.4	0.0	42.8	0.0	237.5	0.0	0.0	96.7	0.0	10.0	0.0
526	127.0	30.0	96.0	1.0	1303.2	10.0	44.3	0.0	66.4	0.0	0.1	144.5	0.0	20.0	0.0
687	284.0	0.0	283.0	1.0	1480.0	0.0	20.0	0.0	110.0	0.0	0.0	0.0	0.0	0.0	0.0
789	0.0	0.0	0.0	0.0	2110.0	520.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
790	0.0	0.0	0.0	0.0	1865.0	650.0	10.0	0.0	450.0	0.0	0.0	0.0	0.0	0.0	0.0
791	0.0	0.0	0.0	0.0	5070.0	700.0	27.0	55.0	496.0	0.0	0.0	0.0	0.0	0.0	0.0
792	0.0	0.0	0.0	0.0	340.0	25.0	10.0	0.0	61.0	0.0	0.0	0.0	0.0	0.0	0.0
793	0.0	0.0	0.0	0.0	410.0	1250.0	0.0	0.0	240.0	0.0	0.0	0.0	0.0	0.0	0.0
1162	641.0	30.0	610.0	1.0	2125.7	500.0	0.2	0.0	83.0	0.0	0.0	7.0	0.0	0.0	0.0
Total	5473.0	1170.0	4243.0	60.0	190998.4	87218.1	1207.7	724.9	12782.9	92.9	176.1	2414.4	63.0	220.0	743.0

Table 5.3 Quantities of small finds from Horizon O111 by material and context.

Object 111	Quantities of small finds per material (nos)									
Context	**Chipped stone**	**Ground stone**	**Other stone**	**Worked bone**	**Bone beads**	**Stone beads**	**Marine shell beads**	**Marine shell other**	**Metal**	**Total small finds**
1	1	2	0	0	0	2	1	0	0	6
40	0	5	0	0	0	0	0	0	0	5
62	0	5	1	0	0	0	0	0	0	6
65	0	1	0	0	0	0	0	0	0	1
75	0	0	0	1	0	0	0	0	0	1
79	0	2	0	0	0	1	1	0	0	4
83	1	0	0	0	0	0	1	0	0	2
116	4	0	0	0	0	0	0	0	0	4
123	0	18	3	0	0	1	2	0	1	25
153	0	4	0	0	0	0	0	0	0	4
186	0	1	0	0	0	0	1	1	0	3
187	0	13	1	0	0	2	2	2	0	20
191	4	10	2	0	0	4	0	2	0	22
443	0	0	1	0	0	0	0	0	0	1
526	0	0	0	0	0	1	0	2	0	3
579	0	2	0	0	0	0	0	0	0	2
788	0	11	2	0	0	0	1	0	0	14
791	0	1	1	0	0	1	0	0	0	3
792	0	0	1	0	0	0	0	0	0	1
793	0	0	0	0	0	0	0	0	0	0
1162	0	2	0	0	0	0	0	0	0	2
Total	10	77	12	1	0	12	9	7	1	129

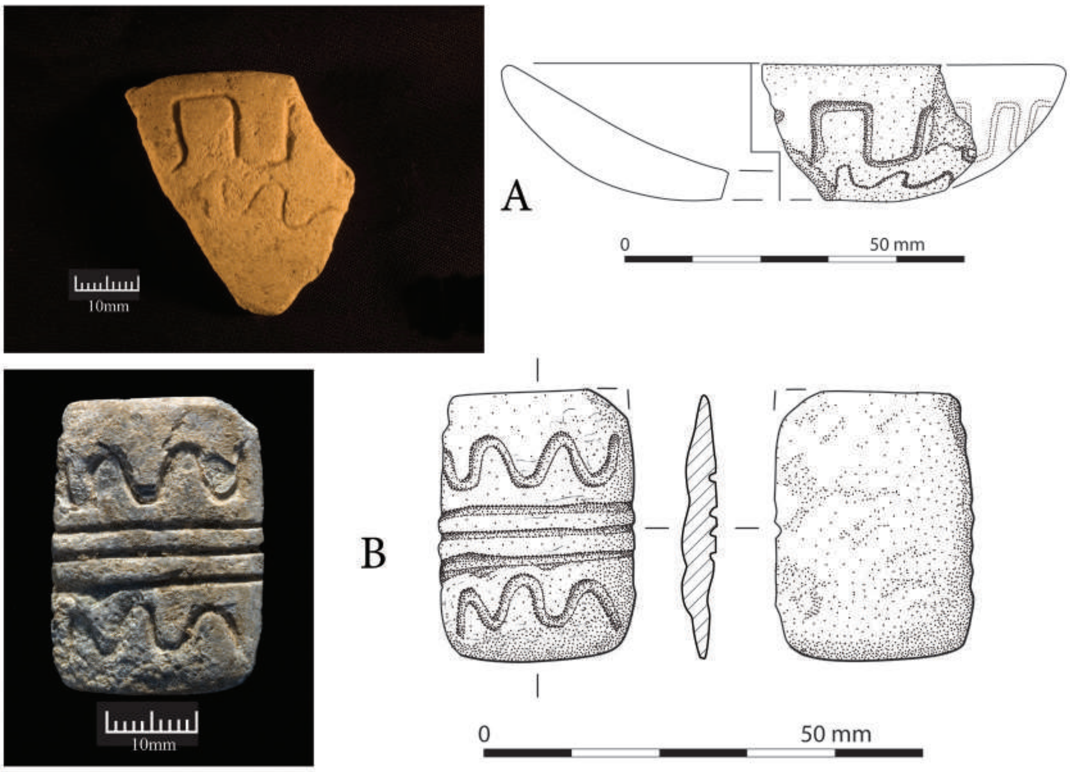


Figure 5.5 A — Fragment of incised limestone bowl SF953 from context (1) of the overburden; B — Incised stone plaque SF82 from context (186) of the overburden in grid square 1014E/2022N.

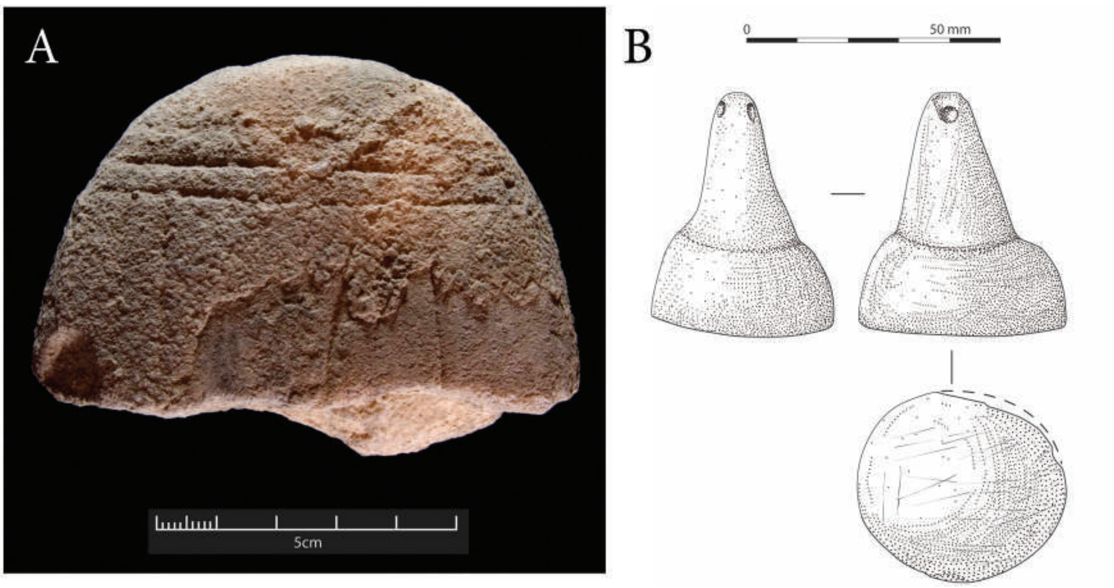


Figure 5.6 A — Incised fragment of rounded sandstone object SF1760 from context (791) of the overburden in grid square 1017E/2032N; B — Perforated conical ground-stone object SF7 from context (62) of the overburden in grid square 1005E/2037N.

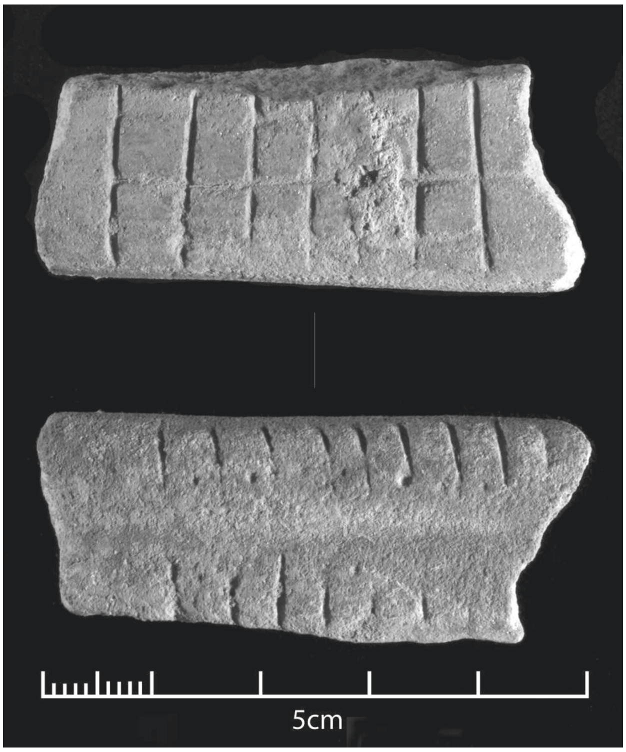


Figure 5.7 Two sides of incised and grooved groundstone object SF34 from context (123) of the overburden in grid square 1008E/2017N.

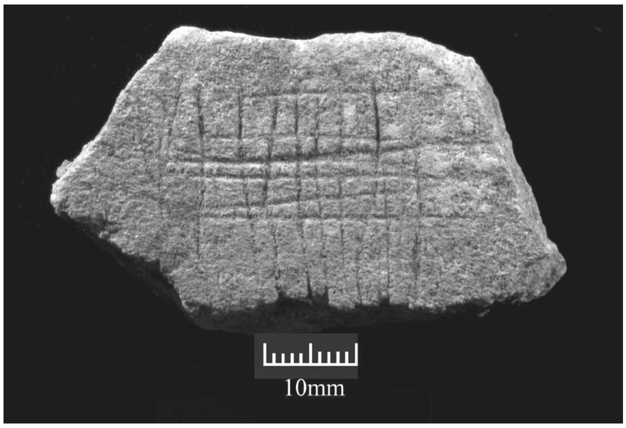


Figure 5.9 Incised stone tablet SF264 from context (123) of the overburden in grid square 1004E/2016N.

Figure 5.8 Three sides of incised and grooved fragment SF281 from context (123) of the overburden in grid square 1010E/2015N.

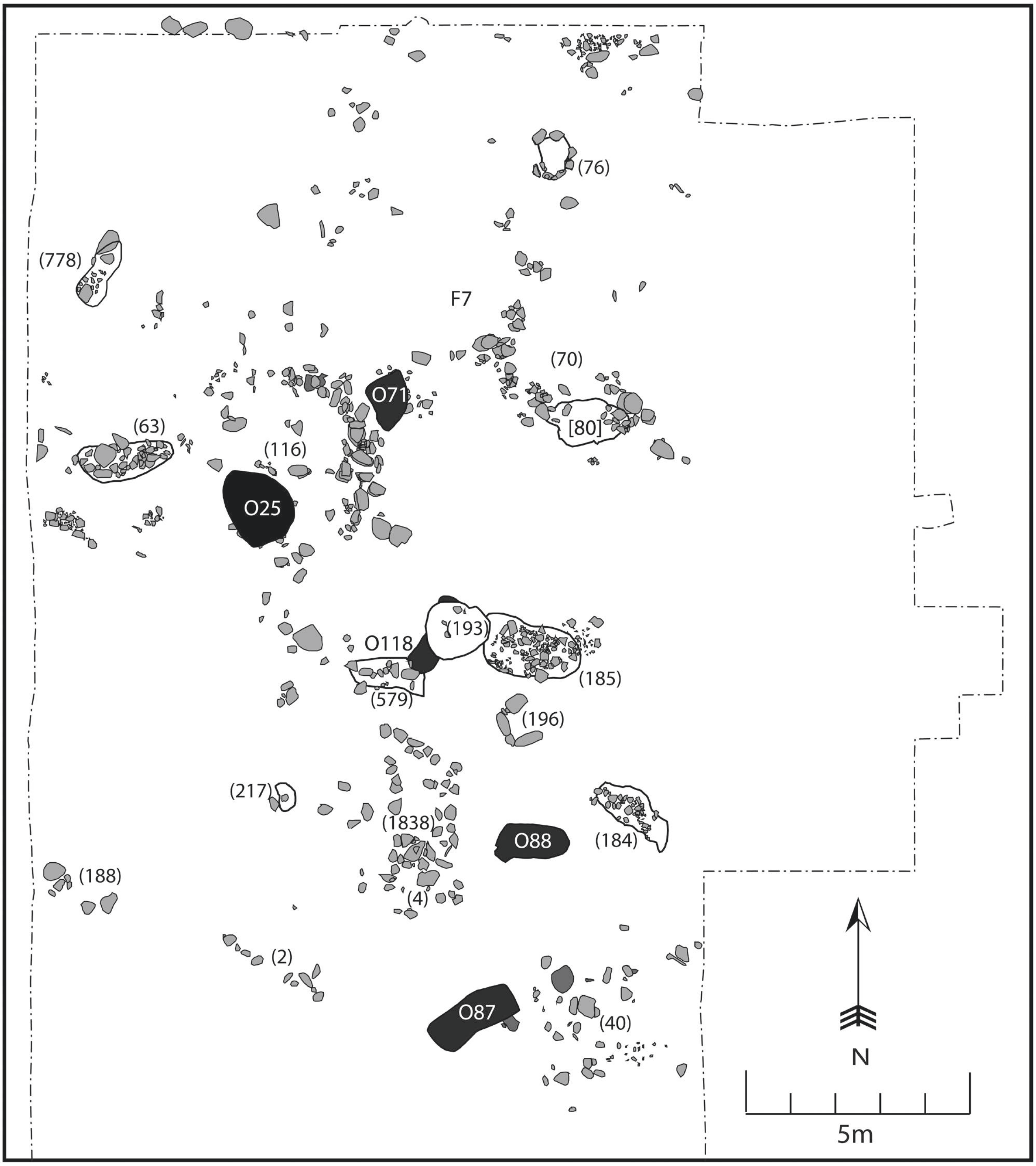


Figure 5.10 Plan of features in Horizon O111 concentrated in the northern half of the excavation trench positioned over the highest part of the knoll. Antique Burials (O99, Chapter 6) are shown in black.

Figure 5.11 Stone built wall (116) with the underlying midden deposits. Scale 2.0 m.

Wall (70) was located 3 m east of wall (116). This was a similar curved scatter of stony rubble with its open side facing to the northeast. If the remains of an oval structure, then its internal diameter would have been between 4 m and 5 m, which is similar to that indicated by walls (1838) and (116). Once again there was no bonding material present among the stones. Part of the south arm of the arc of stones (70) was set into depression or cut [80], which had penetrated underlying midden deposits (later designated as Midden O60). It is likely that some of the chipped stone and animal bone recovered from within the cut [80] had derived from the underlying midden (O60).

At its northern end, the arc of wall (70) abutted another smaller arc of stones with its concave face orientated northwest, one that had been designated as Feature F7 in the 1997 survey of the knoll (Figure 5.1; Finlayson and Mithen 2007: figure 6.5). Apart from the general similarity of its build and size to walls (1838), (116) and (70), no additional information was uncovered about this feature, which was contained in overburden (62).

Two smaller stone settings were also found in the same general area of the excavation trench. Underlying (186), Feature (196) was situated 1.5 m northeast from wall (1838). It consisted of four upright stones forming a three-sided rectangular structure with internal dimensions 0.6 m x 0.5 m, an opening to the northeast and with highest stone at the northern side (Figure 5.12A). Both the southern and northern stone were cracked, probably as a result of heat. No cut was discovered for the construction of this feature, despite the excavation of additional spits of mid-grey to dark grey silt (221) and stonier, but similar, mid-grey silt (448) in the immediate area. Pale loose silt (226) was excavated from the inside of the setting as a possible fill, although this material was not substantially different from the surrounding overburden. A small concentration of charcoal was found in the lower fill (526), which was dark greyish-brown silt. Two marine shells (SF454, SF605) and a stone bead (SF606) were found in this context.

The second stone setting was sub-circular feature (76) (Figure 5.12B), situated 1.5 m north of wall (70) and underlying deposit (62) (Figure 5.10). The setting enclosed

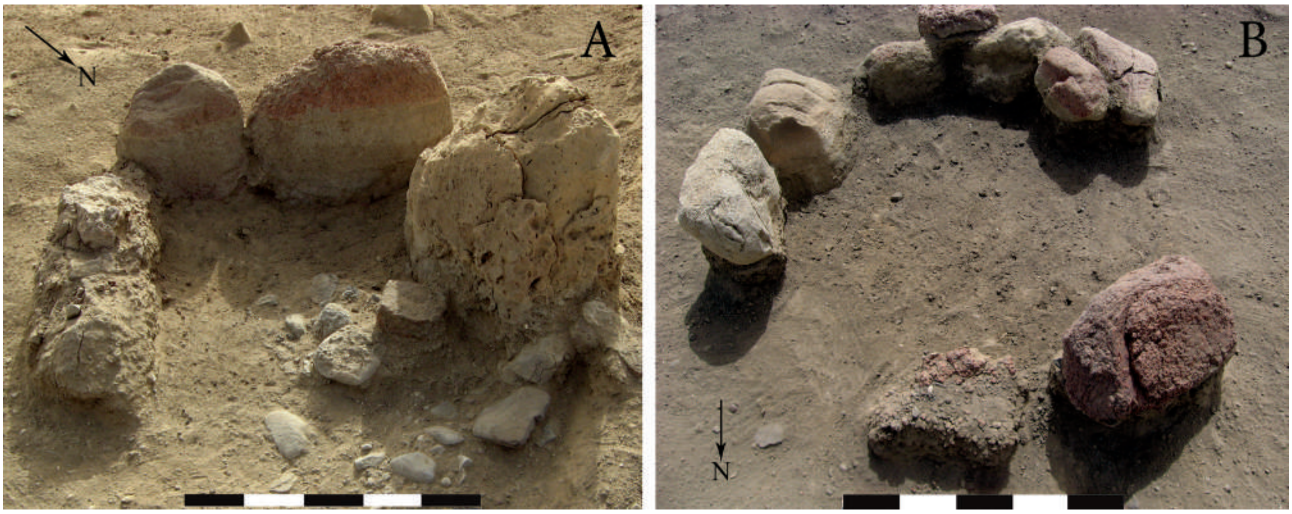


Figure 5.12 A — Stone setting (196) from the northeast. B — Stone setting (76) from the north. Scales 0.5 m.

Figure 5.13 Skeleton (66) within Burial O4, with reused cup-hole mortar set vertically and showing the edge of cut [72]. Scale 0.5 m.

a bone-rich deposit (75) containing a bone point (SF56). The stones of this setting were smaller than those of (196), but were also cracked, suggesting intense heat. Once again no cut was evident.

A burial, Burial O4, was also revealed following the removal of overburden (62). This was heavily disturbed with a partially defined cut [72], having a cup-hole mortar stone set on its edge that marked the eastern side of the burial, Figure 5.13. The skeletal remains (66) were within a silty fill (65) containing flint and charcoal. The recovery of hand and foot phalanges mixed together suggests that the burial had been crouched, with its feet tucked up to the chest where the hands were placed. This burial lay above the mixed deposits (83), within which there was a 2.2 m x 1.8 m depression filled with a stone and charcoal-rich deposit (71).

On a few occasions during the excavation of the overburden, patches of soft material were sufficiently distinct to be investigated as possible discrete features. In most cases these turned out to be localised variations within the general mixed nature of the overburden. More convincing was a small pit [220], filled with mid-brown silt (217) and a patch of bright orangish-brown silt (193) above an amorphous concretion of firm light yellowish-grey silt (204), filling shallow oval cut [209]. Context (96) was stone-rich silty sand, forming a sub-circular shape, *c.* 1 m diameter, against the northern extent of the excavation trench.

Figure 5.14 Rubble deposit (63) from the north prior to the excavation. Scale 0.5 m.

Figure 5.15 A — Rubble deposit (579) prior to the excavation. Scale 0.5 m. B – Excavated feature [688] showing smooth mud-plaster surface at the base. South end of Antique Burial O118 can be seen in the top right corner. Scale 1.0 m.

The final group of features within Horizon O111 consisted of five elongated stone-packed sub-rectangular depressions. These features were recognised as distinct elongated piles of stone rubble, which, upon excavation, were shown to be filling shallow depressions, sometimes deliberately cut features. The northernmost of these features (778) was not excavated. It was demarcated by stone pebbles of various sizes and pisé rubble; suggesting the deliberate backfill of an elongated southwest–northeast orientated cut measuring roughly 1.8 m x 0.6 m.

The next such pile of rubble (63) was situated 3.5 m to the south (Figure 5.14). It measured 2.35 m x 0.82 m and was orientated east–west. It consisted of a mixture of sandstone, porphyry, granite and flint stones ranging in size between 0.1 m and 0.6 m in diameter, overlying mid-brownish-grey sandy silt (64). Both deposits were within a 0.32 m deep sub-rectangular cut [68].

Further to the southeast was another east–west orientated pile of stone rubble (579) within cut [688], Figure 5.15A. Among the water-rolled stones, which were its main constituents, were two ground-stone objects; a pestle (SF991) and a hammerstone (SF985). The stones were overlying compact mid-greyish-brown sandy silt (687). This lower fill of the feature was over a smooth mud-plaster surface, which extended beyond the sides of the feature and clearly belonged to the earlier part of the stratigraphic sequence, later seen to be the surface of one of the benches of Structure O75 (Chapter 38). The cut [688]

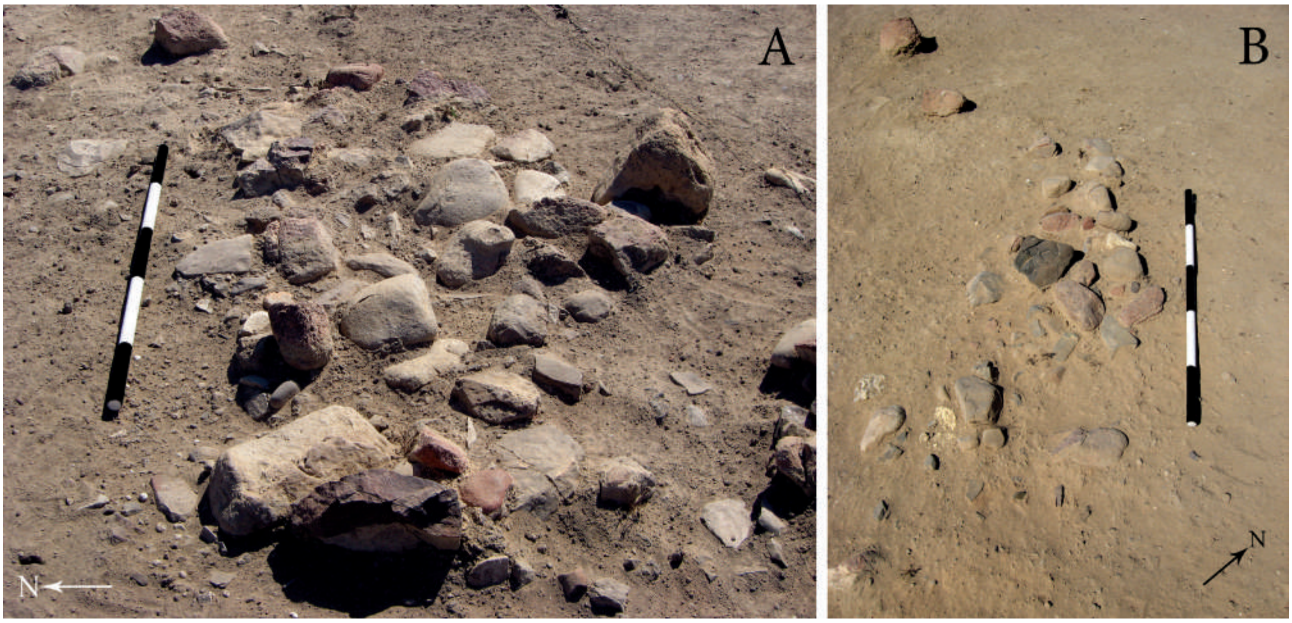


Figure 5.16 A — Stony pit fill (185) from the west. B — Stony pit fill (184) from the southeast. Scales 0.5 m.

was sub-rectangular at the top of the profile, with regular vertical sides, which stopped once they met the mud-plaster surface at the base. The lower profile of the feature was oval (Figure 5.15B). Although unrecognised prior to excavation, this feature was intercut with Antique Burial O118 at its northeast corner (Figures 5.10 and 5.15B). The physical relationship between the two features was slight and the stratigraphic order could not be determined.

Immediately east of Feature [688]/(579) and north of stone setting (196) there was an east–west orientated pile of stone rubble (185), comprising pebbles of sandstone, quartz and flint. Just like the rest of the features in this group, the tightly packed stone rubble (185) stood out among the loose silts of the surrounding overburden (Figure 5.16A). It was 2.8 m long, 1.2 m wide and 0.23 m thick, and constituted the only fill of an irregular shallow cut [190]. Another similar feature was investigated 3 m to the south of feature (185)[190]. Stony fill (184) filled a shallow elongated cut [189], which measured 2.0 m x 0.85 m x 0.12 m, and was orientated northwest–southeast (Figure 5.16B).

5.3 Interpretation

Although the cataloguing, analysis and interpretation of the artefacts from the overburden have yet to be undertaken, a number of El-Khiam points diagnostic of the Pre-Pottery Neolithic A were recovered; artefacts diagnostic of later periods have not yet been observed although these cannot be entirely ruled out at this stage of the research. As such, the large quantities of artefacts and the features within the effectively homogeneous sediment that constituted the overburden appear likely to have originated from stratified deposits of predominately Pre-Pottery Neolithic A occupation that have entirely lost their structure. Stratigraphic links between the features within the overburden and those within the underlying, better preserved, archaeology were either absent or tenuous. Although a number of features partly kept their shape, probably because their heavy stone content was resistant to the erosive movement, the majority were amorphous and were now 'floating' in the overburden, with no stratigraphic connection to the underlying deposits.

Three types of features are notable within the overburden: (1) remains of several stone-built structures, (2) smaller stone settings and (3) rubble filled elongated pits.

Stone built structures

The first group is represented by semi-circular remains of walls (1838), (116) and (70), which appear to have derived from spacious penannular structures. Walls (1838) and (116) would have both been around 5 m in diameter when complete and wall (70) would have been only marginally smaller. None of these structural remains had surviving internal or external deposits associated with them. The same was the case with similar structures F7 and F2 (Figure 5.1), which were recorded during the initial survey of the site in the 1990s (Finlayson and Mithen 2007). These structures have virtually disappeared during the intervening years, with only a small part of the arc of walling of structure F7, surviving to the immediate northwest of wall (70).

Features F1 and F8, excavated between 1997 and 2003, had been better preserved than the curved-wall structures in Horizon O111, despite the similarity of their appearance on the surface. Feature F8 in Trench 2, in particular, was distinct due to its deeper stratigraphic setting, better preservation, and the use of several massive boulders in its partly subterranean construction. These were considerably larger than any of the stones used for the construction of the curved-structures recorded in Horizon O111, which showed no evidence of a subterranean element to their construction. It seems likely that Features F1 and F8 belong to a different phase of activity at WF16 than those poorly preserved structures elsewhere in the overburden.

Structures F7, (1838), (116) and (70) occupied the highest part of the WF16 knoll. Walls (116) and (70), as well as stone settings (196) and (76), and stone-packed feature (185)[190], were situated over the soft midden deposits, later designated as Midden O60, Chapter 35. They represent the latest surviving archaeology in this part of the site, and considering their spatial proximity and the relationship with the top of the midden sequence (Figure 5.3), they might belong to a related phase of occupation on the site. Structure (1838) at the southern edge of the midden deposits might also belong to the group.

Stone settings

Stone settings (196) and (76) were situated on the southern and northern edge of underlying midden deposits (Midden O60) respectively (Figures 5.1, 5.12). Their function is difficult to ascertain without having secured deposits associated with their use. Those from within Stone setting (196) were not significantly different to the surrounding overburden and the only clue to function might be the possible heat cracking of the stones. If the cracking did derive from heat it cannot be determined whether this derived from use of the structures as hearths, ovens, or was simply the result of random fire. The height of the stones suggests storage as another possible function, or even a robbed out grave. Stone setting (76) contained a concentration of bone within its fill (75), but these have not been analysed as yet. Neither feature was set inside one of the surviving curved structures, although there can be no guarantee that further structures did not exist in these locations.

It was not entirely clear whether the pile of stones, designated as Feature (4), located at the southern end of wall (1838) represents related structural rubble or a separate feature. Excavation below Horizon O111 revealed Burials O27 and O77 (O114, Chapter 20), directly below these stones, suggesting they might have acted as a small cairn marking the burial. Once again the deflation of the intermediate deposits prevented direct stratigraphic relationships being established between the burial and the stones.

Rubble filled elongated troughs

Five elongated troughs packed with stones were described as a group of possibly related features. Four of these, Features [68], [688], [190] and [189], were excavated and shown to be shallow cuts mainly packed with stone rubble. Stone rubble (778) was not excavated, but on the basis of its appearance it was suspected to be the fill of a similar feature. All of these features were thought to be possible burials prior to excavation due to their shape and the nature of the backfill. Furthermore, their distribution overlaps with the distribution of Antique Burials O99 (Chapter 6), with some similarity between their respective orientations (Figure 5.10). All of the excavated fills were sparse in material culture, except for fill (185) of Feature [190], which contained chipped stone and animal bone; as noted above, such material may have derived from the underlying midden. In the absence of skeletal remains and finds, the function of these features remains unclear.

Considering that there is no evidence that the rubble had been used to seal some contents within the features, the emphasis might have been on the stones' visual quality, which certainly made the features conspicuous in 2010. It is possible that the features were created to look like graves in order to distract potential grave robbers from the true burials, which were dispersed across the same area. The Antique Burials O99 (Chapter 6) were more difficult to locate because, with a possible exception of Burial O71, they did not contain the same kind of rubble backfill.

5.4 Summary

Horizon O111 contains a rich array of material culture, the majority of which can be safely attributed to the Pre-Pottery Neolithic A. This includes some especially striking incised stone plaques. It also contains a number of features that are likely to have derived from stone-built structures and shallow rubble-filled pits. Extensive post-depositional erosion, bioturbation and anthropogenic disturbance has removed almost all stratigraphic information regarding these structures, as well as contextual information for the artefacts. The contrasts between features observed on the surface of the WF16 knoll in 1997 and existing in 2008 indicate that erosion had continued apace throughout that decade.

In light of the absence of any stratigraphic information and sufficiently preserved contexts that might warrant radiocarbon dating, it is not possible to determine whether the cultural material within Horizon O111 derived from a single phase, or multiple phases, of the Pre-Pottery Neolithic A period, nor the time period over which its deposits accumulated. Moreover, the uneven distribution of features across the knoll suggests differential degrees of erosion. It is not possible, therefore, to provide an informed interpretation of the spatial distribution of features with regard to past human activity. What can be concluded, however, is that a substantial amount of Pre-Pottery Neolithic A activity at WF16 occurred after the period represented by the stratified deposits below Horizon O111.

6. Antique Burials O99

6.1 Distribution and dating

Excavation of Horizon O111 (Chapter 5) revealed six features that were shown to be well-preserved burials cut into PPNA deposits on the knoll of WF16. These burials, combined as Antique Burials O99, were distributed along the north–south ridge of the knoll (Figure 6.1). Each burial has been assigned its own Object number (O25, O63, O71, O87, O88 and O118). They appear to be part of a distinct burial tradition, although the southern group of three burials shares an east–west orientation (Figure 6.2A) and the northern group is more varied (Figure 6.2B). It is not clear if there is any chronological significance to this division. In light of their approximate east–west orientation and the absence of grave goods, it is possible that Burials O63, O87 and O88 date to the Roman–Byzantine periods. The partially excavated Burial O118 is approximately orientated north–south and contains Nabataean pottery. The excavation of Burial O25 exposed the partial remains of a neonatal infant that is likely to be PPNA in date and re-deposited in the Antique burial fill. Burial O71 was partially excavated and assigned to this group on the basis of its undercut chamber, characteristic of the rest of the O99 group.

6.2 Description of excavated deposits

Each burial is described individually with its own matrix. Table 6.1 lists contexts from all of the burials, while Tables 6.2 and 6.3 list the bulk and small finds, respectively.

Burial O25

Burial O25 was identified within Structure O73 (Chapter 38; Figure 6.2B) following the excavation of the partial remains of a neonatal infant (242) exposed immediately below the overburden (186) (Figure 6.3). The fill (241) contained many stones over and around the bones. In the immediate proximity of this heavily disturbed and partially articulated skeleton were two beads (SF367 and SF373), neither of which appeared PPNA in character. No cut could be identified for the burial, and the fill (241) surrounding the bones was similar to the fill (243) of cut [451].

Fill (243) was a 0.20 m thick layer of loose silt with 30% stones from which a mother of pearl pendant (SF426) was recovered (Figure 6.5). It lay above a similar, but firmer and less stony silt 0.2 m thick (454). This lay on top of a thick (0.3 m) layer (528) of rubble (70% stone with some structural mud lumps) with voids that overlay 10 large flat stones. These were the capstones (530) of a primary burial and had been placed at a 45^{o} angle against the upper southwest face of the cut [451]. The burial space below contained fine silt (533 and 534), which had presumably filtered through the capping.

Removal of these fills indicated that cut [451] had created a large (1.86 x 1.38 x 1.25 m deep) oval and steep-sided burial pit, orientated northwest–southeast, and undercut on its southwest side to create a chamber for an adult inhumation (535). Aligned northwest–southeast with the head at the northwest end facing southwest, the torso was extended and supine with the legs pulled up in a crouched position angled to the east with the heels below the hips (Figure 6.4). The skeleton is in a good condition and appears to be complete. The large long bones suggest a tall adult. Although no grave goods were recovered, a small rectangular patch of organic material recovered from near to the right clavicle may be the remains of something placed in the left hand, or suspended around the neck. This patch was sampled for phytolith analysis (SA1229). The section created by the burial cut [451] provided a window into the underlying

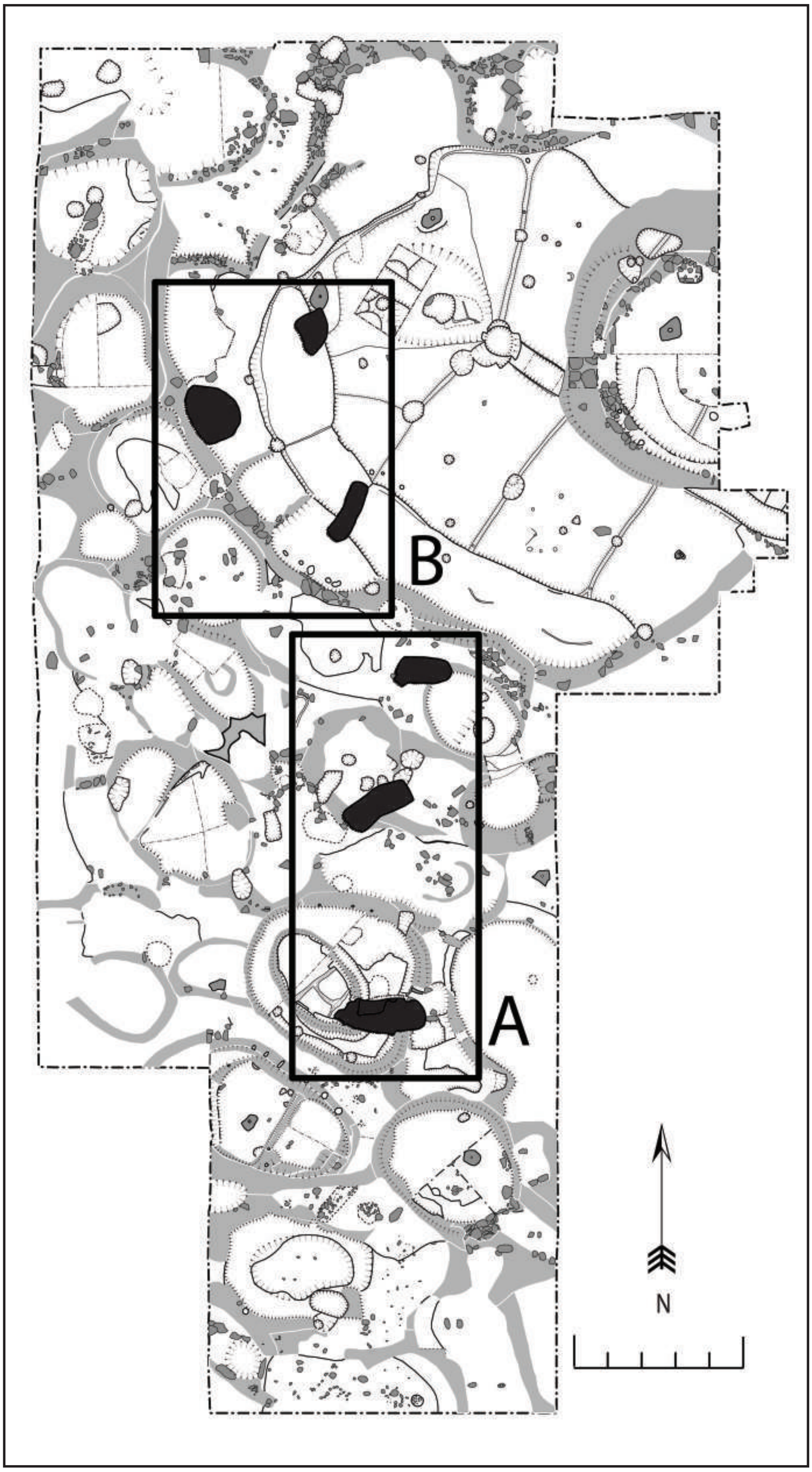


Figure 6.1 Distribution of O99 burials. Inserts refer to Figures 6.2A and B.

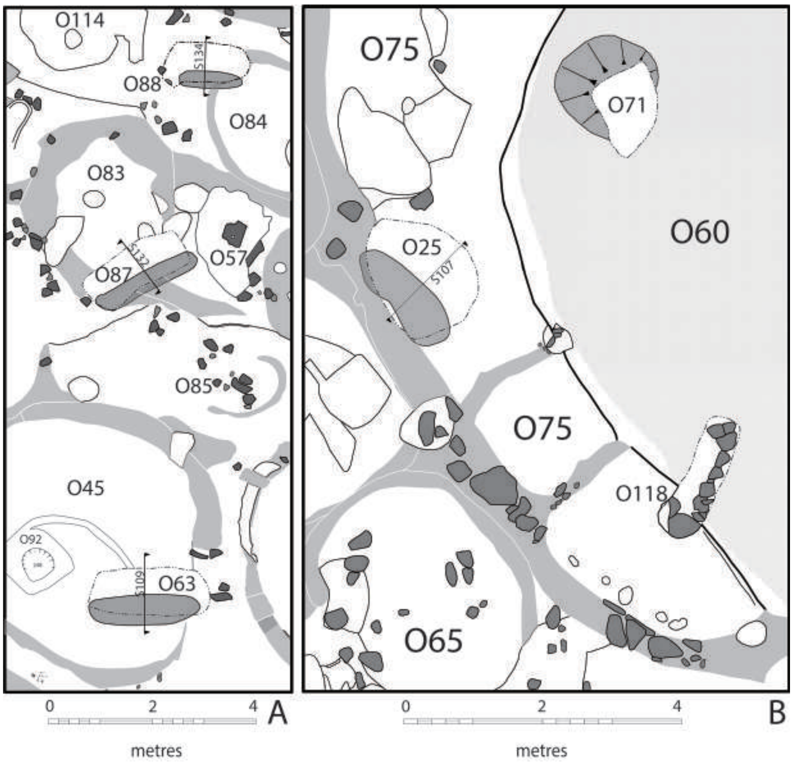


Figure 6.2. Antique burials: A — southern group. B — northern group. Dotted lines indicate the burial pit at its uppermost identified position, shaded areas represent the burial chamber containing the skeleton. O118 was not fully excavated and its unexcavated capstones are shown.

PPNA deposits, showing that these clearly continued below the base of cut [451].

In summary, Burial O25 consists of a large sub-circular pit containing a burial chamber at its base. A partial and disturbed neonatal burial (242), most likely PPNA in date, was found within the fill and appears to have been re-deposited during the original backfilling process of the Antique burial. The main inhumation of the Antique burial was placed in a chamber that undercut the section of the main burial pit.

Burial O63

Burial O63 had an east–west orientated sub-rectangular cut [262] 2.44 m long x 1.12 m wide at the top of its profile (Figures 6.2A, 6.6), exposed during the excavation of deposits within Structure O45 (Chapter 14). It was not recognised as a separate feature until the excavation of occupation deposit (251) within Structure O45 because the dark grey silty uppermost fill (261) of Burial O63 was almost indistinguishable from the looser occupation deposits (16) overlying (251). In retrospect, it appears that the cut [262] for Burial O63 had also cut the cobbled surface (7) within O45 (see Chapter 14).

It was not initially clear that the cut [262] was for a burial. As such, it was excavated and sampled in quadrants and spits as if it had been a pit until a compacted mud (301) layer and stone capping (302) were reached (Figure 6.7). Each spit of the fill was given a different context number (261 = spit 1; 275 = 2; 276 = 3; 288 = 4; 300 = 5) and were grouped as O46. This backfill overlies the compacted mud layer (301), which had most probably been poured or smeared in liquid form over the stone capping (302) to seal the burial. Some of this material dripped through the gaps between the stones to form a concretion (586) below the stone capping. The bottom part of the burial cut [262], at a depth of 1.0 m, narrows sharply and is only half as wide as the top. A near-horizontal cut had been made to the south of the vertical cut, extending for 0.30 m below the southern side of the burial pit to create a side burial chamber with an additional depth of 0.60 m, while also creating a step or platform on the northern side of the grave.

The stone capping (302) had been constructed by laying six large flat slabs as capstones at *c*. 45° so that their lower ends rested on the platform at the north side of the grave and their upper end against the southern side of the grave. Before the mud (301) was poured over the structure, smaller stones had been jammed between the capstones. The upper ends of the capstones rested on the undercut edge of the burial cut [242]. This was unstable, causing one of the lintel slabs to collapse into the side chamber and onto the lower legs of skeleton (589). This appears to have happened some time after the inhumation had occurred because the bones had been shattered in a

Table 6.1 Contexts excavated in Antique Burials O99 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
Burial O25		
241	compact dark brownish-grey silt with frequent stones	fill of burial
242	partial remains of human skeleton	secondary burial
243	loose light brownish-grey fine silt with frequent small stones	fill of burial
451	sub-oval cut with sharp and vertical sides and undercut side chamber with flat base	burial cut
454	firm light grey silt	fill of burial
528	loose light brownish-grey silt with a high frequency of small stones and pisé rubble	fill of burial
530	large mid-grey stone slabs	lintel capping over side burial chamber
533	loose mid-grey fine silt with occasional stones and pisé lumps	fill of burial
534	friable light orangish-brown silt with occasional pisé lumps and one large stone slab	fill of burial
535	extended human skeleton	primary human burial
Burial O63		
261	loose dark grey silt	fill of burial
262	sub-rectangular cut with steep to vertical sides and undercut oval side chamber	burial cut
275	loose dark grey silt	fill of burial
276	loose dark yellowish-brown silt clay	fill of burial
288	loose dark reddish-grey silt	fill of burial
300	loose mid-yellowish-brown sandy silt	fill of burial
301	hard dark yellowish-grey silt clay	mud ‘sealant’ for the lintel capping inside the burial
302	unworked and roughly hewn red sandstone blocks inside burial cut	lintel capping over side burial chamber
305	fine loose yellowish-grey silt	fill of burial
586	hard mid-greyish-yellow silty clay	fill of burial
587	loose mid-yellowish-grey silt with occasional pisé rubble	fill of burial
589	extended human skeleton	primary human burial
Burial O71		
101	loose mid-brownish-grey sandy silt with high concentration of angular and sub-angular stones	fill of burial
376	firm mid-brown to mid-grey silt matrix containing sandstone, flint and granite rubble	fill of burial
711	friable mid-brownish-grey sandy silt with frequent large stones	fill of burial
712	sub-rounded cut with mainly vertical sides, but undercut towards north. Not fully excavated	burial cut
Burial O87		
283	loose dark greyish-brown silt with occasional stones	fill of burial
594	loose pale orangish-brown silt with occasional stones and charcoal	fill of burial
607	sub-rectangular cut with verticle sides and a flat platform acting as a base for capping stones covering an undercut chamber of the same length as the upper part of the burial cut	burial cut
646	hard and compact light grey silty clay	mud ‘sealant’ for the lintel capping inside the burial

Table 6.1 Contexts excavated in Antique Burials O99 with sedimentary descriptions and interpretations continued...

Context	Description	Interpretation
653	six large weathered and water-worn slabs of roughly rectangular shape and a number of smaller choking stones stacked over a burial chamber	lintel capping over side burial chamber
671	loose pale greyish-brown silt with occasional stones and charcoal	fill of burial
677	extended human skeleton	primary human burial
678	loose dark brown fine silty sand with occasional stones	fill of burial
Burial O88		
439	friable pale yellowish-grey silt	encrusted puddling within burial backfill
652	loose light orangish-brown sandy silt with frequent stones	fill of burial
669	hard light grey silty clay	mud ‘sealant’ for the lintel capping inside the burial
670	oval main cut with a short tail to the southwest with mainly steep to vertical sides slight lip over the undercut burial chamber with an irregular concave base	burial cut
989	six greyish-blue, red and greyish-purple stones with smaller choking stones used in between	lintel capping over side burial chamber
994	loose dark brown fine silty sand	fill of burial
996	extended human skeleton	primary human burial
Burial O118		
1136	loose mid-greyish-brown silt with occasional stones and charcoal	fill of burial
1137	sub-rectangular cut with vertical sides. Not fully excavated	burial cut
1138	concrete hard light greyish-brown silty clay	mud ‘sealant’ for the lintel capping inside the burial

Table 6.2 Quantities of bulk finds from Antique Burials O99 by material and context number.

O99	Volume of sediment (l)			Weight of bulk finds per material (g)											
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Animal bone	Human bone	Marine shell	Other shell	Textile	Wood	Charcoal	Misc.
Burial O25															
241	16.0	16.0	0.0	0.0	154.9	104.5	0.0	4.5	0.0	0.0	21.5	0.0	0.0	0.0	0.0
243	270.0	30.0	240.0	0.0	1616.7	0.0	12.0	94.2	0.0	0.0	66.6	0.0	0.0	10.0	80.0
454	381.0	30.0	350.0	1.0	2432.1	0.0	10.0	14.2	0.0	0.0	34.7	0.0	0.0	0.0	0.0
528	241.0	30.0	210.0	1.0	952.4	20.0	0.0	53.2	0.0	0.0	31.1	0.0	0.0	0.0	0.0
533	91.0	30.0	60.0	1.0	417.9	0.0	13.5	16.3	0.0	0.0	36.0	0.0	0.0	0.0	10.0
534	201.0	30.0	170.0	1.0	1825.5	97.0	2.6	180.3	0.0	0.0	9.0	0.0	0.0	0.7	0.0
Total	1200.0	166.0	1030.0	4.0	7399.5	221.5	38.1	362.7	0.0	0.0	198.9	0.0	0.0	10.7	90.0
Burial O63															
261	164.0	40.0	120.0	4.0	1511.4	3930.0	0.0	1720.9	0.0	0.0	69.3	0.0	0.0	10.0	0.0
275	294.0	40.0	250.0	4.0	1792.0	174.4	10.0	143.5	21.0	10.0	55.9	0.0	0.0	0.1	60.0
276	298.0	40.0	254.0	4.0	1580.6	275.0	10.0	161.1	0.0	0.0	115.8	0.0	0.0	10.6	0.0
288	206.0	40.0	162.0	4.0	2643.1	50.0	10.1	203.3	11.0	0.0	101.6	0.0	0.0	0.6	0.0

Table 6.2 Quantities of bulk finds from Antique Burials O99 by material and context number continued...

O99	Volume of sediment (l)			Weight of bulk finds per material (g)												
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Animal bone	Human bone	Marine shell	Other shell	Textile	Wood	Charcoal	Misc.
300	171.0	10.0	160.0	1.0	1526.3	0.0	0.0	97.7	0.0	0.0	14.4	0.0	0.0	0.2	0.0
301	21.0	20.0	0.0	1.0	46.2	0.0	3.1	10.0	0.0	0.0	16.0	0.0	0.0	0.2	0.0
305	191.0	190.0	0.0	1.0	601.8	0.0	0.4	163.9	1.0	0.6	300.0	0.0	0.0	3.1	0.0
586	11.0	10.0	0.0	1.0	11.2	0.0	0.0	4.7	0.0	0.0	5.0	0.0	0.0	0.4	0.0
587	171.0	170.0	0.0	1.0	408.2	222.7	0.3	114.2	0.0	0.0	242.0	0.0	0.0	2.7	0.0
589	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.0
Total	1527.0	560.0	946.0	21.0	10120.8	4652.1	33.9	2619.3	33.0	10.6	920.0	0.0	0.0	27.9	90.0
Burial O71															
101	30.0	30.0	0.0	0.0	951.2	0.0	0.4	26.6	0.0	0.0	178.9	0.0	0.0	0.0	0.0
376	361.0	30.0	330.0	1.0	7646.3	900.0	10.0	285.2	0.0	0.0	335.2	0.0	0.0	0.0	0.0
711	300.0	0.0	300.0	0.0	7270.0	0.0	20.0	270.0	1.0	20.0	0.0	0.0	0.0	0.0	10.0
Total	691.0	60.0	630.0	1.0	15867.5	900.0	30.4	581.8	1.0	20.0	514.1	0.0	0.0	0.0	10.0
Burial O87															
283	13.0	12.0	0.0	1.0	284.2	0.0	0.0	68.4	0.0	0.0	35.8	0.0	0.0	0.0	0.0
594	501.0	30.0	470.0	1.0	2200.0	750.0	11.2	177.5	1.0	0.0	13.9	0.0	0.0	0.3	0.6
646	101.0	30.0	70.0	1.0	531.0	0.0	4.9	35.5	0.0	0.0	15.8	0.0	0.0	0.2	0.0
653	0.0	0.0	0.0	0.0	1150.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
671	176.0	30.0	145.0	1.0	350.0	50.0	10.0	15.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0
678	181.0	30.0	150.0	1.0	150.0	0.0	1.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	972.0	132.0	835.0	5.0	4665.2	800.0	27.1	346.4	11.0	0.0	65.5	0.0	0.0	0.5	0.6
Burial O88															
439	10.0	9.0	0.0	1.0	58.8	0.0	0.0	2.0	0.0	0.0	21.2	0.0	0.0	0.0	0.0
652	730.0	30.0	700.0	0.0	2660.0	0.0	20.0	90.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
669	31.0	20.0	10.0	1.0	20.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
994	31.0	30.0	0.0	1.0	27.0	0.0	0.0	2.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0
Total	802.0	89.0	710.0	3.0	2765.8	0.0	20.0	104.0	0.0	0.0	21.2	10.0	0.0	0.0	0.0
Burial O118															
1136	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0

way to suggest that they were unprotected by flesh, even though the slab became embedded into concretion (586) (Figure 6.8). Immediately below the capping stones there was a very fine silt (305) that presumably had infiltrated through the mud and slab capping.

Apart from the damage caused by this structural collapse, the bones (589) were in good condition. The skeleton was of an adult lying fully extended on its back at the western end of the burial chamber, which was longer than required for the body and therefore empty towards its eastern end. The head was at the western end facing up and looking slightly to the north. The arms were laid across the body so that the right hand was in the pubic region of the pelvis, while the left arm was flexed at 90° across the stomach. Some finger bones were found beside the top of the skull, although no direct evidence of disturbance was noted in the burial during excavation. The right leg was crossed over the left leg at the ankles.

The skeleton was surrounded by very loose dusty silt (587), which had accumulated in the hollow of the burial chamber. Ten glass and shell beads (SF631) were recovered from the neck area of the skeleton and presumably came from a necklace. The beads were all approximately 5 mm in diameter, mainly round, but with one biconical example.

Table 6.3 Quantities of small finds from Antique Burials O99 by material and context number.

O99	Quantities of small finds per material (nos)																	
Context	**Chipped stone**	**Ground stone**	**Other stone**	**Worked bone**	**Disarticulated human bone**	**Bone beads**	**Stone beads**	**Marine shell beads**	**Marine shell other**	**Bitumen objects**	**Plaster/Pisé**	**Textile/leather**	**Basketry**	**Glass**	**Metal**	**Wood**	**Pottery**	**Total small finds**
Burial O25																		
241	1	1	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	5
243	0	2	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	4
454	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3
533	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
534	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	1	5	1	0	0	0	2	3	1	0	0	0	0	0	1	0	0	14
Burial O63																		
261	0	1	1	0	0	0	0	3	0	0	0	0	0	0	0	0	0	5
276	0	1	0	1	0	0	0	3	0	1	0	0	0	0	0	0	0	6
288	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
300	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
302	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
305	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2
587	0	0	0	1	0	0	2	1	0	0	0	1	2	1	0	1	0	9
Total	0	4	2	2	0	0	3	8	0	1	0	1	2	1	0	1	0	25
Burial O71																		
376	0	6	2	2	0	0	0	0	1	0	1	0	0	0	0	0	0	12
711	0	7	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	10
Total	0	13	2	3	0	0	0	2	1	0	1	0	0	0	0	0	0	22
Burial O87																		
283	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
594	0	0	1	1	3	0	1	0	1	0	0	0	0	0	0	0	0	7
646	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
653	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
671	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
678	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2
Total	0	4	1	1	4	0	2	0	1	0	0	1	0	0	0	0	0	14
Burial O88																		
652	0	1	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	4
994	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	3
Total	0	1	0	2	0	0	1	1	0	0	0	0	0	1	1	0	0	7
Burial O118																		
1136	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1

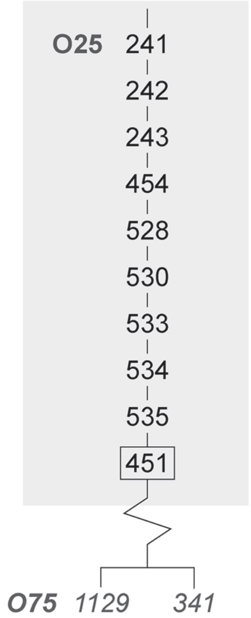


Figure 6.3 Stratigraphic matrix for Burial O25.

The beads varied from red to green in colour, and included translucent examples. In addition, a few pieces of flat wood were found around the skeleton, which might be the remains of a coffin (SF347, SF348, SF632, SF633). Other organic material present in the burial includes leather fragments from near the skull (SA1103) and next to the right tibia. These could be the remains of an organic lining or shrouding within the coffin, or the remains of clothing.

There were numerous finds in the backfill contexts (O46) of Burial O63 including marine shell beads (SF321, SF322, SF323, SF324, SF331), incised and pierced stone objects (SF318, SF330, SF335) and a red painted 'phallic' figurine (SF339), made out of either antler or soft chalky stone (Figure 6.9). These are all likely to be PPNA in date, having been re-deposited into the Antique burial from deposits associated with PPNA activity in Structure O45.

In summary, Burial O63 is cut through occupation deposits, floors and structures associated with Structure O45. The rich collection of artefacts in the fill (O46) of Burial O63 are almost certainly PPNA in origin and derive from the long PPNA sequence within Structure O45 which had been cut by the Antique burial. The body had been placed in a chamber that undercut the main burial pit.

Burial O71

A large 1.2 m long burial cut [712] running north–south and 0.8 m wide east–west was found in 2009 in the western area of Midden O60 (Chapter 35; Figure 6.2A), truncating the mud-plaster surface (713) of the bench of Structure O75 (Chapter 38; Figure 6.10). The cut was only recognised after the surface of the bench had been reached because of the difficulty in identifying cuts though the loose and amorphous midden material (Midden O60) that filled Structure O75. Once the cut was recognised it became clear that two previously excavated stone rich contexts (101) and (376), that had been assumed to be components of Midden (O69) had been the upper part of the fill of Burial O71.

The burial pit was heavily undercut so that its base expanded on one side to form a side burial chamber. This undermined the plaster bench (713) of Structure O75. The fill (711) was excavated to 0.65 m below the level of the platform without encountering a skeleton (Figure 6.11). Excavation ceased at this point because further removal of (711) from below the plaster bench (713), risked the

Figure 6.4 Burial O25, skeleton (535). Scale 0.5 m.

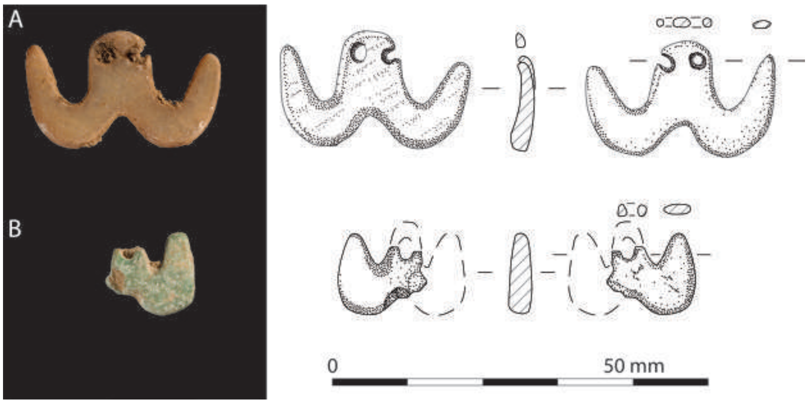


Figure 6.5 Nacre pendant SF426 from the backfill of Burial O25 and a similar W-shaped green stone pendant SF5 from the overburden (62).

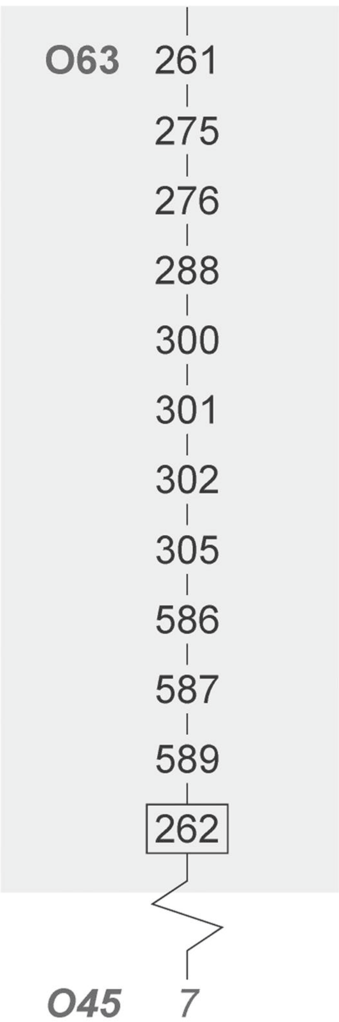


Figure 6.6 Stratigraphic matrix of Burial O63.

collapse of that bench. The burial (711) contained a large number of stones, measuring 0.10–0.30 m, as well as many PPNA ground-stone artefacts. A perforated human cranium fragment SF558 from deposit (376) is also thought to be Neolithic in date (Figure 6.12). In summary, although Burial O71 was not fully excavated, it appears to have the undercut burial chamber typical of the other Antique burials.

Burial O87

Burial O87 was located during the excavation of Structure O83 (Chapter 21; Figure 6.2A). Its uppermost context was a loose friable stony deposit (283) that was difficult to distinguish from the overburden context (123). The first clearly identified burial fill was (594), a loose silty deposit (Figure 6.13). The silty deposit (594) was contained within a cut [607] 2.09 m long x 0.89 m wide, orientated east-southeast by west-southwest, with a depth of 0.93 m. The fill (594) overlay a silty clay (646) that appeared to have been poured over the six capstones (653), that were set at *c*. 60° over the burial (Figure 6.14). The silty clay sealing was very patchy in its distribution and did not completely cover the capstones. The capstones were rectangular in shape, arranged side by side with their long axis perpendicular to the burial. The largest: 0.62 x 0.31 x 0.15 m; the smallest: 0.49 x 0.29 x 0.15 m, and there were smaller stones used as choking stones between the main capstones.

Below the capstones there was a pale loose silt fill (671, Figure 6.15) containing numerous PPNA artefacts such as flint points and greenstone beads. This was above a fine silty sand (678), which lay around a skeleton (677) (Figure 6.16). This was a prone burial of an adult male lying in a roughly east–west orientation with the feet facing east. Preservation of the bone was generally good. The skull had collapsed following decomposition, while the scattering of hand and feet bones throughout the vicinity of the lower limbs suggests animal activity. Phytolith samples SA2821–24 were taken along the length of the body to identify any possible wrapping/ shroud

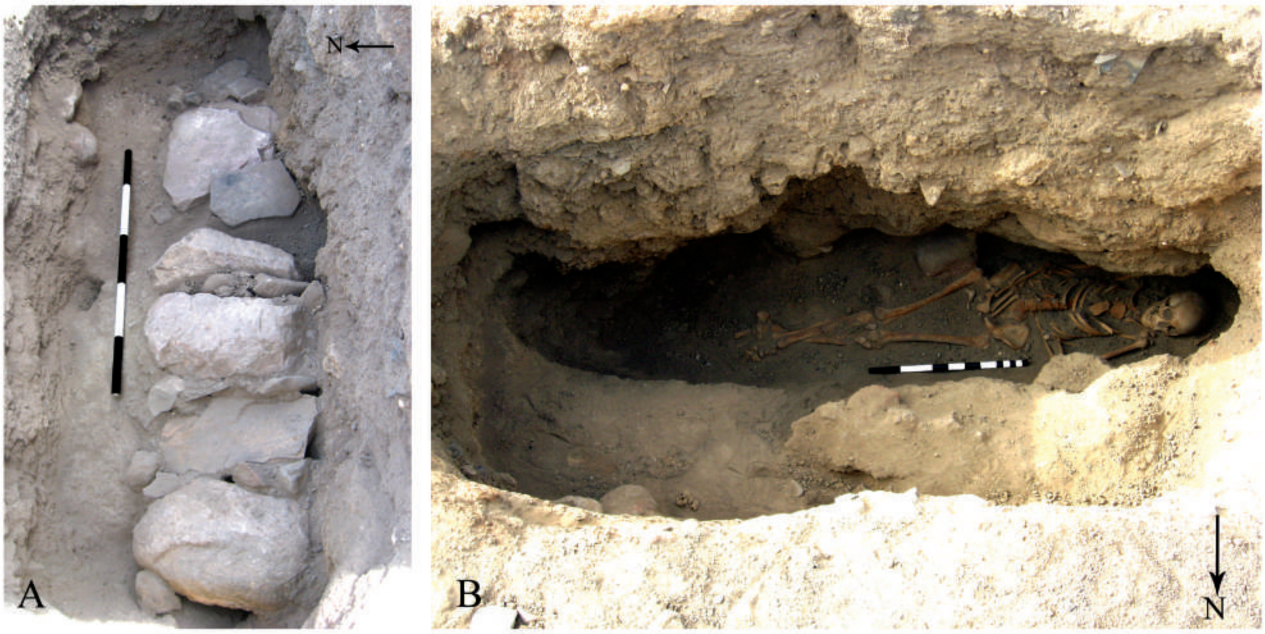


Figure 6.7. A — Burial O63, stone capping (302) looking east, scale 1.0 m. B — the view of fully exposed skeleton (589) from the north in grave [262], scales 0.5 m.

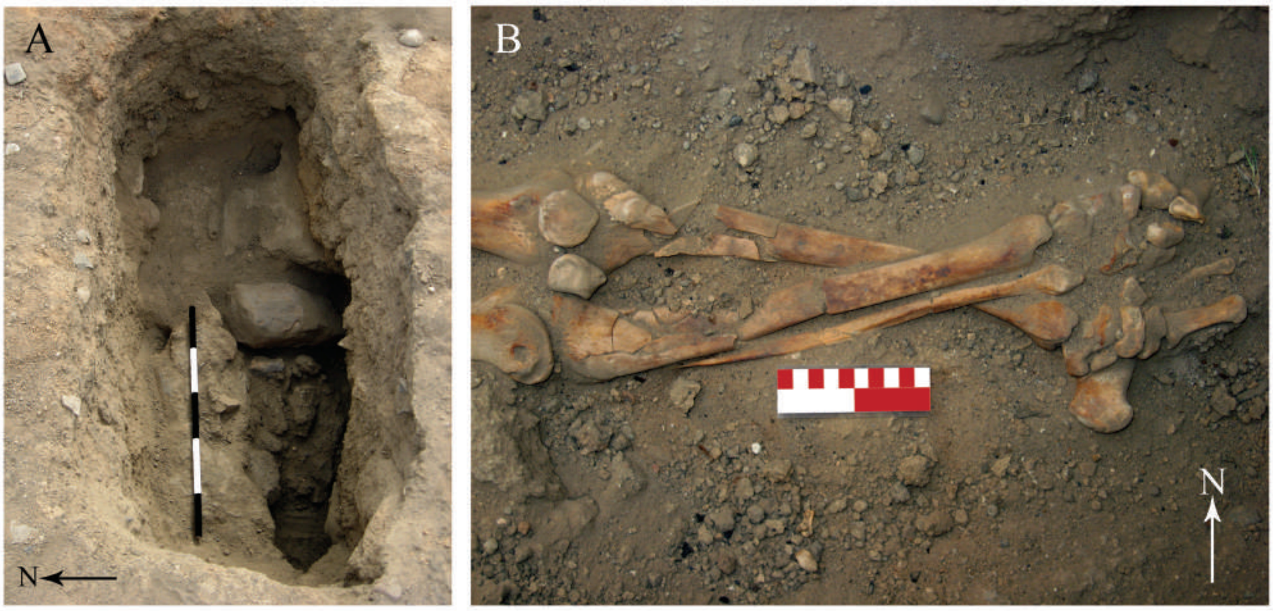


Figure 6.8. A — Burial O63, the position of the collapsed capping stone in context (586) looking east, scale 1.0 m; B — detail of the lower legs of skeleton (589) looking north, scales 1.0 m.

material. A cup-hole mortar (SF 1330) had been placed next to the skull.

The cut (607) had vertical sides and a flat platform for the base of the capstones on the northwest side of the burial. A chamber with the same length as the burial pit was cut into its southeast side opposite the platform. The bases of the capstones rested on the flat platform with their tops placed above, resting against the opposite vertical side. The body had been placed in an undercut chamber.

Burial O88

During the 2008 excavation of Structure O84 (Chapter 19; Figure 6.2A) a pale patch of well-sorted friable silt (439) was revealed after the excavation of the overburden (123). This was identified as the result of water puddling around three rounded stones (0.15–0.20 m diameter) (439) (Figure 6.17). When excavation continued in 2009 it was observed that this lay on the surface of (652), a light orange sandy silt filling a cut [670].

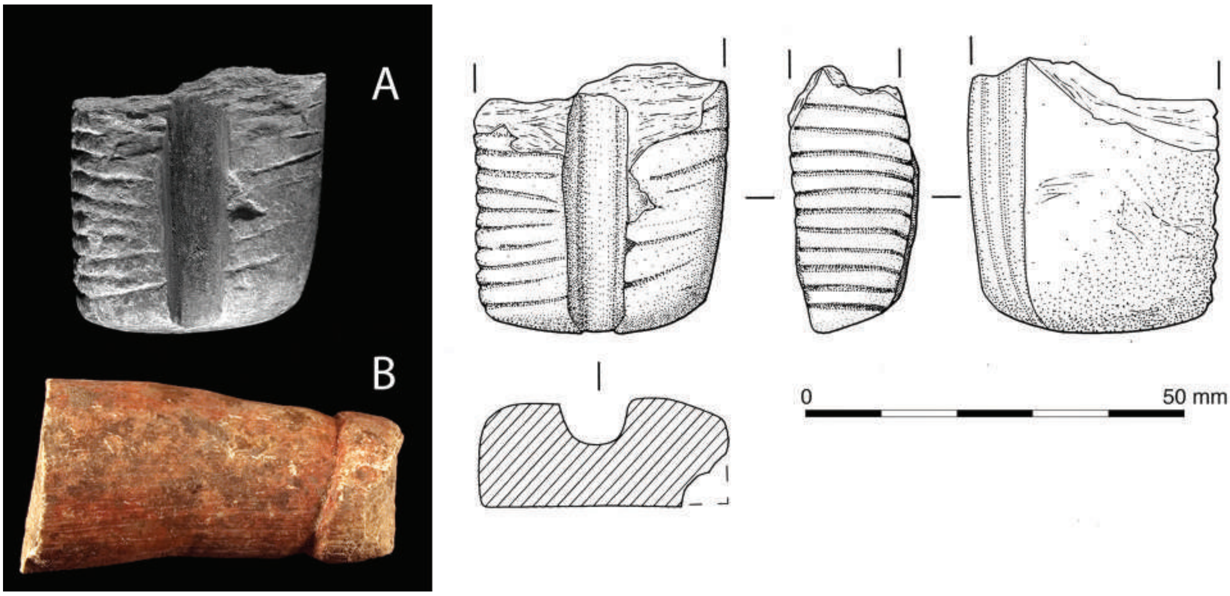


Figure 6.9 Small finds from the backfill of Burial O63: A — Grooved and incised stone SF318 from context (276); B — 'phallic' object with red pigment SF339 from context (300).

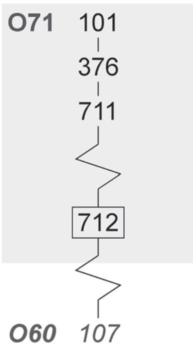


Figure 6.10 Stratigraphic matrix for Burial O71.

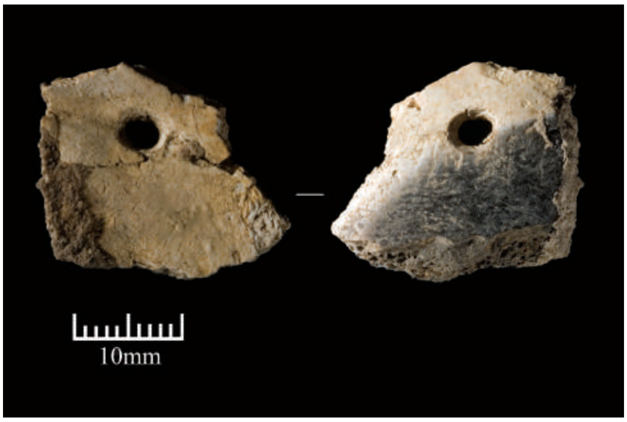


Figure 6.12 Perforated cranium fragment SF558 from backfill (376) of Burial O71.

Figure 6.11 Burial O71, showing the cut as visible through the mud-plaster surface of Structure O75. Scale 0.5 m.

The sandy-silt (652) lay on top of a hard mud deposit (669) that appeared to have been poured over a set of capstones (989) to seal them. The capstones consisted of six large (largest: 0.54 x 0.35 x 0.10 m; smallest: 0.23 x 0.15 x 0.05 m) roughly rectangular stones sloping from south to north to cover the burial. Smaller stones had been used in between the large slabs as choking stones (Figure 6.18).

Below the capstones, a loose fill (994) partially covered the skeleton (996) (Figure 6.19). The majority of this loose fill (994) probably accumulated by falling through the gaps between the capstones, but some may have derived from the ceiling of the undercut chamber. The fill contained beads (SF1381–1383) and numerous pieces of textile from either a shroud or clothing. The textile fragments were found mainly under the skeleton and included woven material and leather.

The skeleton (996) is of a child. The bones were well preserved, although a few of the finger and toe bones were scattered about the body, presumably by animal activity. Both pubic sympheses had been dislodged to the left side of the body. The body was facing roughly west to east and the left side had slumped very slightly so that the left ribs covered the left arm

The main burial pit [670] was oval with a short extension to the southwest, aligned east–west, and measuring 1.62 x 0.96 x 1.20 m. Its sides were steep to vertical, with a sharply defined flat base with an irregular concave form. There was an oval burial chamber, also running east–west and measuring 1.22 x 0.3 x 0.3 m, that undercut the edge of the main pit, and slightly cut below its base to form a slight lip. The skeleton was entirely contained within the burial chamber.

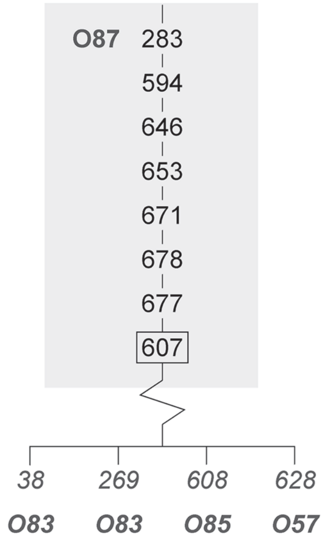


Figure 6.13 Stratigraphic matrix for Burial O87.

Burial O118

Burial O118 is located within Midden O60 (Chapter 26; Figure 6.2B). The cut [1137] for the burial was only identified during the removal of loose midden material (1132), although it must have originally been cut from above all the PPNA contexts (Figures 6.20, 6.21). The fill (1136) consisted of a loose and mixed deposit containing shell and fragments of wood (possibly root), together with two Nabataean complete ceramic vessels placed at the east end of the burial, one intact and one fragmented (SF 1873, Figure 6.22). Below this fill there was a hard mud capping (1138) which appears to have been poured over capstones of a burial (Figure 6.21). The burial cut [1137] had been made into midden deposits (229) of Midden O60, as well as the deposit (1129) sealing the bench surface and wall (399) of Structure O75. Cut [1137] was sub-rectangular in shape, measuring 1.8 x 0.5 m (with the depth unknown) and

Figure 6.14 Capstones (653) in Burial O87. Scale 2.0 m.

Figure 6.15 Fill (671) in Burial O87 below stone capping. Scale 2.0 m.

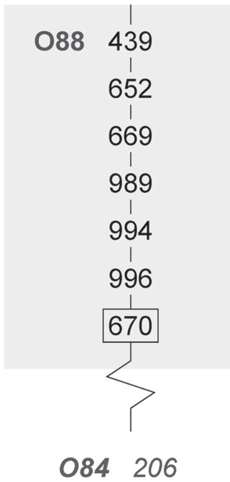


Figure 6.17 Stratigraphic matrix for Burial O88.

Figure 6.16 Skeleton (677) in Burial O87. Scale 2.0 m.

Figure 6.18 Lining/capstones (989) of Burial O88. Scale 1.0 m.

Figure 6.19 Skeleton (996) in Burial O88. Scale 1.0 m.

aligned northeast–southwest. Excavation ceased once the capstones had been exposed and hence there is no information regarding the inhumation.

In summary, Burial O118 was not fully excavated. It is aligned southwest–northeast and has a mud sealing over its capstones. Unique amongst the Antique burials, it had ceramics suggesting a Nabataean date. However, Burial O118 was constructed with mud-sealed capstones in a similar manner to the three southern burials of O99 and it is conceivable that the vessels may have been heirlooms. It is not possible to say whether there is an undercut burial chamber.

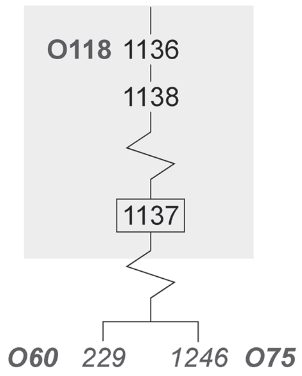


Figure 6.20 Stratigraphic matrix for Burial O118.

Figure 6.21 Capstones and mud lining of Burial O118. Scale 0.5 m.

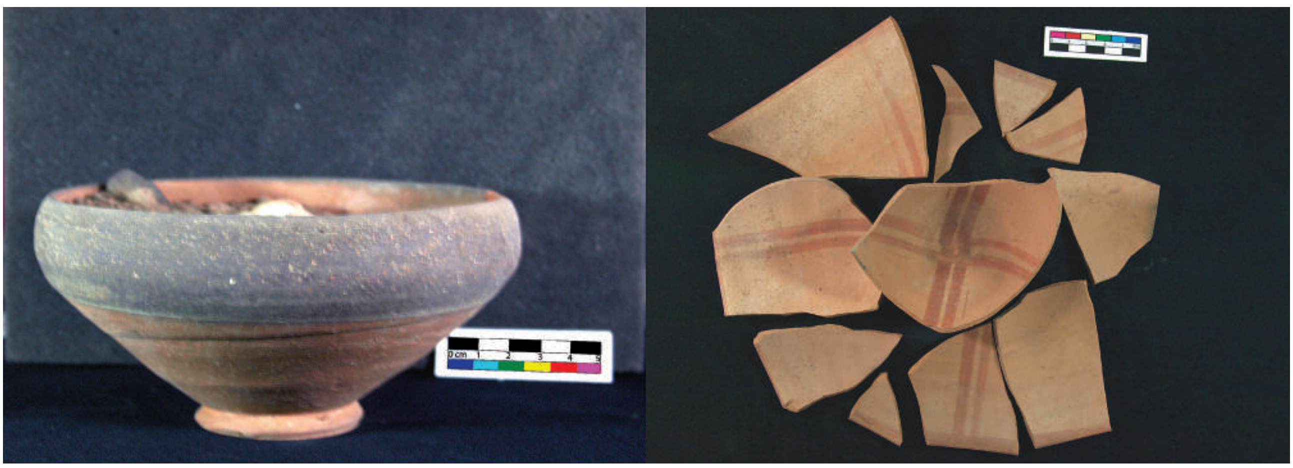


Figure 6.22 Pottery vessels from fill (1136) of Burial O118.

6.3 Interpretation

Antique Burials O99 consists of a series of burials which were distinct from any of the PPNA burials located on the site, being made within deep pits and in some cases having a burial chamber dug slightly to the side of the pit at its base. The good preservation of the skeletal remains, the survival of organic materials and recovery of several bead and ceramic objects, confirm their post-Neolithic date. There is a substantial Roman/Byzantine cemetery (Findlater *et al.* 1998) immediately west of WF16 (Figure 4.2), and it is possible that some of the burials of O99 were outliers from that cemetery. There is no doubt that they are all relatively recent compared to the PPNA occupation of WF16, most likely falling within a broad Nabataean/Roman/Byzantine category. Burial O118 contained Nabatean pottery vessels in its upper fills and it is possible that, considering the similarity in their construction, all six burials belong to this period. Nevertheless, unlike O118, the southern group of three burials had no grave goods, which combined with their east–west alignment and the proximity to the nearby Late Antique cemetery, might suggest that they are Christian.

7. Area O103

7.1 Location and relationship with other structures

Area O103 is composed of a series of heterogeneous deflated deposits immediately below the overburden (1 and 123) located over the central southern end of the trench (Figure 7.1). Unlike the majority of Objects described across the site, Area O103 does not belong to a single structure, but consists of dumps and diffuse layers rich in midden material lying between and over a number of structures. To the northwest of Area O103 is Structure O19, the eastern extent of which is sealed by deposits belonging to Area O103. To the northeast lies Structure O11, the cut of which truncates parts of Area O103. To the east lies Structure O104, the western wall of which is sealed by dumps associated with Area O103. The relationship between Area O103 and the small Structure O21 to the west is not clear, but because the eastern extent of Structure O21 is difficult to define it is likely to lie beneath the diffuse layers of Area O103. Figure 7.2 provides a view of the area during excavation and Figure 7.3 the stratigraphic matrix. Table 7.1 lists the excavated contexts, while Tables 7.2 and 7.3 list the bulk and small finds respectively. Excavation of Area O103 was of a limited nature, with only the uppermost deposits explored.

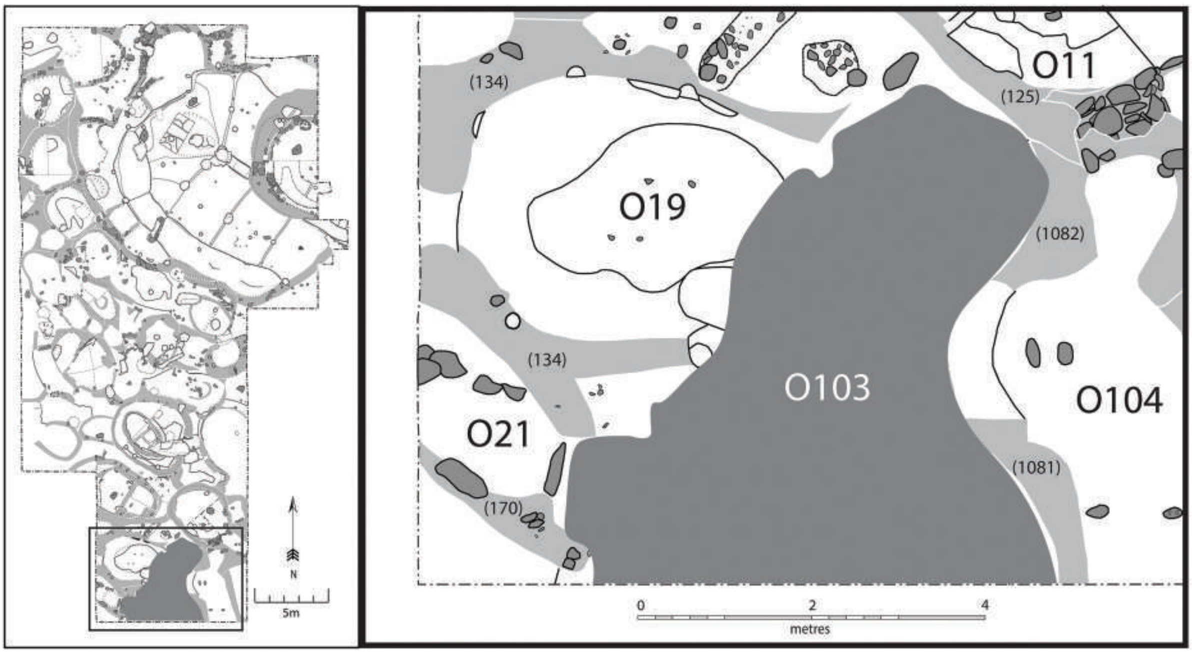


Figure 7.1 Location plan for Area O103 and plan showing its relationship with surrouding Objects

Figure 7.2 View of Area O103, showing its relationship with adjacent structures.

Table 7.1 Contexts excavated within Area O103 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
154	dark mixed deposit	midden accumulation
166	friable dark reddish-grey sandy silt	scorched silt layer
430	friable dark greyish-brown sandy silt	midden accumulation
475	mixed friable mid greyish- and yellowish-brown sandy silt with frequent burnt stone and pisé rubble	dump of mixed rubble and organic material
810	dark greyish-brown sandy silt rich in burnt stone	accumulation of silt in the area between structures
813	friable mid greyish-brown sandy silt	fill of small pit
814	oval cut with vertical sides and flat base	cut of small pit
818	friable mid greyish-brown sandy silt	accumulation of silt between structures
820	friable dark greyish-brown sandy silt	accumulation of silt between structures
826	friable mid greyish-brown sandy silt	accumulation of silt between structures
846	friable mixed dark greyish-brown with yellowish-brown lenses of sandy silt	arbitrary spit of mixed deposit between structures
849	friable mixed dark greyish-brown with yellow brown lenses, sandy silt	arbitrary spit of mixed deposit between structures
852	friable mixed dark greyish-brown with yellow brown lenses sandy silt	arbitrary spit of mixed deposit between structures
1052	loose dark grey fine ashy silt	ashy dump between structures
1069	firm light greyish-brown sandy silt	compacted silt against wall of structure

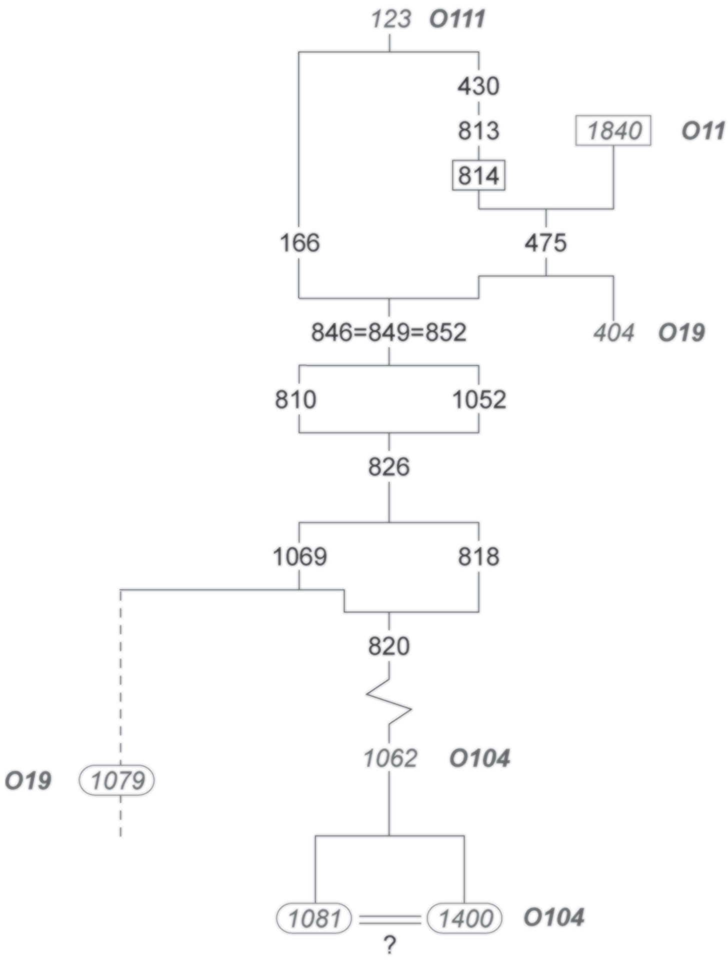


Figure 7.3 Stratigraphic matrix of deposits encountered within Area O103.

7.2 Description of the excavated deposits.

The uppermost deposit encountered below the overburden (1 and 123) in the southern area of the trench was a dark grey-brown silt (430) (Table 7.1, Figure 7.3). This organic rich deposit contained concentrations of burnt stone, some animal bone and a number of ground-stone objects, such as hammer stone SF199 and pestle SF668, as well as three marine shell beads (SF179, SF180 and SF666). The character of the deposit and associated finds suggest dumped refuse.

Below deposit (430) there was the bone-rich fill (813) of a shallow pit [814]. This ephemeral feature cut another organic and burnt stone-rich midden deposit (475) directly

Figure 7.4 Grooved and striated limestone object SF1751 from deposit (820).

Table 7.2 Quantitites of bulk finds in Area O103 by material and context number.

Object 103	Volume of sediment (l)				Weight of bulk finds per material (g)															
Context	**Total volume**	**Flot sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Ground stone**	**Other worked stone**	**Unworked stone**	**Animal bone**	**Human bone**	**Unidentified bone**	**Marine shell**	**Other shell**	**Plaster/Pisé**	**Textile**	**Basktery**	**Wood**	**Plant matter**	**Charcoal**	**Misc.**
154	51.0	30.0	20.0	1.0	1223.0	0.0	0.0	0.0	0.0	0.0	27.6	0.0	12.7	0.0	0.0	0.0	0.0	0.0	20.0	0.0
166	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
430	50.0	10.0	39.0	1.0	374.8	0.0	0.0	0.0	0.0	0.0	87.1	0.0	27.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
475	261.0	30.0	230.0	1.0	1307.2	0.0	10.3	0.0	359.8	0.0	0.0	10.0	26.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
810	151.0	30.0	120.0	1.0	678.9	0.0	2.4	0.0	152.0	0.0	44.8	0.0	27.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
813	4.0	3.0	0.0	1.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
814	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
818	9.0	8.0	0.0	1.0	125.0	148.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
820	42.0	30.0	10.0	2.0	1224.0	1275.0	10.0	0.0	46.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
826	422.0	60.0	360.0	2.0	1434.0	206.0	0.0	0.0	210.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
846	340.0	0.0	340.0	0.0	601.0	0.0	0.0	0.0	181.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
849	431.0	30.0	400.0	1.0	482.0	0.0	1.0	0.0	0.0	0.0	10.1	0.0	50.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
852	301.0	30.0	270.0	1.0	664.5	0.0	0.1	0.0	152.0	0.0	20.5	0.0	11.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1052	45.0	45.0	0.0	0.0	811.0	475.0	0.0	0.0	66.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1069	71.0	30.0	40.0	1.0	291.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	2178.0	336.0	1829.0	13.0	9216.4	2104.0	23.8	0.0	1228.8	0.0	190.1	10.0	155.9	0.0	0.0	0.0	0.0	0.0	20.0	0.0

Table 7.3 Quantities of small finds in Area O103 by material and context number.

Object 103	Quantities of small finds per material (nos)								
Context	Chipped stone	Ground stone	Other stone	Worked bone	Bone beads	Stone beads	Marine shell beads	Marine shell other	Total small finds
166	0	1	0	0	0	0	0	0	1
430	0	3	0	0	0	0	3	1	7
475	0	3	0	0	0	0	0	1	4
820	0	0	1	0	0	0	0	0	1
826	1	3	1	1	1	0	2	0	9
846	0	0	1	0	0	1	0	0	2
852	0	2	0	0	0	0	0	0	2
1052	0	1	0	0	0	0	0	0	1
1069	0	1	0	0	0	0	0	0	1
Total	1	14	3	1	1	1	5	2	28

to the south, that was cut by the construction cut [1840] of Structure O11. Deposit (475) also contained a number of ground-stone tools, including pestles SF683 and SF1231 and hammerstone SF1225. On the same stratigraphic horizon, close to the southern limit of excavation, there was a scorched silt layer (166). A single broken pestle, SF198, was recovered from the surface of (166). Deposit (475) was not fully removed in the southern extent of Area O103.

At the southern area of the trench, three *c.* 5 cm thick spits of homogenous silt (852 = 846 = 849), which were underlying deposits (166) and (475), were removed in an effort to characterise the stratigraphy in this area. Below these diffuse layers there was a dark grey-brown sandy-silt (810). This was rich in burnt stone and similar in nature to silt (475). Deposit (810) was also truncated by the construction cut [1840] of Structure O11 to the north and butted against wall (1400) of Structure O104 to the west. An ash-rich stony layer (1052) was located on the same stratigraphic horizon as deposit (810).

Layer (1052) continued beyond the southern baulk of the trench and contained a concentration of snail shells, large shattered cobbles and charcoal. Sealed by both (810) and (1052), a further dark grey-brown organic silt (826) was distributed over the southern area of the trench. This silt shared characteristics with upper deposits (810) and (475), with both friable and soft areas, burnt stone and charcoal concentrations. At the base of this sequence of midden-like charcoal-rich dump deposits there was a compact light grey-brown silt (1069). This abutted the southern edge of wall stub (1079) within Structure O19 and continued to the west to partially seal wall (1081) of Structure O104. The northern extent of deposit (1069) directly overlay a further dark grey midden infill deposit (820), which contained chipped-stone and ground-stone fragments, as well as finely striated and grooved limestone object SF1751 (Figure 7.4). Deposit (1069) was very firm and inclusion free and similar in character to deposit (1062, of Structure O104) over walls (1081) and (1400). Both of these walls relate to Structure O104 and are most likely the same construction (1081=1400), see Chapter 8).

On the same stratigraphic horizon as silt (1069) there was a mid-grey silt (818) that was similar to the midden-like dark grey, sandy-silt (820). Deposit (1069) also abutted wall (1400) and was bound at the north by a sloping pisé rubble deposit (unexcavated) possibly associated with the collapse or demolition of the wall (134) of Structure O19. Figure 7.5 illustrates the walls exposed below Area O103.

7.3 Interpretation

Area O103 comprises a series of diffuse deposits, several of them (e.g. 430) appearing to represent waste or midden material. These may represent a similar phenomenon to the midden deposits that were identified at the far southern extent of WF16 by the site evaluation (Finlayson and Mithen 2007), apparently comprising rubbish discarded immediately around the edge of the site.

The apparent nature of the deposits, a deflated accumulation of amorphous dumps and in-wash material, inhibits any significant interpretation. The presence of pestles and hammer stones might indicate that the area was also used as a workshop, although ground-stone tools appear common in many waste contexts. The

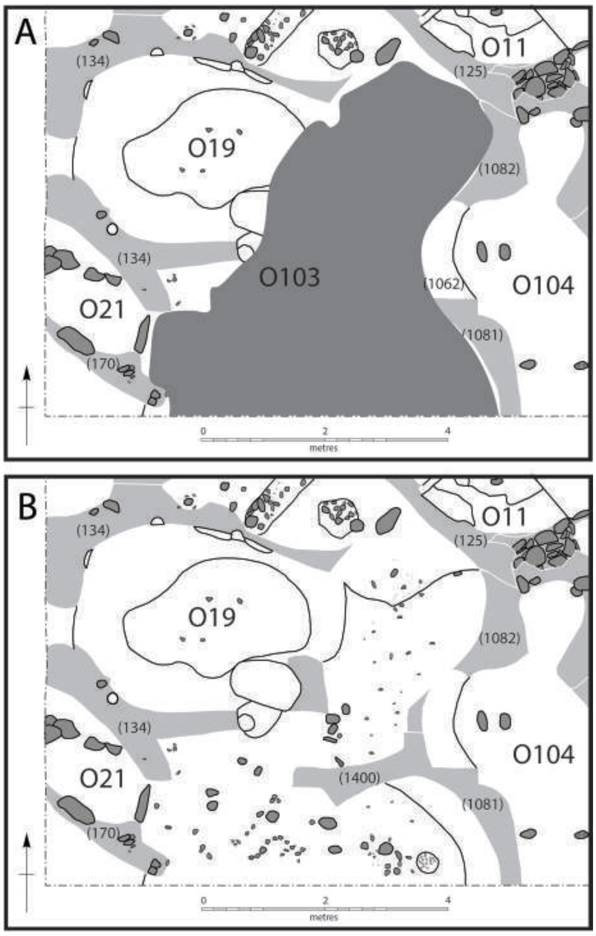


Figure 7.5 A — Plan showing extent of deposits in Area O103; B – post-excavation plan showing walls below upper deposits of Area O103.

most important aspect of Area O103 is that its deposits cover and hence are later than Structures O19, O104 and (probably) O21, while the deposits of Area O103 are truncated by the cut [1840] for a wall (125) representing the construction phase of Structure O11 (See Chapter 12). As such, Area O103 is important for establishing the relative chronology of this suite of structures in the southern area of WF16.

8. Structures O104 and O22

8.1 Location and relationship with other structures

Structures O104 and O22 are located in the southwest corner of the excavation trench (Figure 8.1), an area that received limited excavation. Structure O11 lies directly to their north, together with associated Structures O20 and O23. Excavation revealed that Structure O20 overlies Structure O104. To the west is Area O103, a series of deposits that obscure underlying structures. Figure 8.2 provides a view of Structures O104 and O22, while the stratigraphic matrix is provided in Figure 8.3. Table 8.1 lists all of the excavated contexts. Tables 8.2 and 8.3 list the bulk and small finds respectively.

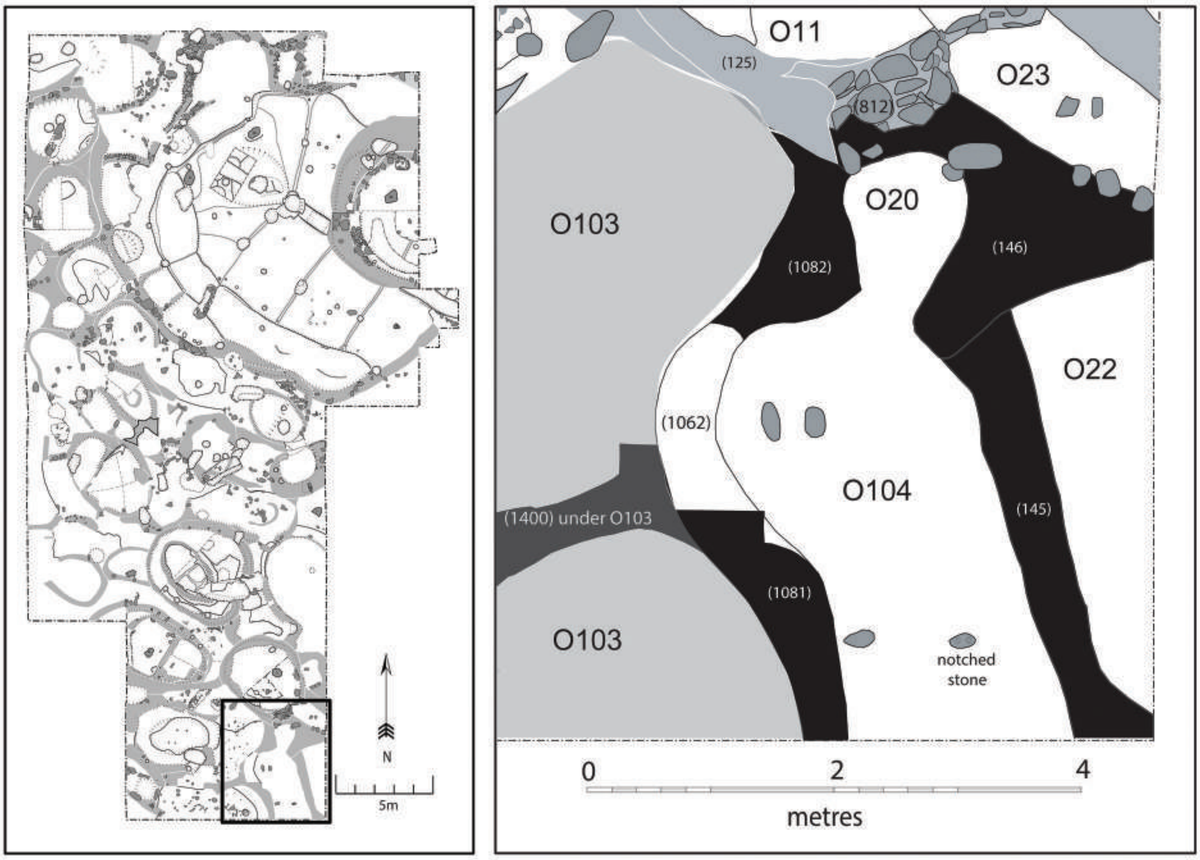


Figure 8.1 Location of Structures O104 and O22, and plan showing their relationships with surrounding objects.

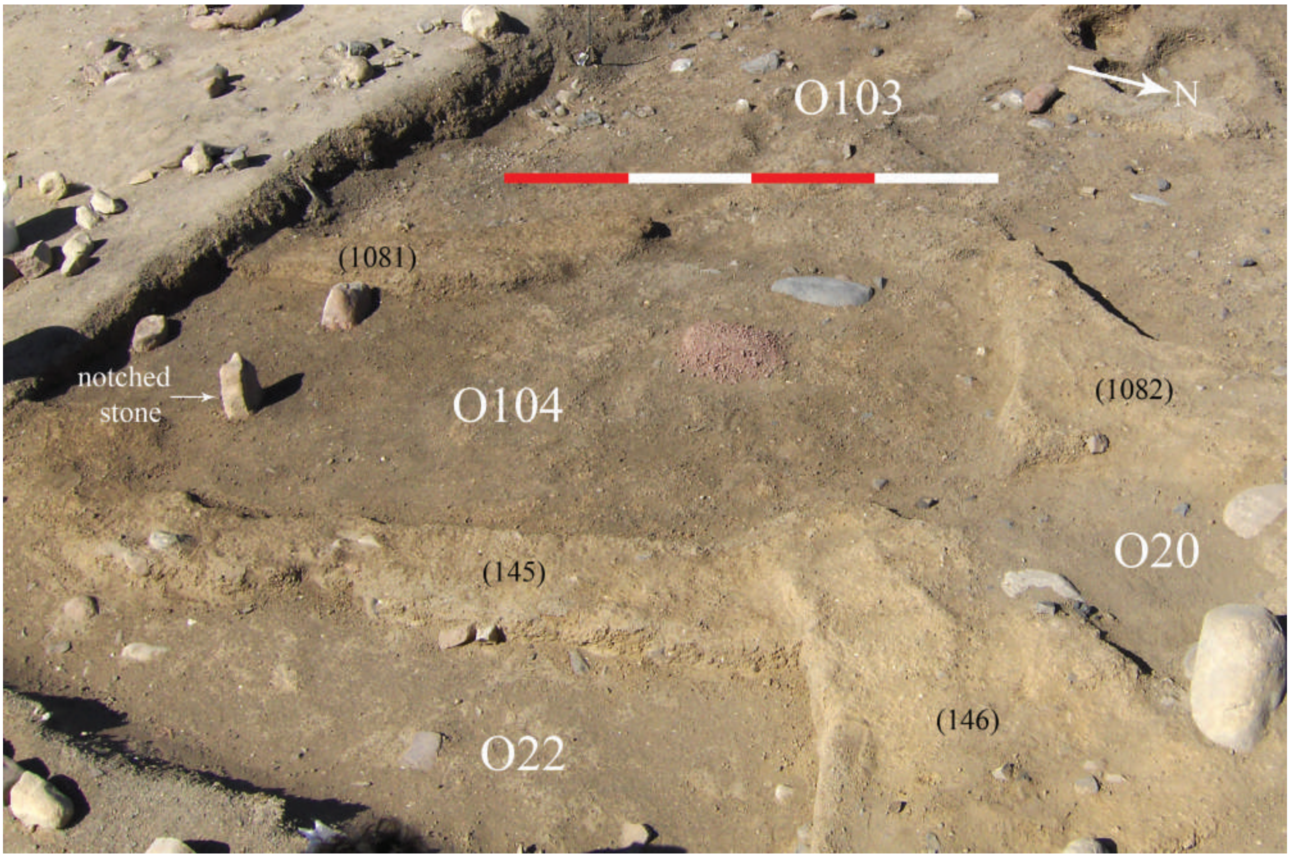


Figure 8.2 View of Structures O104 and O22. Scale 2.0 m.

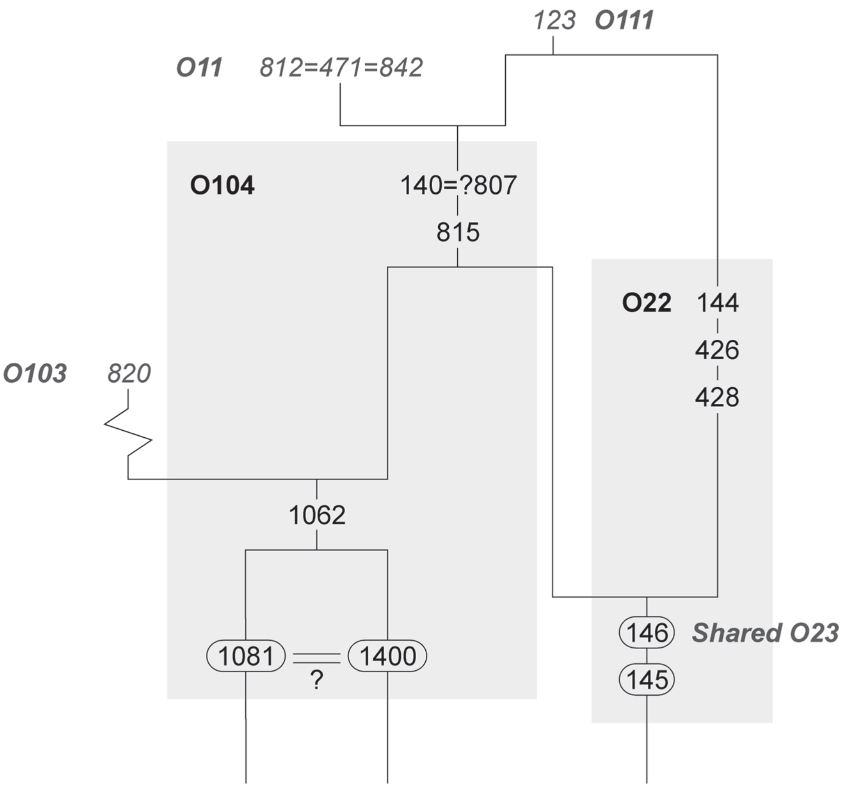


Figure 8.3 Stratigraphic matrix for Structures O104 and O22.

Table 8.1 Contexts excavated in Structures O104 and O22 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
140	friable dark greyish-brown sandy silt	accumulation of silt between walls
144	light greyish-brown mottled sandy silt	accumulation of silt between walls
145	light yellowish-brown pisé	pisé wall of structure
146	light yellowish-brown pisé	pisé wall of structure
426	soft light greyish-brown sandy silt with stones and charcoal	possible degraded floor deposits
428	loose light grey sandy silt with pisé rubble	accumulation of silt between walls
807	loose mid greyish-brown ashy silt	possible blocking of an opening in the wall
815	soft greyish-brown sandy silt	accumulation of silt between walls
1062	firm dark greyish-brown silt	compacted silt overlying walls
1081	light yellowish-brown pisé	pisé wall of structure
1400	light yellowish-brown pisé	pisé wall of structure

Excavation of Structures O104 and O22 was of a limited nature, with only the uppermost deposits explored.

8.2 Description of excavated deposits

Following the removal of the overburden deposits (1 and 123) within the southeastern area of the trench, the outlines of the yellow-brown pisé walls (145) and (146) of Structures O22, O23 and O104 were revealed (Figure 8.1; Table 8.1), with (146) appearing to cut wall (145), although excavation was not undertaken to confirm this relationship.

Unlike the clearly defined Structure O11 to the north, Structures O104 and O22 were difficult to define at their uppermost levels and were only partially exposed within the area of the excavation. Wall (145) was relatively straight and divided the area into two structures (O104 and O22) and their associated infilling deposits. Structure O22 was defined by walls (145) and (146), roughly orientated north-northwest–south-southeast, enclosing an area approximately 3.95 m x 1.20 m at the northern end, and 0.40 m at the southern end. Both walls (145) and (146) continue beyond the limit of excavation to the south and east respectively, neither wall has been excavated. Structure O104 was defined by walls (145), (1400=?1081), again forming a roughly north-northwest–south-southeast orientated structure (Figure 8.3). Walls (1400) and (1081) are most likely the same construction. Whether the spaces defined by these walls represent distinct buildings, or a palimpsest of intersecting wall cuts and truncated infill deposits, remained unclear from the limited extent of excavation.

The uppermost deposit encountered within Structure O22 was light grey-brown mottled sandy silt (144). Below this were similar silt infill deposits (426) and (428), both of which contained lenses of pisé rubble and possibly patches of mud plaster. Both layers contained a number of large stones. Deposit (426) contained higher proportions of chipped-stone and bone fragments and might represent a degraded floor.

Below overburden (123) and enclosed by the walls of Structure O104 (1400=?1081) and (145)) there was a dark grey-brown sandy silt (140). To the north of (140) there was a small opening within walls (1400) and (146) that was filled with a similar deposit (807). The stratigraphic relationship between (807) and (140) could not be established but these are most likely the same deposit. These deposits were sealed by wall (812=471=842) of the stone-built structure (O20) to the south of Structure O11 (See Chapter 12).

Directly below deposit (140) there was a similar grey-brown silt infill (815) that was also contained within the walls of O104 (1400, 1081, 145). Towards the southern edge of the trench, beneath silt infilling layers (140) and (815), two upright stones were revealed (Figure 8.4). The eastern most stone had a notched end, while that lying directly to its west showed no signs of working. Approximately 1.8 m to the northwest, there were two more large unworked stones, lying flat, partially below (815). Deposit (815) also covered a firm grey-brown silt (1062) that continued over pisé walls (1081) and (1400). Walls (1081) and (1400) are most likely a single construction, but deposit (1062) masked the relationship and prevented this being fully verified.

8.3 Interpretation

The poor preservation of these two structures, the limited extent of excavation, and their position adjacent to the trench edge inhibits both description and interpretation. Both are irregular, sub-rectangular spaces bordered by pisé walls. Wall (146) is shared by O23 and O22; wall (145) is

Table 8.2 Quantities of bulk finds from Structures O104 and O22 by material and context number.

O22 & O104	**Volume of sediment (l)**				**Weight of bulk finds per material (g)**															
Context	**Total volume**	**Flot. sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Ground stone**	**Other worked stone**	**Unworked stone**	**Animal bone**	**Human bone**	**Unidentified bone**	**Marine shell**	**Other shell**	**Plaster/Pisé**	**Textile**	**Basktery**	**Wood**	**Plant matter**	**Charcoal**	**Misc.**
140	31.0	30.0	0.0	1.0	334.6	0.0	0.0	0.0	0.0	0.0	36.0	0.0	43.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
144	71.0	30.0	40.0	1.0	200.3	0.0	0.0	0.0	0.0	0.0	28.5	0.0	13.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
426	183.0	30.0	152.0	1.0	266.9	0.0	10.6	0.0	0.0	0.0	86.0	0.0	8.7	0.0	0.0	0.0	0.0	0.0	10.0	0.0
428	31.0	30.0	0.0	1.0	51.2	0.0	0.6	0.0	0.0	0.0	2.5	0.0	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
807	16.0	15.0	0.0	1.0	125.7	0.0	0.0	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
815	266.0	265.0	0.0	1.0	275.0	156.0	10.0	0.0	42.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1062	51.0	30.0	20.0	1.0	225.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1081	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1400	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	649.0	430.0	212.0	7.0	1478.7	156.0	21.20	0.0	45.0	0.0	157.5	0.0	71.6	0.0	0.0	0.0	0.0	0.0	10.0	0.0

Table 8.3 Quantities of small finds from Structures O104 and O22 by material and context number.

O22 & O104	**Quantities of small finds per material (nos)**										
Context	**Ground stone**	**Chipped stone**	**Other stone**	**Worked bone**	**Unworked animal bone**	**Disarticulated human bone**	**Bone beads**	**Stone beads**	**Marine shell beads**	**Marine shell other**	**Total small finds**
144	0	0	0	0	0	0	0	0	2	0	2
426	0	0	0	0	0	0	0	1	0	0	1
807	0	1	0	0	0	0	0	0	0	0	1
Total	0	1	0	0	0	0	0	1	2	0	4

shared by O104 and O22. The fabric of walls (1400) and (1081) is similar to that seen in other buildings, consisting of pale yellow-brown pisé, but their relationships are difficult to define. It remained unclear whether they derive from a coherent building, or, represent a number of intercutting walls belonging to various phases of activity in this southern area. The lack of definition of deposits to the west, obscured by the deposits of O103, also makes any interpretation of these structures problematic.

Following the construction of the walls, the earliest deposit identified within the walls of O104 (1400, 1081, 145) was a notched stone associated with three other apparently unworked stones that could, feasibly, have functioned as support for a raised floor, these stones being similar to better preserved examples in Structure O12 to the northwest (Figure 8.4; see Chapter 11). Either contemporary with this floor, or soon after, some remodelling of walls took place involving the deposition of compacted silt (1062) over the

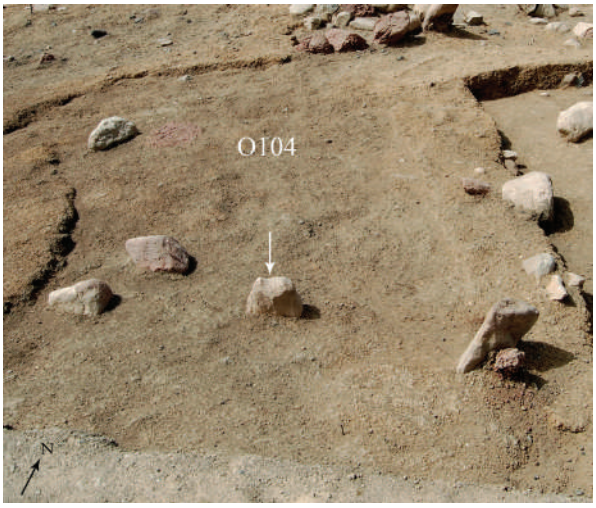


Figure 8.4 Notched stone beneath contexts (140) and (815).

junction of walls (1081) and (1400), possibly as a repair. The final deposits recorded within this structure, (807) and (140), are likely the same deposit, possibly representing natural accumulations of silt forming after abandonment.

Within Structure O22, defined by walls (145) and (146), there appears to have been a natural accumulation of silt (428) followed by a floor (426), on which stone working had occurred or debitage been dumped. Both of these deposits contained stone and lumps of pisé that may have collapsed from the surrounding walls (145, 146). This was followed by a further accumulation of silt (144), probably during a period of abandonment. Overall, the surviving archaeology indicates sporadic use of this structure with periods of abandonment.

9. Structure O21

9.1 Location and relationship with other structures

This small structure is located in the far southwest corner of the trench (Figure 9.1). To its immediate west is Trench 1 from the 1997–2003 site evaluation; the western extent of O21 was exposed but not excavated in Trench 1. To the immediate north of Structure O21 is Structure O19. The northern wall of Structure O21 appears to run into and be part of the same build as a wall of Structure O19, suggesting that these structures were built at the same time. Topographically, Structure O21 lies at the lowest point of the trench with the ground level rising steadily to the north. As demonstrated by the evaluation (Finlayson and Mithen 2007), the settlement is likely to continue for some distance south of the trench. Structure O21 might, therefore, relate to structures in that

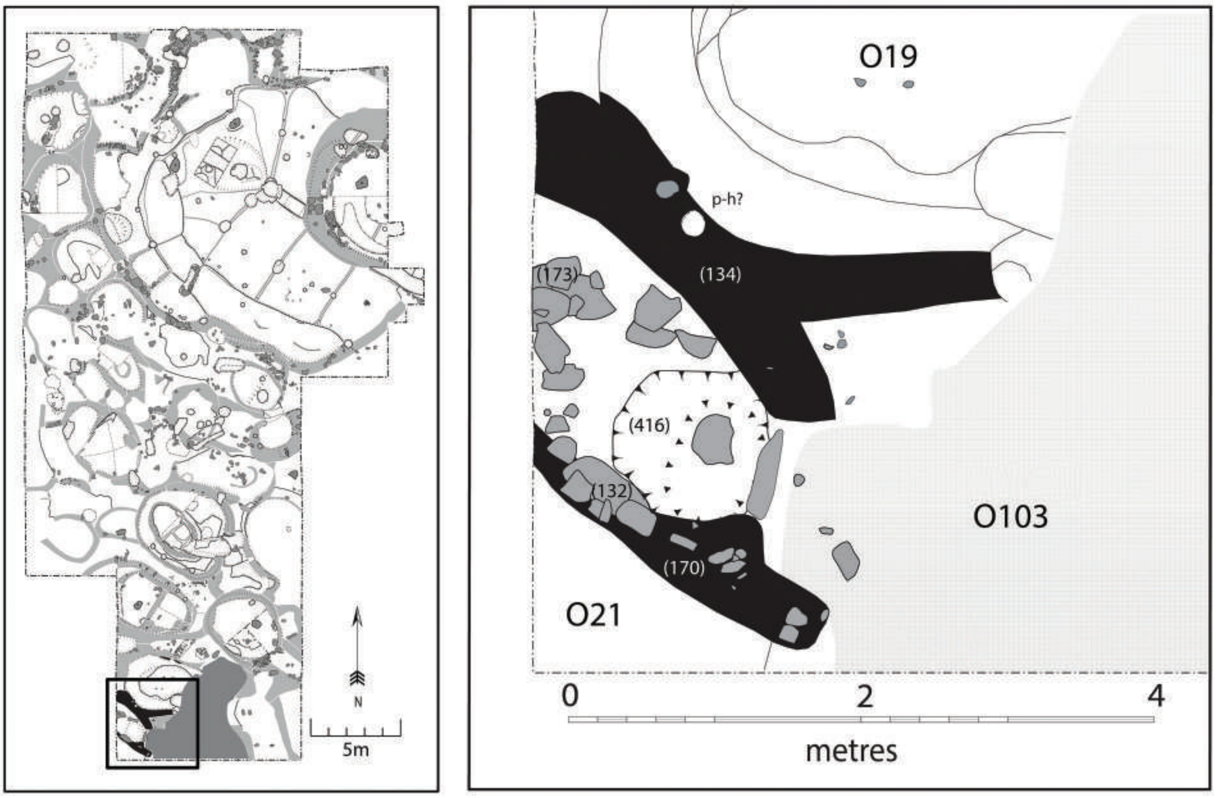


Figure 9.1 Location of Structure O21, and plan showing its relationship with surrounding Objects.

Figure 9.2 View of Structure O21 after the removal of stone wall (132). Scale 2.0 m.

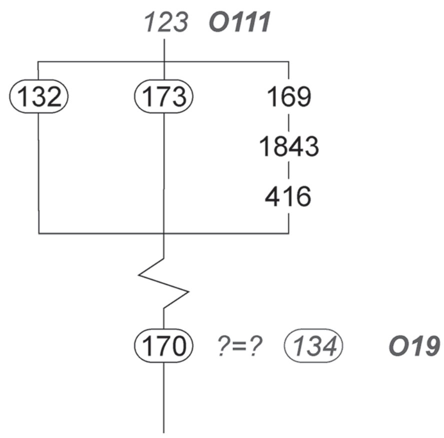


Figure 9.3 Stratigraphic matrix of deposits within structure 021.

Table 9.1 Contexts excavated in Structure O21 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
132	unworked limestone wadi cobbles	single course wall
169	dark greyish-brown ash rich sandy silt	gradual accumulation through use of small structure
170	yellowish-brown pisé wall	pisé wall of structure
173	unworked limestone wadi cobbles	pisé and stone wall
416	friable mid brownish-grey sandy silt	floor surface inside structure

Table 9.2 Quantities of bulk finds in Structure O21 by material and context number.

Object 21	Volume of sediment (l)				Weight of bulk finds per material (g)																
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Unworked stone	Animal bone	Human bone	Unidentified bone	Marine shell	Other shell	Plaster/Pisé	Textile	Basktery	Wood	Plant matter	Charcoal	Misc.
132	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
169	49.0	33.0	15.0	1.0	283.6	0.0	0.1	0.0	0.0	0.0	32.5	0.0	53.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
170	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
173	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
416	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	49.0	33.0	15.0	1.0	283.6	0.0	0.1	0.0	0.0	0.0	32.5	0.0	53.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

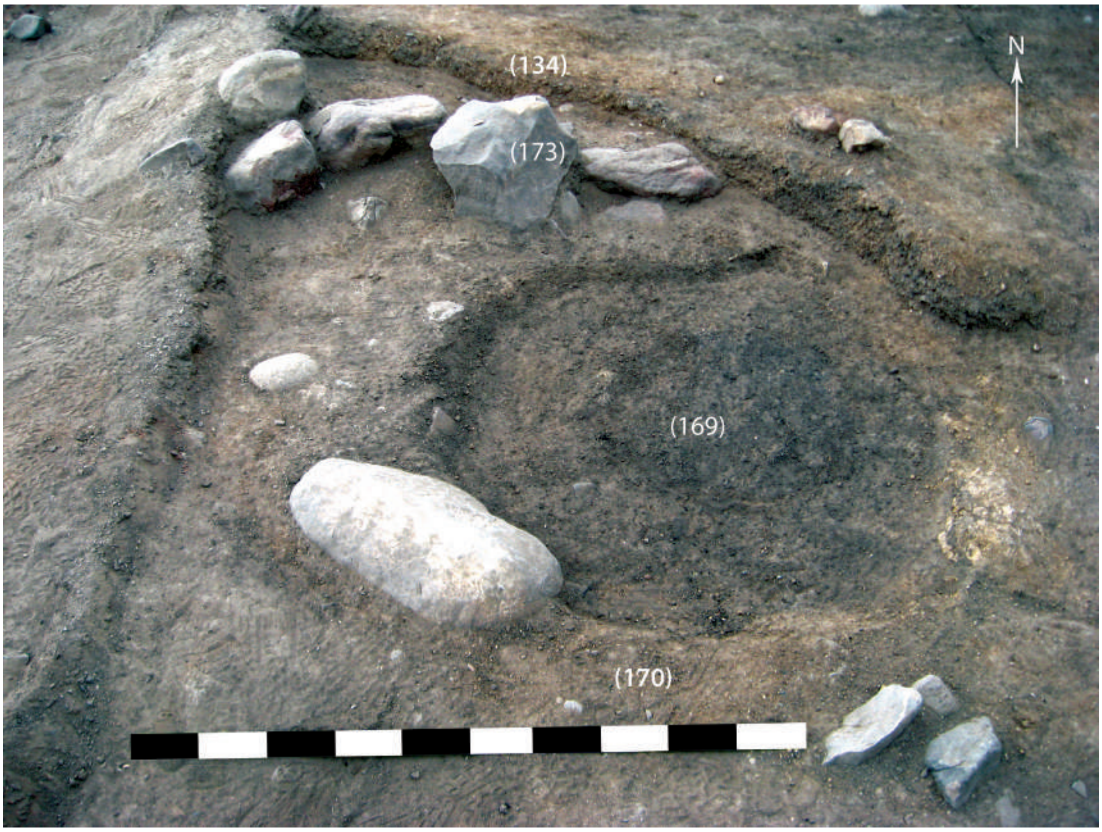


Figure 9.4 View of Structure O21 with exposed walls (170) and (173) and internal deposit (169) before excavation. Scale 1.0 m.

unexcavated area. Figure 9.2 shows Structure O21 during excavation, while Figure 9.3 provides the stratigraphic matrix. The excavated contexts are listed in Table 9.1. Table 9.2 lists the bulk finds. Excavation of Structure O21 was of a limited nature, with only the uppermost deposits explored.

9.2 Description of the excavated deposits

Excavation of the overburden (1 and 123) exposed stone wall (132). This wall consisted of a single course of unworked limestone wadi cobbles curving from north to southeast for approximately 2 m (Figure 9.1). To the northwest of wall (132) there was another single-coursed stone wall (173) running roughly east–west for approximately 1.3 m (Figures 9.2, 9.4). Wall (173) also consisted of unworked wadi cobbles and lay just to the south of pisé wall (134) of Object O19 (Chapter 10). These stone walls, (132) and (173), lay on the same stratigraphic horizon and formed a roughly oval structural unit enclosing an area of approximately 1.5 x 1.0 m within the excavated area. Both walls terminated at their southwestern ends, leaving a gap that may have provided a southwest facing entrance to the structure.

Enclosed by walls (132) and (173) there was a dark grey-brown, ash-rich sandy silt (169) (Figure 9.4). Below this there was a friable sandy silt surface (416). At its eastern extent, (416) was sealed by a band of degraded mud construction material (1843), possibly a continuation of deposit (810) of Area 103 (see Chapter 7).

Below stone walls (132) there was a pisé wall (170) running on the same alignment and abutted by the surface (416). Set within this wall there was a large smooth boulder protruding out from the north face. The wall (170) was aligned northwest–southeast and abruptly terminated at its southeast end. A short stub of wall extended northwards in the direction of wall (134), to which it may have once been joined (Figure 9.2). To the north of wall (170), the southern part of wall (134) of Structure O19 divides into two, with the southern part forming a return pisé wall that ends adjacent to the north running end of wall (170). If these ends of walls (134) and (170) are deliberately made termini, then the space between them would provide an entrance into Structure O21 at the same location as that which appears to be provided between the later stone walls (132) and (173). It appears very probable that pisé wall (134) of Structure O19 formed the northern wall of Structure O21 when it was defined to the south by pisé wall (170).

9.3 Interpretation

Structure O21 appears to be a poorly preserved, small single-celled building, only partially contained within the excavation trench. As it proved more difficult to identify structures in this area compared to elsewhere, we suspect that erosion has been especially severe. Structure O21 had two phases: an early pisé walled structure (wall 170, 134) which may have utilised a boulder within its wall construction, and a later stone walled version (walls 132, 173) enclosing a beaten or trampled earth floor (416) which may have belonged to an earlier phase of construction. In its pisé walled phase, Structure O21 shared a wall with Structure O19 and may have been an integral part of that building. The relationship between Structure O19 and the upper stone walled phase of Structure O21 remains unclear.

10. Structure O19

10.1 Location and relationship with other structures

Structure O19 is located close to the southern end of the excavation trench against the eastern baulk of Trench 1 of the 1997–2003 WF16 evaluation (Finlayson and Mithen 2007). It is surrounded by Structure O12 directly to the north, Structure O11 to the northeast and by Structure O21, with which it shares a wall, to the southwest (Figure 10.1). To the south and east of Structure O19 severe erosion has made the identification of structures especially difficult: we have grouped the archaeological deposits in this area together as Area O103 (Chapter 7). They partially overlie Structure O19 and were truncated during the construction of O11 (Chapter 12). To the northeast there

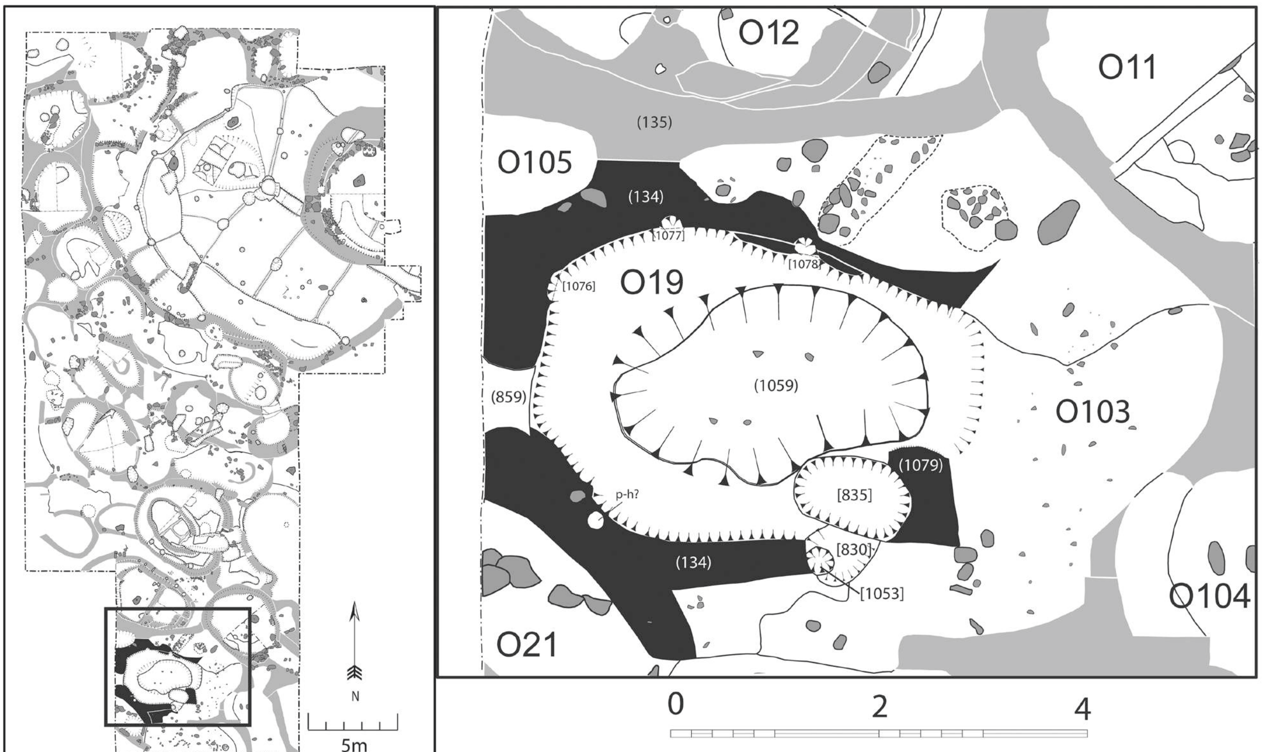


Figure 10.1 Location of Structure O19 and plan showing its relationships with surrounding Objects.

Figure 10.2 View of Structure O19 at the cessation of excavation. Scale 2.0 m.

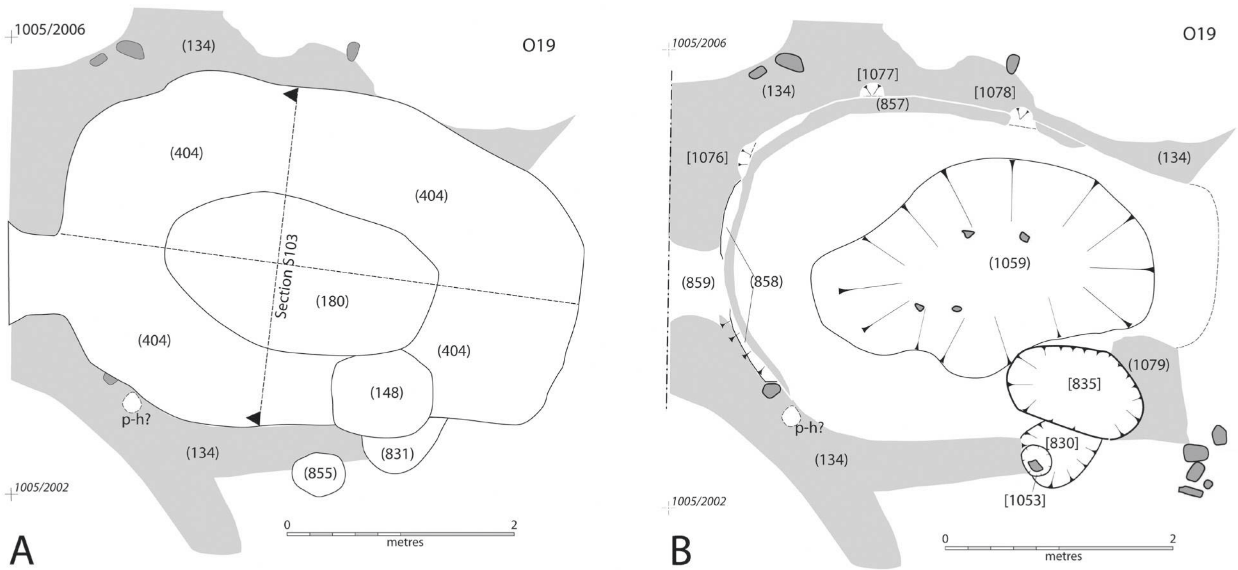


Figure 10.3 Plan of Structure O19: A — showing features from the upper part of the sequence, division of the excavation in quadrants and the location of Section S103 shown in Figure 10.5; B — showing features from the lower part of the sequence including lining (857).

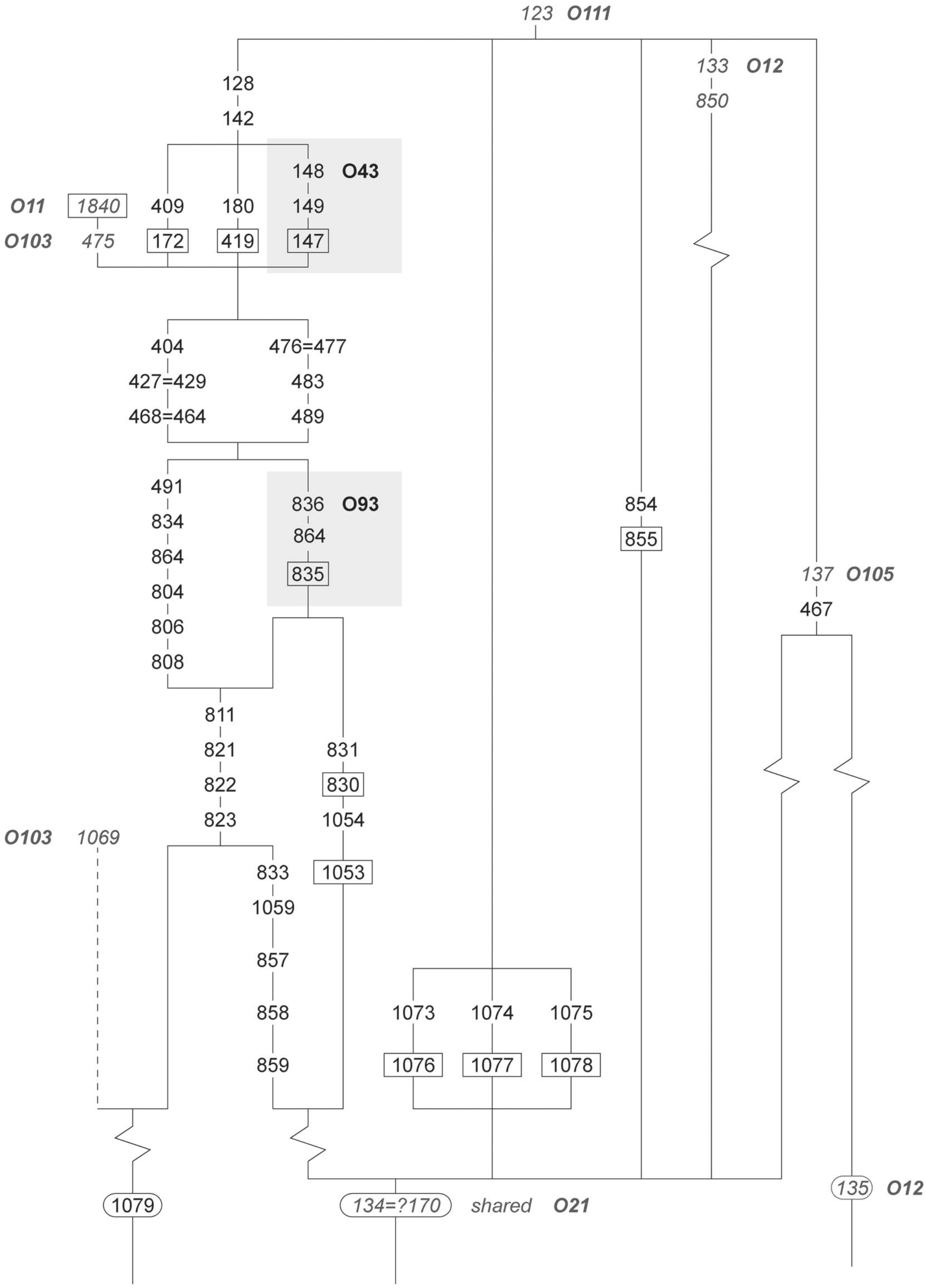


Figure 10.4 Stratigraphic matrix of excavated deposits related to structure O19.

is a space (O105) between the walls of Structure O12 and Structure O19. Both the walls of this space and the walls of Structure O19 continue into Trench 1, and are likely to be represented in part by the walls revealed in that trench (Finlayson and Mithen 2007: figure 6.30; Context 131). Figures 10.2 and 10.3 provide a view and a plan for Structure O19 at the cessation of excavation, while the stratigraphic matrix is provided in Figure 10.4. Table 10.1 lists the excavated contexts. Tables 10.2 and 10.3 list the bulk and small finds respectively.

Table 10.1 Contexts excavated in Structure O19 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
128	friable mid-greyish-brown sandy silt	silt accumulation inside structure
134	mid-yellowish-brown sandy pisé	pisé wall of structure
137	dark grey brown sandy silt	silt accumulation in space O105 between structures
142	soft dark grey sandy silt	silt accumulation inside structure
147	shallow oval cut	burial cut
148	friable dark greyish-brown sandy silt	fill of burial
149	poorly-preserved human skeleton	primary crouched inhumation burial
172	sub-circular cut with steep sides and concave base	cut of small pit
180	friable dark grey sandy silt with frequent charcoal	fill of small pit
404	friable dark grey sandy silt	silt accumulation inside structure
409	friable mid-grey sandy silt	fill of small pit
419	oval hollow with moderately sloping sides	possible cut of shallow pit or a subsidence depression
427	friable dark grey sandy silt	silt accumulation inside structure
429	friable dark grey sandy silt	silt accumulation inside structure
464	friable dark grey sandy silt	silt accumulation inside structure
467	unexcavated deposit exposed in plan with surface finds	silt accumulation in space O105 between structures
468	friable dark grey sandy silt	silt accumulation inside structure
476	soft/loose greyish-brown sandy silt with occasional large cobbles	silt accumulation inside structure
477	charcoal-rich lenses within silt matrix	charcoal tips
483	soft/loose greyish-brown sandy silt occasional large cobbles and burnt stones	silt accumulation inside structure
489	soft/loose greyish-brown sandy silt occasional large cobbles, charcoal and pisé	silt accumulation inside structure
491	loose dark grey sandy silt with large burnt stone and frequent charcoal	possible make up below cup-marked stone SF773
804	firm scorched dark yellowish-brown silt with occasional stones	scorched mud plaster of a hearth or burnt floor
806	friable dark greyish-brown sandy silt with frequent charcoal	burnt deposit inside structure
808	friable dark grey sandy silt with frequent charcoal	burnt deposit inside structure
811	firm scorched yellowish-brown and orangeish-brown silt	scorched mud plaster of a hearth or burnt floor
821	friable greyish-brown with yellow lenses sandy silt with frequent stones	stone-rich make-up layer
822	friable yellowish-brown sandy silt with frequent stones	stone-rich make-up layer
823	firm fine dark brown sandy silt	heavily degraded or trampled floor surface
830	sub-circular cut with shallow sides and flat base	cut of small pit
831	firm mid-greyish-brown sandy silt	fill of small pit
833	friable greyish-brown silt with frequent pisé rubble and burnt stones	pisé and rubble make-up or levelling deposit
834	loose greyish-brown sandy silt	mixed cleaning deposit
835	oval cut with gradually sloping sides and concave base	burial cut
836	compact greyish-brown sandy silt	fill of burial
841	crouched skeleton	primary crouched inhumation burial
854	loose mid-greyish-brown sandy silt with frequent charcoal	fill of small pit
855	circular cut with steep sides and flat base	cut of small pit
857	compact mid-greyish-brown sandy silt	wall lining or facing

Table 10.1 Contexts excavated in Structure O19 with sedimentary descriptions and interpretations continued...

Context	Description	Interpretation
858	friable dark greyish-brown organic rich silt	localised organic deposit adhering to the walls
859	friable dark greyish-brown organic rich silt	silt accumualtion between walls
864	loose dark grey silt with ash and charcoal	fill of possible hearth
1053	circular cut with vertical, occasionally undercutting sides and flat base	cut of post-hole
1054	firm yellowish-brown sandy silt	fill of post-hole
1059	friable yellowish-brown silt	degraded floor surface
1073	firm mid-greyish-brown sandy silt	fill of post-hole
1074	firm mid-greyish-brown sandy silt	fill of post-hole
1075	firm mid-greyish-brown sandy silt	fill of post-hole
1076	sub circular cut with steep sides	cut of post-hole
1077	sub circular cut with steep sides	cut of post-hole
1078	sub circular cut with steep sides	cut of post-hole
1079	mid-yellowish-brown sandy pisé	stub of pisé wall

10.2 Description of the excavated deposits

The outline of the mid-yellow-brown pisé wall (134) of Structure O19 was revealed by removal of the overburden deposits (1 and 123) across the southern area (Figures 10.2, 10.3, 10.4). This wall was unlike those of Structure O11 and Structure O12 to the north, because rather than being continuous in plan it became diffuse towards the western-side of the structure, later interpreted as a possible entrance. The surface of the northern section of wall (134) was cut by three post-holes [1076, 1077 and 1078]; the southern extent was cut by a pit [855]. The structure had an approximate east–west orientation and within its excavated portion enclosed an area of about 3 x 3.5 m. The interior of the structure was excavated in quadrants to provide spatial control.

The uppermost deposit encountered within Structure O19 was a sandy silt (128) that was similar in nature to the overburden deposits (1 and 123). Below this, another darker silt (142) was removed. This further defined the walls and structural details of the building, exposing a number of discrete features: burial cut [147, Burial O43], and pits [172] and [419]. A charcoal-rich, laminated deposit containing burnt stone, bone and chipped stone (180) filled the pit [419], 2.2 x 1.2 x 0.25 m deep, which was located in the centre of the structure. Rather than being a deliberately cut feature, this pit [419] might be a depression caused by the slumping of the internal deposits. In the northeast quadrant of the structure there was an homogeneous sandy silt (409) that filled a shallow pit [172] 0.4 m in diameter and 0.2 m deep (Figure 10.5). Due to the poor preservation of the upper horizons of Structure O19, it is possible that this feature had been cut from a higher level, but had not been detected because of erosion and disturbance. Towards the southern edge of Structure O19 there was a cut [147] 0.85 x 0.7 x 0.17 m deep, filled with a dark grey sandy silt (148) that contained a poorly preserved skeleton (149, Burial O43) (Figure 10.6).

Skeleton (149) was a crouched inhumation, lying on its right side, facing south. The skull was poorly preserved and the left arm was absent, probably through erosion. In light of evidence from elsewhere at WF16 (e.g. Burial O35, Chapter 25; Burial O38, Chapter 21), lenses of light grey material adhering to the better-preserved long bones may have been deliberately positioned deposits of gypsum. No grave goods were recovered from the fill (148) during excavation, although a fragment of marine shell was recovered through flotation. The grave [147] cut both the sandy silt (404) within Structure O19 and the pisé wall (134).

Subsequent fills within Structure O19 were excavated in quadrants and spits, for spatial control and to establish a section through the deposits. The northwest and southeast quadrants were excavated in spits as contexts (404), (427, equivalent to 429) and (468, equivalent to 464). On the northeast and southwest sides of the internal space were spits (476), (483) and (489). All of these contexts comprised a greyish brown sandy silt, with numerous lenses of charcoal and pisé, which gently dipped towards the centre of the structure, appearing to represent a gradual infilling of the structure as it went out of use. Deposit (476) contained charcoal-rich lenses (477). Deposit (489) contained cup-hole mortar SF773 (Figure 10.7). This lacked an associated surface, although a crushed stone layer (491) below the mortar may indicate that a floor surface has been entirely lost. Context (404) was overlain by (475) in O103 (Chapter 7), which was truncated by the construction cut [1840] for Structure O11 (Chapter 12).

After the stone-rich deposit (491) was removed, excavation in quadrants ceased and the structure was

Table 10.2 Quantities of bulk finds in Structure O19 by material and context number.

Object 19	Volume of sediment (l)				Weight of bulk finds per material (g)									
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Animal bone	Human bone	Unidentified bone	Marine shell	Other shell	Charcoal	Misc.
128	531.0	30.0	500.0	1.0	4668.1	267.5	20.1	10.0	0.0	301.1	0.0	27.0	10.0	40.0
137	71.0	30.0	40.0	1.0	534.7	0.0	0.0	51.1	0.0	0.0	0.0	14.0	0.0	0.0
142	551.0	30.0	520.0	1.0	3211.0	148.1	10.0	0.0	0.0	158.6	0.0	30.4	0.0	10.0
148	76.0	75.0	0.0	1.0	584.6	0.0	0.0	0.0	0.0	29.0	0.7	85.4	0.0	0.0
180	43.0	41.0	0.0	2.0	861.9	0.0	0.0	0.0	0.0	87.3	0.0	288.1	0.0	0.0
404	112.0	20.0	90.0	2.0	1016.6	0.0	10.0	0.0	0.0	111.0	0.0	36.2	10.0	0.0
427	81.0	10.0	70.0	1.0	158.3	0.0	0.4	0.0	0.0	23.9	0.0	17.8	10.0	0.0
429	11.0	10.0	0.0	1.0	793.8	10.0	10.0	0.0	0.0	155.6	0.0	11.7	0.0	0.0
464	134.0	10.0	122.0	2.0	576.9	0.0	20.1	0.0	0.0	113.2	0.0	3.6	0.0	0.0
468	191.0	10.0	180.0	1.0	729.8	0.0	10.0	0.0	0.0	160.0	0.0	7.6	0.0	0.0
476	127.0	30.0	95.0	2.0	774.5	0.0	0.0	237.0	1.0	5.5	0.0	6.0	0.0	0.0
477	35.0	35.0	0.0	0.0	256.6	0.0	0.0	18.8	0.0	0.0	0.0	12.5	0.0	0.0
483	242.0	20.0	220.0	2.0	256.6	0.0	0.0	18.8	0.0	0.0	0.0	12.5	0.0	0.0
489	512.0	20.0	490.0	2.0	551.4	0.0	0.0	127.9	0.0	6.1	0.0	10.2	0.0	0.0
491	10.0	10.0	0.0	0.0	1865.3	210.0	31.0	415.5	0.0	28.8	0.0	37.8	2.3	0.0
804	13.0	13.0	0.0	0.0	137.8	0.0	0.1	1.0	0.0	117.9	0.0	41.7	0.0	0.0
806	11.0	10.0	0.0	1.0	210.0	460.0	0.0	47.0	0.0	0.0	0.0	0.0	0.0	0.0
808	41.0	40.0	0.0	1.0	538.3	0.0	0.0	136.1	1.4	0.0	0.0	47.6	0.0	0.0
811	121.0	120.0	0.0	1.0	545.8	241.2	0.0	63.3	0.0	0.0	0.0	14.6	0.0	0.0
821	43.0	30.0	12.0	1.0	363.0	590.0	0.0	51.0	0.0	0.0	0.0	0.0	0.0	0.0
822	38.0	37.0	0.0	1.0	450.0	450.0	0.0	89.0	0.0	0.0	0.0	0.0	0.0	0.0
823	97.0	30.0	65.0	2.0	265.0	0.0	0.0	141.0	0.0	0.0	0.0	0.0	0.0	0.0
831	21.0	10.0	10.0	1.0	93.0	66.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0
833	170.0	30.0	140.0	0.0	1736.0	1050.0	0.0	411.0	0.0	0.0	0.0	0.0	0.0	0.0
834	165.0	0.0	165.0	0.0	1480.0	200.0	20.0	180.0	0.0	0.0	0.0	0.0	0.0	0.0
836	171.0	160.0	10.0	1.0	1063.4	68.4	0.0	201.9	0.0	0.0	0.0	38.1	0.01	0.0
854	13.0	10.0	2.0	1.0	372.3	17.8	0.0	75.0	0.0	0.9	0.0	0.0	0.0	0.0
855	10.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
857	111.0	30.0	80.0	1.0	656.2	0.0	10.0	10.0	0.0	5.2	0.0	7.9	1.0	0.0
858	10.0	10.0	0.0	0.0	67.7	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0
864	12.0	12.0	0.0	0.0	206.6	0.0	0.0	0.0	0.0	23.0	0.0	10.8	0.0	0.0
1054	10.0	10.0	0.0	0.0	130.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
1059	51.0	30.0	20.0	1.0	666.0	0.0	0.0	98.0	0.0	0.0	0.0	0.0	0.0	0.0
1073	5.0	5.0	0.0	0.0	26.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1074	5.0	5.0	0.0	0.0	12.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
1075	5.0	5.0	0.0	0.0	32.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	3850.0	988.0	2831.0	31.0	25891.2	3779.0	141.7	2391.2	2.4	1327.1	0.7	761.5	33.31	50.0

Table 10.3 Quantities of small finds in Structure O19 by materials and context number.

Object 19	Quantities of small finds per material (nos)							
Context	**Chipped stone**	**Ground stone**	**Worked bone**	**Unworked animal bone**	**Bone beads**	**Stone beads**	**Marine shell beads**	**Total small finds**
148	0	0	0	1	0	0	0	1
180	0	0	0	0	0	0	1	1
404	0	1	0	0	0	0	2	3
429	0	0	0	0	0	0	1	1
464	0	0	0	0	0	1	0	1
483	0	2	1	0	0	1	0	4
489	0	1	0	0	0	0	0	1
808	0	1	0	0	0	0	0	1
823	0	1	0	0	0	0	0	1
833	0	2	0	0	0	0	0	2
836	2	0	1	0	0	2	0	5
857	0	0	0	0	0	0	2	2
1059	0	0	0	0	0	0	1	1
1075	0	0	0	0	0	0	1	1
Total	2	8	2	1	0	4	8	25

cleaned, with all finds from that cleaning grouped within context (834). Subsequent deposits excavated from within Structure O19 dipped towards the centre of the structure. This may have been caused by earlier, and as yet unrevealed, features or may have been a product of the infilling process. Below deposit (491) there was an ash-rich silt (864) that sealed a patchy and scorched mud-plaster surface (804). Given that (804) was poorly preserved, it is not clear whether it represented a formal hearth or simply an area of mud-plaster floor that was used to support hot and burning material. Below (804) there were ash-rich dump deposits (806) and (808) and then another scorched surface (811). Both scorched surfaces (804) and (811) had a radiating halo of colours as would arise from an area of intense heat.

Deposits (489) and (468=464) sealed a compact grey-brown sandy silt fill (836), designated as the fill of Burial O93. This contained the skeleton (841) (Figure 10.8) of an adult male, in a crouched position on its left side, which had been tightly packed into a cut [835] made into sediments (811) and (831) and then into a wall (1079). This wall (1079) (Figure 10.3) may have been part of wall (134) before being cut by the burial. Burial cut [835] lies directly below burial cut [147] and hence it is possible that the burials were related, with [147] of Burial O43 representing a secondary inhumation (Burial O43). Alternatively, cut [147] may have been made to reference the earlier burial. The burial cut [835] was roughly oval and measured 1.15 m east–west and 0.86 m north–south and was 0.35 m deep. The right arm of the skeleton (841) had been bent across the body and tucked under the left humerus; the right hand was partially under the skull. The left arm was bent with the hand up to the chest. Both legs were tightly bent with the knees together and the feet slightly apart. Fill (836) was highly compacted which made the excavation of the skeleton particularly difficult.

The burial fill (836) contained white flecks, possibly indicating mineral leaching from the bones or surrounding deposits. Alternatively, this may have derived from deliberate depositions on the bone of gypsum or plaster. A piece of worked animal bone (SF798), two flint blades (SF1236, SF1237) and a malachite bead (SF1238) were recovered from within this fill.

Below burial cut [835] to the south was a mid greyish-brown sandy silt fill (831) of a shallow pit [830], 0.65 m x 0.58 m x 0.1 m deep. This pit was possibly cut to retrieve a post because it truncated the silty fill (1054) of a post-hole [1053], 0.18 m x 0.25 m x 0.24 m deep, that lay directly below: post-hole [1053] truncated wall (134). The post it held is likely to have been associated with the superstructure of the building (Figure 10.9).

Below surface (811) there were burnt, stone-rich silty deposits (821, 822), most likely created to provide a foundation layer for the floor (811). Deposit (822) sealed a heavily degraded surface (823) comprising a firm inclusion-free silt with occasional pisé or mud

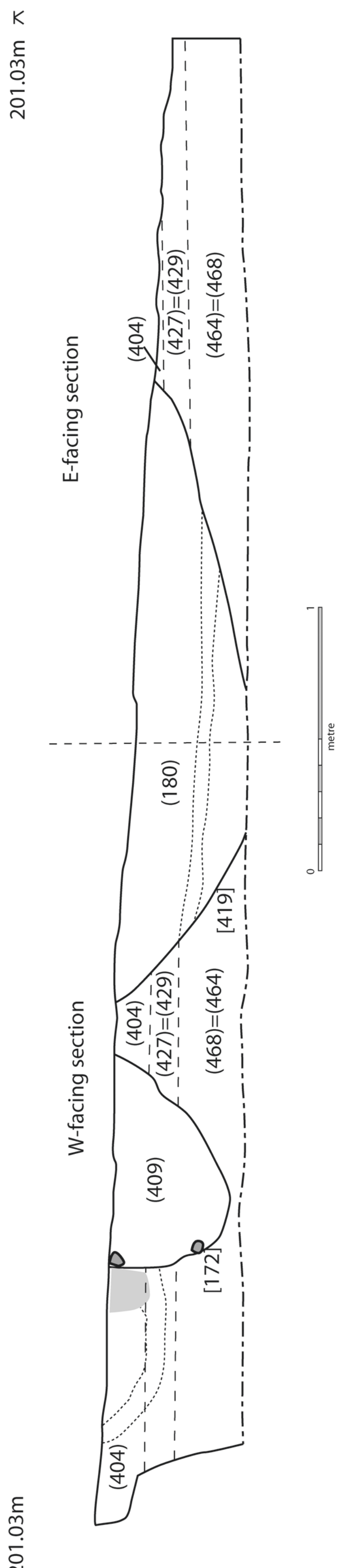


Figure 10.5 Section drawing S103 through deposits within Structure of O19.

plaster lenses (Figure 10.10). The patchy nature of the deposit and lack of significant depth suggests a beaten earth or trampled surface, rather than a deliberately laid mud-plaster floor. Below surface (823) at its southeastern extent was wall stub (1079), into which burial cut [835] had been made. This wall was a projection from the internal face of the main wall (134) of Structure O19 on its southern side. How this stub fits with the phasing of the building remains unclear (see below). The northern end of this roughly rectangular wall fragment was covered in a smooth curved plaster facing, largely truncated by burial cut [835] (Figure 10.11). Surface (823) also sealed burnt stone and pisé rubble-rich silty layer (833) that acted as a foundation layer, or levelling deposit, for the overlying surface.

Below (833) was another patchy floor layer (1059) (Figure 10.12). This surface consisted of firm yellow-brown inclusion-free silt that may have been a trampled or beaten surface. Below the sequence of infilling and surfaces was a possible lining or facing (857) adhering to wall (134) consisting of compact, grey-brown sandy silt, possibly derived from degraded pisé. This material was removed down to the level of the excavated horizon of the surviving infilling deposits, although it continued below these deposits. Below facing (857) was a dark grey-brown organic-rich deposit (858) that also adhered to wall (134), concentrated on the western side (Figure 10.12). This sealed a similarly organic-rich deposit (859) that appeared to fill a west-facing opening into the structure that was subsequently closed by the construction of lining (857).

The removal of the overburden (1 and 123) from over the northern part of wall (134) exposed post-holes [1076] (0.32 x 0.08 x 0.18 m deep), [1077] (0.2 x 0.14 x 0.18 m deep), and [1078] (0.2 x 0.14 x 0.18 m deep) (Figure 10.13) filled respectively with (1073), (1074), and (1075). Whether these post-holes had been cut into the internal face of the pisé of wall (134), or were created while the pisé wall was being built, was impossible to establish due to the degraded nature of the wall material. As with lining (857), it was clear that the post-holes continued below the excavated levels within the building. Similarly, removal of the overburden over the southern part of wall (134) had exposed a shallow feature, 0.30 x 0.25 x 0.04 m deep [855], filled by charcoal-rich silt (854) that had been cut into the wall surface.

To the northwest of structure O19 there was a small space (O105) created between the northern extent of wall (134) of Structure O19 and the southern wall (135) of Structure O12 (Figure 10.1). This space continued into the area excavated by evaluation Trench 1 and represents one of the main structures identified by that excavation (Finlayson and Mithen 2006, Figure 6.30). Within Space O105 the homogeneous, dark grey-brown, sandy silt infill (137) was removed to a depth of 0.2 m. This space was cleaned and resulting finds labelled as context (467). No further deposits were removed in this space due to the proximity to the western limit of excavation.

Figure 10.6. Burial O43: Skeleton (149). Scale 0.5 m.

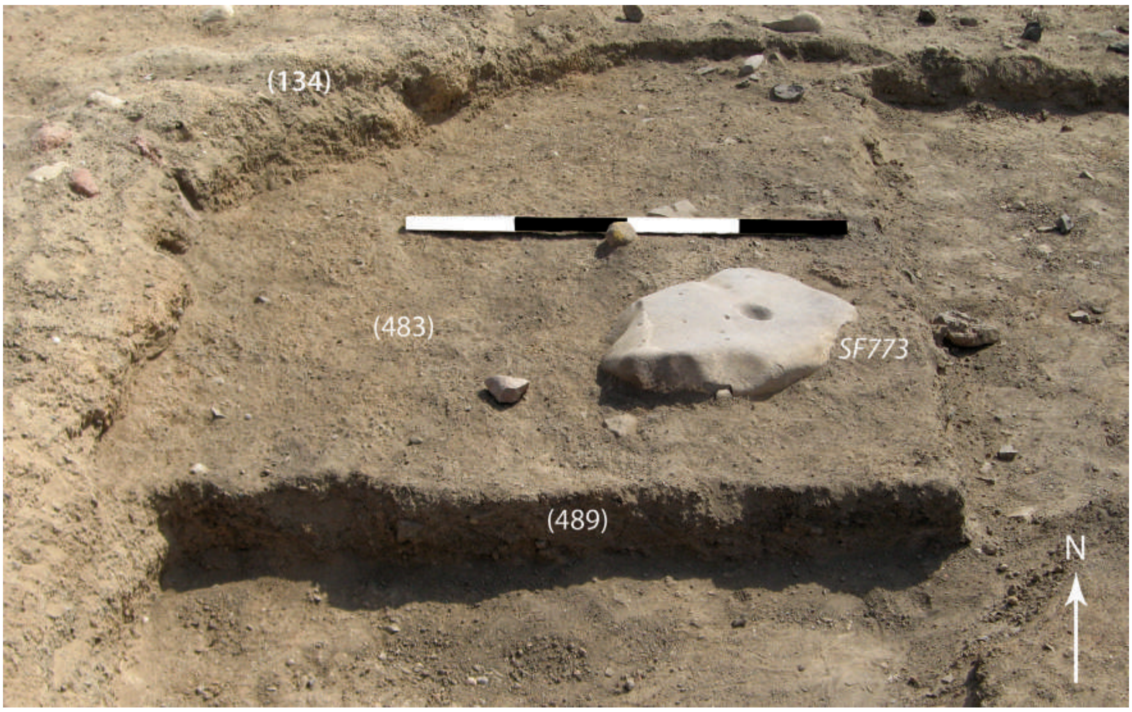


Figure 10.7. Cup-hole mortar SF773 within deposit (489). Scale 1.0 m.

Figure 10.8. Burial O93: A — Skeleton (841) within cut [835], scale 1.0 m; B — Skull of (841) showing wear pattern on teeth, scale 0.1 m; C — Burial cut [835] into wall stub (1079) on the left side of the picture, scale 1.0 m.

10.3 Chipped stone

The sample (n=1012 pieces) includes material from 9 out of the 18 contexts with chipped stone in Structure O19. By weight, the sample (5590 g) constitutes 34% of the chipped stone bulk finds from this structure. The composition of the sampled assemblage is provided in Chapter 39.11.

10.4 Interpretation

Structure O19 is an elliptical structure with pisé walls and a series of poorly preserved floors; it has not been excavated to its full depth. Although no radiocarbon dates have been derived, all of the sampled chipped stone fits comfortably within the known scope of the PPNA.

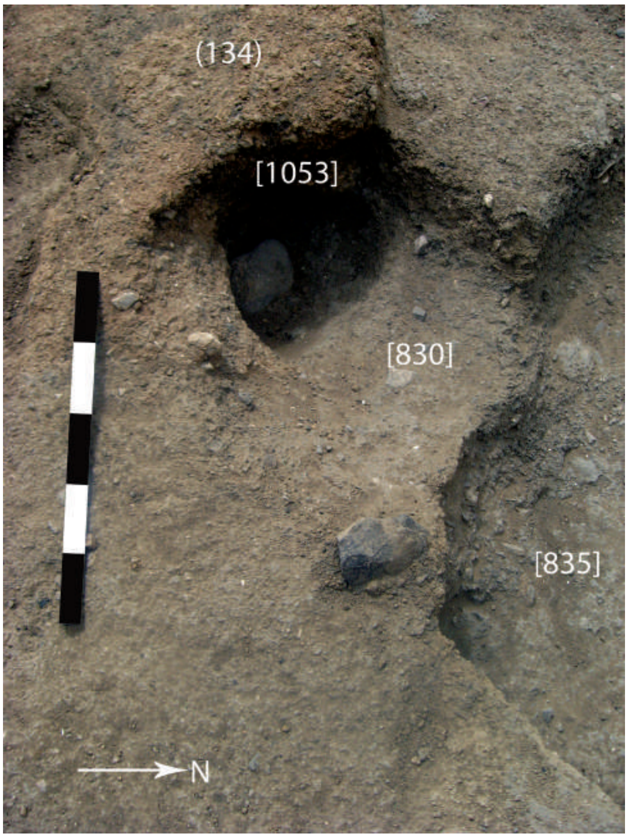


Figure 10.9 Shallow pit [830] and post-hole [1053]. Scale 0.5 m.

Figure 10.10. Floor surface (823) in relation to cut [835] of Burial O93. Scale 1.0 m.

Figure 10.11 Plastered face of wall (1079). Scale 0.1 m.

The wall (134) of Structure O19 and wall (135) of Structure O12 appear to be continuous and may derive from a single construction. To the southwest, Structure O19 shared its wall (134) with Structure O21. The small area defined by the gap where the southern wall of Structure O12 (135) and the northern wall of Structure O19 (134) separate creates a small space (O105). The exact nature of this space is difficult to define due to its proximity to the baulk. To the west, Structure O19 continues beyond the limit of excavation, and to the east the wall was not traceable beyond burial cut [835]. The orange-brown pisé of wall (134) was similar in nature to other investigated structures; this wall (134) appears to represent a primary phase of construction. Within this primary phase a western opening was visible that may represent an entrance, truncated niche, or a wall chamber. The insertion of a later lining or wall layer (857) over this opening suggests architectural remodelling of the internal space, as seen in a number of other structures.

The location of this Structure, at the southern end the trench, appears to have resulted in a greater degree of erosion of its deposits than those elsewhere, most likely also including the pisé of wall (134). To the east of Structure O19 the wall circuit was lost beyond burial cut [835]. It is possible that wall (134) is truncated away at this point by, as yet undefined, cut features, or that the pisé of the walls has collapsed and is sealed by subsequent deposits. The very diffuse nature of the deposits to the south and east (Area O103) masks the continuation and eastern extent of the structure.

The presence of an apparently organic-rich deposit (858) between lining (857) and wall (134) seems to indicate an organic element to later gypsum-rich wall coatings, possibly a wattle backing to a plastered wall. Re-modelling of the structure may also be indicated by wall stub (1079). This wall was lighter in colour and of a different pisé matrix to wall (134), and had a plastered face (Figure 10.11). It may represent a bench or internal fixture as was seen in a number of buildings across the site, notably Structure O12 to the north.

Some information about the superstructure was possibly revealed through the presence of post-holes [1076], [1077] and [1078]. These were either cut or moulded into the internal face of the wall. The posts they once held might have either directly supported a roof, or been inserted into the pisé to enhance its strength, so that the pisé itself could support the roof.

Activity within Structure O19 involved the creation of a sequence of floors/surfaces (1059, 823), make-up

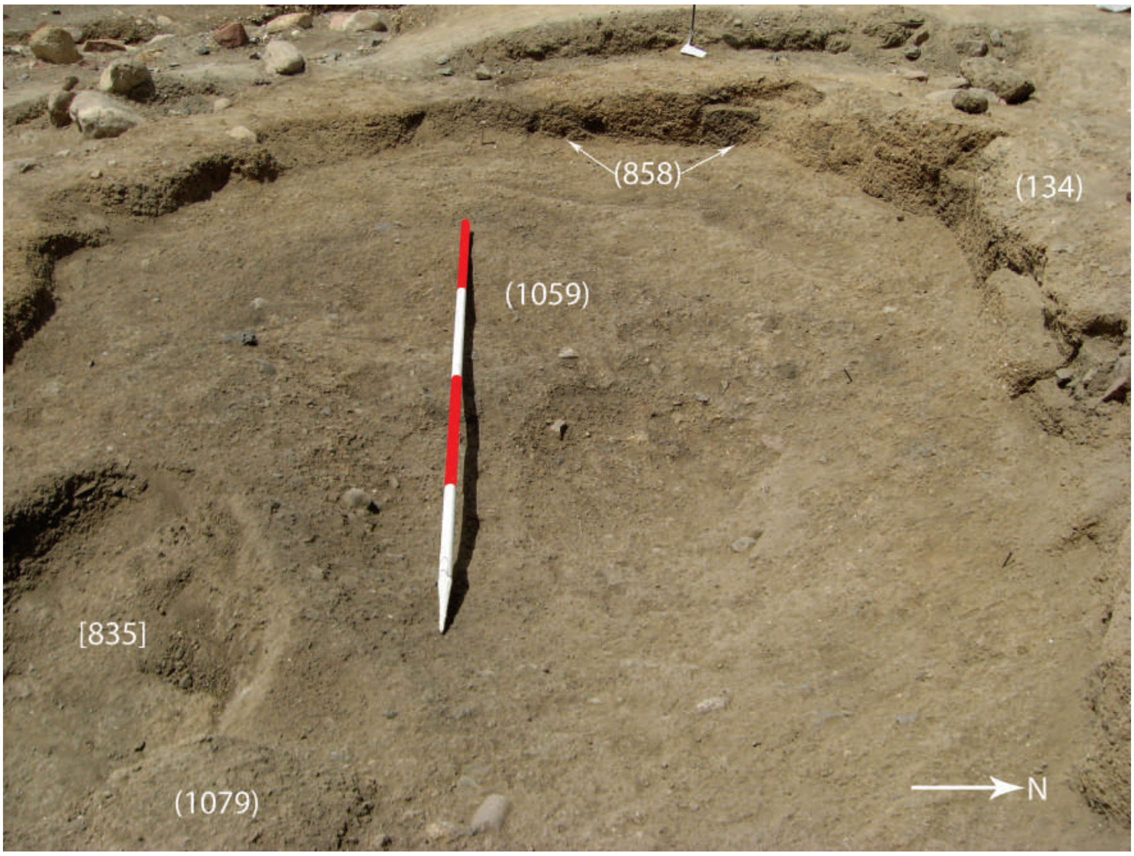


Figure 10.12 Trampled floor surface (1059) with wall (1079) in the bottom left corner. Possible lining deposit (858) peeling away from wall (134) can be seen towards the top of the picture. Scale 2.0 m.

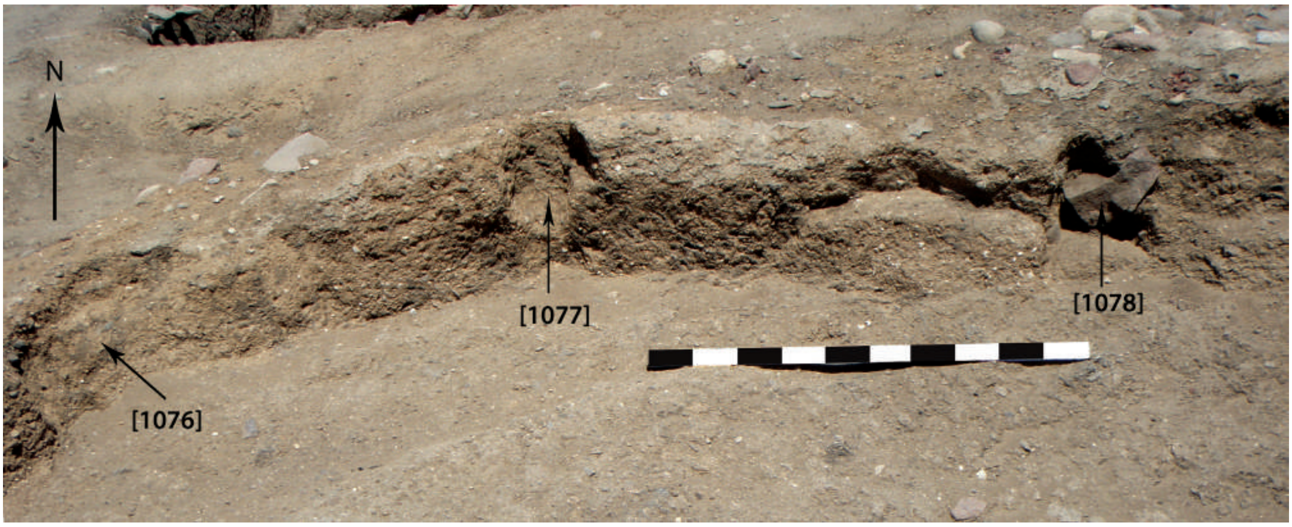


Figure 10.13 Post-holes [1076], [1077] and [1078] truncating the northern wall face of wall (134). Scale 1.0 m.

horizons for floors (821, 822, 823), ambiguous deposits that might derive from occupation, in-wash, or deliberate dumping (404, 427, 468, 476), pits (172, 419, 830, 855), and burning on surfaces (804, 811). The presence of lining material (857, 858) suggests architectural phases that might be matched by corresponding floor surfaces, although such relationships could not be established. The chipped stone suggests that there had been either an activity or a cultural change between the lower (below 833) and upper horizons.

Deposits (823) and (1059) appear to have been subject to central erosion or collapse, producing a bowl or dish shape. Both appear to have been of beaten trampled earth, rather than laid mud-plaster floors. The presence of cup-hole mortar SF773 in deposit (489) suggests that while sediment was accumulating within the structure, processing activities continued to take place. It is not clear whether such activities were associated with a formal floor, or were simply making use of a partially collapsed building.

The scorched surfaces (804, 811) covered by ashy deposits are interesting, as there are few formal hearths inside the smaller structures at WF16. It is possible that this structure lacked a built hearth but had hot material placed directly on its floor surface.

Burials O43 and O93 were tightly crouched inhumations located partially within wall (134) and wall stub (1079). As the main wall (134) of the structure was truncated, the building must have been out of use when the burial took place. Only a fragment of marine shell was recovered from the backfill (148) of burial cut [147], but the recovery of flint blades SF1236 and SF1237 and malachite bead SF1238 from backfill (836) of burial cut [835] suggest a likely PPNA date for this burial. Because burial cut [147] was located above burial cut [835], a PPNA date for this inhumation is also probable.

The deposits of Area O103 seal the latest deposits and walls of Structure O19 and are in turn truncated by the construction cut [1840] of Structure O11, providing a clear stratigraphic sequence. If Structures O19 and O12 do indeed share walls (134, 135), this may indicate they are contemporary. Similarly, Structure O19 may be contemporary with the pisé-walled phase of Structure O21 in light of the shared wall (134).

11. Structure O12

11.1 Location and relationship with other structures

Structure O12 is located towards the southern end of the 2008–2010 excavation trench against the western baulk of Trench 1 (Figure 11.1). It lies directly to the south of Structures O45 and O115, to the west of Structure O11, and to the north of Structure O19. To the northwest lies Structure O52. Structure O12 continues beyond the western limit of excavation into evaluation Trench 1 and is likely to be represented in part by the walls and surfaces revealed within that trench (Finlayson and Mithen 2007, Figure 6.30). To the south of Structure O12 there is a discrete space, O105, defined by the splitting of the apparently shared wall of Structures O12 and O19. This space also continues into evaluation Trench 1.

No direct stratigraphic relationship could be demonstrated between Structures O45 and O12. Structures O19 and O12 may share a wall (135=1394), but it is not clear if these structures were a single build or whether

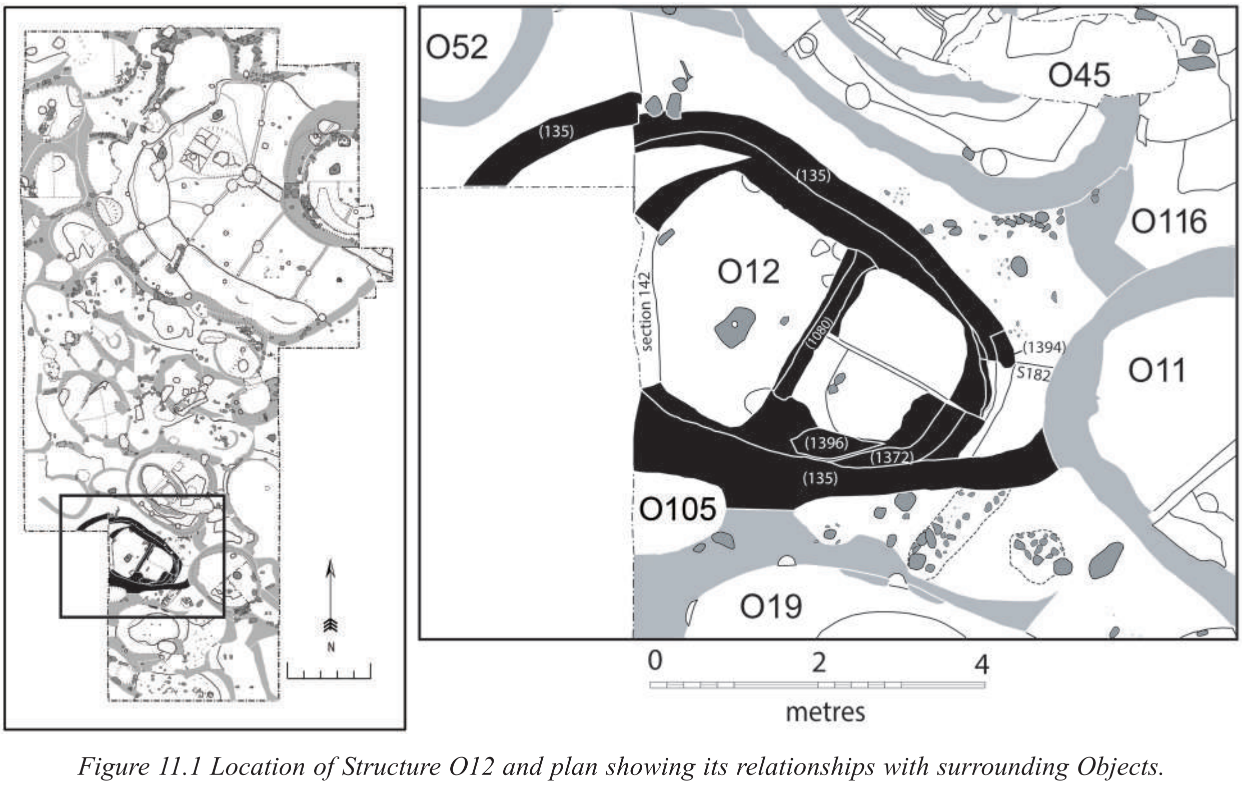


Figure 11.1 Location of Structure O12 and plan showing its relationships with surrounding Objects.

Figure 11.2 View of Structure O12 at cessation of the excavation. Scale 2.0 m.

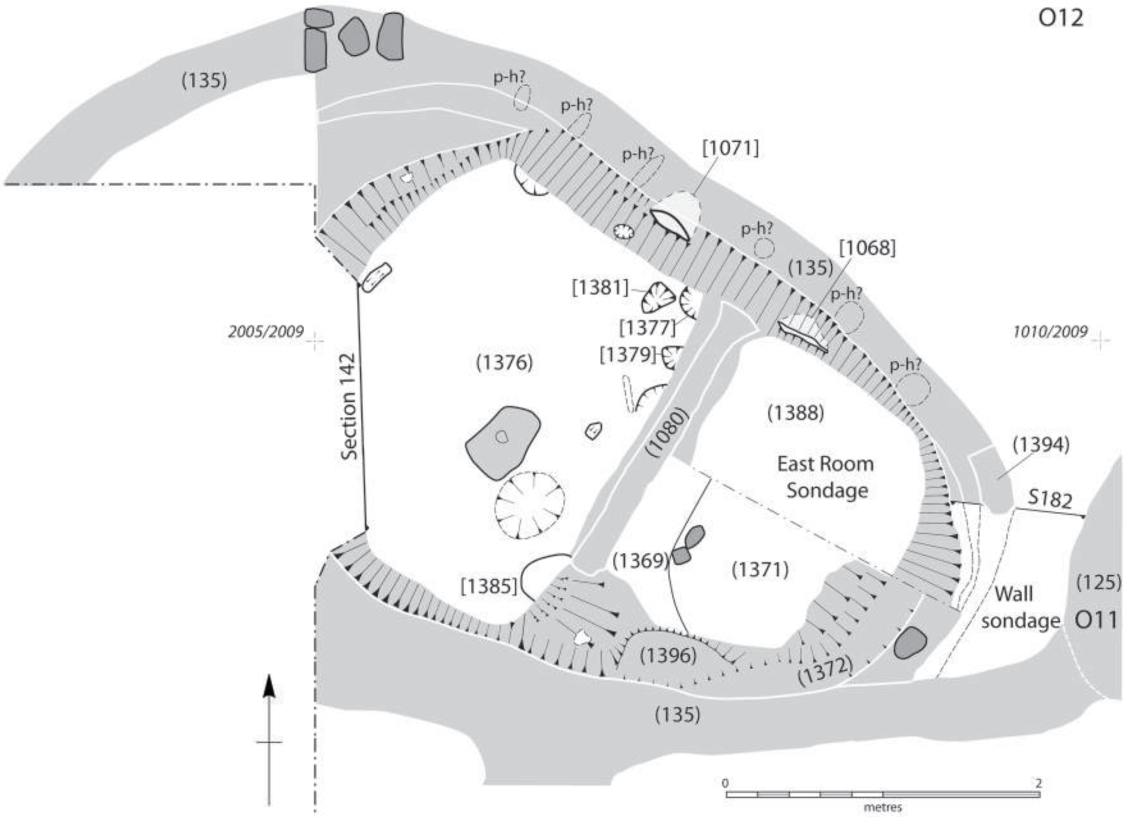


Figure 11.3 Plan of Structure O12 at cessation of the excavation.

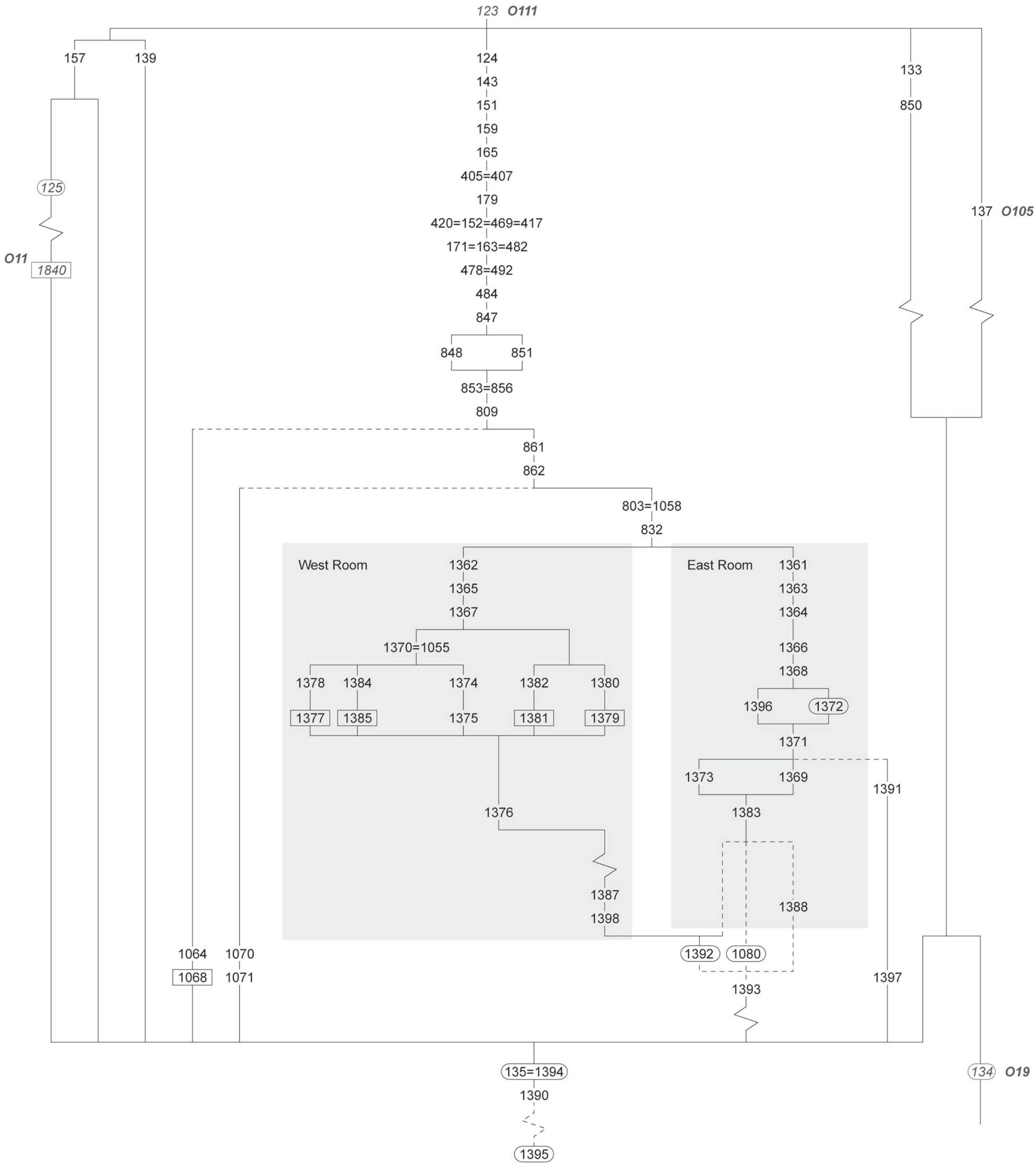


Figure 11.4 Stratigraphic matrix of deposits within Structure O12.

one of them was a later attachment. The excavation of a narrow sondage between Structures O11 and O12 showed that the cut [1840] of wall (125) of Structure O11 is later than the wall (135=1394) of Structure O12. This sondage also demonstrated the architectural complexity of Structure O12, although its precise nature could not be established within the confines of the sondage.

Figure 11.2 provides a view of Structure O12 at the end of the excavation, while a post-excavation plan is given in Figure 11.3 and its stratigraphic matrix in Figure 11.4. Table 11.1 lists the excavated contexts. Tables 11.2 and 11.3 provide the bulk and small finds, respectively.

11.2 Description of excavated deposits

Excavation of the overburden (1 and 123) exposed the surface of a cup-hole mortar (SF1) located roughly in

Table 11.1 Contexts excavated within Structure O12 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
124	mid-greyish-brown sandy silt	accumulation inside structure
133	mid-greyish-brown silty sand with yellow mottling and pisé rubble	deliberate infill of intramural space
135	mid-yellowish-brown pisé	pisé wall of oval structure
139	mid-yellowish-grey sandy silt with stone rubble	structural collapse
143	greyish-brown sandy silt	accumulation inside structure
151	dark greyish-brown sandy silt with relatively frequent charcoal	rich organic midden infill of structure
152	yellowish-brown sandy silt with frequent charcoal and rubble	rubble rich infill of structure
157	light greyish-brown sandy silt with large stones	stone rubble or remnants of structure in mixed overburden
159	dark greyish-brown sandy silt with frequent rubble and burnt stone	dump of rubble, burnt and organic material inside structure
163	mid-yellowish-brown sandy clay with pisé rubble	mixed demolition or collapse infill
165	dark grey sandy silt with frequent charcoal and stones	rich organic midden infill of structure
171	mid-yellowish-brown sandy clay with pisé rubble	mixed demolition or collapse infill
179	mid-grey sandy silt with yellowish-brown mottling and some stones	rich organic midden infill of structure
405	dark greyish-brown sandy silt with yellow mottling	silt accumulation inside structure
407	fragment of human mandible	disarticulated human remains in deposit 405
417	mid-to dark grey sandy silt with yellowish-brown mottling	mixed deposit of organic rich material and pisé rubble
420	dark grey sandy silt with frequent charcoal and stones	charcoal and rubble rich infill of structure
469	fragment of human maxilla	disarticulated human remains in deposit 152
474	Mottled compact pisé rubble	Possible structural rubble/dump between the walls of Structures O12, O11 and O19
478	mid-yellowish-brown sandy clay with pisé rubble	mixed demolition or collapse infill
482	mid-yellowish-brown sandy clay with pisé rubble	mixed demolition or collapse infill
484	loose fine ashy mid-grey silt with frequent burnt stone	dump of burnt material inside structure
492	mid-yellowish-brown sandy clay with pisé rubble	mixed demolition or collapse infill
803	mid-yellow grey silt with pisé rubble	rubble laid as a levelling deposit for construction of a floor
809	compact whiteish-grey sandy silt	mud-plaster floor surface
832	dark grey silt	localised silt deposit inside structure
847	dark grey sandy silt with occasional charcoal and frequent ashy lenses	dump of ashy material in structure
848	dark grey loose silt with some charcoal	concentration of burnt material within the occupation deposit
850	mid-greyish-brown sandy silt with frequent stones and charcoal	packed rubble in the intramural space between structures
851	dark grey silt	occupation deposit on top of mud-plaster floor
853	light yellowish-grey compact silt	mud-plaster floor surface
856	dark yellowish-brown pisé	large lump of collapsed wall
861	mid-yellowish-grey silt with pisé rubble	rubble laid as a levelling deposit for construction of a floor
862	mid-yellowish-grey silt with pisé rubble	rubble laid as a levelling deposit for construction of a floor
1055	dark grey sandy silt with well-sorted 2mm sized grit	silt accumulation inside structure
1058	dark grey sandy silt with pisé rubble and charcoal	silt accumulation inside structure
1064	dark brown sandy silt with frequent stones and charcoal	fill of niche in the wall of the structure
1068	irregular rounded cut in the face of pisé wall	small niche or shelf dug into the interior face of the wall
1070	mid-greyish-brown silt	fill of niche in the wall of the structure

Table 11.1 Contexts excavated within Structure O12 with sedimentary descriptions and interpretations continued...

Context	Description	Interpretation
1071	oblique sub-circular cut in the face of a pisé wall	small niche or shelf dug into the interior face of the wall
1080	compact light yellowish-brown pisé	partitioning wall inside structure
1361	dark brown sandy silt	occupation deposit inside structure
1362	light to mid-greyish-brown sandy silt with mottled degraded pisé	mixed backfill inside structure
1363	mid-yellowish-brown silt with mottled degraded pisé	patchy remnants of degraded trampled floor surface
1364	compact mid-grey sandy silt	mud-plaster surface
1365	mid-grey sandy silt with mottling of degraded pisé	backfill inside structure
1366	compact dark yellowish-brown silty loam	compacted mixed material perhaps acting as make up for overlying floor
1367	mid-greyish-brown sandy silt with degraded pisé and some charcoal	rubble dump or collapse
1368	compact mid-grey sandy silt	mud-plaster surface
1369	dark yellowish-brown sandy silt with pisé rubble	dump of rubble acting as a wall support
1370	mid-grey sandy silt	silt accumulation inside structure
1371	mid-greyish-brown sandy silt with a high concentration of well-sorted 2mm grit	dump of material to level of area prior to construction
1372	compact pisé with a grey core and white outer face	pisé wall
1373	mid-grey sandy silt	dump of material to level of area prior to construction
1374	light yellowish-grey compact silt with mottling of pisé	dump of wet mud on top of mud-plaster floor
1375	group of groundstone objects	broken fragments of mortar and bench stones on top of floor surface
1376	compact light greyish-yellow sandy silt	mud-plaster floor surface
1377	circular steep cut with concave base	post hole cut
1378	mid-greyish-brown sandy silt	fill of post hole
1379	triangularly shaped cut with moderately sloping sides and concave base	cut of small feature in mud-plaster floor, possible post hole
1380	mid-greyish-brown sandy silt	fill of possible post hole
1381	sub-circular cut with steep sides and stepped base	post hole cut
1382	mid-greyish-brown sandy silt	fill of post hole
1383	mid-yellowish-grey sandy silt with a high concentration of pisé rubble	probable wall collapse
1384	mid-grey silt with frequent stones	fill of small pit
1385	irregular rounded cut with steep sides and irregular base	probable shallow pit
1387	mid- to dark brown sandy silt with occasional stones	fill of post-pipe
1388	compact whitish-grey sandy silt	mud-plaster floor surface
1390	dark grey silty-loam	silt accumulation in between structures
1391	mid-grey sandy silt	fill of small niche in the wall
1392	compact white grey pisé or mud plaster	mud-plaster facing of pisé wall
1393	dark grey silt	unexcavated deposit behind wall 1392
1394	compact mid-orangeish-brown pisé	pisé wall
1395	compact mid-orangeish-brown pisé	pisé wall
1396	mid-greyish-white pisé	pisé bench
1397	circular moulded shelf in the face of the wall	small niche in the wall
1398	sub-circular void in pisé wall	post-pipe in pisé wall

Table 11.2 Quantities of bulk finds in Structure O12 by material and context number.

Object 12	Volume of sediment (l)				Weight of bulk finds per material (g)												
Context	**Total volume**	**Flot. sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Ground stone**	**Other worked stone**	**Unworked stone**	**Animal bone**	**Human bone**	**Unidentified bone**	**Marine shell**	**Other shell**	**Plaster/Pisé**	**Plant matter**	**Charcoal**	**Misc.**
124	551.0	30.0	520.0	1.0	2618.3	18.0	0.0	0.0	0.0	0.0	141.3	0.0	58.8	0.0	0.0	0.0	0.0
133	141.0	30.0	110.0	1.0	853.7	0.0	0.0	0.0	0.0	0.0	21.0	0.0	18.3	0.0	0.0	0.0	0.0
143	391.0	30.0	360.0	1.0	1889.5	60.0	0.0	0.0	0.0	0.0	131.4	0.0	46.9	0.0	0.0	0.0	0.0
151	171.0	30.0	140.0	1.0	407.8	0.0	5.0	0.0	0.0	0.0	249.0	0.0	26.4	0.0	0.0	10.3	0.0
152	162.0	20.0	140.0	2.0	3348.1	40.0	20.0	0.0	0.0	0.0	451.3	0.0	44.6	0.0	0.0	0.0	10.0
159	6.0	6.0	0.0	0.0	137.1	0.0	0.0	0.0	0.0	0.0	18.5	0.0	27.6	0.0	0.0	0.0	0.0
163	11.0	10.0	0.0	1.0	62.3	0.0	0.0	0.0	0.0	0.0	50.6	0.0	14.0	0.0	0.0	0.1	0.0
165	31.0	30.0	0.0	1.0	2611.7	250.0	0.1	0.0	0.0	0.0	321.3	0.0	341.5	0.0	0.0	0.0	10.0
171	442.0	20.0	420.0	2.0	1419.2	0.0	1.0	0.0	381.0	1.0	4.7	0.0	16.1	0.0	0.0	0.0	0.0
179	41.0	10.0	30.0	1.0	384.4	10.0	0.0	0.0	0.0	0.0	141.0	0.0	37.0	0.0	0.0	10.0	0.0
405	91.0	10.0	80.0	1.0	1133.5	310.0	0.0	0.0	0.0	0.0	232.8	0.0	0.0	0.0	0.0	0.0	0.0
417	91.0	10.0	80.0	1.0	249.4	0.0	0.1	0.0	0.0	0.0	122.4	0.0	7.0	0.0	0.0	10.0	0.0
420	25.0	20.0	3.0	2.0	154.9	0.0	0.0	0.0	0.0	0.0	179.4	0.0	108.4	0.0	0.0	0.1	0.0
478	11.0	10.0	0.0	1.0	325.8	0.0	1.0	0.0	110.0	10.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0
482	574.0	20.0	552.0	2.0	1770.5	0.0	1.0	0.0	371.0	50.0	26.3	0.0	186.2	0.0	0.0	0.0	100.0
484	1051.0	40.0	1007.0	4.0	2992.6	85.0	11.0	0.0	407.9	22.0	4.4	1.0	49.2	0.0	0.0	0.0	0.0
492	222.0	20.0	200.0	2.0	3083.3	0.0	0.0	0.0	426.2	40.0	44.5	0.0	141.9	1200.0	0.0	0.1	0.0
803	282.0	40.0	240.0	2.0	443.1	0.0	10.0	0.0	58.9	0.0	0.0	0.0	7.1	0.0	0.0	10.0	0.0
809	46.0	20.0	15.0	1.0	159.7	0.0	10.0	0.0	12.5	0.0	0.0	0.0	0.0	600.0	0.0	0.0	0.0
832	181.0	30.0	150.0	1.0	431.3	0.0	0.0	0.0	16.9	0.0	0.0	0.0	4.7	0.0	0.0	0.0	20.0
847	271.0	30.0	240.0	1.0	1041.7	0.0	0.2	10.0	10.0	0.0	12.2	0.0	62.1	0.0	0.0	20.1	0.0
848	1.0	1.0	0.0	0.0	51.5	0.0	0.0	0.0	5.3	0.0	0.0	0.0	11.2	0.0	0.0	0.0	0.0
851	30.0	30.0	0.0	0.0	220.4	0.0	0.0	0.0	0.0	0.0	3.5	0.0	20.5	0.0	0.0	0.0	0.0
853	313.0	40.0	269.0	4.0	521.2	0.0	1.0	0.0	83.2	0.0	2.5	0.0	10.1	0.0	0.0	6.0	0.0
861	752.0	40.0	718.0	4.0	1100.8	0.0	0.1	0.0	104.5	0.0	0.0	0.0	1.2	0.0	0.0	1.1	0.0
862	347.0	20.0	325.0	2.0	591.7	0.0	0.0	10.0	42.3	0.0	0.7	0.0	3.3	0.0	0.0	13.1	0.0
1055	251.0	30.0	220.0	1.0	231.5	0.0	1.0	0.0	12.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
1058	8.0	8.0	0.0	0.0	358.1	0.0	0.0	20.0	30.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
1064	8.0	8.0	0.0	0.0	47.2	0.0	0.0	0.0	1.9	0.0	0.0	0.0	4.3	0.0	0.0	0.0	0.0
1070	20.0	20.0	0.0	0.0	62.8	0.0	0.0	0.0	7.5	0.0	0.0	0.0	9.9	0.0	0.0	0.0	0.0
1361	131.0	30.0	100.0	1.0	443.5	0.0	20.0	0.0	11.9	0.0	0.0	0.0	2.3	0.0	0.0	21.1	0.0
1362	346.0	30.0	315.0	1.0	470.0	0.0	0.0	0.0	42.2	0.0	0.0	0.1	1.7	0.0	0.0	10.1	0.0
1363	31.0	30.0	0.0	1.0	79.9	0.0	1.4	0.0	6.6	0.0	0.0	0.0	1.5	0.0	0.0	0.1	0.0
1364	31.0	30.0	0.0	1.0	80.7	0.0	0.1	0.0	9.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1365	326.0	10.0	315.0	1.0	496.0	20.0	0.0	0.0	65.6	0.0	0.0	0.0	1.8	0.0	0.0	10.6	16.0
1366	171.0	30.0	140.0	1.0	539.9	0.0	0.0	0.0	29.6	0.0	0.0	0.0	5.5	0.0	0.0	2.1	0.0
1367	531.0	45.0	485.0	1.0	908.6	0.0	0.1	0.0	65.8	0.0	0.0	0.0	0.0	0.0	0.0	15.0	0.0
1368	31.0	30.0	0.0	1.0	80.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	2.8	0.0	0.0	0.0	0.0

Table 11.2 Quantities of bulk finds in Structure O12 by material and context number continued...

Object 12	Volume of sediment (l)				Weight of bulk finds per material (g)												
Context	**Total volume**	**Flot. sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Ground stone**	**Other worked stone**	**Unworked stone**	**Animal bone**	**Human bone**	**Unidentified bone**	**Marine shell**	**Other shell**	**Plaster/Pisé**	**Plant matter**	**Charcoal**	**Misc.**
1369	446.0	30.0	415.0	1.0	1670.9	0.0	10.0	0.0	240.7	0.0	0.0	0.0	2.2	0.0	0.0	12.0	0.0
1370	556.0	30.0	525.0	1.0	1687.8	60.0	0.0	0.0	154.3	0.0	0.0	0.0	0.8	0.0	0.0	25.0	0.0
1371	226.0	30.0	195.0	1.0	1078.2	0.0	0.0	0.0	78.5	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0
1372	741.0	30.0	710.0	1.0	397.6	15.0	0.0	0.0	16.3	0.0	0.0	0.0	20.6	0.0	0.0	15.0	0.0
1373	31.0	30.0	0.0	1.0	226.4	0.0	0.1	0.0	17.2	0.0	0.0	0.0	22.2	0.0	0.0	0.1	0.0
1374	181.0	30.0	150.0	1.0	333.8	245.0	1.1	0.0	67.2	0.0	0.0	0.0	2.3	0.0	0.0	10.0	0.0
1378	1.0	1.0	0.0	0.0	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
1380	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
1382	1.0	1.0	0.0	0.0	0.6	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0
1383	116.0	35.0	80.0	1.0	394.6	0.0	0.1	0.0	51.1	0.0	23.9	0.0	9.6	0.0	0.0	20.0	10.8
1384	5.0	5.0	0.0	0.0	48.5	0.0	0.0	0.0	12.1	0.0	0.0	0.0	6.0	0.0	0.0	0.1	0.0
1387	2.0	2.0	0.0	0.0	9.8	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1390	2.0	2.0	0.0	0.0	667.7	0.0	1.0	0.0	45.4	0.0	0.0	0.0	48.7	0.0	0.0	1.1	0.0
1391	2.0	2.0	0.0	0.0	10.1	0.0		0.0	0.7	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0
Total	10431.0	1127.0	9249.0	55.0	38333.4	1113.0	95.4	40.0	2996.7	123.0	2183.3	1.1	1391.1	1800.0	0.0	223.6	166.8

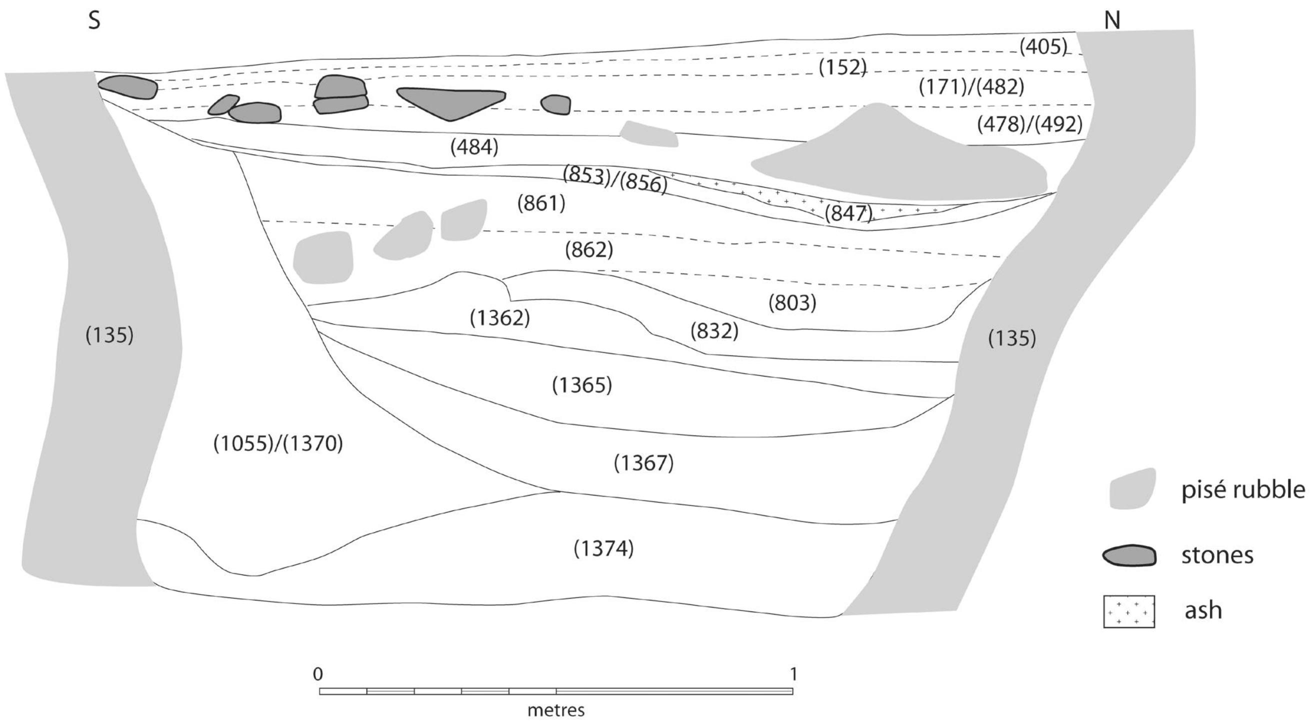


Figure 11.5 Section S142 through the deposits inside Structure O12 left in the baulk at the western limit of the excavation.

Table 11.3 Quantities of small finds in Structure O12 by material and context number.

Object 12	**Quantities of small finds per material (nos)**										
Context	**Chipped stone**	**Ground stone**	**Other stone**	**Worked bone**	**Unworked animal bone**	**Disarticulated human bone**	**Bone beads**	**Stone beads**	**Marine shell beads**	**Marine shell other**	**Plaster/Pisé**	**Total small finds**
139	0	2	0	0	0	0	0	0	0	0	0	2
143	0	3	0	0	0	0	0	0	1	0	0	4
151	0	0	0	0	0	0	0	0	4	0	0	4
152	0	2	1	0	1	1	0	0	0	0	0	5
157	0	0	0	0	0	1	0	0	0	0	0	1
165	0	1	0	0	0	0	0	0	0	0	0	1
171	0	1	0	1	1	5	0	0	0	2	0	10
405	0	0	0	0	0	1	0	0	0	0	0	1
417	0	0	0	0	0	1	0	0	0	0	0	1
420	0	0	0	0	1	0	0	0	1	0	0	2
474	0	1	0	0	0	0	0	0	0	0	0	1
478	0	3	0	0	0	0	0	0	0	0	0	3
482	0	1	0	0	0	1	0	2	1	3	0	8
484	1	3	0	1	0	0	0	1	1	0	0	7
492	0	3	0	0	0	1	0	1	0	0	0	5
803	0	2	0	1	0	0	0	1	0	0	0	4
809	0	0	1	0	0	0	0	1	1	0	0	3
832	0	0	0	1	0	0	0	0	0	0	0	1
847	0	0	0	0	0	0	0	1	1	0	0	2
848	0	1	0	0	0	0	0	0	2	0	0	3
861	0	0	0	1	0	0	0	1	0	0	0	2
862	0	4	0	0	0	0	0	0	2	0	0	6
1070	1	1	1	0	0	0	0	0	0	0	0	3
1361	0	0	0	0	0	0	0	1	0	0	0	1
1362	0	1	1	0	0	0	0	0	1	0	0	3
1365	1	0	0	2	0	0	0	0	0	1	0	4
1366	0	2	0	0	0	0	0	1	0	1	0	4
1367	0	0	0	0	0	0	0	2	0	0	0	2
1369	0	2	0	0	0	0	0	0	2	0	0	4
1370	0	1	0	0	0	0	0	0	1	0	0	2
1372	0	2	0	0	0	0	0	0	0	0	0	2
1375	1	1	1	0	0	0	0	0	0	0	0	3
1380	0	1	0	0	0	0	0	0	0	0	0	1
1382	1	0	0	0	0	0	0	0	0	0	0	1
1383	0	0	0	0	0	0	0	0	0	0	1	1
1384	0	1	0	0	0	0	0	0	0	0	0	1
Total	5	39	5	7	3	11	0	12	18	7	1	108

the centre of a circuit of light yellow-brown pisé walls (135=1394) that were used to define Structure O12. A stone setting (139), consisting of tightly packed stones, was exposed overlying the northern portion of pisé wall (135=1394). No cut was discernible for this feature. Also immediately below the overburden (123) and outside Structure O12 to its east (and above wall (125) of Structure O11) was a cluster of stones (157) initially thought to represent a burial. A fragment of human femur (SF189) was recovered from amongst the stones, but no other bone was encountered and no burial cut was visible. To the southeast of Structure O12 and below (123) lay a stone rubble deposit (133) representing infilling between Structures O12 and O19. Below (133) there were rubble deposits (474) and (850) that were more clearly set within a pisé matrix.

Structure O12 was exposed as elliptical in shape, defined by a continuous pisé wall (135=1394), on a north-northwest–south-southeast orientation, enclosing a space approximately 4 m x 3 m within the trench. Part of the structure lies beyond the trench, the traces of the wall visible on the surface suggest the walls had once enclosed an area up to 6 m long, orientated northwest–southeast. A section (S142, Figure 11.5) was established at the western edge of the structure where a narrow baulk was maintained between this excavation and evaluation Trench 1 excavated in 1997–2003 (Finlayson and Mithen 2007, Figure 6.30). The uppermost deposits within the walls were grey-brown sandy silts (124, 143) representing the final infilling of the structure after abandonment.

Below (143) there was a dark organic-rich deposit (151) across the extent of the internal space of the structure. Underlying (151) there were further organic rich infilling deposits (159, 165) concentrated in the southwest of the structure. These contained high concentrations of burnt stone and animal bone suggesting the dumping of domestic waste into the structure, possibly as intentional levelling deposits. Under (165) there was a deposit (405) containing significantly less burnt stone and bone, perhaps suggesting a period of natural silt accumulation between dumping episodes. Within this deposit there was a fragmentary human mandible (407). Under (405) a grey, sandy silt (179) represented the last of the organic-rich fills, prior to a series of deposits characterised by significant quantities of pisé rubble.

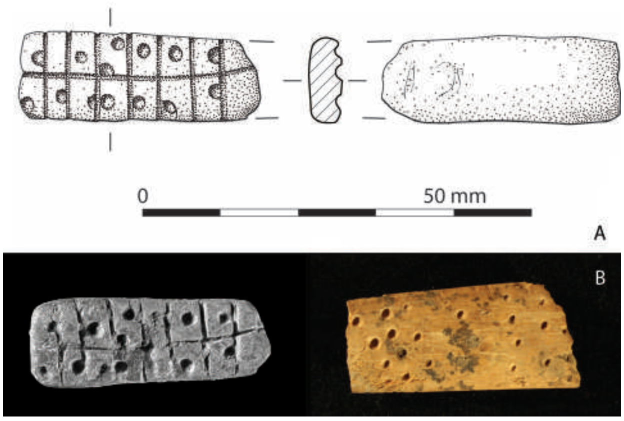


Figure 11.6 A — Grooved and decorated stone plaque SF332 from deposit (152); B — decorated section of an animal rib bone SF688 from deposit (171).

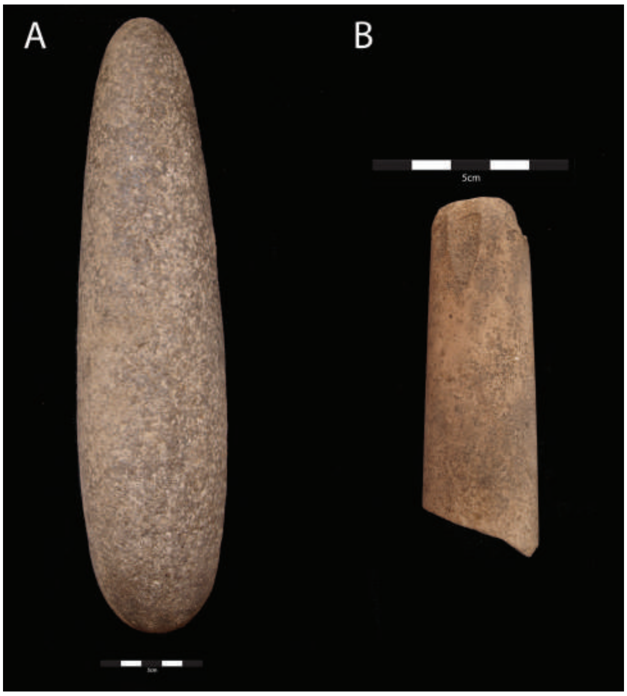


Figure 11.7 A — Ground-stone pestle SF699 from deposit (478); B — polished stone object SF786 from deposit (492).

These began with a pisé-rich, firm, yellow-brown sandy silt (152, equivalent to 417 and 420). This deposit was present across the extent of the structure, sloping gently towards the southwest. Within context (152) there was a partial maxilla with fragmented teeth (469), a human molar and pre-molar (SF670) and a decorated stone plaque SF332 (Figure 11.6). Below (152) there was a similar pisé-rich silt deposit that also followed the gentle southwest slope. This was excavated in quadrants in two spits (171=163) and (482), followed by (478) and (492). Deposits (171), (482) and (492) all contained further disarticulated human remains, predominantly teeth and jaw fragments (SF692–695), but also a fragment of burnt femur (SF689) in deposit (171). Deposit (171) also contained a decorated animal rib fragment SF688 (Figure 11.6). The same deposits contained chipped stone, animal bone and several ground-stone objects, such as pestles (Figure 11.7).

Below these pisé-rich deposits there was a dump deposit (484) containing a high concentration of burnt stone and ashy lenses, but which was otherwise similar to the dump or infilling deposits overlying the upper pisé-rich contexts (Figure 11.8). Underlying (484) was charcoal-rich silt (847) followed by a fine inclusion-free silt (851), which was above a mud-plaster surface (853). At the same horizon

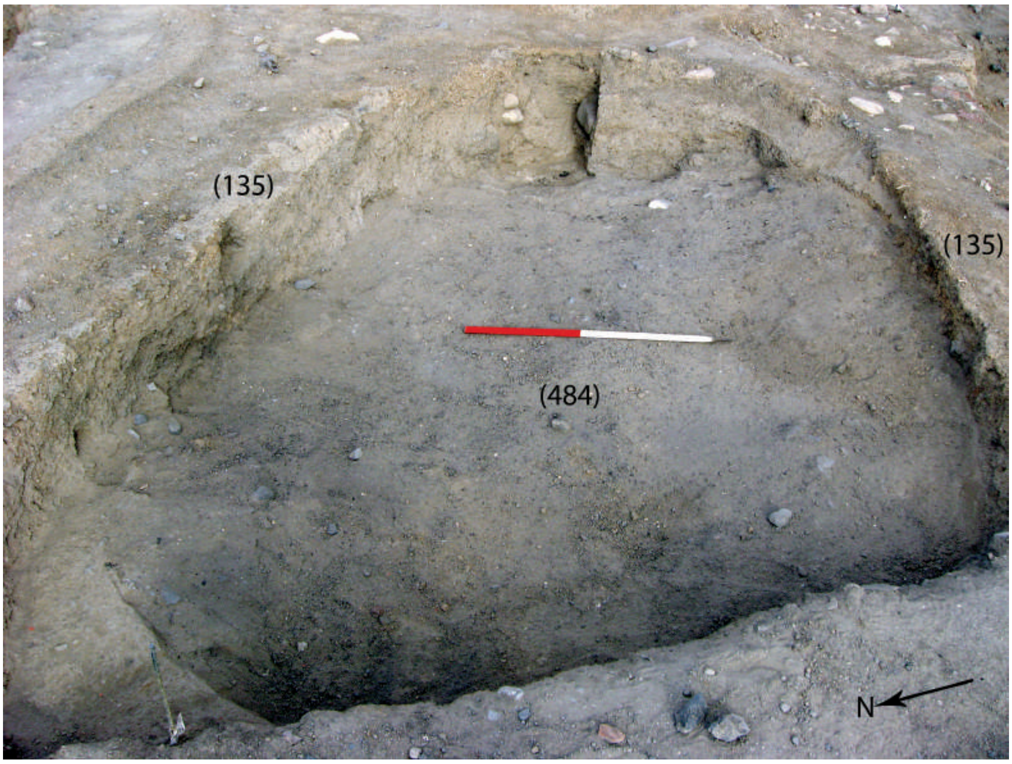


Figure 11.8. Burnt stone rich dump deposit (484) across the entire extent of structure O12. Scale 1.0 m.

as the fine occupation silt (851) there was what appeared to be a scorched patch of silt (848).

Below these deposits a yellowish-grey mud floor (853) was exposed in the northern half of the structure, close to its northern wall. A large fragment of pisé (856) was incorporated in the floor (853) at the southeast edge of the context. At its northern edge the floor appeared to have broken away from the wall and subsided towards its centre. This is likely to have been caused by slumping into underlying deposits as the floor settled while drying. Scorching had occurred towards the western edge of the deposit. Directly below floor (853) there was a second mud-plaster floor (809) that was less extensive and also subject to the same slumping as floor (853). This floor (809)

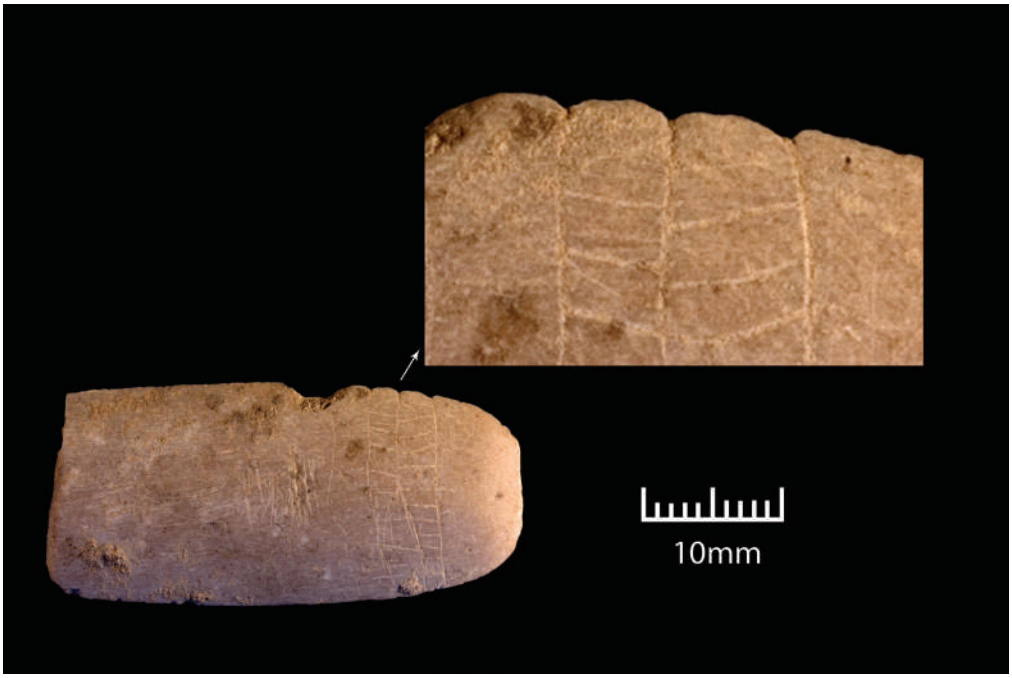


Figure 11.9 Incised ground-stone object SF1243 from deposit (809).

had no discernible occupation silt above it and contained a limestone flake SF1243 decorated with a geometric pattern (Figure 11.9). This floor (809) was noticeably whiter than the floor above (853) and may contain gypsum.

Upon excavation of floor deposit (809) a series of rubble infill layers were revealed, most likely deposited as a foundation layer, or levelling, for the overlying floors. Contexts (861) and (862) contained compacted pisé rubble but fewer finds, suggesting deliberately deposited levelling. Below (862) there was a further pisé rubble deposit (803) containing a number of large pisé fragments, including pisé block SA3498 that retained a curved face. Upon removal of this block, a grey silt with charcoal fragments (1058) was revealed, possibly linked to the apparent demolition associated with the rubble of (803) and block SA3498. Deposit (803) also contained a number of re-deposited mud-plaster floor fragments SA3496, SA3524. As with the fragments of pisé walling, it seems likely that these floor fragments were deposited as levelling and derive from the demolition of a nearby structure. Upon removal of these pisé fragments a stone setting formed by three large stones was revealed. A ground-stone pestle (SF 1732) was recovered from within this stone setting. Several other ground-stone objects and stone and marine shell beads (Table 11.3) were found in deposits (803), (861) and (862), as well as worked bone points SF1232 and SF1466 (Figure 11.10).

Removal of rubble fill (803) and underlying silt (832) revealed the top of a subdividing wall (1080) running roughly northeast–southwest and subsequently dividing all deposits within Structure O12 into two distinct rooms; hereafter referred to as the east and west rooms. The stratigraphic sequence within each room will be described separately.

West room

Within the west room a sequence of deposits sloped steeply towards the northeast, below rubble (803) and silt (832). The uppermost of these was a mixed silty fill (1362). This deposit contained a large stone with a smooth underside (SF2216). It is possible this stone was associated with a similarly sized and orientated stone (not retained) on floor deposit (1364) within the east room, perhaps suggesting a split level for Structure O12 (see below). Below deposit (1362) there was a darker and more charcoal-rich silt and pisé fill (1365). Under (1365) there was a substantial structural mud rubble deposit (1367) (Figure 11.11). Excavation of this context revealed a silt deposit (1370=1055) banked up against the southern wall of O12, containing lenses of pea grit suggesting individual tips of material. Removal of this silt revealed another thick mud deposit (1374) (Figure 11.12A) also tipping to the northwest.

Mud (1374) appears to have been deposited while still wet, forming a solid mass as it set, indicating the dumping of surplus construction material. Deposit (1374) sealed a group of stone objects (1375), including fragments of a broken cup-hole mortar (SF1795), a chipped-stone core (SF1794), and a possible stone bench or working platform (SF2258), Figure 11.12B. This collection of objects lay directly on a well-constructed mud-plaster floor surface (1376) that was the earliest deposit encountered in the west room of structure O12. The objects constituting (1375) appeared to be deliberately placed adjacent to a cup-hole mortar set into this floor (1376), Figure 11.13. Excavation in this part of Structure O12 did not proceed below this floor.

Floor (1376) was cut by post-holes [1377] (0.13 x 0.13 x 0.12 m deep), [1379] (0.17 x 0.15 x 0.09 m deep),

Figure 11.10 Bone points: A — SF1232 from deposit (803); B — SF1466 from deposit (861).

Figure 11.11 Deposits (1367) (top) showing large fragments of structural mud rubble. Scale 1.0 m.

and [1381] (0.23 x 0.22 x 0.12 m deep), filled by (1378), (1380) and (1382), respectively (Figure 11.14). Within fill (1380) there was a flake of a ground-stone pestle SF2259 and within fill (1382) a serrated flint flake SF2260 was recovered. In the adjacent corner, between wall (1080) and the southern wall of Structure O12, there was a shallow irregular feature [1385] (0.2 x 0.35 x 0.2 m deep) filled with a stony deposit (1384).

Floor (1376) clearly abutted the walls of the structure, indicating that it was constructed at a later date than the walls. At the northwest and southeast edges of this deposit two notched stones protruded through the mud plaster of the floor surface indicating the presence of earlier occupation below. It is uncertain whether these stones were intended to be visible at this level, or if they had become exposed through erosion or the settling of the mud-plaster floor (1376) over time (Figure 11.13).

East room

Within the east room of Structure O12, below the rubble deposit (803) and silt (832), there was a dark inclusion-free silt (1361) that sealed a lighter yellow-brown silt (1363). These deposits overlay a compact but patchy surface (1364). It contained a large stone similar in nature and orientation to SF2216 recovered within deposit (1361) as discussed above. Below surface (1364) there was a compacted silty deposit (1366), potentially laid down as levelling and consolidation to support surface (1364). Underlying this there was a second mud-plaster floor surface (1368). This floor was also poorly preserved, only surviving as a trampled surface in the centre, being completely worn away to the north. Upon removal of (1368), a section (East Room Sondage) was established on a northwest–southeast axis and all subsequent deposits were only removed in the northern half of the east room (Figures 11.3, 11.15 and 11.16). This section was continued through the eastern wall of Structure O12 (to the west of the wall of Structure O11) at a depth of 0.5 m (Wall Sondage). This was excavated to explore the architectural sequence of Structure O12, to establish whether the building sat within a construction cut and examine the relationship between Structures O12 and O11.

East room sondage

The initial deposit encountered in the sondage below (1368) was a wall (1372). This pisé wall lay directly below surface (1368) and was of the same build, suggesting that (1368) and (1372) may have been part of a single deposition, with the horizontal part (1368) smoothed down to form the floor. Wall (1372) consisted of a base of solid whitish-grey pisé, with firm pisé faces on the northwest and southeast sides, and a loose, silty rubble infill (Figure 11.15). Excavation also revealed that the sub-dividing wall (1080) had a pisé ramp at its southern end, appearing to relate to either floor (1368) or wall (1080). Also exposed by the excavation of

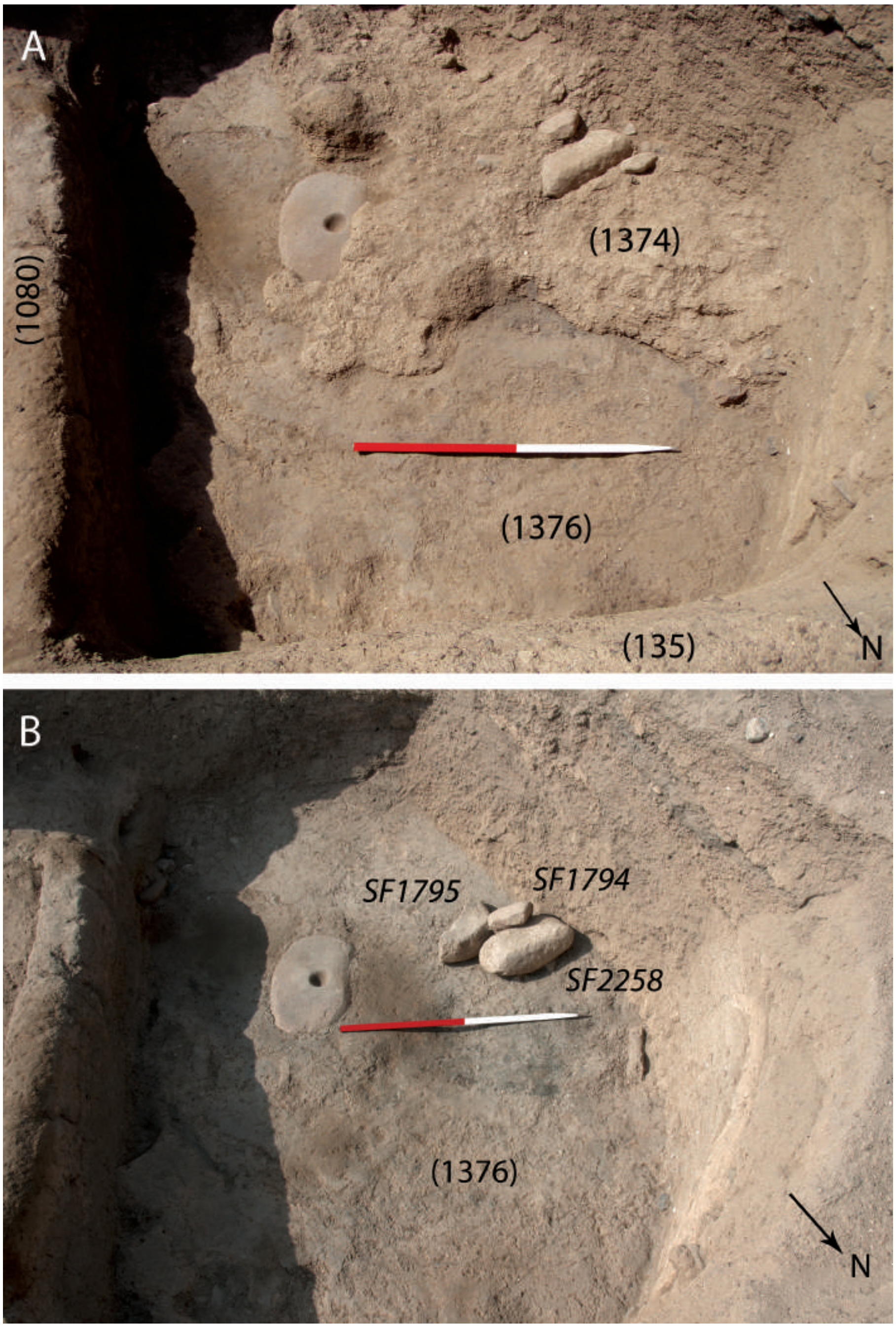


Figure 11.12 A — Deposit (1374) (top) indicating pisé spread over floor (1376). B — Deposit (1375) has a collection of small finds SF1794, SF1795, SF2258 directly over floor (1376) adjacent to a cup-hole mortar set in to the floor. Scales 1.0 m.

(1368) was a buttress/bench (1396) protruding from the southern wall (135=1394) (Figure 11.16).

Below wall (1372) there was a series of silty fill deposits apparently laid down to build up the level within the structure. The uppermost of these was pea grit-rich silt (1371) with a depth of 0.4 m, sealing similar silt deposit on the northwest side (1373). On the southeast side, up against wall (1080), there was pisé-rich fill (1369), possibly deliberately placed against the wall to add support prior to levelling. Below this sequence of filled silts there was another pisé-rich deposit (1383) containing several fragments of pisé with plant impressions, including SF2311 (Figure 11.17), sealed by this pisé-rich layer was a well-preserved mud-plaster floor surface (1388). This floor appeared to be of the same build as the sub-dividing wall (1080). As with upper floor surface (1368), there was no connection between the wall and floor (Figure 11.18).

Wall sondage

The wall sondage exposed a complex series of walls that could not be fully resolved within the small area of the excavation. Wall (1372) was adhered directly to wall (1392)

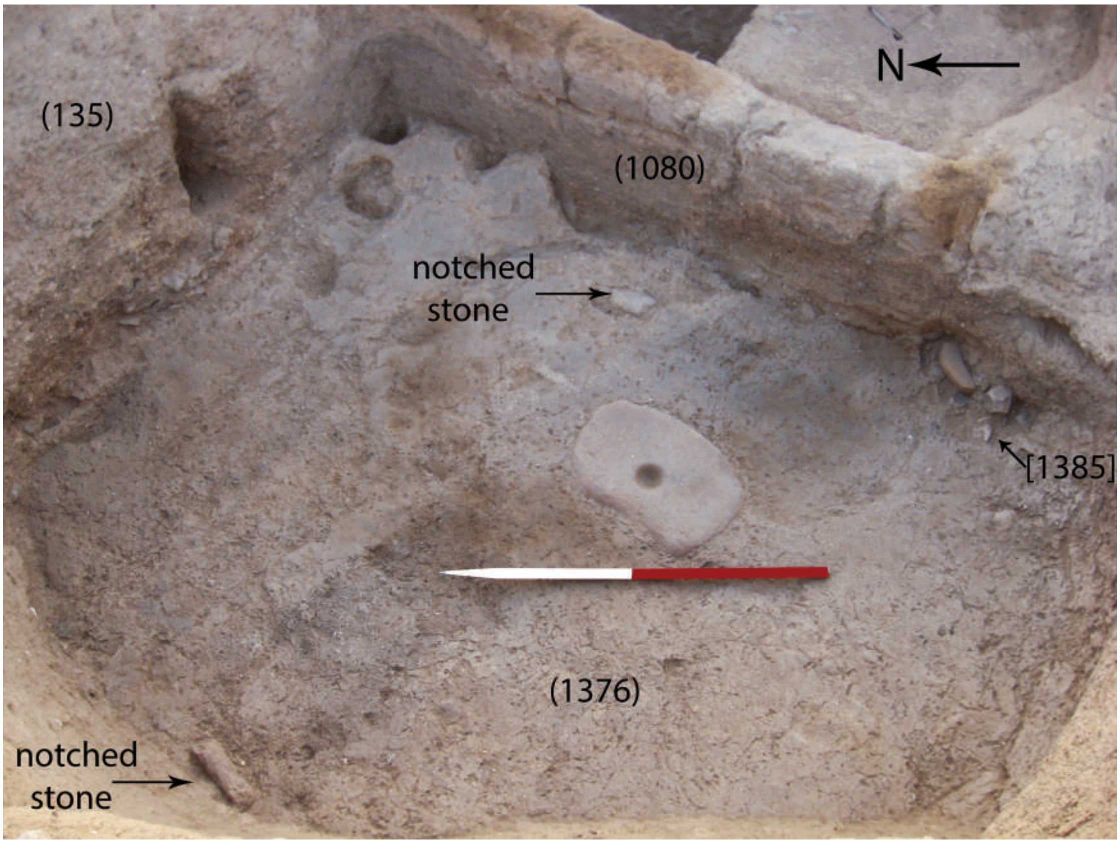


Figure 11.13. Well-laid mud-plaster floor (1376) within the western half of structure O12 as defined by subdividing wall (1080). Highlights the cup-hole mortar set within the floor and the notched stones protruding from below. Scale 1.0 m.

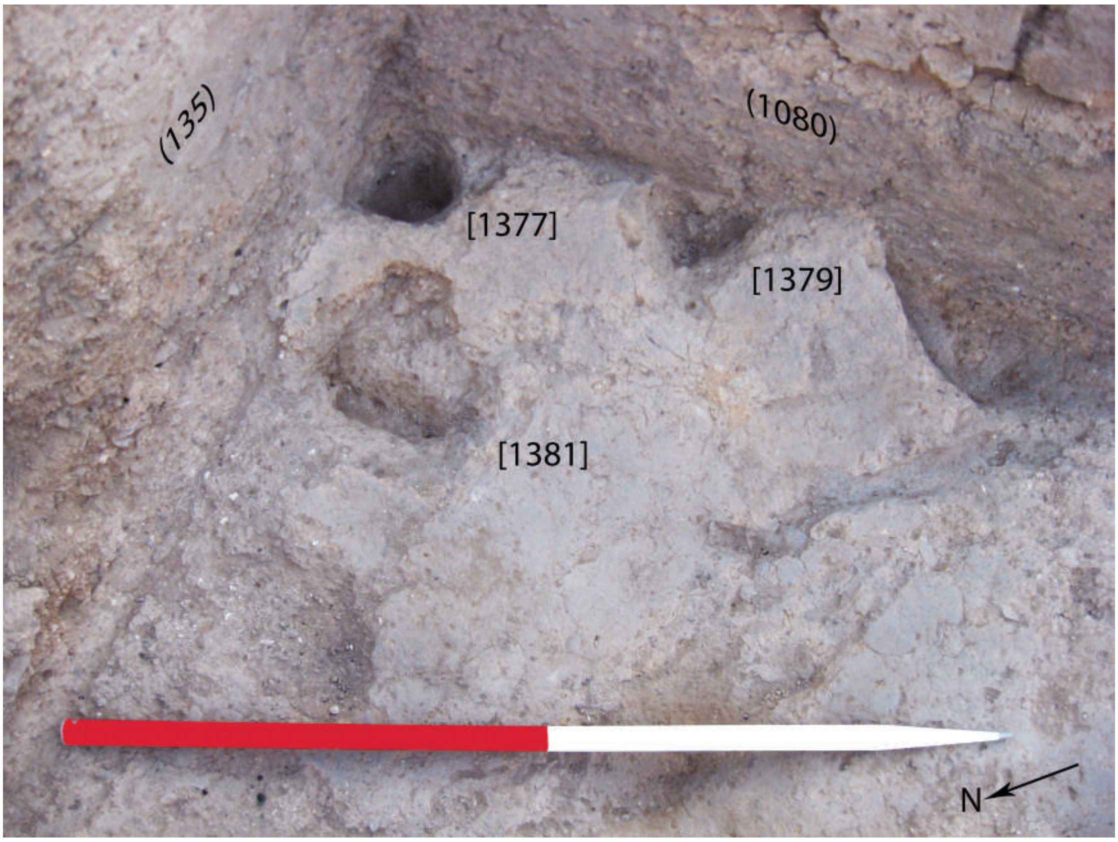


Figure 11.14. Post-holes [1377], [1378] and [1379] up against wall (1080). Scale 1.0 m.

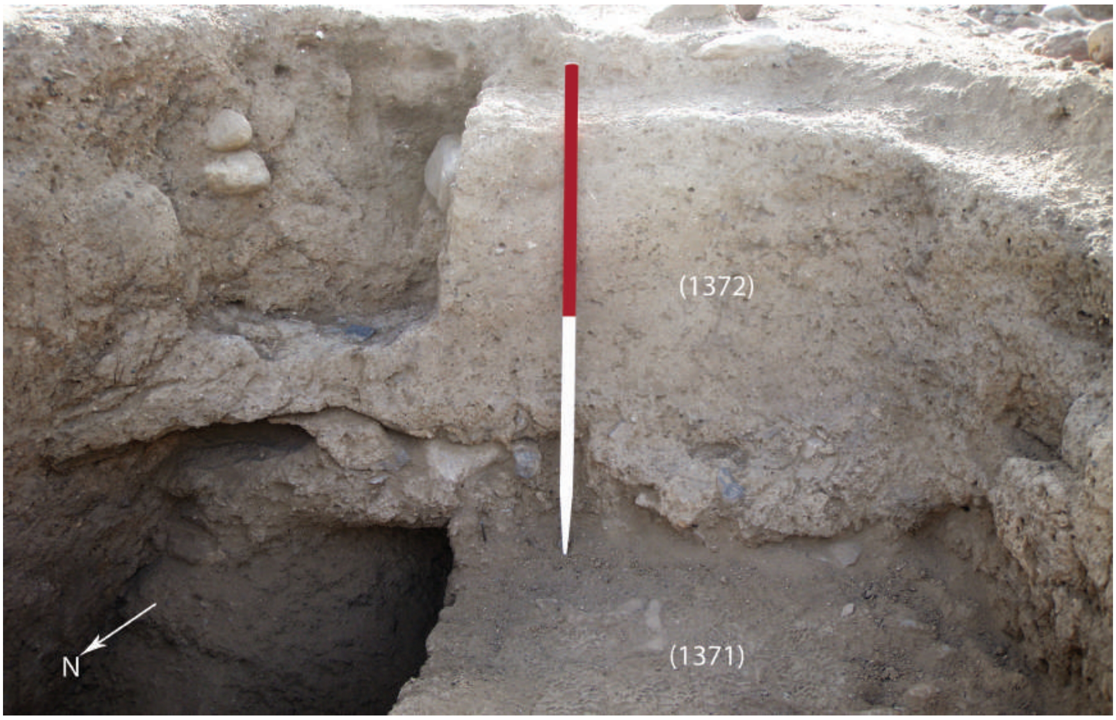


Fig 11.15 East room sondage showing wall (1372) after removal of floor surface (1368). Scale 1.0 m.

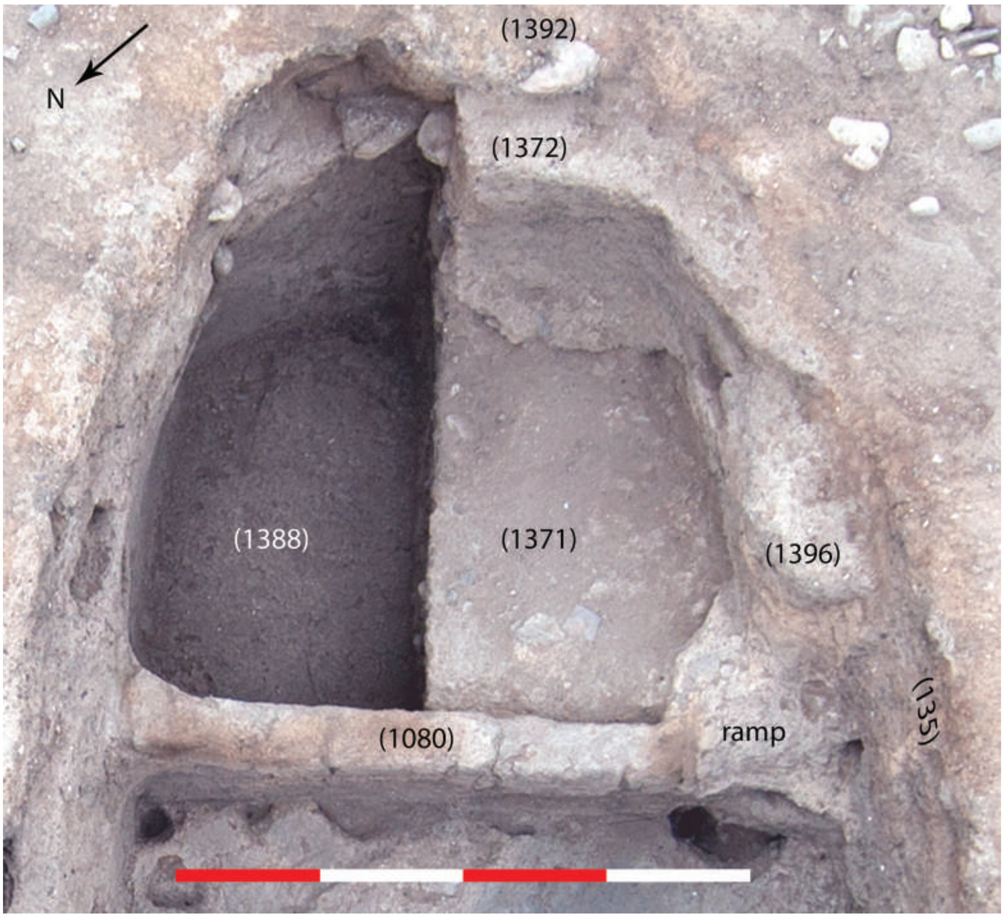


Figure 11.16 Half-sectioned east room from above showing the floor (1388) at the base, as well as pisé ramp at the south end of wall (1080) and bench/buttress (1396) protruding inwards from wall (135=1394). Scale 2.0 m.

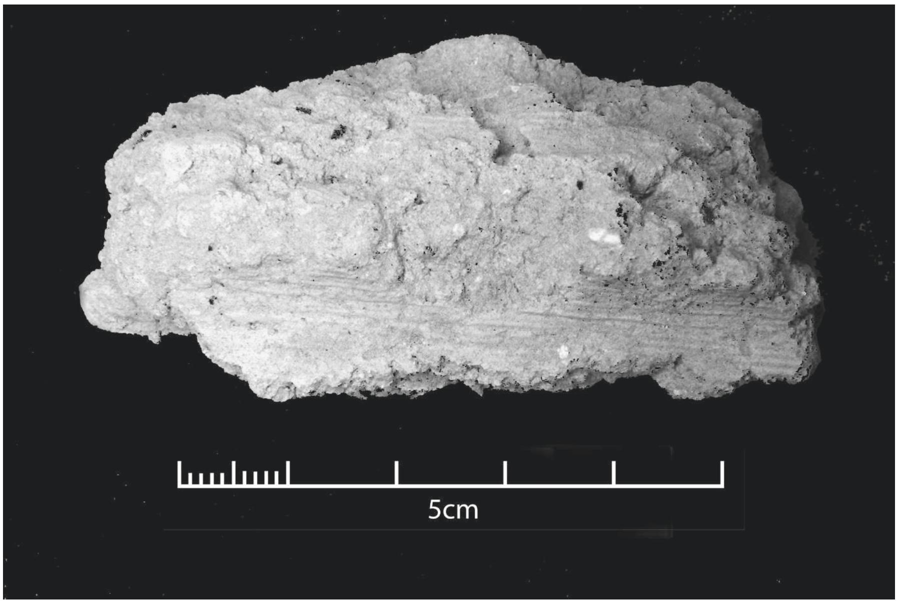


Figure 11.17 Plant impressions on pisé SF2311 from deposit (1383).

on the northern side of the structure, modifying the original form of (1392). As excavation proceeded wall (1392) was observed to consist of a thin band of pale grey mud plaster, sitting over a silty fill (1393) that, in turn, overlay a yellow-orange pisé wall (1394=135). This wall formed a butt end, possibly suggesting the presence of a former entrance or opening at the eastern end of the building, which had been blocked by the later insertion of wall (1392) (Figure 11.19). Wall (135=1394) appears to have been inserted into a dark grey silty loam (1390) for which no cut could be identified within the confines of the sondage. At the eastern end of the sondage, context (1390) had been cut [1840] for the construction of wall (125) of Structure O11. Cut [1840] also appears to have truncated the wall (135=1394) of Structure O19. At the base of the wall sondage a small length of a poorly made pisé wall (1395) was revealed, appearing to run below wall (135=1394). Given the spatial confines of the sondage it remains unclear if this represents an earlier course of (135=1394), or if it is part of an earlier, unrelated, structure.

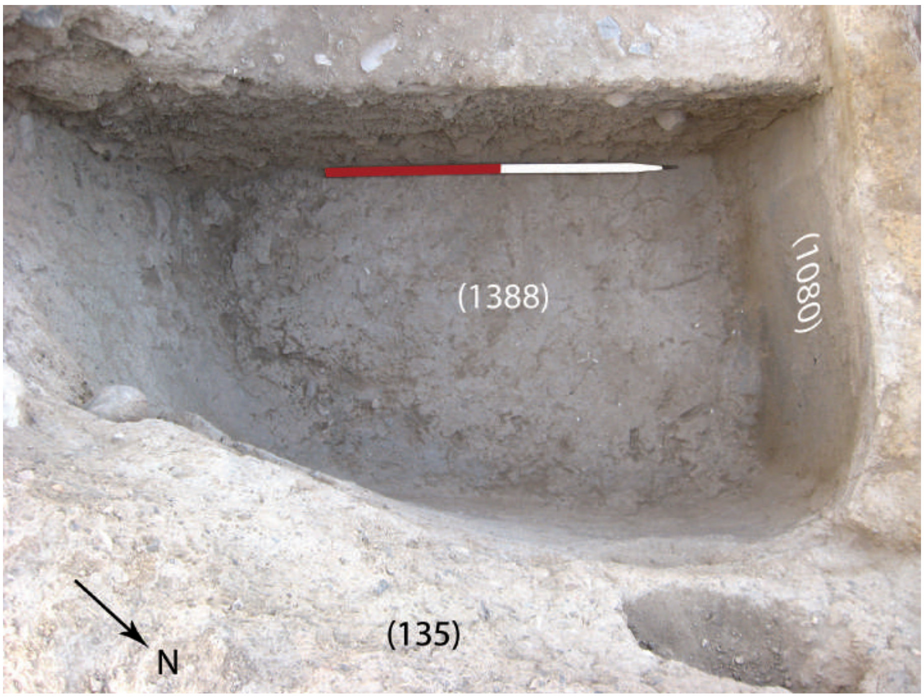


Figure 11.18 Floor surface (1388) highlighting the relationship with subdividing wall (1080) to the right of the photograph. Scale 1.0 m.

Niches and post settings in wall (135=1394)

Several niches were located within the fabric of the wall (135=1394) on the northern side of the structure (Figure 11.20). While none of these can be confidently allocated to a single phase of walling, they respect the position of the sub-dividing wall (1080), suggesting that they were either part of a contemporary build or later additions. To the western side of wall (1080) an upper niche [1071] (0.3 m wide, 0.4 m deep, and 0.28 m deep) was filled with sandy silt (1070) (Figure 11.20). This roughly circular opening was built or moulded into the wall and was sunk 0.3 m into the pisé, at a roughly 45° angle. Just above the level of floor deposit (1376), almost directly under niche [1071], there was a possible post setting [1398] (0.1 x 0.1 x 0.3 m deep) filled with silt (1387). This feature sloped steeply back into the wall and was v-shaped in profile, indicating it could have taken a shaped timber, perhaps as a roof support, or a ladder.

To the east of wall (1080) a niche [1068] (0.3 x 0.2 x 0.1 m) filled by (1064) was cut (not moulded) into the pisé of the wall (Figure 11.20). It was irregular in shape yet had a flat base. Directly below [1068] there was a smaller moulded feature [1397] filled by sandy silt (1391). As with [1071], [1397] was a roughly circular (0.2 x 0.18 m) moulded feature, running straight back into the wall for 0.20 m. No distinction could be made between the fills of these niches.

After the final cleaning of the surface of the pisé wall (135=1394) a number of possible post-holes were revealed as dark silty depressions in the northern stretch of the wall. These may, however, represent the natural accumulation of material into depressions within the wall, although post-holes internal to the wall fabric were noted within Structure O19 directly to the south. As yet, they have not been given context numbers, nor have they been excavated.

11.3 Sedimentary analysis

Two samples were taken from wall (135=1394) in O12, which are similar to each other in terms of their sedimentary characteristics. The data, results and interpretation are provided in Chapter 41.6.

11.4 Chipped stone

The sample (n=2244 pieces) includes material from 13 out of the 37 contexts with chipped stone in Structure O12. By weight, the sample (9475 g) constitutes 34% of the chipped stone bulk finds from this structure. The

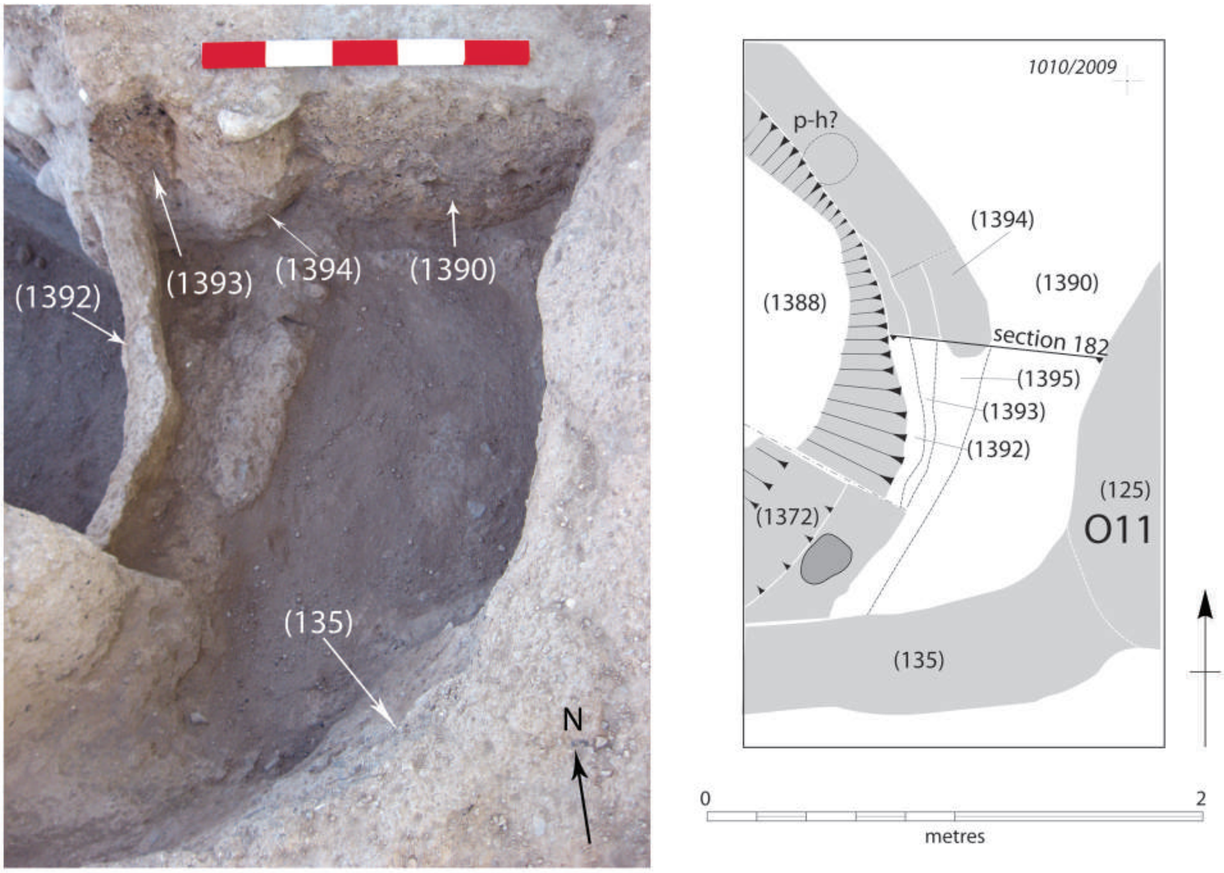


Figure 11.19 Photo of the sondage at the eastern end of Structure O12 (scale 0.5 m) and the corresponding plan with indicated context numbers.

Figure 11.20. Niches [1071], [1068] and [1397] and moulded post-hole [1398] in south-facing face of wall (135=1394). Scale 2.0 m.

composition of the assemblage is provided within Chapter 39.11; a sample of artefacts is illustrated in Figure 11.21.

11.5 Interpretation

Structure O12 is an elliptical structure with an internal sub-division creating two 'rooms' of different floor areas. It has a complex history, with at least two major styles of floor: one with stone uprights that had probably supported a raised floor, and one with a mud-plaster surface containing a cup-hole mortar. Several modifications were made to its walls and the structure appears to have been deliberately filled in.

The excavation of the wall sondage through the wall of Structure O12 provided some information regarding the construction history, but full interpretation is not possible in light of the small area exposed. The extent to which Structure O12 would have been upstanding from the original ground level remained unclear. The depth of floor (1388) at 1.5 m below the present ground surface suggests that Structure O12 was at least, in some part, subterranean.

Wall (135=1394) of Structure O12 and wall (134) of Structure O19 to the south appear to be the same build at the level exposed by the excavation. However, the investigation of the walls of Structure O12 demonstrated that wall (135=1394) had a complicated construction history, some of which may have predated wall (134). The sondage demonstrated at least two further skins of mud-plaster walling, (1392) and (1372). These had followed the construction of an initial wall (135=1394). Wall (135=1394) appeared to have a butt end, suggesting that there may have been an entrance at the eastern end of the structure. The addition of walls (1392 and 1372) reduced the internal area of the structure and a sub-dividing wall (1080) had been inserted. The walls and associated fixtures, such as a bench/buttress (1396) and the ramp over the southern end of the wall (1080), indicate a significant architectural development within Structure O12.

Floor (1388) was only reached in the eastern half of the structure. This floor had been constructed contemporaneously with internal wall (1080) and the associated faces of the northern and southern walls of Structure O12.

Floor (1376), reached in the west room, was a later insertion because it butted against the walls. Additionally, the tops of upright, notched stones, visible in floor (1376), suggest that there is at least one substantial preceding phase, with a floor supported by beams running between the notched stone uprights. As no floor was encountered in the eastern room at the level of (1376), it is tempting

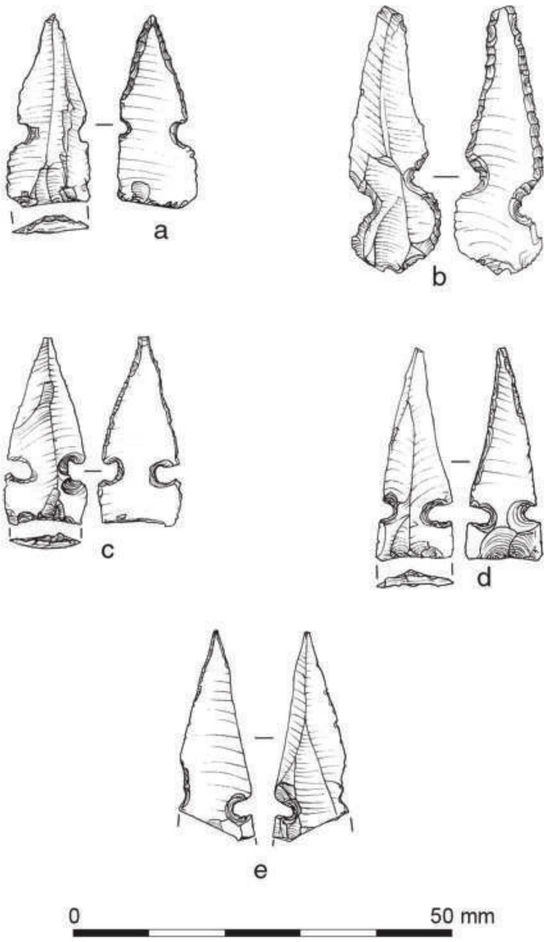


Figure 11.21 (a–e) El-Khiam points from context (484) Structure O12 (SF 794).

to see Structure O12 as having a split-level. It is possible that there is a floor in the western room at the same level as (1388) and that all subsequent floors were stepped either side of wall (1080). In this scenario floor (1368) in the east room would be contemporary with floor (1376) to the west, but is impossible at present to relate the floors on either side of partitioning wall (1080).

The shallow post-holes (1377, 1381 and 1379), clustered in the corner of floor (1376) where wall (1080) met the northern wall of Structure O12, may have been created by the placing of a ladder, or steps, up against wall (1080) for access between the two rooms of O12. A pestle (SF2259) and serrated flint flake (SF2260) might have been deliberate placements within these post-holes. The purpose of the niches in the interior face of the northern wall (135=1394) of Structure O12 is difficult to interpret. As proposed for similar features in other structures (e.g. O56), these features may represent storage areas, or relate to the means of getting in and out of the structure.

A period of abandonment is represented by the deposition of a thick mud deposit (1374) on the floor (1376) in the west room, followed by further dumping episodes (1370, 1365, 1362) and the accumulation of silt deposits (832, 861) across the whole structure. Mud-plaster floors (853 and 809) were created, which had a poor survival. Patches of these were scorched, suggesting the use of open floor areas as hearths, or at least for placing hot ashes or charcoal. A charcoal-rich silt (847) on these floors is the most recent remaining occupation deposit within the structure. Above this, the structure appears to have been primarily used as a dump, initially for (484) with a high concentration of burnt stone and ashy lenses. The deposits above this (152, 163, 171, 417, 420, 478, 492) have a high frequency of pisé lumps suggesting deliberate backfilling using collapsed wall and roof material, either from Structure O12 itself, or elsewhere on the site. Scattered within these dumped deposits were a number of human bone fragments (e.g. SF670, SF689, SF692, SF693, SF694, SF695), seeming to indicate that human skeletal material had been displayed within the structures that provided the dumped material. All of these were grouped into O44, most likely being from a single skull, other than SF689, the fragment of a human femur. Alternatively these skeletal fragments might be from a re-deposited burial.

12. Structures O11, O20, O23 and O106

12.1 Location and relationship with other structures

Structure O11 is located towards the southern end of the 2008–2010 trench, close to the eastern limit of the excavation (Figure 12.1). To the west of Structure O11 is a small cellular structure (O106). To the south Structure O11 is less clearly defined and its deposits merge with those of Structures O23 and O20. Given the clear relationships between these structures they are described together within this Chapter. This group of structures is surrounded by, Structures O45 to the northwest, O116 and O53 to the north, O12 to the west, O19, O104 and O22 to the south, Area O103 to the southeast, and Structure O106 adjacent

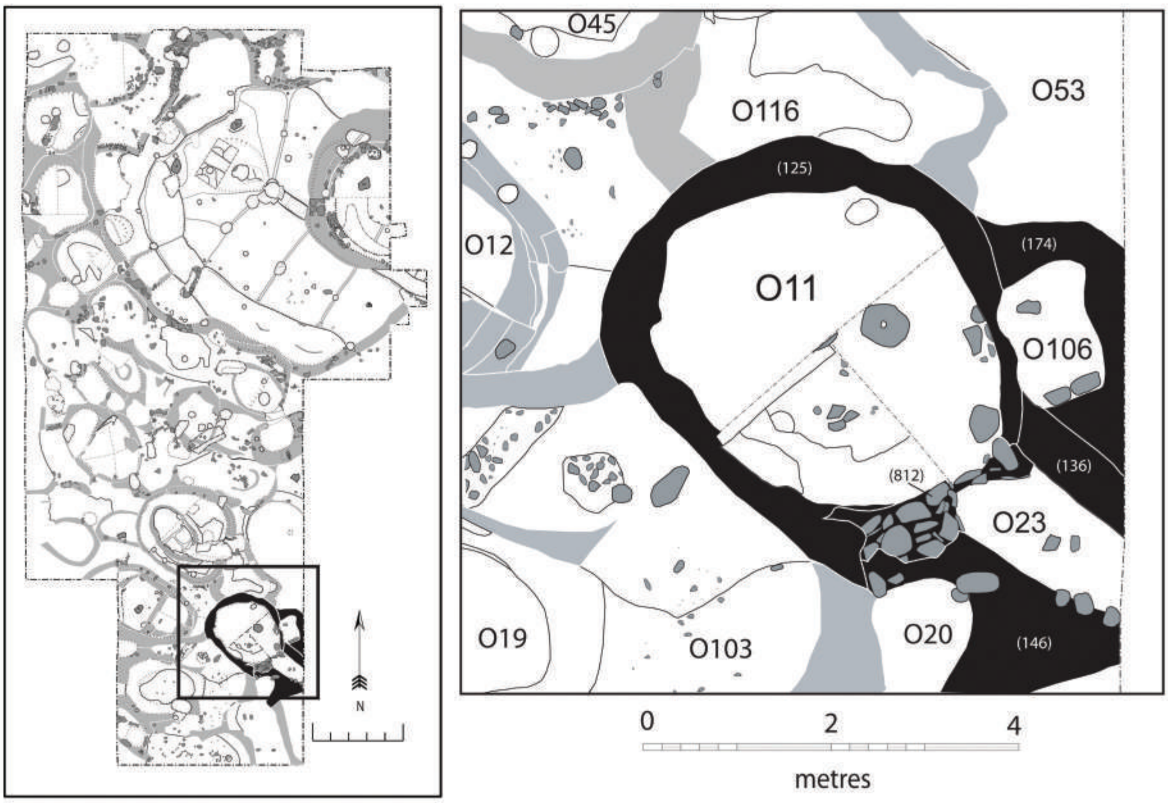


Figure 12.1 Location of Structures O11, O20, O23 and O106, and plan showing their relationships with surrounding Objects.

Figure 12.2 View of Structures O11, O20, O23 and O106 at the cessation of excavation. Scale 1.0 m.

to the eastern edge of the trench. The chronological relationship between Structure O11 and most of these other structures is difficult to determine because of their limited stratigraphic relationships at the depths reached by excavation. However, a sondage sunk between the walls of Structure O12 and O11 suggested Structure O11 was built later, because the construction cut for Structure O11 truncated the wall of Structure O12. This relationship was not fully resolved, however, and the wall sondage proved more useful in highlighting the architectural complexity of Structure O12. The construction cut for Structure O11 also cut the upper horizons of Area 103. Unfortunately it was not possible to establish the relationships between the walls of Structure O11 and those of Structures O106 and O116. A view of Structures O11, O20, O23 and O106 is provided in Figure 12.2 and the stratigraphic matrix in Figure 12.3. Table 12.1 lists the excavated contexts. Tables 12.2 and 12.3 list the bulk and small finds, respectively.

12.2. Description of the excavated deposits

The outline of the light yellow-brown pisé wall (125) that defines Structure O11 became visible as soon as the overburden deposits (1 and 123) were removed. To the southeast, wall (125) was partially obscured by clusters of stone rubble (131) and (150). Removal of overburden (123) also exposed a cup-hole mortar (SF31) that was subsequently seen to be roughly central to Structure O11. A group of metatarsal and phalange fragments (138) were found immediately below (123).

Structure O11 was revealed as being elliptical in shape, with the long axis orientated roughly northwest–southeast enclosing a space of 4.35 m x 3.10 m. The latest surviving deposit enclosed by its walls was a light grey-brown sandy silt (126). Below this deposit there was a small patch of consolidated silt that may have been remnants of a floor (130), although it is possibly the result of water puddling.

After removal of (130), excavation inside the structure was undertaken in diagonally opposed quadrants to improve spatial resolution in recording and sampling, and to gain running sections through the diffuse upper infill deposits. At the top of this sequence was a pit [402], 0.31 m x 0.22 m x 0.16 m deep, filled by a charcoal-rich silt (403). Below (130) and pit-fill (403), the structure contained a homogeneous grey-brown silt. This was excavated in four *c.* 10 cm thick spits within the two opposing quadrants, (400=155), (167=160), (176=161) and (178=162). This silt probably entered the structure during a period of abandonment with a higher concentration of chipped stone in the top spit (155=400) (Table 12.2). The only small find in this series of contexts was a green, stone bead SF193 (Figure 12.4). Towards the base of this silt, underlying

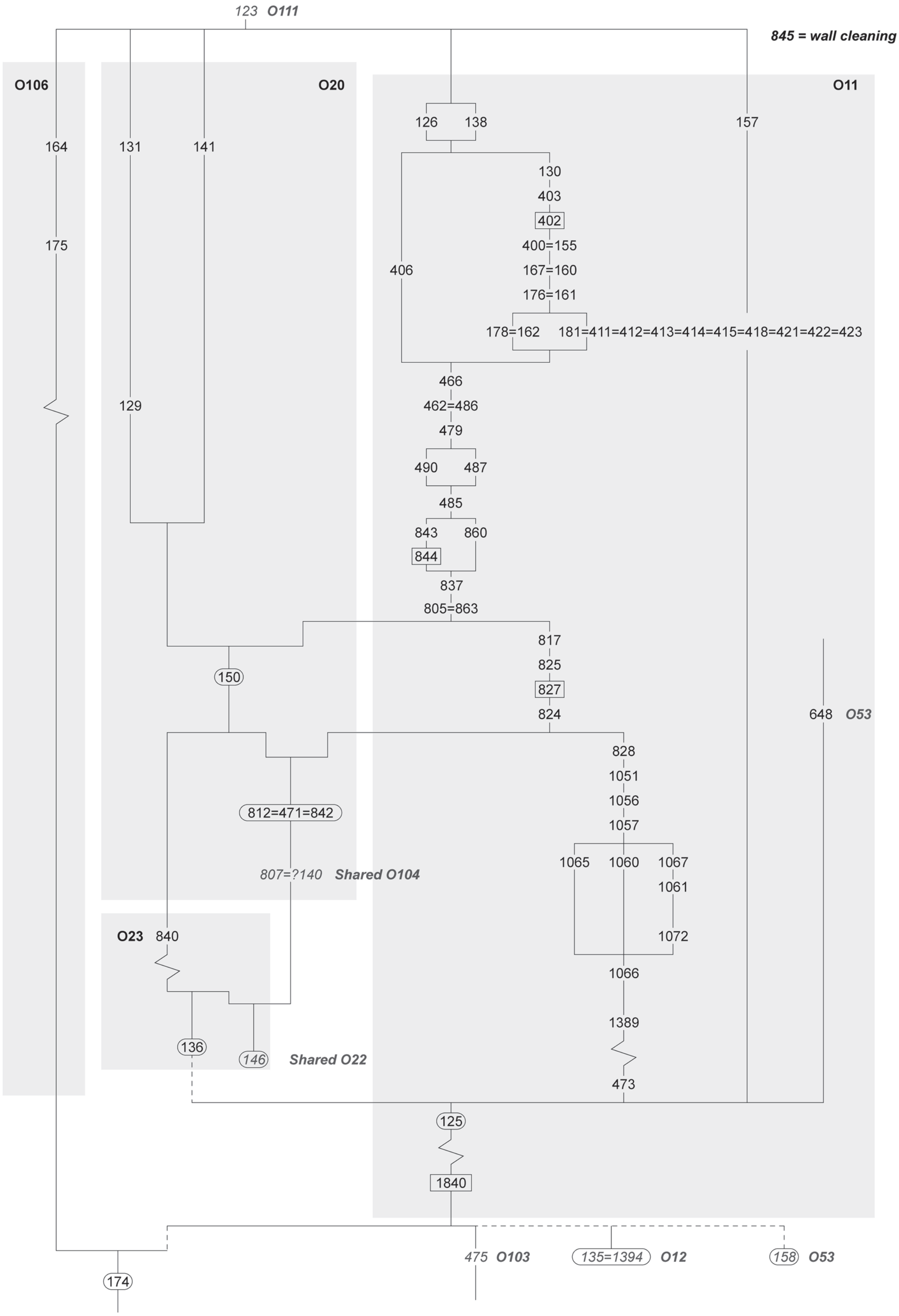


Figure 12.3 Stratigraphic matrix of deposits revealed within Structure O11.

Table 12.1 Contexts excavated forming and filling Structures O11, O20, O23 and O106 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
125	light yellowish-brown compact pisé	pisé wall of structure
126	mid-greyish-brown sandy silt	silt accumulation inside structure
129	loose light grey ashy-silt with brown mottling	silt accumulation inside structure
130	friable greyish-brown sandy silt	remnants of a possible floor surface but more likely the result of water puddling
131	greyish-brown sandy silt with a high concentration of stone rubble	tumbled structural rubble
136	light yellowish-brown sandy pisé	pisé wall of structure
138	semi-articulated metatarsals and phalanges, probably animal	truncated fragmentary deposit
141	mid-greyish-brown fine silt with occasional small stones	silt accumulation inside structure
150	sandstone and granite boulders with a light yellowish-brown pisé bond	blocking of the corridor
155	mid-greyish-brown sandy silt with yellow mottling	silt accumulation inside structure
160	mid-greyish-brown sandy silt with yellow mottling	silt accumulation inside structure
161	mid-greyish-brown sandy silt with yellow mottling	silt accumulation inside structure
162	dark greyish-brown and light greyish-brown sandy silt with yellowish-brown patches	silt accumulation inside structure
164	mid-greyish-brown sandy silt with yellowish-brown mottling	deliberate infilling of structure
167	mid-greyish-brown sandy silt with yellowish-brown lenses	silt accumulation inside structure
174	yellowish-brown pisé	pisé wall of structure
175	greyish-brown sandy silt with pisé lenses	deliberate infilling of structure
176	mid-greyish-brown sandy silt with yellow mottling	silt accumulation inside structure
178	mid-greyish-brown sandy silt with yellow mottling	silt accumulation inside structure
181	light grey sandy silt with a high concentration of burnt stone	midden containing burnt stone and articulated remains of several birds of prey
400	mid-greyish-brown sandy silt with yellow mottling	silt accumulation inside structure
402	sub-circular cut with steep sides and a concave base	shallow rubbish pit
403	greyish-brown sandy silt with frequent charocal	charcoal-rich fill of pit
406	greyish-brown sandy silt	silt accumulation inside structure
411	semi-articulated animal bones	avian remains in midden 181
412	semi-articulated animal bones	avian remains in midden 181
413	semi-articulated animal bones	avian remains in midden 181
414	semi-articulated animal bones	avian remains in midden 181
415	semi-articulated animal bones	avian remains in midden 181
418	semi-articulated animal bones	avian remains in midden 181
421	semi-articulated animal bones	avian remains in midden 181
422	semi-articulated animal bones	avian remains in midden 181
423	semi-articulated animal bones	avian remains in midden 181
462	light yellowish-brown sandy-clay with pisé mottling	rubble collapse or dump inside structure
466	mid-greyish-brown sandy silt	silty occupation over floor
471	limestone and granite boulders	blocking/ramp of the entrance
473	greyish-brown mud plaster	wall facing
479	light grey sandy silt with yellow patches	rubble collapse or dump inside structure
485	mid-greyish-brown sandy silt	silty occupation over floor

Table 12.1 Contexts excavated forming and filling Structures O11, O20, O23 and O106 with sedimentary descriptions and interpretations continued...

Context	Description	Interpretation
486	mid-greyish-brown sandy silt with yellow patches	rubble collapse or dump inside structure
487	mid-greyish-brown sandy silt with yellow patches	rubble collapse or dump inside structure
490	light greyish-yellow sandy silt	possible pisé wall collapse
805	mid-greyish-brown sandy silt	occupation deposit
807	mid-greyish-brown ashy-silt	silt accumulation inside structure
812	roughly hewn stones in a light yellowish-brown pisé bond	blocking/ramp of the entrance
817	greyish/yellowish-brown sandy silt	degraded mud-plaster floor
824	mid-greyish-brown sandy silt	occupation deposit
825	greyish-black ashy sandy silt	ashy fill of pit or shallow basin
827	oval cut with straight sides and a concave base	shallow basin or a pit
828	mid-yellowish-brown silt	degraded mud-plaster floor surface
837	compact light yellowish-brown silty sand with burnt stone inclusions	mud-plaster floor
840	loose mid-greyish-brown ashy-silt	ashy-silt accumulation within the entrance area of the structure
842	light greyish-brown sandy silt	blocking/ramp of the entrance
843	mid-greyish-brown sandy silt	fill of a shallow feature in mud-plaster floor
844	sub-circular cut with shallow sides and a concave base	shallow feature in mud-plaster floor
845	mid-greyish-brown sandy silt	mixed deposit cleaned off the face of the wall
860	dark red-grey sandy silt with ashy burnt mud plaster	burnt mud-plaster hearth on floor
863	greyish-brown sandy silt	occupation deposit
1051	dark greyish-brown sandy silt with a high concentration of stone rubble	levelling deposit
1056	mid-greyish-brown ashy-silt with pisé rubble	levelling deposit
1057	dark greyish-brown ashy-silt	silt accumulation inside structure
1060	mid-yellowish-brown pisé	wall collapse
1061	light greyish-brown ashy-silt	ashy deposit containing human bone
1065	roughly hewn stones	possible stone setting for a hearth
1066	light yellowish-brown mud plaster	mud-plaster floor in the structure
1067	mid-yellowish-brown silt	silty occupation over floor
1072	mid-greyish-brown sandy silt	silty occupation over floor
1389	yellowish-brown mud plaster	partially surviving floor
1840	cut with straight sides	cut for wall

(176=161) and located in the western quadrant, there was a dense spread of burnt stone (181) and bird bones, including (and perhaps entirely) those from raptors, some of which were articulated. Groups of bones were given the following context numbers: (411), (412), (413), (414), (415), (418), (421), (422), (423) (Figure 12.5). To the southeast of the structure, a *c*. 0.2 m thick layer of slit (406) was removed to better define the southern part of wall (125); it is likely that this silt is equivalent to the internal silt deposits (400=155), (167=160), (176=161) and (178=162). Layer (406) overlay both internal (466) and external (150) deposits.

Below silt deposits (181), (178=162) and (406) there was a mid-grey-brown silt (466) that sealed a mixed pisé-rich deposit (462=486). Below this, there was a silt-rich deposit with pisé inclusions (479) that was only present in the northwest quadrant, and below this level excavation in quadrants ceased: (479), together with underlying deposits (490) and (487), appeared to represent a period of collapse of the structure once it had gone out of use. Deposit (490) was a mass of pisé rubble concentrated on the western side of the structure, most probably deriving from wall collapse (Figure 12.6). Sealed by this sequence of collapse layers there was a fine, mid-grey-brown, charcoal rich silt (485) that had accumulated on an underlying mud-plaster floor (837, Figure. 12.8). Silt (485) contained a number of burnt stones within the centre of the floor area. Two marine shell

Table 12.2 Quantities of bulk finds from Structures O11, O20, O23 and O106, by material and context number.

Object 11	Volume of sediment (l)				Weight of bulk finds per material (g)								
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Animal bone	Marine shell	Other shell	Plaster/Pisé	Charcoal	Misc.
126	601.0	50.0	570.0	1.0	2079.6	140.0	6.1	222.9	0.0	32.6	0.0	0.0	0.0
129	11.0	10.0	0.0	1.0	200.0	0.0	0.0	10.0	0.0	30.3	0.0	10.0	0.0
130	7.0	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
141	41.0	30.0	10.0	1.0	81.4	0.0	0.0	33.3	0.0	20.9	0.0	20.0	0.0
150	11.0	10.0	0.0	1.0	39.2	0.0	0.0	6.9	0.0	6.3	0.0	0.1	0.0
155	192.0	60.0	130.0	2.0	620.6	200.0	0.0	52.7	0.0	141.9	0.0	0.0	10.0
160	112.0	20.0	90.0	2.0	284.0	0.0	0.0	38.0	0.0	18.9	0.0	0.1	0.0
161	102.0	20.0	80.0	2.0	90.0	0.0	0.0	30.0	0.0	0.0	0.0	10.0	0.0
162	101.0	20.0	79.0	2.0	224.9	0.0	0.0	40.6	0.0	49.4	0.0	0.0	0.0
164	61.0	10.0	50.0	1.0	102.2	0.0	0.0	10.9	0.0	10.2	0.0	0.0	0.0
167	68.0	20.0	46.0	2.0	200.4	0.0	0.0	94.4	0.0	44.2	0.0	0.2	0.0
176	106.0	30.0	74.0	2.0	198.1	0.0	0.0	94.6	0.0	38.8	0.0	0.0	10.0
178	11.0	10.0	0.0	1.0	247.0	0.0	0.0	33.8	0.0	13.3	0.0	0.2	0.0
181	239.0	210.0	28.0	1.0	907.4	2744.6	0.1	590.4	0.0	1571.6	0.0	10.5	0.0
400	163.0	30.0	130.0	3.0	1438.2	0.0	20.0	742.3	0.4	55.2	0.0	0.1	0.0
403	6.0	5.0	0.0	1.0	40.2	0.0	0.0	2.2	0.0	34.0	0.0	0.1	0.0
406	6.0	5.0	0.0	1.0	11.7	0.0	0.0	2.3	0.0	3.2	0.0	0.1	0.0
462	222.0	20.0	200.0	2.0	618.0	0.0	0.0	116.8	1.0	50.6	0.0	10.0	0.0
466	2.0	1.0	0.0	1.0	58.2	0.0	0.0	7.7	0.0	24.1	0.0	0.0	0.0
471	1.0	1.0	0.0	0.0	38.9	0.0	0.0	2.6	0.0	13.1	0.0	0.0	0.0
479	111.0	10.0	100.0	1.0	476.9	0.0	0.0	28.1	0.0	13.2	0.0	1.0	0.0
485	177.0	168.0	0.0	9.0	631.8	0.0	0.1	67.1	0.0	67.8	0.0	96.0	0.0
486	242.0	10.0	230.0	2.0	402.8	0.0	0.4	62.0	0.0	40.4	0.0	1.0	0.0
487	83.0	80.0	0.0	3.0	247.5	0.0	0.0	39.8	0.0	68.9	0.0	10.3	0.0
490	111.0	30.0	80.0	1.0	172.5	0.0	0.0	26.3	0.0	14.4	300.0	1.1	0.0
805	4.0	3.0	0.0	1.0	74.9	0.0	0.0	8.4	0.5	4.7	0.0	0.1	0.0
807	16.0	15.0	0.0	1.0	125.7	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0
817	222.0	60.0	160.0	2.0	314.8	0.0	10.0	36.3	0.0	8.0	0.0	0.0	0.0
824	22.0	20.0	0.0	2.0	21.7	0.0	0.0	5.1	0.0	1.9	0.0	0.0	0.0
828	277.0	60.0	215.0	2.0	3954.0	0.0	1.0	125.8	0.0	14.8	0.0	0.0	0.0
837	227.0	30.0	195.0	2.0	298.5	0.0	0.0	35.6	0.0	0.0	0.0	20.1	0.0
840	31.0	30.0	0.0	1.0	446.6	0.0	0.2	17.1	0.0	138.6	0.0	20.0	0.0
842	11.0	10.0	0.0	1.0	50.5	0.0	0.0	3.7	0.0	3.1	0.0	0.0	0.0
843	4.0	3.0	0.0	1.0	29.1	0.0	0.0	1.0	0.0	6.9	0.0	0.0	0.0
845	14.0	0.0	14.0	0.0	150.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0
863	202.0	60.0	140.0	2.0	819.0	0.0	10.0	74.6	0.0	11.9	0.0	0.2	7.1
1051	92.0	60.0	0.0	32.0	344.2	0.0	0.0	44.6	0.0	16.9	0.0	0.3	0.0
1056	202.0	60.0	140.0	2.0	491.7	940.0	0.0	83.8	0.0	17.1	0.0	0.8	0.0

Table 12.2 Quantities of bulk finds from Structures O11, O20, O23 and O106, by material and context number continued...

Object 11	**Volume of sediment (l)**				**Weight of bulk finds per material (g)**								
Context	**Total volume**	**Flot. sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Ground stone**	**Other worked stone**	**Animal bone**	**Marine shell**	**Other shell**	**Plaster/Pisé**	**Charcoal**	**Misc.**
1057	262.0	60.0	200.0	2.0	718.6	0.0	0.1	155.2	1.0	27.6	0.0	0.6	0.0
1066	96.0	30.0	65.0	1.0	102.8	0.0	0.0	33.8	0.0	0.8	0.0	10.1	0.0
1067	82.0	80.0	0.0	2.0	192.3	0.0	0.0	119.4	0.0	88.9	0.0	0.2	0.0
1072	15.0	15.0	0.0	0.0	1.2	0.0	0.0	7.2	0.0	0.0	0.0	0.0	0.0
1389	51.0	30.0	20.0	1.0	338.2	0.0	0.0	25.0	0.0	1.0	0.0	20.2	0.0
Total	4617.0	1493.0	3046.0	98.0	17885.3	4024.6	48.0	3146.8	2.9	2705.5	300.0	243.4	27.1

Table 12.3 Quantities of small finds from Structures O11, O20, O23 and O106, by material and context number.

Object 11	**Quantities of small finds per material (nos)**										
Context	**Chipped stone**	**Ground stone**	**Other stone**	**Worked bone**	**Unworked animal bone**	**Disarticulated human bone**	**Bone beads**	**Stone beads**	**Marine shell beads**	**Unworked marine shell**	**Total small finds**
126	0	0	0	0	0	1	0	0	0	1	2
129	0	0	1	0	0	0	0	0	0	0	1
131	0	2	0	0	0	0	0	0	0	0	2
150	0	2	0	0	0	0	0	0	0	0	2
155	0	0	0	0	0	0	0	1	0	0	1
181	0	1	0	0	0	0	0	0	0	0	1
462	0	0	0	0	0	0	0	1	0	0	1
479	0	1	0	0	0	0	0	0	1	0	2
485	0	0	0	0	0	0	0	0	2	0	2
490	0	0	0	0	0	0	0	1	0	0	1
807	0	1	0	0	0	0	0	0	0	0	1
817	0	0	2	0	0	0	0	0	1	1	4
828	0	0	0	1	0	0	0	0	0	0	1
837	0	1	1	0	0	0	0	0	0	0	2
863	0	0	0	0	0	1	0	2	1	0	4
1051	0	2	0	0	0	0	0	0	0	0	2
1056	0	1	0	0	0	0	0	0	0	0	1
1057	0	2	0	0	0	0	0	1	0	0	3
1066	0	1	0	0	0	0	0	0	0	0	1
1067	1	0	0	0	0	1	0	0	0	0	2
1072	2	3	0	0	1	1	0	0	0	0	7
Total	3	17	4	1	1	4	0	6	5	2	43

Figure 12.4 Green stone bead SF193 from deposit (155).

beads were also found within this deposit (Figure 12.7). Also above the floor (837) and below (485) was a discrete deposit, *c.* 0.5 m in diameter, consisting of scorched mud plaster or pisé and ashy residue (860), spatially associated with the burnt stones and surrounded by a thin crust of trampled material. Before (837) was reached the wall faces of (125) were cleaned (845).

Floor (837) was a firm and exceptionally well-preserved, yellow-brown, mud-plaster surface with a fragmented and burnt stone matrix (Figure 12.8; Figure 12.9A). Measuring approximately 0.05 m thick, the surface lapped up over wall (125) of Structure O11 and contained an integral small basin or pit [844] that was filled with a silty deposit (843). From this level all subsequent interior deposits within Structure O11 were only removed from the southeast half of the structure. This generated a southeast facing section (S141) through floor (837) and underlying deposits, from which a block sample SA6552 was taken for micro-stratigraphic analysis (Figure 12.9B)

Below floor (837) there was another fine, inclusion-free, silt deposit (863 = 805) that overlapped some of the stones of (150), interpreted as deriving from occupation that sealed a patchy and degraded pisé floor surface (817). Below this floor there was an occupation deposit (824) into which a shallow basin [827] had been cut, and which had a silty fill (825). Context (824) was above a further degraded mud-plaster floor surface (828), as well as a stone wall/ramp (812=471=842).

Within the confines of wall (125) a silt, rich in stone rubble (1051) lay below (828). Context (1051) sealed an ash-rich rubble (1056), containing pisé lumps. Underlying this was an ashy silt (1057) that was relatively inclusion-free, except for occasional pisé rubble. These deposits sealed stone setting (1065) located against the eastern wall of the building on a mud-plaster floor (1066). Deposit (1065) consisted of four moderately sized rocks arranged in a semi-circle, possibly associated with a circular flat stone that had evidently been roughly flaked into shape and inserted into the pisé wall (125) directly above (1065). As the roughly circular stone showed signs of scorching it is possible that (1065) was a small hearth setting.

Also underlying ashy silt (1057) was a wedge of pisé (1060) that had split from the wall and tipped towards the northeast on the eastern edge of the structure. On the same horizon as (1060) and (1065) was a fine silt (1067) which overlay an ashy silt (1061) that contained both burnt and unburnt human bone fragments. Below (1061) was an occupation deposit (1072), containing a number of artefacts that may have been placed on the underlying floor (1066) (Figures 12.10 and 12.11). These include a ground-stone implement (SF1742), a hammerstone (SF1743), a flint blade (SF1746), and two ground-stone pestles (SF1744), (SF1745). Associated with this collection of placed objects was a concentration of crushed human and animal bone.

Floor (1066) was the second well-preserved floor surface within Structure O11. This firm mud-plaster floor was best preserved on the eastern side and contained a cup-hole mortar set just to the east of centre of the structure (Figure 12.10). To the west of this cup-hole mortar was a further large stone set into the floor, running under the section (S141, Figure 12.9B) created by unexcavated deposits to the north. This stone is located close to the centre of the structure and may be another cup-hole mortar. The visible portion contains small circular indents, apparently a product of natural inclusions within the matrix of the stone. At the west end of this stone, floor (1066) was scorched orange-yellow, likely as a result of activity associated with the formation or deposition of ash (1061) (see above).

Further excavation of a southwest quadrant through floor (1066) revealed a less well-preserved yellow-brown, patchy mud-plaster surface (1389). Removal of floor (1389) revealed a number of closely laminated patchy floors suffering varying degrees of scorching. These were not given context numbers. At this point excavation ceased within Structure O11, although it was apparent that the base of the sequence of deposits within the building had not been reached. At this level the internal face of wall (125) was covered by a layer of greyish-brown mud plaster (473), suggestive of re-surfacing, or coating, of the interior of the structure walls, and possibly indicating an intentional use of gypsum within the coating. Similar coatings or thin layers of mud plaster were better preserved in Structure O12 to the west. Deposit (473) was not removed as it is sealed by the sequence of floor layers that remain to be excavated.

Figure 12.5 A — Bird bones in burnt stone-rich deposit (181), scale 0.5 m; B — close up of articulated bird bone, scale 0.1 m.

Structures O20 and O23

At the southeast edge of Structure O11 a series of rubble deposits and stone constructions were associated with the sequence of floors and occupation deposits described above. These were clearly visible following removal of the overburden deposits (1 and 123) and are referred to as Structures O20 and O23 (see Figure 12.1). The latest deposit within Structure O20 was a stone rubble layer (131). This consisted of loose blocks of worn pink granite and limestone, and contained part of cup-hole mortar (SF176), the remainder of which was found in a concentration of boulders and rocks (150, Figure 12.10) below, and possibly a continuation of, (131). Between rubble layers (131) and (150) an ash and charcoal rich silt containing frequent burnt stones (129) was present, possibly indicating *in situ* burning in this location. Rubble (150) was also overlain by both fine silt (141) and silt (805=863) from Structure O11.

Below stones (150) was a substantial sloping stone structure (812=842=471), which formed a shallow ramp overlying and blocking the opening in the upper levels of wall (125) of Structure O11. Wall/ramp (812=842=471) was also partly overlain by the internal occupation deposit (824) of Structure O11 (Figure 12.12). This relationship suggests that (812=842=471) may have been built at the same time as floor (828),

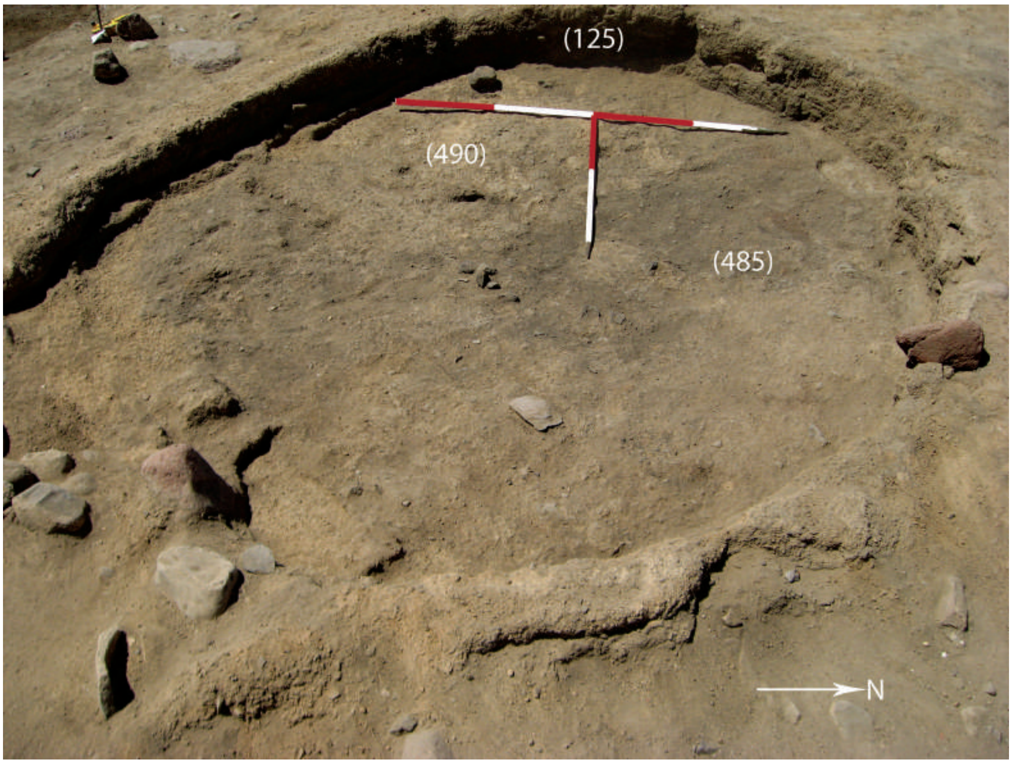


Figure 12.6 Pisé-rich collapse deposit (490) and silty inclusion-free occupation deposit (485). Note the stone concentration in the centre suggesting a hearth setting. Scales 2.0 m x 1.0 m.

Figure 12.7 Marine shell bead SF785 from deposit (485).

which also underlies (824). Underlying wall/ramp (812=842=471) was ashy silt deposit (807), which may be a continuation of deposit (140) (Structure O104, see Chapter 8), which filled the gap between walls (146) and (1400) in Structure O104.

To the southeast of (812=842=471) was linear Structure O23 (Figure 12.1). This structure lies adjacent to the southeast facing opening in wall (125), which was blocked by stones (812=842=471). Structure O23 was defined by pisé walls (136) and (146) (Figure 12.13). Wall (136) joins to wall (125) of Structure O11, while wall (146) separates Structure O23 from Structure O20. Together, these two walls form a corridor running to the opening in Structure O11 from the southeast. The stone Structure O23 contained a single ashy silt deposit (840).

Structure O106

Directly to the east of Structure O11, and exposed after removal of overburden context (123), was an irregular space defined by pisé wall (174) of Structure O106 (Figures 12.1 and 12.10). Within wall (174) there was silt with degraded pisé inclusions (164) representing the latest surviving infilling deposit. Below deposit (164) there was a similar deposit with degraded pisé lenses (175). Wall (174) was highly eroded and difficult to define. A number of large stones revealed within the infill deposits might indicate the presence of more substantial walling at a lower depth. The relationship between Structures O11 and O106 was not fully resolved, although in plan it appeared as if wall (125) had truncated wall (174).

12.3 Sedimentary and micro-stratigraphic analysis

Nine sediment samples were analysed from O11: one of these came from the surrounding wall (125); six samples

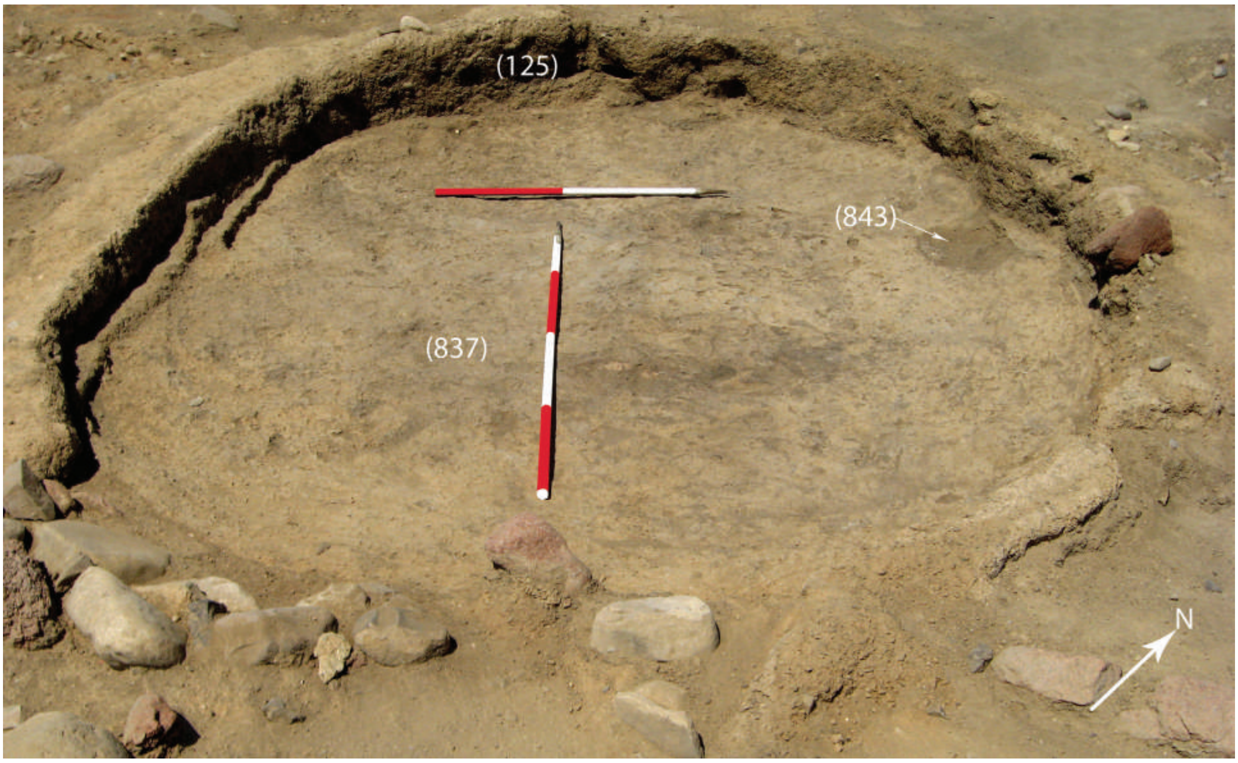


Figure 12.8 Well-preserved floor surface (837). Note the fill (843) of basin [844] in the top right corner of the floor and the floor lapping up against wall (125) to the right. Scales 1.0 m x 2.0 m.

were from the floor (837); and one sample was taken from each of the underlying floors (828) and (817). The multiple samples were taken from floor (837) to explore variation within a single context. The data, results and interpretation are provided in Chapter 41.6.

A block sample SA6552 was taken through deposits located immediately below the mud-plaster floor (837) in the upper horizons of O11 (Figures 12.9B and 12.14). Excavation identified three stratified deposits in this location in Section S141, but analysis split the block into four units (Figure 12.14; Table 12.4). These were, however, only marginally differentiated and contained limited charcoal and other debris. One unit (Unit 3) had a higher frequency of mud-plaster blocks than others, suggesting it may have been a floor laid within an otherwise accumulating silty-deposit. This unit corresponds to deposit (817), which was interpreted as a degraded mud-plaster floor in the field.

12.4 Chipped stone

The sample (n=1034 pieces) includes material from 13 out of the 25 contexts with chipped stone in Structure O11. By weight, the sample (3765 g) constitutes 33% of the chipped stone bulk finds from this structure. The composition of the sampled assemblage is provided in Chapter 39.11.

12.5 Radiocarbon dates

Seven samples were selected for radiocarbon dating from contexts within O11 (Table 12.5). The samples were selected to provide an initial assessment of the absolute dating of the sequence represented in O11 by targeting samples from five contexts throughout the excavated sequence: contexts 466, 837, 824, 828 and 1961. The analysis of these dates, with calibrated values, Bayesian model and chronological interpretation, is provided in Chapter 40.5 (Tables 40.1, 40.2, 41.3; Figure 40.9).

In summary, posterior estimates place the start of activity associated with the excavated contexts of O11 at *12.44–11.36 ka cal BP*, although the oldest samples (Beta-2537376, Beta-290705) within this structure may have been re-deposited from elsewhere at WF16. Estimates for the end of activity indicate that this had ceased by *9.44 ka cal BP*, although this may be too young due to the potential intrusive nature of the dating sample that provided the youngest date (Beta-271683). Our best estimate for the date of the occupation debris of (824) comes from sample Beta-290706. This date is statistically consistent with three dates coming from contexts lower in the sequence, one from (828), a degraded floor surface, and two from (1061), an ashy deposit containing burnt bone. All four of these dates are statistically consistent, providing a calibrated combined value centred on 11.21 ka

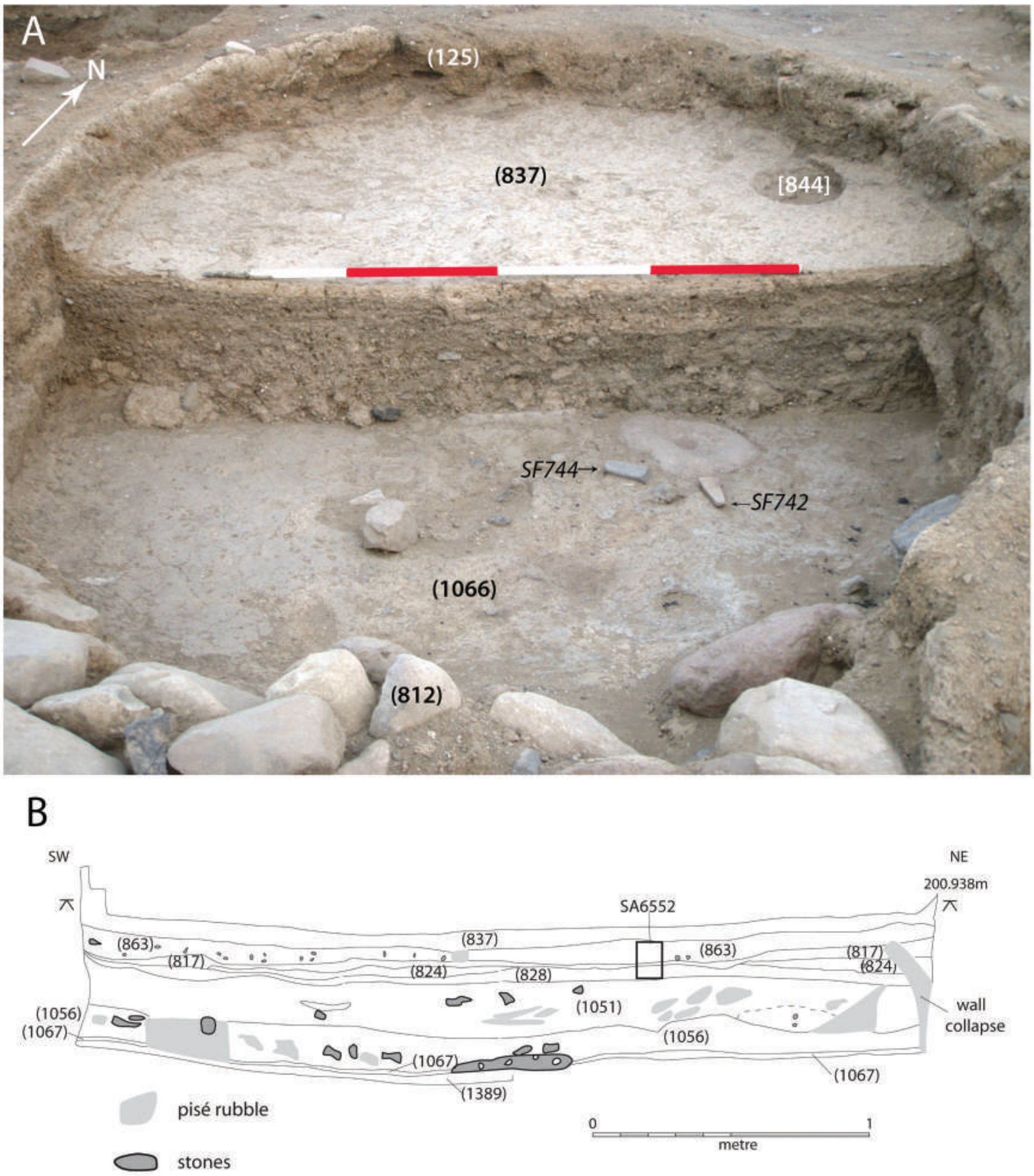


Figure 12.9 A — Floor and make up sequence below well-preserved floor (837), scale 2.0 m; B — Section S141 through floor (837) and underlying deposits to the base of the excavated sequence.

cal BP (χ^2-test: df=3; T=1.7; 5% critical value=7.8) (Table 40.3). We interpret these dates as indicating a relatively rapid accumulation of the stratigraphic sequence between contexts (1061) and (824), although the calibrated date range encompasses a period of roughly two human generations.

12.6 Interpretation

Structure O11 is an elliptical structure with associated Structures (O20 and O23) appearing to form an entrance to the main room. At least three different types of horizons suggest that it may have changed its function through time: a floor (1066) with a centrally placed cup-hole mortar; a floor without mortar (837); and the horizon of bird bones (181). The lowest part of the excavation sequence appears to have accumulated at around 11,200 cal BP; a combination of intrusive younger charcoal (probably from rodent or insect activity) and intrusive older charcoal (probably from the use of 'old pisé' during construction) prevents us providing an estimate for the date of the upper part of the excavation sequence.

Excavation neither reached natural nor any archaeological remains of an earlier structure: all the deposits excavated within Structure O11 appear to relate to its use and occupation,

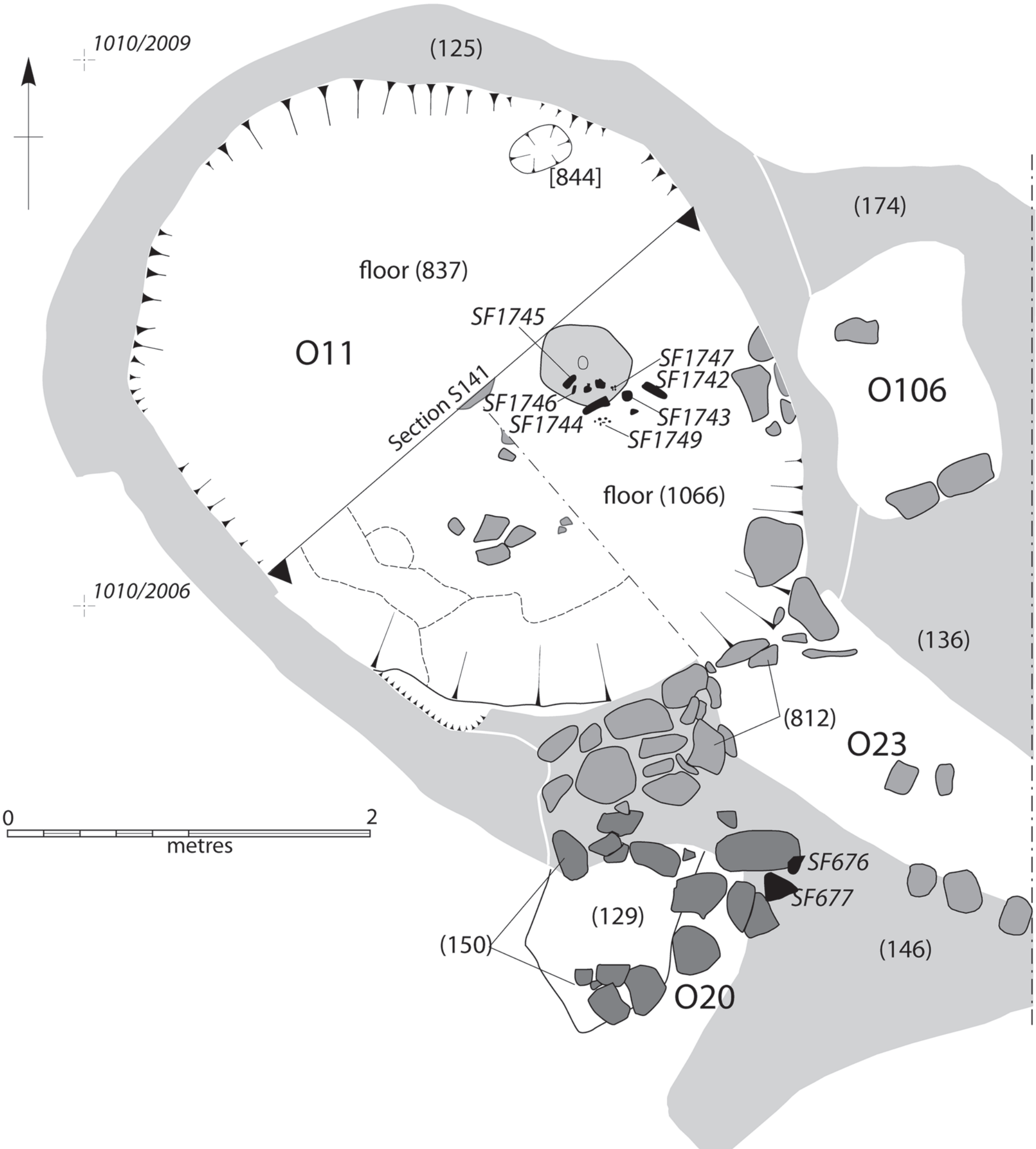


Figure 12.10 Plan of Structure O11 at the cessation of excavation.

and none are visibly intrusive. The basal floor deposits (1389 and the patchy floor remains below) are the earliest contexts that have been partially excavated. The walls, earlier in the construction sequence, have been exposed, but not excavated, and their bases have not been reached. At present we assume that Structure O11 is built in an oval construction cut [1840] that has then been lined with pisé (wall 125). The line of the construction could be seen in the sondage between Structures O11 and O12. There are some small steps in the face of the wall, which may relate to episodes of refurbishment when the wall may have been marginally realigned, or may be part of the original construction technique. As the floor sequence was accumulating within the building we assume it must have become necessary to extend the wall upwards, requiring modification. The wall also appears to have been faced with a coating that was richer in gypsum than the core of the wall (473).

Floor (1066) was fairly well preserved, and contained at least one cup-hole mortar and a number of artefacts, such as pestles SF1744 and SF1745 (1072), which appear to have been placed around this mortar. Deposits immediately above this floor (1072, 1061) contained some fragmentary human remains. Two poorer-quality floors (817, 828) had been constructed above these deposits, followed by a second substantial floor (837). Micro-stratigraphic analysis of block SA6552 indicated that the deposits between the floor horizons contain limited amounts of occupation debris, such as charcoal and bone fragments, being primarily constituted by silt and hence may indicate periods of abandonment of the structure rather than on-going use. Alternatively, the silt may have been deliberately deposited to provide a basis on which to lay mud-plaster floor (837).

Floor deposit (837) was the best-preserved and best-constructed floor layer within the structure. The mud plaster

Figure 12.11 Deposit (1072) highlighting the collection of placed artefacts around the cup-hole mortar and concentrations of crushed bone (1061). Scale 0.2 m.

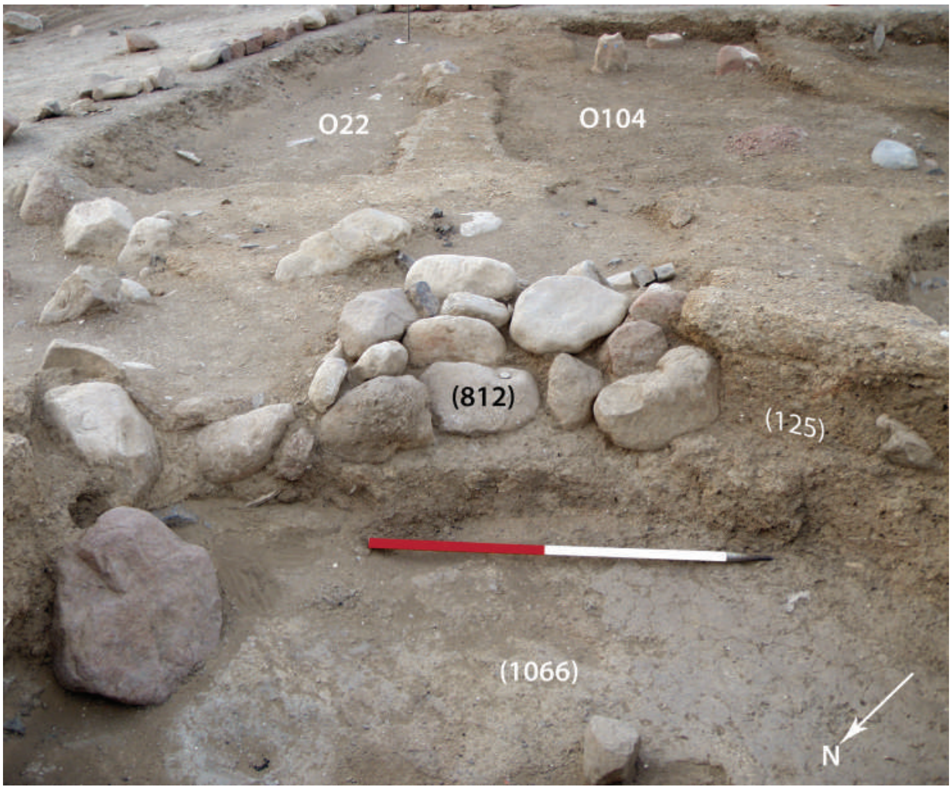


Figure 12.12 Stone structure (812=471=842) over the southern wall (125) of Structure O11. Scale 1.0 m.

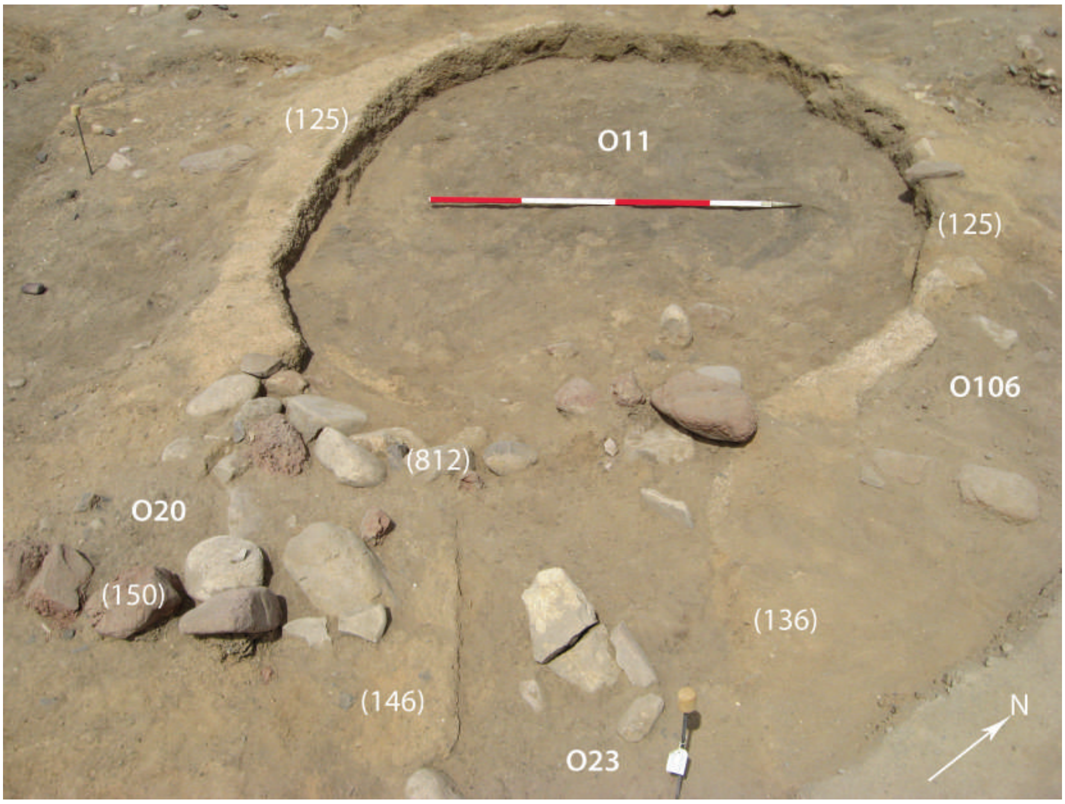


Figure 12.13 Possible blocked entrance made up of walls (136) and (146). Scale 2.0 m.

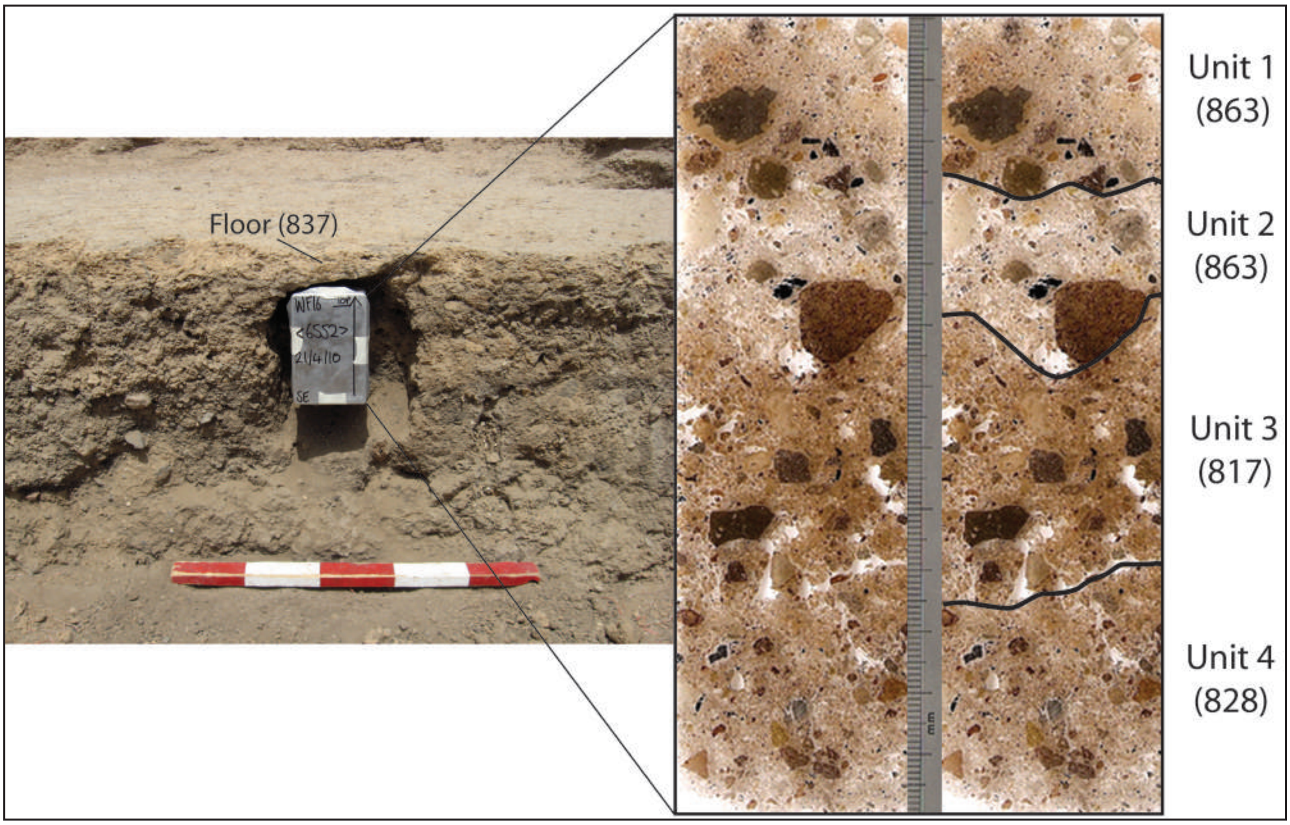


Figure 12.14 Location and microstratigraphy of block sample SA6552. Photo scale 0.5 m.

Table 12.4 Results of the micro-stratigraphic analysis from sample SA6552.

Layer	Particle size/sorting	Anthropogenic remains — charred material	Plant impression	Shell	Plaster/pisé type if applicable	Clean/dirty	Other comments
1	Silty clay loam	5%	<1%	2–5%	Aggregates: Foram in small plaster/pisé aggregate, Type 3 plaster/pisé fragments. Overall <2% pisé/plaster	Dirty	
2	Silt loam	5%		2–5%		Dirty	
3	Silty clay	<1%	<1%	<1%	Plaster layer: *c.*4–5 large plaster aggregates, Plaster Type 1	Dirty	Rough plaster. Large Inclusions. Thick layer
4	Silt loam	5–10%	2–5%	2–5%	Aggregates: Small plaster aggregates. Type 3 plaster/pisé	Dirty	

Table 12.5 Radiocarbon dates and modelled date ranges from Structure O11.

						Chronological model Posterior density estimates cal BP	
Object and Laboratory Code	**Context**	**^{14}C yrs BP**	**Δ^{13}C ‰**	**Taxa**	**Form**	**68%**	**95%**
O11							
Beta-253736	466	10,020±70	-26.7	Salicaceae	Indeterminate	11,590–11,320	11,750–11,250
Beta-290705	837	10,070±50	-23.9	Pistacia	Juvenile	11,690–11,390	11,800–11,320
Beta-271683	824	9070±50	-23.9	Salicaceae	Juvenile	10,260–10,190	10,410–10,170
Beta-290706	824	9790±50	-24.6	Ficus	Juvenile	11,250–11,190	11,290–11,120
Beta-271684	828	9780±50	-25.7	Pistacia	Juvenile	11,240–11,180	11,270–11,100
Beta-271685	1061	9830±50	-26.6	Chenopodiaceae	Mature	11,270–11,200	11,340–11,170
Beta-271686	1061	9730±50	-26.8	Salicaceae	Mature	11,230–11,130	11,250–10,870

of the floor was tempered with a crushed stone matrix creating a very firm surface that lapped up against wall (125). There were no deliberately placed deposits over floor (837), which contained a basin [844] but lacked a cup-hole mortar. As such, this floor may represent a change in function for Structure O11 from an earlier period in which floor (1066) had a cup-hole mortar. A mix of occupation deposits (485) and what appear to be washed-in silts (466) accumulated on the later floor (837) prior to the formation of a horizon containing burnt raptor bones and stone. Interpretation of this dense deposit of bird bones will need to await their identification — the type of birds, whether they were complete skeletons and whether cut marks are evident. One possibility is that these derived from bird carcasses that had been displayed on the upstanding walls of Structure O11 towards the end of its sequence and then had fallen into the interior deposits following abandonment.

The overlying horizons consist of varying silts and may reflect in-wash material during a period of abandonment. The final occupation of the building is represented by a cup-hole mortar (SF31) and a possible vestigial fragment of floor surface (130). It is possible that these are not related to Structure O11, but the absence of any other wall lines at this horizon and the central placement of the mortar relative to wall (125) suggest that it is part of the same sequence. It is therefore probable that the final phase(s) of Structure O11 have been extensively lost by erosion. Given that the occupation history and use of the structure appears to have varied, we do not know if the latest stages of its use were architecturally significant, or whether the final occupation was relatively ephemeral. If we assume that the cup-hole mortar was set into a floor (and this appears to be the case with all examples from the site that are clearly *in situ* below the overburden), then the implication is that this cup-hole mortar would have been accompanied by a solid floor, and that the walls must have once risen to a considerable height above the current ground surface.

The entrance to Structure O11 appears to have been through a passage (Structure O23). The stones (Structure O20) that lie across O23 were initially assumed to be an intentional blocking of O23, but it is possible that they were the remains of a ramp that led down into the structure. It is not entirely clear what floor these entrance structures relate to, and it may be that they were reused at different floor levels. It is possible that the narrow opening cut into the pisé walls was intended to contain a stone-lined hearth formed by (150) and (129).

Wall (174) of structure O106 is apparently truncated by wall (125), and the poorly defined walls of this structure suggest it may have been completely demolished by the time Structure O11 was erected.

13. Structure O52

13.1 Location and relationship with other structures

Structure O52 is a relatively small sub-circular structure located towards the southern end of the trench, close to the western limit of excavation (Figure 13.1). This area of the trench was severely eroded because of the topography of the knoll, which slopes down to the west. To the southwest of Structure O52 is Structure O12, the western extent of which continued into Trench 1 from the 1997–2003 site evaluation (Finlayson and Mithen 2007). To the east is a small sub-circular structure, Structure O115. No stratigraphic relationship could be determined between Structure O52 and these surrounding structures as the space between these structures is made up of pisé rubble, which masks their relationships. To the north of Structure O52 is Structure O72 and a series of degraded silts and walls forming Structure O112. The extent of erosion has made interpretation of these

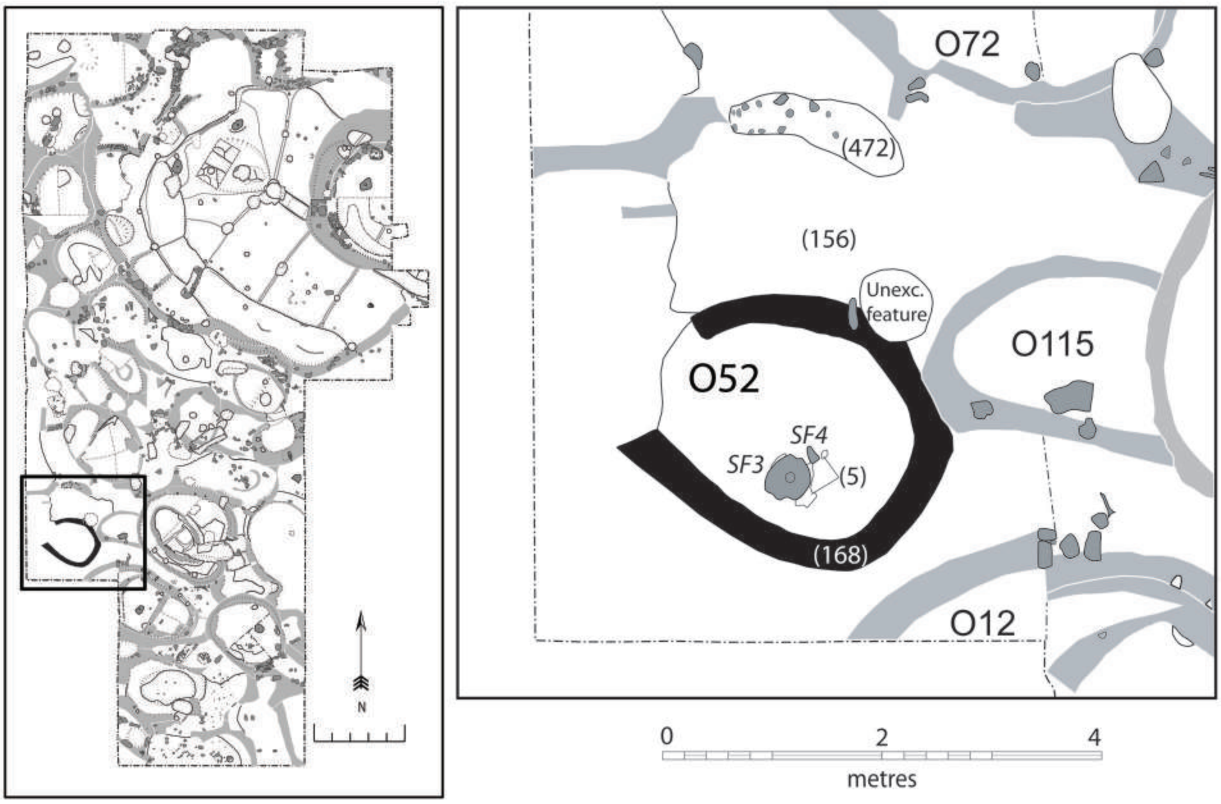


Figure 13.1 Location of Structure O52 and plan showing its relationships with surrounding Objects.

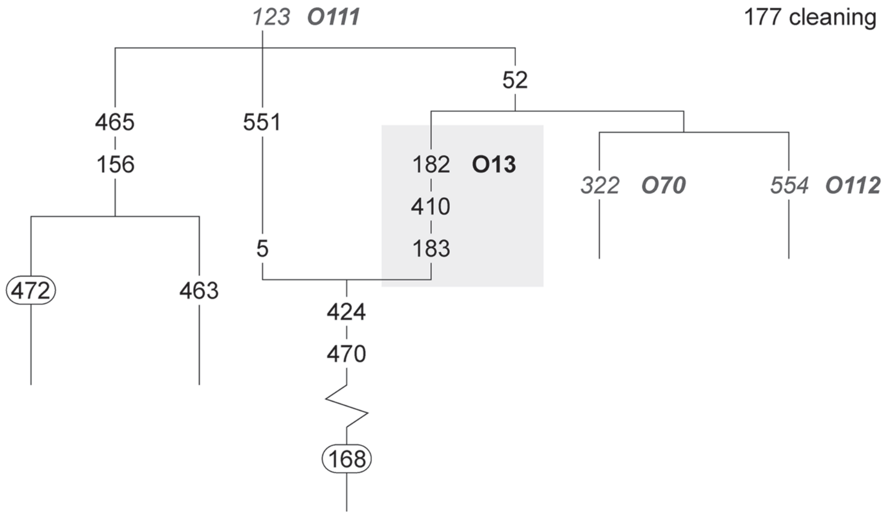


Figure 13.2 Stratigraphic matrix for Structure O52.

structures and associated deposits particularly problematic. Figure 13.2 provides the stratigraphic matrix for the excavated deposits, while Figure 13.3 provides a view of Structure O52 during the course of excavation. Tables 13.1, 13.2 and 13.3 list the excavated contexts, bulk funds and small finds respectively.

13.2 Description of the excavated deposits

Immediately below the overburden (1 and 123) were dark brown fine silts, containing variable quantities of stone and shell (465), (551) and (52). Silt deposit (52) was exposed against the western edge of the excavation, where it ran for *c*. 6 m in a roughly north–south orientation, covering deposits in Structure O52, Structure O70, and those from O112. Below these silt deposits the yellow-brown pisé wall (168) of Structure O52 was partially revealed, forming an ellipse aligned roughly east–west enclosing a space of approximately 2.8 m x 2.3 m. At its western end is a 1.5 m gap in the wall. A possible hearth designated as O13 was exposed by removal of mid- to dark greyish-brown sandy silt (52). The hearth was positioned at the western

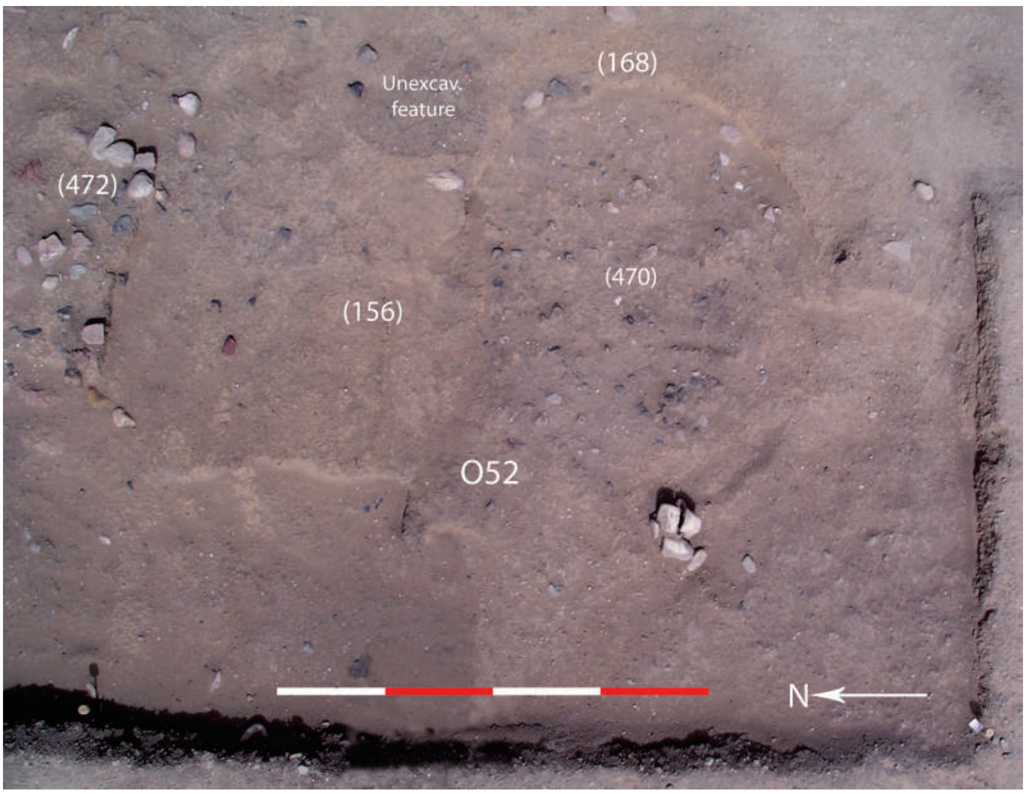


Figure 13.3 Structure O52 during the course of excavation. Scale 2.0 m.

Table 13.1 Contexts excavated within Structure O52 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
5	compact light sandy silt	localised remains of mud-plaster floor
52	friable/loose mid-to dark greyish-brown sandy silt	deflated deposits washed down the slope of the knoll
156	loose light grey with yellowish mottling sandy silt with pisé rubble	pisé rubble used as levelling or make up deposit
168	mid-yellowish-brown pisé	pisé wall of structure
177	mixed cleaning deposit	silt accumulation inside structure
182	friable dark greyish-brown sandy silt with frequent burnt stones	fill of hearth
183	compact light greyish-brown sandy silt	mud-plaster moulded hearth
410	friable mid-greyish-brown sandy silt with frequent burnt stones and charcoal	fill of hearth
424	friable mid/light greyish-brown sandy silt with fine laminations	remains of possible flooring and occupation inside structure
463	compact yellowish-brown mud plaster	mud-plaster surface
465	loose mid-to dark greyish-brown sandy silt	deflated midden washed down the slope of the knoll
470	friable mid-greyish-brown sandy silt with frequent burnt stones and charcoal	dumping of burnt material inside structure
472	roughly two courses of unworked stone with a pink yellow pisé bond	stone wall coursing on top of pisé wall
551	loose\soft dark greyish-brown silt	deflated midden washed down the slope of the knoll

Table 13.2 Quantities of bulk finds from Structure O52 by material and context number.

Object 52	**Volume of sediment (l)**				**Weight of bulk finds per material (g)**																
Context	**Total volume**	**Flot. sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Ground stone**	**Other worked stone**	**Unworked stone**	**Animal bone**	**Human bone**	**Unidentified bone**	**Marine shell**	**Other shell**	**Plaster/Pisé**	**Textile**	**Basketry**	**Wood**	**Plant matter**	**Charcoal**	**Misc.**
5	3.5	3.0	0.0	0.5	6.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
52	61.0	30.0	30.0	1.0	3100.4	560.0	20.0	0.0	0.0	0.0	26.8	0.0	48.3	0.0	0.0	0.0	0.0	0.0	20.0	0.0
156	79.0	10.0	68.0	1.0	274.4	0.0	0.0	0.0	10.0	0.0	0.3	0.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
177	0.0	0.0	0.0	0.0	940.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
182	6.0	6.0	0.0	0.0	11.2	0.0	0.0	0.0	0.0	0.0	0.9	0.0	9.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
183	10.0	10.0	0.0	0.0	132.2	0.0	0.2	0.0	0.0	0.0	1.7	0.0	61.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
410	10.0	10.0	0.0	0.0	735.9	0.0	0.0	0.0	0.0	0.0	2.4	0.0	43.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
424	161.0	30.0	130.0	1.0	1046.5	0.0	10.0	0.0	0.0	0.0	83.6	0.0	21.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
470	0.0	0.0	0.0	0.0	260.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
551	20.0	0.0	20.0	0.0	250.0	0.0	0.0	0.0	11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	350.5	99.0	248.0	3.5	6756.6	560.0	30.2	0.0	31.0	0.0	117.7	0.0	192.4	0.0	0.0	0.0	0.0	0.0	20.0	0.0

Table 13.3 Quantities of small finds from Structure O52 by material and context number.

Object 52							
Context	**Ground stone**	**Other stone**	**Bone beads**	**Stone beads**	**Marine shell beads**	**Marine shell other**	**Total small finds**
5	2	0	0	0	0	0	2
52	0	1	0	0	0	0	1
168	1	0	0	0	0	0	1
424	2	0	0	0	0	0	2
551	0	0	0	0	1	1	2
Total	5	1	0	0	1	1	8

extent of wall (168) of Structure O52. The uppermost deposit within the hearth was a burnt stone-rich dark grey-brown silt deposit (182). Silt (182) sealed a similar stone-rich deposit (410, Figure 13.4), below which there was a further silt with fine laminations (183). Context (183) was possibly a deliberately laid mud-plaster rim, enclosing deposit (182) to form a hearth structure. It is so close to the surface, however, that deposit (183) may derive from puddling around the burnt stone concentration (410).

To the north of the pisé wall (168) of Structure O52 and underlying (465) was a loose, mottled, light grey sandy silt (156) (Figures 13.1, 13.3 and 13.4). This deposit sealed a probable floor surface (463). To the north of (463) and also underlying (156) there was a rubble deposit (472) that appeared to be the stone upper course of a stone and pisé wall running on an east–west alignment (Figure 13.3). To the northwest of pisé wall (168) there was a sub-circular patch of darker sediment. This remained unexcavated but is likely to be the fill of a pit (Figures 13.1 and 13.3).

Within the area enclosed by pisé wall (168), the uppermost deposit contained surviving fragments of mud-plaster flooring (5). These fragments lapped up against an *in situ* cup-hole mortar SF3; to the northeast of this there was a pestle SF4 (Figure 13.5). Deposits from cleaning the floor were collected as (177). Underlying floor (5) and hearth deposit (183) there was a mid-grey sandy silt (424). This had fine laminations and possibly derived from a series of highly degraded floor surfaces and associated

Figure 13.4 Stone-rich deposit (410) filling possible Hearth O13. Scale 1.0 m.

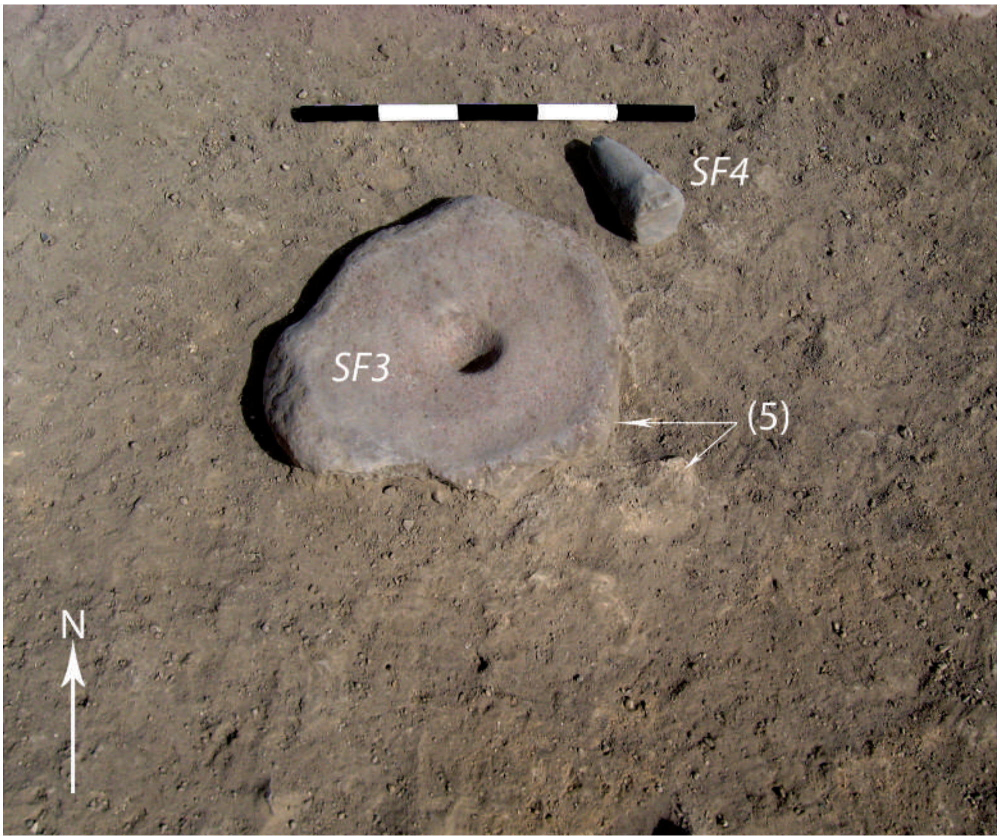


Figure 13.5 Cup-hole mortar SF3 and pestle SF4 with associated patchy mud-plaster surface remnants. Scale 0.5 m.

occupation material. From within this sequence, a pestle (SF208) was recovered. Sealed by deposit (424) was a deposit rich in burnt stone (470, Figure 13.3).

13.3 Interpretation

Structure O52 is a small structure with pisé walls, subsequently covered by the dumping of waste material and slopewash. The limited scale of excavation, coupled with severe erosion, made the definition of pisé wall (168) problematic. Towards the western edge of the excavation trench, the terracing effect of erosion down the slope revealed a number of earlier pisé structural elements that suggest a fairly substantial depth of stratigraphy and the likelihood of better-preserved structures at a lower level. The key surviving evidence for activity within wall (168) was large cup-hole mortar (SF3) with an adjacent pestle (SF4) and surviving fragments of a mud-plaster floor (5). The central position of the mortar suggests that it is directly associated with this wall.

Context (183) of Hearth O13 formed a mud-plaster rim that enclosed deposit (182). Lying just below slopewash (52) and very close to the modern surface, this structure lay over and possibly cut wall (168), indicating it was constructed after the structure defined by wall (168) had gone out of use.

The highly degraded deposits of (465), (551) and (52) suggest either the deliberate dumping of waste material, or accumulation of slopewash over this area. The lack of clarity in this area is due to a combination of limited excavation and erosion in this western part of the site.

14. Structure O45

14.1 Location and relationship with other structures

Structure O45 is the largest structure excavated in the southern half of the 2008–2010 trench, having maximum internal dimensions of 5.5 m x 4.5 m. It is completely surrounded by other structures. Some of these have been well defined by excavation, such as Structures O11 and O12 to the south and O53 to the east; others remain largely unexcavated, notably Structures O85 and O113 to the north, O115 to the west, and Intramural Chamber O116 situated between Structures O45, O53 and O11 (Figures 14.1, 14.2).

The stratigraphic relationships between Structure O45 and the surrounding structures are not yet fully understood. Excavation has established direct stratigraphic links between Structures O45, O53 and O85, but these could not be determined for Structures O45 and O12; Structure O11 is thought to represent the latest addition to this suite of adjacent buildings. Structure O115 was truncated by the initial construction of Structure O45 and is, therefore, earlier.

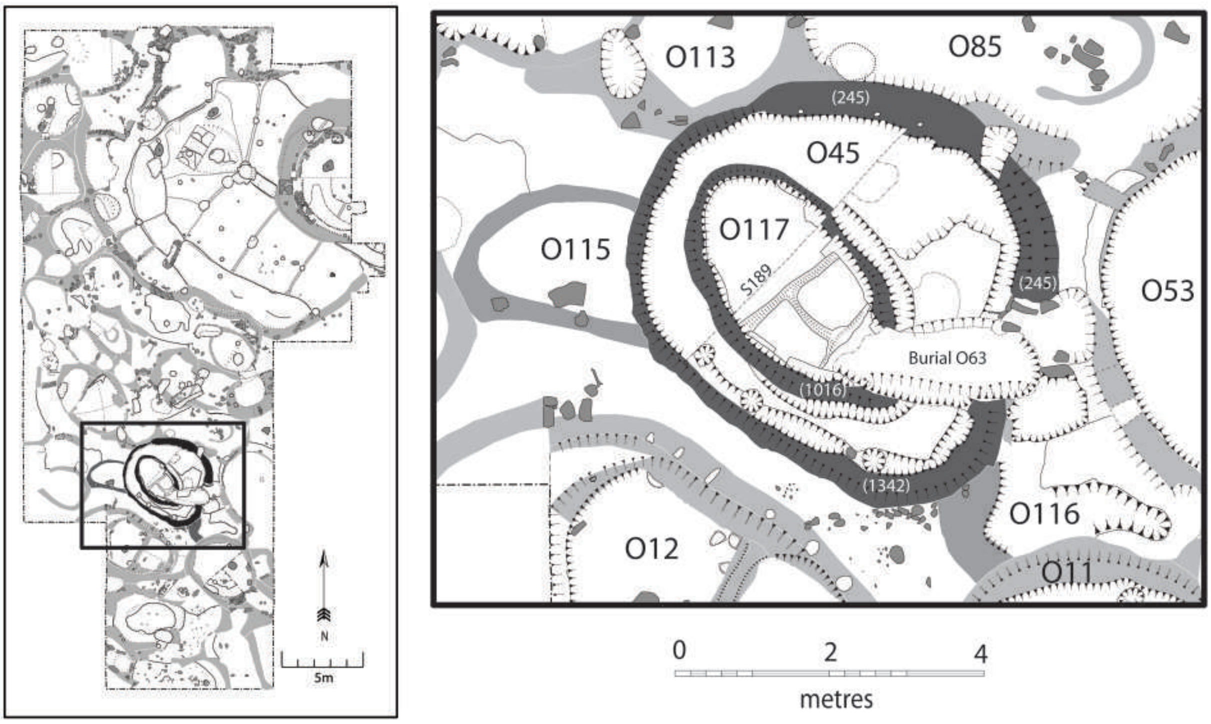


Figure 14.1 Location of Structure O45 and plan showing its relationships with surrounding Objects.

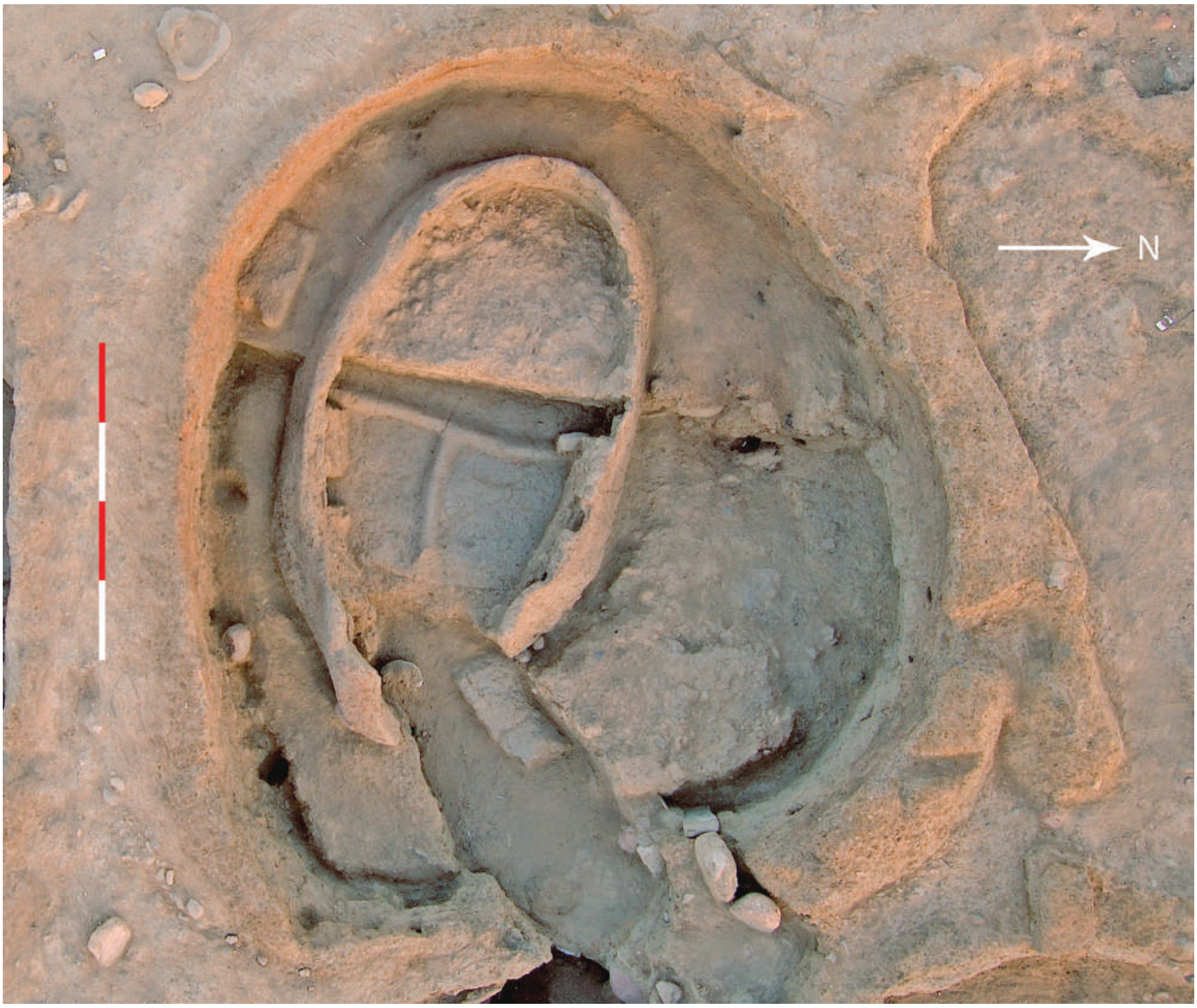


Figure 14.2 Structure O45 from above at the end of the 2010 excavation season. Scale 2.0 m.

The excavation of Structure O45 revealed three distinct phases of activity and sediment accumulation, which serve to organise the following report (Figure 14.3). The contexts in the upper part of the sequence relate to a mud-plaster moulded hearth built within a pre-existing structural footprint, but with no surviving upstanding walls. This phase is referred to as Stratigraphic Block 1. Below this the contexts relate to a semi-subterranean structure that, due to a rapid destruction event that preserved numerous structural features below the collapsed superstructure, provides particularly useful information about roof and floor construction. This phase is referred to as Stratigraphic Block 2. An underlying floor and related contexts were partly exposed by the excavation, but not fully investigated. These are referred to as Stratigraphic Block 3 and represent the earliest known phase of Structure O45. The presence of, as yet unidentified, earlier occupational and structural phases cannot be discounted. Table 14.1 describes all contexts from the three Stratigraphic Blocks, Table 14.2 lists the bulk finds and Table 14.3 the small finds.

14.2 Description of the excavated deposits

Stratigraphic Block 1

The excavation of the overburden deposits (1 and 123) revealed two non-PPNA features within the structure, later defined by walls (245), (1031) and (1342) of Structure O45. One of these was an elongated pit [259] measuring 1.2 m x 0.6 m, filled with a grey silt and rubble (257). The fill contained a rare instance of pottery at WF16, which is as yet unidentified to period. A second and larger feature was a Late Antique burial, Burial O63, which is described as part of Antique Burials O99 (Chapter 6). Once excavated, the sides of this burial provided sections through large parts of the stratigraphic sequence of Structure O45 (Sections S110, S129 and S112; see Figures 14.8, 14.21 and 14.35). Immediately to the southwest of pit [259], there was a spread of rubble (588) that overlay the pisé wall (1833) of Structure O115.

The uppermost deposit cut by Burial O63 was a cobbled surface (7) (Figure 14.4A), which incorporated several ground-stone pestles and hammer-stones. This deposit

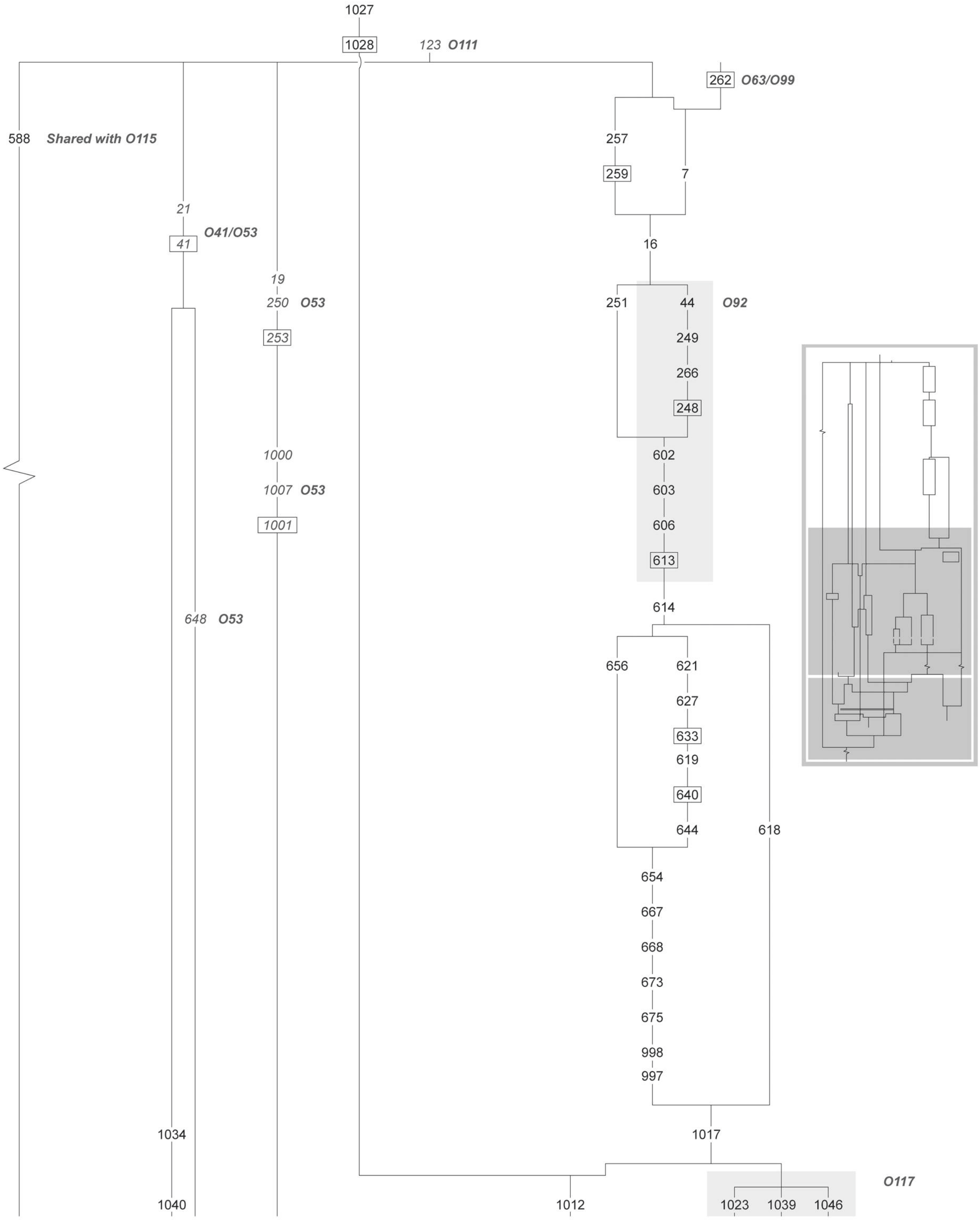


Figure 14.3A — Stratigraphic matrix for Structure O45: Stratigraphic Block 1.

represents the uppermost PPNA occupation surviving under the overburden in this area. It lay above a silt deposit (16), which had accumulated across the entire area of Structure O45. The extent of this deposit and that of an underlying silt (251) was delineated by an ovoid wall circuit that was first exposed at this stage of the excavation and constituted by pisé-built wall segments (245), (1031) and (1342) (Figure 14.5). These segments formed an almost continuous circuit of walling, which was burnt along all of its interior face. Stratigraphically these walls belong to the earlier phases of Structure O45 (Stratigraphic Block 3), but they continued in use throughout the structure's subsequent development. Deposits (16) and (251) were contained within the walled area, indicating that they had accumulated after the burning occurred. Deposit (16) also overlay a moulded mud/clay feature interpreted as a hearth (Hearth O92) while deposit (251) surrounded this

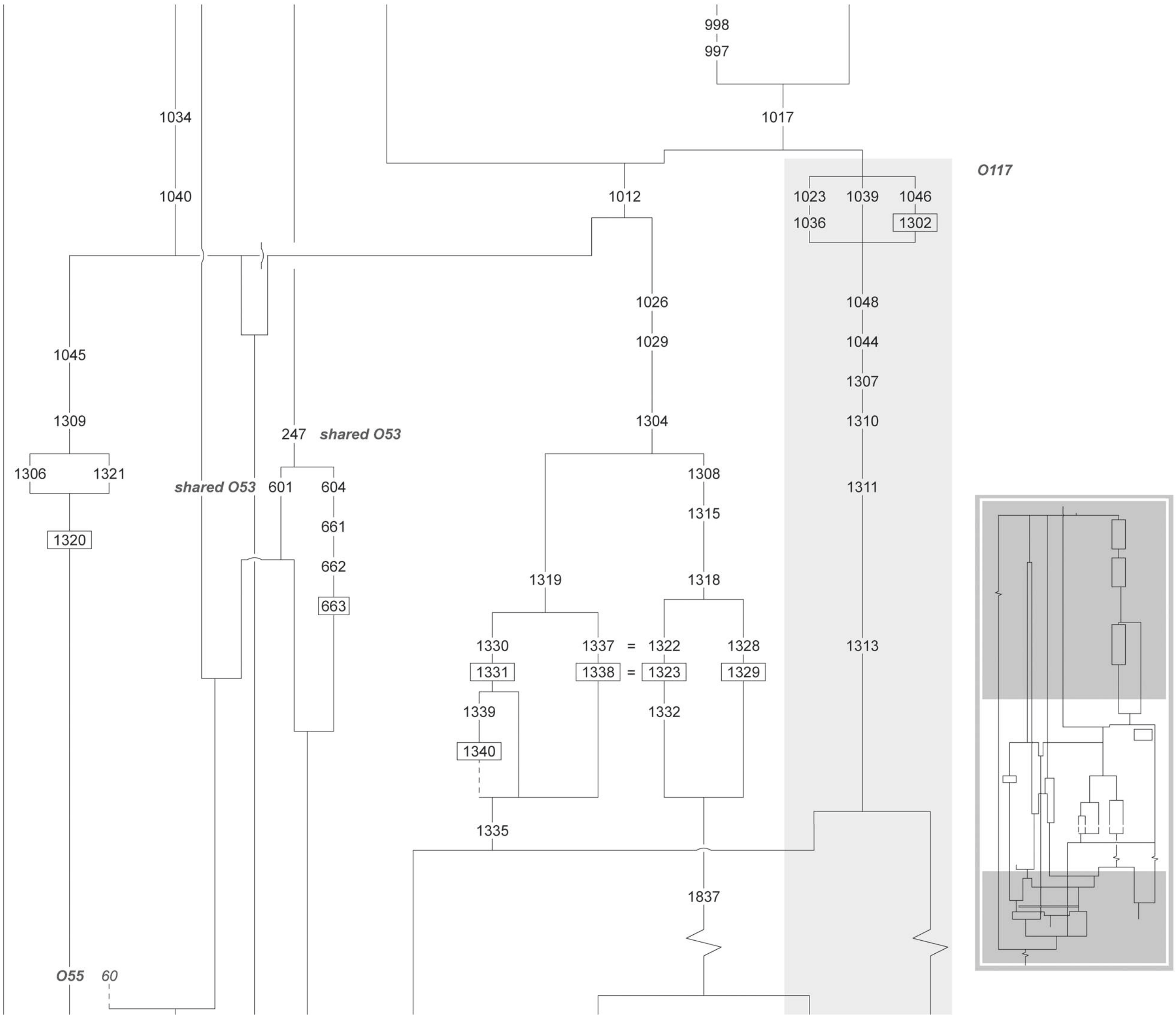


Figure 14.3B — Stratigraphic matrix for Structure O45: Stratigraphic Block 2.

feature and probably derived from the associated occupation. A cluster of stones (19) was found overlying the northeastern arc of the wall (245) of Structure O45 (Figure 14.4B), as well as deposits within Structure O53 (Chapter 15).

Silt (251) was excavated in 1.0 m grid squares for the spatial control of finds and samples; field observations indicated that it was notably rich in chipped stone and animal bone, and contained several marine shell and green stone beads.

Hearth O92 was situated off-centre towards the southwest within the interior of Structure O45 (Figure 14.5). It was first recognised as a concentration of burnt stone and charcoal (44) overlying a rough mud-plaster moulded pit [248] filled with a mixture of fire-cracked stones and ashy charcoal (249) (Figure 14.6). The stones were between 5 cm and 15 cm in size and were mostly porphyry. Samples of wood charcoal were taken for radiocarbon dating (see section 14.4).

Both (44) and (249) were rich in finds consisting mainly of chipped- and ground-stone artefacts and including a centrally perforated stone with incised markings (SF250, Figure 14.7). Two pieces of yellow and red sandstone among the burnt stones might suggest pigment production. In contrast to these upper fills, the lowest fill of the hearth was a stone free ashy silt (266). This is likely to represent compacted *in situ* ash that had accumulated in the base of the hearth during use.

Excavation revealed that the hearth had been constructed by laying three successive bands of rough mud plaster (606), (603) and (602) within a shallow cut [613]. The lowest band (606) formed a wider oval platform, or a surface, that extended over an area 2.0 m x 1.4 m. The northern edge of (606) was a raised lip of moulded mud plaster, which was visible through deposit (251) (Figure 14.5). The shape of this lip suggests that (606) abutted some form of curved structure to the north, which may have been either an organic screen, since perished, or some other degraded or robbed out construction. The full extent of (606) in the other directions could not be established. The western end of the platform was set deeper into the underlying soft deposits. This contained the base of the bowl-shaped pit [248], which

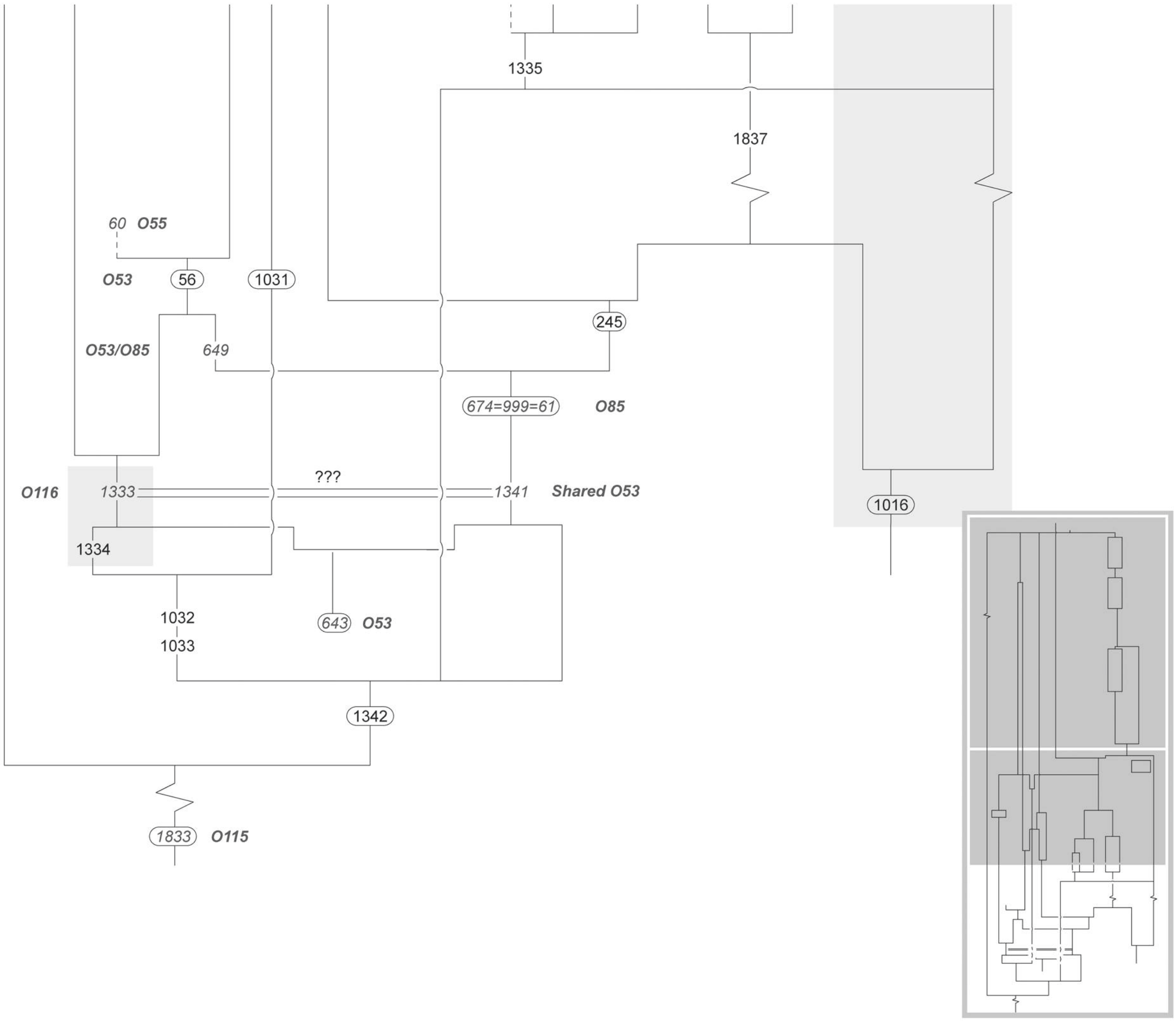


Figure 14.3 C — Stratigraphic matrix for Structure O45: Stratigraphic Block 3.

appeared to have been moulded into the mud-plaster platform as part of its construction, rather than having been cut into the mud plaster at a later date. The overlying rough plaster band (603) completed the construction of the pit by adding a pronounced rough plaster rim (Figures 14.5 and 14.6). These plaster bands were easily differentiated during the excavation, as the upper band (603) peeled off onto the smooth surface of the lower rough plaster band (606). A block sample SA1306 for micro-stratigraphic analysis was taken from across the boundary of the mud-plaster layers (606) and (603) (see section 14.3).

Immediately below Hearth O92 excavation exposed a layer of silt (614) covering the entire interior area of Structure O45 and cut by [613] for the hearth construction. The silty deposit (251), which was overlying Hearth O92, could be readily distinguished from (614) in the area of the hearth, but elsewhere (251) and (614) were difficult to separate. The silt (614) overlay a suite of deposits: a dump of cracked stones (656); an organic rich deposit (618); loose silty deposits, (621) and (627), which filled a subsiding oval feature [633]. Cut [633] truncated rubble (619), which levelled an elongated hollow feature [640]. During the course of subsequent excavation, it transpired that these subsiding hollows followed the shape of an underlying oval pisé wall (1016) that defined Internal Structure O117, as described within Stratigraphic Block 2. Thus feature [633] was located above the hollow part of the interior at the northwest end of (1016), while hollow [640] formed along the outer northeast edge of the internal structure where underlying loose material had slumped against the outer face of (1016) (Figure 14.8).

Underneath these features excavation revealed a series of mixed deposits comprised of pisé rubble, silt and charcoal. Deposits (644), (654), (667), (668), (673), (675) and (998) filled the bowl shaped interior of Structure O45 (Figure 14.9) and were generally thicker towards the centre.

Excavation of these deposits gradually exposed burnt deposits (997) and (1012), which were closest to the surface along the southern and southwestern internal wall face, itself reddened by fire. Deposit (997) was of a finer consistency than that of an underlying layer of burnt rubble (1012). With the excavation of deposit (997) the outline

Table 14.1 Contexts excavated within Structure O45 with sedimentry descriptions and interpretations.

Context	Description	Interpretation
7	medium-sized sub-angular and sub-rounded cobbles in dark grey loamy silt	partially surviving cobbled surface
16	loose mid-brownish-grey loamy silt	silt accumulation inside structure
19	mid-brownish-grey friable sandy silt with large stones	dump or collapse of stone rubble in a sandy silt matrix
44	dark grey ashy silt with charcoal and numerous burnt sub-angular stones	spill-over of burnt material on top of a disused hearth
245	mid-yellowish-brown pisé with coarse rock temper	upper wall of O45 along north and northeastern extent
247	dark grey sandy silt with high percentage of sub-angular rubble	packing material in the small intramural space between three structures
248	sub-circular cut with vertical to steep sides and flat to slightly concave base	fire pit within mud-plaster hearth, actually moulded rather than cut
249	dark grey ashy silt rich in charcoal and containing numerous burnt sub-angular stones	deposit filling the fire pit of hearth O92
251	mid-grey silt with occasional charcoal	silt accumulation inside structure
257	dark grey silt with stones	rubble fill of pit
259	sub-rectangular cut with moderately sloping sides and flat base	cut of pit
266	mid-grey ashy silt with occasional charcoal and pisé flecks	ashy residue at the base of the hearth
588	light greyish-brown silt with rubble	isolated dump of rubble
601	brownish-grey loose silt with angular and sub-angular rubble	packing material in the small intramural space between three structures
602	reddish/yellowish brown gritty pisé	pisé surface remnant surrounding a hearth platform
603	yellow gritty-clay	mud-plaster rim of hearth
604	mid-greyish-brown silt with occasional charcoal	top fill of niche in wall (245)
606	part greyish-yellow and part bright yellow gritty-clay	mud-plaster platform of hearth O92 into which fire pit [248] was moulded
613	oval cut with vertical to moderate sides and uneven base	cut for a mud-plaster hearth structure
614	pale to mid-grey dusty silt with occasional stones	silt accumulation inside structure
618	light brownish-grey silt rich in charcoal and containing landsnails	dump of burnt and organic material within a hollow caused by subsidence
619	yellowish-grey brown silt with rubble and occasional charcoal	levelling deposit deliberately dumped within a hollow caused by subsidence
621	brownish-grey loose silt with occasional charcoal	silting of a hollow caused by subsidence
627	brownish-grey silt with occasional charcoal	silting of a hollow caused by subsidence
633	kidney-shaped cut with uneven sides and concave base	subsidence hollow
640	elongated cut with moderate to steep sides and uneven base	subsidence holow
644	brownish-grey sandy silt with occasional stones	mixed deposit deliberately dumped for levelling
654	orangish/yellowish-brown gritty silt with pisé rubble and stones	mixed deposit deliberately dumped for levelling
656	grey loose silt with large stones	dump of fire-cracked stones
661	a quater of large stone bowl and a large fragment of flat ground stone platter	blocking or furnishing of niche [663] in wall (245)
662	dark greyish-brown loose silt with charcoal and occasional small stones	lower fill of niche in the wall formed through use and organic deposition
663	pear shaped cut with moderately sloping sides and flat base	niche in wall (245)
667	orangish/yellowish-brown gritty silt with pisé rubble and stones	mixed deposit deliberately dumped for levelling

Table 14.1 Contexts excavated within Structure O45 with sedimentry descriptions and interpretations continued...

Context	Description	Interpretation
668	yellow, brown and grey pisé rubble, silt and ashy silt	mixed deposit deliberately dumped for levelling
673	greyish-yellow compact silty-pisé rubble	mixed deposit deliberately dumped for levelling
675	greyish-brown loose ashy silt	mixed deposit deliberately dumped for levelling
997	yellowish-brown to purplish-red loose ashy silt	post-depositionally deflated silt deriving from underlying burnt collapse
998	pale greyish-brown friable silt with stones	mixed deposit deliberately dumped for levelling
1012	yellowish-light brown, reddish-brown, purplish-red, dark grey to black friable to loose pisé rubble and silt	burnt structural collapse of upstanding walls of O45 with two ^{14}C dates on charred twigs
1016	greyish-brown pisé blackened by burning on the outside and crumbly on the inside	boat-shaped mud-plaster internal structure
1017	dark grey loose loamy silt with ocasional charcoal, land snails and stones	loose midden infill of the hollow formed by underlying structural collapse
1023	yellowish-grey loose silty pisé rubble	collapse rubble in the northwest end of internal structure
1026	pale greyish-yellow pisé surface with burnt redenning and blackenning	mud surface of fallen through roof
1027	mid-greyish-brown loose loamy silt	fill of animal burrow
1028	sub-circular cut with vertical sides	animal burrow
1029	red, orange and black burnt pisé rubble and ashy silt with lots of charcoal	mixed structural collapse of roof with rafters, walling and a broken raised floor
1031	crumbley greyish-brown pisé	wall repair at the southeast of O45
1032	bright yellow compact clay silt	mud-plaster lining of probable unexcavated intramural chamber
1033	dark grey loose gritty charcoal rich silt	charcoal-rich lens stratified between two phases of construction. Two twigs were ^{14}C dated to 1. 10410+50 BP or 12525–12085 cal BP and 2. 9880+50 BP or 11593–11198 cal BP
1034	grey compacted silt	post-construction silting in intramural space between buildings
1036	yellowish-grey loose silty-pisé rubble	structural collapse in northern half of the internal structure
1039	light yellowish-grey loose silty-pisé rubble	structural collapse in southern half of the internal structure
1040	brownish-yellow loose pisé rubble and silt	outer collapse in the east of O45
1044	reddish-brown loose silty-pisé rubble	burnt collapse inside internal structure
1045	greyish-brown loose silty-pisé rubble	top fill of rubbish pit
1046	light brownish-grey loose silty sand	fill of pit or depression
1048	brownish-yellow loose silty-pisé rubble	mud surface of fallen through roof
1302	sub-circular cut with shallow sides and an uneven base	possible feature or natural depression
1304	light yellowish-brown silty-pisé rubble	unburnt collapse in the east part of the structure
1306	greyish-brown compacted pisé	collapsed mud-plaster lining inside pit
1307	reddish-brown loose silty-pisé rubble	burnt collapse inside internal structure
1308	dark purplish-red and yellowish-greyish-brown loose ashy silt	ashy collapse through a void in raised floor of O45
1309	greyish-yellow loose silt with pisé rubble	collapsed chamber lining into a later pit
1310	brownish/whitish-yellow loose silty-pisé rubble	unburnt structural collapse in the western part of the internal structure
1311	reddish-brown loose silty-pisé rubble	burnt structural rubble
1313	yellowish-grey brown hard clay silt	mud-plaster floor inside the internal structure
1315	orangish-red, ashy whitish-grey, purplish-brown loose ash and ashy silt	ashy collapse through a void in raised floor of O45

Table 14.1 Contexts excavated within Structure O45 with sedimentry descriptions and interpretations continued...

Context	Description	Interpretation
1316	rounded part of a hollow seen partly in section with moderately sloping sides and irregular concave base	a hollow cretaed by collapse of burnt material through the raised floor
1318	yellowish-grey brown loose silt	disturbed occupation underlying burnt collapse north of Antique Burial O63
1319	mid-brownish-grey loose sandy silt	disturbed occupation underlying burnt collapse south of Antique Burial O63
1320	sub-rectangular cut with steep near vertical sides and uneven base	cut of rubbish pit
1321	greyish-brown compacted clay silt	collapsed mud-plaster lining inside pit
1322	light greyish-yellow brown loose silt	fill of construction gully for raised floor
1323	curvilinear cut with steep sides and sharp v-shaped base	construction trench for raised floor uprights
1328	light greyish and yellowish brown loose silt with frequent pisé inclusions	fill of construction gully for raised floor
1329	curvilinear cut with steep sides and a flat base	construction trench for raised floor uprights
1330	light yellowish-grey brown loose silt	fill of construction gully for raised floor
1331	curvilinear cut with moderate sides and irregular base with recognisable stone-holes	construction trench for raised floor uprights
1332	light brownish-grey loose sandy silt	fill of construction gully for raised floor
1333	greyish-yellow hard silty-clay	mud-plaster exterior surface between structures O45 and O53
1334	mid-brownish-grey loose sandy silt	deposit seen in section only filling intramural chamber O116
1335	mid-yellowish-brown loose loamy silt	earlier occupation below raised floor
1337	pale yellowish-brown friable silt with frequent pisé inclusions	fill of construction gully for raised floor
1338	curvilinear cut with shallow sides and a flat base	construction trench for raised floor uprights
1339	fine light greyish-brown loose silt	fill of post-hole predating raised floor
1340	sub-circular deep cut with vertical sides and a concave base	cut of post-hole
1341	bright yellowish-brown compact mud plaster	mud-plaster exterior surface between structures O45 and O53
1342	yellowish-brown pisé	unexcavated lower wall of O45
1833	yellowish-brown pisé	pisé wall of structure truncated by construction of O45
1837	unexcavated mud-plaster surface	mud-plaster floor

Table 14.2 Quantities of bulk finds from Structure O45 by material and context number.

Object 45	Volume of sediment (l)				Weight of bulk finds per material (g)										
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Unworked stone	Animal bone	Human bone	Marine shell	Other shell	Plaster/Pisé	Charcoal	Misc.
7	161.0	30.0	130.0	1.0	1743.5	8000.0	10.1	0.0	48.8	0.0	6.0	79.4	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	360.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44	41.0	40.0	0.0	1.0	2120.6	1560.0	10.0	0.0	49.0	0.0	0.0	87.8	0.0	10.2	10.0
247	97.0	30.0	66.0	1.0	340.5	780.0	0.0	0.0	10.8	0.0	0.0	7.8	0.0	0.0	0.0
249	14.0	14.0	0.0	0.0	657.7	0.0	0.0	0.0	48.8	0.0	0.0	191.2	0.0	10.1	0.0
251	1073.0	221.0	831.0	21.0	5525.8	249.2	31.4	0.0	455.6	0.0	0.0	489.3	0.0	0.8	80.0
257	16.0	10.0	5.0	1.0	52.5	10.0	0.0	0.0	12.0	0.0	0.0	27.1	0.0	10.0	0.0
266	10.0	10.0	0.0	0.0	36.5	0.0	0.4	0.0	1.8	0.0	0.0	3.8	0.0	0.0	0.0
601	62.0	30.0	30.0	2.0	281.9	0.0	0.0	0.0	2.8	0.0	0.0	2.5	0.0	0.2	0.0
602	17.0	16.0	0.0	1.0	37.3	0.0	0.0	0.0	1.6	0.0	0.0	5.7	0.0	0.0	0.0
603	24.0	23.0	0.0	1.0	35.7	0.0	0.0	0.0	0.4	0.0	0.0	5.9	0.0	0.0	0.0
604	20.0	10.0	10.0	0.0	64.9	0.0	0.0	0.0	13.3	0.0	0.0	4.7	0.0	0.0	0.0
606	181.0	30.0	150.0	1.0	781.0	0.0	0.0	0.0	48.0	0.0	0.0	21.5	0.0	0.1	0.0
614	338.0	90.0	245.0	3.0	1465.9	0.0	16.0	0.0	129.6	0.0	0.0	138.2	0.0	0.1	0.0
618	35.0	35.0	0.0	0.0	777.3	0.0	0.0	0.0	42.5	0.0	0.0	403.5	0.0	0.8	0.0
619	306.0	30.0	275.0	1.0	1968.4	0.0	0.4	0.0	246.1	0.0	0.0	4.4	0.0	0.0	0.0
621	151.0	30.0	120.0	1.0	726.5	54.2	10.0	0.0	29.2	0.0	0.0	65.8	0.0	0.1	0.0
627	31.0	30.0	0.0	1.0	272.8	0.0	0.0	0.0	22.8	0.0	0.2	109.8	0.0	0.1	0.0
644	49.0	30.0	18.0	1.0	1442.5	0.0	10.0	0.0	239.2	0.0	0.0	37.9	0.0	0.2	0.0
654	443.0	39.0	400.0	4.0	1681.2	959.0	1.3	0.0	389.5	0.0	1.0	15.6	10.0	1.5	0.0
656	13.0	12.0	0.0	1.0	23.7	0.0	0.3	0.0	1.5	0.0	0.0	3.6	0.0	0.1	0.0
667	145.0	0.0	145.0	0.0	500.0	0.0	0.0	0.0	11.0	0.0	0.0	0.0	0.0	0.0	0.0
668	196.0	0.0	196.0	0.0	1051.0	0.0	0.0	0.0	185.0	0.0	0.0	0.0	0.0	0.0	0.0
673	275.0	0.0	275.0	0.0	1325.0	150.0	10.0	0.0	266.0	0.0	0.0	0.0	0.0	0.0	0.0
675	299.0	115.0	180.0	4.0	1710.0	359.0	1.0	0.0	235.0	0.0	0.0	0.0	0.0	0.0	0.0
997	548.0	145.0	399.0	4.0	3078.2	1710.0	2.4	0.0	456.8	0.0	0.0	82.1	0.0	0.0	15.0
998	61.0	10.0	50.0	1.0	1152.0	600.0	0.0	0.0	113.0	0.0	0.0	0.0	0.0	0.0	0.0
1012	1951.0	140.0	1810.0	1.0	6729.3	1840.0	20.2	120.0	987.0	0.2	0.0	19.3	2520.0	125.9	0.1
1017	302.0	60.0	240.0	2.0	2862.0	935.0	100	0.0	1057.0	0.0	11.0	0.0	0.0	10.0	20.0
1023	111.0	10.0	100.0	1.0	302.5	0.0	0.0	0.0	53.8	0.0	0.0	5.5	0.0	10.8	0.0
1026	124.0	50.0	70.0	4.0	1599.1	200.0	10.0	0.0	215.4	0.0	0.0	3.1	0.0	55.4	0.0
1027	0.0	0.0	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1029	1328.0	50.0	1260.0	18.0	4451.3	0.0	0.0	250.0	280.6	0.0	0.0	4.2	0.0	3059.1	0.0
1031	71.0	10.0	60.0	1.0	88.6	0.0	0.0	0.0	10.8	0.0	0.0	2.6	0.0	6.1	0.0
1032	11.0	10.0	0.0	1.0	89.4	0.0	0.0	0.0	20.9	0.0	0.0	2.7	0.0	0.2	0.0
1033	10.0	10.0	0.0	0.0	59.5	0.0	0.0	0.0	21.4	0.0	0.0	2.5	0.0	0.0	0.0
1034	231.0	10.0	220.0	1.0	2988.1	0.0	1.0	0.0	93.1	0.0	1.0	3.5	0.0	0.2	0.0
1036	81.0	10.0	70.0	1.0	64.8	0.0	1.0	1.0	16.1	0.0	0.0	14.5	0.0	0.1	0.0
1039	41.0	10.0	30.0	1.0	182.2	0.0	0.1	0.0	53.7	0.0	0.0	7.0	0.0	0.1	0.0

Table 14.2 Quantities of bulk finds from Structure O45 by material and context number continued...

Object 45	Volume of sediment (l)				Weigth of bulk finds per material (g)										
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Unworked stone	Animal bone	Human bone	Marine shell	Other shell	Plaster/Pisé	Charcoal	Misc.
1040	131.0	10.0	120.0	1.0	657.9	0.0	0.0	0.0	103.2	0.0	0.0	3.7	0.0	20.0	0.0
1044	254.0	0.0	250.0	4.0	143.2	0.0	0.0	0.0	23.7	0.0	0.0	2.1	0.0	10.2	0.0
1045	162.0	30.0	130.0	2.0	1448.1	0.0	0.0	0.0	662.5	0.0	0.0	15.0	0.0	0.3	0.0
1046	4.0	3.0	0.0	1.0	4.6	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.1	0.0
1048	38.0	10.0	23.0	5.0	353.3	0.0	0.0	0.0	50.5	0.0	0.0	0.0	0.0	10.0	0.0
1304	272.0	20.0	250.0	2.0	2763.9	1440.0	30.2	0.0	399.3	0.0	14.4	17.9	0.0	60.3	0.0
1306	61.0	10.0	50.0	1.0	763.4	100.0	0.0	0.0	156.3	0.0	0.0	3.5	0.0	13.0	0.0
1307	42.0	0.0	40.0	2.0	81.5	0.0	0.0	0.0	20.7	0.0	0.0	0.7	0.0	0.1	0.0
1308	271.0	20.0	250.0	1.0	1779.9	400	0.0	0.0	537.9	0.0	0.0	34.1	0.0	112.7	5.0
1309	131.0	10.0	120.0	1.0	820.3	0.0	1.0	0.0	60.7	0.0	0.0	4.5	0.0	20.4	0.0
1310	71.0	10.0	60.0	1.0	68.9	0.0	0.0	0.0	16.8	0.0	0.0	0.0	0.0	12.0	0.0
1311	31.0	28.0	0.0	3.0	31.4	0.0	0.0	0.0	5.2	0.0	0.0	1.7	0.0	0.0	0.0
1315	41.0	10.0	30.0	1.0	853.7	260.0	0.0	0.0	60.6	0.0	0.0	2.1	0.0	1.1	0.0
1318	151.0	10.0	140.0	1.0	1448.5	1540.9	0.0	0.0	211.4	0.0	0.0	0.0	0.0	8.0	2.0
1319	121.0	10.0	110.0	1.0	532.9	0.0	0.0	0.0	80.5	0.0	0.0	14.2	0.0	0.1	0.0
1321	51.0	10.0	40.0	1.0	225.5	0.0	0.2	0.0	71.5	0.0	0.0	15.4	0.0	15.5	0.0
1322	31.0	10.0	20.0	1.0	166.7	0.0	0.0	0.0	63.4	0.0	0.0	12.2	0.0	0.1	0.0
1328	41.0	10.0	30.0	1.0	107.6	0.0	10.0	0.0	63.0	0.0	0.0	0.0	0.0	0.1	0.0
1330	61.0	10.0	50.0	1.0	209.6	0.0	0.0	0.0	44.8	0.0	0.0	21.6	0.0	22.2	0.0
1334	30.0	0.0	30.0	0.0	50.0	0.0	0.0	0.0	40.0	0.0	0.0	0.0	0.0	13.0	0.0
1335	8.0	8.0	0.0	0.0	79.3	0.0	0.0	0.0	17.0	0.0	0.0	19.8	0.0	0.1	0.0
1337	21.0	10.0	10.0	1.0	33.0	0.0	0.0	0.0	26.9	0.0	0.0	11.8	0.0	0.0	0.0
1339	10.0	10.0	0.0	0.0	9.6	0.0	0.0	0.0	4.0	0.0	0.0	2.7	0.0	0.0	0.0
Total	11487.0	1925.0	9438.0	124.0	61262.0	21147.3	197.0	371.0	8590.3	0.2	33.6	2035.5	2530.0	3621.5	132.1

of a wall (1016) began to emerge (Figure 14.10), which was later used to designate Internal Structure O117 of Stratigraphic Block 2.

Below (997) a deposit of midden material (1017) had accumulated in a hollow (later shown to be the southeastern end of Structure O117). This deposit contained a much higher percentage of organic material than any of the overlying deposits, evident by its dark grey colour, abundant charcoal inclusions and high quantity of animal bone (Table 14.2). It also contained a strip of bitumen (SF1530), 15 cm long and 3 cm wide, which was striated with longitudinal impressions resembling basketry patterns (Figure 14.11). Other finds included marine shell beads, worked bone, and a couple of fragmentary ground-stone objects, including bowl SF1529.

Stratigraphic Block 2

The complete wall circuit (1016) of the uppermost surviving part of an oval Internal Structure O117 became exposed at this stage of the excavation (Figure 14.12). Deposits inside O117 were isolated from those outside by an upstanding wall (1016). The excavation of the internal deposits ran independently from those of the surrounding deposits located between (1016) and the interior face of the walls forming Structure O45, forming separate sequences evident in the stratigraphic matrix (Figure 14.3).

Deposits within Structure O45 but external to Internal Structure O117

Below (997) and (1017) there was a horizon of burnt rubble (1012) covering the whole interior of O45 (Figure

Table 14.3 Quantities of small finds from Structure O45 by material and context number.

Object 45	Quantities of small finds per material (nos)												
Context	**Chipped stone**	**Ground stone**	**Other stone**	**Worked bone**	**Unworked animal bone**	**Disarticulated human bone**	**unidentified beads**	**Stone beads**	**Marine shell beads**	**Marine shell other**	**Other shell**	**Bitumen objects**	**Clay objetcs**	**Total small finds**
7	0	2	0	0	0	0	0	0	0	0	0	0	0	2
44	7	3	0	0	1	0	0	0	0	1	0	0	0	12
249	1	7	3	0	0	0	0	0	0	0	0	0	0	11
251	2	0	0	0	0	0	0	2	3	2	0	0	0	9
588	0	1	1	0	0	0	0	0	0	0	0	0	0	2
604	0	2	0	0	0	0	0	0	0	0	0	0	0	2
606	0	0	1	0	0	0	0	1	0	0	0	0	0	2
614	0	2	0	0	0	0	0	0	0	0	0	0	0	2
619	0	0	0	0	0	0	0	0	0	1	0	0	0	1
621	0	1	0	0	0	0	0	0	1	0	0	0	0	2
644	0	2	0	1	0	0	0	0	0	1	0	0	0	4
654	0	0	0	0	1	0	0	0	2	1	0	0	0	4
656	0	1	0	0	0	0	0	0	0	0	0	0	0	1
662	0	0	1	0	0	0	0	0	0	0	0	0	0	1
667	0	0	0	1	0	0	0	0	0	1	0	0	0	2
668	0	4	0	0	0	0	0	0	1	0	0	0	0	5
675	0	0	0	0	0	1	1	2	0	0	1	0	0	5
997	0	1	3	0	0	0	0	1	2	1	0	0	0	8
998	0	2	0	1	0	0	0	0	0	0	0	0	0	3
1012	0	5	1	0	0	5	0	1	0	0	0	0	0	12
1017	0	2	0	1	0	0	0	0	2	1	0	2	0	8
1026	0	0	0	0	0	1	0	0	0	0	0	0	0	1
1027	0	0	0	0	0	1	0	0	0	0	0	0	0	1
1029	0	3	3	3	2	3	0	3	2	0	0	0	0	19
1031	0	0	0	0	0	0	0	0	1	0	0	0	0	1
1032	0	0	0	0	0	0	0	0	1	0	0	0	0	1
1034	0	1	0	0	0	0	0	0	0	0	0	0	0	1
1039	0	1	0	0	0	0	0	0	0	0	0	0	0	1
1040	0	5	1	0	1	0	0	0	1	0	0	0	0	8
1045	1	4	2	1	3	1	0	0	0	0	0	0	0	12
1048	0	1	0	0	0	0	0	0	0	1	0	0	0	2
1304	0	1	0	5	0	3	0	0	3	1	0	0	0	13
1306	0	3	0	0	1	0	0	0	0	0	0	0	0	4
1308	1	9	4	0	0	0	0	0	1	0	0	1	1	17
1309	0	1	1	0	0	1	0	0	0	0	0	0	0	3
1315	0	1	0	1	0	0	0	0	1	0	0	0	0	3
1318	1	4	8	0	0	1	0	1	1	0	0	0	1	17
1319	0	0	2	0	0	0	0	0	0	0	0	0	0	2
1321	0	0	0	0	0	0	0	1	0	0	0	0	0	1
1322	0	2	0	0	0	0	0	0	0	0	0	0	0	2
1328	0	0	1	0	0	0	0	0	1	0	0	0	0	2
1330	0	1	1	0	0	0	0	0	0	0	0	0	0	2
1335	0	1	0	0	0	0	0	0	0	0	0	0	0	1
1337	0	0	1	1	0	0	0	0	0	0	0	0	0	2
1339	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Total	13	73	34	15	9	17	1	12	24	11	1	3	2	215

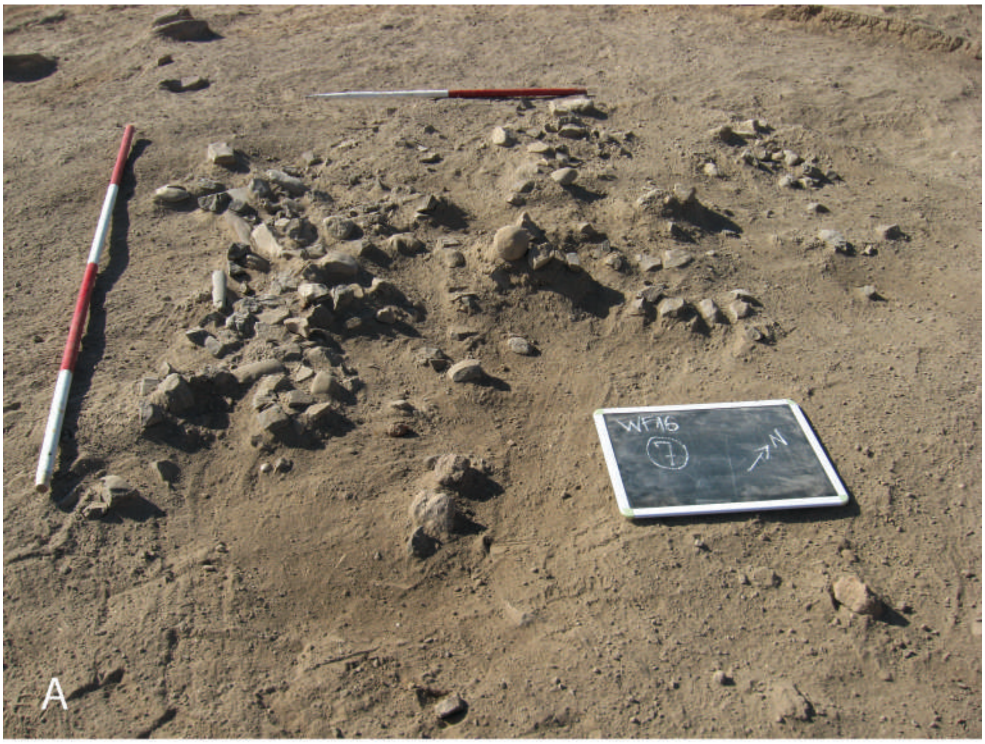


Figure 14.4 A — Remnants of cobbled surface (7) from the southeast prior to the excavation of Burial O63, whose western end is situated under the board. Scales 2.0 m x 1 m. B — Cluster of stones (19) from the south. Scale 2.0 m.

14.12), which had been disturbed by animal burrowing, e.g. (1027)/[1028]. Rubble (1012) was composed of a variable density of burnt pisé blocks in an ashy silt matrix and with numerous voids between pisé blocks. These differed in colour and texture, most likely reflecting variation in the intensity of the burning process. They were often encrusted in a yellowish hard baked outer skin, while their interior was often blackened and extremely friable. In other areas, the burnt pisé rubble was red or purple and included a mixture of hard baked and extremely friable pieces. This deposit contained numerous decorated objects (e.g. Figure 14.13) and charcoal fragments. Two charred twig samples SA3328 and SA3329 from the southeast area of this deposit (1012) were submitted for radiocarbon dating (Table 14.5).

Some of the most reddened material was situated along the north side of Burial O63 and extended to the outside of Structure O45, beyond the southern terminus of wall (245). The terminus marked an opening in the otherwise continuous wall (245, 1031, 1342), which had allowed the rubble (1012) to spread outside of the O45 wall circuit in this one place only. Although there was no surviving opposing terminus of wall (1031), the spread of this rubble indicates that (1031) must have terminated somewhere within the space now occupied by Burial O63.

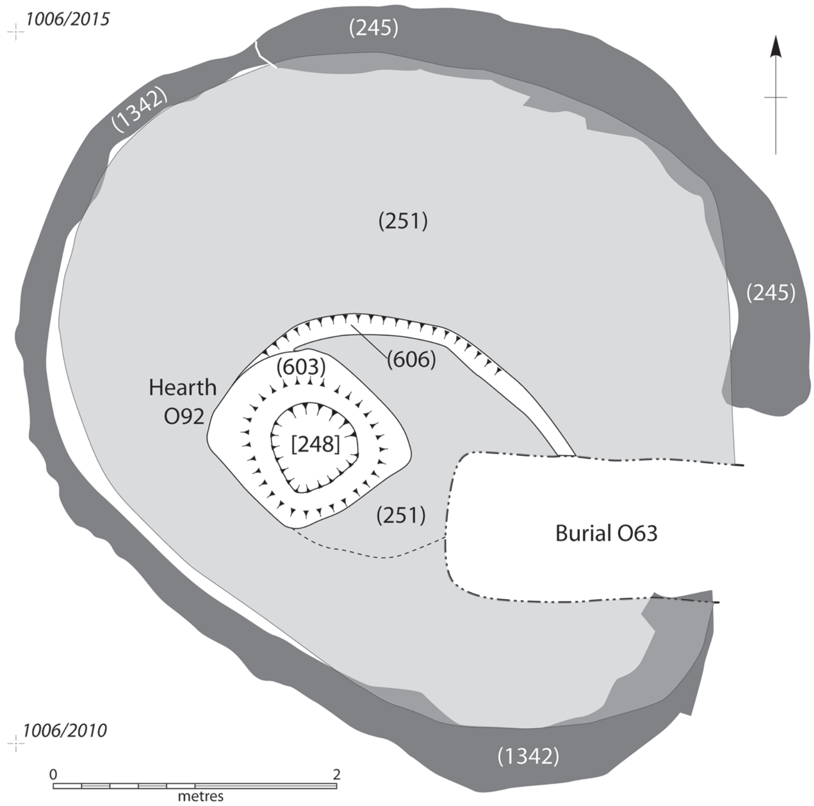


Figure 14.5 Plan of Stratigraphic Block 1 contexts around Hearth O92.

The removal of burnt rubble (1012) exposed five flat fragments of a hard mud plaster. The largest of these (1048) was inside the area demarcated by wall (1016) of Internal Structure O117, while four smaller fragments were external to this wall and referred to as (1026)/1–4 (Figure 14.16A). These fragments of a surface were stratified between layers of burnt pisé rubble: (1026) was overlain by burnt rubble (1012) and overlay burnt rubble (1029), while (1048, within O117) was under burnt rubble layers (1036) and (1039), and over burnt pisé rubble deposit (1044) (Figure 14.14A). These fragments of a surface (or surfaces) supported a relatively high density of chipped stone (with regard to field observations) including visible concentrations of macro and micro debitage from knapping activity (Figure 14.15, 14.16). The largest fragment of degraded mud-plaster surface (1048) was cut by a circular shallow feature [1302] with an irregular base filled with charcoal-rich brownish-grey silt (1046) (Figure 14.14B).

Outside of the perimeter of (1016) there was a rubble deposit (1029), which was similar in composition to the overlying rubble (1012) but contained linear arrangements of wood charcoal (Figure 14.17; 14.18). These appeared to be the remains of individual pieces of burnt timber, many of which had kept their shape despite being carbonised (Figures 14.19, 14.20). The plan (Figure 14.17) shows the distribution of the excavated lines of charcoal, which were all individually numbered and sampled for the identification of the wood species and estimation of the diameters of the original timbers. The lines of charcoal formed two spatially exclusive co-axial patterns, one orientated northeast–southwest and southeast–northwest in the northwest part of the structure and one orientated roughly east–west and north–south in the northeast part of the structure (Figure 14.17). The northeastern group was better preserved, although it consisted of generally thinner charcoal blocks. There were fewer linear charcoal arrangements preserved in the southern part of the structure, but the overall content of loose charcoal was still high. The linear charcoal formations were not found at precisely the same level within the rubble (1029), but the majority were contained within a 0.25 m thick band spread across the interior of the structure. Several stretches of charcoal appeared to have dropped into the spaces between the pisé blocks of (1029), especially in the northeast part of the interior.

A section line (Section S189) was established across the whole of the interior, including Internal Structure O117. Excavation continued only to the southeast of this section (Figures 14.21 and 14.22).

The mass of burnt pisé rubble (1029) continued below the carbonised wood horizon in the excavated southeast part of the structure, but with new types of structural elements. Some of the pisé blocks now had smooth surfaces, which were often facing downwards (Figure 14.23). A concentration of

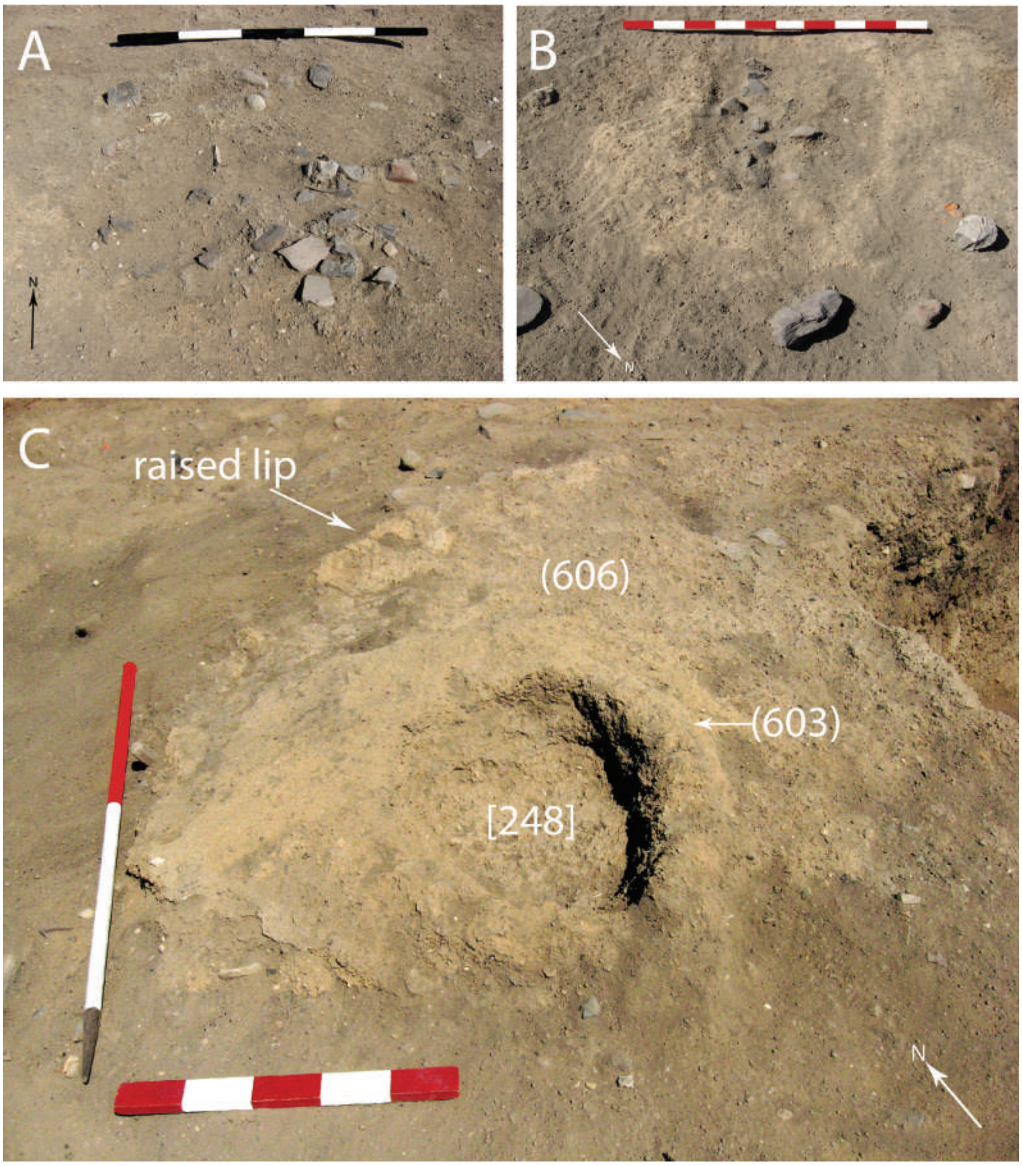


Figure 14.6 View of Hearth O92 showing: A — upper spread of burnt stones (44), scale 0.5 m; B — fill (249) with burnt stones, scale 1.0 m; and C — excavated fire pit [248] with mud-plaster rim (603) and mud-plaster surface (606), scales 1.0 m x 0.5 m.

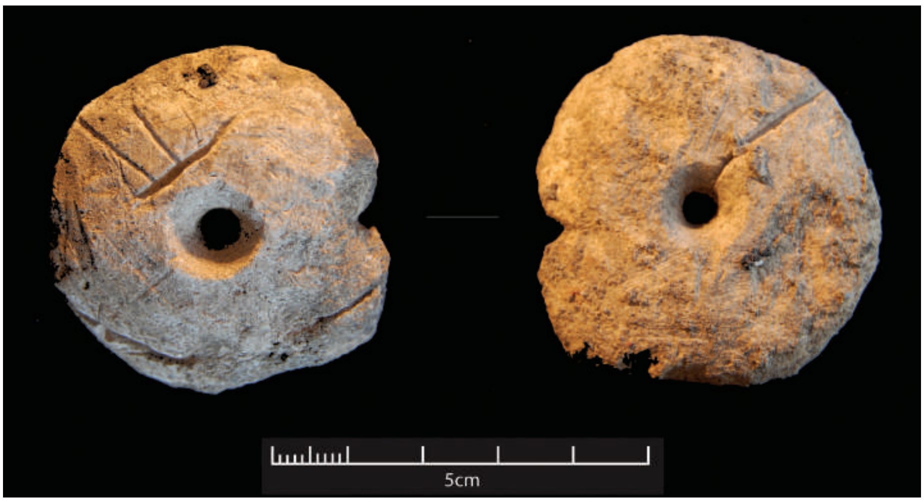


Figure 14.7 Incised and perforated limestone object SF250 from fill (44) of hearth O92.

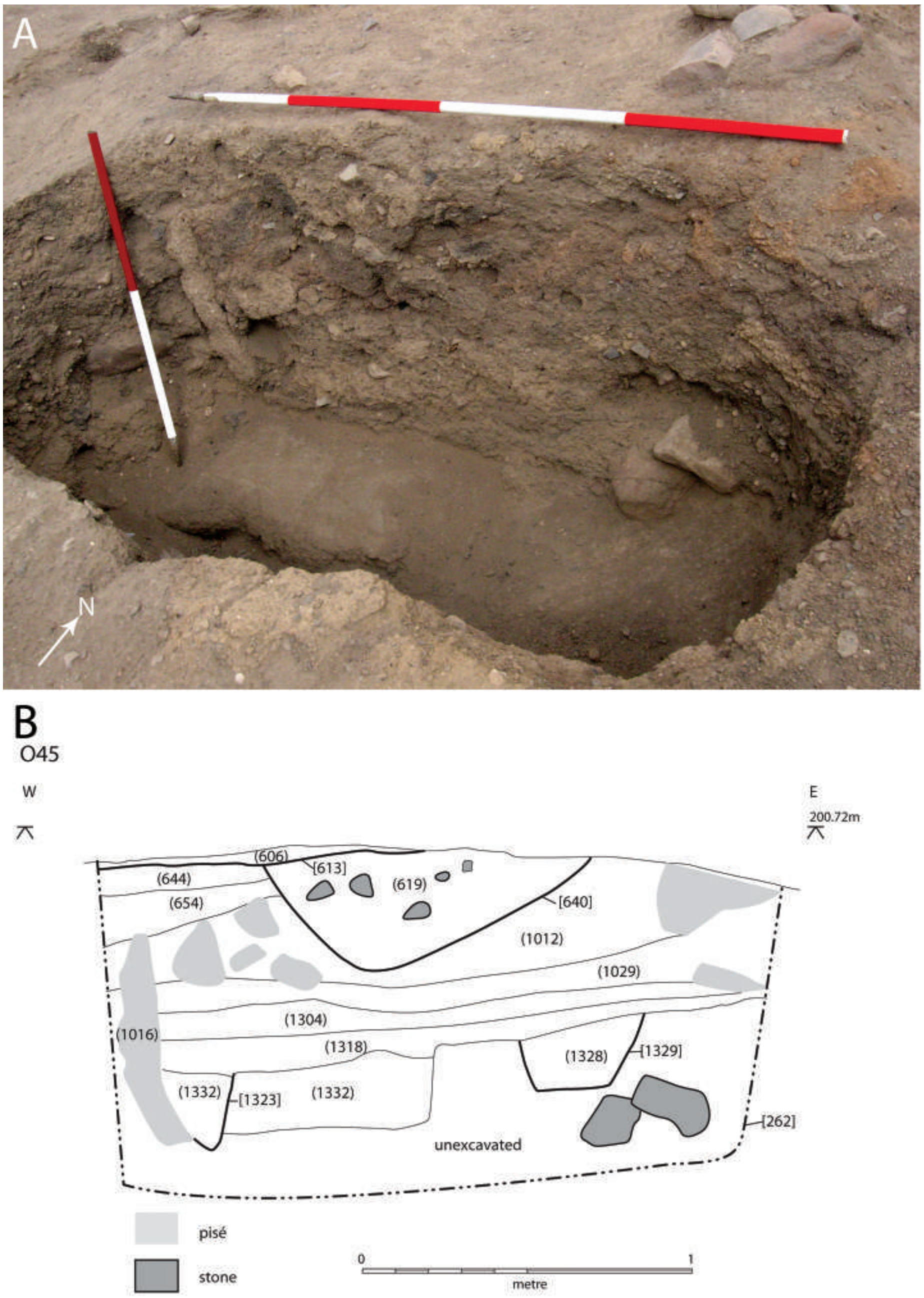


Figure 14.8 A — Oblique view of the south-facing side of Burial O63 from the southeast. Scales 1.0 m x 2 m. B — Corresponding section drawing S112 showing the relationship between internal wall (1016), pisé rubble (1012), subsidence feature [640](619) and overlying mud-plaster surface (606).

particularly heavy pisé blocks (up to 0.5 m³, part of 1029) was located in the far northeast part of the structure. They were surrounded by broken sheets of mud plaster (part of 1029). These were lying at various angles but all pitched towards the pisé blocks and interpreted as fragments of a mud-plaster floor. Further excavation discovered that underlying and mixed in with these fragments were two large and notched stones (SF2062, SF2425). Additional notched stone SF2426 in the same area was found in the underlying deposit (1318). Each had a shallow notch carved in one end. Figure 14.23 illustrates the inter-relationships between the heavy rubble, the tipped mud-plaster sheets, and one of these notched stones (SF2062).

An area of loose charcoal fragments, 1.5 m x 1.0 m in extent, was revealed below the burnt rubble (1029) in the northeast part of the structure. Some of the charcoal was attached to the underside of the pisé blocks as they were lifted; selected blocks with attached charcoal were kept for the identification of the represented plant taxa (Figure 14.24). This dense layer of carbonised twigs and small branches

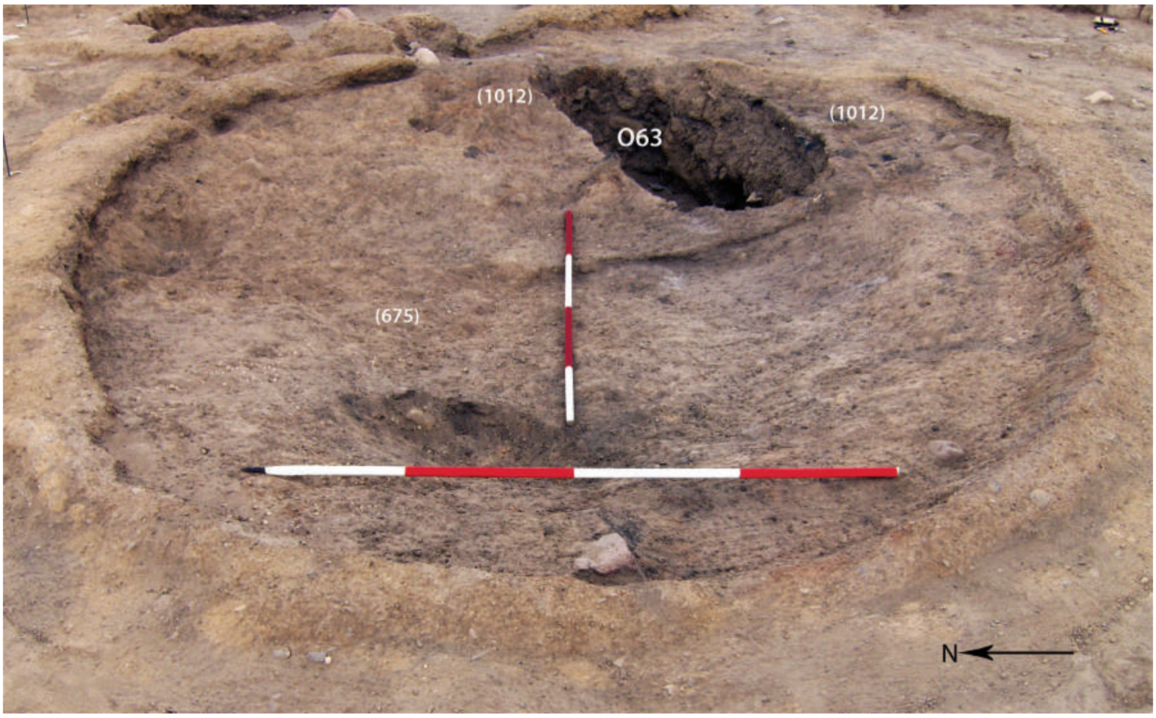


Figure 14.9 Structure O45 from the west during the excavation of deposit (675) across the middle of the interior. Note the raised burnt material (1012) around excavated Burial O63 in the south and southwest. Scale 2.0 m.

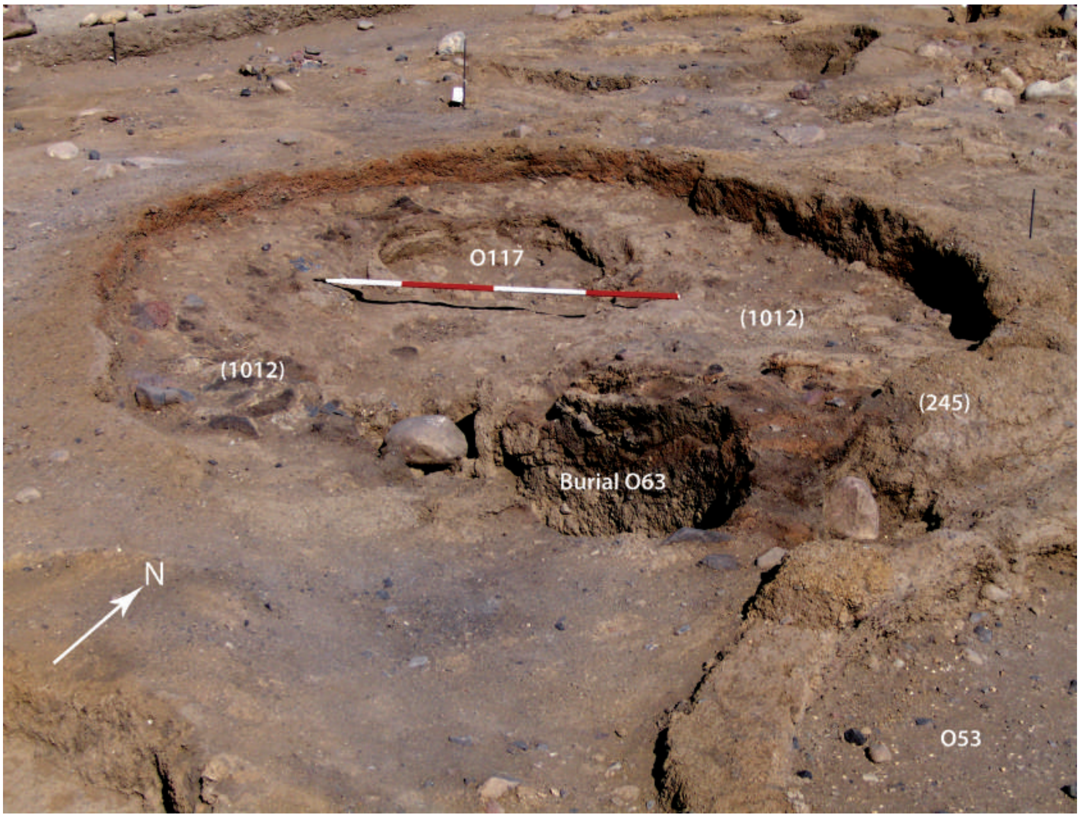


Figure 14.10 Structure O45 from the southeast showing the top of exposed burnt rubble (1012) and the emerging Internal Structure O117. Note the reddened part of the deposit extending out of the structure between the terminus of wall (245) and the cut of Burial O63. Scale 2.0 m.

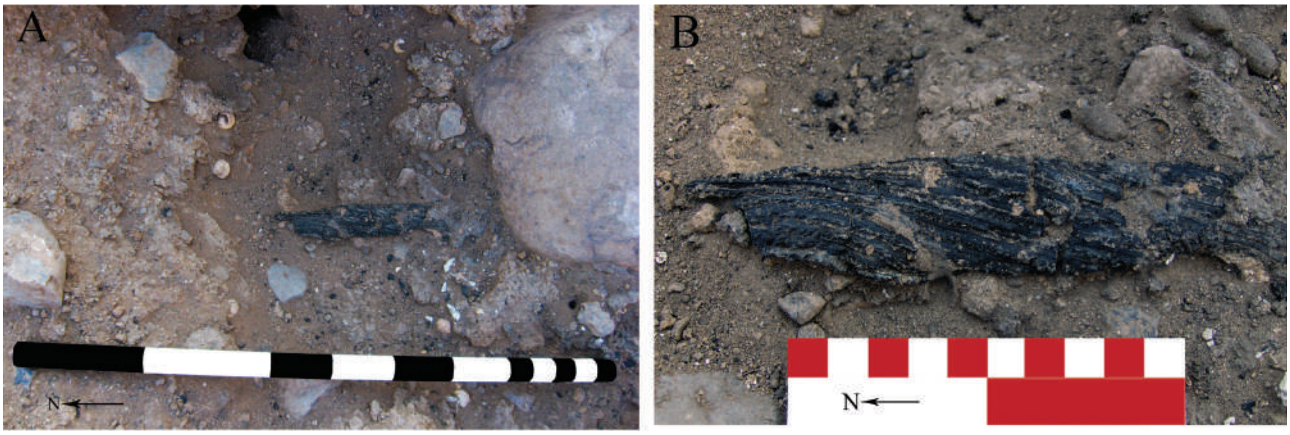


Figure 14.11 A — Deposit (1017) incorporating a large rock and a strip of bitumen SF1530. Scale 0.5 m; B — close up SF1530 showing the impressed basketry striations. Scale 0.1 m.

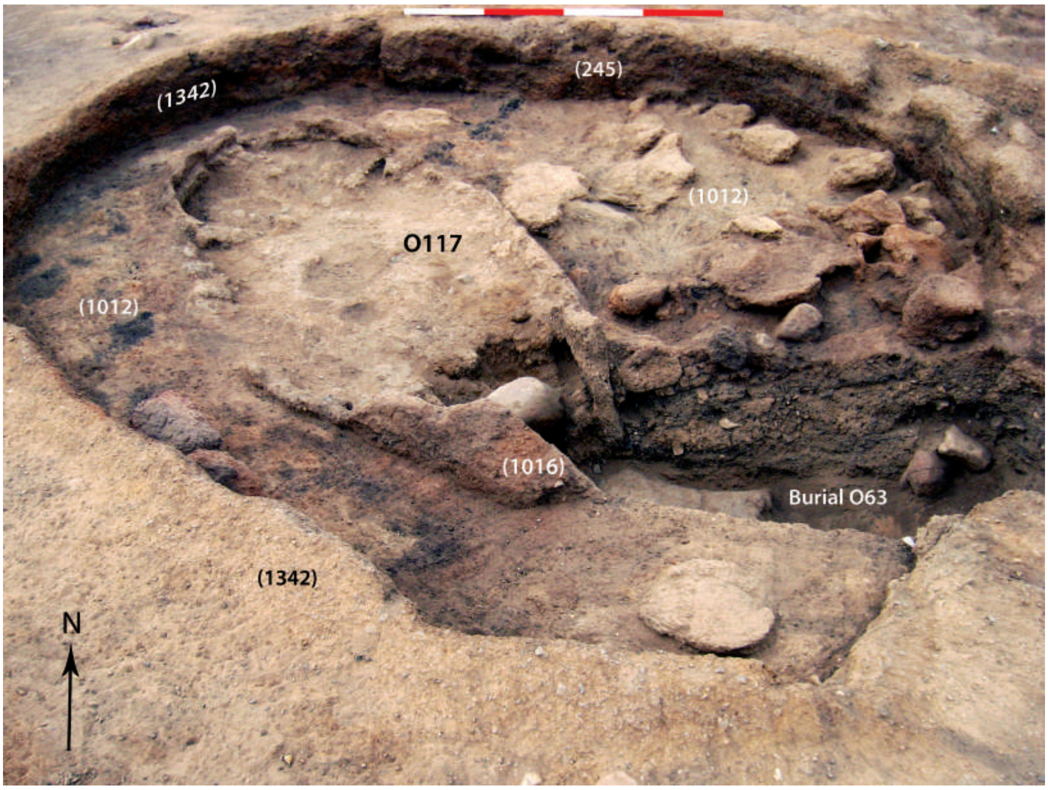


Figure 14.12 Structure O45 from the south during the excavation of burnt rubble (1012) showing the exposed outline of wall (1016) of Internal Structure O117, with burnt outer face and clear outlines of some of the burnt pisé blocks. Scale 2.0 m.

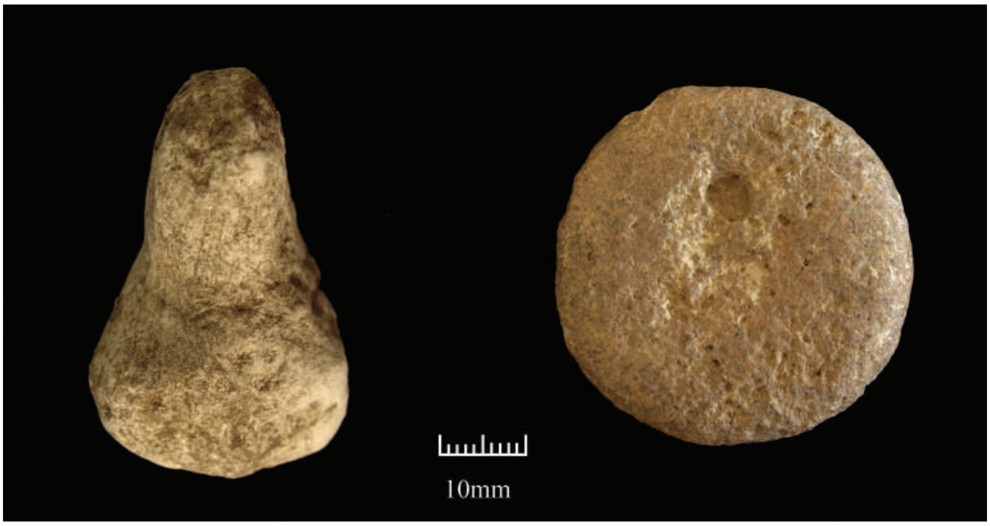


Figure 14.13 Partially surviving carved and incised limestone object SF1560 (left) found in collapse (1012) and partially perforated stone disc SF2027 (right) from collapse (1029).

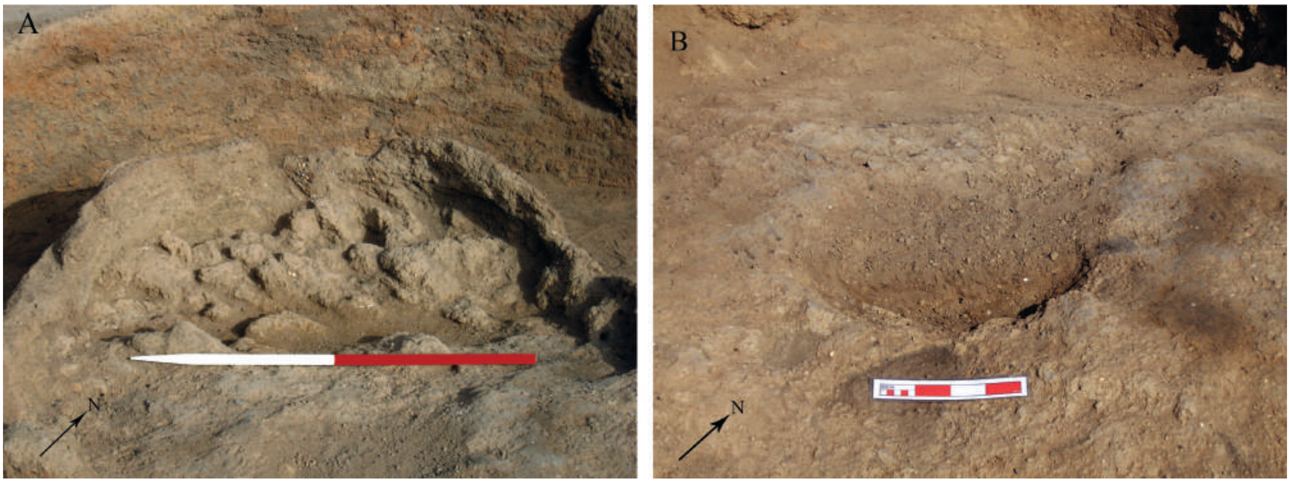


Figure 14.14 A — Rubble (1036) at the northwest end of Internal Structure O117. Scale 1.0 m; B — Half-sectioned fill (1046) of feature [1302] in burnt surface (1048). Scale 0.2 m.

(recorded as part of 1029) was spread over loose red and grey ash deposits (1308) and (1315), which filled part of the interior between Section S189 (Figure 14.22), outer wall (245)/(1342), Internal Structure O117, and the earlier build-up of unburnt deposits located on both sides of Burial O63 to the south.

Also below (1029) and in the southeast quadrant of the structure on both sides of Burial O63, there was a deposit of unburnt pisé rubble (1304). Underlying (1304) to the north of Burial O63 there was the ashy deposit (1308) and loose yellowish-grey-brown silt (1318), while its equivalent on the south side of the burial was sandy silt (1319). Deposits (1308) and (1319) were rich in objects made of stone, especially hammerstones (SF2407, SF2410, SF2416, SF2419, SF2422, SF2073, SF2077 and SF2397), pestles (SF2074, SF2076 and SF2414), notched stone support pillar (SF2079), and other less definable ground-stone and chipped-stone objects. A number of carved and incised stone objects were also found including pendant SF2415, miniature phallus SF2389 and patterned incised plaque SF2390 (Figure 14.25). The finds in deposits (1308) and underlying silt (1318) also included several burnt yellow and reddish sandstone blocks (SF2398, SF2411, SF2420 and SF2421), which could have been used as pigment stones. Fragments of plant-impressed bitumen (SF2394) were also found in deposit (1308) (Table 14.3), and deposit (1318) contained previously mentioned notched stone SF2426, one of several found within the structure.

In the area south of Burial O63, deposit (1304) contained a concentration of human bone including a mandible (SF2066, Figure 14.26). At the distance of 0.5 m

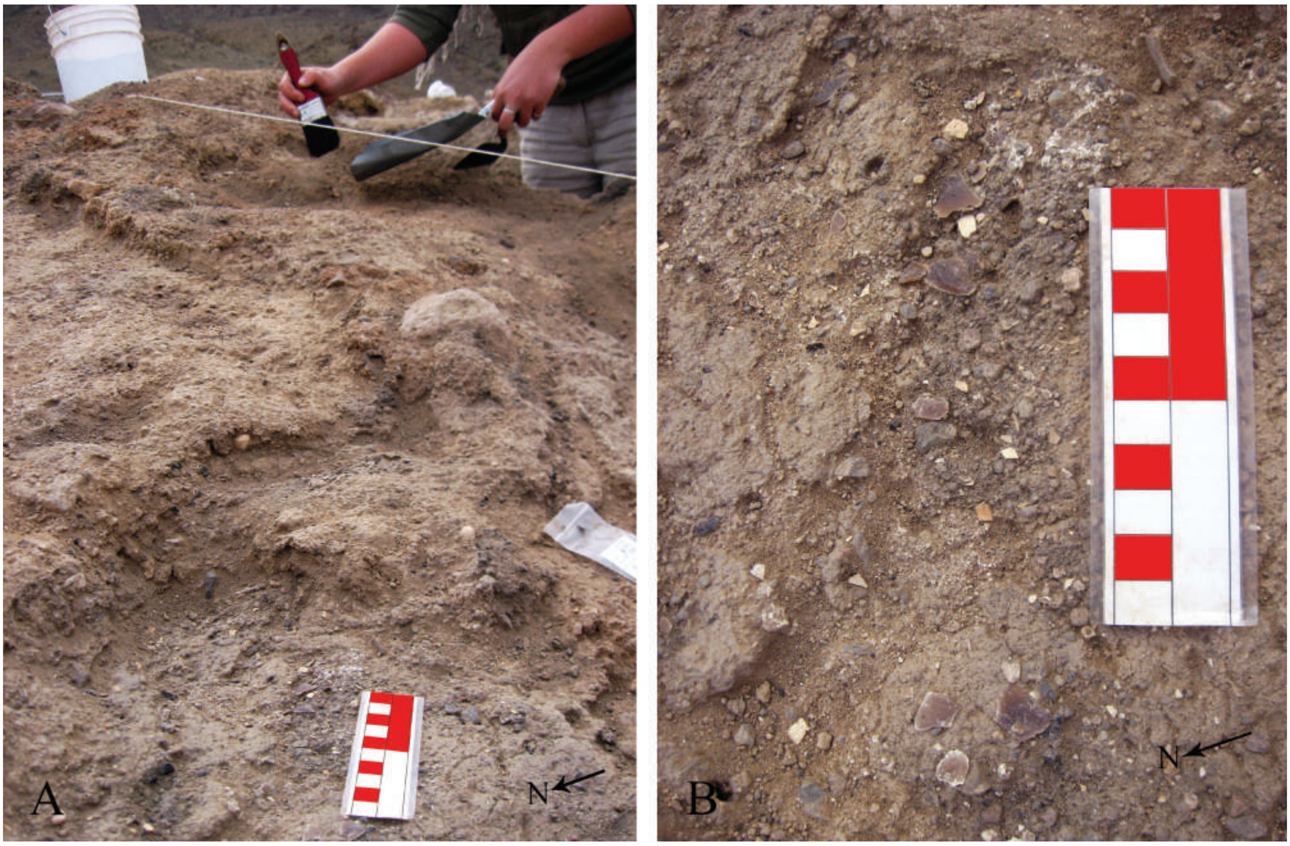


Figure 14.15 A — A fragment of exposed surface (1026)/4 with burnt rubble (1012) being excavated beyond it and B — the close up detail of the same area showing chipped-stone micro-debitage. Scale 0.1 m.

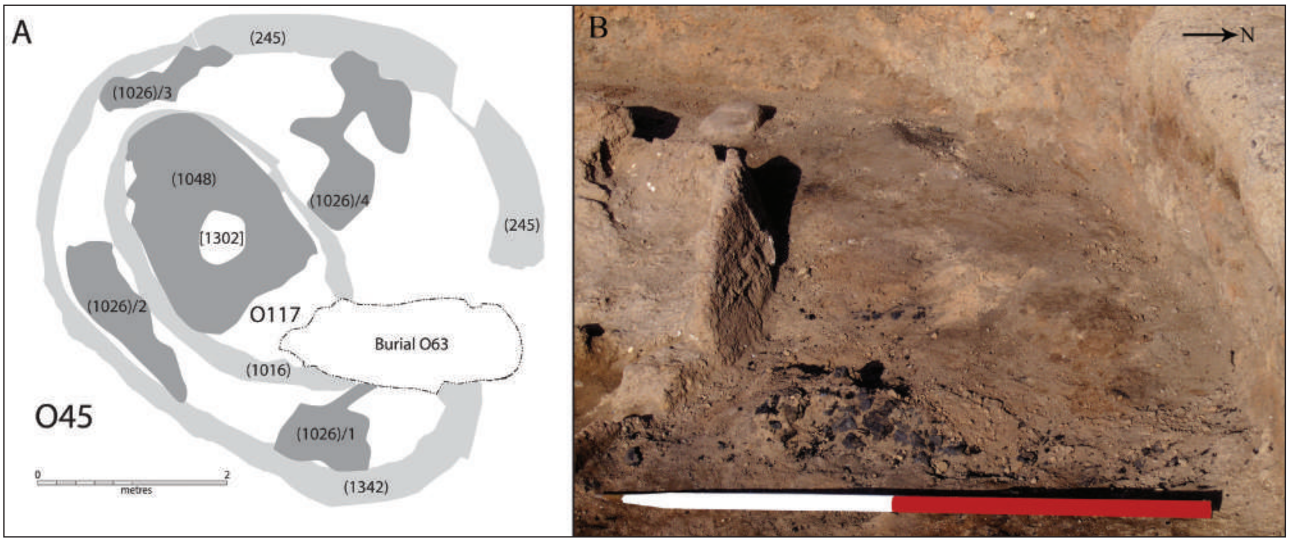


Figure 14.16 A — Plan of the surviving fragments of a mud-plaster surface(s) (1026)/(1048) in Structure O45 and B — the view of fragment (1026)/3 from the east showing underlying burnt timber in deposit (1029) in the foreground and the smooth surface in the background. Photo scale 1.0 m.

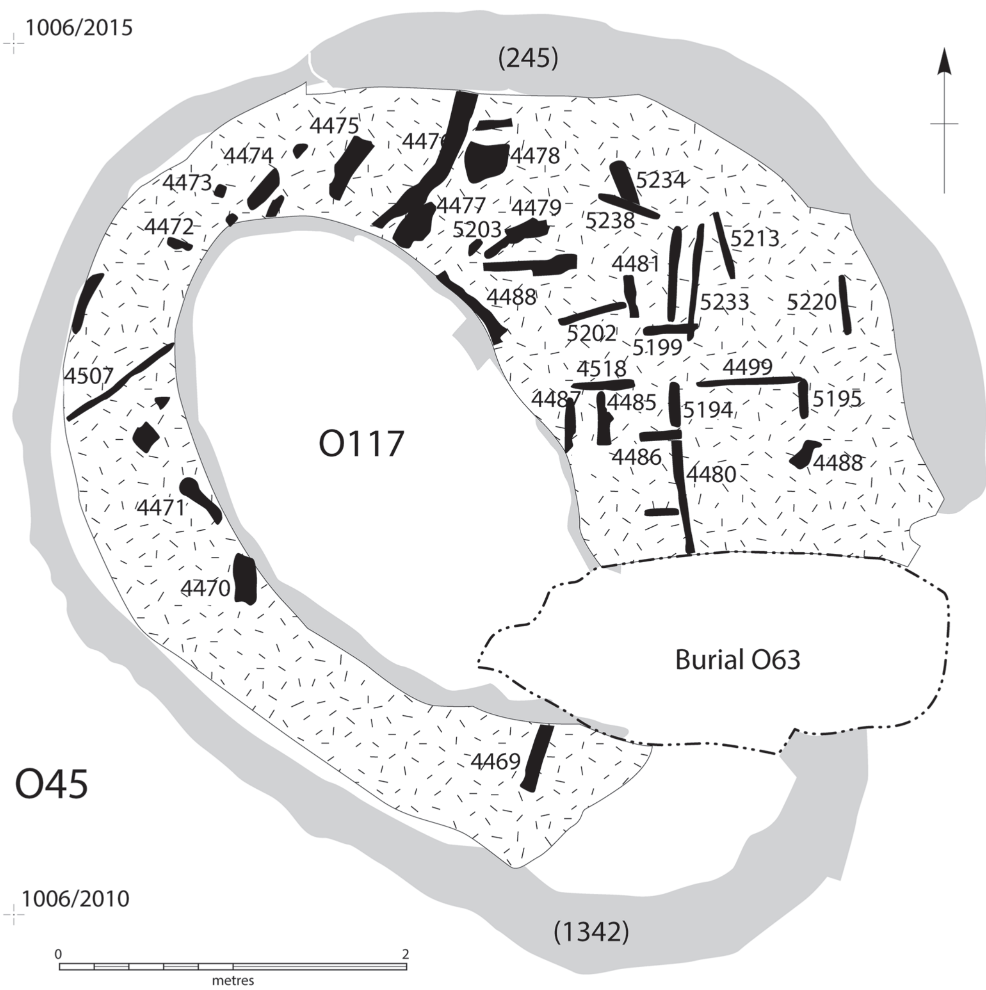


Figure 14.17 Plan of charcoal in deposit (1029).

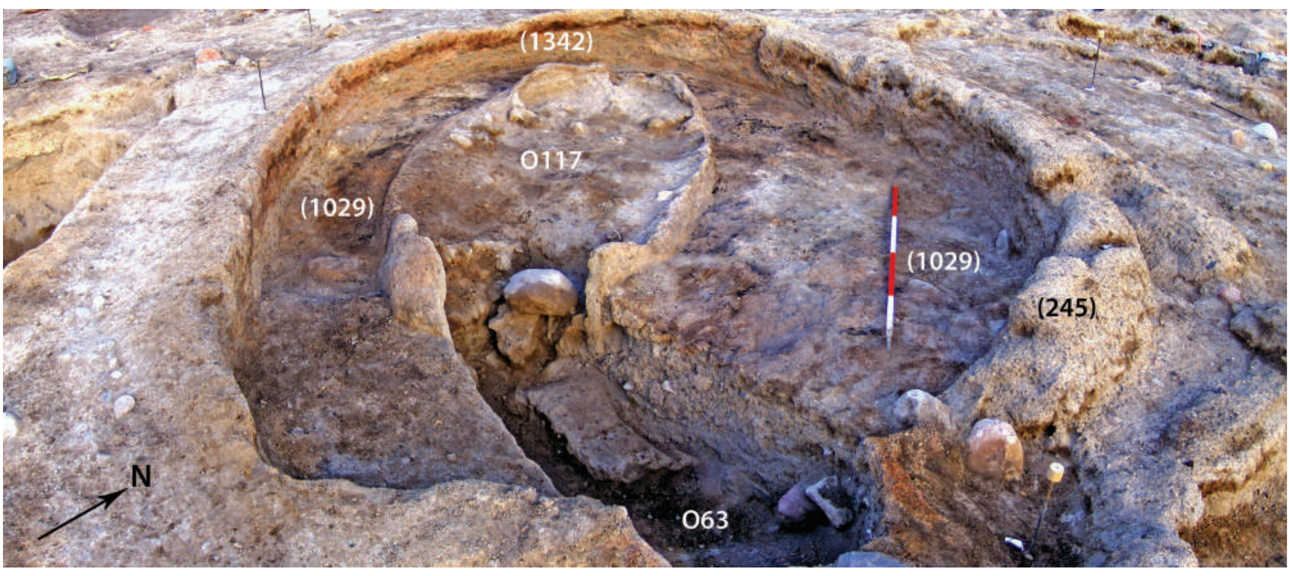


Figure 14.18 Structure O45 from the southeast showing top horizon of charcoal lines and rubble (1029) around Internal Structure O117. Scale 2.0 m.

Figure 14.19 A — Part of co-axial pattern of charcoal lines SA4518, SA4485, SA4486 and SA5194 in the eastern part of O45. Scale 2.0 m; B — Charcoal lines SA4476, SA4475 and SA4474 to the north of (1016). Scale 1.0 m.

Figure 14.20 Close ups of burnt timbers in deposit (1029): A — 45° junction of thicker burnt timber SA5234 and thinner charcoal line SA5238, scale 0.2 m; B — Cross-section of carbonised timber SA5234, scale 0.05 m; C — Charcoal line SA4475, scale 0.2 m.

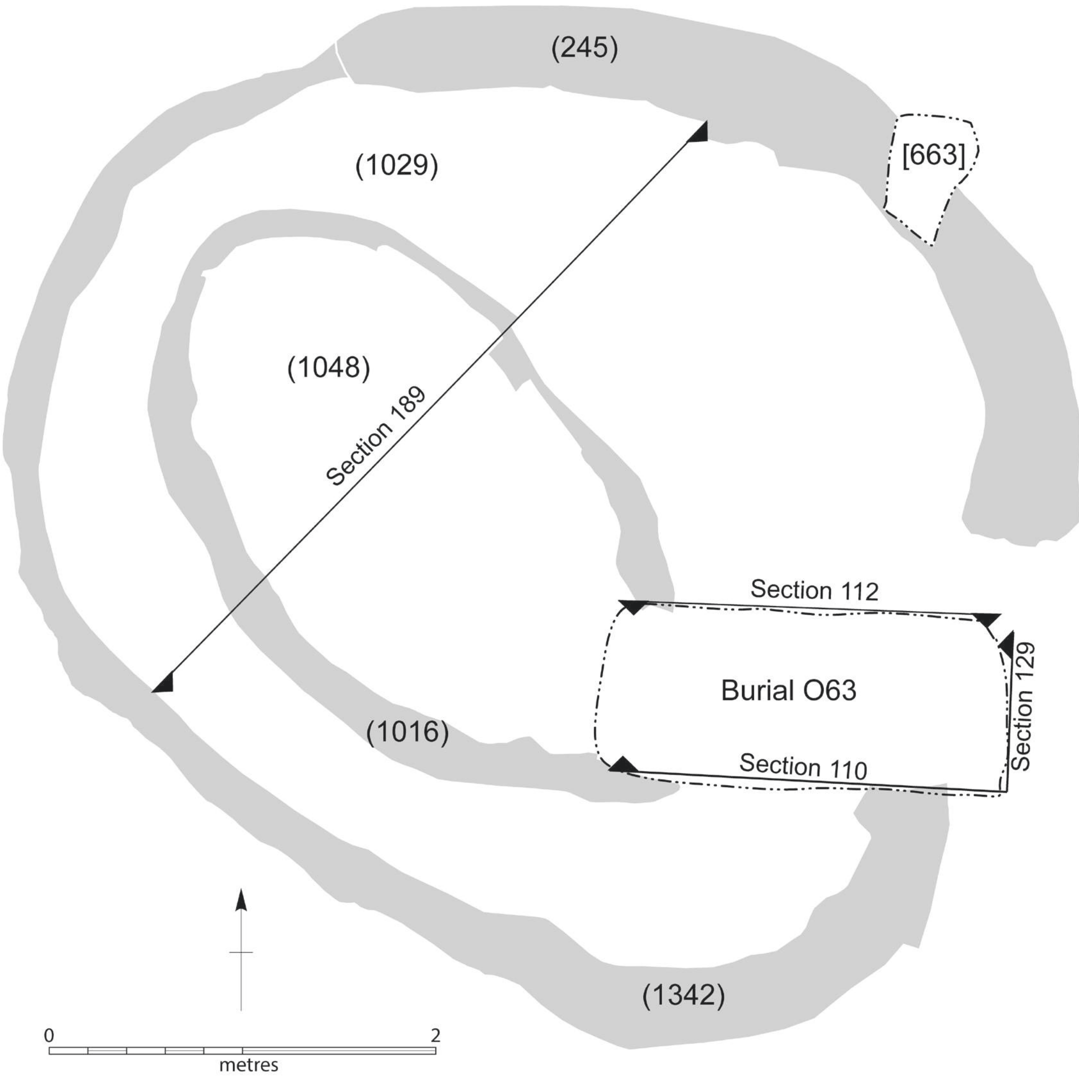


Figure 14.21 Plan of Structure O45 showing location of Sections S110, S112, S129 and S189.

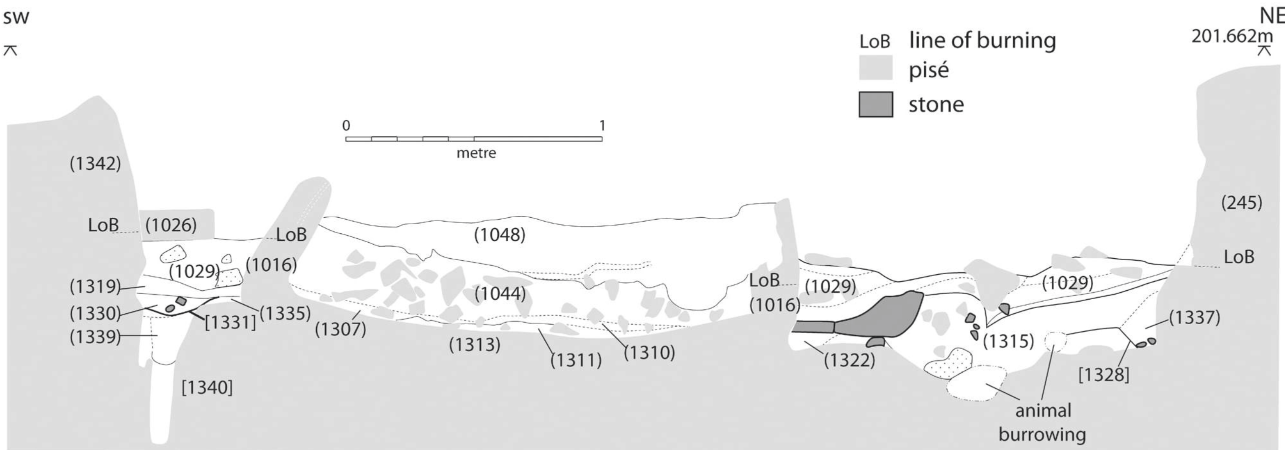


Figure 14.22 Southeast-facing Section S189 showing the burnt collapse deposits and the level of burning inside Structure O45 represented by the scorch lines on the interior face of the outer wall (245)/(1342) and the outer face of the interior wall (1016).

Figure 14.23 The lowest level of burnt rubble (1029) comprised of heavy pisé blocks in the northeast part of Structure O45. The sheets of broken and pitched mud-plaster flooring are marked with the upward pointed arrows. Stone 'pillar' support SF2062 and unexcavated wall niche in wall (245) are also marked. Scale 2.0 m.

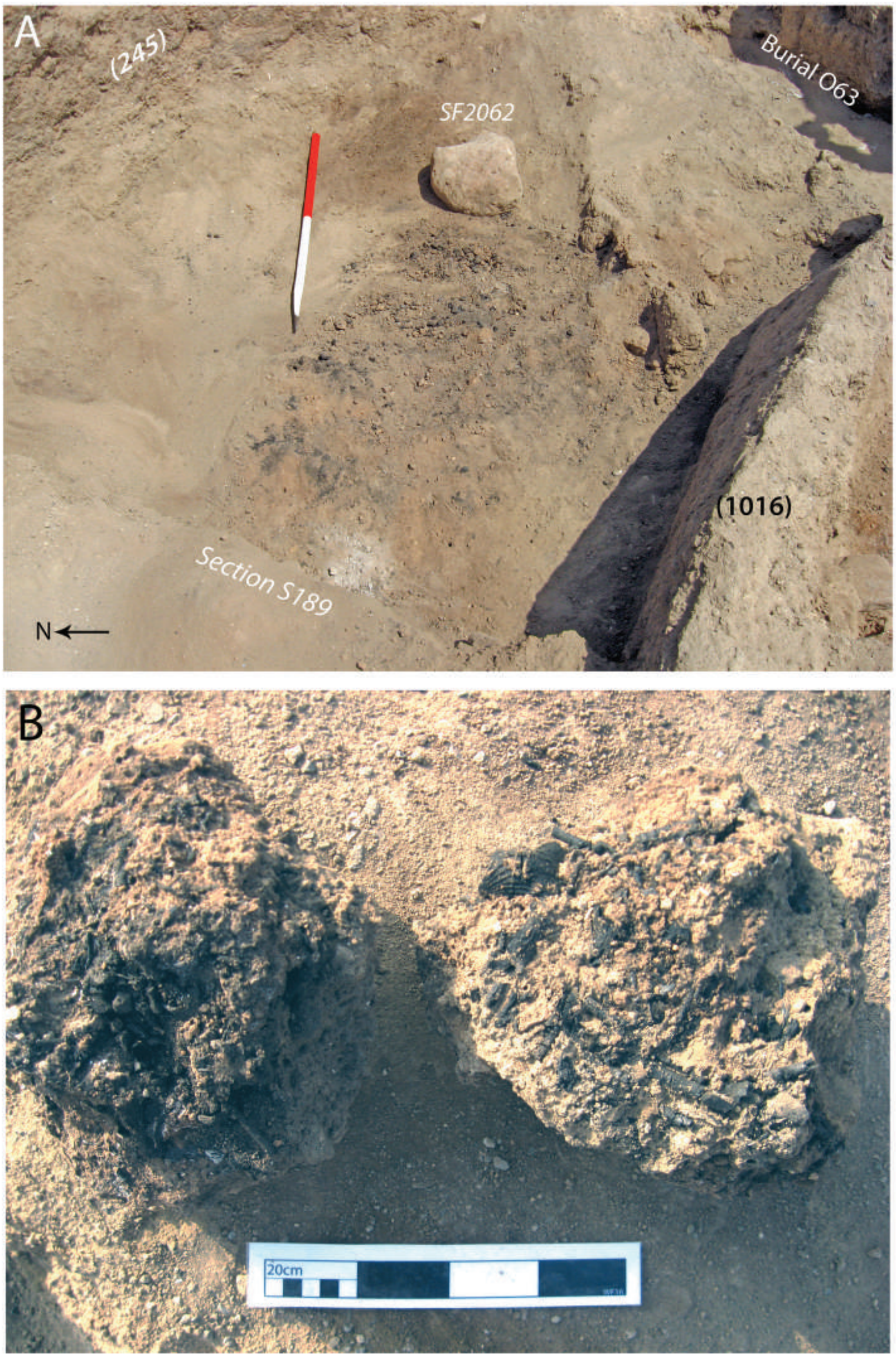


Figure 14.24 A — Spread of loose charcoal in relation to Section S189, wall (245) and toppled floor support 'pillar' SF2062. Scale 1.0 m; B — Pisé blocks SA5691 and SA5692 with attached charcoal. Scale 0.2 m.

from the mandible and set into underlying rubble (1319), there was a further notched stone (SF2079). This was the largest of such stones (Figures 14.28 and 14.42) found in Structure O45 (0.45 m long); it was pointed at one end and chipped into a notch at the other.

Tables 14.2 and 14.3 show that the amount of disarticulated human bone found in the burnt rubble deposits of (1012), (1026) and (1029) is greater than in the later deposits in the structure. All human bones found in the infill of the structure were either loose teeth or small cranium fragments except for the mandible (SF2066) found amidst unburnt pisé rubble (1304). The mandible was crammed between pisé blocks in the southernmost part of the interior (Figures 14.26 and 14.27). The highest concentration of loose human bones was also found in this area, mainly to the east of mandible SF2066 (Figure 14.27), and included several cranium fragments, some of which were partly burnt and blackened. Their distribution had been influenced by burrowing animals, demonstrated by the location of a burnt cranial fragment (SF1569) in the

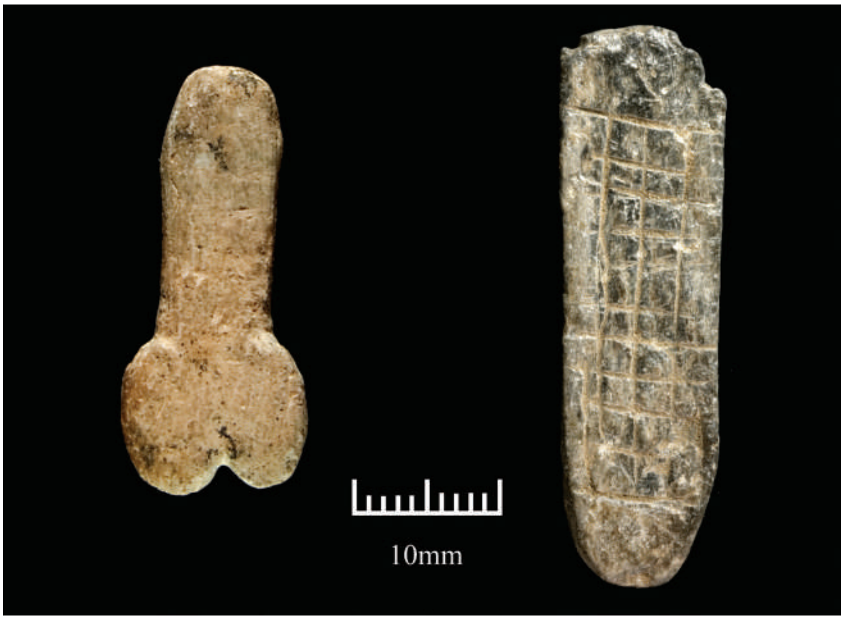


Figure 14.25 Phallic carved stone object SF2389 and incised stone plaque SF2390 from deposit (1308).

Figure 14.26 Human mandible SF2066 crammed in among pisé blocks (1304). Scale 0.1 m.

fill (1027) of an animal burrow [1028] that cut into burnt rubble (1012). It seems likely, however, that the majority of teeth and cranial fragments in this area belong to the same skull as mandible (SF2066). As such, they have been combined as Human Remains O129.

Below deposits (1318) and (1319) were two concentric gullies [1329/1331] and [1323/1338], which were both bisected by the cut of Burial O63 (Figure 14.28 and 14.29). The outer gully followed the inner face of outer wall (245)/(1342)/(1031) and the inner gully ran along the outside of Internal Structure O117, following wall (1016). The northern stretch of the outer gully [1329] was filled with silt and pisé rubble (1328). It contained a firmly set flat stone (SF2428) that had a smooth notch (Figures. 14.28 and 14.29). Gully [1329] was 0.2 m deep where it cut through the build-up of earlier deposits next to Burial O63, but in the area towards Section S189 it completely petered out onto what appears to have been an earlier mud-plaster

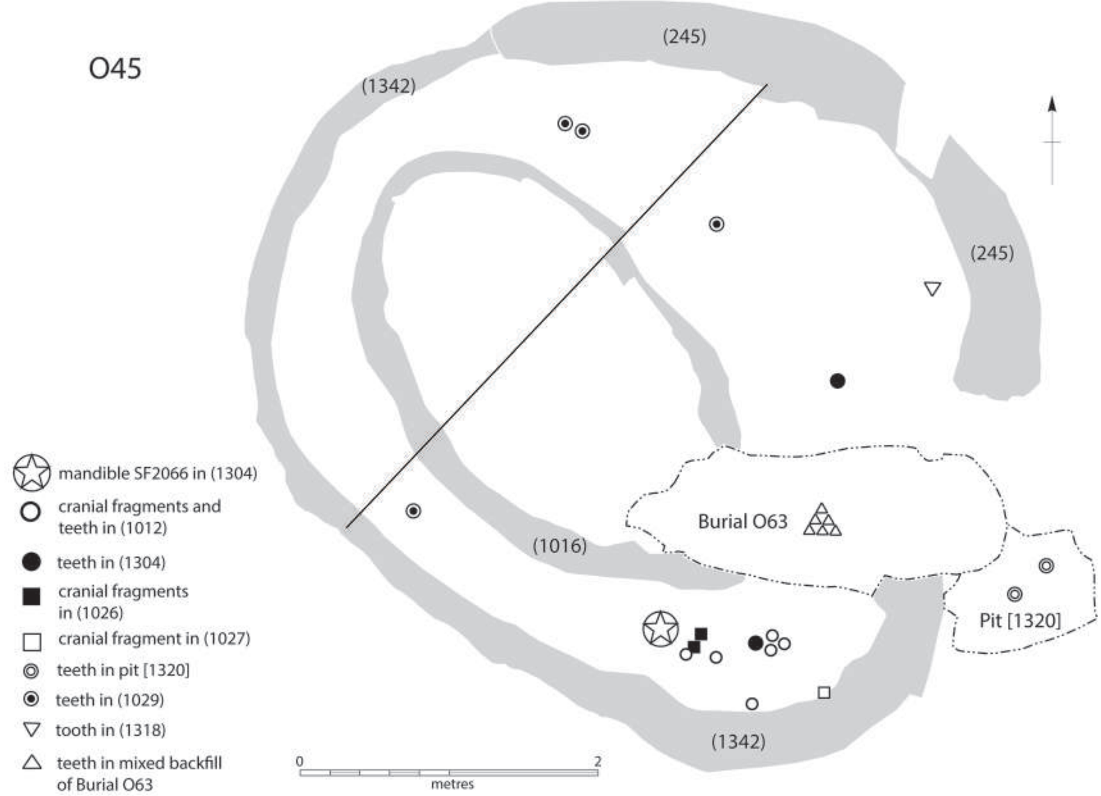


Figure 14.27 Distribution of Human Remains O129 in Stratigraphic Block 2 in Structure O45 and including the residual teeth in Burial O63.

floor (1837), although this was not further exposed by excavation. A similar situation was found in the case of the corresponding inner gully [1323/1338], filled by silt with pisé rubble (1322/1337), which cut through an unexcavated context, probably a pit fill (1332) at its southern end. As it followed the outer curve of wall (1016) it became shallow and hardly traceable.

The southern continuation of the outer gully [1331] (still inside Structure O45) had two pits, most likely holes to contain stones, cut into its base (Figure 14.28). The easternmost pit was deeper and had narrowing sides and a pointed base. Between the two pits a stone (SF2430), shorter than SF2079 but with a similar notch, was lying within the gully fill. These were two of several stone pillars from this area of the excavation, all sharing a similarity in form and, we suspect, function, as illustrated in Figure 14.42. There was also a recess in the inner face of outer wall (1342) at the eastern end of gully [1331] of a similar dimension to the stone pillars.

A deep and narrow post-hole [1340], measuring 0.3 m x 0.25 m and 0.5 m deep, filled by light greyish-brown silt (1339), was uncovered in the base of gully [1331] immediately adjacent to Section S189. Although in line with the gully, the post-hole was sealed by its fill and thus probably belongs to a phase preceding the floor represented in (1029). The post-hole cuts mid-yellowish-brown silt (1335), which was the lowest deposit reached in the southern part of the structure.

Niche in wall (245) of O45

This niche [663] was situated *c.* 0.75 m above the level of the floor fragments within (1029) in the northeast wall of Structure O45 and measured 0.65 m deep x 0.55 m wide, although the opening is considerably narrower. The height of the niche remains unknown because the wall and the niche were truncated at this level. The niche was situated in the northeast part of wall (245), which (as described below) is the secondary rebuild of the original wall circuit (1342) (Figure 14.28). This rebuilding phase predates the floor represented within (1029) and it was not fully investigated by the excavation, although certain aspects will be commented upon below. The nature of the construction of wall (245) is significant with regard to the construction of niche [663], which was probably created at the same time. This construction phase was part of the wider restructuring of Structure O45 that included wall (56) of Structure O53 to the east and wall (674=999=61) of Structure O85 to the north (see below). All three walls were constructed in a similar way with outward sloping pisé extending over the surrounding ground level at the time of construction thus creating buttressing for the vertical part of the construction. Wall

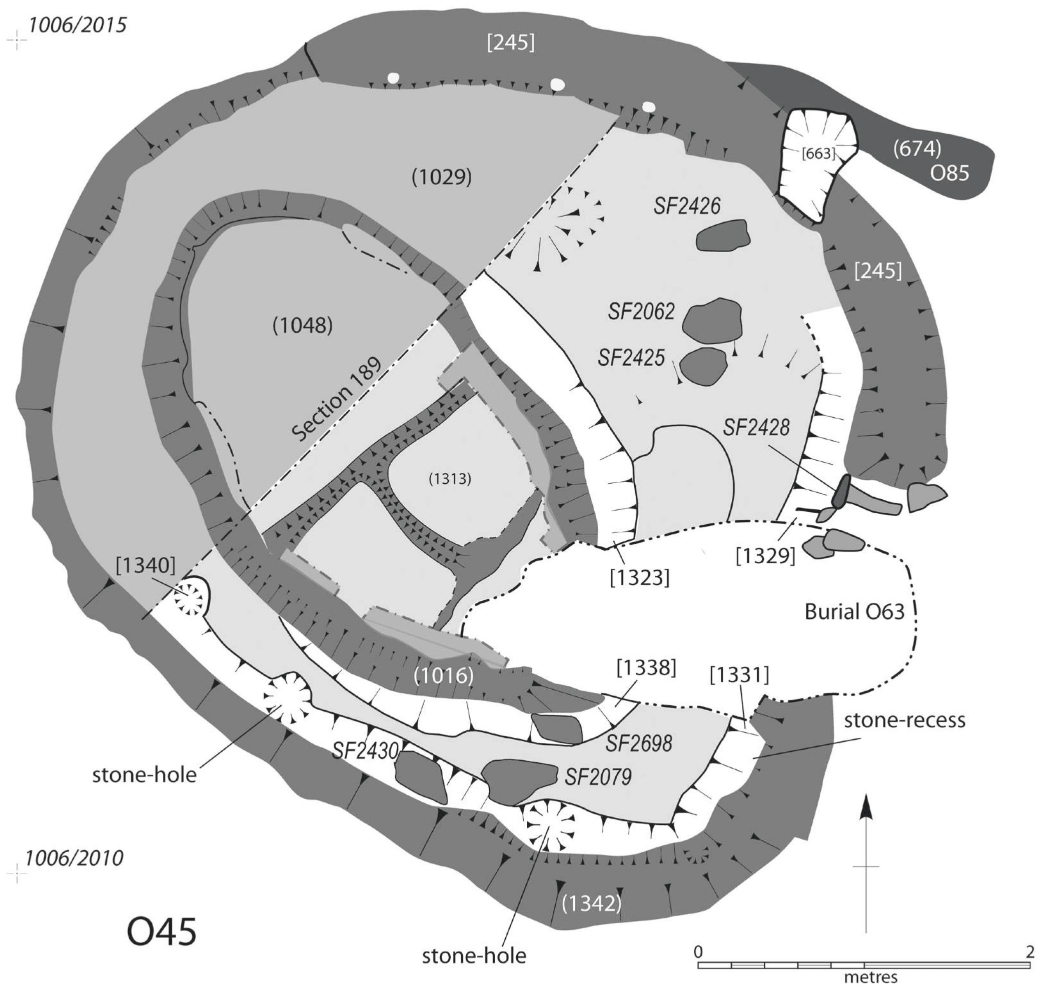


Figure 14.28 Plan of Structure O45 showing the location of the trenches and the stone supports for the construction of the raised floor.

(674=999=61) of Structure O85 was already in place when wall (245) was built partly overlying its outward slope. This allowed for niche [663] to extend into the adjacent wall (674=999=61) of Structure O85, creating a space that could not be obtainable within the thickness of wall (245) alone (Figures 14.28, 14.30A).

The niche contained three fills. The upper-most fill (604) was mid-greyish-brown loose silt, which probably accumulated at some point after the collapse of the building. Underlying this silt were two ground-stone objects: a quarter of a stone bowl (SF943) and a thick stone platter (SF944) (Figure 14.30). The positioning of these objects, which occupied the entire niche, implies their deliberate placement (during excavation the objects were combined as (661)). The bowl fragment was placed on its side across the mouth of the niche; the platter was placed horizontally behind it and their joined arrangement is suggestive of a shelf with the bowl fragment acting as a lip to stop things rolling off. The flat platter (SF944) overlay the lower fill (662), which was much richer in finds and charcoal than the upper fill (604) and was therefore probably the product of accumulation during the use of the niche. At the base and the back of the niche a ground stone 'piercer' (SF1169) was found.

Niche [663] was not the only feature within wall (245)/(1342). A metre and a half to its west a second feature within wall (245/1342) was exposed by the excavation of the burnt rubble (1029). This feature appeared to be larger than niche (663) but was not excavated because its location was beyond Section S189, i.e. it fell within the unexcavated part of the lower sequence (Figure 14.23).

Internal Structure O117

The Internal Structure O117 did not survive to its full height at any point around its wall (1016) circuit. The material broken from its top accounts for some of the rubble inside it designated as (1023) and (1036) at its northwest end and (1039) at its southeast end (Figures 14.14, 14.31). These deposits were at a similar stratigraphic level to the burnt pisé rubble (1012) located outside Internal Structure O117.

Figure 14.29 View of construction gully (1328)[1329] before the excavation with in situ *stone support SF2428 at the far right. Note the uneven surface in relation to the continuous ledge at the raised floor level along the inner face of the outer wall. Scale 0.2 m.*

They were differentiated from (1012) by a lesser extent of burning, presumably because the rubble of (1023) had derived from the top and inner face of wall (1016) rather than the outer walls of O45. The central part of Structure O117 was occupied by a degraded mud surface (1048), which was cut by a circular shallow feature [1302] with an irregular base filled with charcoal-rich brownish-grey silt (1046) (Figure 14.14B).

Excavation revealed that there had been a substantial collapse of the interior face of the wall, especially along its northeast and south sides. Because of the fragile nature of wall (1016) the excavation only exposed the inner face of the wall within three narrow slots. Two of the slots were at the southwest and one at the northeast side of the structure (Figure 14.31; 14.32). The remaining rubble infill adjacent to the inner faces of the wall was left unexcavated as a precaution against potential collapse. The fragile nature of the inner face of wall (1016) was at least partially caused by the way it had been constructed in layers, with at least two internal layers of mud-plaster facing having been applied over a mud core (Figure 14.31). The mud core of the wall was exposed by the cut for Burial O63, which showed horizontal wickerwork impressions in the core of the wall (Figure 14.33).

The interior of Internal Structure O117 was half-sectioned from the level of mud surface (1048) by Section S189 (Figure 14.21, 14.22), which meant that the potential of a carbonised wood horizon, equivalent to that within the surrounding deposit (1029) was not explored in its northwest half. The southeast half of the deposits within Structure O117 lacked any traces of linear charcoal, unlike the collapsed rubble in deposits (1012) and (1029), which

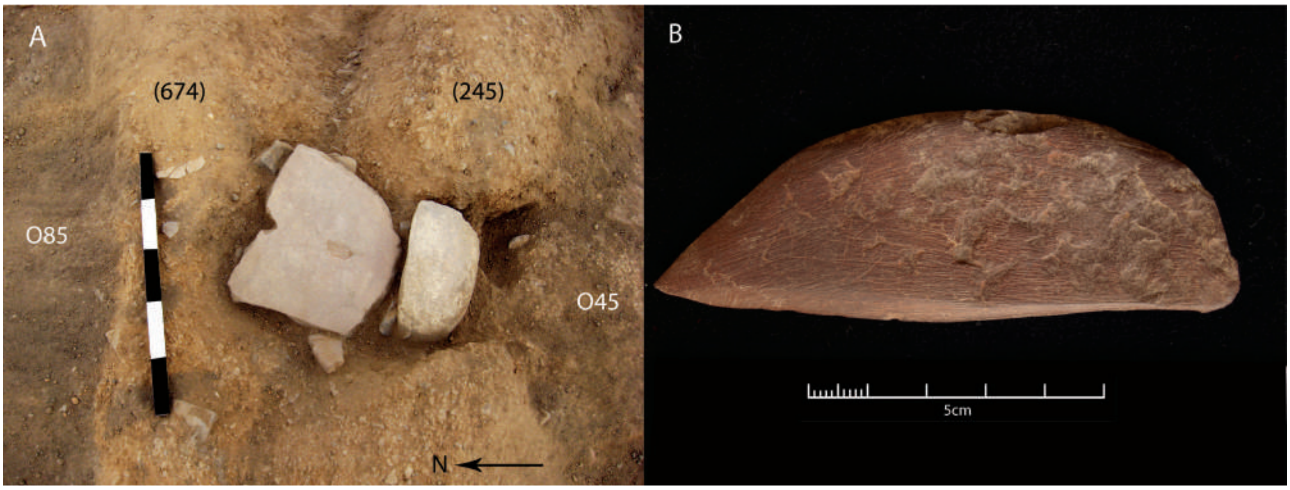


Figure 14.30 A — Stone platter SF944 and stone bowl fragment SF943 in niche [663] in the junction of walls (674=999=61) on the left and (245) on the right, scale 0.5 m. B — Ground-stone piercer SF1169.

Figure 14.31 Half-sectioned interior of Internal Structure O117 showing sequence of rubble deposits (1048, 1044, 1310, 1311, 1307) above moulded mud-plaster floor (1313). Note the baulks of rubble left in situ *for support of the incurving wall. Scales 1.0 m x 0.5 m.*

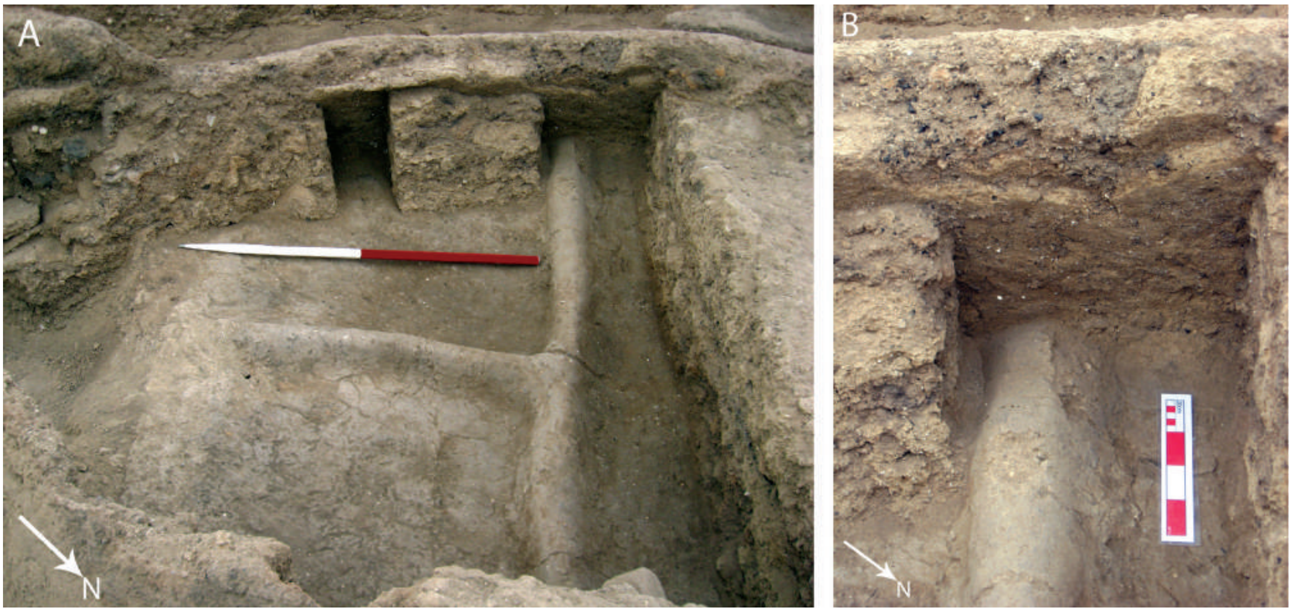


Figure 14.32 A — View of mud-plaster floor (1313) showing excavated slots on the southwest side and the lighter band of the scoured ridge at the southeast extent. Scale 1.0 m. B — Close up view of the junction of moulded floor ridge and wall facing on the southwest side. Scale 0.2 m.

Figure 14.33 A and B — Wattle impressions inside wall (1016); Scales 0.5 m, 0.1 m. C — Broken piece of moulded ridge SA5326 from mud-plaster floor (1313). Scale 0.2 m.

contained high proportions of very large pisé blocks and such charcoal. Rubble deposits (1039), (1044), (1307), (1310) and (1311), all contained within Internal Structure O117, were composed of predominantly smaller broken up pisé pieces with considerable quantities of charcoal fragments. These deposits contained fewer artefacts than those deposits surrounding the internal structure (1012, 1029).

Below these deposits a mud-plaster surface (1313) (Figures 14.31 and 14.32) was exposed that was exceptionally clean with neither artefacts nor occupation debris on its surface. The lowest burnt rubble deposit (1311) was resting directly on this surface (1313), which lacked any sign of burning. The exposed area of the floor was divided into three compartments by moulded low partitions, which were on average 0.10 m in height (Figures 14.31, 14.33C). The southeastern partition appeared to have been scoured away leaving a lighter linear mark on the floor. A broken piece of moulded plaster with the same profile as the other partitions was found directly next to its southwest end. The scoured ridge marked the southeast end of floor (1313), which did not reach the southeast end of Internal Structure O117. The southeast end of floor (1313) was abutted from the southeast by deposits that remain unexcavated and have not been given context numbers.

Possible entrance to Structure O45

The last area considered within Stratigraphic Block 2 concerns the space outside the presumed entrance into Structure O45 (Figure 14.1). The area between Structures O45, O53 and O11 contained silt (1034) overlying burnt rubble (1040), which was a continuation of the upper part of burnt rubble (1012) that was located inside the walls of O45. Figures 14.2, 14.18 and 14.23 show that the terminus of wall (245)/(1342) was marked by two large upright positioned stones, which were not fully excavated and were left *in situ* at the end of the excavation. They were sufficiently exposed, however, to record that the innermost stone was a sideways-interred cup-hole mortar.

The north-facing (Section S110) and west-facing (Section S129) sides of Burial O63 provided sections through the structural sequence of the south part of Structure O45, and through pit [1320] and surface (1333), which were excavated outside its southeast wall (Figures 14.34, 14.35). The deposition of burnt rubble (1012) on the inside of Structure O45 was paralleled on the outside by burnt deposit (1040). Its excavation revealed a pit [1320], which had cut an external mud-plaster surface (1333), located in an intramural space between Structures O45, O53 and O11 (Figure 14.40). Pit [1320] was sub-square in shape, measuring 1.07 m x 1.09 m and was 0.90 m deep. Large fragments of a cup-hole mortar (SF2037, SF2038 and SF2041) were found at the top of the pit (Figures 14.34). Below them were two substantial fills, the upper of which was greyish-brown silt (1045) and the lower greyish-yellow silt (1309), which included pisé rubble inclusions. Two smaller lower fills (1306) and (1321) were mainly composed of greyish-brown pisé rubble.

The fills (1045), (1309) and (1306) of pit [1320] contained several stone objects, including one with a polished side (SF2042), a mortar fragment (SF2040) and a flat pointed stone (SF2051), which had striations along both of its sides. Ground-stone fragments (SF2055, SF2056, SF2057) and parts of a single stone platter, or a dish, (SF2080) were dispersed throughout these pit fills. Among and below the discarded stone objects in fills (1045) and (1309) were small dumps of animal bone. These included the articulated lower leg and feet bones of juvenile goat/sheep; jaw bones and ribs of older individuals, as well as a complete tortoise carapace (Figure 14.36), a human molar (SF2049) and another possible human bone SF2070. Other finds included a ground-stone pestle SF2405, a quartz rubbing stone (SF2323) and a large flint flake (SF2061) with possible use-wear from scraping. The lowest fills (1306) and (1321) were situated along the western and eastern sides respectively of the pit and were comprised of structural mud rubble, which, judging by the material the pit cut through, most probably derived from the external mud-plaster surface (1333) in the case of eastern fill (1306) and a mud-plaster lining (1032, see Stratigraphic Block 3 below) in the case of western fill (1321). These relationships were helpful in establishing further links between the sequences of construction of structures O45 and O53.

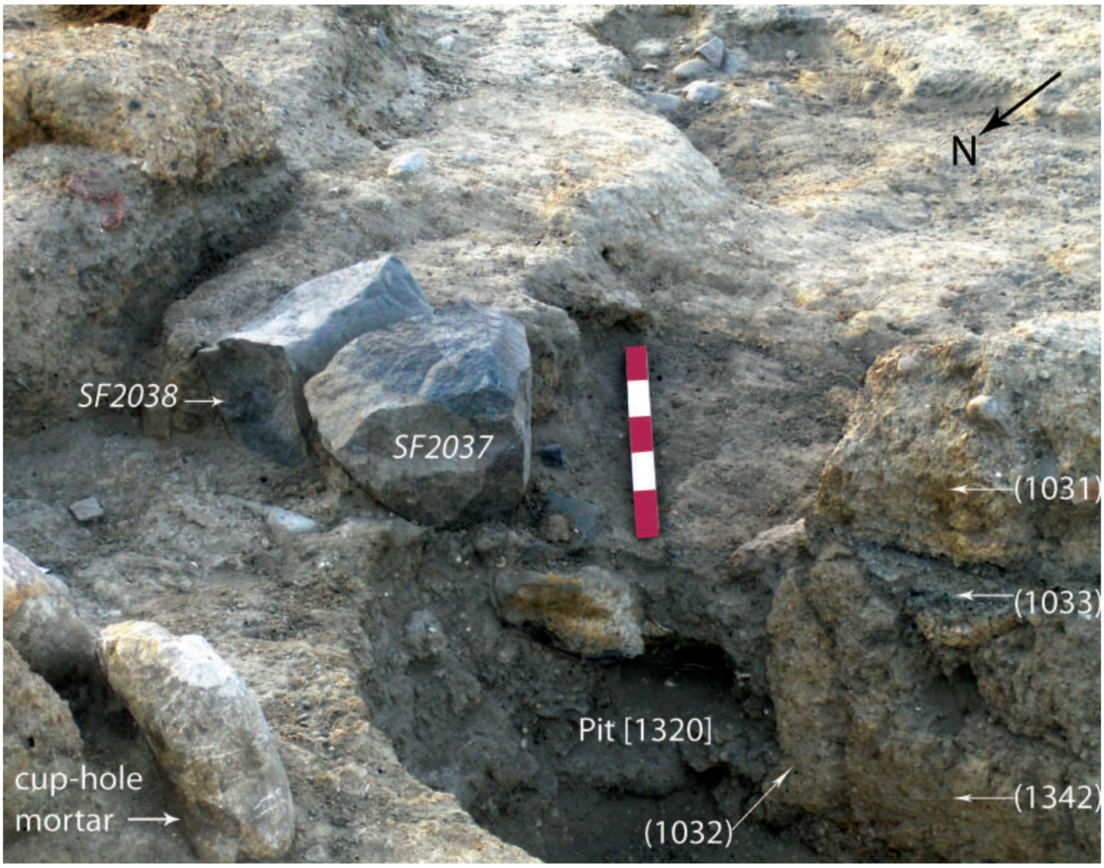


Figure 14.34 Cup-hole mortar fragments SF2037 and SF2038 at the top of pit [1320]. In the foreground on the left are the sideways-interred cup-hole mortar and another stone marking the terminus of wall (245). The wall sequence cut by Burial O63 on the right is topped by pisé wall (1031). Scale 0.5 m.

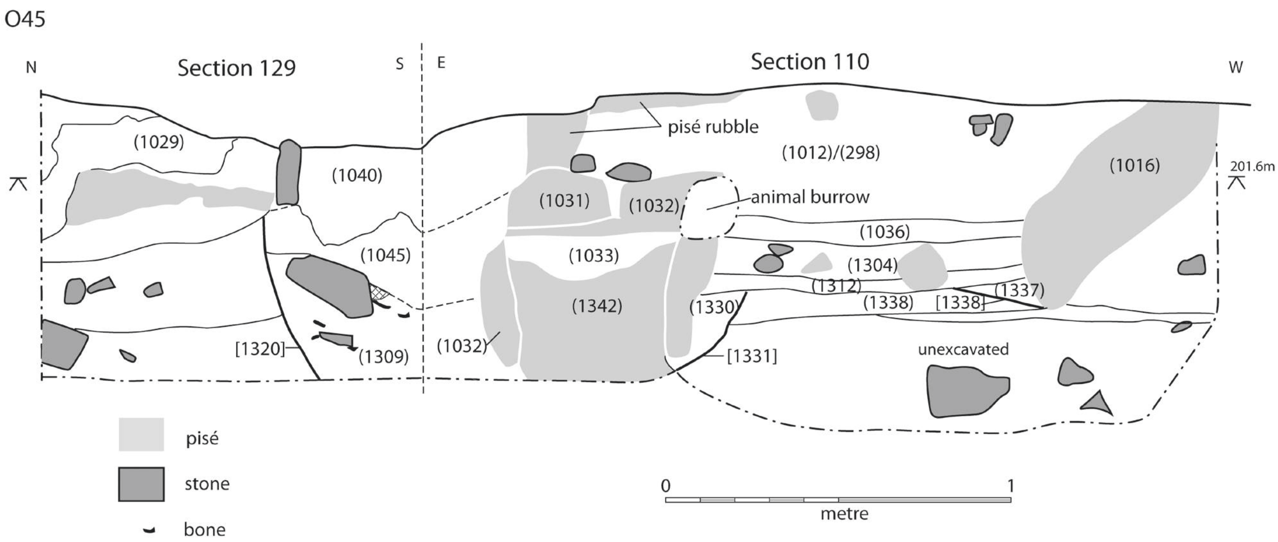


Figure 14.35 Conjoined west-facing Section S129 and north-facing Section S110 showing the construction sequence of the southern part of O45 and pit [1320].

Stratigraphic Block 3

Stratigraphic Block 3 refers to all excavated and exposed deposits located below the horizon of the mud-plaster floor represented by fragments within (1029) of Stratigraphic Block 2 (Figure 14.3). The walls of Structures O45 (245/1031/1342) and O117 (1016) appear to predate this floor and to have been reused several times in the building history.

Section S110 (Figures 14.35 and 14.37) through the southern arm of the main wall sequence showed that the uppermost surviving pisé wall (1031) represents an addition to the top of a preceding wall (1342). This is similar to the relationship between (1342) and the upper wall (245) in the north part of the structure, except that (1342) and (1031) were separated by intermediate mud plaster (1032) and a loose charcoal-rich silt (1033), which did not extend beyond the width of the wall. Deposit (1033) was directly overlying wall (1342) and was in turn overlain by mud-plaster lining (1032), which was attached to the outer face of wall (1342) and was cut by pit [1320] from Stratigraphic Block 2 (Figure 14.37).

The extramural mud-plaster surface (1341), located below the walls of three adjacent structures (wall (245) of Structure O45, wall (56) of Structure O53 and wall (674=999=61) of Structure O85) is also assumed to belong to this early phase of construction, but it has not yet been investigated in detail. Its stratigraphic position is similar to that of mud-plaster surface (1333) in the southern part of the intramural space between Structures O45, O53 and O11, which was overlain by the upper wall (56) of Structure

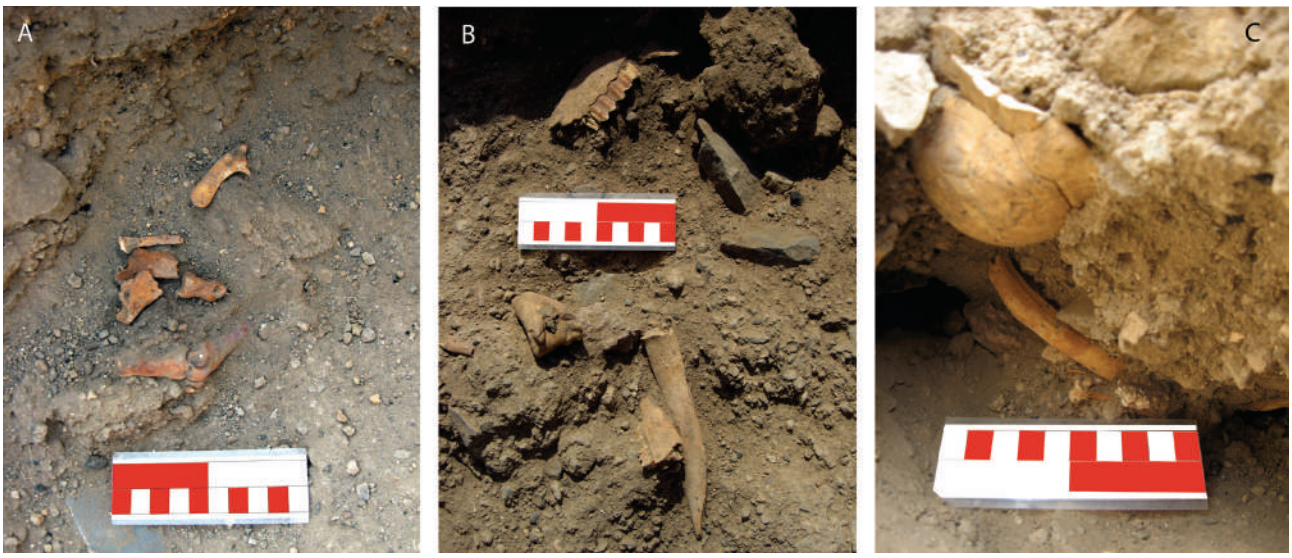


Figure 14.36 Faunal remains in pit [1320]: A — juvenile goat/sheep; B — older goat/sheep; and C — tortoise shell and goat/sheep ribs. Scales 0.1 m.

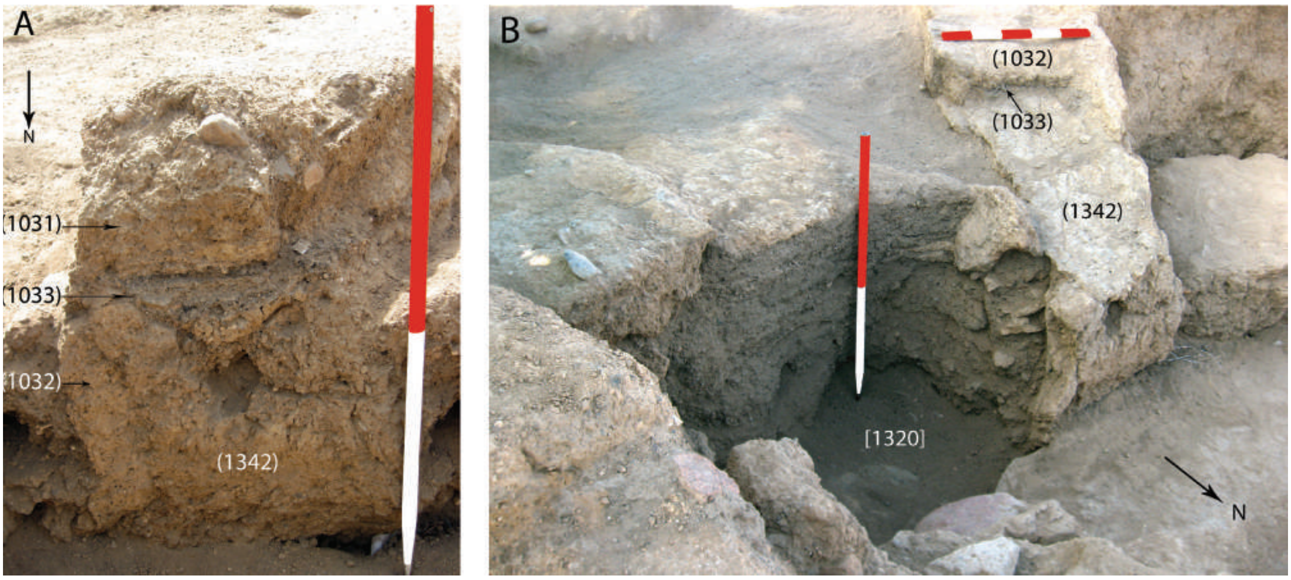


Figure 14.37 A — wall sequence as exposed by the cut of Burial O63 and illustrated in Section S110 in Figure 14.35. Scale 1.0 m. B — Excavated pit [1320] with visible grey soft fills of possible intramural Chamber O116. Sloping top surface of wall (1342) is exposed after partial excavation and sampling of mud-plaster lining (1032), which continues under the horizontal scale. Scales 1.0 m x 0.5 m.

O53 and abutted its lower wall (643). The two surfaces were separated by the cuts of pits [1320] and [1001], but it is possible that they were a continuous surface prior to the truncation by the pits.

The complete extent of mud-plaster lining (1032) was not fully explored, but it was possible to trace the top of its vertical face as it diverged from wall (1342) in the direction of Structure O11 to the south. The section of pit

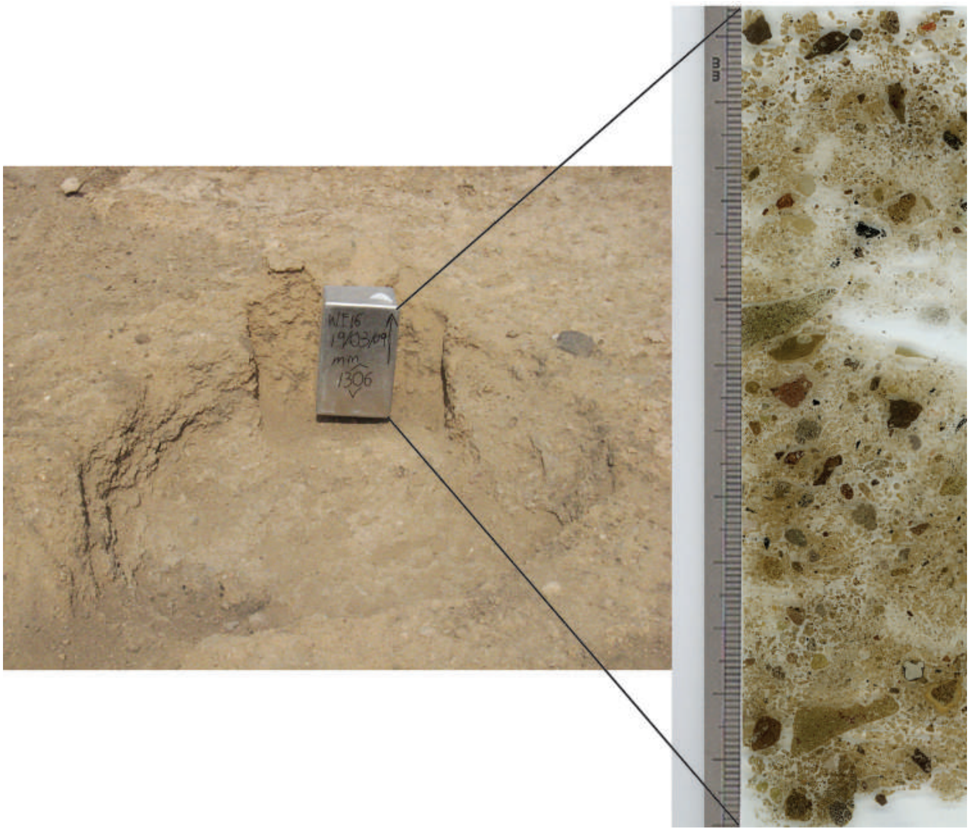


Figure 14.38 Extraction of block sample [1306] from context (606) and (603) in Structure O45 and the corresponding thin section.

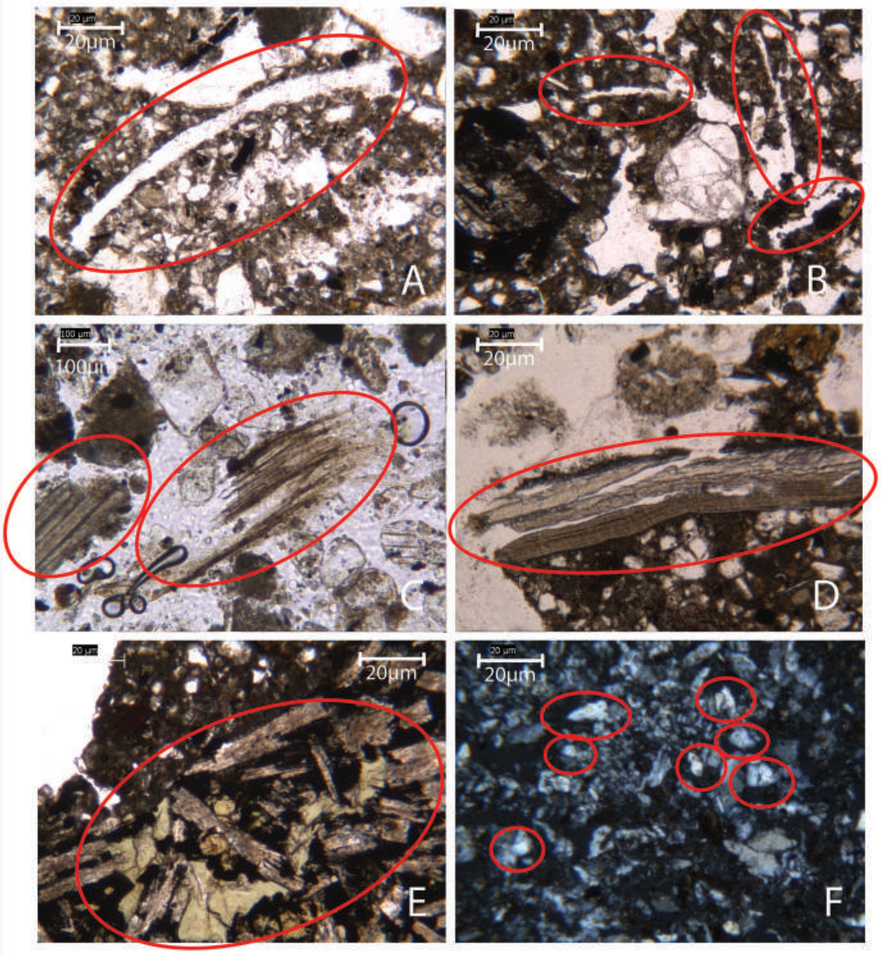


Figure 14.39 Images of different inclusions from a micromorphological thin section taken from sample SA1306: A and B — pseudomorphic voids; C — plant stems; D — shell; E — plaster particles around a rock; F — gypsum particles under polarised light.

[1320], which cuts through the intramural space between Structures O11, O53 and O45, shows multiple layers of grey soft silt (1334) abutting mud-plaster lining (1032) (Figure 14.37). The lining could be the inner face of an intramural chamber, designated as O116.

14.3 Sedimentary and micro-stratigraphic assessment

Fifteen sediment samples were analysed from O45: six of these were taken from the surrounding wall (245), including a transect across the inner, middle and outer face; one sample was taken from the internal wall (1016); three samples of burnt pisé (1012); three samples from a pisé partition wall, one indicating structural impressions (1029); one sample from floor (1313); and one sample from roof collapse (1026). The data, results and interpretation are provided within Chapter 41.6.

A block sample SA1306 was taken across contexts (606) and (603) which formed two mud-plaster horizons in the construction of Hearth O92, located in the southwest area of O45 within Stratigraphic Block 1 (Figure 14.38). Although field observations appeared to indicate two distinct mud plasters, analysis could only identify a single homogeneous unit (Figure 14.38; Table 14.4).

The unit was put into the plaster/pisé category 4 (see Chapter 4). It had a mixed composition, appearing more like an occupation horizon than a mud plaster, perhaps indicating the recycling of occupation deposits and sediment for construction at WF16. Between 20 and 30% of the unit consisted of elongated pseudomorphic voids that probably derive from the addition of plant material as a tempering agent for the mud plaster (Figure 14.39 A–C). The anthropogenic remains consisted of charred material, bone and micro debitage from flint knapping. The addition or incorporation of this material suggests that occupation debris was recycled into the manufacture of this mud plaster. Gypsum is present within some of the voids (Figure 14.39F), most likely arising from post-depositional formation and accumulation, although this might also have been deliberately added to the mud-plaster mix.

Table 14.4 Description of unit 1 within Sample SA1306.

Layer	Particle size/ sorting	Anthropogenic remains	Other	Aggregates/Large inclusions/Voids	Plaster/Pisé type if applicable	Clean/Dirty
1	Moderately sorted silt loam. Few areas poorly sorted	10–15 % Charred material. Burnt and unburnt bone 2–5 %. Two fragments of angular flint	Shell. Phytoliths in pseudomorphic voids (from stems)	20–30 % elongated pseudomorphic plant voids	Plaster/pisé 4	Dirty

14.4 Chipped stone

The sample (n=3102 pieces) includes material from 17 out of the 49 contexts with chipped stone in Structure O45. By weight, the sample (12655 g) constitutes 24% of the chipped stone bulk finds from this structure. The composition of the sampled assemblage is provided in Chapter 39.11.

14.5 Radiocarbon dates

Five samples were selected for radiocarbon dating from contexts within O45 (Table 14.5). The samples were selected in an attempt to provide an initial assessment of the absolute dating of the sequence represented in O45 by targeting contexts (249 fill of a hearth within Stratigraphic Block 1), (1012 burnt rubble in Stratigraphic Block 2) and (1033 charcoal-rich deposit between two phases of construction within Stratigraphic Block 3). The analysis of these dates, with calibrated values, Bayesian models and chronological interpretation is provided in Chapter 40.5 (Tables 40.1, 40.2, 40.3; Figure 40.11, 40.12).

In summary, the sum (SCPD) of a stratigraphic sequence model suggests at least two main pulses of activity associated with Structure O45 (Fig. 40.12). The two dates from context (1033) (Beta-290713 and Beta-290714) suggest that this deposit is an accumulation of material of similar ages forming between *11.66–11.20 ka cal BP* (stratigraphic model) and *11.47–10.75 ka cal BP* (chronological model). The two dates (Beta-271687 and Beta-271688) from (1012) are statistically consistent (χ^2-test: df=1; T=1.1; 5% critical value=3.8), providing a calibrated combined value centred on 10.82 ka cal BP for the accumulation of the pisé rubble arising from the destruction of the structure by fire (Table 41.3). The date (Beta-253737) on charcoal from (249), that within Hearth O62, provided a posterior density estimate of *11.25–10.88 ka cal BP,* which is several centuries older than the underlying dates from (1012) (Beta-271687 and Beta-271688), suggesting that old wood had been burned within the hearth.

The posterior density estimates generated from a stratigraphic model, place the start of activity associated with the excavated deposits at O45 at *12.41–11.22 ka cal BP*. Estimates for the end of activity associated with the O45 excavated deposits indicate that its use had ceased by *10.32 ka cal BP* or *9.89 ka cal BP*.

14.6 Interpretation

Structure O45 contains deposits from at least three phases of activity within a large semi-subterranean structure, with continuous reuse of the main walls. Both the chipped stone and radiocarbon dates placed the entirety of the activity

Table 14.5 Radiocarbon dates from O45 with calibrated and modelled values.

						Chronological model		Stratigraphic model	
						Posterior density estimates			
						cal BP			
Object and Laboratory Code	Context	^{14}C yrs BP	$\Delta^{13}C$ ‰	Taxa	Form	68%	95%	68%	95%
O45									
Beta-253737	249	9730±50	-25.6	cf. Salicaceae	Indeterminate	*11,220–11,130*	*11,250–10,890*		
Beta-271687	1012	9480±50	-25.9	Salicaceae	Juvenile	*11,080–10,720*	*11,100–10,600*	*11,070–10,960*	*11,100–10,710*
Beta-271688	1012	9560±60	-24.5	*Pistacia*	Juvenile	*11,130–10,930*	*11,170–10,750*	*11,050–10,730*	*11,070–10,690*
Beta-290714	1033	10,410±50	-20.5	Cupressaceae	Mature	*11,300–10,990*	*11,470–10,770*	*11,440–11,240*	*11,660–11,210*
Beta-290713	1033	9880±50	-21.2	Cupressaceae	Juvenile	*11,300–11,210*	*11,390–11,190*	*11,310–11,220*	*11,390–11,200*

within the PPNA. With the exception of the presence of glossed pieces, the typological and technological characteristics of the sampled chipped-stone assemblage from Structure O45 share many traits with the assemblages recovered from WF16 evaluation Trenches 1 and 2, previously described by Pirie (2007). This assessment agrees with the absolute dating that places the start of activity associated with the excavated deposits at *12.41–11.22 ka cal BP* and that the use of this structure had ceased by *10.32 ka cal BP* or *9.89 ka cal BP*.

Stratigraphic Block 1: Early Phase

The earliest phase of Structure O45 so far exposed by excavation is a semi-subterranean pisé walled structure, with a solid mud-plaster floor (1837). Limited exposure of this structure makes it difficult to interpret its function, other than to note that it is one of the larger structures excavated at WF16.

The earliest recognised construction is the denuded pisé wall circuit (1342), which was subsequently reused with new parts of the elevation built directly on top. To the west its construction appears to have truncated wall (1833) of Structure O115, although this relationship was not investigated by excavation. It is impossible to say what happened to the earliest superstructure, whether it collapsed or was deliberately dismantled. It is impossible to know at what height this wall may have been at the west and south sides because of erosion. Nevertheless, wall (1342) was certainly not standing more than 1.0 m in height at the eastern side of the structure by the time charcoal-rich deposit (1033) was deposited above it to the south of the entrance. Our best estimate for the formation of this deposit is 11.66–11.20 ka cal BP (Table 14.7; Chapter 40).

The presence of deposit (1033) on top of the stump of wall (1342) is significant because this was not a structural deposit, and its loose nature indicates that at this time Structure O45 was not standing in a substantive manner. The confinement of deposit (1033) to the width of wall (1342) is most likely the product of later truncation due to the construction of Intramural Chamber O116 lined with mud plaster (1032) along the east side of wall (1342) and the clearance of the interior of Structure O45 to the west (Figures 14.35 and 14.37). In other words, it is likely that the limited extent of deposit (1033), confined to the top of wall (1342), represents the only surviving remnant of a more extensive spread of charcoal and ash deposited while Structure O45 was in a ruined, or dismantled, state. During the time that the structure was in disrepair, there were important developments in the narrow space between Structure O45 and the adjacent Structures O53, O11, and O85 to the east, that indicate continued activity in this part of the site between the phases of demolition and the rebuilding of the main structural units.

Figure 14.40 shows stratigraphic phasing of different episodes of construction of Structures O45, O85, O53 and O11. Parallel development of Structures O45 and O53 can be postulated on the basis of the relationships that both structures had with the deposits situated between them. Earlier walls (1342) and (643) of both respective structures were either taken down, or collapsed, after which deposit (1033) accumulated over wall (1342). The next event was the construction of a separate Intramural Chamber (O116) within the southern intramural space between Structures O45 and O53. The only clues about the structure of the chamber come from the sections provided by the cuts of Burial O63 and pit [1320], which show that wall (1342) was clad in mud plaster (1032) along its top and the outer face, thus forming the western internal face of the chamber. The top edge of (1032) was traced in plan towards Structure O11, but further excavation is necessary to establish the nature of their relationship. It is not known whether similar plastering was undertaken along the outer face of wall (643) to form the eastern face of the Intermural Chamber (O116).

Uniform layers of grey silt completely filled the chamber (Figure 14.37). None of these deposits were excavated, but they suggest that the intramural space filled up after the abandonment in much the same way as many of the other structures at WF16. However, this structure appears to lack any walls that were purpose built, which is why it is referred to as an intramural chamber, i.e. space facilitated by the lining of the nearby walls of the pre-existing structures with mud plaster. After it filled up, the Intramural Chamber O116 was capped by a mud-plaster surface (1333), which abutted lower wall (643) of Structure O53 but was overlain by its upper wall (56).

Separated from surface (1333) by the cuts of pits [1320] and [1001] was a similar mud-plaster surface (1341), which occupied the northern part of the intramural space between Structures O45, O53 and O85 (Figure 14.40); it appears likely that (1333) and (1341) are fragments of what had been a continuous surface. Walls (245), (56) and (674=999=61) formed a tight triangle between Structures O45, O53 and O85, respectively, and were all built on top of mud-plaster surface (1341), which was perhaps laid specifically in order to provide a solid level base for the new construction of firstly Structure O85 and afterwards the rebuilding of Structures O45 and O53. Surface (1341) extended underneath walls (56) and (245) of Structures O53 and O45, and separated them stratigraphically from the underlying walls (643) and (1342).

Thus both mud-plaster surface (1341) and mud-plaster surface (1333), located on either side of pits [1320] and [1001], were stratigraphically placed between the consecutive construction phases of Structures O53 and O45. The relationships on the southern side of the pits suggest that Intramural Chamber O116, situated between the southern parts of Structures O45 and O53, was in use and filled up during the period when neither of these larger structures was standing. Interpreting the nature of its use, however, will have to await its full excavation. Once this intramural structure filled up, mud-plaster surface (1333) and (1341) was laid and the rebuilding programme started, beginning with the construction of Structure O85

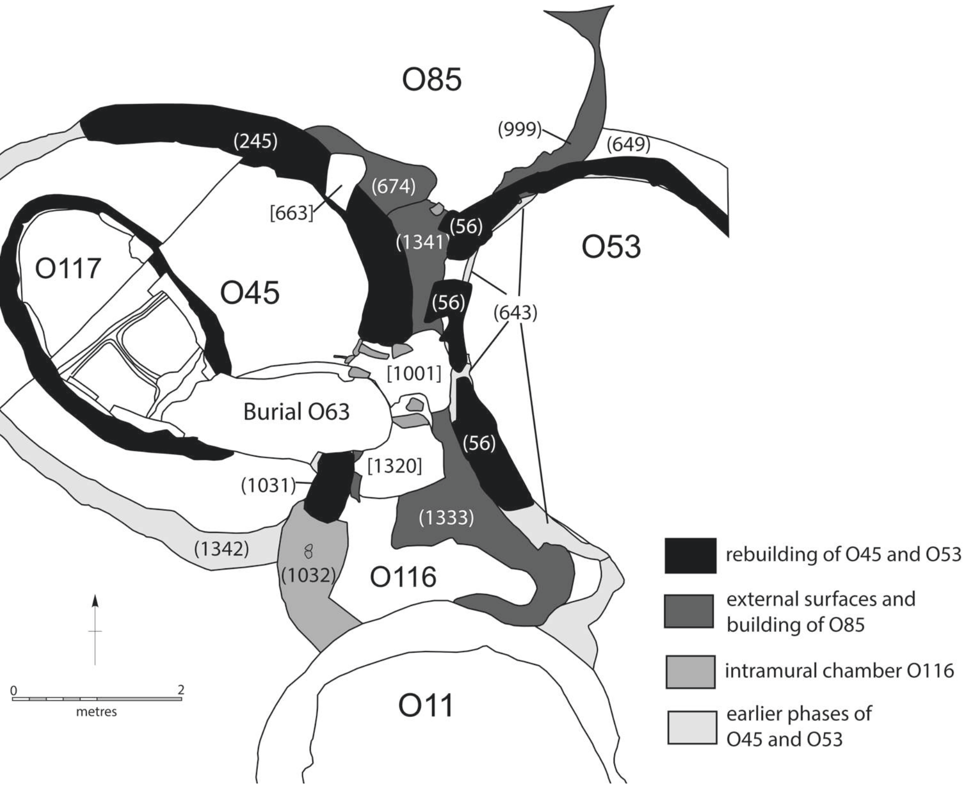


Figure 14.40 Phased plan of the intramural space between structures O45, O53, O11 and O85.

to the north. Both the rebuilt Structure O53 and Structure O45 were constructed on the footprints provided by their earlier walls (643) and (1342). The buttressing of wall (245) clearly overlaid buttressing of wall (674=999=61), indicating the sequence of construction from O85 to O45. The junction of these two walls provided an extra thickness of pisé into which wall niche [663] was inserted. On the inside of the structure the accumulated material, which must have reached, at least, to the level of charcoal-rich deposit (1033), must have been cleared. The internal face was then rendered with mud plaster so that the distinction between the old and new wall was not visible.

Wall (245) terminated to form an entrance into the structure, which was probably re-established in the same place as it had been in the previous structural phase. The underlying wall (1342) was not visible in the south-facing side of Burial O63, which indicates that it probably terminated in the same place as the upper wall. At the southeast side of the entrance into Structure O45, which was cut away by Burial O63, wall (1031) was built at the same time.

The exact nature of the earliest activity associated with walls (245) and (1031) is as yet unknown because the lowest sequence within the walls was not fully investigated. It is possible that this phase could be associated with the partly exposed mud-plaster floor (1837) reached in the northeast part of the structure, which is at a comparable level to floor (1313) of Internal Structure O117. A number of unexcavated deposits concealed the full surviving extent of this lowest floor. Deposit (1335) was the lowest deposit reached in the southern part of the structure; it is uncertain if flooring similar to (1837) survives beneath it. Deposit (1335) was cut by a deep, narrow post-hole [1340] situated flush against the interior face of the southern arc of wall (1342). A probable pit fill (1332) was recognised, but not excavated, in the central part of the structure. Any cut for pit (1332) would have cut through the deposits that clearly overlie the mud-plaster floor (1837) to the north.

Stratigraphic Block 2: Raised floor phase

We interpret this phase of Structure O45 as consisting of a semi-subterranean structure, with a raised floor, around a central Internal Structure O117 made from mud plaster covering a wicker frame. This structure was either deliberately or accidently burned down, resulting in a collapse of its roof and walls. This fire event is estimated to have taken place at *c*. 10.82 ka cal BP (Table 14.5; Chapter 40). The quality of the evidence from Structure O45, that has not survived elsewhere in WF16, has provided us with unique insight into its original architecture and construction.

In forming our view of Structure O45 we have made the following interpretations of the evidence described above:

- (1026), (1028) represent the remnants of a flat roof on which activities including flint knapping had taken place.
- (1029) represents further wall collapse along with the fragments of a mud-plaster floor that had been

supported by timbers, which had themselves been supported by stone pillars.
- The linear arrangements of charcoal within (1029) represent timber beams that had supported the roof (1026, 1028).
- The stones SF2079, SF2430, SF2425, SF2426, SF2062 and SF2428, some of which had a notch, were stone pillars supporting the timbers for the raised floor.
- Gullies [1329/1331] and [1323/1338] were construction trenches, into which pits had been dug to contain the stone pillars as supports for the raised floor. In particular, we note the close fit between the shape of the eastern most pit in gully [1331] and the shape of notched stone SF2079, found adjacent to this pit and suggesting it had been deliberately extracted.
- The recess in wall (1342) was to receive a stone pillar that supported the raised floor.

The curvilinear construction trenches [1329/1331] and [1323/1338] for the stone pillars (SF2079, SF2430, SF2425, SF2426, SF2062 and SF2428) for the raised floor (fragments within 1029), were cut into pre-existing deposits (those of Stratigraphic Block 3). Considering that the trenches cut through these deposits to the level of the earlier floor (1837), which coincides with the base of internal wall (1016), it is most likely that the internal structure was already present. As yet, it is impossible to say whether Internal Structure O117 was reused from an earlier phase of Structure O45, or whether it was an integral part of the new design of the rebuilt structure. The raised floor would have abutted wall (1016) of Internal Structure O117 at a height of 0.30 m to 0.40 m and thus have created a considerable discrepancy of *c.* 0.20 m between the height of the flooring inside O117 and the new flooring around it (Figure 14.22).

The cut for Burial O63 truncated the southwest end of wall 1016 of Internal Structure O117. This exposed roughly parallel horizontal wattle impressions within the interior of the wall, (Figure 14.33), suggesting that Internal Structure O117 had been constructed from mud applied over a wicker frame.

The floor around Internal Structure O117 was most likely held up on the timber beams resting on the series of stone pillars of variable size and shape (Figures 14.41, 14.42). These pillars had been positioned within pits cut into the base of two roughly concentric trenches, [1323]/[1338] and [1329]/[1331], which had themselves been cut into the earlier cultural deposits. The tops of several of the stone pillars had been shaped into a notch or saddle, suitable for accommodating round beams, carbonised fragments of which were found within (1029) (Figure 14.20). The main beams would have required cross-laid beams on top of them, as well as a layer of brushwood or reeds, to provide a framework for the mud-plaster floor, fragments of which were also found within (1029). Nothing of this timber framework for the floor survived because the fire that destroyed the structure did not spread to the floor support.

Evidence for intense burning could be clearly seen on the plaster of the interior face of wall (1342)/(245); a horizontal line running at between 0.30 m and 0.40 m height above the lowest mud-plaster floor horizon (1837) in the northeast part of the structure. Towards the possible entrance at the eastern side of the structure the level of the burning rises, while a subtle ledge, indicative of the level of the raised floor, continues horizontally to the end of the wall where its height corresponds with the height of the *in situ* floor support SF2428 (Figure 14.43). The base of the burning could be seen at a comparable height along the opposing outer face of wall (1016), of Internal Structure O117 (Figure 14.44). The line between the upper burnt part of the wall and the lower unburnt part is the mirror image of the opposing wall face, because the level to which the wall was burnt also rises as it approaches the southern end of the wall.

The northeast part of the space under the raised floor, where the lower mud-plaster floor (1837) was partly exposed, lacked any deposits into which the construction trenches could have been cut, which suggests that the floor-supporting stone pillars must have stood directly upon the surface of the earlier floor, perhaps being kept in position by loose packing material. The weight of the beams and the mud-plaster floor, which was resting on securely dug-in supports further south, must have provided most of the stabilising force in this area until the floor was broken by the heavy roof collapse. As the under-floor space in this area was empty, the broken sheets of mud plaster tipped inwards making them recognisable as the flooring.

Three stone pillars, SF2062, SF2425 and SF2426, were found toppled among the broken mud-plaster flooring and the collapse in this area (Figures 14.23, 14.24, and 14.28, and 14.42). All three were found centrally between Internal Structure O117 and the outer wall (245). Only stone pillar SF2428 was found inside one of the construction trenches [1329], still *in situ*. A possible toppled stone support could be seen in continuation of construction trench [1323], in Section S189, next to the outer face of wall (1016). At the opposite side of the section, wall (245) had a pronounced ledge at the right height and width for a floor beam to rest upon (Figure 14.22). It remains unclear whether the remaining stone pillars (SF2062, SF2425 and SF2426) in this part of the structure were moved deliberately prior to the destruction of the structure by fire, or as a consequence of the resulting collapse.

The only evidence of occupation associated with the raised floor was also found in the northeast part of the excavated interior. A concentration of finds including ground-stone objects, such as pestles (SF2074, SF2076 and SF2414), hammerstones (SF2073, SF2077, SF2397, SF2410, SF2416, SF2419 and SF2422), a possible polishing stone (SF2072), as well as several yellow and red sandstone pieces (SF2398, SF2411, SF2420 and SF2421) that might have been intended for pigment production, and incised stone objects (SF2390, SF2404 and SF2413), was found

Figure 14.41 Makeshift reconstruction showing the possible arrangement of the floor beams supported by the stone supports. Scale 2.0 m x 0.5 m.

below the rubble (1029) in deposits (1308) and (1318). The distribution of these finds matches the direction in which the broken mud-plaster floor sheets (within 1029) were tipped, and it seems likely that they rolled into the under-floor void from the raised floor surface during the collapse. Immediately above this concentration, in wall (245) was the niche [663] containing a piercer (SF1169), which might have been hidden, or forgotten, at the far back of the niche, and within which organic-rich sediment had accumulated. The niche had a base or a shelf in the form of a reused stone platter (SF944) laid flat, while a fragment of a stone bowl SF943 appears to have been positioned to act as the stopper for stored goods.

In the southern part of the building the raised floor might have been deliberately dismantled before the fire. This is indicated by the robbing of some of the stone pillars, the discard of others, and the absence of surviving remains of the floor surface itself. The finds were less numerous in this part of the interior, suggesting that they may have been cleared out. Inside Internal Structure O117, part of the mud-plaster flooring (1313) might have been destroyed at the same time as one of the floor ridges was scoured away. The fill (1045) of pit [1320], located immediately outside the entrance and directly sealed by the burnt collapse, included a range of ground-stone objects, some of which are fragmented (Figure 14.45). Animal bones within the pit might indicate that

Figure 14.42 Floor beam support pillars from WF16. From left to right: SF2430, SF2425, SF2426, SF2062, SF2306, SF2079, SF1687. All were found in Structure O45, except for SF2306 and SF1687, which were unstratified surface finds. Note the differences in shape, size and the extent of notch/saddle modification. Scale 2.0 m.

Figure 14.43 Composite photograph of the interior elevation of wall (245)/(1342) from the southwest, showing the horizontal line of burning that runs from Section S189 on the left, along the face of the wall, until it starts to rise sharply before it reaches the small horizontal scale (0.1 m). The top of the horizontal scale marks the ledge which continues horizontally up to floor support SF2428 on the far right. The stone directly above it is the reused cup-hole mortar marking the north side of the entrance. Scales 0.5 m.

the demolition of the interior of Structure O45 had been a planned activity that involved feasting.

The Internal Structure O117 may have been intended for storage. The low divisions across its floor (1313) suggest some form of compartmentalisation. The complete absence of material culture associated with floor (1313) makes interpretation especially difficult, although geochemical and phytolith analysis of the samples taken from the different compartments may shed some light on what they contained. Although the wall of the structure was high and curved inwards, the divisions were less than 0.10 m in height, and if the purpose of the whole construction was storage then it must have been for the goods that were spread relatively thinly. This could be appropriate for various kinds of wild foods, such as for drying berries, fruits or nuts. A carbonised seed (SA5330) was found in burnt rubble deposit (1029), provisionally identified as coming from a date palm (*Phoenix dactylifera*).

Access to the interior of Internal Structure O117 appears to have been difficult, with the construction of a high thin incurved wall, unless, of course, there was an opening within the space cut by Burial O63. This is the direction facing what is likely to have been the entrance

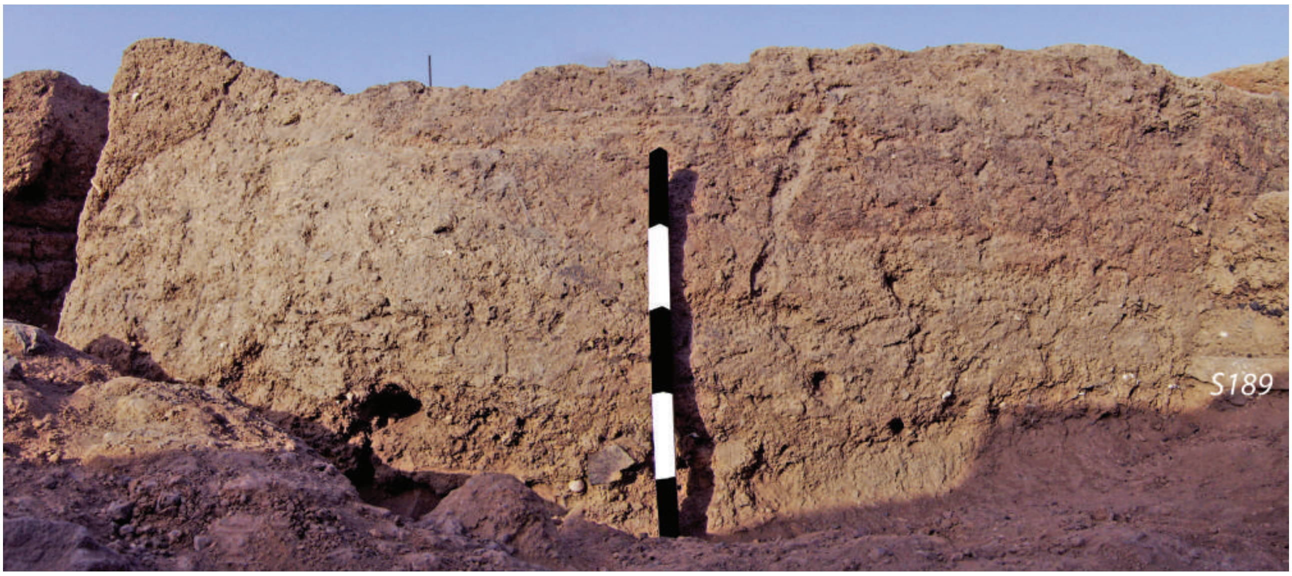


Figure 14.44 Composite photograph of the exterior elevation of wall (1016) from the northeast, showing the horizontal line of the burning running from Section S189 on the right and then rising sharply left of the scale. Scale 0.5 m.

into Structure O45 and, hence, would have been an obvious place for such an opening into the Internal Structure. Floor (1313) did not extend all the way in this direction, possibly having been worn close to an opening. Another possible indication that something different was happening at this end of the Internal Structure are the kinks in the walling on both lateral sides, the symmetry of which is best appreciated from above (Figures 14.2 and 14.41). Perhaps the strongest evidence for an opening at this end of structure O117 comes from the pitch of the rubble collapse in this direction.

The convex walls of Structure O117 raise the possibility that the structure was domed and therefore completely enclosed, although an opening might have been present at its apex or, as already described, in the space truncated by Burial O63. There was no obvious evidence among the rubble (1036, 1039) that O117 had once formed a complete

Figure 14.45 Cup-hole mortar fragments SF2037 and SF2038 in pit fill (1045) of pit [1320] from the south. Scale 0.5 m.

dome. A number of mud blocks with a curved surface were found inside the sub-structure, but it is difficult to know whether these pieces derive from the roof or the higher parts of the curved wall of O117. An additional problem is estimating the proportion of rubble that derived from the collapse of Internal Structure O117, as opposed to that from the main Structure O45. The breakage patterns were clearly different and the small size of the rubble inside the Internal Structure could well be due to the fact that it mainly derives from its thinner wall (1016). Equally, the percentage of heavily burnt structural mud rubble was lower than in the surrounding rubble deposits (1029) and (1012), which also points to the Internal Structure as the main source, because neither floor (1313) nor wall (1016) showed evidence for internal burning of the sub-structure, although the outer face of its wall was scorched.

The main task, in disentangling the architectural form of the main structure, was in the careful stratigraphic excavation and recording of the large amount of predominantly burnt collapse (1012, 1026, 1029, 1304), which almost completely filled the entire subterranean space. Although this initially appeared to be a random accumulation of burnt rubble, excavation was able to identify several discrete tumbles. It is probable that these tumbles followed one another in swift succession as the structure started to collapse in on itself, and, in that sense, they do not hold great chronological importance. Our best estimate for this collapse is *c.* 10.82 ka cal BP based on the two statistically consistent dates of Beta-271688 and Beta-271687 (Chapter 40).

The collapse of Structure O45 was substantial. Parts of the roof (1026, 1048) and large blocks of wall (1012) came down first, and in the northeast area they broke through the remaining raised mud-plaster floor, letting ash (1308, 1318) and artefacts drop into the underlying void. The loose ash, which seeped through the rubble in the northeast part of the structure, was overlaid by a layer of burnt brushwood (Figure 14.24A). It is difficult to pinpoint how this localised spread of charcoal fits into the overall sequence of the collapse of Structure O45 because it was found under the layer of mixed pisé and mud-plaster rubble, which incorporated parts of the collapsed ceiling and walls, as well as the broken up mud-plaster floor. The brushwood could have been part of the roof layering which dropped through the rafters and the cracks in the broken floor. The timbers supporting the floor were protected underneath the mud-plaster flooring and were not affected by the fire, as shown by the base level of the burning marked on the walls (Figures 14.44 and 14.45). The northeast part of Section S189 illustrates the manner in which the burnt collapse of loose, reddened and white-grey ash, such as deposit (1315), broke through into the void under the raised floor (Figure 14.22).

In amongst the overlying burnt rubble collapse (1029) the excavation revealed a latticework of burnt timbers (Figures 14.17, 14.18, 14.19 and 14.20). This horizon of burnt timber clearly overlay the remains of a raised mud-plaster floor, so it could not be the supporting frame for this floor, although it is expected that a very similar construction would have existed underneath the floor. Instead, the timbers were carbonised by the fire and were underlying fragments of a mud-plaster surface (1026), which was revealed in four main areas around sub-structure (1016). A similar surface (1048) was revealed at the same level within the limits of wall (1016) of Internal Structure O117, and it is probable that all of these fragments represent parts of the same surface. The burnt timber was clearly an integral part of the collapse, which indicates that the timbers were the rafters and that mud surface (1026, 1048) was the top surface of a collapsed flat roof of Structure O45. This roof surface was associated with an increase in the quantities of chipped stone and animal bone in relation to the rubble collapse both below it and above it. Flint knapping may have taken place on the roof as indicated by the presence of debitage on pisé blocks within (1026); alternatively, if sediment from the site had been recycled to build the roof it is possible that the chipped stone had been re-deposited from another location at WF16.

From the distribution of the burnt rafters it appears that the entire flat roof had collapsed as one, falling vertically into the structure. The partial survival of its top surface (1026, 1048) was most likely due to the subsequent damage under the impact of further collapse (1012), which mainly consisted of large blocks from the wall of the structure (Figure 14.23). It is probable that a small feature [1302], that appeared to be cut into surface (1048), was the result of such damage to the collapsed surface, rather than a feature originally cut into the roof surface (Figure 14.14B). Some of the individual heavy blocks, as well as large stones which were incorporated into the walls, penetrated into the burnt remains of the collapsed roof, which resulted in random breakage of burnt timbers and also pushed certain timber sections deeper down. The collapsed roof did not land on an even surface, as a significant amount of collapse from the ceiling and the wall preceded it. Furthermore, there would have been major breaking points all along the line of wall (1016), which was still standing proud at this point. This might be the reason why burnt rafters did not survive inside the excavated southeast half of Structure O117 and in the narrow strip along its southwest side, as well as in the wider eastern part of the interior (Figure 14.17). Nevertheless, these areas were rich in loose charcoal that might have derived from the shattered charred rafters.

Thus, the horizon of burnt rafters was at an uneven depth and with different levels of preservation across the interior of Structure O45. Despite this, most sections of burnt timber retained their alignment, meaning that it was possible to reconstruct the shape and form of the structural framework that held the roof. The excavation of deposit (1029) revealed evidence of two different co-axial timber frameworks, which were spatially almost completely exclusive of each other. The best preservation was in the widest part of the interior, in the northeast quadrant of the structure, where a partial latticework of relatively thin rafters, less than 0.10 m in diameter and *c.* 0.25 m apart, was found on predominantly east–west and north–south alignments. Cross-sections of timbers larger than 0.10 m diameter were rare (Figure 14.20), although this could be partly due to the variable preservation of the easily crushed material. In the northwest part of the interior, around Internal Structure (O117), the fallen rafters were aligned northeast–southwest and southeast–northwest (Figure 14.17). There were fewer carbonised rafters in this area, although those present were generally thicker than in the northeast. In several instances, in both sets of rafters, separate sections of carbonised wood lined up and presumably represent segments of single beams.

The different orientations and thickness of the rafters are significant in relation to the shape of the structure, the length of the span that the rafters had to cross, and consequently the strength of the roof. Different variations of the roofing method are viable for the construction of the flat roof over Structure O45, but it is clear that at least two different coaxial sets of rafters at an angle of 45° to each other were used. The east–west and north–south orientated latticework in the east part of deposit (1029) was generally of a lighter construction, with a high proportion of thin rafters. The two sets of rafters marginally overlap in the area occupied by charcoal samples SA4479, SA4488, SA5234 and SA5238 (Figures 14.17 and 14.20A). It is possible that different alignments were used in different parts of the building, utilising the shape of the structure in order to reduce the overall span and thus reduce the need for timbers of a greater length, which might have been harder to come by. The northeast–southwest orientation would have been the obvious choice over the narrower northwest part of the structure and perhaps also at the opposite southeast end, although the evidence in this part is lacking altogether due to the lack of burning and, hence, lack of organic preservation. The central and the widest part of the structure could have been bridged along the same northeast–southwest axis. This is overall the shortest distance across the width of the central part of the structure, with a maximum distance of 4.2 m internally, but the span in the perpendicular direction would be up to 5.5 m. The coaxial frame constructed along these two axes would, therefore, have required a significant amount of strong timber in excess of 4 m and 5 m in length.

It has been noted that the southeast quadrant was not affected by the fire as much as the rest of the structure, this can be seen in the predominant distribution of unburnt rubble, such as deposit (1304), in this area and the absence of burnt timber. This is further supported by the limited scorching of the walls in this vicinity (Figures 14.44 and 14.45). Although the fire was perhaps not as fierce in the southeast corner, the flames did reach and partly char a human skull (mandible SF2066), which is likely to have been either hanging from the roof, or resting in some niche high up in the southeast part of the wall. When it dropped it shattered over the area below; a few pieces appear to have flown across the interior (Figures 14.26 and 14.27).

There are two processes by which artefacts potentially entered the collapsed remains of Structure O45. The first is by their incorporation into the pisé and mud-plaster mixtures used for the construction of the walls, floors and roof. These artefacts would have ultimately derived from the areas where the sediment was acquired and where the pisé and mud plasters were mixed during construction. As such, they would have no association with the activities that took place within Structure O45. That artefacts were indeed incorporated into the pisé of Structure O45 was clear from the actual excavation of the walls and from the break up and dry sieving of the collapsed rubble, such as (1012).

The second process by which artefacts entered the collapsed remains of Structure O45 was via their manufacture, use and/or storage within the Structure itself. The activity space included not only the floor but also the walls and the ceiling, which housed niches, shelves and perhaps supported hanging bags or baskets, all of which might have been used to keep various possessions. Arguably the largest source could be the top of the flat roof. This surface of a partly subterranean structure would provide additional activity space of an equivalent, or even larger, extent than the interior flooring, which could have been subject to a considerable amount of refuse deposition and sediment accumulation. The problem is that these two categories of finds, i.e. the residual component locked in the structural pisé and the occupational deposition in the activity spaces, are extremely difficult to differentiate when excavating broken up structural rubble.

Making a clear separation between finds with different depositional pathways in the deposits of mixed rubble collapse layers (1012), (1029), or (1304) is difficult. Polishing stone SF1559, which was found in (1012) for example, was burnt and fractured by heat. It is difficult to say whether such an object was in use in the structure, on the roof, or reused as the building material in the pisé wall of the structure. The fact that it was burnt does not exclude any of these possibilities. The same dilemma faces the interpretation of several other sizable ground-stone objects, such as mortar or quern fragments SF1562, SF1565 and SF1566. The range of finds with no clear provenance in collapse (1012) includes portable art, such as carved limestone object SF1560 (Figure 14.13) and decorated bone plaque SF1564.

Stratigraphic Block 1: Hearth Phase

The most recent surviving phase of Structure O45 is represented by Hearth O92 and its surrounding deposits, which were heavily eroded. Given that the accumulation deposits that are stratigraphically closely associated with the hearth respect the walls, it appears likely that this phase used the pre-existing walls (245)/(1031)/(1342), at least as the footings. It is possible that the structure had become entirely above ground and free standing by this time, which would explain the degree of erosion.

There is certainly no evidence from the excavation that the hiatus between the collapse and the hearth construction was substantial because there was no accumulation of windblown or water-laid sediments. The depression left after the collapse of the structure was used as the dumping ground for organic-rich midden material (1017), which was deposited in the deepest part of the ruin over the southeast end of internal structure (1016). After this the entire interior was gradually filled up with the series of mixed levelling deposits containing rubble, earth and more rubbish. This continued until the level within the old structure was more or less even and suitable for the construction of a mud-plaster surface (606).

The oval, rough mud-plaster surface (606) was laid over a relatively small part of the interior, covering only a quarter of the overall space at most. The northern edge of the surface lipped up against some kind of partition or low setting that did not survive. The surface acted as a platform for the construction of Hearth O92, which was moulded so that a fire pit was created with a mud-plaster rim around it. Our best estimate for the date of the wood that had been burned within this hearth is *11.25–10.88 ka cal BP*, based on sample Beta-254737 (Table 14.7) coming from the fill of the hearth. This date is older than the best estimate of *c.* 10.82 ka cal BP for the destruction of the preceding phase of Structure O45, based on samples Beta-271688 and Beta-271687. As such, it appears that old wood had been burned within Hearth O92.

The surface and the hearth were positioned off centre in the structure, in the same area once occupied by internal Structure O117, which was buried under the collapse, and the levelling deposits below. This might have been a deliberate reference to the focal feature within the structure, which could indicate that the new phase of occupation followed relatively swiftly and that the layout inside the old structure was still in living memory. The spatial relationship of deposits (16) and (251) with burnt pisé wall (245)/(1031)/(1342), suggests that the structure associated with Hearth O92 existed on the same footprint as the preceding burnt phase. Burnt wall (245)/(1031)/(1342) was probably used as the footing for a rebuilt structure, the upper part of which has not survived. The last recognisable phase of occupation followed in the form of cobbled surface (7). Erosion prevents us determining the original spatial extent of this surface.

15. Structure O53

15.1 Location and relationship with other structures

Structure O53 is located between the eastern edge of the excavation trench and Structure O45 (Figures 15.1, 15.2). Its easternmost part remained under the baulk and its western side faced the possible entrance of Structure O45. Directly to the south, Structure O53 was apparently open towards Structure O106. To the southwest Structure O53 was connected to Structure O11 by a short pisé wall (158), but the stratigraphic relationship between O53 and O11 was only partially investigated. In the southeast, Intramural Chamber O116 was constructed between Structures O45 and O53 during a period when both structures were temporarily dismantled.

In the north, Structure O53 was interlinked with Structure O85, which was constructed between two different structural phases of Structures O53 and O45. The construction of the later phase of Structure O53, Structure O85 and Structure O56 created Intramural Space O55, which was used while all three structures were at least partly upstanding.

Because of the limited extent of excavation, the shape and the size of the initial construction cut for the earliest phase of Structure O53 can only be surmised. A sondage excavated along the western exterior of the structure showed that there might have been as many as three separate construction phases on the same footprint as Structure O53. The excavation of the upper wall of Structure O53 provided a rare opportunity to fully investigate the way in which one of the pisé walls was constructed, while also enabling the relationships with adjacent structures to be explored. Table 15.1 lists all excavated contexts, their relationships are described in the stratigraphic matrix Figure 15.3; Tables 15.2 and 15.3 list the bulk and small finds, respectively.

15.2 Description of the excavated deposits

The overburden (1, 123) was excavated across the space occupied by Structure O53. Its excavation revealed the top of the incomplete circuit of oval pisé wall (56), a set of discrete features and a patch of compacted sandy silt (18) (Figures 15.2, 15.4). Only one of these features, pit [43], was situated inside the structure, while the others cut through the outside edge of wall (56) at its southern and western perimeter.

Pit [43] was located inside the southern half of Structure O53. It was oval in shape, east–west orientated, 0.97 m x 0.58 m in extent and 0.3 m deep. The pit was filled with single dark grey organic silt (15) that contained a relatively high percentage of rubble compared to other deposits within this Structure (Table 15.1). The fill was rich in charcoal and contained animal bone and chipped stone, both of which were also abundant in the midden deposits (57), (641), (645) and (647) that the pit cut through (Table 15.2). A distinctive concentration of animal bones at the top of the pit's profile was numbered separately as context (22) because it was possible that these remains represented a discrete depositional event (Figure 15.5). Other finds from the pit included over four kilograms of chipped stone, including flint blades SF80 and SF132, hammerstone BF944, and worked bone objects SF133 and SF134. A small ground stone tool SF117, stained with red pigment, was also found in the pit (Table 15.3).

The second feature, recognised immediately below the overburden, was designated as Burial O41, with its cut [42] located 1.5 m to the southwest from pit [43]. The cleaning of the feature showed that the burial fill (17) was cut across its western extent by a roughly circular pit [41], which was 0.70 m in diameter and filled with stone rubble (21). This deposit was distinct

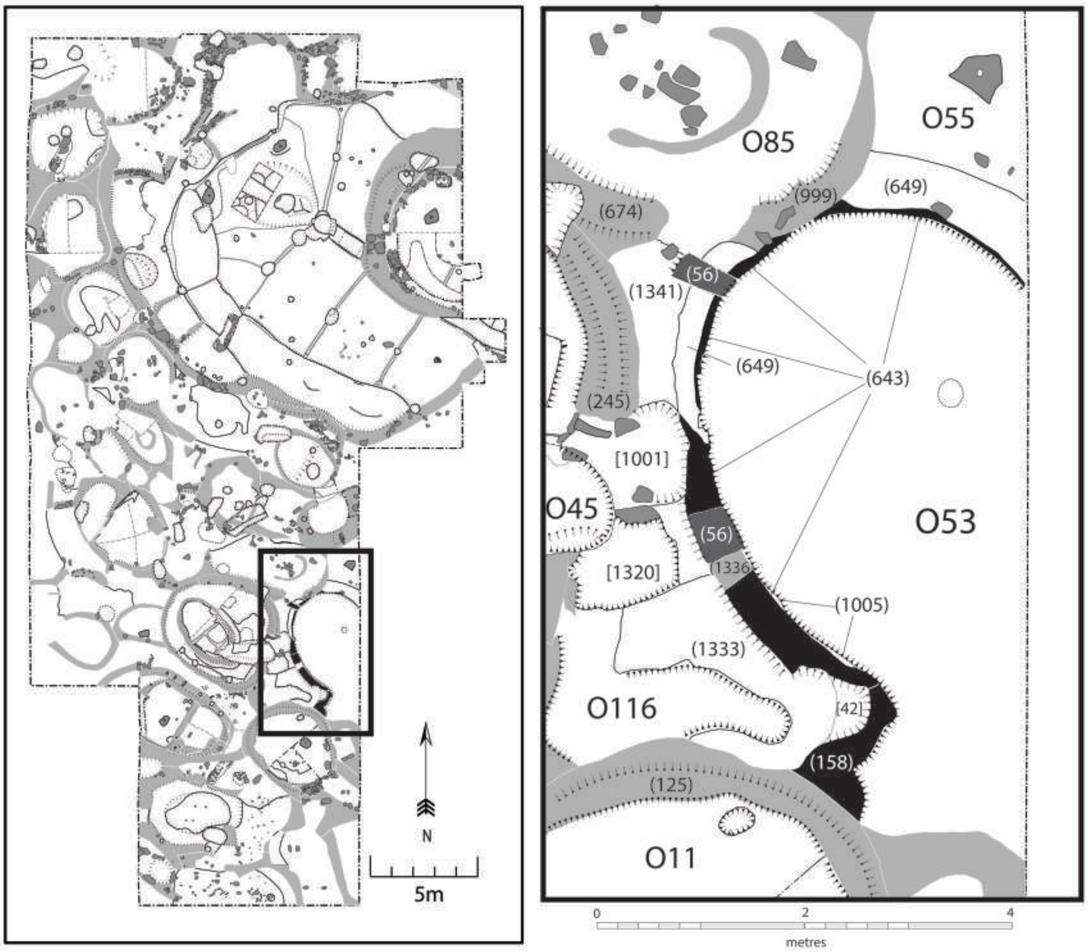


Figure 15.1 Location of Structure O53 and plan showing its relationship with surrounding Objects.

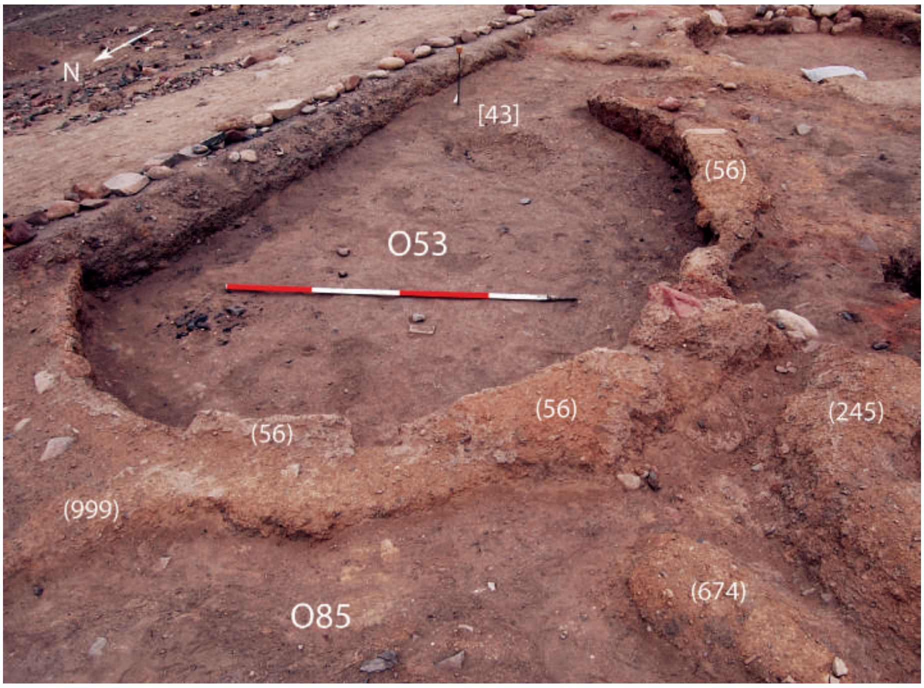


Figure 15.2 Structure O53 from the southeast taken towards the end of its excavation. Scale 2.0 m.

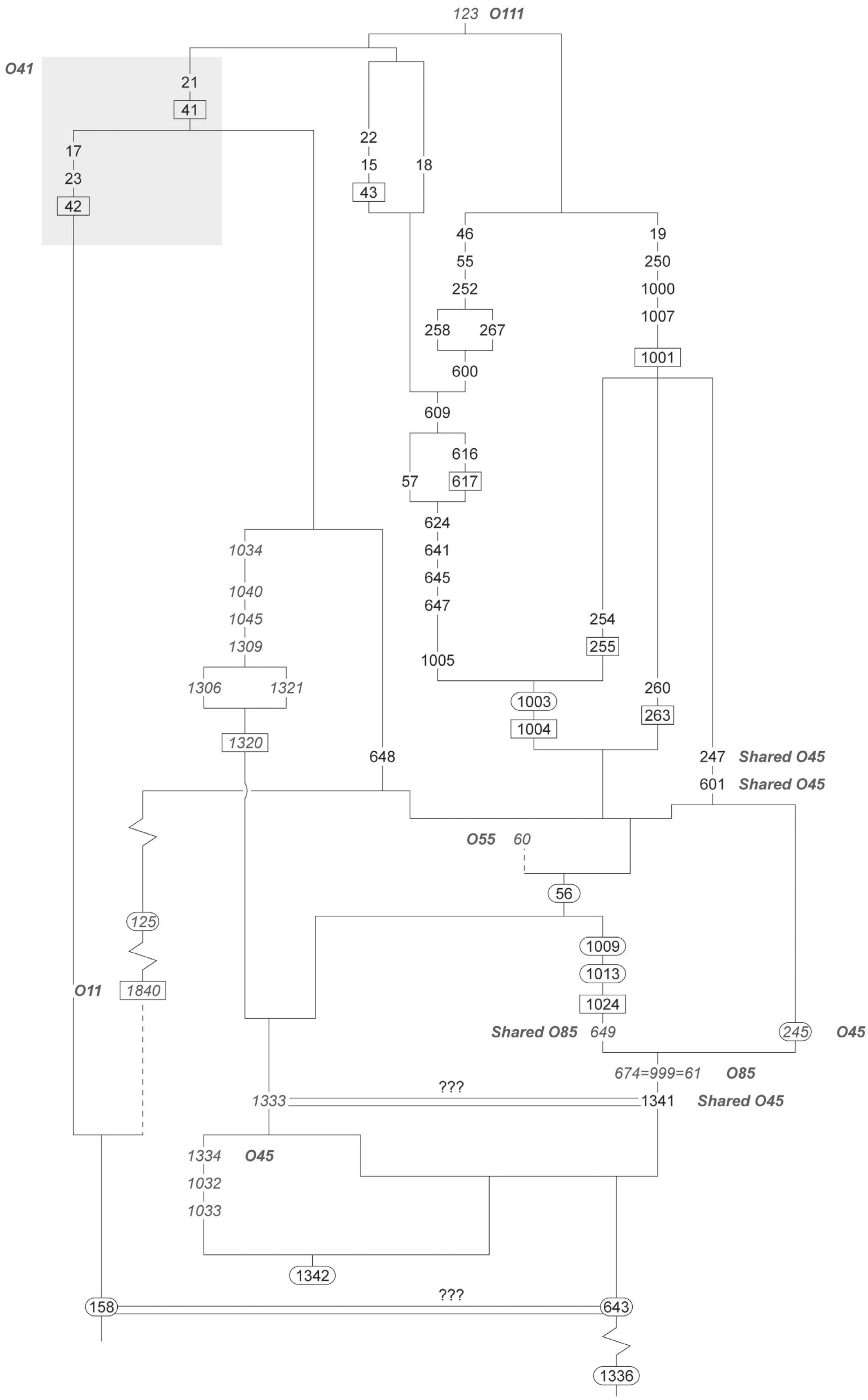


Figure 15.3 Stratigraphic matrix for Structure O53.

Table 15.1 Contexts excavated within Structure O53 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
15	loose dark grey silt with pisé rubble	deliberate backfill of pit [43]
17	compact greyish-brown silt with stones	fill of burial
18	light greyish-brown compacted sandy silt	localised silty spread
19	mid-brown grey friable sandy silt with large stones	dump or collapse of stone rubble in sandy silt matrix
21	yellowish-brown sandy silt with high percentage of medium-sized stone rubble	deliberate backfill of pit [41]
22	concentration of animal bone	bone-rich fill of pit
23	articulated human remains	partially surviving inhumation
41	sub-circular cut with straight steep sides and convex base	robber pit cutting burial (23)
42	rectangular cut with steep shallow sides and concave base	burial cut
43	slightly irregular oval cut with steep to vertical sides and flat sloping base	cut of pit
46	light yellowish-grey silt with stones	possible demolition or collapse rubble
55	compact light greyish-yellow mottled silty clay	poorly surviving mud-plaster floor surface
56	mid-orangish-brown silt with occasional charcoal and moderate stone temper	pisé wall of structure
57	greyish-brown ashy silt with charcoal	accumulation of ashy midden inside structure
158	light yellowish-brown pisé	pisé wall
247	dark purplish-grey silt with a high percentage of stone rubble	rubble packing within intramural space
250	dark brownish-grey silt	fill of pit formed through silting up of the open feature
252	loose greyish-brown silt	silt accumulation inside structure
254	light brown silt	fill of post-pipe formed through silting after the post burnt in situ
255	sub-rectangular cut with vertical or very steep sides, apart from the east side which are irregular, concave pointed base	cut of post-pipe
258	light grey loose silt	silt accumulation inside structure
260	orangish-grey loose silt	fill of post-pipe
263	irregularly shaped cut with sloping sides and a concave base	cut of post-pipe
267	friable grey silt	silt accumulation inside structure
600	light yellowish-grey silt	poorly surviving compacted floor surface
601	loose brownish-grey silt with high a percentage of stone rubble	rubble packing within intramural space
609	yellowish-grey to dark grey loose silt	accumulation of silty midden inside structure
616	dark grey loose silt with a high percentage of charcoal	fill of small pit or post-hole
617	sub-circular cut with vertical sides and a flat base	cut of pit
624	yellowish-grey loose to friable silt with pisé rubble	accumulation of silt and pisé rubble inside structure
641	greyish-brown ashy silt with charcoal and rubble	accumulation of ashy stony midden inside structure
643	light yellowish-brown pisé with well sorted gravel temper	pisé wall of structure
645	loose ashy grey silt with fire-cracked stones and occasional charcoal	accumulation of ashy midden inside structure
647	loose ashy grey silt with fire-cracked stones and occasional charcoal	accumulation of ashy midden inside structure
648	orangish/greyish-brown friable silt with a high concentration of stones	rubble packing within intramural space
649	mid-greyish-brown friable silt	deposit accumulated between two structural phases of walls (56) and (643)
1000	mid-yellowish-grey loose sandy silt	fill of pit, possibly deliberate backfill around stones (1007)
1001	irregular triangular cut with steep sides and a flat base	cut of pit
1003	light yellowish-white compact pisé	pisé wall repair
1004	linear cut with gently sloping sides and a concave base	cut for wall repair
1005	light yellowish-white compact mud plaster	mud-plastered face of walls (56) and (643)

Table 15.1 Contexts excavated within Structure O53 with sedimentary descriptions and interpretations continued...

Context	Description	Interpretation
1007	four large stones approx 20 x 30 cm in size and several smaller stones	stone packing/counterweights for a post
1009	whitish-grey silty pisé with moderate temper of small to medium stones	band of pisé within wall construction
1013	light whitish-yellow pisé with inclusions of medium to large stones	band of pisé within wall construction
1024	oval cut containing upper phase of Structure O53	unexcavated construction cut of the structure
1333	greyish-yellow hard silty-clay	mud-plaster exterior surface between structures O45 and O53
1336	whitish-yellow hard pisé	earlier wall of structure O53 seen only within arbitrary slot
1341	bright yellowish-brown compact mud plaster	mud-plaster exterior surface between structures O45 and O53

Table 15.2 Quantities of bulk finds from Structure O53 by material and context number.

Object 53	Volume of sediment (l)				Weight of bulk finds per material (g)									
Context	Total volume	Flot. Sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Animal bone	Human bone	Marine shell	Other shell	Plaster/Pisé	Charcoal	Misc.
15	121.0	120.0	0.0	1.0	4180.5	110.0	0.0	472.6	0.0	0.0	550.5	0.0	10.8	0.0
17	not known	not known	not known	1.0	231.7	0.0	0.0	15.4	0.0	0.0	51.9	0.0	1.0	10.0
18	12.0	12.0	0.0	0.0	57.4	0.0	0.0	9.4	0.0	0.0	12.2	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0		0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0
21	23.0	23.0	0.0	0.0	316.8	0.0	0.0	7.5	10.0	0.0	19.1	0.0	0.0	0.0
46	170.0	40.0	126.0	4.0	324.6	263.7	10.0	55.2	0.0	0.0	37.6	0.0	20.0	0.0
55	43.3	30.0	10.0	3.3	681.7	0.0	0.0	15.8	0.0	0.3	22.3	0.0	0.2	0.0
56	101.0	0.0	100.0	1.0	130.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
57	632.0	60.0	570.0	2.0	14472.7	1130.0	11.3	1652.5	0.0	10.0	65.0	0.0	1.8	150.0
158	2.0	1.0	0.0	1.0	17.2	0.0	0.0	0.4	0.0	0.0	1.7	0.0	0.0	0.0
247	97.0	30.0	66.0	1.0	340.5	780.0	0.0	10.8	0.0	0.0	7.8	0.0	0.0	0.0
250	31.0	30.0	0.0	1.0	107.4	0.0	0.0	1.1	0.0	0.0	26.9	0.0	0.0	0.0
252	31.0	10.0	20.0	1.0	915.8	10.0	0.0	52.8	0.0	0.0	738.6	0.0	0.0	0.0
254	5.0	5.0	0.0	0.0	28.5	0.0	0.0	1.1	0.0	0.0	7.4	0.0	10.0	0.0
258	11.0	10.0	0.0	1.0	22.8	0.0	0.0	2.3	0.0	0.0	11.7	0.0	0.2	0.0
260	8.0	8.0	0.0	0.0	8.7	0.0	0.0	3.4	0.0	0.0	11.1	0.0	0.1	0.0
267	13.0	12.0	0.0	1.0	129.5	0.0	0.0	4.3	0.0	0.0	22.5	0.0	0.1	0.0
600	98.0	30.0	65.0	3.0	1462.1	0.0	0.0	151.9	1.0	0.0	28.6	0.0	2.6	0.0
601	62.0	30.0	30.0	2.0	281.9	0.0	0.0	2.8	0.0	0.0	2.5	0.0	0.2	0.0
609	330.0	30.0	300.0	0.0	4369.3	0.0	10.6	411.4	0.0	0.0	17.2	0.0	0.1	0.0
616	5.0	5.0	0.0	0.0	14.2	0.0	0.0	1.8	0.0	0.0	4.9	0.0	1.0	0.0
624	856.0	30.0	825.0	1.0	7087.7	0.0	1.0	895.6	0.0	0.0	153.3	0.0	0.0	0.0
641	401.0	30.0	370.0	1.0	6925.2	0.0	1.1	844.9	0.0	0.0	0.0	1100.0	10.0	0.0
643	14.0	0.0	14.0	0.0	20.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0
645	371.0	30.0	340.0	1.0	3156.0	0.0	10.0	590.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 15.2 Quantities of bulk finds from Structure O53 by material and context number continued...

Object 53	Volume of sediment (l)				Weight of bulk finds per material (g)									
Context	**Total volume**	**Flot. sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Ground stone**	**Other worked stone**	**Animal bone**	**Human bone**	**Marine shell**	**Other shell**	**Plaster/Pisé**	**Charcoal**	**Misc.**
647	60.0	0.0	60.0	0.0	251.0	0.0	1.0	110.0	0.0	0.0	0.0	0.0	0.0	0.0
648	281.0	30.0	250.0	1.0	2072.6	0.0	111.0	126.7	0.0	0.0	6.4	0.0	0.0	0.0
649	25.0	25.0	0.0	0.0	221.0	0.0	0.0	34.1	0.0	0.0	106.6	0.0	0.3	0.0
1000	55.0	30.0	25.0	0.0	318.4	0.0	0.0	33.5	0.0	0.0	18.3	0.0	0.2	0.0
1003	20.0	0.0	20.0	0.0	30.0	0.0	0.0	15.0	0.0	0.0	0.0	1950.0	0.0	0.0
1009	30.0	0.0	20.0	0.0	200.0	0.0	0.0	10.0	0.0	0.0	0.0	300.0	0.0	0.0
1013	21.0	0.0	20.0	1.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	1550.0	0.0	0.0
1333	10.0	0.0	10.0	0.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	3939.3	661.0	3241.0	28.3	48415.2	2293.7	156.0	5564.3	11.0	10.3	1924.1	4900.0	58.6	160.0

Table 15.3 Quantities of small finds from Structure O53 by material and context number.

Object 53	Quantities of small finds per material (nos)										
Context	**Ground stone**	**Chipped stone**	**Other stone**	**Worked bone**	**Unworked animal bone**	**Disarticulated human bone**	**Bone beads**	**Stone beads**	**Marine shell beads**	**Coral**	**Total small finds**
15	1	2	0	2	1	0	0	1	0	0	7
17	0	5	0	0	0	0	0	0	0	0	5
18	0	1	0	0	0	0	0	0	0	0	1
19	2	0	1	0	0	0	0	0	0	0	3
46	2	0	0	0	0	0	0	0	0	0	2
55	1	0	0	0	0	0	0	0	1	0	2
57	2	0	0	1	0	0	0	2	2	0	7
252	1	0	0	0	0	0	0	1	0	0	2
600	3	0	0	0	0	0	1	0	0	0	4
609	3	0	0	0	0	0	0	4	1	0	8
624	2	0	0	0	0	0	0	2	2	1	7
641	2	0	2	0	0	0	0	0	0	0	4
645	7	0	0	2	0	0	0	0	1	0	10
647	0	0	1	2	1	0	0	0	0	0	4
648	3	0	0	0	0	1	0	0	1	0	5
Total	29	8	4	7	2	1	1	10	8	1	71

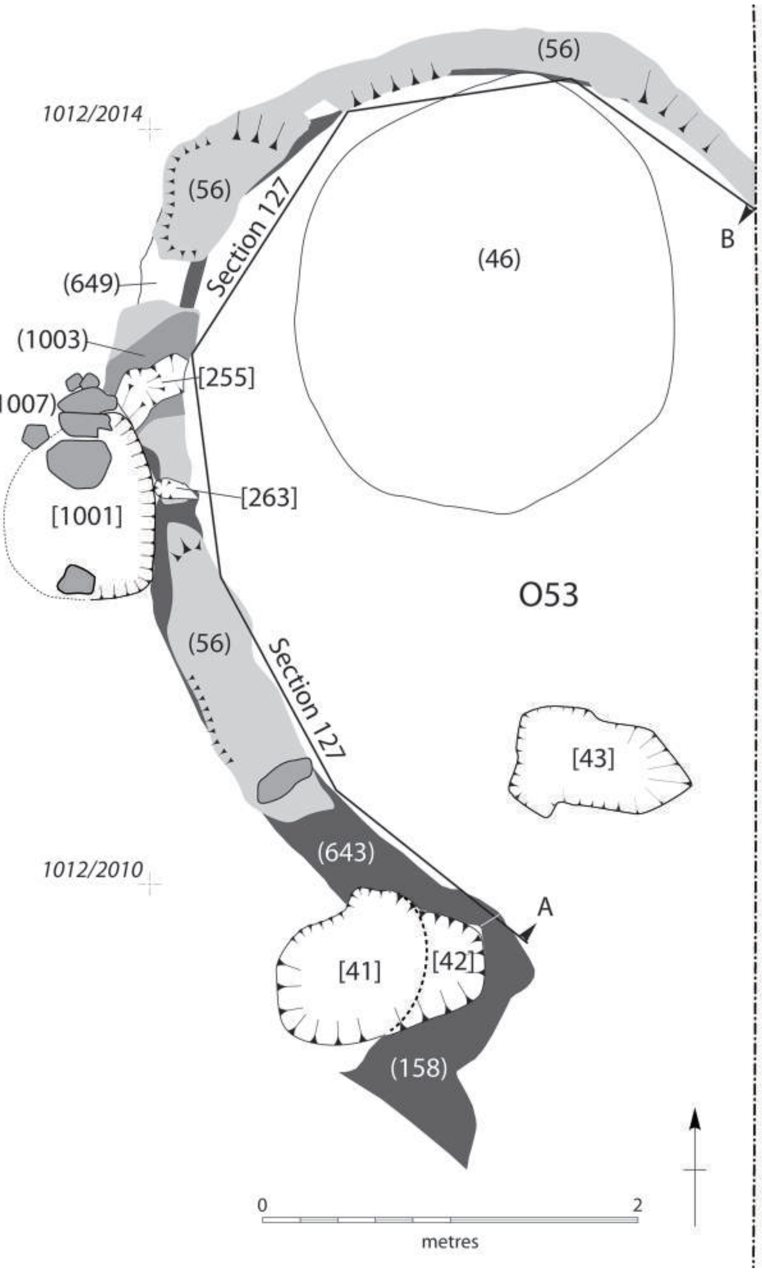


Figure 15.4 Plan of the late features in relation to the surviving part of wall (56) of Structure O53.

from the silty fill (17) of the burial. The base of pit [41] was at the same level as the base of the burial, both having maximum depths of 0.20 m. The cut of the pit had removed the western half of the burial, presumably with the upper part of the skeleton (23) it contained. The remaining part of the skeleton, which was lying on its right-hand side, comprised a partially surviving rib cage, bones of the right arm, the right scapula, most of the pelvis and the bones of both legs which were tightly flexed at the top of the eastern end of the burial. There were very few vertebral bones; the left arm and hand were missing, as were both clavicles and the skull, which would have been situated in the area cut away by pit [41] (Figure 15.6).

At its eastern end, Burial O41 cut through wall (158) (Figure 15.4), which covered the short distance between the southern end of walls (56) and (643) of Structure O53 and the northern arc of wall (125) of Structure O11 (Chapter 12). The surviving end of the burial was 0.6 m wide with regular sides and sharp corners, suggesting that the burial was originally rectangular in shape. Considering that the burial did not continue beyond pit [41] to the west, it could not have been more than 1.2 m long. The position of the leg bones shows that the body was crammed tightly into this small grave. The burial fill (17) contained a small amount of chipped stone and animal bone, among which were five flint blades SF112, SF113, SF136 and SF246. Two flint blades SF110 and SF111 were found

Figure 15.5 Animal bone concentration (22) in pit [43] from the south, showing a probable dog mandible and a section of articulated vertebrae. Scale 0.5 m.

Figure 15.6 View of the excavated pit [41] from the west with the remaining part of Burial O41 in the foreground showing tightly flexed legs of skeleton (23). Scale 1.0 m.

in fill (21) of pit [41], as were small amounts of other chipped stone, animal bone and human bone including human teeth fragments (Tables 15.2 and 15.3).

The northern area of the interior of Structure O53 was filled by a series of deposits that were limited to a roughly circular area of 2.5 m in diameter (Figure 15.4). The uppermost of these deposits was light yellowish-grey silt (46) that contained pisé and stone rubble. Directly below this rubble-rich deposit was a much more compact and smooth deposit (55) that was mottled in appearance due to silt and pisé patches within it. This deposit was interpreted as a floor; it was thin and patchy and matched the area of deposit (46). The excavation of these two deposits showed that they had formed within a shallow depression set into the underlying sediment (252) (Figure 15.7). Both deposits contained relatively small amounts of chipped stone and animal bone. Hammerstone SF252 was found in deposit (46), and two less easily identifiable ground-stone implements SF279 and SF280 were found in deposits (46) and (55), respectively.

Underlying floor (55) and situated along the north and west sides of the circular depression were grey silt deposits (252), (258) and (267). Deposit (252) was the most substantial and contained a relatively high density of chipped stone, and notable quantities of snail shells suggesting that the deposit initially contained organic matter. This deposit also contained a ground-stone pestle SF288 and a green stone bead SF287.

Figure 15.7 Deposit (55) inside Structure O53 from the southeast showing the nearest quadrant and pit [43] excavated in the foreground. Pisé wall (56) can be seen running across the top left corner of the photograph. Scale 2.0 m.

Figure 15.8 A — Phallic-shaped object SF646; B — Pestle SF665 partly coated in red pigment.

Figure 15.9 A — Marine shell bead SF753 and B — coral fragment SF770 from deposit (624).

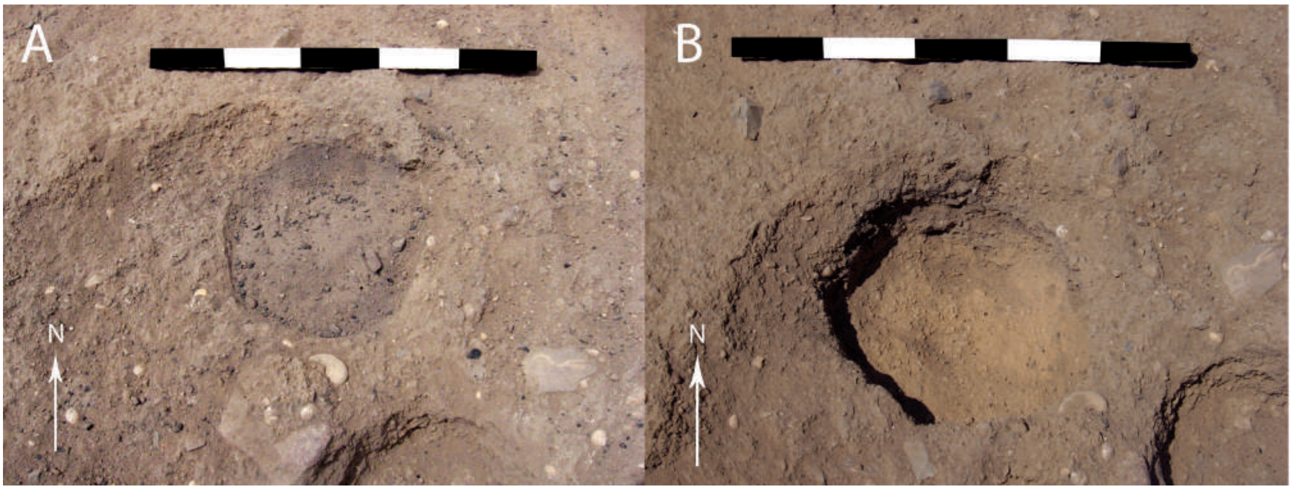
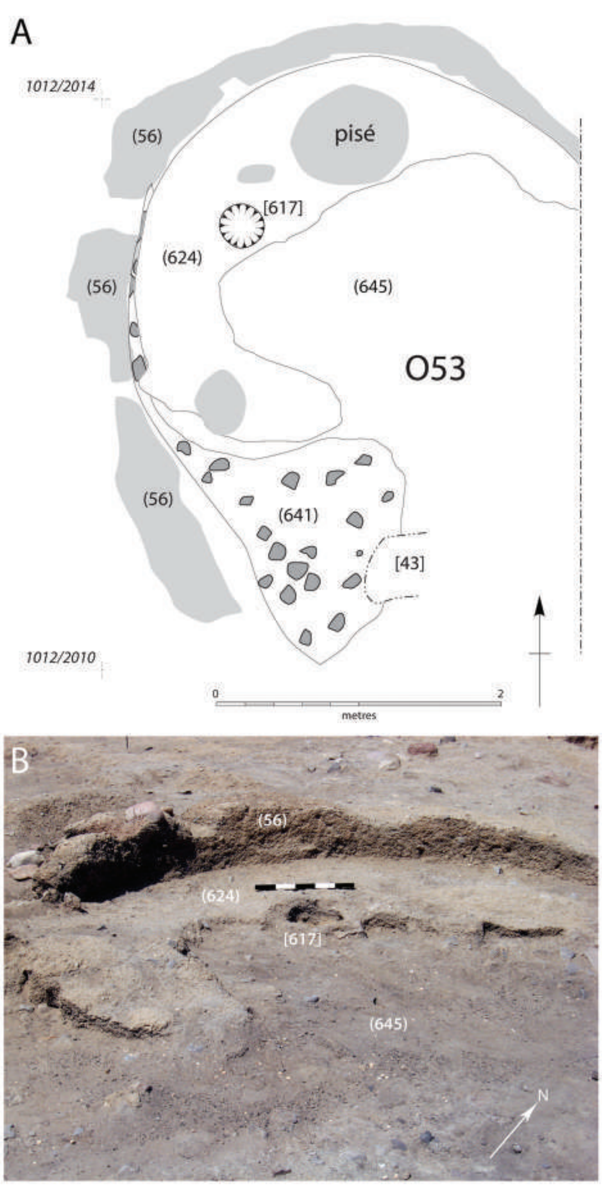


Figure 15.10 A — Pre-excavation view of feature (616)[617]; B — Excavated feature [617] from the south. Scales 0.5 m.



Below (252, 258 and 267) was a compacted silt layer (600), which was the first deposit that extended over the entire northern half of the structure and abutted wall (56) along its western and northern limits. This had a firm upper surface and a loose mixture of greyish and yellowish silts below; it was interpreted as the remnants of a floor and did not extend any further south than the overlying deposits, remaining limited to the northern half of the interior of Structure O53. Unlike (46) and (55), however, which were situated within the shallow depression, floor (600) was spread out evenly on top of the underlying sediments. It contained a comparable amount of chipped stone to the overlying deposit (252) (Table 15.2). Hammerstone SF641, pestle SF647 and a phallic-shaped ground stone fragment SF646 (Figure 15.8A) were found during the excavation of (600), while bone bead SF649 and a human tooth BF3640 were retrieved when dry sieving this deposit.

Underlying deposit (600), and extending across the entire exposed interior of Structure O53, there was a loose grey silt (609). It is important to note that (609) extended into the southern 'annex' area of the structure, which was delineated by the perpendicular orientation of wall (158) to the line of walls (56) and (643), and small Structure O106 to the south (Figure 15.1). Deposit (609) is the uppermost of a series of substantial loose grey midden deposits that accumulated inside Structure O53. All of these deposits contained a significantly greater quantity of snail shell and animal bone in comparison to the overlying deposits (Table 15.2). The numbers of ground-stone tools and other objects made of stone, marine shell and animal bone are also higher (Table 15.3). Five beads were found in deposit

Figure 15.11 A — Plan showing the extent of deposits (624) and (641) within Structure O53; B — Rubble deposit (624) from the southeast showing excavated feature [617] in the centre. Scale 0.5 m.

(609), four of which were made from green stone (SF656, SF657, SF664 and SF738) and one from marine shell (SF753) (Figure 15.9A). Two ground-stone pestles (SF654 and SF665) and one hammerstone (SF655) were also found. A roughly worked pestle SF665 was partly coated in red pigment; possibly derived from ochre (Figure 15.8B).

Deposit (57), which underlay (609) in the southern part of the interior, was the richest midden deposit inside Structure O53, containing almost 15 kg of chipped stone and over 1.6 kg of animal bone. The high concentration of both chipped stone and animal bone might be significant in relation to the high proportion of both of these materials in fill (15) of pit [43], which was cut through deposit (57), suggesting pit fill (15) incorporates re-deposited material from (57). The range of objects found in deposit (57) was similar to that found in deposit (609), with beads made from stone (SF737, SF2001) and marine shell (SF758, SF2104) (Figure 15.9B), as well as a pestle SF659, hammerstone SF660, and an object (SF1304) made from animal bone.

In the northern part of the interior a small circular pit or post-hole [617] was revealed at this level. It was 0.3 m in diameter and filled with charcoal-rich silt (616). This feature cut through a mixed pisé and silt rubble deposit (624) (Figure 15.10) and was the only cut feature present at this level within Structure O53.

Deposit (624) contained pisé rubble. Its extent was irregular and spread across the northern part of the interior (Figure 15.11). Among the numerous smaller pieces of pisé rubble in deposit (624) and situated on either side of feature [617], were two large, flat, oval-shaped pisé blocks 0.6 m to 0.8 m in size and up to 0.3 m in thickness. Deposit (624) contained over 7 kg of chipped stone and nearly a kilogram of animal bone (Table 15.2). Beads continued to be present, especially those made of green stone (SF769, SF900) and marine shell (SF894, SF895). A possible polished stone axe SF1545 and a fragment of a small stone vessel SF761 were also recovered (Table 15.3).

The pisé rubble deposit (624) occupied a crescent-shaped area across the northern part of the structure. The western margin of the interior was occupied by loose ashy-silt deposit (641). (Figure 15.11A). The face of lower wall (643) had partially collapsed leaving an overhang below wall (56), which was also filled by deposit (641) (Figure 15.12). Deposit (641) was rich in charcoal, while around 30% of its volume was rubble of sub-angular grey stones between 2 cm and 20 cm in size, some of which were fire-cracked. Chipped stone and animal bone were abundant (Table 15.2). Amongst the rubble were two fragments of polished stone batons (SF904 and SF906) and two refitting fragments of the same ground-stone pestle (SF907 and SF908).

Two pisé rubble samples were taken from deposit (641) in the area where the burnt wall face was collapsing inwards. One of the samples, SA1901, was a loose piece of burnt pisé, which, because of its position and appearance, was suspected to derive from the adjacent burnt wall (56)/(643). The other piece was SA2253, which was classified as a possible fragment of mud-plaster flooring on the basis of its thickness and one smooth surface. The burnt pisé sample SA1901 was interesting in that it was mainly consistent with other wall and burnt pisé samples, except in the absence of any evident gypsum in its makeup (Chapter 41).

The lowest stratigraphic unit reached by the excavation inside Structure O53 was a loose dark grey ashy midden deposit (645)/(647). This deposit, which occupied the entire interior of the structure, but did not extend into the

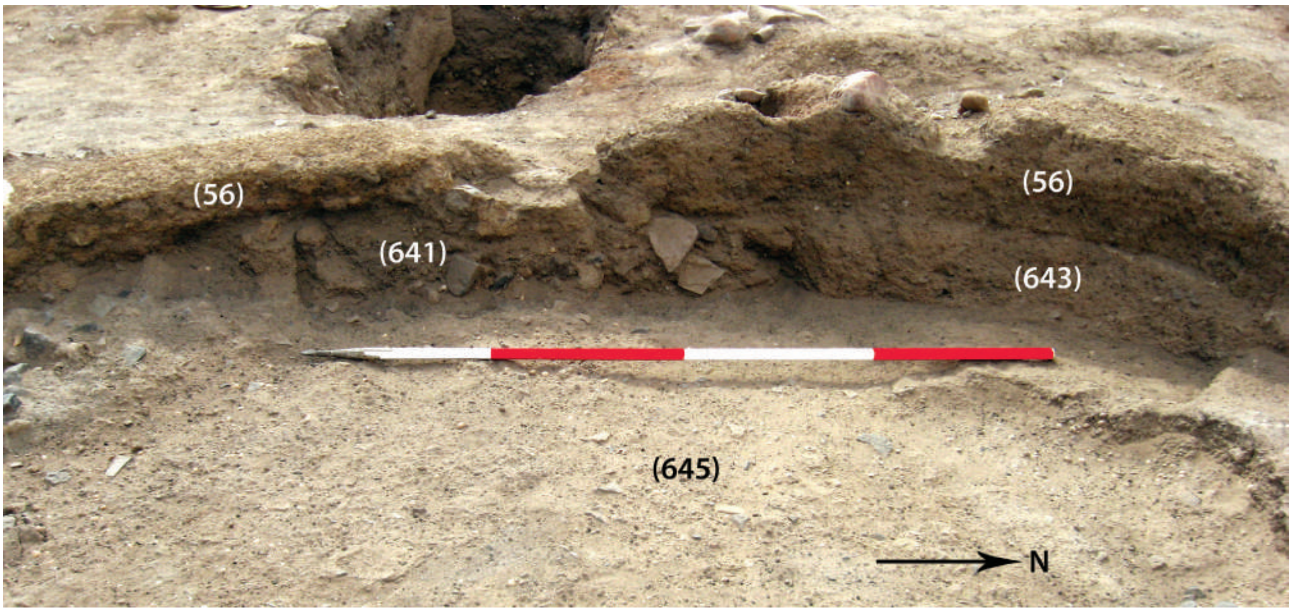


Figure 15.12 View of the east-facing part of wall (56)/(643) showing rubble deposit (641) under the overhang formed by upper wall (56). Scale 2.0 m.

Figure 15.13 Goat/ibex horncore SF956 in deposit (647). Scale 0.1 m.

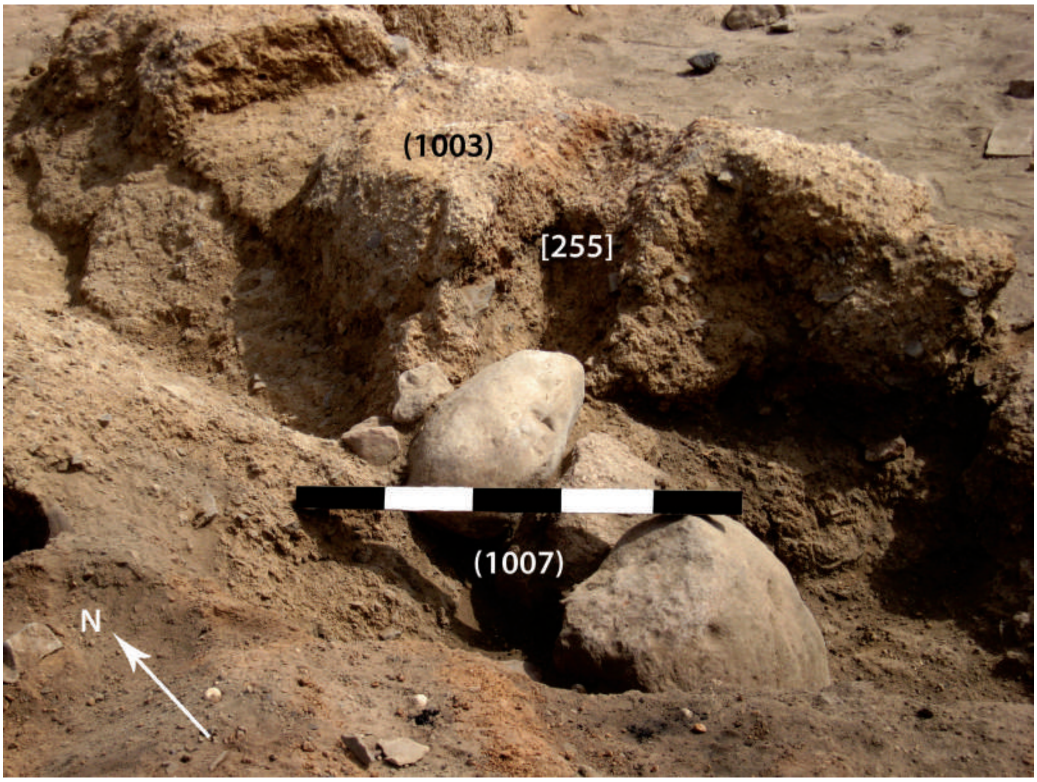


Figure 15.14 Stones (1007) in cut [1001] at the back of post pipe [255], a void within pisé left by the decomposition of a wooden post, from the southwest. Scale 0.5 m.

southern 'annex', was excavated in two spits. The upper spit (645) was 0.10 m thick and was fully excavated. Only 60 litres of sediment from across the top of the lower spit (647) was excavated before the end of the excavation programme. Both spits contained substantial amounts of fire-cracked stones, snail shells and charcoal. Chipped stone and animal bone were still relatively abundant, including a goat/ibex horncore (SF956) (Figure 15.13). Four pieces of worked bone were also found, including bone point SF957 and partly drilled bone fragment SF1531, both from the lower spit (647). The upper spit (645) contained a range of ground-stone tools including five pestles (SF909, SF910, SF914, SF916 and SF917), hammerstone SF915 and unidentifiable ground stone object SF913. A piece of worked green stone (SF1532) from lower spit (647) and marine shell bead (SF924) were also found. Excavation did not continue any further in the interior of the structure. The level reached with deposit (645)/(647) was below the base of wall (56). The deposit abutted the eroded face of the lower wall (643) as well as a thin white mud-plaster coating (1005), which had been applied to the interior face of the wall at its southernmost part. It is important to note that coating (1005) also partially covered the inner face of the southernmost part of upper wall (56), which was, however, petering out in this area due to truncation.

Excavation in the intramural spaces

In addition to excavation in the interior of the structure, excavation was undertaken in the intramural spaces between Structures O53, O45, O85 and O11 (Figure 15.1). Immediately below the overburden (123) in this space, there was a horizon of silt with large irregular stones (19) that sealed pit [1001], located in the narrowest central part of this elongated area. The uppermost fill of pit [1001] was a clean brownish-grey silt (250). Below this, a line of four large stones (1007), all approximately 0.3 m x 0.2 m in size, was revealed in a similar silty fill (1000) (Figure 15.14).

Pit [1001] cut a dense rubble deposit (247) that filled the triangular intramural space between wall (56) of Structure O53, wall (245) of Structure O45, and wall (674=999=61) of Structure O85. Below (247) was another layer of dense rubble (601), which was also confined to this narrow space and rested directly on a flat pisé or mud-plaster surface (1341). This external surface was described in Chapter 14, but it is important to reiterate its relationship with walls (56), (674=999=61) and (245), all of which had outwards-sloping outer faces and partly extended over surface (1341). This surface therefore predates the construction of these three walls, all of which belong to separate structures.

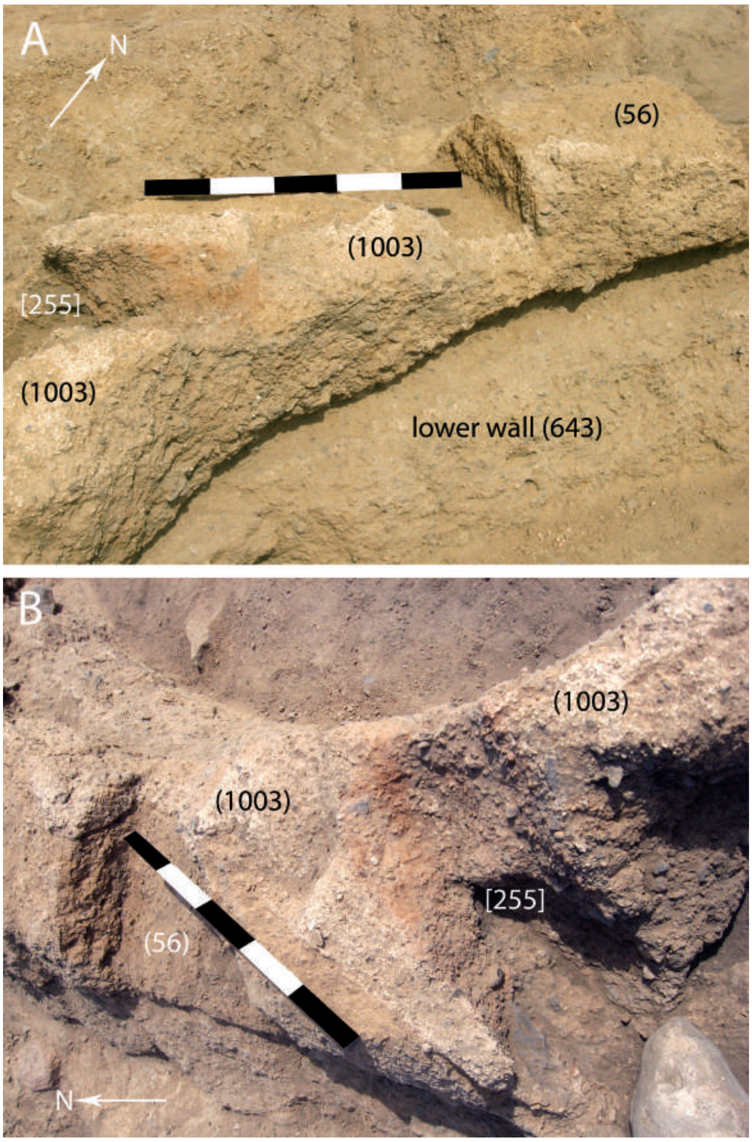


Figure 15.15 Whitish pisé insertion (1003) with the excavated post pipe [255] marked by scorched reddening: A — from the southeast; B — from above facing east. Scales 0.5 m.

In the southern part of the intramural space a rubble deposit (648), resembling rubble deposits (247) and (601), was present in the northern part of the intramural space, but was separated from (247) and (601) by the cut of pit [1001]. Deposit (648) was also cut by pit [41]. Deposit (648) abutted the southernmost external slope of wall (56) and the northern exterior of wall (125) of Structure O11. All three deposits (247), (601) and (648) contained chipped stone, ground stone and animal bone. Deposit (648), was somewhat richer in all of the finds categories (Table 15.2). In addition to the bulk finds, it also contained two ground-stone pestles (SF923 and SF935), hammerstone SF934, marine shell bead SF939 and a charred human tooth SF933.

To the immediate east and cut by pit [1001] was a probable post pipe [255] filled with silt (254). The post pipe was set within the wall (56) of Structure O53 at its westernmost point, angled inwards at 45°, thus matching the angle of the outer slope of the wall. Because of this, the base of the post pipe was situated at the back of the wall in the location overlain by stones (1007), while the top was visible on the truncated upper surface of the wall. Fill (254) was fine light brown silt with a high percentage of charcoal. The pisé surrounding the post pipe was scorched red by intense burning (Figure 15.15). Post pipe [255] was 0.25 m in diameter through most of its profile, which survived to a length of 0.38 m.

The reddening around the post pipe was emphasised by the whitish colour of pisé (1003), which the angled post pipe was set into. This distinctively coloured part of the wall was shown by the excavation to be an insertion into orange-brown pisé wall (56). The sequence of events here is clear: firstly, cut [1004] was made into wall (56) so that the wall was completely bisected at its westernmost point (Figures 15.15 and 15.16). This was then filled with the whitish coloured pisé (1003), which was probably moulded directly around the post. Eventually, the burning of the post left the scorched appearance of the pisé surrounding post pipe [255], which was created by this process. Cut [1004] was fan-shaped and it splayed out towards the interior of the structure. Similar, or perhaps even the same, white mud plaster which had been packed into the cut to hold the post, was also used to plaster the remaining interior face of wall (56). This thin coating (1005) was given a separate number to pisé fill (1003) and remains only partly excavated as it continues downwards along the face of earlier wall (643); pisé (1003) was excavated in full.

Half a metre to the south of post pipe [255] was another angled post pipe [263] (Figure 15.16B) set in wall (56) and filled with orange-grey silt (260). The diameter at the top of the profile was 0.25 m, which narrowed to 0.15 m at the mid profile and reached a point at the back of the wall. Fill (260) was cut obliquely by pit [1001] at the outer side of wall (56). Thus, two inward angled post pipes were located at the western part of Structure O53. Post pipe [255] was set into whitish pisé insertion (1003) while post pipe [263] was set into original pisé of wall (56).

Excavation of wall (56)

Following the excavation of post pipes [255] and [263] and pisé insertion (1003), it was possible to deconstruct wall (56) by excavation. Deposits within the interior of Structure O53 were excavated to a level below the base of this wall, leaving the white mud-plaster wall coating (1005) at its southernmost extent as the only deposit stratigraphically later than wall (56). As coating (1005) also continued across

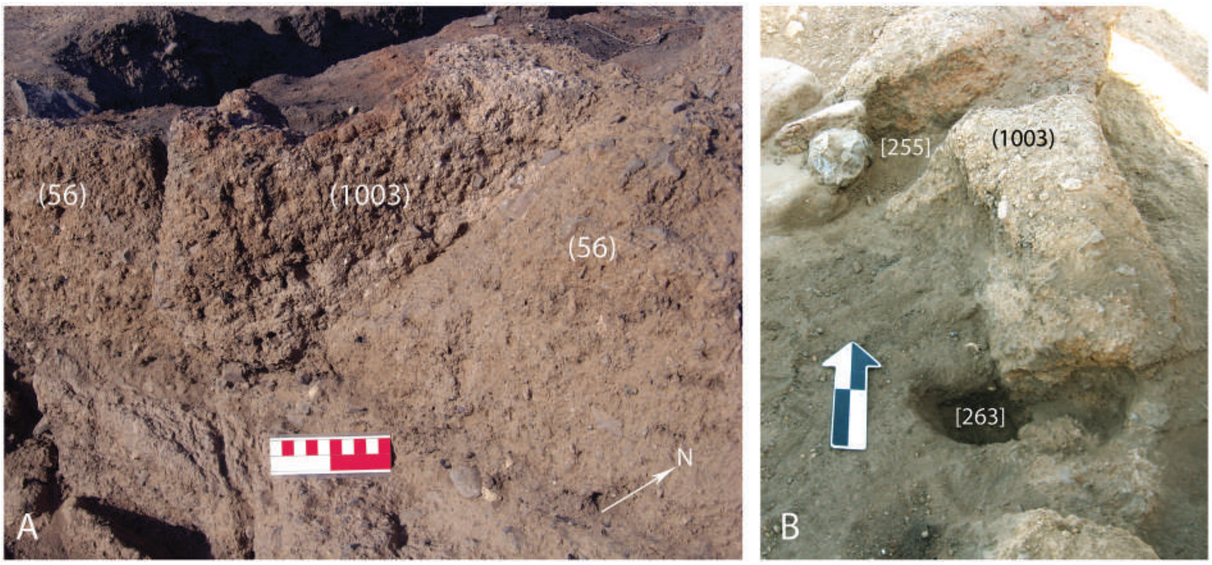


Figure 15.16 A — Profile of inserted pisé (1003) in cut [1004] made into wall (56) from the northeast in mid-excavation, scale 0.1 m; B — Excavated post pipe [263] from the south in relation to post pipe [255] in the background, scale 0.2 m.

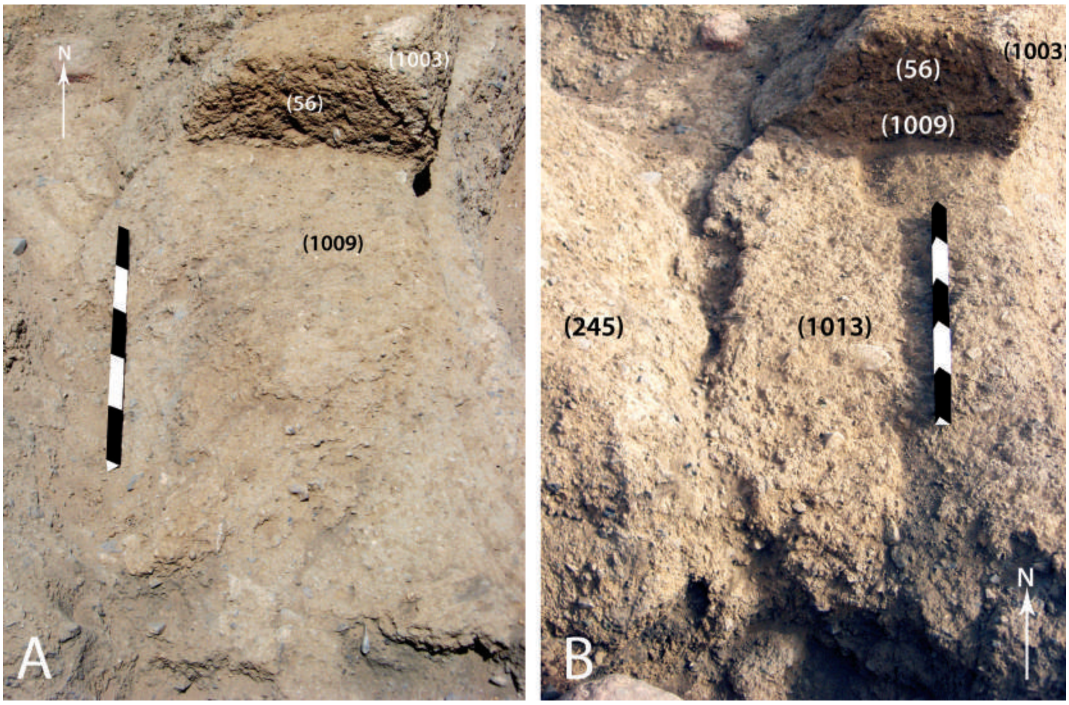


Figure 15.17 A — Middle pisé band (1009) exposed in plan with top pisé (56) and white mud-plaster wall coating (1003) visible in the south-facing section; B — Bottom pisé band (1013) exposed in plan. Note its outward extent as the base of the buttressed back slope of the wall. Scales 0.5 m.

the face of lower wall (643) to an unknown depth, it was arbitrarily excavated to the top of lower wall (643) to allow excavation of the upper wall (Figure 15.18).

Upper wall (56) was fully excavated except for two 0.30 m long baulks, which were left temporarily for micromorphological and sediment analysis sampling (Figures 15.17, 15.18B). The northernmost baulk of wall (56) was subsequently excavated leaving only the southern baulk as a remaining part of this structural phase. Excavation of the northern stretch of the wall revealed that this part of it was built from three successive bands of pisé. The top band retained the number (56) and overlay a thinner but wider band (1009), which in turn overlay a further pisé band (1013) (Figure 15.17). The lowermost band (1013) had been laid across outer surface (1341), thus forming the base of the outer slope of the wall, which was achieved by narrowing the width of the successive pisé bands (1009) and (56) inwards. Built in this fashion, the wall was effectively buttressed against the outer surface (1341) (Figure 16.6, Chapter 16).

There was a clear distinction in the makeup of the pisé bands that constituted the upper wall of Structure O53. The uppermost band (56) was orange-brown pisé and it contained the highest percentage of coarse stone temper. This pisé band was the most degraded. Within it were several large stones between 20 cm and 50 cm in breadth, which were spaced out along the line of the wall. The middle and lowermost pisé bands (1009) and (1013) were firmer and had smoother upper surfaces, indicating that they had been roughly levelled and dried before the next band was applied. The colour and consistency of the bands were also slightly different, although both (1009) and (1013) were paler than the uppermost band (56). These lower bands also contained fewer stone temper and temper inclusions. Just like pisé insertion (1003), all three bands contained small amounts of chipped stone and animal bone (Table 15.2).

Before the excavation of the upper wall sequence (56)/(1009)/(1013), the lower wall (643) was visible mainly in elevation (Figures 15.12 and 15.19A). From this perspective it was clear that the lower wall of the structure had the same footprint as the upper wall. It was also clear that both walls had a burnt interior face, which caused large parts of the wall faces to flake off during and following excavation. A small patch of burnt mud-plaster coating adhered to lower wall (643) in the south part of the elevation (Figure 15.19B). This was different in nature to the more robust mud-plaster coating (1005) to the south of it.

In the southern part of the structure, upper wall (56) as well as lower pisé bands (1009 and 1013) sat directly on top of lower wall (643). In the northern part, however, an intermediate deposit (649) was revealed first in elevation and then in plan (Figures 15.19A and 15.20). In addition, the excavation of the upper wall (56) in the northern part of Structure O53 revealed the underlying pisé wall (674=999=61), which curved in the opposite direction to form the southeastern limit of Structure O85 (Chapter 16, see Table 16.1 for context descriptions, Figures 15.20 and 15.21). The greyish

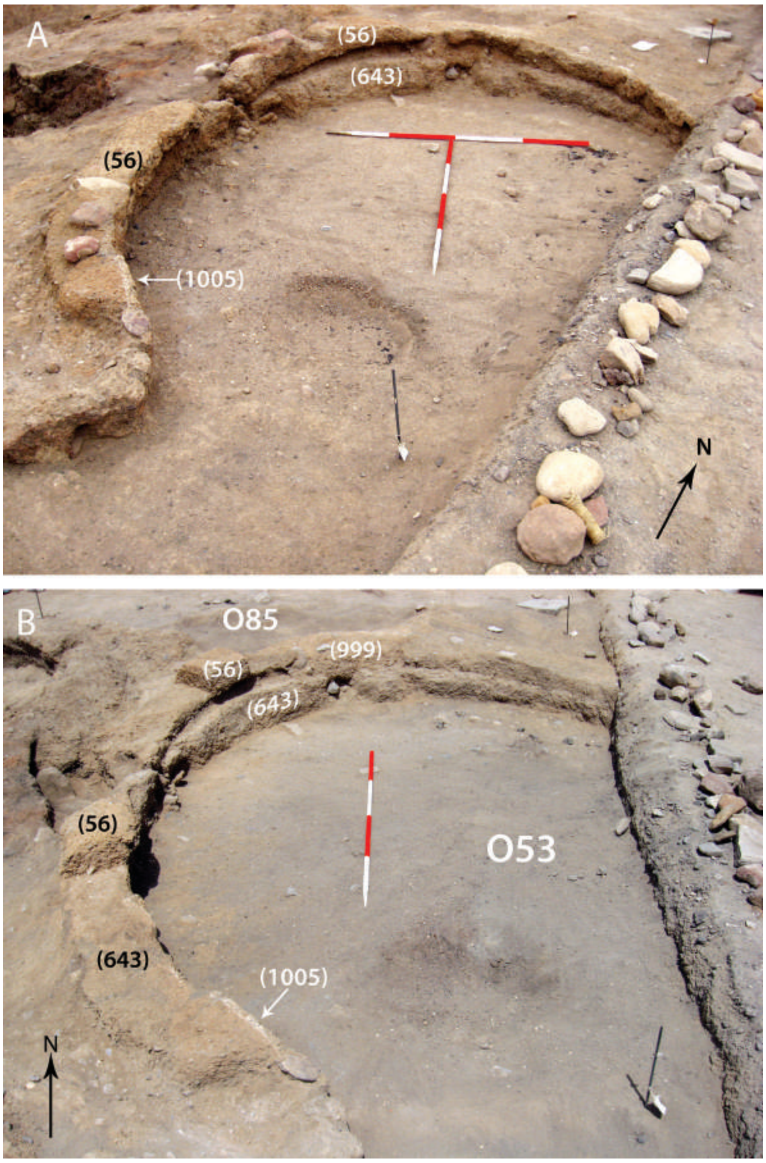


Figure 15.18 Structure O53; A — before, and B — after the excavation of upper wall sequence (1013), (1009), (56). Sampling baulks can be seen left standing proud in photograph B. Note the white inner mud-plaster coating (1005) present in the foreground in both photographs. Scales 2.0 m.

brown silt (649), which separated the upper and the lower wall of Structure O53, abutted wall (674=999=61) from the east and the southwest. This deposit did not extend into the interior of Structure O53, only being found in the area sandwiched between the two successive walls of Structure O53, which suggests that the interior of the structure was cleaned out prior to the construction of the upper wall, thus removing (649) from the inside of the structure (Figure 15.20). This event, which was given cut number [1024], followed the inner-side of lower wall (643) to an unknown depth and was interpreted as the construction activity for the upper phase of O53. To the southwest of wall (674=999=61), deposit (649) survived as an elongated spread located stratigraphically between the bottom pisé band (1013) of the upper wall of Structure O56 and exterior mud-plaster surface (1341). To the east of the wall (674=999=61) it emerged as a somewhat wider band, which remains unexcavated (Figures 15.20 and 15.21). Only the southwestern arm of deposit (649) was excavated to expose the relationship between mud-plaster surface (1341) and the lower wall (643) of Structure O53. A small quantity of chipped stone, animal bone and snail shells was retrieved from this part of the deposit.

Sampling of wall (643)

The final excavation work relating to Structure O53 was undertaken adjacent to the southernmost of the two baulks left from the upper wall (56). A small section, 0.30 m in length, was dug into lower wall (643) exposing an even earlier wall (1336) (Figure 15.20). This established that wall (643) was much firmer than any of the pisé bands

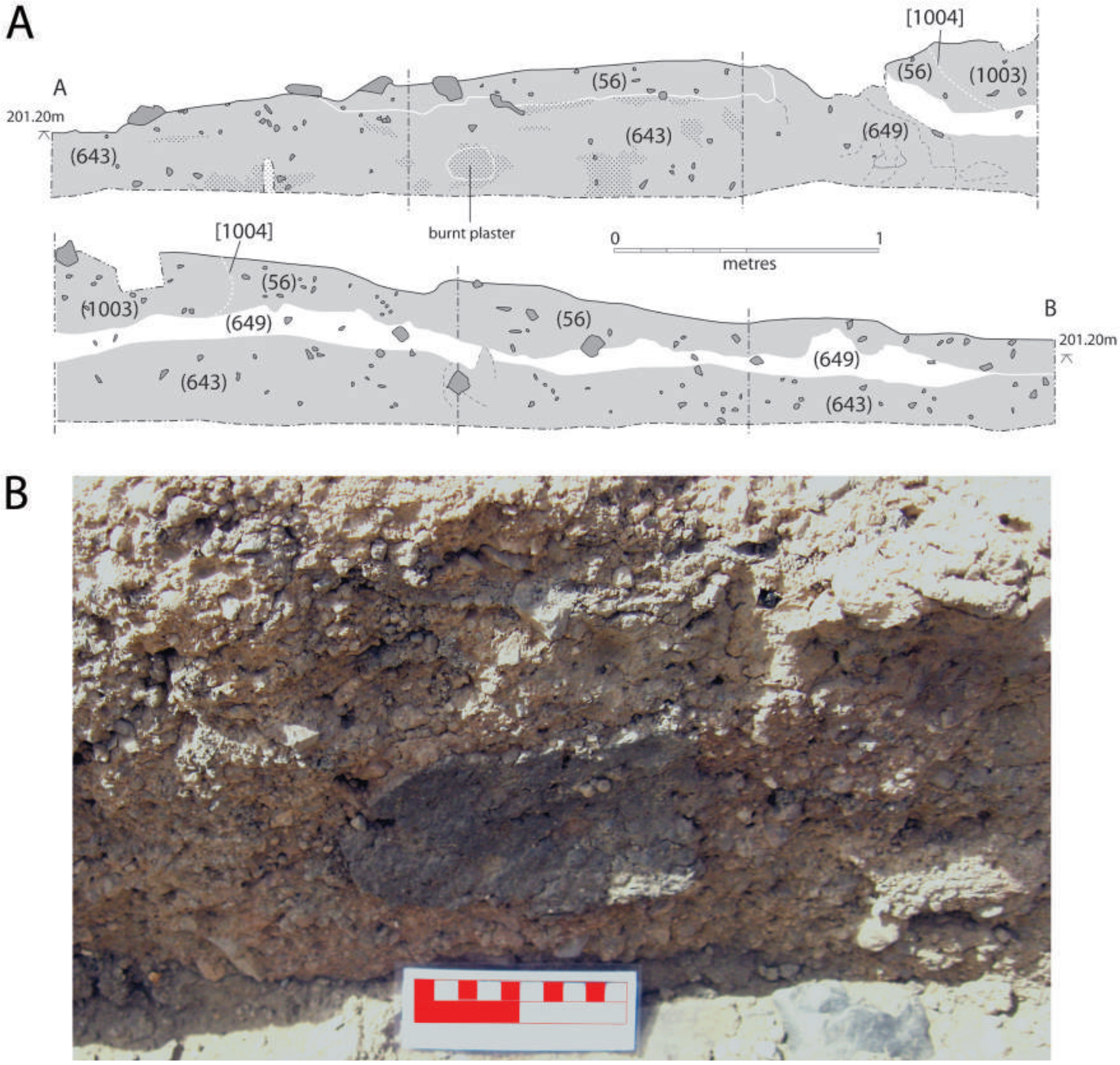


Figure 15.19 A — Complete internal elevation inside Structure O53, Section S127 located on Figure 15.4; B — Small patch of burnt mud-plaster coating which survived on the otherwise crumbled face of wall (643), scale 0.1 m.

relating to the upper wall (56, 1009, 1013) of Structure O53 and that the gravel temper used in its construction was both coarser and denser. An attempt to cut out a Kubiena sample for micromorphology between the two walls had to be abandoned because the matrix was too hard for conventional digging tools. Another section, 0.40 m wide, was excavated on the outside of the same baulk (Figures 15.20) containing the wall sequence of Structure O53 (Figure 15.22). In this way the stratigraphy of Structure O53 was connected to that of Structure O45 via a north-facing section provided by the side of pit [1320], as described in Chapter 14. Wall (643) was abutted from the outside by mud-plaster surface (1333), which was lipped over by the upper wall (56). This relationship matches the relationships between these two successive walls (56 and 643) of Structure O53 and mud-plaster surface (1341) in the north part of the intramural space between Structures O53 and O45 (Figure 15.1B). The section also exposed the outer face of Structure O53 and revealed an earlier wall (1336) below wall (643), as well as evidence for an even earlier truncated mud-plaster surface (not assigned a context number) (Figure 15.22). It is not clear whether wall (1336) runs on the same footprint as walls (643) and (56), i.e. whether it represents an earlier construction phase of Structure O53, or an unrelated, and as yet undefined, structure.

15.3 Sedimentary analysis

Six sediment samples were analysed from O53 (Tables 39.12 and 39.13): four were taken from the lower wall (643) and two from collapsed material (641), assumed to have derived from either walls (56) or (643). One of the samples from (641) was visibly burnt. The data, results and interpretation are provided in Chapter 41.6.

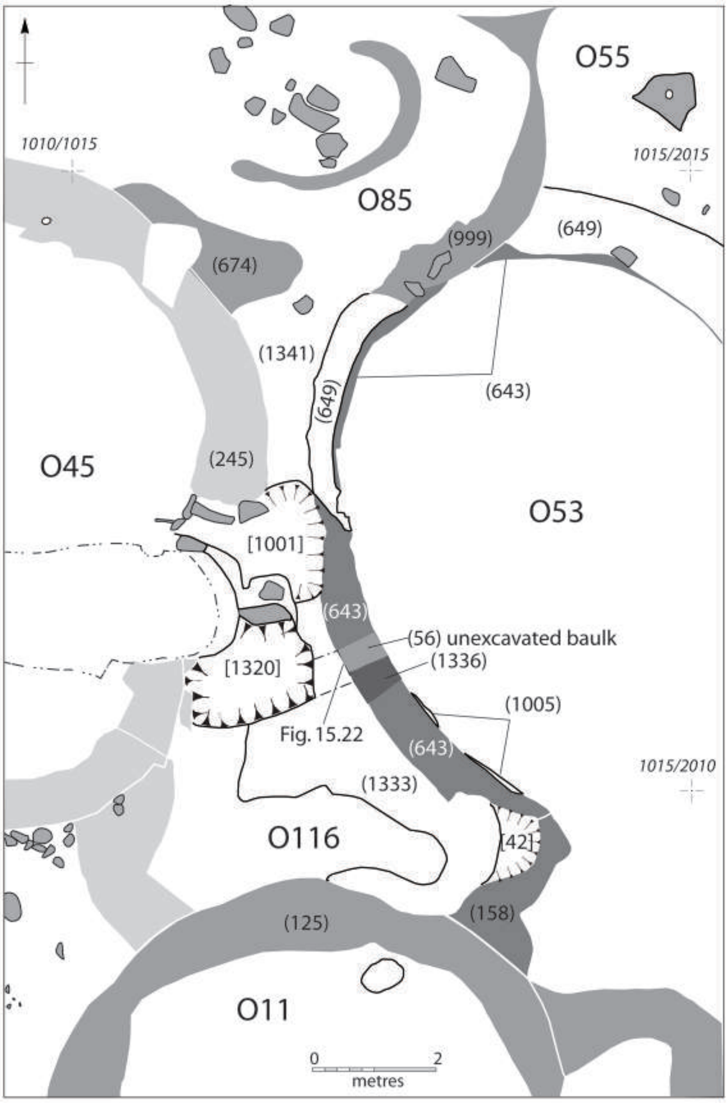


Figure 15.20 Structural plan of the lower phase of Structure O53 in relation to the surrounding structures, showing the remaining unexcavated baulk of the upper wall (56) and adjacent sections through the wall sequence exposing (1336) in plan (and in section in Figure 15.22).

15.4 Interpretation

Structure O53 is a partially excavated pisé-walled structure. Part of the structure lies outside the trench limits, but it appears to have been elliptical in shape, with a possible annex to its south. Excavation has demonstrated a complex construction history, which included at least one complete structural overhaul. An early structural phase belonging to Structure O53 is possibly represented by wall (1336), revealed in the slot trench at the southwest side of the structure (Figure 15.22). A mud-plaster surface, which underlies this wall, appears to be a remnant of a different structural layout, unrelated to the outline of Structure O53 as delineated by later walls (643) and (56).

The first clear phase of Structure O53 is formed by pisé wall (643). It is not known whether internal deposits related to this wall survive, as the excavation did not progress to a sufficient depth. Neither is it known whether wall (643) was significantly reduced, intentionally or by time, to reach its current height before being overlain by the construction of overlying wall (674=999=61) of Structure O85 to the northwest.

Although wall (674=999=61) only marginally overlaps with wall (643) (Figures 15.20 and 15.21), there is further evidence that wall (643) could, probably, not have been standing anywhere along its circuit when Structure O85 was built. This evidence is the presence of deposit (649), which accumulated around wall (674=999=61), i.e. on the outside of Structure O85 and in the space previously occupied by Structure O53. Although deposit (649) survived only along the line of wall (643), sandwiched between it and the upper wall (56), it is probable that this is the consequence of the re-establishment of Structure O53 on its prior footprint when wall (56) was built. This

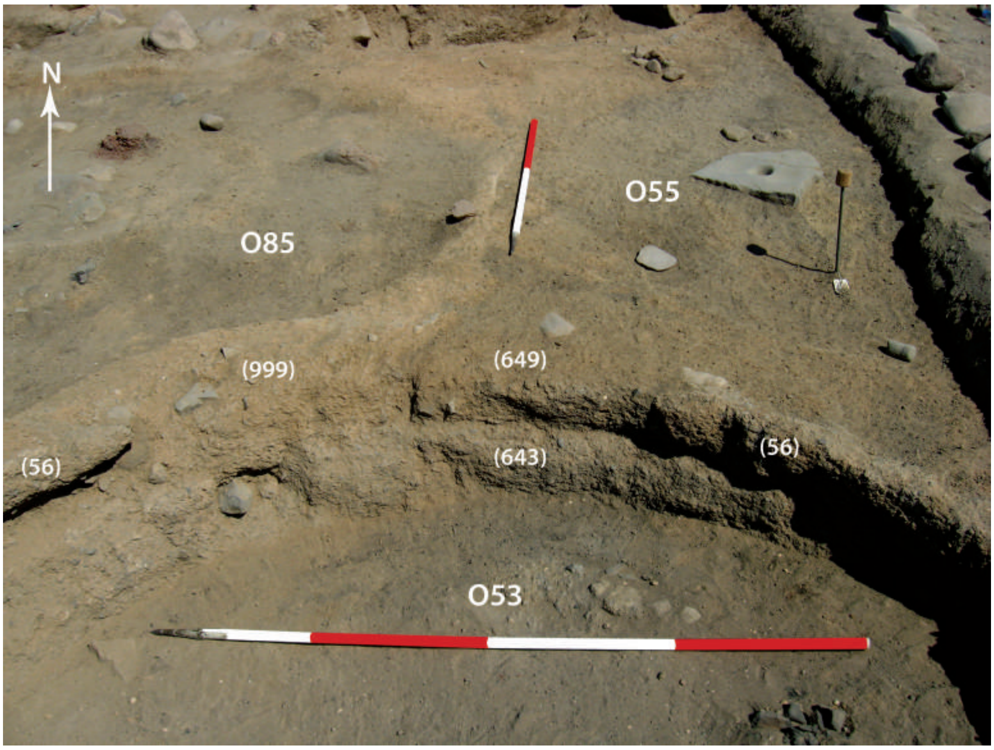


Figure 15.21 North part of Structure O53 seen from the south during the excavation of the upper wall. Photo shows the relationships between the partly removed upper wall (56) of Structure O53, underlying silt (649), which abuts wall (674=999=61) of Structure O85 from the outside, which in turn overlies the lower wall (643) of Structure O53. Scales 2.0 m x 1.0 m.

new phase in the construction of Structure O53 must have involved the removal of deposits that had accumulated inside it during the time when wall (643) was down and Structure O53 was not standing. This action is represented by cut [1024], which followed the inner sides of wall (643) in order to clear the subterranean space inside Structure O53 for renewed occupation. This action cut away the part of deposit (649) that accumulated across the interior of disused Structure O53, but the remains of it survived on top of wall (643).

Wall (674=999=61) of Structure O85 was in turn partially overlain by wall (56) (Figures 15.20 and 15.21). This means that, by this time, wall (674=999=61) had either been pulled down, had collapsed, or had been modified in such a way to allow both structures to co-exist. The last option has threefold support: firstly, the way that Structure O85 was constructed, next to both Structures O53 and O45 without encroaching on their interior spaces, suggests forethought in regard to their rebuilding; secondly, the way that the intramural space between Structures O45, O85 and O53 was packed with stony deposits (247) and (601), which directly overlay the buttressed walls of all three structures evenly; and thirdly, the fact that deposits inside Intramural Space O55 abutted both wall (56) of Structure O53 and wall (674=999=61) of Structure O85, indicating their co-presence.

A similar deposit to that of (649) was found during the excavation of the rebuilding phase of Structure O45. Here loose charcoal-rich deposit (1033) was sandwiched between the underlying denuded wall (1342) and the newly laid mud-plaster coating (1032), which formed one side of Intramural Chamber O116 between the southern parts of Structures O45 and O53 (Chapter 14). Just like silt layer (649), deposit (1033) had probably initially existed as a more extensive spread over the denuded remains of Structure O45. It was subsequently truncated along the vertical lines of the old wall, which was being reused as the base for Intramural Chamber O116 on one side and the rebuilt Structure O45 on the other side.

Without the excavation of Intramural Chamber O116 we cannot say how this structure related to walls (1336) and (643) of Structure O53. What is clear is that O116 was already full with sediment and capped by a mud-plaster surface (1333) before Structure O53 was once again rebuilt with the addition of wall (56). What this means in broader stratigraphic terms is that both Structure O85, or at least its known phase represented by wall (674=999=61), and Intramural Chamber O116 were constructed while Structures O53 and O45 were not standing. However, when Structures O53 and O45 were rebuilt, Structure O85 might have been incorporated into the overall design, while Intramural Chamber O116 was completely filled up with soft silty sediments.

Although wall (56) was extremely damaged by lateral truncation and erosion and, in places, survived only as a thin sliver of pisé, the better preservation of the northwest part of the structure revealed how walls were built above ground in

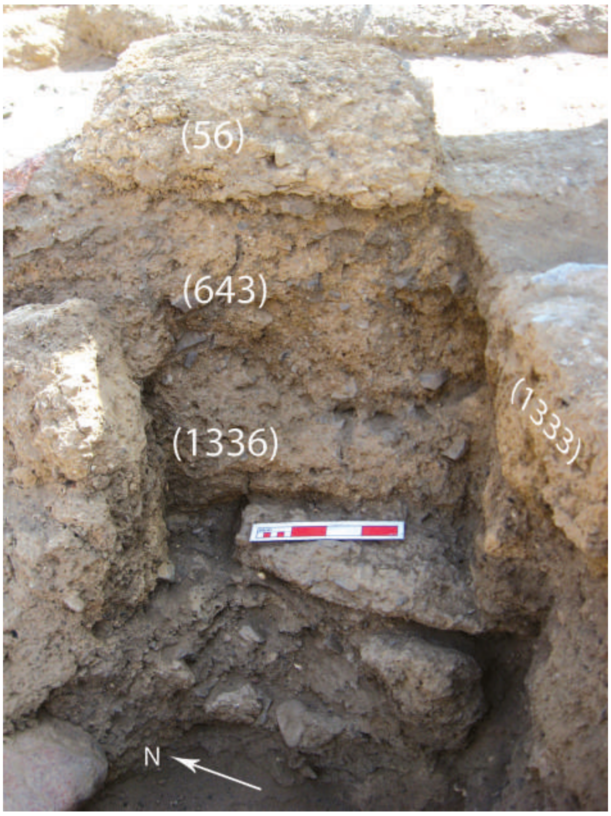


Figure 15.22 Sequence of superimposed walls visible in the section dug between the outer side of Structure O53 and pit [1320]. The scale rests on an earlier mud-plaster surface, which was underneath wall (1336) and was truncated by the pit. Scale 0.2 m.

these partly subterranean structures. Here excavation revealed that multiple pisé bands were laid horizontally, starting with the widest at the bottom in relation to the internal face of the wall. Successive pisé bands were then laid narrowing inwards and upwards so that the resulting wall had an outward slope at the back (Figure 15.17). Three pisé bands (1013), (1009) and (56) were clearly made from different mixes of material; they particularly differed in colour, and in the size and density of stone temper. The smooth upper surfaces of bands (1013) and (1009) indicate that these were left to dry before the next band was laid. All of them contained small amounts of chipped stone and animal bone.

Buttressing the wall had a stabilising effect. This made the structure stronger because the wider base, spread over the surrounding surface, could carry part of the weight of the superstructure that did not depend solely on the subterranean part of the structure. In other parts of the structure the same principle was applied, although distinctive pisé bands could not be recognised. Instead the surviving part of the wall was constructed from the only continuous pisé band (56), which was nevertheless buttressed outwards in the same manner. Excavation of packing rubble deposits (247) and (601) from the tight intramural triangle between Structures O53, O45 and O85 revealed that all respective walls (56), (245) and (674=999=61) were buttressed out onto underlying surface (1341).

Two post pipes were revealed in the top surface of the walls of Structure O53 (260) [263] and (254) [255]. Both were located at the western part of the wall circuit about half a metre from each other (Figure 15.16B). The southern post pipe [263] was set at a 45° angle into wall (56) with its pointed base located at the back of the wall. The edges of this post pipe were in poor condition due to the crumbly nature of the burnt wall, but there was no doubt about its basic geometry and its relationship with the wall.

Post pipe [255] to the north was better preserved and was set into whitish pisé insertion (1003) in cut [1004] (Figure 15.15). Pisé (1003) encompassed the post pipe entirely and there can be little doubt that the purpose of the cut [1004] into wall (56) was to insert this angled post into the wall. Presumably the post was put into place and the pisé was moulded around it. Once the post was pulled out or disintegrated following burning, its shape left the void in the pisé, which was then filled with silty material. By the shape and the size of the two post pipes it is possible to deduce that the post within post pipe [255] was probably more substantial and set deeper into the wall. Additionally, a short row of stones (1007) in cut [1001] was placed directly at the base of the post pipe, possibly as counterweights for the post (Figure 15.14).

It is impossible to say whether the two post pipes were contemporaneous, or whether post pipe [255] was the replacement for post pipe [263]. The two post pipes were set on different orientations. If the angle of the post pipe is projected upwards the post in post pipe [263] would have projected in an east-southeasterly direction, while the post in post pipe [255] would have projected in a northeasterly direction. If the role of these posts was structural, i.e. to provide support for the roof, then neither of them would have been very effective on their own. If they were projected to the apex of the structure then their top ends would have been towards the ends of the oval-shaped structure. This arrangement could have provided support for a ridged roof, but it would have worked much better if there had been counterpart posts projected from the opposite side of the structure creating a double A-frame. The evidence for such additional posts or their absence, however, remains outside the current limit of the excavation.

The excavation of the internal sequence inside Structure O53 stopped at the level of the midden deposit (645)/(647) (Figure 15.18). Although this was the lowest deposit reached inside the structure, its accumulation postdates the construction of upper wall (56). In fact, the entire excavated sequence inside Structure O53 postdates the destruction of the latest surviving structural phase represented by the circuit of wall (56) together with the pisé insertion (1003) [1004] and angled post pipe [255]; this can be seen by the white mud-plaster coating (1005) that was applied onto the interior of both upper wall (56) and lower wall (643). This facing (1005) was abutted by the lowest excavated deposit inside the structure, midden (645)/(647), which, therefore, has to be later than both facing (1005) and the construction of wall (56). The vertical extent of facing (1005) suggests that the phase represented by wall (56), incorporated wall (643) into the same structure. Wall (643) represented the subterranean component of the structure, while wall (56) was built up from the level of the outside construction surface. This is exactly the same scenario as described in Chapter 14, where lower wall (1342) and upper wall (245) combined to form Structure O45.

Both walls (56) and (643) were heavily burnt as was pisé insertion (1003), which was particularly heavily scorched around post pipe [255], indicating that the post inside it burnt *in situ.* Considering both walls were in use when the fire occurred, the implication is that the burning visible on both walls derived from the same fire. Once again, this repeats evidence found in adjacent Structure O45, which was destroyed by fire after a rebuilding phase that was both structurally and stratigraphically comparable to the construction of wall (56) in Structure O53. Considering the intensity of burning visible in both structures and their spatial proximity, they may have been burnt in the same event. There is strong stratigraphic evidence that the rebuilding of both Structure O45 and Structure O53 happened after that of Structure O85.

The distinct circular extent of deposits (46) and floor (55), and perhaps related but marginal silts (252), (258) and (267), along with the underlying floor (600), seem to be marking the footprint of a small superficial structure, not more than 2.5 m in diameter, which was set up at the northern end of what used to be Structure O53 (Figure 15.7). In the southern part of the interior a pit [43] was dug into the midden deposits (57), into which a deposition of partly articulated goat/sheep remains, a dog mandible and a bird skull (22) was placed in fill (15) (Figure 15.5).

On the southwest edge of the former structure a small rectangular burial, Burial O41, was dug and a flexed inhumation was crammed inside it (Figure 15.6). The burial clipped earlier pisé walls (643) and (158), as has happened with many other burials excavated on the site, which possibly deliberately cut the wall line. The human remains were partly truncated by a later cut, possibly deliberately targeted at the time when the memory of their placement was still fresh. Pit [41] was dug into the western half of the burial; the skull and some of the bones of the upper torso were probably removed and the pit backfilled with stone rubble (21).

16. Structure O85

16.1 Location and relationship with other structures

Structure O85 was probably elliptical in shape. Its western end was not identified in the course of the excavation, leaving its length and precise shape undefined. Nevertheless, the curved shape of its pisé wall along the southern and the eastern sides of the structure suggests an oval form (Figures 16.1, 16.2). Its northern limit was visible only as a thin line of mud plaster, which continued the line of the interior face of the pisé wall. The maximum internal width of the structure was 2.20 m. The eastern area of the interior contained an arc of a mud-plaster wall, *c.* 2.0 m in length. This may have been part of a complete oval wall circuit, but the extent of excavation within the western area of the interior was insufficient to test this.

Structure O85 links Structures O45 and O53 to its south, forming a three-way junction between their walls, which was explored via the excavation of each structure (hence see also Chapters 14 and 15). While the walls of these structures touch and overlap, their interiors do not (Figure 16.1). A similar spatial relationship exists to the northeast of Structure O85, where its wall is probably truncated by the cut for the wall of Structure O56. The walls of Structures O53, O85 and O56 formed Intramural Space O55 (Figure 16.1), inside of which the latest surviving occupation

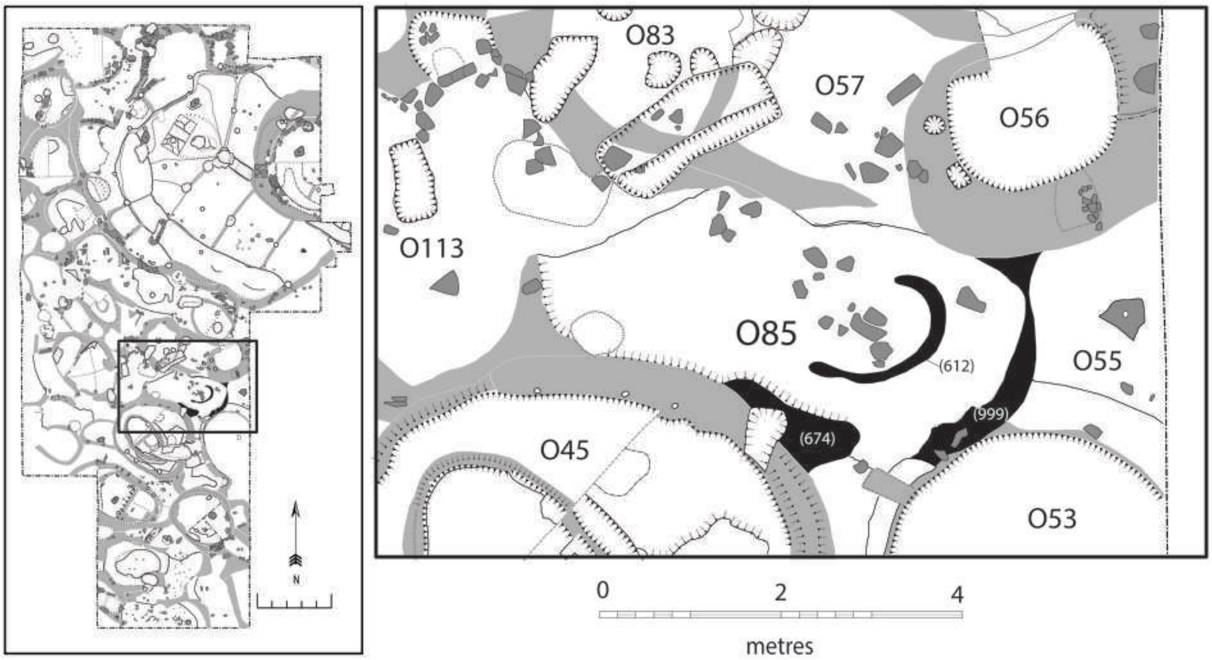


Figure 16.1 Location of Structure O85 and plan showing its relationship with surrounding Objects.

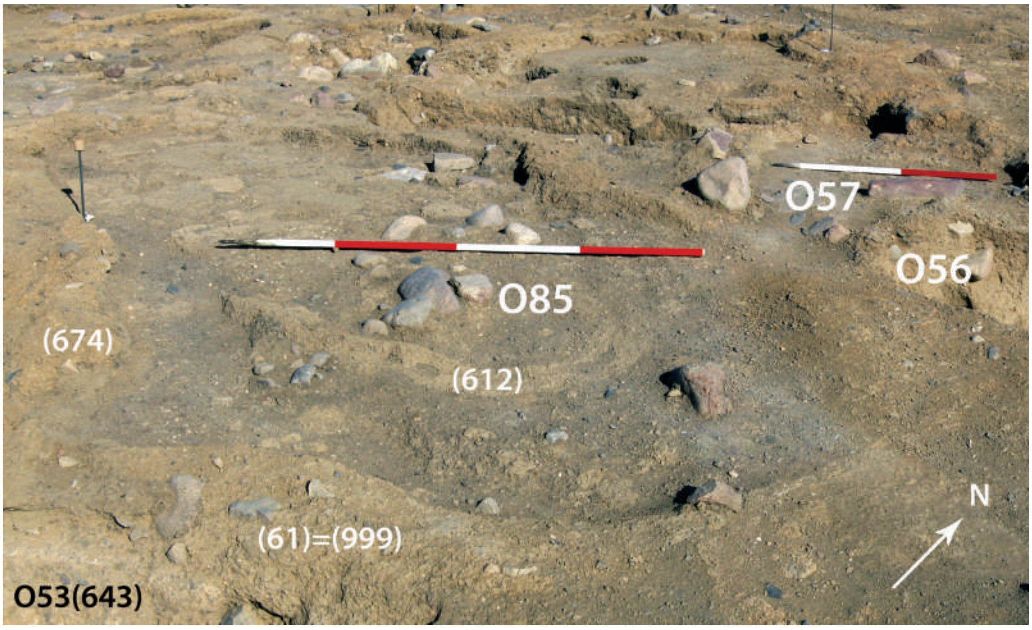


Figure 16.2 Structure O85 from the southeast at the cessation of the excavation in its interior. Scales 2.0 m x 1.0 m.

likely postdates these structures (see Chapter 18). The inter-relationships between Structure O85 and Intramural Space O57 to the north and Structure O83 to the northeast are uncertain, as are the relationships at the western end of Structure O85 with deposits related to Structure O113 (Figure 16.1). Figure 16.3 provides a matrix for all excavated contexts, which are described in Table 16.1. Bulk and small finds are listed in Tables 16.2 and 16.3 respectively.

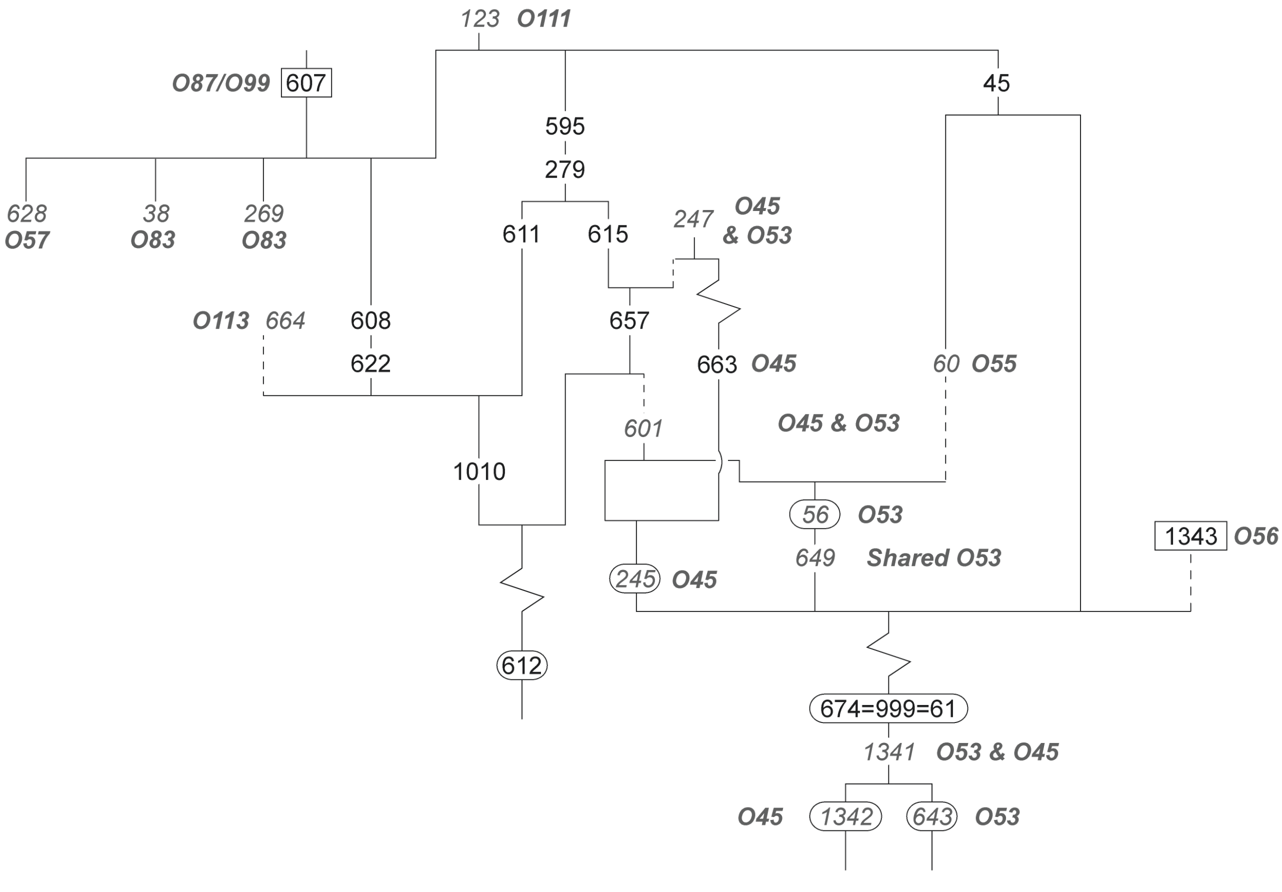


Figure 16.3 Stratigraphic matrix for Structure O85.

Table 16.1 Contexts excavated in Structure O85 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
45	mid-grey sandy silt containing a disturbed concentration of animal bones	localised dump
61	mid-yellowish-brown pisé with medium coarse stone temper	pisé wall of structure
279	greyish-brown silt with occasional charcoal and some stones	silt accumulation inside structure
595	infant cranial fragments	possible disturbed human burial
608	mid-grey to light brown sandy silt with some pisé rubble inclusions	silt and rubble accumulation inside structure
611	dark greyish-brown ashy silt with a large percentage of fire-cracked stones	spread of ash and burnt stones perhaps associated with a hearth
612	mid-yellowish-brown mud plaster	unexcavated structure or installation
615	concentration of fire-cracked stones	dump of burnt stones possibly from a hearth
622	medium compact yellowish-brown pisé and silt	silt with pisé rubble accumulation inside structure
649	mid-grey brown friable silt	deposit accumulated between two structural phases of walls (56) and (643)
657	loose pale grey silt	silt accumulation inside structure
674	mid-yellowish-brown pisé with medium coarse stone temper	pisé wall of structure
999	mid-yellowish-brown pisé with medium coarse stone temper	pisé wall of structure
1010	greyish-brown loose silt with pisé rubble	silt and rubble accumulation inside structure

Table 16.2 Quantities of bulk finds from Structure O85 by material and context number.

Object 85	Volume of sediment (l)				Weight of bulk finds per material (g)						
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Other worked stone	Animal bone	Marine shell	Other shell	Charcoal	Misc.
279	171.0	30.0	140.0	1.0	1335.0	20.0	114.6	10.0	38.4	0.0	0.0
608	201.0	30.0	170.0	1.0	1035.0	11.0	40.0	0.0	0.0	0.0	0.0
611	46.0	30.0	15.0	1.0	781.1	0.0	33.7	0.0	166.8	0.0	0.0
615	5.0	5.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0
622	141.0	30.0	110.0	1.0	567.2	0.2	13.4	0.0	39.7	0.0	0.0
649	25.0	25.0	0.0	0.0	221.0	0.0	34.1	0.0	106.6	0.3	0.0
657	15.0	15.0	0.0	0.0	30.0	1.0	50.0	1.0	0.0	0.0	20.0
1010	421.0	30.0	390.0	1.0	1340.0	10.0	66.0	0.0	0.0	0.0	0.0
Total	1025.0	195.0	825.0	5.0	5309.3	42.2	355.8	11.0	351.5	0.3	20

Table 16.3 Quantities of small finds from Structure O85 by material and context number.

Object 85	**Quantities of small finds per material (nos)**								
Context	**Ground stone**	**Other stone**	**Worked bone**	**Unworked animal bone**	**Disarticulated human bone**	**Bone beads**	**Stone beads**	**Marine shell beads**	**Total small finds**
279	6	0	1	0	0	0	0	1	8
608	0	1	0	0	1	0	2	0	4
611	5	0	1	0	0	0	0	0	6
615	2	1	0	0	0	0	0	0	3
657	0	0	0	0	0	0	0	1	1
1010	4	1	0	1	0	0	0	6	12
Total	17	3	2	1	1	0	2	8	34

16.2 Description of the excavated deposits

The surface of the pisé wall of Structure O85 was exposed below the overburden (1 and 123), initially as three separate stretches (61, 674 and 999), which were later identified as parts of a single construction. Two disturbed deposits were found below the overburden at the eastern extent of the structure (Figure 16.4). Deposit (45) was an oval spread of sandy silt containing poorly preserved animal bones, also extending into Structure O55 (Chapter 18). To the west of this there was much more extensive greyish-brown silt (279) that contained several human infant cranial fragments (595). There were no cuts visible around either of these deposits.

Deposit (279) was 3.20 m x 2.70 m in extent and occupied an oval area; it extended up to wall (999=674=61) in the east, but overlay this wall to the south and abutted the exterior of wall (245) of Structure O45 in the southwest. The western extent of (279) was unclear because it merged with a similar mid greyish-brown sandy silt (608), which contained a higher percentage of pisé rubble than (279). Chipped stone was relatively abundant in (279) (Table 16.2); it also contained four hammerstones (SF308, SF309, SF311, SF635), two ground-stone pestles (SF306, SF310), a marine shell bead (SF307), and a bone pin (SF1068) (Table 16.3). Removal of deposit (279) exposed a mud-plaster ridge (612) that formed an oval within O85 (Figure 16.5).

Deposit (608) was 2.5 m x 2.0 m in extent and occupied an area to the west of deposit (279) and the main oval layout of Structure O85 (Figure 16.4). At the time of the excavation it was separated from (279) by what initially appeared to be a line of pisé, but which turned out to be a linear spread of rubble within an underlying, yellowish-brown silt (622). Two stone beads (SF653, SF658) and a decorated stone object (SF652) were recovered from (622). Deposit (608) was cut by Antique Burial O87 at its northern extent (Chapter 6). A small human cranial fragment (SF751) was found within (608) in this area.

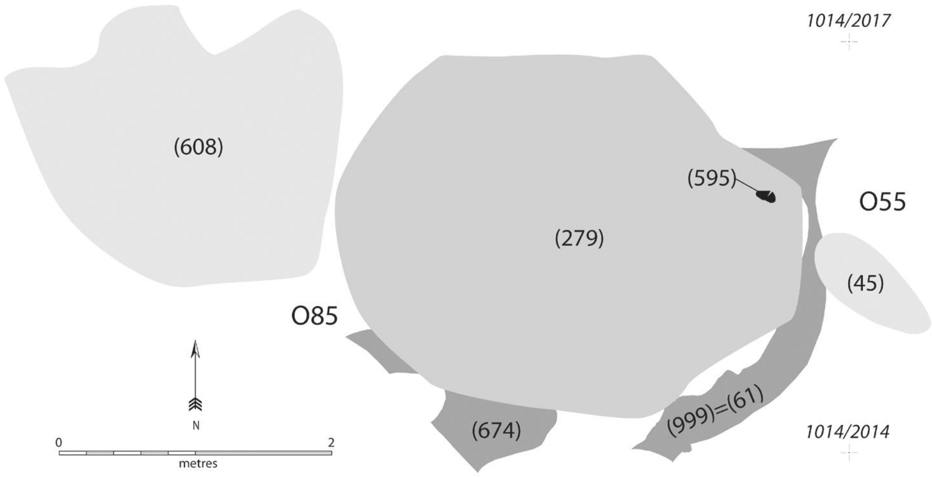


Figure 16.4 Plan of deposits (608), (279) and (45) with the location of infant cranial fragments (595).

Excavation of deposit (279) revealed two localised spreads of burnt material (611) and (615), as well as the partial outline of an internal structure defined by a mud-plaster ridge (612) (Figure 16.5). Deposit (611) was predominantly dark grey ashy silt, forming a sub-circular spread 0.5 m in diameter over the western part of the oval mud-plaster structure (612). The ashy material contained fire-cracked stones, five hammerstones (SF743, SF747, SF748, SF750, SF752) and a bone point (SF749). Deposit (615) was a separate concentration of fire-cracked stones abutting internal structure (612) from the south. There were three artefacts among these stones; a quartz hammerstone (SF744), and two ground-stone pestles (SF745, SF746).

In the western area two further mixed infilling deposits were found below deposit (608): a yellowish-brown silt (622) and a grey-brown silt (1010), both containing a substantial amount of pisé rubble. A ground-stone tool within (1010) was identified as a pestle (SF1519), but the function(s) of two triangular objects found together (SF1516, SF1528) remain unclear. A large pointed object (SF1549) was thought to be either a roughout for an unfinished pestle, or a pick. Six dentalium shell beads (SF1522, SF1523, SF1524), and other marine shell beads (SF1512, SF1518, SF1521), were also found in this deposit. Excavation of the mixed deposits (622, 1010) in the western part of Structure O85 did not reveal any sign of a possible wall enclosing this end of the structure, although a wall may survive at a lower level not reached by excavation.

A loose grey silt (657) extended along the narrow space between the internal structure (612) and the outer wall (674=999=61) in the better-defined eastern part of Structure O85, and also filled a 0.7 m wide gap in the wall (674=999=61) circuit. The nature of this apparent break in the wall circuit was not investigated. It could not be established with certainty whether silt (657) encroached through this gap onto gravel (601 of Structure O45), which filled the intramural space between Structures O85, O53 and O45 and overlay the walls of these structures. No further excavation took place inside Structure O85 following the excavation of deposit (657). This deposit was below the spread of fire-cracked stones (615).

Walls (245), (674=999=61), and (56) were all buttressed with outer ramps of pisé that met in the small triangular intramural space between Structures O45, O53 and O85 (Figure 16.6). The latest surviving phases of Structures O45 and O53, in the form of walls (245) and (56), overlay wall (674=999=61) of Structure O85. The back of niche [663], which was primarily contained within wall (245) and accessed from the interior of Structure O45, was cut

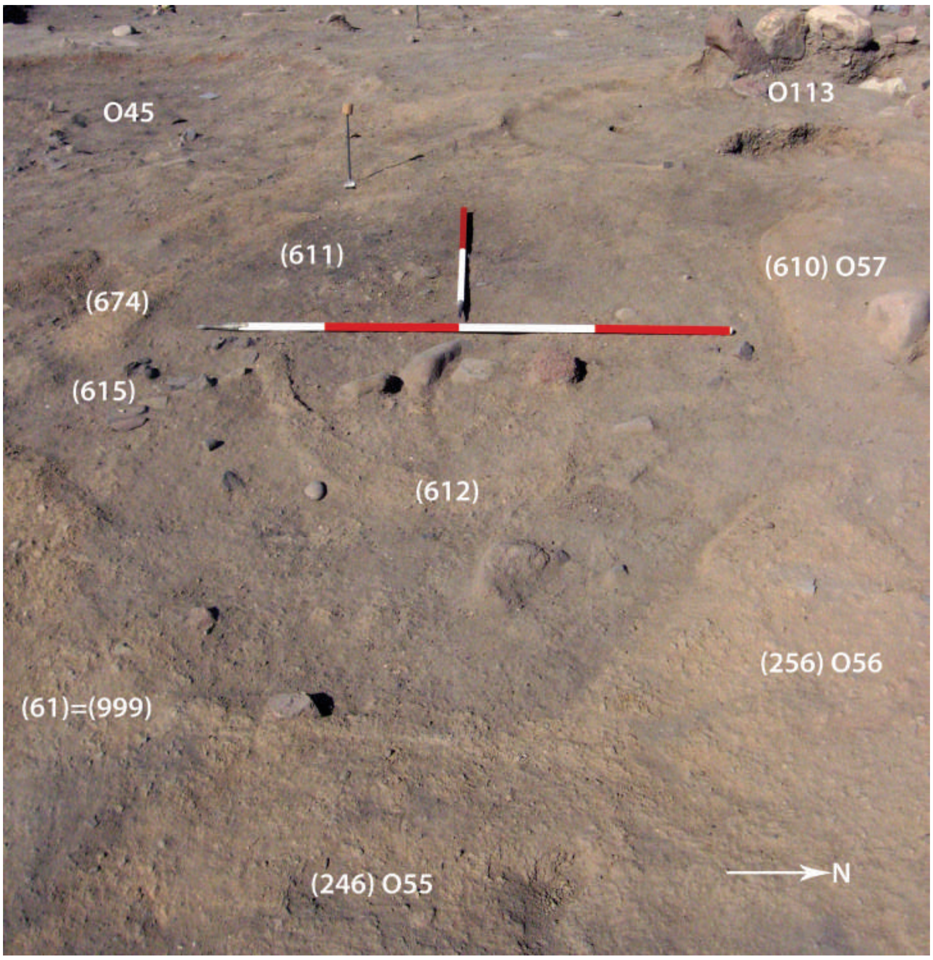


Figure 16.5 Structure O85 from the east with partly exposed oval mud-plaster structure (612) in the centre, spread of fire-cracked stones (615) to the left and dark ashy spread (611) in the background. Scale 2.0 m x 1.0 m.

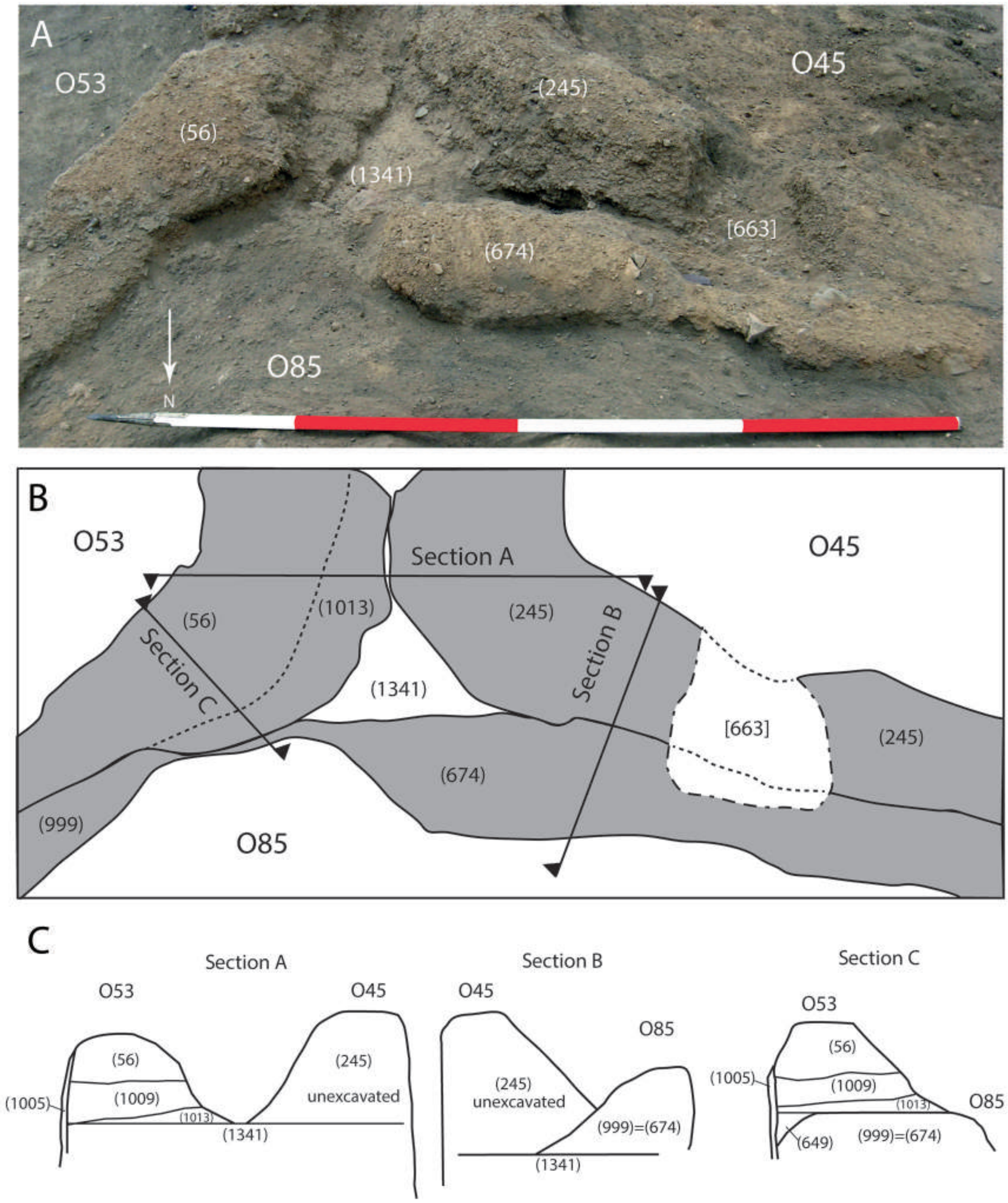


Figure 16.6 Three-way junction between Structures O85, O45 and O53 from the north: A — photo showing the pisé walls, surface (1341) between them, and niche [663], scale 2.0 m; B — plan showing the location of the schematic sections; and C — schematic sections showing relationships between the walls and surface (1341).

into wall (674=999=61) (Figure 16.6). Wall (674=999=61) overlay a mud-plaster surface (1341), that covered the intramural space between the structures and in turn overlay the earlier phases of Structures O45 and O53 represented by walls (1342) and (643). This shows that Structure O85 was built after the earlier phases of Structures O45 and O53 were denuded and were, presumably, not in use (Figure 16.6).

As described in Chapter 15, wall (674=999=61) is sandwiched between walls (643) and (56) of Structure O53 (Figure 16.7), which indicates that its construction took place in between two structural phases of Structure O53. Silt layer (649) was present over denuded wall (643), which abutted wall (674=999=61) from the south and the east. Only a small part of the deposit at the southern limit was excavated in order to ascertain the relationship between mud-plaster surface (1341) and wall (643), over which (649) lay.

16.3 Sedimentary analysis

One wall sample was analysed from O85, (674), the data, results and interpretation of which are provided in Chapter 41.6.

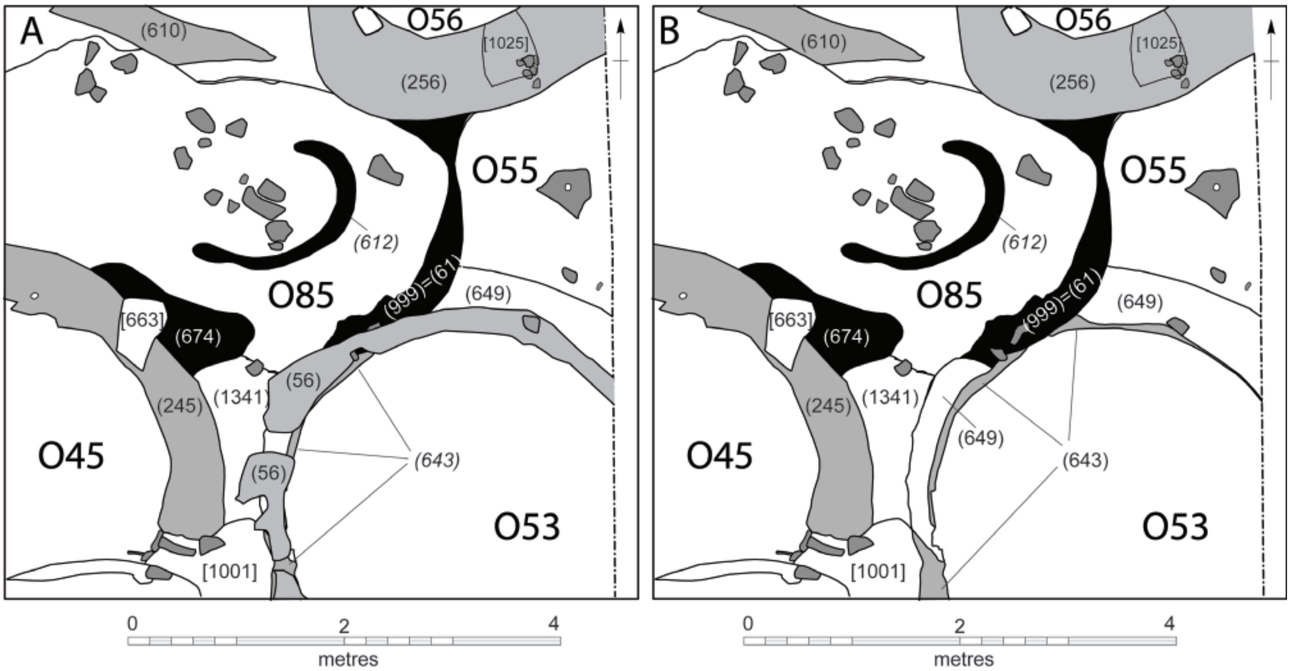


Figure 16.7 Phased plans showing the spatial and stratigraphic relationship between Structure O53 and Structure O85: A — Plan showing later phase of Structure O53 with the late wall (56) overlying wall (999) of Structure O85; B — Plan of the same area after the excavation of wall (56) showing wall (999) and abutting deposit (649) overlying earlier wall (643) of Structure O53.

16.4 Interpretation

Structure O85 has only been partially excavated but appears to be the truncated remains of an elliptical pisé-walled structure defined by wall (674=999=61), containing an internal mud-plaster walled feature. The latest surviving phases of occupation and construction in neighbouring Structures O53 and O45, and possibly Structure O56, contain deposits and structural elements that postdate the construction of wall (674=999=61).

Excavation in the interior of Structure O85, and to its west and north, was primarily undertaken in order to define the full circuit of its pisé walling and to explore relationships with other structures. This met with only partial success. The exact nature of the relationship between Structures O85 and O56 was not explored by excavation, but, from what is visible in plan, the thick pisé wall (256) of Structure O56 appears to interrupt the line of the thinner wall (674=999=61) of Structure O85 (Figure 16.1), suggesting that the construction cut [1343] for Structure O56 was made into Structure O85.

Excavation of Structure O53, especially its upper wall (56), and the intramural space between Structures O53, O45 and O85, provided information about the construction of Structure O85. Similar construction techniques were used for the walls of all three structures, which can be seen in the characteristic buttressing slope, or ramp, on the exterior of walls (674=999=61), (245) and (56). All three walls were buttressed onto a mud-plaster surface (1341), which covered the intramural space between them, but also onto each other, which allowed determination of their stratigraphic sequence (Figure 16.6). Wall (999=674=61) was built at a time when neither Structure O45 nor Structure O53 was standing, and prior to the construction of walls (245) and (56). Wall (674=999=61) of Structure O85 was buttressed onto mud-plaster surface (1341) that covered the triangular space between the three structures and extended over the remains of walls (1342) and (643), which represent earlier phases of Structures O45 and O53 respectively. Wall (674=999=61) also directly overlay part of wall (643) of Structure O53. The greyish-brown silt layer (649) accumulated against the outer face of wall (674=999=61) and over wall (643) (Figure 16.7), which indicates that Structure O53 was not in use. Wall (56) of Structure O53 was then built on the same footprint as its earlier wall (643), whose remaining part was reused for the subterranean part of the structure (Figure 16.8). The two areas of silt (649) may have been continuous across the interior of O53 but cleared from this area when O53 was reused.

Wall (56) was constructed partially over wall (674=999=61) in exactly the same way in which wall (674=999=61) had been built over wall (643), only in the opposite direction (Figures 16.7 and 16.8). While we have stratigraphic evidence that Structures O45 and O53 were not standing at the time of the construction of Structure O85, it is not entirely clear what happened to wall (674=999=61) when Structures O45 and O53 were

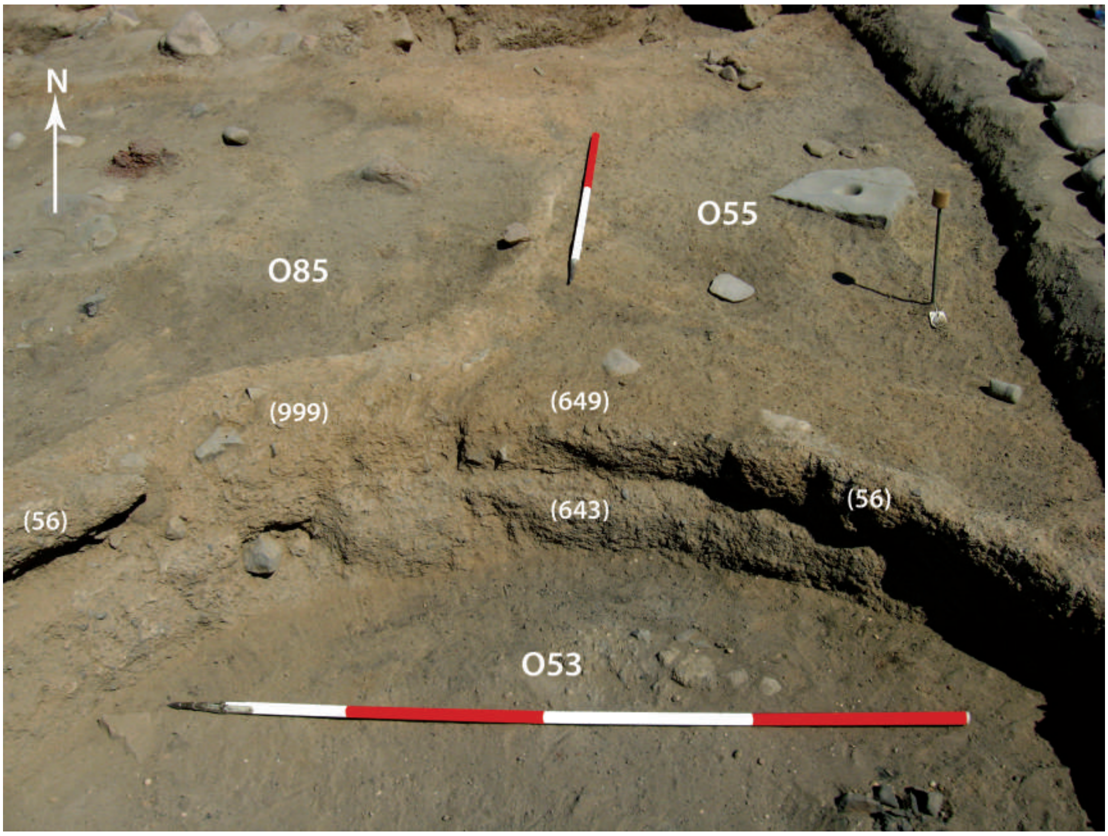


Figure 16.8 The eastern end of Structure O85 from inside Structure O53 showing the relationships revealed by the excavation of wall (56), which was, at this stage, only partly removed. Part of wall (674=999=61) and silt (649) were covered by it, while wall (643) lies beneath them. Scale 2.0 m x 1.0 m.

rebuilt. Some modification seems likely considering the manner in which the later walls (56) and (245) overlap and overlay (674=999=61), but this does not necessarily mean that Structure O85 could not remain standing. In fact, as discussed in the previous chapter, the careful spatial referencing of the walls of these three structures and their structural interlinking probably suggests otherwise. Furthermore, deposits within Intramural Space O55 appeared to abut the walls of surrounding Structures O53, O85 and O56, indicating their co-presence.

Almost nothing is known about the use of Structure O85 following the construction of wall (674=999=61), as the excavation of its interior did not reach relevant occupation deposits. Excavated deposits of mixed silt and pisé rubble (1010), (622), (608) and (279) extended across most of the interior of the structure and probably over its western limits. Similar deposits remain to be excavated before the full layout of the structure can be revealed and possible occupation deposits reached. Although the thin mud-plaster ridge or wall (612) was not fully exposed (or may not be preserved), the location of this internal feature dominated the interior, with little space left between it and the outer walls.

Internal structure (612) remained mostly covered by rubble, including some large stones (Figures 16.2 and 16.5). The spreads of ash and fire-cracked stones (611) and (615), which surrounded and partly overlie it, do not relate to its use. These deposits are likely to be dumps of burnt material from a time when Structure O85 was already partially filled by silts and rubble. The spreads (611) and (615) were similar to the fills of Hearth O92, which was the focus of the latest surviving occupation in adjacent Structure O45 after it was rebuilt following its destruction by fire. Fire-cracked stones (612) and (615) were overlain by deposit (279), which was rich in chipped stone and contained four hammerstones. The disturbed and badly preserved remains of an infant skeleton (595) were found on top of this deposit, probably representing the remains of an extremely truncated burial.

17. Structure O56

17.1 Location and relationship with other structures

Structure O56 is a small structure located close to the middle of the excavation trench along its eastern baulk (Figures 17.1, 17.2). It borders Structure O85 in the southwest and Structure O84 in the north. In the west it is separated from Structure O83 by Intramural Space O57; in the south it is separated from Structure O53 by Intramural Space O55. Additional structures might be present immediately to the east, beyond the limit of the trench, as suggested by the layout of the exposed structures, the knoll topography, and the continuation of Intramural Space O55 and Structure O53 beyond the edge of the trench (Figure 17.1). Structure O56 is one of the later structures in this part of the site, and together with Structure O84 appears to have been built onto the wall (1049) of an earlier structure. As far as it could be deduced from the surface evidence, the construction of Structure O56 post-dates Structure O85, but this relationship was not tested by excavation. Intramural Space O55 was created by the construction of Structures O53, O85 and O56, and the latest deposits within this space appear to abut the exterior of the walls of these structures. The latest occupation inside Intramural Space O57 might have also post-dated the construction of Structure O56, but the direct relationship with these deposits could not be established.

Excavation examined the internal deposits of Structure O56 and made a limited investigation of its construction and stratigraphic relationships through the excavation of a section through the wall between Structures O56 and O84. All deposits excavated within this wall section are described in the context of the excavation of Structures O56 and O84, although some clearly predate these structures. Table 17.1 lists the excavated contexts, the stratigraphic relationships of which are illustrated in Figure 17.3. Tables 17.2 and 17.3 list the finds from the excavation of O56 and associated deposits.

17.2 Description of the excavated deposits

The outline of the structure was exposed by the removal of the overburden (1 and 123). It was orientated west-southwest–east-northeast and defined by what appeared to be a continuous pisé wall (256) enclosing a space 2.15 m x 1.30 m in maximum extent. The interior of the structure was kidney-shaped (Figures 17.1, 17.2) with the convex interior wall face on the north side of the structure. The top of the wall (256) had a mottled appearance and was criss-crossed by trails of fine grey silt brought in by burrowing insects and animals.

Excavation of caprine horn cores from within wall (256)

Cleaning of the pisé wall at the east end of the structure revealed a pair of caprine horns (47), which had been built into the wall with their tips pointing downwards (Figure 17.4). Considering the importance of this kind of faunal evidence and the fact that the exposed part of the horns would rapidly deteriorate, it was decided that the horns should be excavated out-of-phase from within the wall (256) with minimal disturbance to the sequence of deposits in the interior of the structure.

A rectangular box section, measuring 1.2 m x 0.5 m, was excavated next to the eastern baulk of the trench through wall (256). The size of the box section was governed by the length of the horns (0.32 m) and the necessary space on either side required for their excavation. In the process of excavating the surrounding wall material, a large stone was found to have been incorporated into the wall, as well as half a stone platter SF291 (Figure 17.4). The excavation

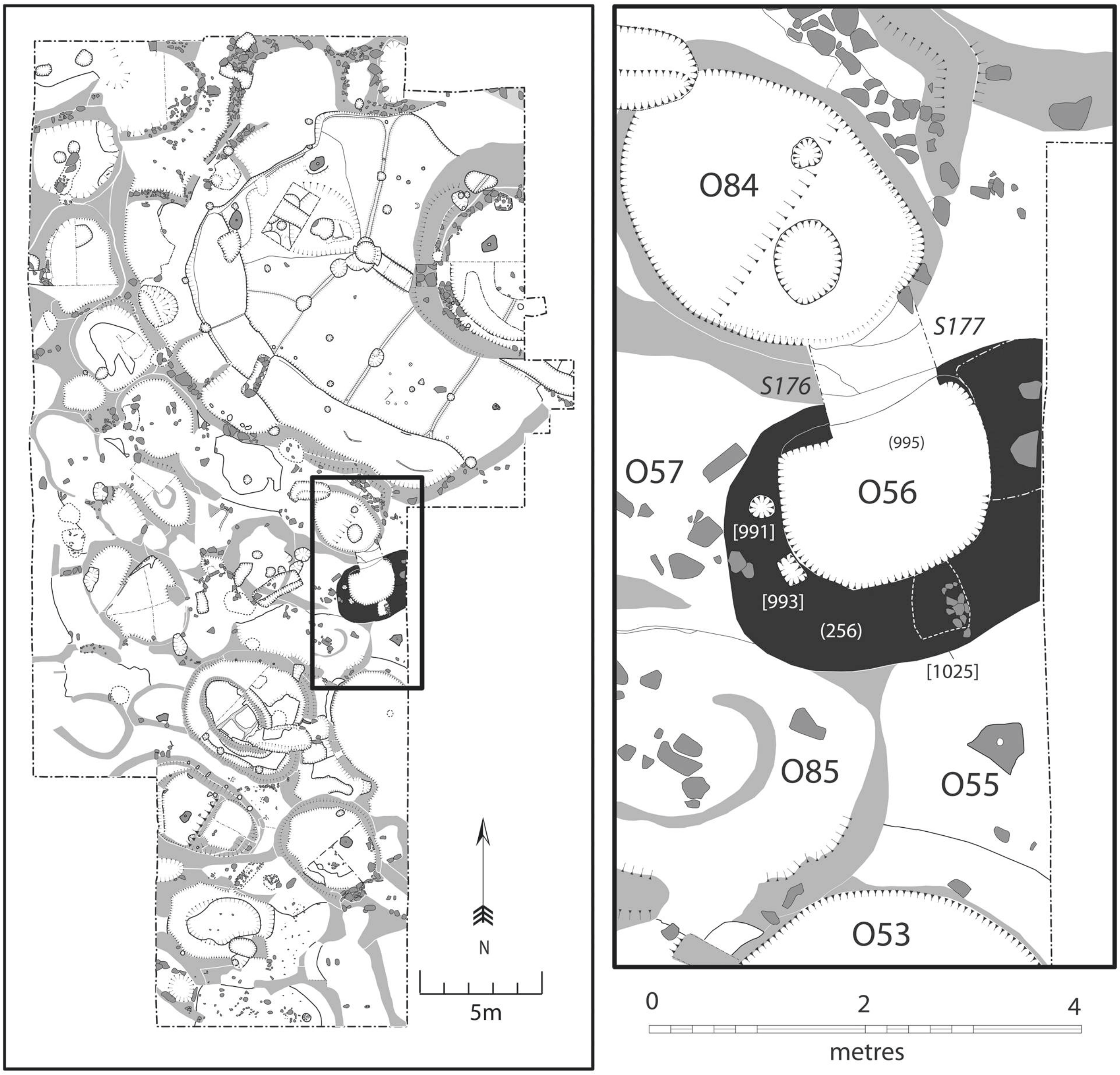


Figure 17.1 Location of Structure O56 and plan showing its relationship with surrounding Objects.

of the box section was mainly restricted to the body of the wall, but a small amount of the internal deposits adjacent to its interior face were also excavated out-of-phase. A number of finds were retrieved in this process, including several ground-stone objects. All finds from this narrow part of the interior were grouped under context (58) and the small finds were three-dimensionally recorded (Table 17.2 and 17.3). The horns (47) were lifted as a block together with some sediment still attached, due to concerns about their structural integrity. A water-soluble consolidation fluid was used to help with the lifting as they were heavily fragmented. After their safe retrieval the internal deposits of the structure were excavated.

Excavation of the interior of Structure O56

The uppermost surviving deposit in the interior of Structure O56 was a grey silt excavated in two 0.10 m spits (53) and (54) (Table 17.1). Both spits were relatively rich in chipped stone and contained some animal bone, as well as ground-stone tools (Table 17.2 and 17.3).

The concentration of finds, ground and chipped stone in particular, became increasingly dense in the underlying deposit (59) (Figure 17.5). The presence of pisé rubble gave this deposit a paler yellowish colour and the appearance of a rough surface. A spread of several ground-stone tools was found at this level, including pestles (SF273 and SF275), hammerstone (SF639) and stone bowl fragment (SF638). Stone beads (SF644, SF645 and SF2082), worked bone objects (SF637 and SF642), and human tooth (SF643) were also found.

Below (59) there was a mid-yellowish-grey silt, with occasional pisé rubble (605), containing a stone, *c.* 0.30 m in diameter, situated in the centre of the structure. The stone

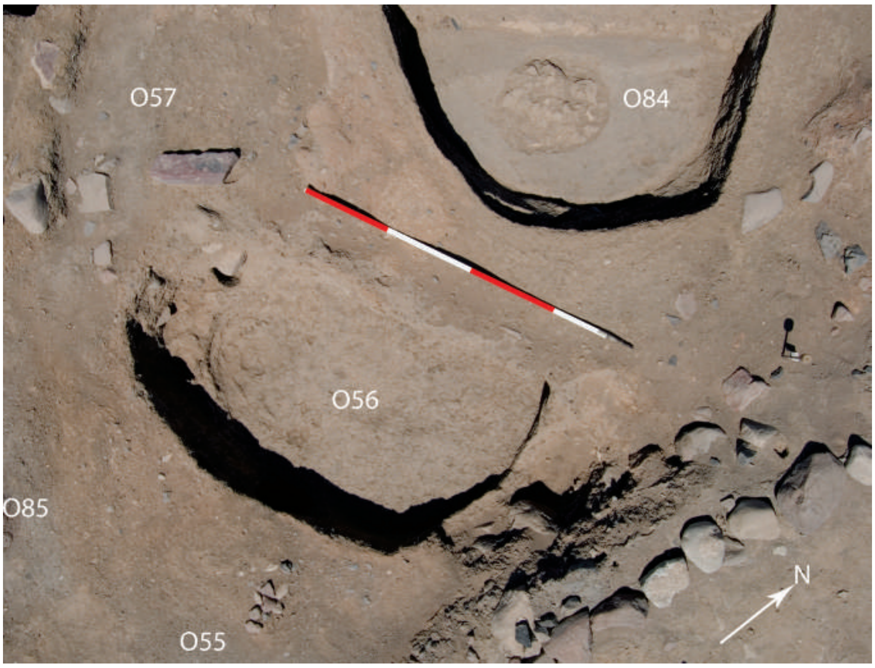


Figure 17.2 View of Structure O56 in relation to surrounding structures. Scale 2.0 m.

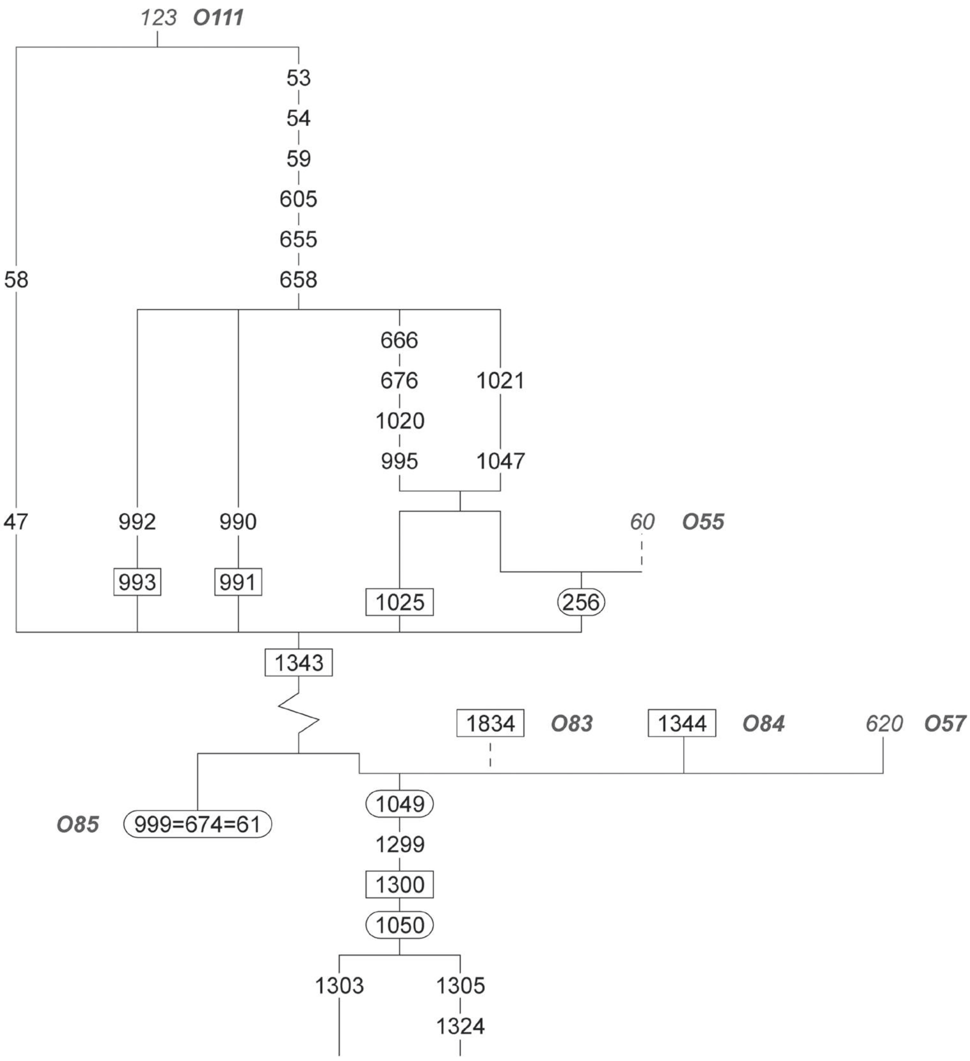


Figure 17.3 Stratigraphic matrix of excavated deposits related to Structure O56.

Table 17.1 Contexts excavated in Structure O56 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
47	caprine horns inside pisé wall	possible foundation deposit or structural armature
53	loose dark grey sandy silt with small to medium stones	silt accumulation inside structure
54	friable dark grey sandy silt with small to medium stones	silt accumulation inside structure
58	mixed deposits boxed out during the box section excavation of caprine horns (47)	context reference for finds retrieved from the sondage through the eastern section of wall (256) and caprine horns (47)
59	friable light yellowish-grey with medium stones and pisé rubble	silt and rubble backfill inside structure
256	light yellowish-brown pisé	curvilinear pisé wall of structure
605	mid-yellowish grey silt with occasional pisé rubble	silt and rubble backfill inside structure
655	mid-greyish brown silt	silt and rubble backfill inside structure
658	compact pale yellowish-brown pisé and silt with small, medium and large stones	collapse of pisé wall (256) together with internally incorporated stones
666	medium grey loose sandy silt with occasional charcoal, pisé and medium to large stones	occupation deposit mixed with collapse
676	medium grey friable silt with charcoal inclusions and frequent medium to large fire-cracked stones	occupation deposit
990	loose pale greyish-brown silt	fill of post pipe void inside pisé wall
991	circular angled narrowing void inside pisé wall	post pipe left after either extraction or disintegration of timber post inside pisé wall
992	loose pale yellowish-brown silt	fill of stone void in pisé wall
993	irregular void inside pisé wall	void left after dislodging of a large stone within pisé wall (256)
995	compact light yellowish-brown mud plaster	mud-plaster floor
1020	friable yellowish-grey silt	collapse of mud-plaster wall lining
1021	loose light brownish-grey silt with charcoal and pisé inclusions and small to medium stones	deliberate backfill of side-chamber (not fully excavated)
1025	moulded space inside pisé wall	side chamber inside wall (256)
1047	compact light yellowish-brown mud plaster	mud-plaster wall lining (same as 995)
1049	orangish-brown pisé	pisé wall (not fully excavated)
1050	gravelly yellowish-brown pisé	pisé wall (not fully excavated)
1299	light grey soft silt	fill of post-hole in pisé wall
1300	oval cut in pisé wall	cut of post-hole
1303	yellowish-brown loose gravelly silt	possible make-up layer
1305	light grey soft sandy silt	possible infill of an earlier structure
1324	compact yellowish-brown mud plaster	mud-plaster floor of an earlier structure
1343	partially excavated oval cut with variably concave and convex sides	construction cut for the walls of O56

Table 17.2 Quantities of bulk finds from Structure O56 by material and context number.

Object 56	Volume of sediment				Weight of bulk finds per material									
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other stone	Unworked stone	Animal bone	Marine shell	Other shell	Pisé/Plaster	Charcoal	Misc.
53	88.0	40.0	44.0	4.0	379.3	0.0	3.5	0.0	54.4	0.0	32.8	0.0	0.0	10.0
54	83.0	40.0	39.0	4.0	235.0	160.0	330.0	0.0	71.8	0.0	35.1	0.0	20.1	0.0
58	n/a	n/a	n/a	0.0	100.0	1110.0	10.0	0.0	70.0	0.0	0.0	0.0	0.0	0.0
59	119.0	115.0	0.0	4.0	1182.0	0.0	0.0	0.0	56.9	0.0	88.5	0.0	0.4	0.0
256	30.0	10.0	20.0	0.0	116.0	0.0	0.0	0.0	21.0	0.0	0.1	0.0	25.1	0.0
605	131.0	50.0	80.0	1.0	941.8	0.0	0.7	0.0	63.2	0.0	105.1	0.0	10.6	0.0
655	151.0	30.0	120.0	1.0	854.0	0.0	51.0	0.0	65.0	1.0	0.0	0.0	0.0	1.0
658	171.0	30.0	140.0	1.0	2358.8	1250.0	0.0	30.0	211.0	10.0	0.0	1250.0	0.0	0.0
666	131.0	30.0	100.0	1.0	1501.5	0.0	0.0	0.0	305.0	10.0	0.0	540.0	0.6	0.0
676	66.0	30.0	35.0	1.0	2071.7	0.0	0.0	0.0	75.0	0.0	0.0	800.0	1.3	0.0
990	5.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
992	2.0	2.0	0.0	0.0	1.1	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
1020	5.0	5.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
1021	76.0	30.0	45.0	1.0	258.0	0.0	0.0	0.0	0.0	0.0	0.0	140.0	0.0	0.0
1047	45.0	10.0	35.0	0.0	154.3	0.0	0.0	0.0	31.8	0.0	4.6	0.0	2.2	0.0
1049	75.0	10.0	65.0	0.0	109.1	0.0	0.0	0.0	10.7	0.0	1.5	0.0	10.1	0.0
1050	156.0	10.0	145.0	1.0	586.4	0.0	0.0	0.0	47.1	0.0	0.0	0.0	16.1	0.0
1299	3.0	3.0	0.0	0.0	15.4	0.0	0.0	0.0	20.4	0.0	1.3	0.0	0.1	0.0
1303	21.0	10.0	10.0	1.0	84.0	158.4	0.0	0.0	16.7	0.0	0.0	0.0	5.8	0.0
1305	37.0	7.0	30.0	0.0	115.1	0.0	0.0	0.0	22.3	0.0	1.5	0.0	0.1	0.0
Total	1395.0	467.0	908.0	20.0	11068.0	2678.4	395.2	30.0	1143.3	21.0	270.5	2730.0	92.6	11.0

Table 17.3 Small finds from Structure O56 by material and context number.

Context	Ground stone	Chipped stone	Other stone	Worked bone objects	Unworked animal bone	Stone beads	Bone beads	Marine shell beads	Bitumen objects	Clay objects	Disarticulated human bone	Total small finds
53	2	1	0	0	0	0	0	0	0	0	0	3
54	0	0	1 (fossil)	0	0	0	0	0	0	0	0	1
58	2	0	0	0	0	0	0	0	0	0	0	2
59	5	0	0	2	0	3	0	0	0	0	1 (tooth)	11
256	1	0	0	0	0	0	0	0	0	0	0	1
605	0	0	0	1	1	1	0	0	1	0	0	4
655	2	0	1 (fossil)	0	0	0	0	0	0	0	0	3
658	4	0	0	0	0	0	0	0	0	0	0	4
666	2	0	2	2	1	1	1	1	0	0	0	10
676	16	3	2	0	0	0	0	0	0	0	0	21
1021	1	0	0	1	0	2	0	0	1	3	0	8
Total	35	4	6	6	2	7	1	1	2	3	1	68

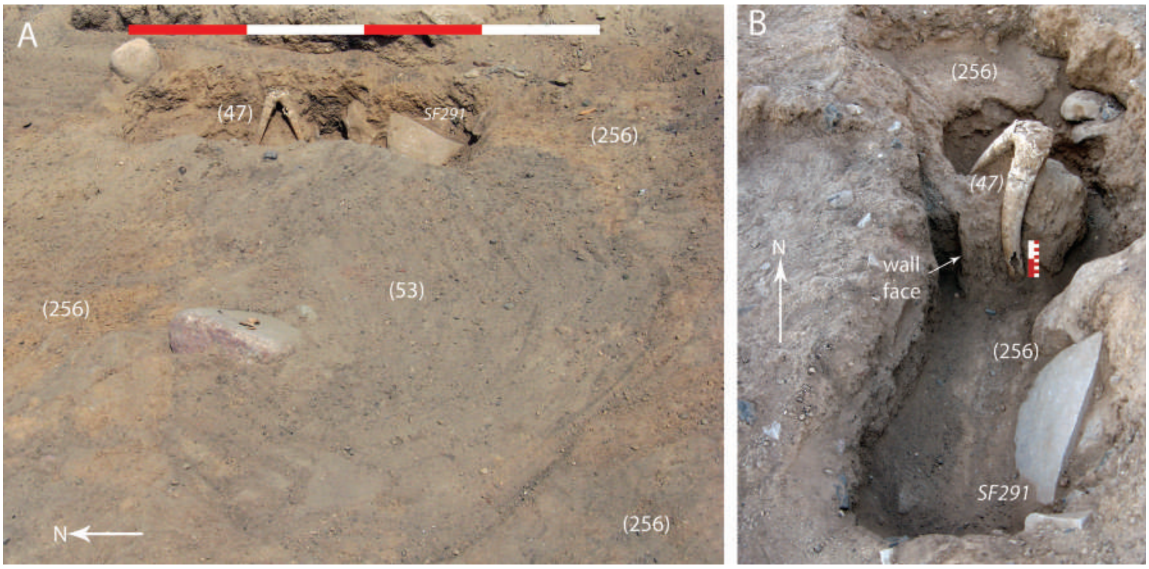


Figure 17.4 A — Kidney-shaped interior of Structure O56 showing silt (53) with horns (47) visible in the wall sondage in the background, scale 2.0 m; B — view of the sondage through wall (256) showing caprine horns (47) and a stone platter (SF291) in relation to the interior face of wall (256), scale 0.1 m.

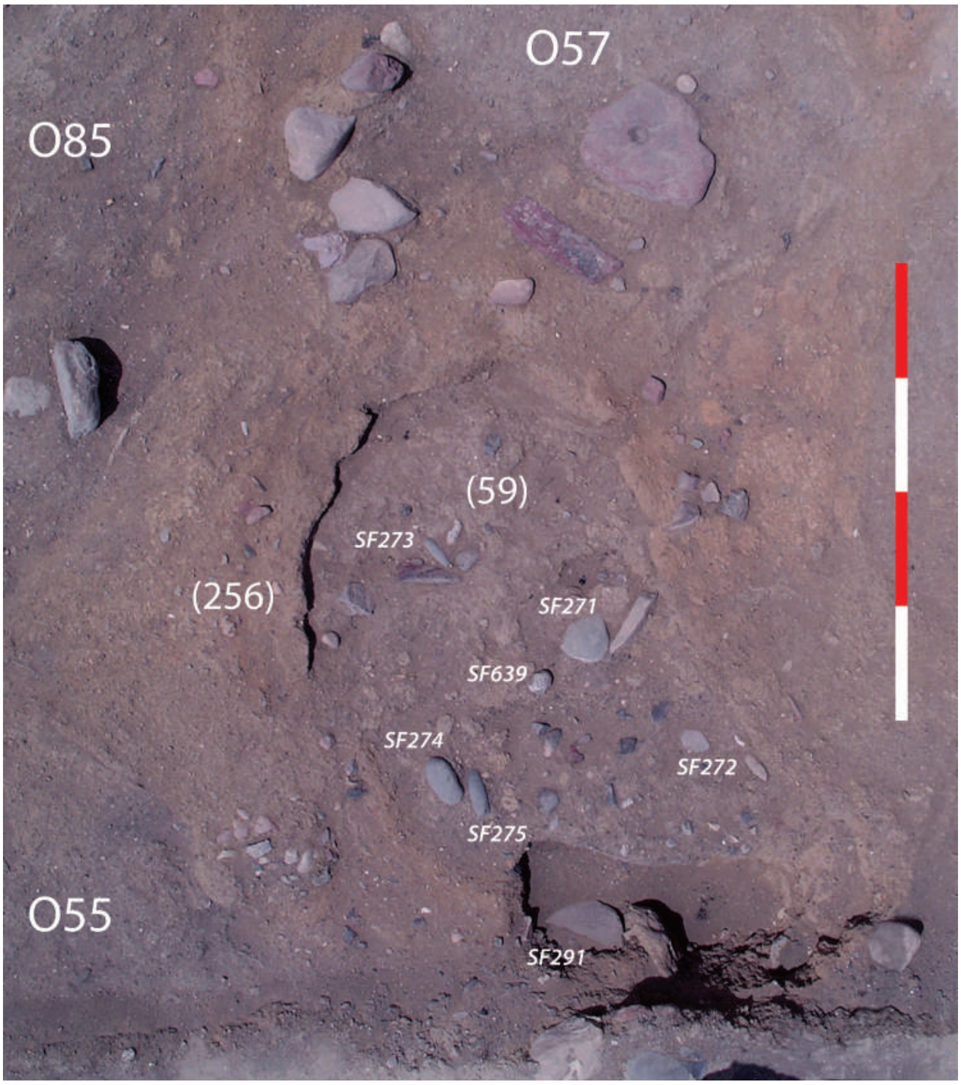


Figure 17.5 Structure O56 from the east showing the spread of ground-stone objects in deposit (59) in relation to the surrounding structures. Scale 2.0 m.

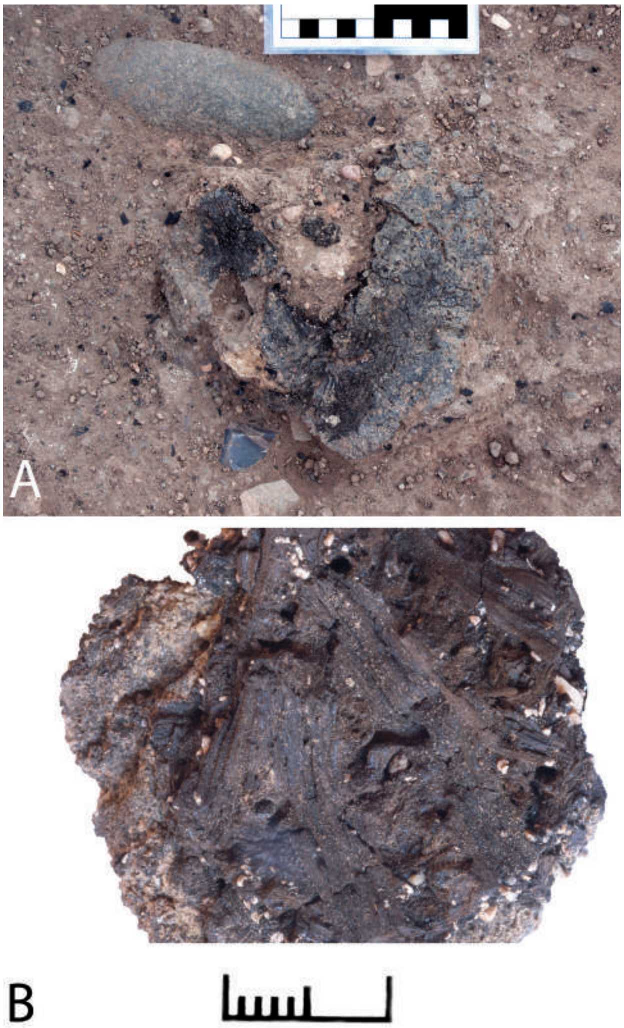


Figure 17.6 A — Bitumen SF648 and pestle SF650 in deposit (605), scale 0.1 m; B — close up of plant material on the underside of one of the fragments of bitumen SF648, scale 10 mm.

Figure 17.7 Decorated bone object SF739 from deposit (605) with indentations.

was resting directly upon a piece of bitumen (SF648), 0.15 m in diameter (Figure 17.6) that could not be seen until the stone was moved. Its upper part was stuck to the underside of the stone and it broke and became detached when the stone was lifted. This revealed the impressions of plant material, resembling burnt reeds or twigs (Figure 17.6), on its concave underside. The undamaged part of the object was lifted as a block together with the underlying sediment. Next to the bitumen there was a stone pestle (SF650, Figure 17.6A). Flecks of charcoal were present in the soil surrounding these objects. An unusual find from context (605) was a fragment of flat bone with a meander motif formed by a row of small circular indentations (SF739, Figure 17.7).

The next deposit excavated was a mid-greyish-brown silt (655), which had accumulated in the eastern half of the interior. This contained a significant amount of chipped stone, two fragments of highly polished ground-stone tools SF947 and SF1308, and a fragment of an incised stone bowl (SF952). A pisé rubble deposit (658) filled the western half of the structure.

Rubble (658) sealed a rich dark deposit (666) containing chipped- and ground-stone tools, including flint drills and picks, worked and non-worked animal bone (including microfauna), hammerstones (SF959 and SF1158, Figure 17.8), and beads. One of the bone objects was an aurochs' mandible (SF953) without teeth, which might have been worked at its wider end into a spatula (Figure 17.8). A curved piece of pisé (SA2299) from this deposit is likely to have once been moulded around a post.

The increase in the variety of material culture seen in deposit (666) continued in the underlying deposit (676). This lay directly on top of a mud-plaster floor (995), except for a small patch of underlying but localised mud-plaster collapse (1020) under a wall overhang in the northeast corner of the structure. Deposit (676) contained a dense scatter of stone tools concentrated around two stone anvils or working benches (SF1171 and SF1173). This concentration of objects, many of which were coarse and *ad hoc* fashioned tools, did not extend to the wider eastern part of the interior (Figures 17.9, 17.10).

A battered piece of red sandstone had four circular holes of *c.* 10 mm diameter drilled into its upper surface and was interpreted as a small work bench (SF1171) (Figure 17.9C). Two of the holes were in the line of an artificially made shallow groove, of the same width as the holes. The stone was reminiscent of many cup-hole mortars found on the site and its shape suggests that the bench might have been made from a broken fragment of a cup-hole mortar. Other tools on the working floor (676) included scrapers, hammerstones, pounders, smoothers and rubbing stones (Table 17.4).

The excavation of rubble deposit (658), and deposits (666) and (676), exposed a small 'porthole-like' opening in the interior face of the southern stretch of wall (256), (Figures 17.11, 17.13). This led into a chamber [1025]

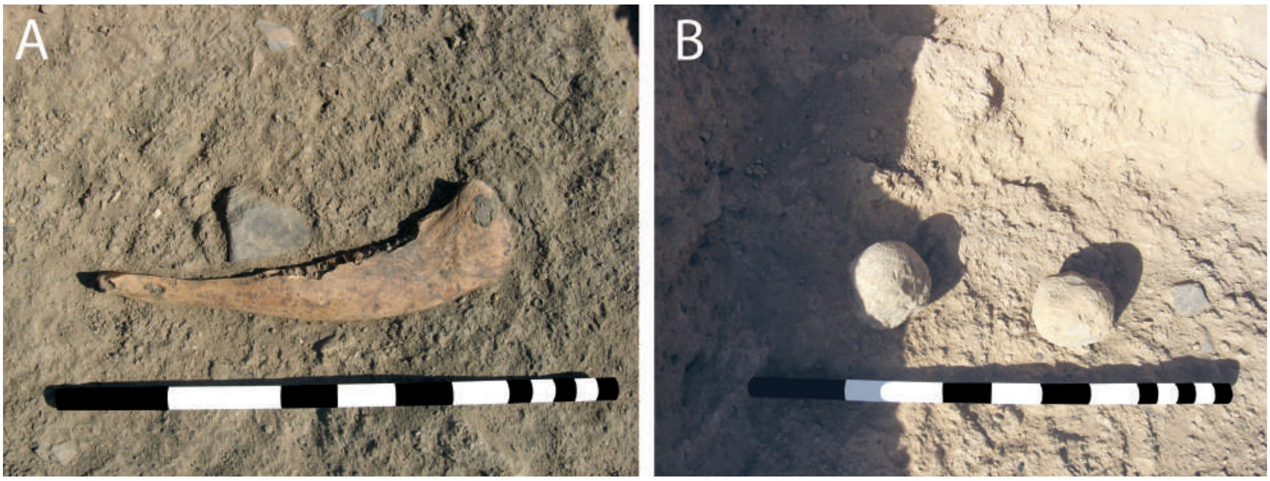


Figure 17.8 A — Aurochs' mandible SF953; B — Hammerstones SF959 and SF1158, found in deposit (666) at the opposite ends of Structure O56. Scale 0.5 m.

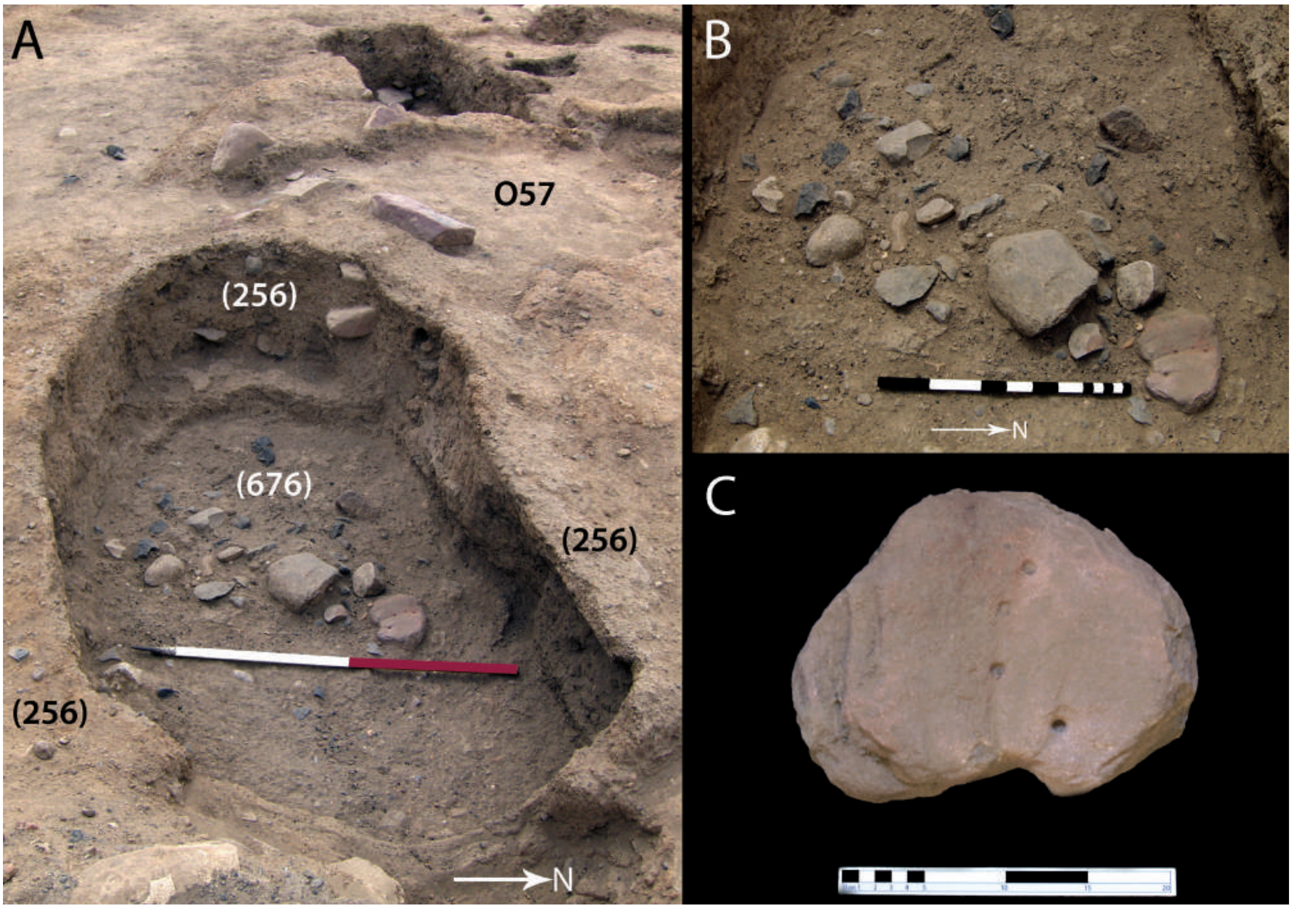


Figure 17.9 View of Structure O56 with exposed working floor (676): A — Overall from the east, scale 1.0 m; B — Close up of the main concentration of tools, scale 0.5 m; C — Detail of the working bench SF1171, scale 0.2 m.

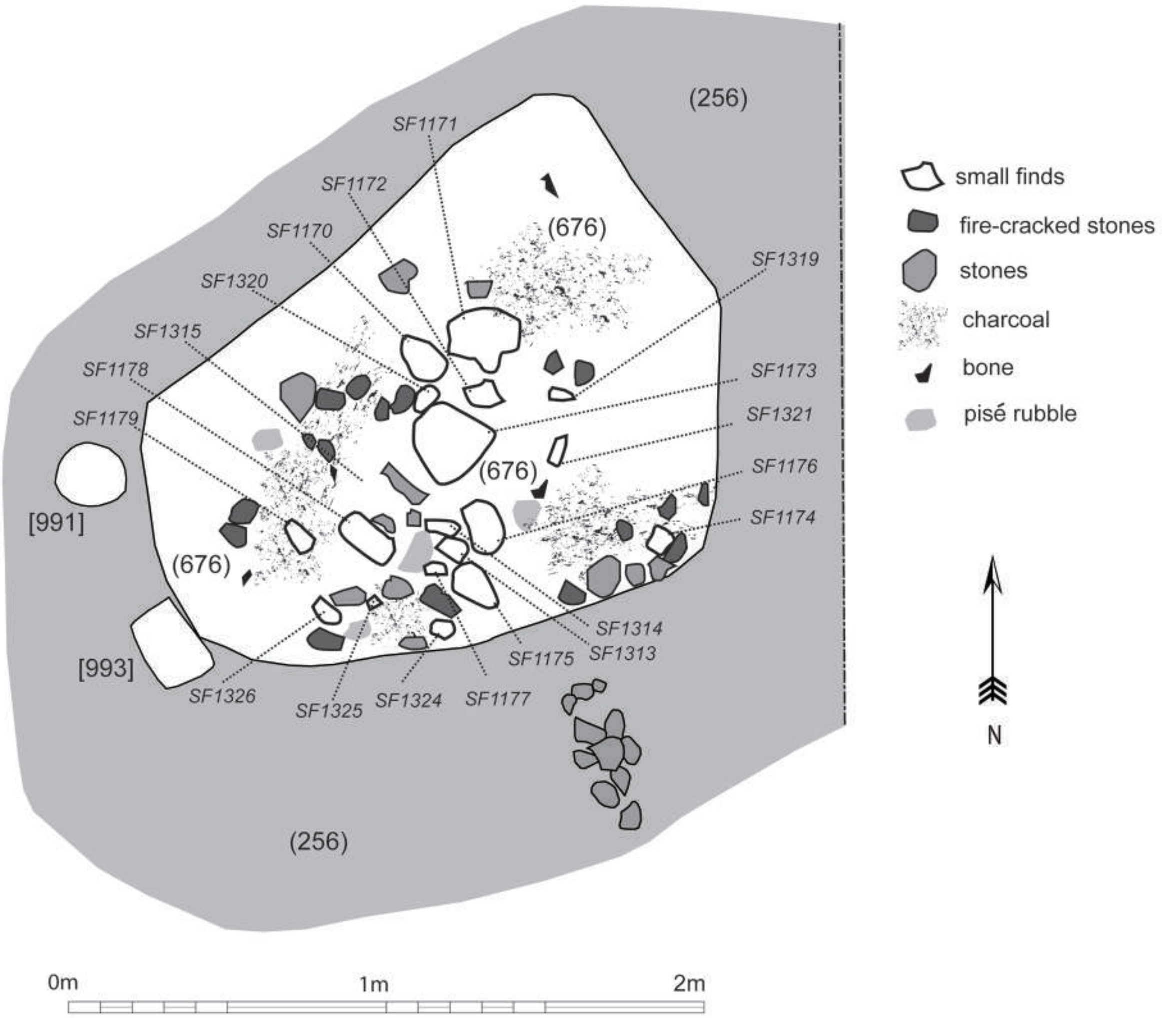


Figure 17.10 Plan of 'working floor' (676) in Structure O56 with labelled small finds listed in Table 17.3.

Table 17.4 List of small finds from deposit (676) shown on plan in Figure 17.10.

Small Find	Material	Description	Small Find	Material	Description
1170	ground stone	pestle/smoothing stone	1313	ground stone	pounder/smoothing stone?
1171	ground stone	anvil/working bench	1314	ground stone	tool/implement
1172	chipped stone	scraper	1315	chipped stone	pick fragment
1173	stone	anvil/working bench	1319	ground stone	tool/implement
1174	ground stone	hammerstone	1320	ground stone	pestle
1175	ground stone	hammerstone (soft)	1321	ground stone	tool/implement
1176	ground stone	large flake	1323	chipped stone	core
1177	ground stone	pestle	1324	ground stone	tool/implement
1178	stone	anvil/working bench?	1325	ground stone	tool/implement
1179	ground stone	hammerstone	1326	ground stone	tool/implement

contained within the thickness of wall (256). The unusual thickness of the wall construction on the southern side of the structure might have been originally designed with the chamber in mind. The stratigraphy suggests that the chamber was constructed before the mud-plaster floor (995) because this partially covers the chamber's mud-plaster lining. The chamber widens out after the initial opening from 0.3 m to at least 0.5 m. It was excavated to the length

Figure 17.11 Side chamber [1025] from the northeast showing bitumen basket lining SF1533 and hammerstone SF1535 in fill (1021). Note the curvature of the plastering of the sides and base of the chamber and the way it runs under the floor (995) next to the scale. Scale 0.2 m.

of 0.8 m after which excavation had to stop due to the structural instability of its ceiling. No more work can be done unless wall (256) is fully removed.

The infill (1021) of chamber [1025] was a loose brownish-grey silt, rich in charcoal and pisé inclusions, as well as a few small to medium stones. The accumulation of the material in the chamber is at the same stratigraphic level as the accumulation of deposits (676) and (666) in the interior of the structure. Finds near the front of the entrance of the chamber included a piece of bitumen SF1533 with impressions similar to those on bitumen SF648, a hammerstone SF1535 (Figure 17.11), a sheep/goat mandible and other animal bones, as well as impressed clay mouldings SF1537, SF1542 and SF1543 (Figure 17.12).

The lowest fully exposed horizon in Structure O56 was a well-preserved mud-plaster floor (995) (Figure 17.13), which underlay deposit (676) in the main part of the interior. At the west end of the structure, part of the internal face of wall (256) was missing, partially exposing the interior of the wall construction. The core of the damaged wall section contained a 0.4 m long post pipe [991] filled with fine silt (990), which sloped at an angle of 45° into the wall (Figures 17.14 and 17.15).

An irregularly shaped feature [993] with a fill (992) similar to (990) was recorded 0.5 m south of post pipe

Figure 17.12 Clay object SF1543 from the wall chamber fill (1021) showing impressions of weaving or basketry.

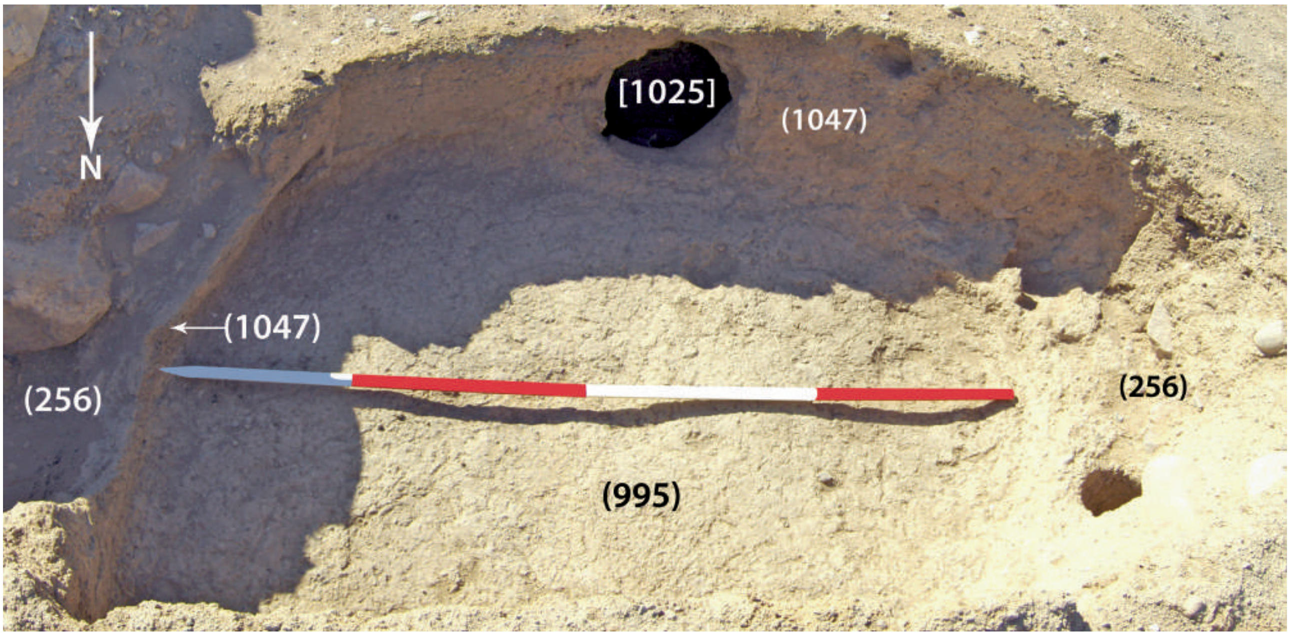


Figure 17.13 View of Structure O56 from the north at the end of the excavation in 2009 showing the well-preserved mud-plaster floor (995), wall plaster (1047) and the entrance of the side chamber [1025]. Scale 2.0 m.

[991], (Figure 17.1). The irregularity of this feature suggests it might not have housed a post, but perhaps a large stone, which had become dislodged during the wall collapse. Similar stones were present still imbedded within the surviving part of the wall, while others had been located within the sondage through wall (256) made to recover the caprid horns (47), as described above.

Excavation of walls and exterior deposits

A one metre wide section was excavated through the walls of adjacent structures O56 and O84 to explore their construction history (Figure 17.1). The excavation of the section revealed that the stratigraphy within the walls is composed of a series of deposits following an inward trend. The latest deposits were present on each of its sides and represented the construction of Structures O56 and O84, while the structural core between them was in the form of a distinctive orange pisé wall line (1049) and (1050), which belonged to an earlier otherwise unknown structure.

The latest deposit on the southern side of the wall section was a mud-plaster lining (1047), which was 0.10 m thick and formed the interior face within O56. The lining was attached onto wall (256) at the same time as pisé floor (995) was laid inside the structure. The excavation of (1047) and (995) revealed that these were a single continuous layer of smooth mud-plaster lining the interior of the structure. The excavation of (1047) within the section exposed more large stones in the makeup of wall (256) (Figure 17.16), similar to those already described within the box section in the damaged wall in the eastern end of the structure.

Wall (256) was set vertically against the side of construction cut [1343], which, in this particular area, followed the line of the earlier wall constructed of two different pisé bands (1049) and (1050).

Wall (1049) could be traced on the surface running from the excavated section in a westerly direction, but it is unclear whether this represents part of Structure O57, or an even earlier structure. Its reddish-yellow appearance is similar to the line of walls (598) and (540), which divide Structures O83, O66 and O114 to the west and northwest. The lower pisé band (1050) is only known from the section, but it seems to represent a completely separate phase of construction as it was cut through by a post-hole [1300] that was allowed to silt up with fill (1299) before the upper pisé (1049) was laid over it (Figures 17.16 and 17.7). The lowest deposits reached in this excavated section were a gravelly silt (1303) on the west side and a fine sandy layer (1305) on the east side, which overlay a mud-plaster floor (1324), which is likely to relate to an as yet unidentified structure.

17.3 Sedimentary analysis

One sediment sample was analysed from O56, a comparative pisé sample from pisé rubble (658), categorised as 'other'. The data, results and interpretation are provided in Chapter 41.6.

17.4 Chipped stone

The sample (n=1237 pieces) includes material from six out of the fourteen contexts with chipped stone in Structure O56. By weight, the sample (7052 g) constitutes 82.94% of the chipped-stone bulk finds from this structure. The

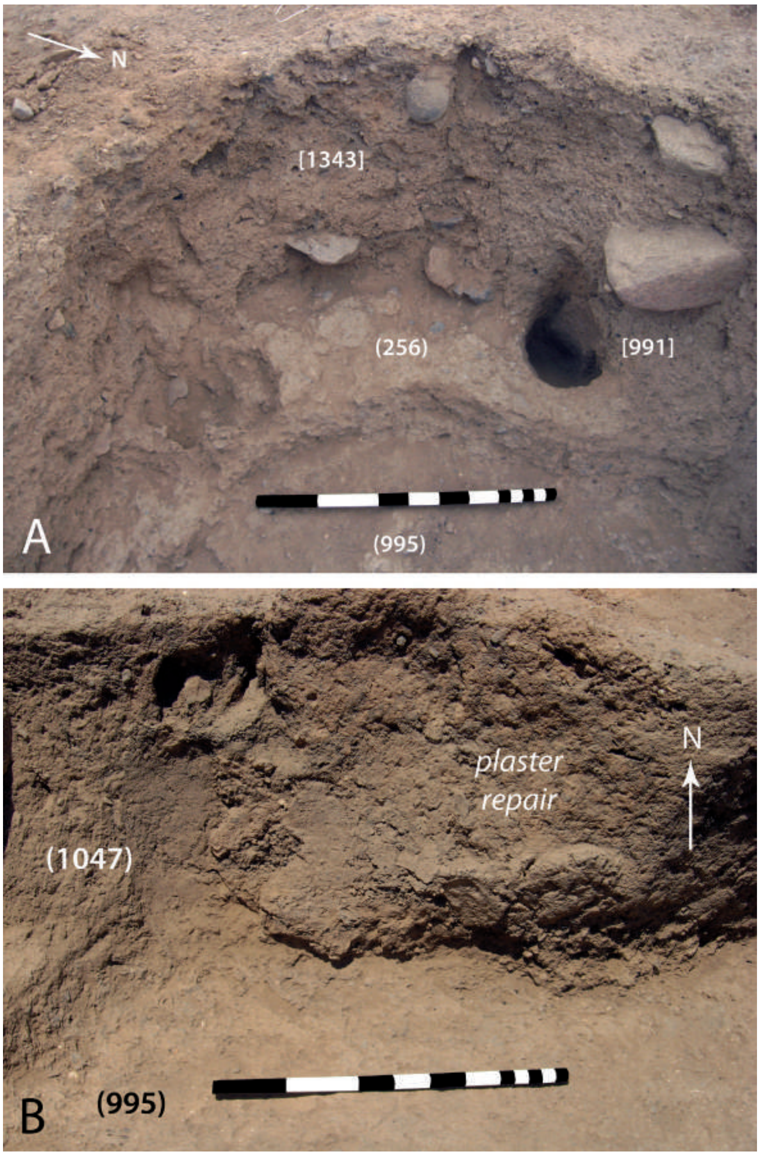


Figure 17.14 A — Collapsed western section of wall (256) showing the full width of the wall, partially exposed construction cut [1343], and post pipe [991] under excavation; B — A detail of contiguous mud plaster of floor surface (995) and wall plaster (1047) and overlapping plaster repair in the northwest corner of Structure O56. Scale 0.5 m.

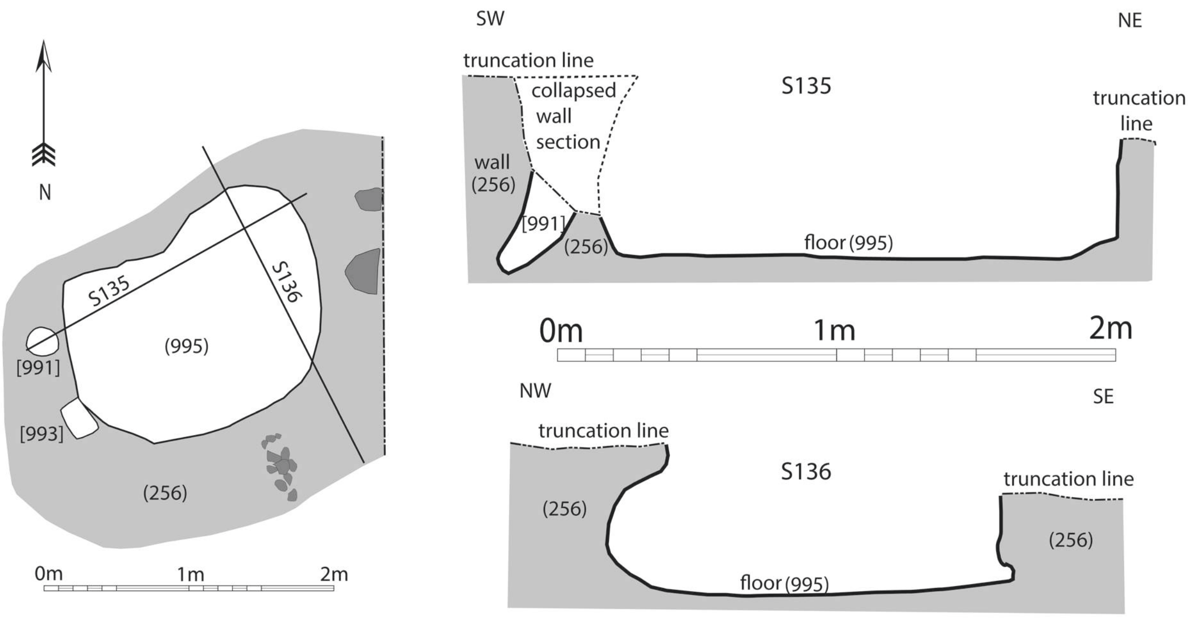


Figure 17.15 Plan and profiles of Structure O56 at the end of the excavation.

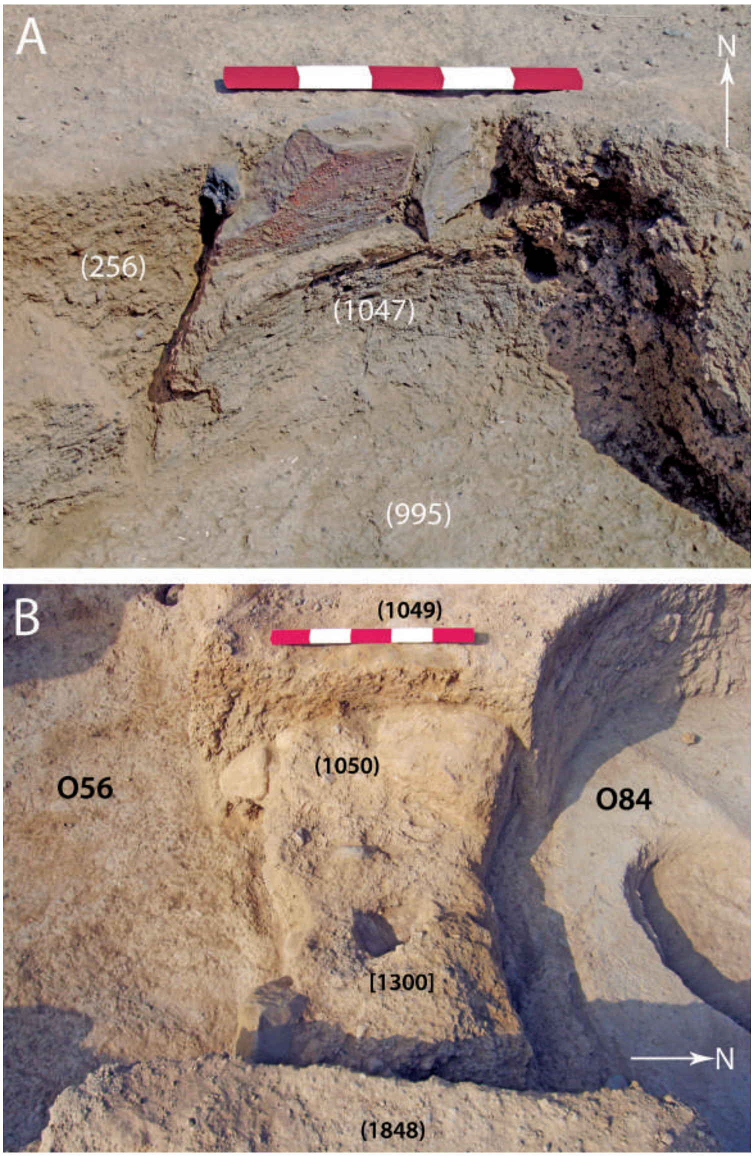


Figure 17.16 A — Mud-plaster lining (1047) in mid-excavation showing large stones in wall (256) behind it; B — Mid-stage of the excavation of the section between Structures O56 and O84 showing earlier wall (1050) with excavated post-hole [1300] in the centre. Scale 0.5 m.

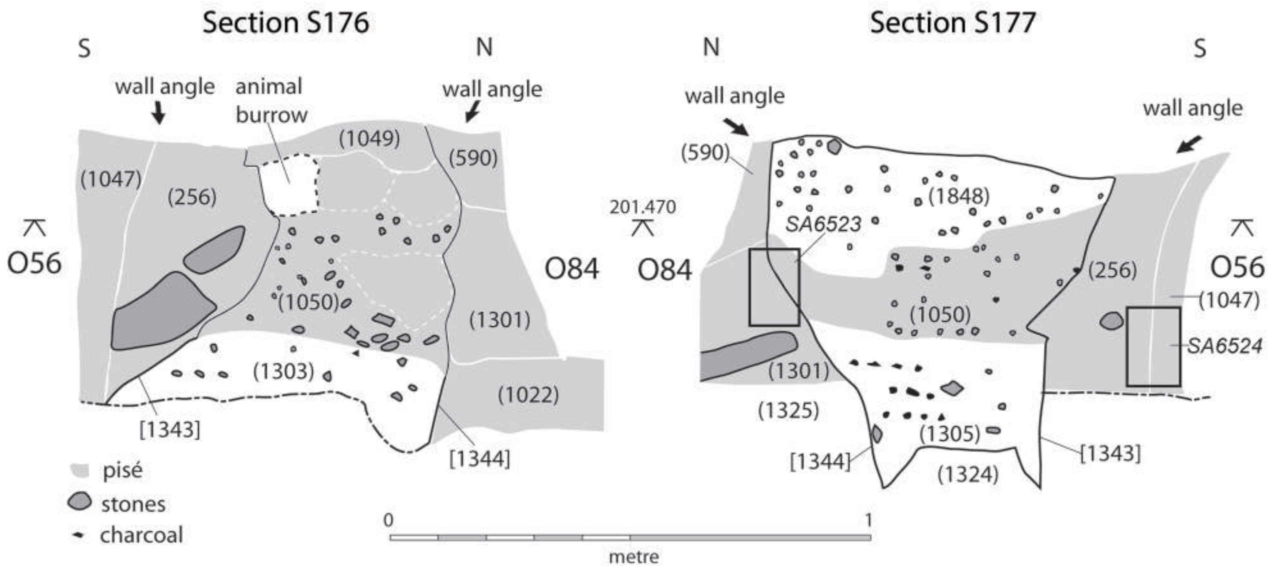


Figure 17.17 East-facing Section S176 and west-facing Section S177 through walls between Structures O56 and O84 showing the sequence of their construction, the intramural deposits and the location of micromorphology samples.

composition of the sampled assemblage is provided within Chapter 39.11; a sample of artefacts is illustrated in Figures 17.18–17.20.

17.5 Interpretation

Structure O56 is a small sub-circular pisé-walled structure built in an oval construction cut [1343] measuring *c.* 3.5 m x *c.* 2.5 m. The chipped stone suggests that the entirety of its period of construction and use is contained within the PPNA. The construction of Structure O56 cut through earlier structures represented by walls (1049) and (1050) and mud-plaster floor surface (1324), which were revealed in the section cut through the wall on the north side of Structure O56 into Structure O84. The interpretation of the deposits in the section is difficult due to the small exposure, but at least three earlier phases of construction appear to be present. Pisé wall (256) was constructed against the sides of a construction cut. In the southwest, this construction cut [1343] probably cut wall (61=999=674) of Structure O85, but this relationship was not tested by excavation.

The thickness of pisé wall (256) varied, having been thicker on the southern side where a wall chamber [1025] was constructed within it.

The wall (256) contained a number of objects including water-worn stones of various sizes, a stone platter (SF291) and caprine horns (47) (Figure 17.4). These objects may have been embedded into the wall to provide structural support, for symbolic reasons, or potentially both. Directly opposite the horns a post [991] had been built into the wall at a 45° angle at the western end of the structure. It may be significant that post-holes were also found in the westernmost parts of the wall circuits of both Structures O53 and O56.

The angle of these posts could be significant in reconstructing the height of the structures. In a small construction such as Structure O56 this would mean a relatively low ceiling, perhaps no higher than 1.5 m from the floor (995), as calculated on the basis of a straight projection of a post from post-hole [991]. Parts of the wall (256) visibly slope inwards at the northeast and east of the interior (Figure 17.15), which may provide further support for a low roofed structure, although it is difficult to know how much of this is post-depositional

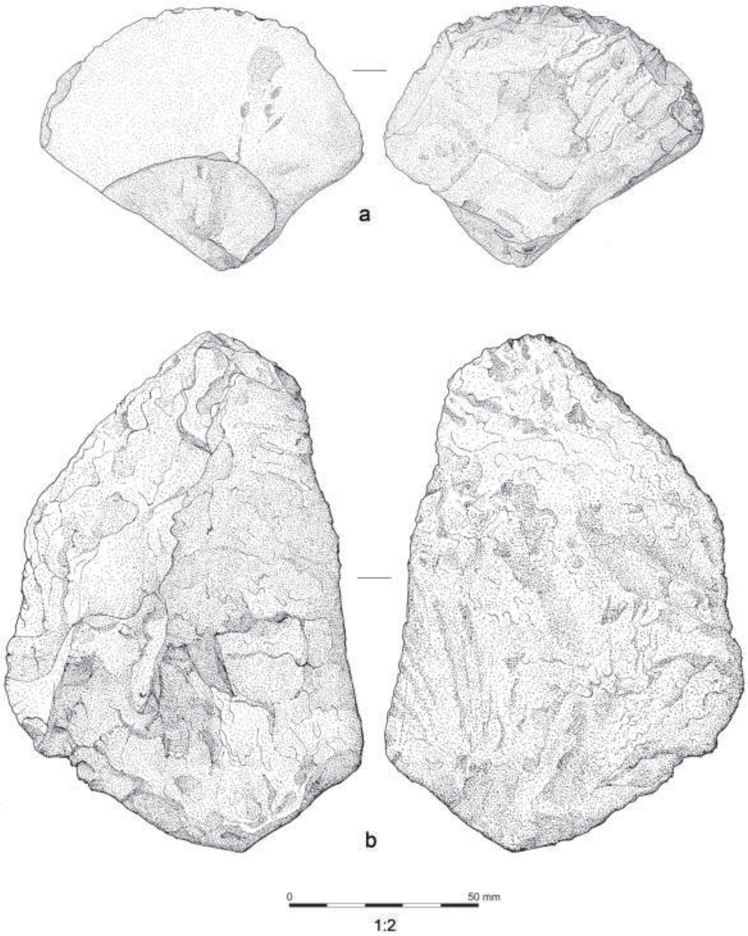


Figure 17.18. Chipped-stone artefacts from Structure O56 context (676). (a) scraper on fragment of polished limestone vessel (SF1172), (b) large flake of limestone (SF1176).

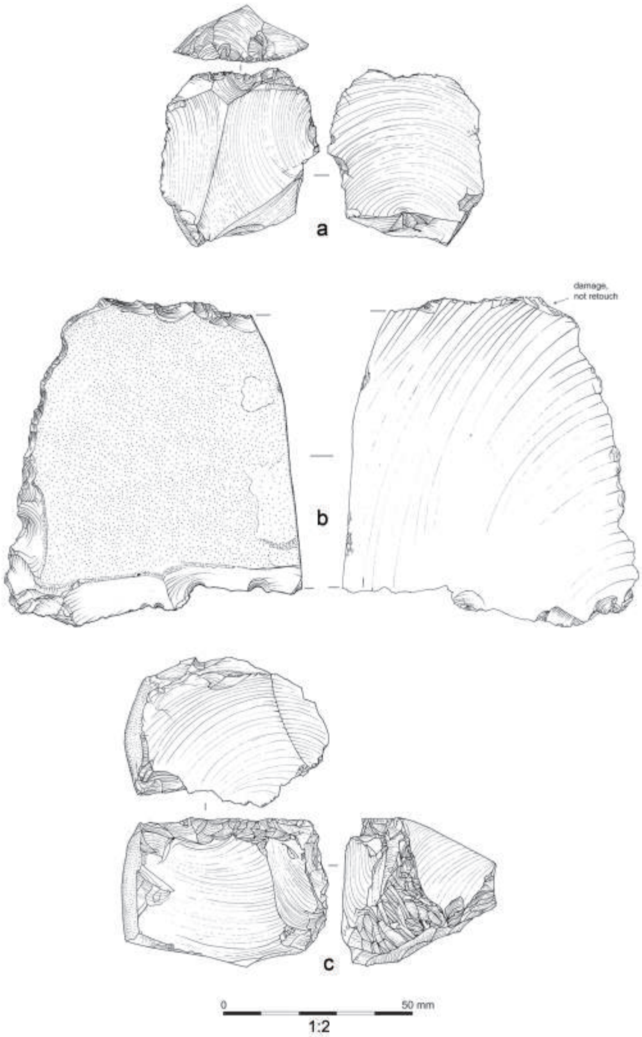


Figure 17.19 Chipped-stone artefacts from Structure O56 (context numbers in brackets): (a) scraper (676), (b) tabular scraper (605), (c) mixed flake/bladelet core SF1323 (676).

deformation due to inward pressure on the subterranean walls.

Mud-plaster floor (995) and mud plaster (1047) were laid as one, lining the ground and the rough wall faces. It is possible that (995) is not the primary floor within the structure. Some re-plastering may have been applied, but this could not be verified within the extent of the excavated wall section. The exact thickness of the floor is unknown, but at least 0.02 m lips over the plaster lining of wall chamber [1025]. Some re-plastering work was carried out prior to the accumulation of deposits (676) and (666), suggesting that floor (995) was in use, and kept clean, for some time. Eventually rubbish began to accumulate, and there is little evidence of upkeep in the wall chamber [1025] or across the interior (676).

It is possible that the structure was used for the manufacture of beads and perhaps other activities, as suggested by the inventory of stone tools on 'working floor' (676), which were arranged around two stone working benches (SF1171 and SF1173). The association of perforating tools and large scrapers echoes assemblages described elsewhere as relating to bead making activities (Wright *et al*. 2008). Moreover, SF1171 (the stone workbench with perforating holes) clearly suggests that perforating activity took place in context (676), making the dearth of perforators in this context puzzling. These factors raise several questions regarding the formation of deposits in this structure and may suggest that the artefacts within occupation contexts (676) and (658) and initial collapse (666) represent a single tool kit designed for bead manufacture. In this light, it is possible that wall/roof collapse (666) may include tools that had been stored in wall niches or baskets/bags suspended from the superstructure.

The spatial distribution of tools in deposit (676), which features an 'empty' space to the east of the working benches, could indicate that this space was occupied by a person facing the tools and the benches. An obvious interpretation for the small-drilled holes in the upper surface of SF1171 (Figure 17.9C) is that they were fixing

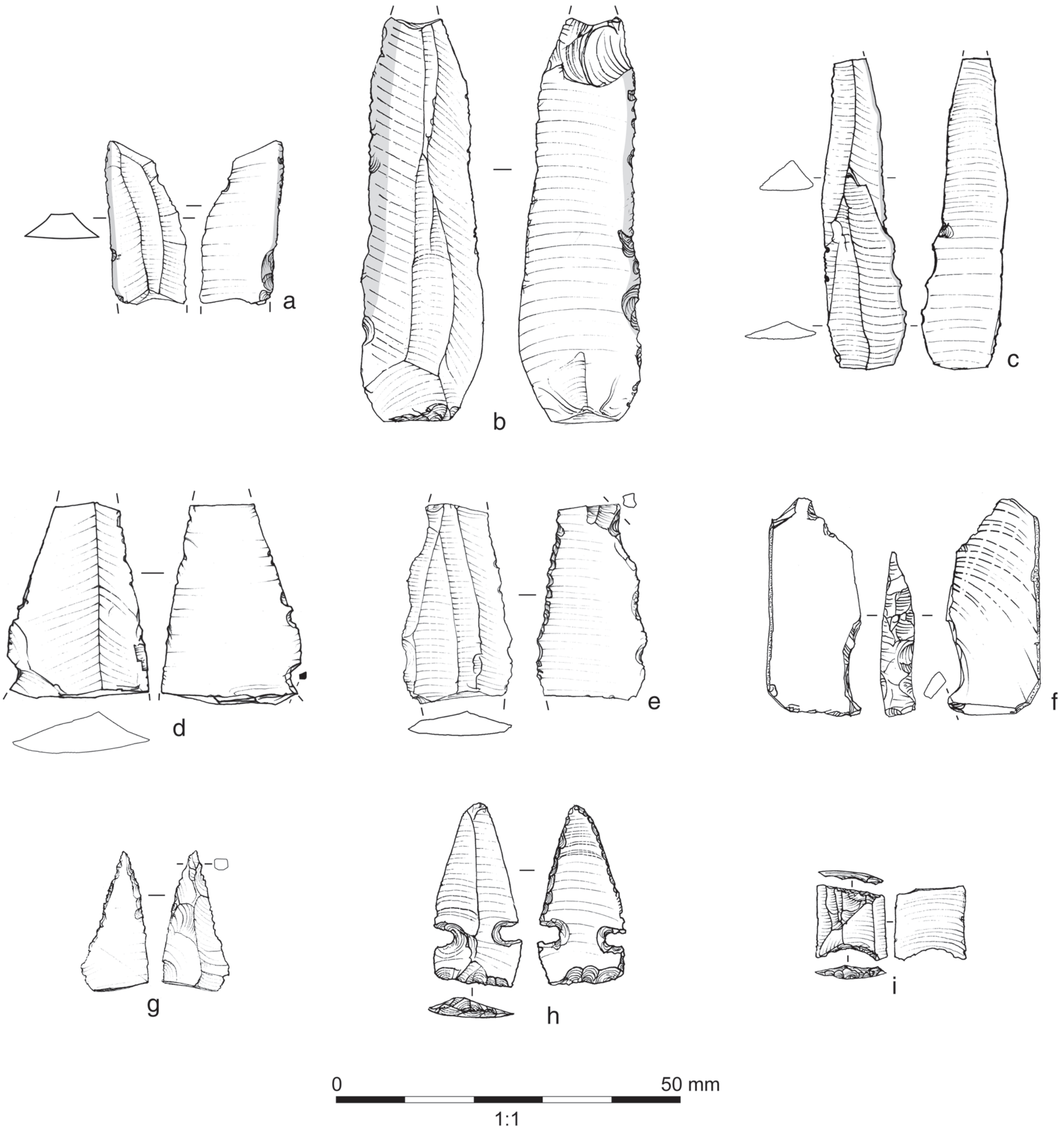


Figure 17.20. Chipped-stone artefacts from Structure O56 (context numbers in brackets): (a) fragment of glossed blade (666); (b) glossed blade (676); (c) glossed blade (605); (d) awl (666); (e) awl (666); (f) awl (676); (g) awl (666); (h) El-Khiam point (666); (i) Hagdud bi-truncation (676).

sockets made to accommodate bead blanks while they were being drilled. The accompanying groove might have been used for grinding the exterior surface of the beads, or perhaps as a guide to aid their positioning into the holes. The upper surface of the stone itself would have been helpful in this respect as it sloped towards the centre where the groove and three of the holes were located. It is interesting to note that while beads were not found in significant numbers, Structure O56 contained the highest concentration of beads per volume of sediment of any structure on the site. The majority of the tools might appear rather coarse for this type of production, but they include smoothing and rubbing stones, as well as both soft and hard hammers. A high percentage of flint points and drill bits were also found within the structure, although the absence of such tools at the same level as the working benches is perhaps puzzling. It is not known whether a similar type of activity took place from the earliest stages of the occupation in Structure O56, as the evidence for this would have been cleaned out before deposits (676) and (666) were allowed to form.

The structure was probably abandoned and left to deteriorate before wall (256) partly collapsed on the western side to expose features [991] and [993]. This collapse can be identified in the form of pisé rubble (658), which overlies occupation deposits (676) and (666) and the damaged part of the wall. The collapse of the western section of the wall seems to have marked at least a temporary end of activity within Structure O56.

Following such collapse the structure was used for the disposal of rubbish, deposits (655) and (605), involving a wide range of material culture, and including twig-impressed bitumen SF648. It is possible that the twigs or reeds had once formed a basket lined with bitumen. This would mean that SF648 was found inverted, as the twiggy basket material was found on the concave side of the bitumen. Similar instances of bitumen were found elsewhere on the site, as well as in the earlier levels within Structure O56 in the infill (1021) of wall chamber [1025]. Some of these pieces were impressed with a woven basketry pattern suggesting that the bitumen was used for lining and waterproofing baskets or woven bags. The loose nature of the surrounding deposits suggests that both objects were simply discarded, although the placement of a stone directly on top of bitumen lining SF648 may indicate more intentional placement.

A brief period of renewed activity inside the structure might be indicated by the creation of rough surface (59), which contained several pestles. The main difficulty when interpreting this part of the sequence is the absence of information regarding any potentially succeeding structural arrangements above the ground, due to erosion.

18. Intramural Space O55

18.1 Location and relationship with other structures

Intramural Space O55 is situated mid-way along the eastern edge of the trench, with its eastern extent below the baulk (Figures 18.1, 18.2). It was flanked on the other three sides by the walls of Structures O53, O85 and O56. Excavation was limited, primarily seeking to establish the footprint of the surrounding walls and their relationships. Once it was established that these walls had been constructed with respect to the structures they enclosed, rather to define the area designated as O55, excavation focused on their interiors rather than the intramural space. Excavation within O55 was restricted

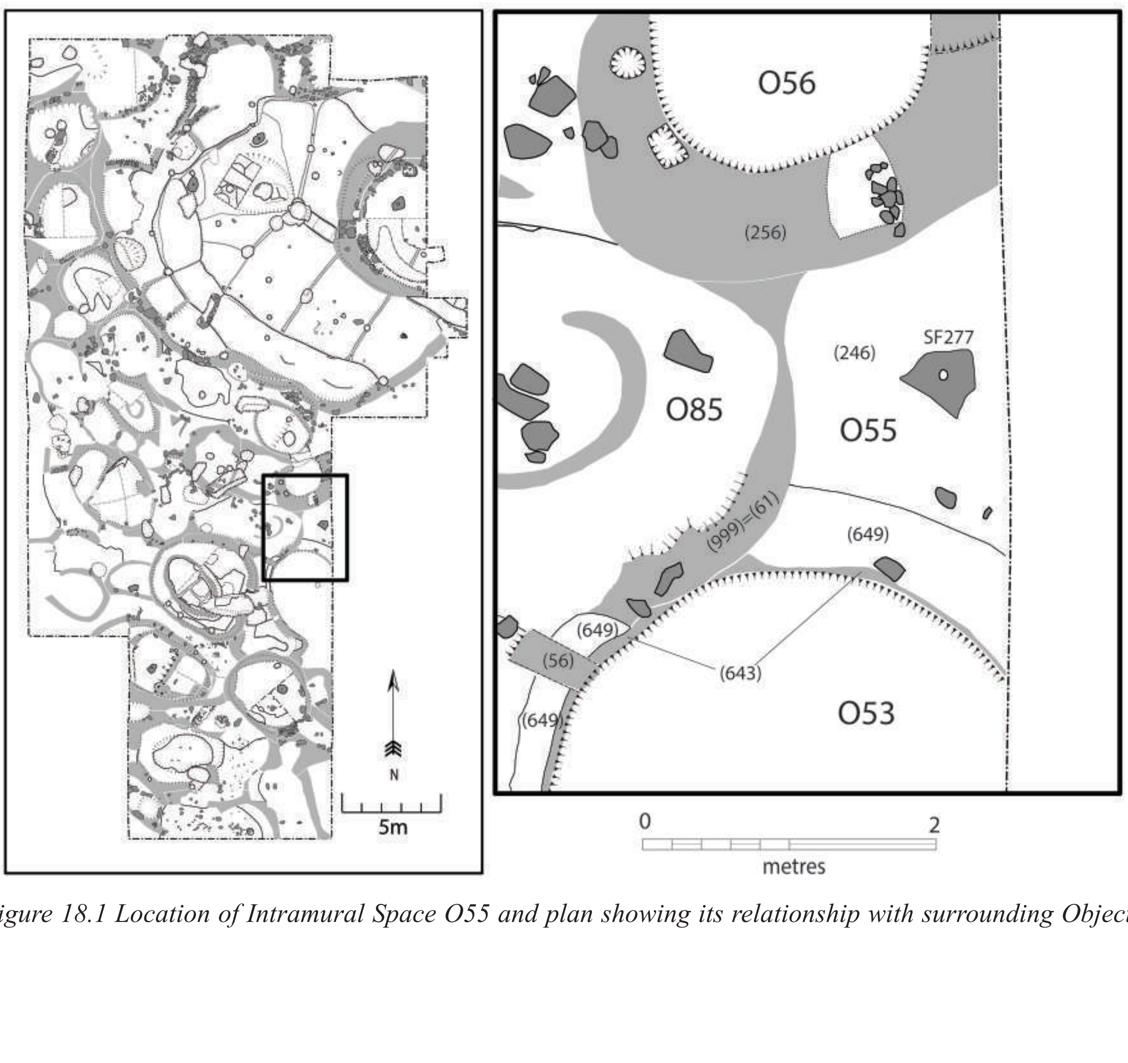


Figure 18.1 Location of Intramural Space O55 and plan showing its relationship with surrounding Objects.

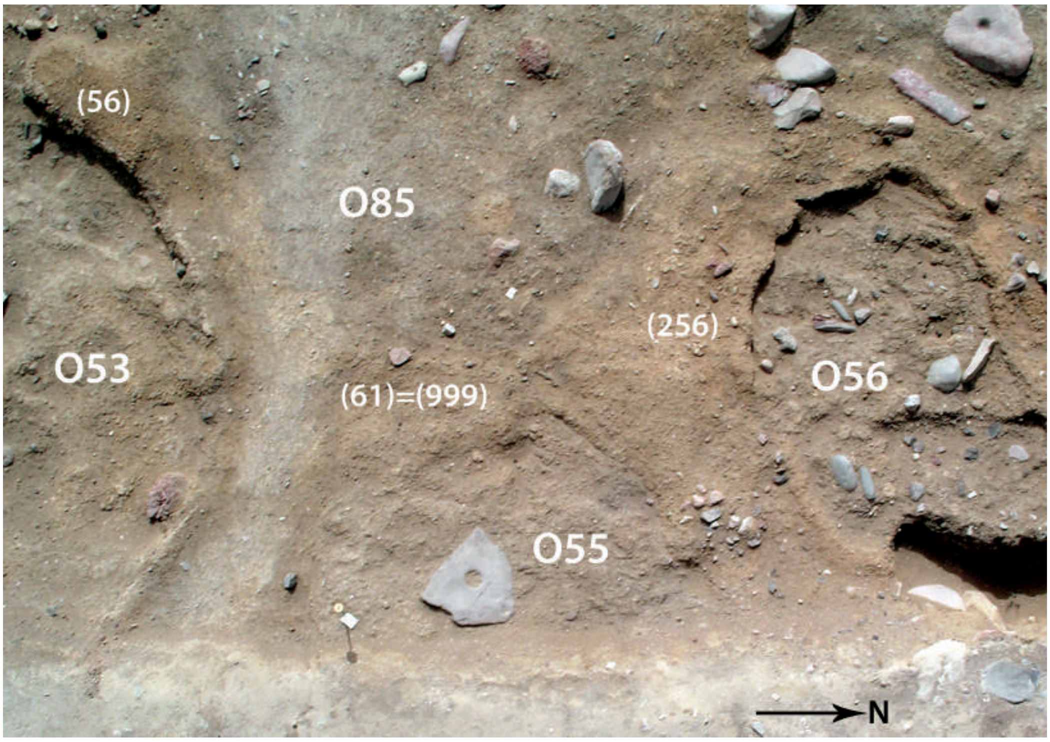


Figure 18.2 View of Intramural Space O55 from the east, showing relationship with surrounding structures.

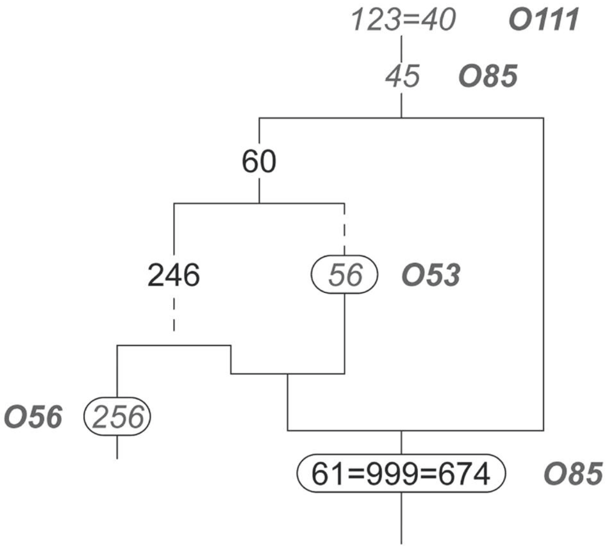


Figure 18.3 Stratigraphic matrix for Intramural Space O55.

to the most recent deposits that had accumulated after the surrounding walls had been constructed. Moreover, this area of the excavation had evidently suffered from erosion constraining our ability to relate the excavated deposits to those less disturbed deposits within the surrounding structures. Figure 18.3 shows the stratigraphic matrix for the excavated deposits, which are described by context in Table 18.1. Bulk and small finds are listed in Tables 18.1 and 18.2, respectively.

18.2 Description of the excavated deposits

Below the overburden (1, 123, 40) there was a localised mid-grey sandy silt (45). This contained a badly preserved concentration of animal bone and extended over wall (61=999=674) of Structure O85. To the east of this

Table 18.1 Contexts excavated in Intramural Space O55 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
45	mid-grey sandy silt	localised dump containing a concentration of animal bones
60	soft/friable mid-green grey silt	silt accumulation in intramural space
246	friable mid-orangish brown sandy silt with occasional stones	possible thin mud-plaster floor surface around cup-hole mortar

Table 18.2 Quantities of bulk finds from Intramural Space O55 by material and context number.

Object 55	Volume of sediment (l)				Weight of bulk finds per material (g)		
Context	**Total volume**	**Flot. sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Animal bone**	**Other shell**
60	45.0	20.0	23.0	2.0	69.3	12.0	21.5
246	0.0	0.0	0.0	0.0	20.0	0.0	0.0
Total	45.0	20.0	23.0	2.0	89.3	12.0	21.5

Table 18.3 Quantities of small finds from Intramural Space O55 by material and context number.

Object 55			
Context	**Stone beads**	**Marine shell beads**	**Total small finds**
60	1	1	2
Total	1	1	2

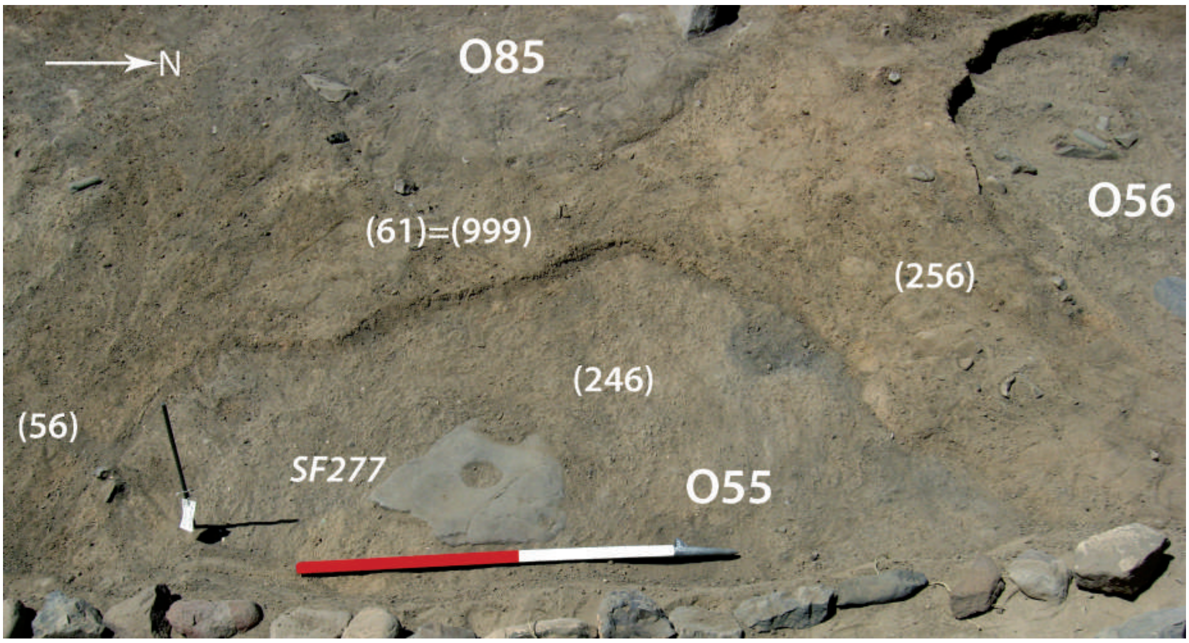


Figure 18.4 Cup-hole mortar (SF277) embedded in deposit (246) within Intramural Space O55. Scale 1.0 m.

wall, deposit (45) was partly overlying a mid-greenish-grey silt (60) which extended between the walls (256) of Structure O56 in the north, (61=999=674), Structure O85 in the west, and wall (56) of Structure O53 in the south. The excavation of deposit (60), which appears to abut these pisé walls, helped to define their direction so that it was possible to confirm that they were curving away from Space O55 and forming parts of Structures O53, O85 and O56.

Underlying deposit (60) there was an orangish-brown sandy silt (246), which also apparently abutted walls (256) and (61=999=674), forming a deposit that surrounded a cup-hole mortar SF277 (Figure 18.4), only the surface of which was exposed. SF277 had a considerable amount of use-wear visible suggesting a long history or an intensive period of use. Deposit (246) was not excavated, but a small amount of chipped stone was recovered during the cleaning of its surface (Table 18.2). It remained unclear whether the cup-hole mortar had been embedded into (246), or whether it was associated with a floor below this deposit. Two possible post-holes were identified at the north edge of Space O55, against the outer side of wall (256), but neither was excavated.

18.3 Interpretation

Intramural Space O55 was only partially investigated, and its eastern part lies beyond the limits of the excavation. The excavation of deposit (60) demonstrated that the space had not been enclosed by a wall built for this purpose but was defined by the walls constructed for Structures O53, O56 and O85. The space with its cup-hole mortar (SF277) may have been an intramural working area. Alternatively, there may have been an earlier structure at this location with its floor levels remaining buried below (246) and its walls either entirely levelled prior to the construction of Structures O53, O56, and O85 or destroyed by their construction. As such, the cup-hole mortar would relate to floors of this earlier structure rather than having been positioned into the intramural space following construction of Structures O53, O56 and O85.

19. Structure O84

19.1 Location and relationship with other structures

Structure O84 is elliptical in shape and orientated along a southeast–northwest axis. The interior measures 2.8 m x 2.2 m in maximum extent. It is the easternmost structure in a group of at least six that form a chain alongside the southern and western flank of the large Structure O75 (Figure 19.1). The majority of these structures are conjoined, and the only possible break was immediately west of Structure O84, where Structure O114 was not as well defined as the rest of those within the arc (Chapter

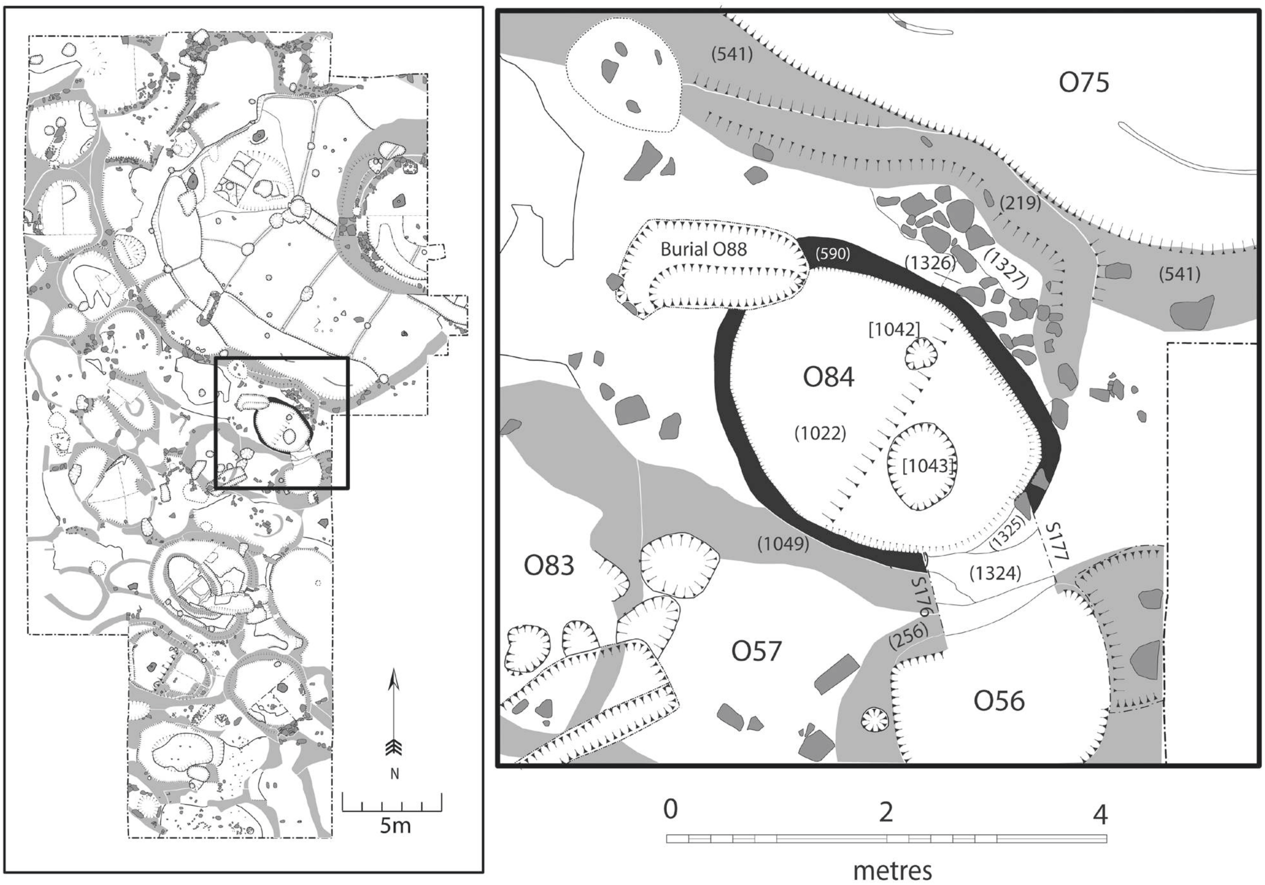


Figure 19.1 Location of Structure O84 and plan showing its relationships with surrounding Objects.

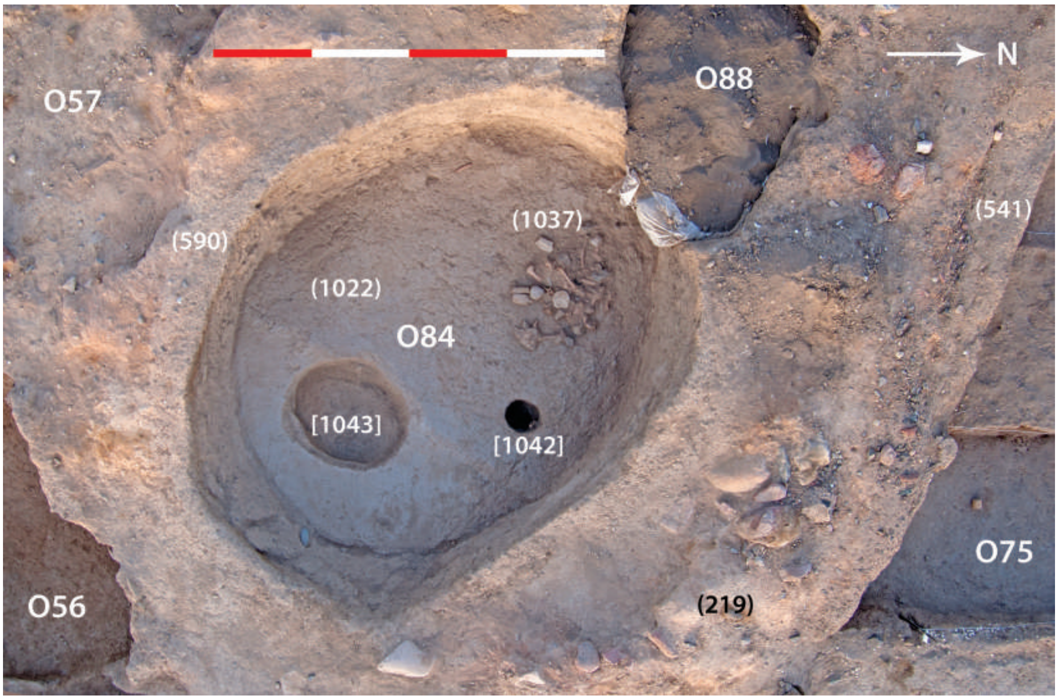


Figure 19.2 Structure O84 from above, towards the cessation of the excavation, showing deposit (1037) on mud-plaster floor (1022). Antique Burial O88 to the northwest has been fully excavated and then backfilled for stability. Scale 2.0 m.

20). Structure O84 was separated from Structure O75 in the north by a wall (219) that ran from west to east and then curved southwards towards the eastern end of Structure O84. Structure O84 had been constructed against the rubble that filled the south side of the curve of wall (219), while Structure O75 appeared to be attached to the opposite side of the wall. Excavation of a section through the wall between Structures O84 and O56 showed that both structures were attached to the opposite sides of the earlier line of walling (1049) and (1050). It is not yet clear whether this earlier wall line belongs to Structure O57 to the south, or whether it represents part of an earlier structure in the space subsequently occupied by Structure O84.

Figure 19.2 provides a view of Structure O84 towards the end of the excavation and Figure 19.3 the stratigraphic matrix for the excavated deposits. Tables 19.1, 19.2 and 19.3 list the excavated contexts, bulk funds and small finds respectively.

19.2 Description of the excavated deposits

The overburden (1, 123, 186 and 187) contained sporadic concentrations of large wadi stones, presumably derived from eroded structures. The largest of these (40) was located over the area occupied by Structure O84 and Structure O57. Among these stones, which appeared randomly distributed within the overburden, were several ground-stone objects (SF122, SF123, SF125, SF126, SF128).

Immediately below the overburden a yellowish-brown silt (218=458), within which the protruding surfaces of sections of pisé and stone walls (219 and 1049) (Figure 19.4) were exposed. This silt was cut by Antique Burial O88 (Chapter 6) as well as Neolithic Burials O10, O26 and O122.

Burials O10, O26 and O122

The skeletal remains of Burial O10 (207) were in a poor condition, most likely a consequence of deflation and the animal burrowing that was evident within the pale greyish-brown sandy silt (206) which filled cut [210]. Nevertheless, a significant proportion of the skeleton was present, the most obvious absences being both scapulae, the left side of the rib cage, and the bones of the hands and the feet. The skeleton was orientated northeast–southwest, lying in a crouched position, with its head to the southwest resting on its right hand so it faced southeast (Figures 19.5, 19.6). The right arm was flexed underneath the ribs towards the head, and the left arm was extended in front of the body and also flexed towards the face. One of the animal burrows ran from the area where the bones of the left hand would have been, to the area where the scapula should have been, suggesting that animal burrowing had played a part in the movement of at least some of the missing bones. A chipped-stone tool (SF158) and a grooved ground-stone object (SF154) were found beside the skeleton, and a mortar fragment (SF165) lay to its immediate south (Figure 19.5). The shape and the extent of burial cut [210] could not be firmly established, with only its base having a defined edge to the surrounding deposits.

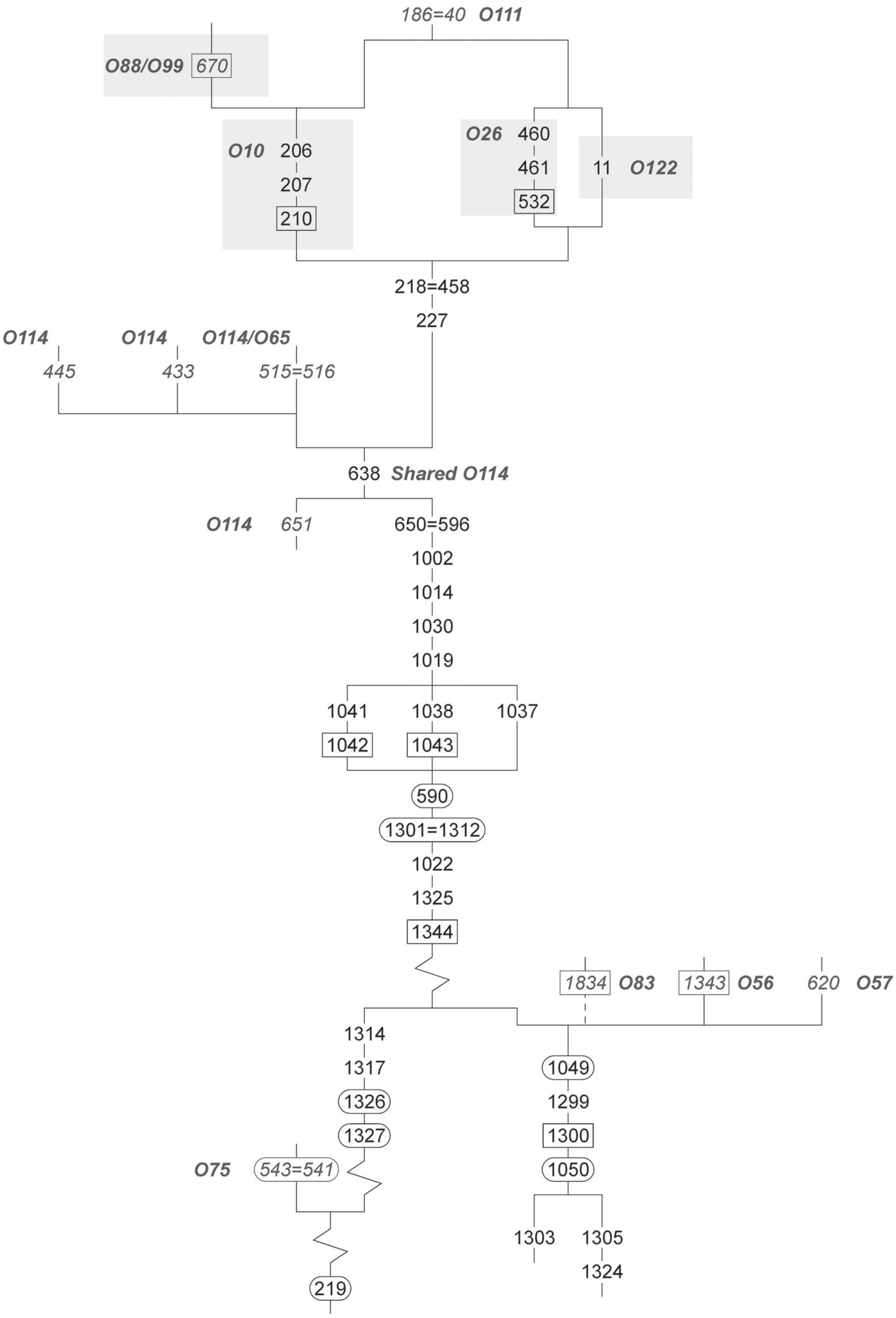


Figure 19.3 Stratigraphic matrix for Structure O84.

Table 19.1 Contexts excavated within Structure O84 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
11	cranium, mandible and other disarticulated human bones	partially surviving human burial or a secondary deposition of partial human remains
40	loose greyish-brown sandy silt with a concentration of stones of up to 0.5 m diameter	deflation horizon with a concentration of rubble
206	pale greyish-brown sandy silt	burial fill
207	articulated human skeleton	primary inhumation
210	sub-oval shallow cut with a flat base	cut of burial
218	light yellowish-brown silt with occasional small stones	mixed deflated deposit directly below the overburden
219	burnt reddish-orange pisé	burnt pisé wall
227	yellowish-brown friable to compact silt	water-laid patchy silt deposit
458	light yellowish-brown loose silt with occasional small stones	mixed deflated deposit directly below the overburden
460	light greyish-brown loose silt with occasional larger (10–20 mm) stones and insect burrowing	burial fill
461	articulated human skeleton	partially surviving primary human burial
532	sub-oval cut with sharp break of slope at the top, vertical to steep sides and a flattish base	cut of burial
590	oval-shaped circuit of pale yellowish-brown pisé	pisé wall of structure
596	pale yellowish-brown sandy silt with some pisé rubble	silt and rubble accumulation inside structure; same deposit as (650)
638	light greyish-yellow and yellowish-brown silt with some pisé rubble	silt and rubble accumulation over disused area
650	pale yellowish-brown sandy silt with some pisé rubble	silt and rubble accumulation inside structure; same deposit as (596)
1002	friable pale yellowish-brown sandy silt with some pisé rubble	silt and rubble accumulation inside structure
1014	friable pale yellowish-brown sandy silt with a large amount of pisé rubble	possible structural collapse inside structure or backfill with pisé rubble
1019	greyish-brown silt with pisé rubble	occupation deposit
1022	compact yellowish-brown clayey silt	hard mud-plaster surface inside structure
1030	compact yellowish-brown clayey silt with a high concentration of pisé rubble	probable wall collapse inside structure
1037	light grey loose silt with charcoal and occasional stones containing a dense spread of animal bones	dump of animal bones in silty charcoal rich matrix
1038	loose yellowish-brown silt with pisé rubble and stones	rubble fill of feature cut into floor of structure
1041	loose light grey silt with charcoal and occasional stones	fill of small pit
1042	circular cut with vertical sides and a pointed base	probable small pit
1043	oval cut with steep to vertical sides and a flattish base	backfilled feature in the floor of structure, possible mortar stone hollow
1049	bright orangish-brown pisé	pisé wall (not fully excavated)
1050	gravelly yellowish-brown pisé	pisé wall (not fully excavated)
1299	light grey soft silt	fill of post-hole in pisé wall
1300	oval cut with steep to vertical sides and a flattish base	possible post hole cut into pisé wall
1301	yellowish-brown pisé	pisé band laid as lower part of wall of structure; possibly same as (1312)
1303	yellowish-brown loose gravelly silt	possible make-up layer
1305	light grey soft sandy silt	not fully excavated deposit encountered in the sondage through walls
1312	yellowish-brown pisé	pisé band laid as lower part of wall of structure; possibly same as (1301)
1314	soft yellowish-brown silt	deposit sandwiched between different phases of walling
1317	compact yellowish-brown silt	deposit sandwiched between different phases of walling
1324	compact yellowish-brown clay silt	probable mud-plaster floor of an earlier structure
1325	compact yellowish-brown clay silt	part of hard mud-plaster surface seen in the sondage

Table 19.1 Contexts excavated within Structure O84 with sedimentary descriptions and interpretations continued...

Context	Description	Interpretation
1326	yellowish-brown pisé and stones	part of wall seen in the sondage
1327	yellowish-brown pisé and stones	part of wall seen in the sondage
1344	oval cut with sharp breaks of slope and vertical, occasionally undercut sides and probably a flat base	construction cut for subterranean structure

Table 19.2 Quantities of bulk finds from Structure O84 by material and context number.

Object 84	Volume of sediment (l)				Weight of bulk finds per material (g)							
Context	**Total volume**	**Flot. sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Ground stone**	**Other worked stone**	**Animal bone**	**Other shell**	**Plaster/Pisé**	**Charcoal**	**Misc.**
11	4.0	4.0	0.0	0.0	1.2	0.0	0.0	1.8	0.7	0.0	0.0	0.0
206	85.0	84.0	0.0	1.0	468.1	0.0	0.0	11.2	42.6	0.0	0.0	0.2
212	2.0	2.0	0.0	0.0	17.2	0.0	0.0	0.5	2.2	0.0	0.1	0.0
218	115.0	30.0	84.0	1.0	295.8	0.0	0.0	20.4	15.5	0.0	0.0	0.0
458	90.0	0.0	90.0	0.0	450.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0
460	38.0	38.0	0.0	0.0	44.3	0.0	0.0	16.7	0.0	0.0	30.0	0.0
590	65.0	20.0	45.0	0.0	141.4	0.0	0.0	20.2	0.0	0.0	2.1	0.0
638	198.0	0.0	198.0	0.0	1660.0	0.0	30.0	2143	0.0	0.0	0.0	0.0
650	474.0	40.0	430.0	4.0	418.0	0.0	0.0	34.0	0.0	0.0	0.0	0.0
1002	1110.0	60.0	1045.0	5.0	1778.5	0.0	0.2	148.0	0.0	0.0	22.1	0.0
1014	1062.0	40.0	1020.0	2.0	1448.0	112.0	11.0	305.7	0.0	150.0	27.5	0.0
1019	422.0	40.0	380.0	2.0	1783.7	369.0	1.0	2481.4	0.0	300.0	105.2	160.0
1030	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
1037	5.0	5.0	0.0	0.0	835.3	0.0	0.0	570.5	0.0	0.0	0.1	0.0
1038	46.0	10.0	35.0	1.0	96.9	0.0	0.0	154.9	0.8	0.0	10.0	0.0
1041	4.0	4.0	0.0	0.0	34.0	325.0	0.0	23.0	0.0	0.0	0.0	0.0
1049	75.0	10.0	65.0	0.0	109.1	0.0	0.0	10.7	1.5	0.0	10.1	0.0
1050	156.0	10.0	145.0	1.0	586.4	0.0	0.0	47.1	0.0	0.0	16.1	0.0
1299	3.0	3.0	0.0	0.0	15.4	0.0	0.0	20.4	1.3	0.0	0.1	0.0
1301	20.0	10.0	10.0	0.0	69.0	0.0	0.0	6.5	3.3	0.0	10.0	0.0
1303	21.0	10.0	10.0	1.0	84.0	158.4	0.0	16.7	0.0	0.0	5.8	0.0
1305	37.0	7.0	30.0	0.0	115.1	0.0	0.0	22.3	1.5	0.0	0.1	0.0
1312	31.0	10.0	20.0	1.0	128.7	0.0	0.0	20.4	0.0	0.0	10.1	0.0
1314	71.0	10.0	60.0	1.0	67.4	0.0	0.1	10.4	2.0	0.0	4.1	0.0
1317	21.0	10.0	10.0	1.0	30.7	0.0	0.0	11.9	0.6	0.0	1.2	0.0
1326	51.0	10.0	40.0	1.0	21.1	0.0	0.0	11.0	0.0	0.0	1.0	0.0
Total	4226.0	487.0	3717.0	22.0	10699.3	964.4	42.3	6128.7	72.0	450.0	256.7	160.2

Table 19.3 Quantities of small finds from Structure O84 by material and context number.

Context	Chipped stone	Ground stone	Other stone	Worked bone	Bone beads	Stone beads	Marine shell beads	Shell	Bitumen	Total small finds
40	0	5	0	0	0	0	0	0	0	5
206	1	1	1	0	0	0	0	0	0	3
458	0	1	0	0	0	1	1	0	0	3
460	2	1	3	0	0	0	0	0	0	6
596	0	0	0	0	0	1	0	0	0	1
638	0	1	0	1	0	0	0	0	1	3
650	0	0	0	0	0	0	1	0	0	1
1002	0	1	1	1	0	2	2	0	0	7
1014	0	2	0	1	0	0	1	1	0	5
1019	0	2	1	2	0	0	2	0	0	7
1049	0	2	0	0	0	0	0	0	0	2
1050	0	2	0	0	0	1	0	0	0	3
1305	0	0	0	0	0	0	2	0	0	2
Total	3	18	6	5	0	5	9	1	1	48

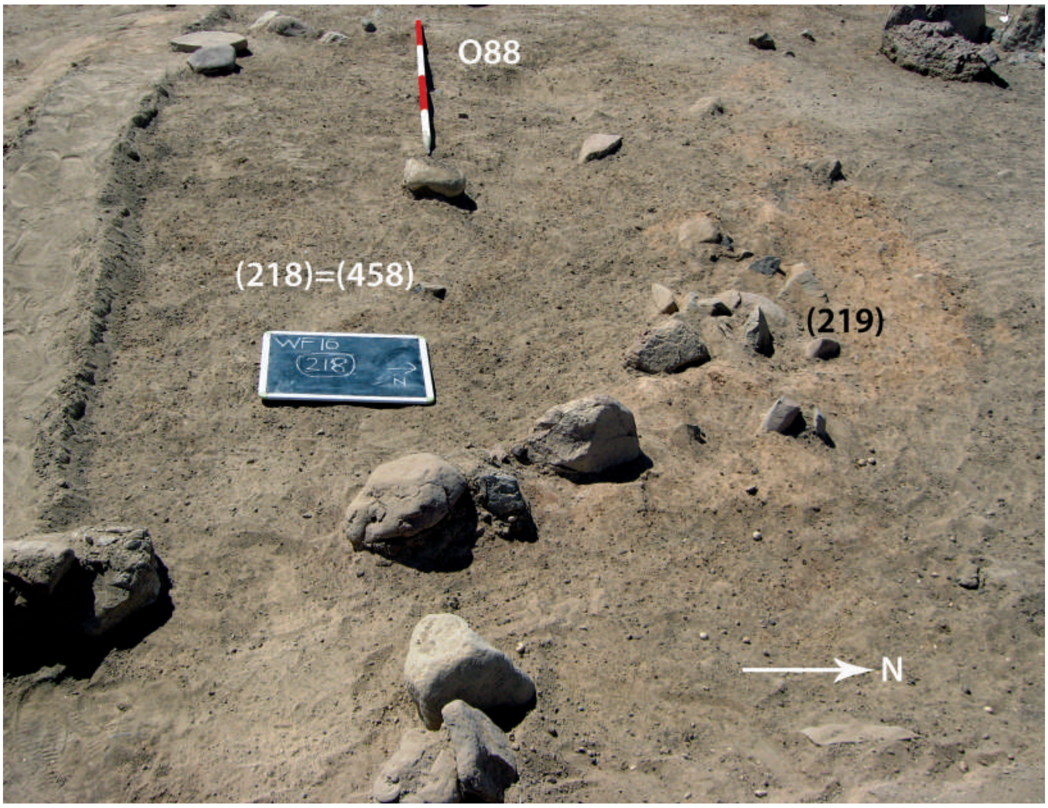


Figure 19.4 Deposit (218=458) from the east. Curved orange pisé and stone wall (219) can be seen on the right. Unexcavated Antique Burial O88 is present but difficult to discern underneath the photo scale in the background. Scale 2.0 m.

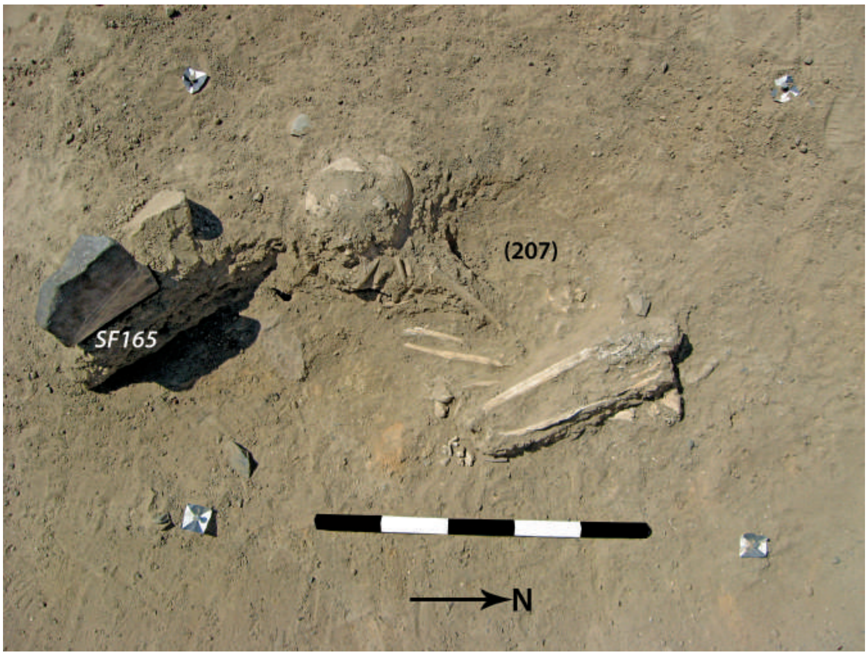


Figure 19.5 Skeleton (207) from the east. Mortar fragment SF165 can be seen on the left. Scale 0.5 m.

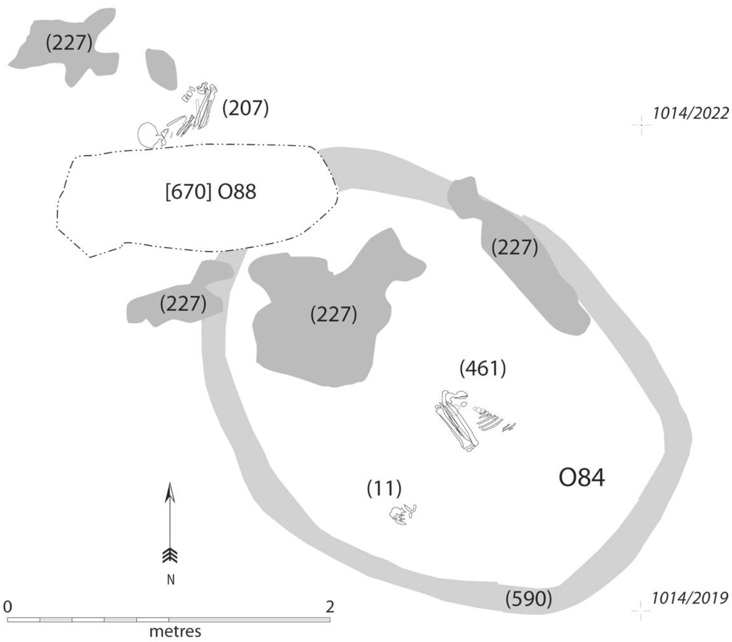


Figure 19.6 Location of human remains (207) Burial O10, (461) Burial O26, and (11) Burial O122 in relation to patches of silt (227), Antique Burial O88 and Structure O84.

A ground-stone pestle (SF445), a marine shell (SF444) and a green stone (SF449) bead were recovered from within the silt (218=458, Table 19.3). Excavation of deposit (218=458) revealed Burials O26 and O122, situated approximately three metres southeast of Burial O10 (Figure 19.6), and apparently cut from above the level of (218=458). The fill of Burial O26 (460) was almost indistinguishable from the surrounding deposit (218=458).

Burial O26 contained skeletal remains (461) in a light greyish-brown loose silt (460) within cut [532] (Figure 19.7A). The fill showed signs of intense insect burrowing around the skeleton, which was orientated northwest to southeast, lying on its left side and would have originally faced southwest. However, the entire upper part of the skeleton above the lower four ribs was missing. Because of the similarity of deposits inside and outside the burial it was not clear whether the

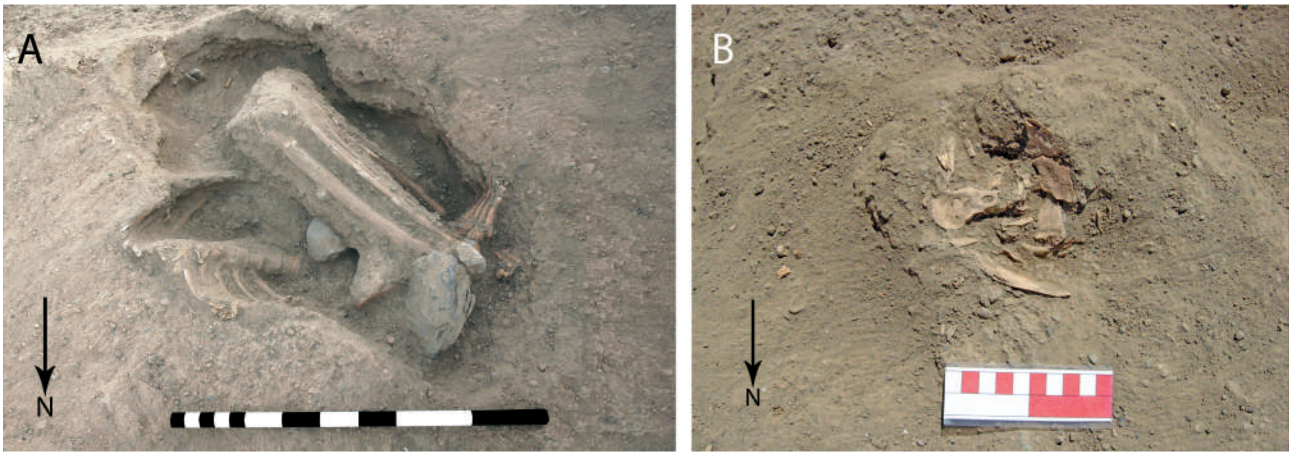


Figure 19.7 A — Partial skeleton (461) in cut [532] from the north, scale 0.5 m; B — Skeletal remains (11) without visible cut, scale 0.1 m.

upper part of the body was lost due to having been truncated by erosion, or whether there had been a secondary intrusion, such as a robber cut or an extraction pit, that removed the upper part of the burial. Judging from what remained, the body had been packed tightly into a sub-oval cut in a flexed position, with the pelvis and the sacrum in the northeast corner of the grave and the feet in the adjacent northwest corner. The spine ran against the northeast side of the grave. A large stone was situated on top of the pelvis area and another was found between the leg bones and the lower rib cage. Fill (460) contained a number of objects, which included two chipped-stone tools (SF452, SF455), a ground-stone pestle (SF613), two unidentified fragments of worked stone (SF597, SF598) and a fragment of red ochre (SF453).

Burial O122 was situated one metre to the southwest of Burial O26 and consisted of skeletal remains (11), which comprised several fragments of a cranium, a mandible and rib fragments (Figure 19.7B). The sediment containing these remains could not be differentiated from the surrounding mixed loose light greyish and yellowish-brown silt and pisé rubble (218=456) and (638), and there was no visible cut. The sediment immediately surrounding the bones was collected as a flotation sample.

Deposits interior to Structure O84

Below (218=458) were five separate amorphous patches of yellowish-brown silt (227) that had a smooth upper surface and were approximately 1 cm thick (Figure 19.6). The similarity between the patches suggests that they could represent surviving parts of a single deposit that had once stretched across this area. None of these patches had a direct relationship with the burials, but Burial O10 had cut (218=458) and is, therefore, later than (227). The ephemeral nature of this deposit suggests that it is unlikely to be the remnants of a floor.

Underlying Burials O10, O26 and O122 and the patchy deposit (227), and located within the area between wall (219) in the north and wall (1049) in the south, there was a mixed deposit of light greyish-yellow and yellowish-brown silt with pisé rubble (638). Deposit (638) was 8.6 m x 2.9 m in total extent and between 0.05 m and 0.10 m in thickness, extending from the eastern limits of walls (219) and (1049) to Structure O65 in the northwest, providing some stratigraphic relationships between Structure O84, Structure O65 and Structure O114 (Figures 19.1, 19.3). A flat perforated stone (SF902) was found towards the middle of the extent of deposit (638) (Figure 19.8). Other finds included a worked piece of bone (SF905) and a small fragment of bitumen (SF1310).

Excavation of deposit (638) revealed a complete circuit of a very pale yellowish-brown pisé wall (590) situated between more striking bright orange-brown pisé walls (219) and (1049) (Figure 19.9) and enclosing a yellowish-brown sandy silt and pisé rubble layer (596=650). The Antique Burial O88 had cut the northwest end of pisé wall (590) and marginally penetrated into the interior of the structure cutting deposits (596=650).

Deposit (596=650) was excavated in quadrants orientated along the southeast–northwest axis of the structure, starting with quadrant A in the north, B in the east, C in the south and D in the west. The same divisions were kept for the sampling and the retrieval of finds throughout the remaining excavation of the deposits inside Structure O84. Deposit (596=650) extended across the whole of the interior of Structure O84 and was 2.8 m long, 2.2 m wide and 0.10 m thick. It contained considerably fewer finds than overlying deposit (638) and was without significant variation in the distribution between the quadrants. Apart from relatively small quantities of chipped stone and animal bone, the finds included two beads, one of which was made of marine shell (SF1378) and the other of stone (SF346).

Deposit (596=650) was fully excavated to reveal underlying deposit (1002), a light yellowish-brown sandy silt with an increased amount of pisé rubble. From this level, excavation of the interior proceeded only in the southeast half of the structure (quadrants B and C) until a mud-plaster

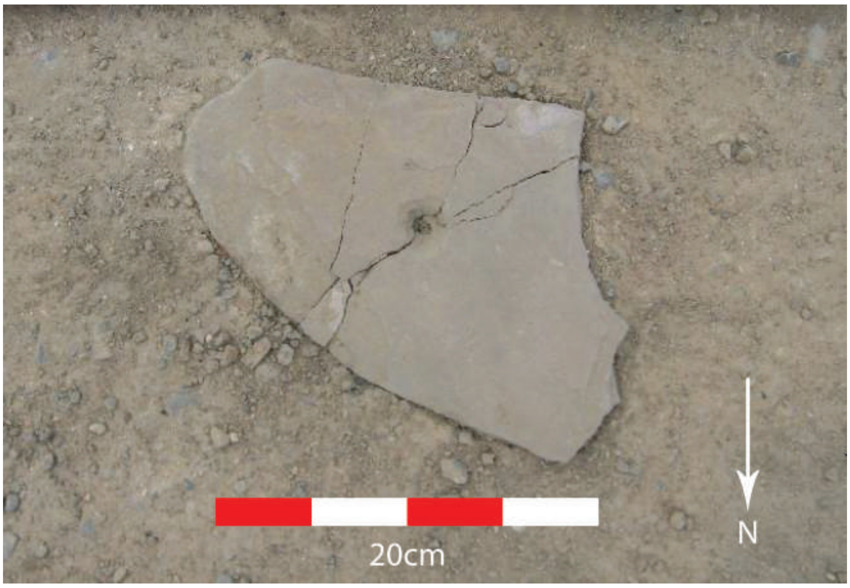


Figure 19.8 Perforated stone SF902 found in deposit (638).

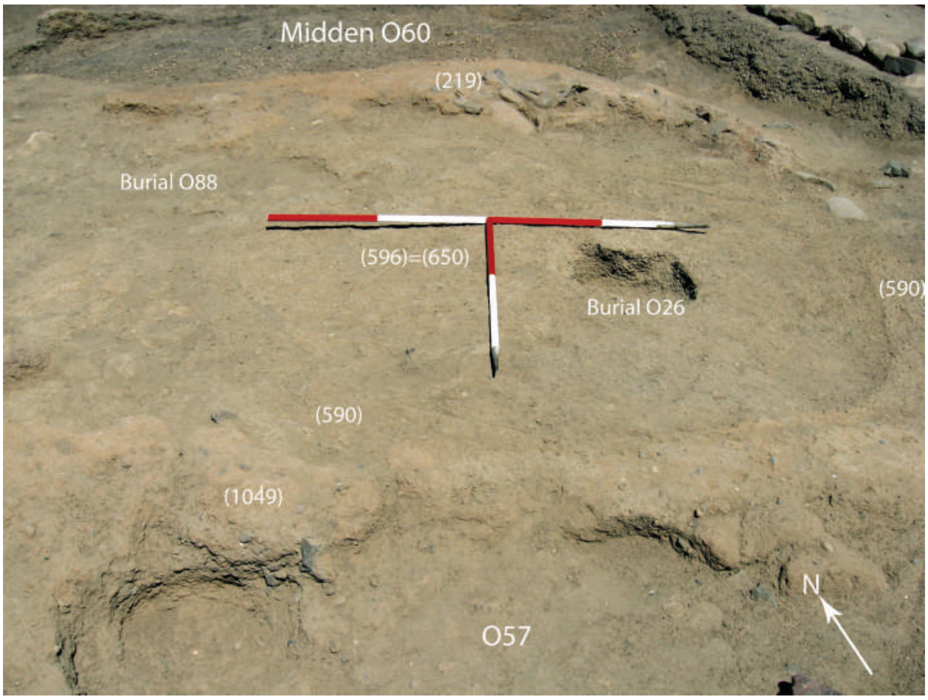


Figure 19.9 Structure O84 represented by wall (590) sandwiched between older walls (219) and (1049). Also showing as yet unexcavated Antique Burial O88, which cuts wall (590) in the northwest. Scale 2.0 m x 1.0 m.

floor (1022) was reached and a cross-section through the fill sequence of the structure was obtained (Figure 19.10). The remaining quadrants A and D were then excavated.

Deposit (1002) was marginally richer in finds than deposit (596=650), but the distribution of chipped stone and animal bone was concentrated in the northwest half of the structure, represented by quadrants A and D. A small ground-stone cup (SF1567) was found among the pisé rubble in the western quadrant D (Figure 19.11). From quadrant B in the northeast of the structure came bone fragment SF1564 with a double row of partial perforations forming a meander (Figure 19.12). Four more beads were found in deposit (1002), two of which were made from green stone (SF1393, SF1513) and two from marine shell (SF1568, SF2513).

Underlying deposit (1002) there was a similar mixture of light yellowish-brown sandy silt and pisé rubble (1014). Some of the rubble had impressions of what appeared to be

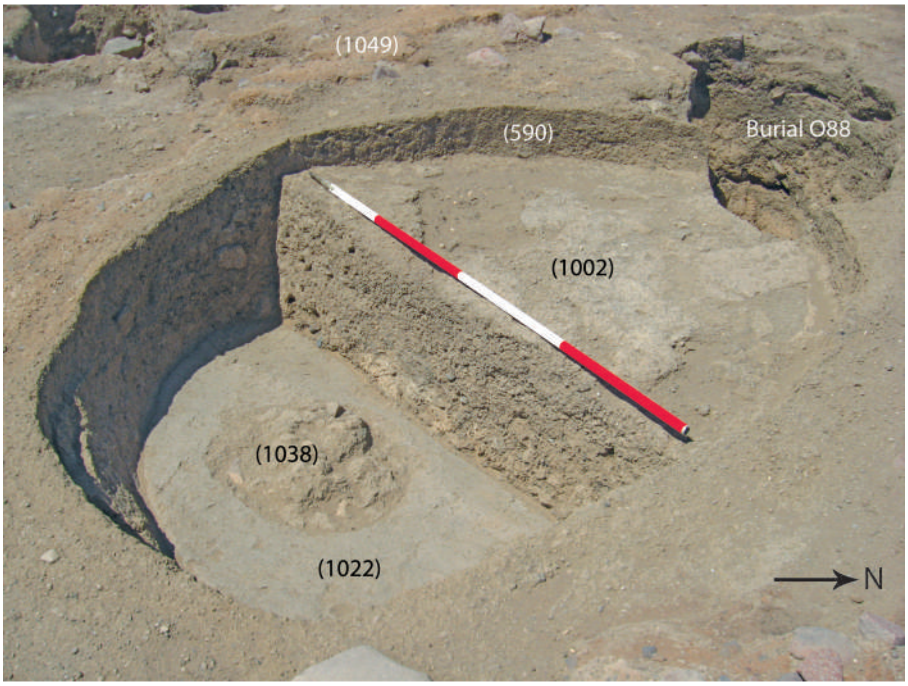


Figure 19.10 Half-sectioned interior of Structure O84 showing deposit (1002) in the partly excavated northwest half of the structure (quadrants A and D) cut by Antique Burial O88. Mud-plaster floor (1022) is visible at the base of the southeast half, with rubble (1038) filling feature [1043] in its centre (quadrants B and C). Scale 2.0 m.

reeds or wattle (SA3357), and this became more abundant with depth. The percentage of animal bone and chipped stone in deposit (1014) remained higher in the northwestern quadrant. Other finds included a possible pestle rough out (SF2016), a stone platter fragment (SF2017) and a marine shell bead (SF2552), all found in quadrant A, and a bone point (SF1511) found in quadrant C.

The increasing amount of pisé rubble reached a peak in the underlying deposit (1030), which was thickest against the interior wall face and sloped towards the middle of the structure (Figure 19.13). Despite its substantial volume this rubble deposit did not contain any finds. Several structural pisé samples from the rubble were kept for comparative analysis (BF4656, SA4437, SA4493, Figure 19.14) including a piece with a curved outer surface, which could belong to a shaped mudbrick. A few large stones were present among the pisé rubble.

Underlying the rubble (1030) was a greyish-brown silt (1019) containing chunks of pisé. These included a piece with plant stem impressions from wattle or reeds (SA3375). Although the east quadrant of the structure contained the least number of finds at this level, several objects worth specific mention came from this part of deposit (1019). These include two marine shell beads (SF1539, SF1540), a large pestle (SF2045), a long thin polished bone needle or point (SF1527) and a fossil (SF1526), which might have been collected and brought to the site. Another complete pestle from context (1019) came from the western quadrant D, as did a double-ended bone tool (SF2018), which was made into a point at one end and a spatula at the other.

Figure 19.11 Ground-stone cup SF1567.

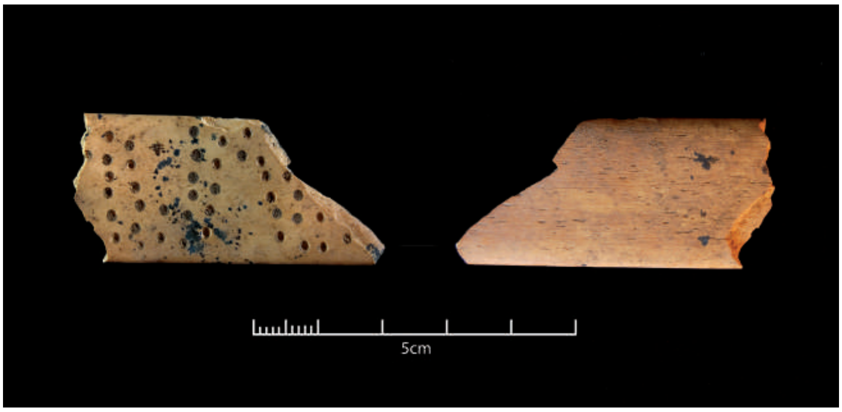


Figure 19.12 Fragment of animal rib SF1564 from deposit (1002); decorated with a pattern of partial perforations.

Excavation of silt (1019) in the northern quadrant A revealed a small but dense concentration of animal bones, charcoal and burnt stones in a light grey loose silt (1037) (Figure 19.15, Figure 19.16). Field observations suggested that the animal bones included remains of a young goat/ibex, which was represented by a number of unfused bones, and a canine mandible. At the base of the deposit were the remains of two semi-articulated caprid lower legs (Figure 19.17). These remains were lying directly on top of a hard compacted yellowish-brown mud-plaster surface (1022) and were at the same general level as the greyish-brown silt (1019), which extended across the whole of the interior, but were differentiated from it due to the density of bone and burnt material, which suggested that this material was a separate localised depositional event.

Two small features were cut through the surface of mud-plaster floor (1022) to the east and southeast of deposit (1037) (Figure 19.16). The larger of these was identified during the excavation of the southeast half of the structure (Figure 19.10). It consisted of a yellowish-brown silt and pisé rubble fill (1038) within an oval, shallow, but relatively steep-sided cut, [1043] (Figures 19.18, 19.19 and 19.20). Deposit (1038) was similar to the pisé-rich deposits, such as (1030), (1014) and (1002), in contrast to soft greyish-brown silt (1019). The small quantities of chipped stone and animal bone contained in (1038) were also more similar to the rubble-rich deposits above silt (1019). Cut [1043] was 0.75 m x 0.60 m in size and had maximum depth of 0.15 m. Its base sloped gently down to the east, with a groove at the base of the western shallower side of the feature (Figures 19.18 and 19.20). The other sides were near vertical. The base was on relatively compacted clayey silt, not unlike mud-plaster floor (1022). The northwest side of the cut truncated a slight lip, which was modelled in (1022) at the break of the slope between the southeast raised flat part and the slightly downward sloping central part of the floor surface. The slope gradually evened out in the northwest part of the structure where deposit (1037) was resting on the lower flat part of the floor surface (Figure 19.19).

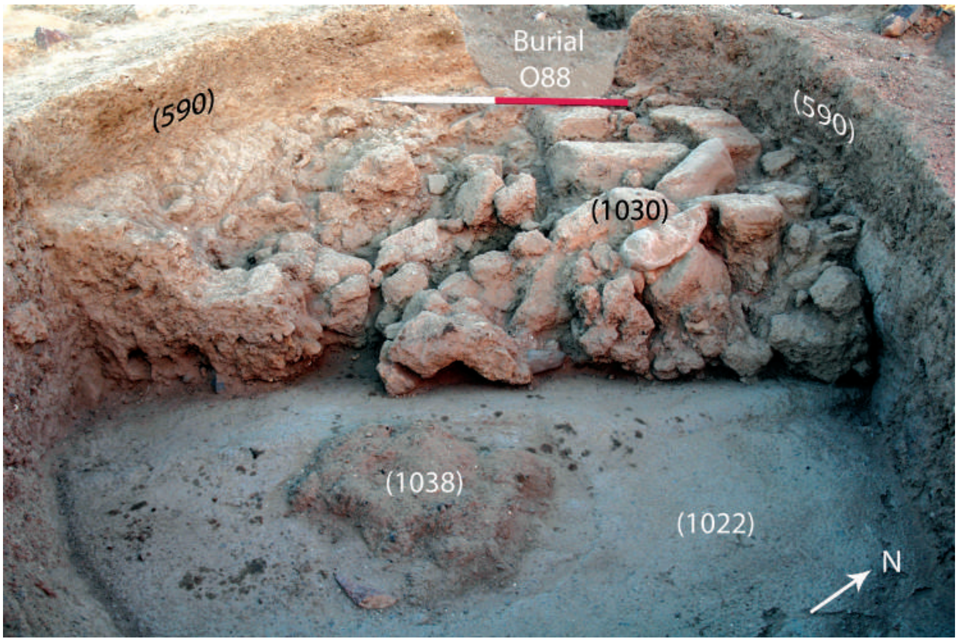


Figure 19.13 Pisé rubble deposit (1030) in the northwest half of the structure and unexcavated feature (1038)[1043] in the foreground. Scale 1.0 m.

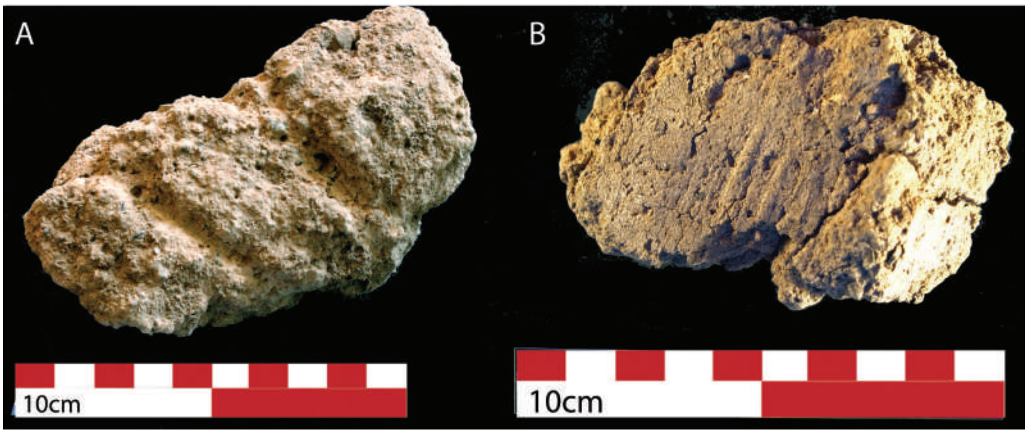


Figure 19.14 Pisé blocks with wattle or reed impressions: A — SA4493 from deposit (1030); B — BF4656 from deposit (1019).

Figure 19.15 Close up view of deposit (1037) before excavation. Scale 0.2 m.

The smaller feature [1042] cut through the mud-plaster surface (1022) close to the northern wall and immediately east of deposit (1037) (Figure 19.16). It was filled with loose light grey silt with charcoal and occasional stones (1041). The cut was sub-circular and steep-sided, 0.25 m in diameter and 0.18 m in depth (Figure 19.20). Deposit (1041) had an animal long bone embedded vertically, close to the north edge of the feature. The bone was set firmly into the base and the fill must have accumulated around it.

19.3 Sections excavated through wall (590) of Structure O84

Two sections were excavated through the outer wall of Structure O84, one in the south towards Structure O56 and a second through the northeast side, towards the burnt reddish-orange pisé wall (219) (Figures 19.19–19.23). These sections were to investigate the methods of construction of the structures and to establish stratigraphic relationships with Structure O56 and wall (219).

The sections (S176, S177) exposed by excavating through the wall revealed similarities in the construction methods for Structures O84 and O56 (Chapter 17). Each structure had been built within its own construction cut, which was lined with pisé to form the semi-subterranean part of the structure. Investigation of the stratigraphic sequence belonging to Structure O84 started with the excavation of a 1.0 m long segment of a pale yellowish-brown pisé band (590), which formed the uppermost surviving part of the outer wall of the structure. Below (590) was another similar, but recognisably distinct, band of yellowish-brown pisé (1301), which in turn overlay mud-plaster floor (1022), which extended underneath the pisé wall to meet the edge of construction cut [1344] (Figure 19.22). The pisé walls of Structures O84 and O56 were attached to an earlier wall

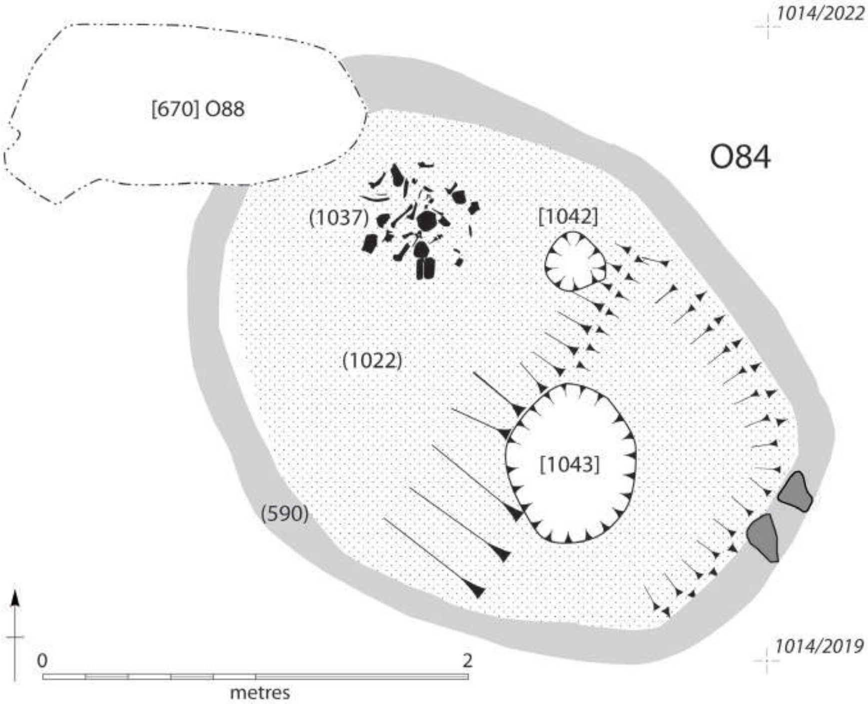


Figure 19.16 Plan of features and deposits associated with mud-plaster floor surface (1022) inside Structure O84.

Figure 19.17 Semi-articulated lower legs of caprid at the base of deposit (1037). Scale 0.2 m.

line (1049) and (1050) at this part of their circumferences. Because of the small size of the excavation through the wall, it remained unclear what this earlier wall line represents. The pisé band (1049) ran on a west-northwest–east-southeast orientation and was parallel to the western part of wall (219) to the north (Figure 19.21). It petered out in the area of the section excavated through the wall, so it is unknown whether it continued eastwards or turned north to meet the line of wall (219). The pisé bands of (1049) and (1050) were constructed as separate events, as shown by post-hole [1300], filled by soft silt (1299), which was cut into (1050) and filled before the construction of (1049) (Chapter 17). Wall (1050) was underlain by a loose gravel (1303) that may have served as a foundation for the wall.

Figure 19.18 North-northwest facing section through fill (1038) of feature [1043]. Scale 0.2 m.

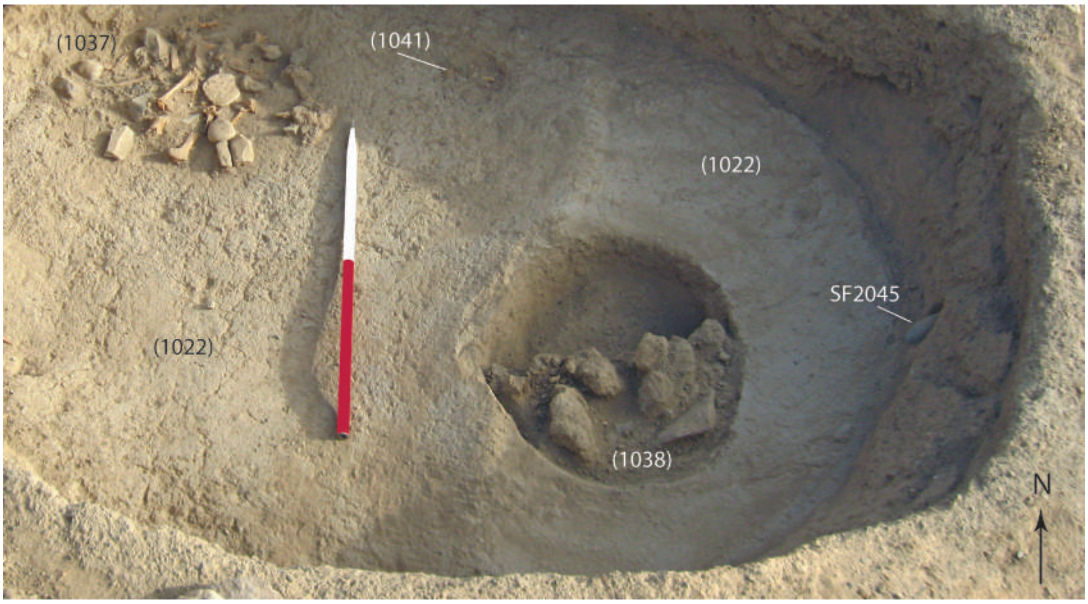


Figure 19.19 View of the interior of Structure O84 from the south showing exposed mud-plaster surface (1022) with half-sectioned feature (1038)[1043], pestle SF2045, unexcavated feature (1041)[1042] and spread of animal bone and burnt material (1037). Scale 1.0 m.

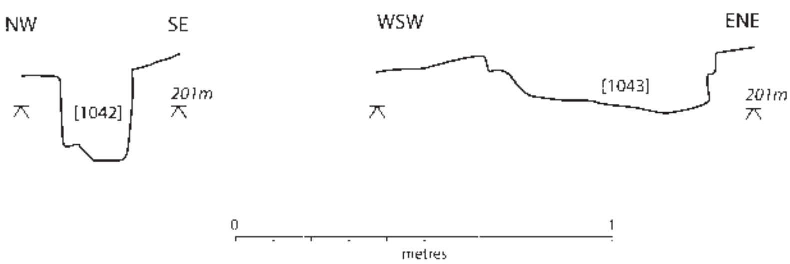


Figure 19.20 Profiles of cuts [1042] and [1043] inside Structure O84.

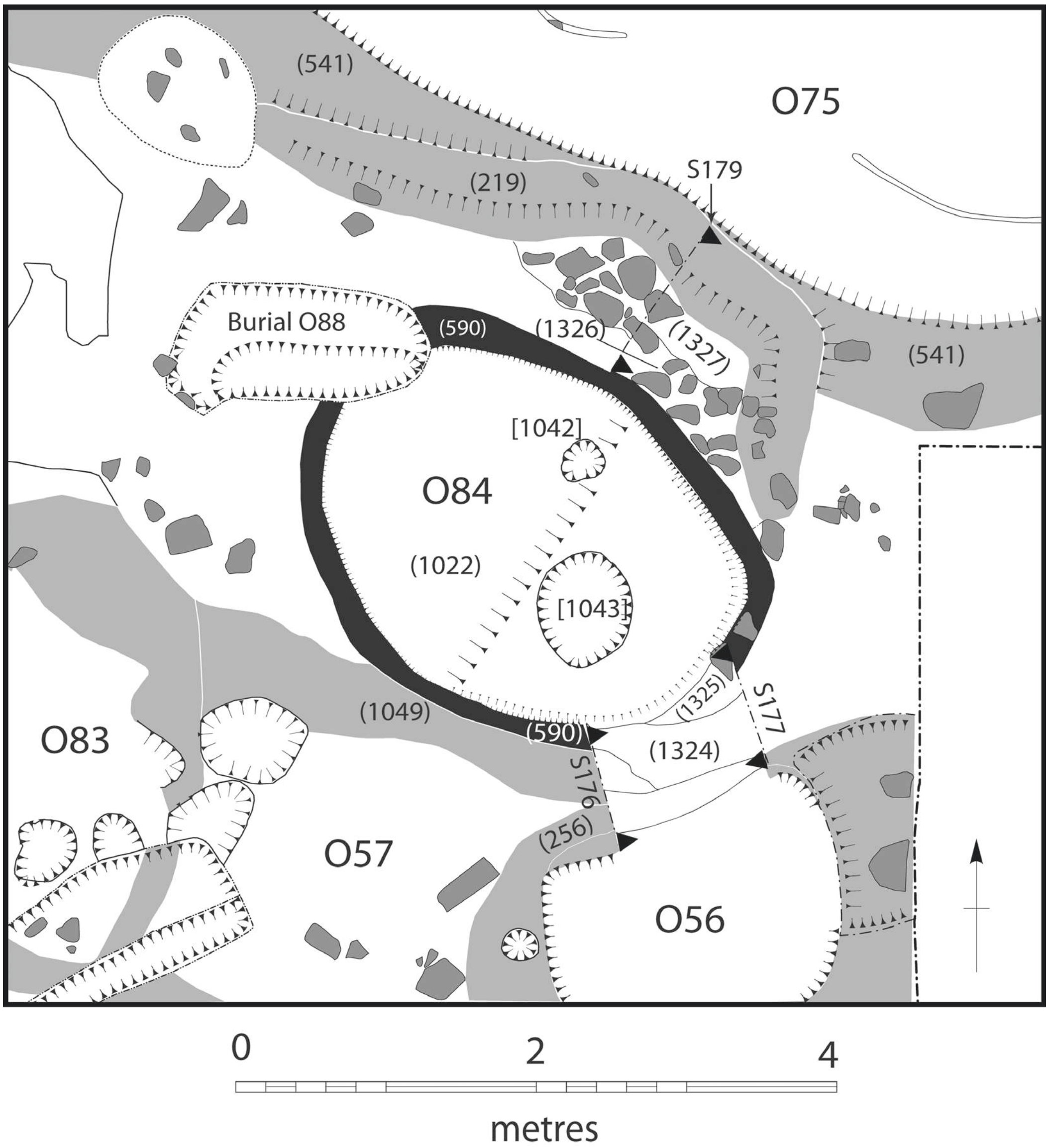


Figure 19.21 Structure O84 with the location of the northern and southern sections through the outer wall, showing locations of Sections S176, S177 and S179.

Mud-plaster floor surface (1022) was made of smooth and compact yellowish-brown clayey silt laid at the base of the construction cut [1344], which defined the elliptical shape of Structure O84. The section cut through the wall also exposed mud-plaster surface (1325) below floor (1022) within the construction cut [1344] and this may represent an earlier floor in Structure O84. Upper floor (1022) was a substantial and hard deposit, 0.17 m thick, and difficult to cut through during excavation. Only a small portion of the overall floor surface was excavated within the limits of the southern wall section, but its thickness could also be seen in the sides of internal features [1043] and [1042]. The surface of the floor was carefully prepared with clearly graded and moulded features. The southeast end was higher and flat, with a narrow 0.05 m wide groove bordering the east and southeast edge of the mud-plaster surface against the inner face of the wall (Figure 19.19). Towards the middle of the interior the surface lipped up very slightly before it sloped down to the northwest. The structure was marginally truncated at its far end by Burial O88, where the burial cut obliquely through pisé wall (590).

A compact yellowish-brown clay silt (1325), 0.20 m thick, with a smooth upper surface similar to floor (1022), was partially revealed below (1022) at the eastern end of the southern section cut through the wall. This deposit had a curved edge that was aligned with construction cut [1344], but further excavation is needed to establish whether this represents an earlier floor, or a foundation platform for Structure O84. The lowest deposit (1324) revealed within the section cut was located under pisé wall (1050), underlying the light grey soft sandy silt (1305) (Figures 19.21 and 19.22). Deposit (1324) was a compact yellowish-brown clay silt, consistent with the makeup of a mud-plaster floor. This deposit was cut by construction cuts

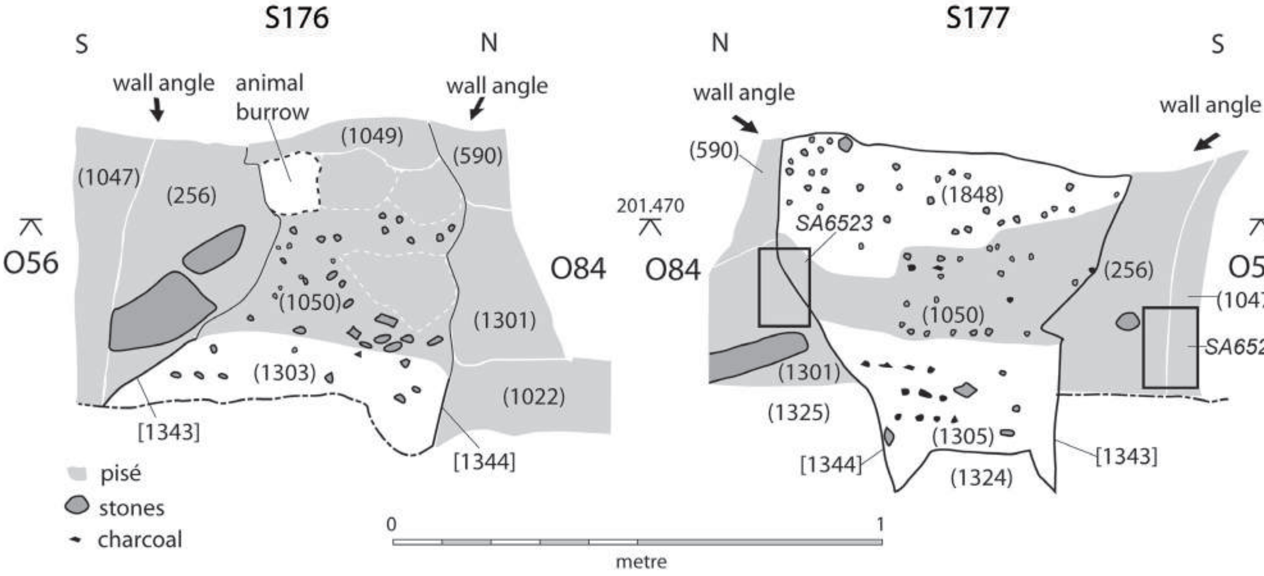


Figure 19.22 East-facing Section S176 and west-facing Section S177 of the southern section between Structures O56 and O84 showing the sequence of their wall construction, the intramural deposits and the location of micromorphology samples.

[1343] and [1344] and is, thus, earlier than both Structures O84 and O56 and the structures defined by the fragmentary wall line represented by (1049) and (1050).

The stratigraphic sequence in the northern section, excavated through the wall (Section S179), followed an outward trajectory from the inner face of the wall of Structure O84 towards the burnt pisé wall (219). As was the case in the southern section excavated through the wall, the latest deposit was the pale yellowish-brown pisé (590), which formed the uppermost surviving pisé band of the outer wall of Structure O84. Below (590) was a yellowish-brown pisé band (1312), which formed the lower part of the wall. It is probable that (1312) and (1301), which was the corresponding pisé band in the southern wall section, represent the same deposit, but this cannot be proven without the excavation of the intervening wall segment between the two wall sections. Pisé band (1312) was laid on top of mud-plaster floor (1022). Both the floor and the pisé wall of the structure were laid against the side of construction cut [1344], which was cut through earlier deposits and structures situated between Structure O84 and wall (219) (Figure 19.23).

The uppermost of these intramural deposits was soft yellowish-brown silt (1314), which was located between pisé wall (590) of Structure O84 and the burnt pisé wall (219) (Figure 19.23). Underneath it was another probable wall, or a bench made of yellowish-brown pisé (1327), and a substantial amount of stone rubble. This wall was separated from Structure O84 by a yellowish-brown silt (1317), which was similar to the upper silt (1314), and was abutting wall (219) alongside its inner face. Underneath silt (1317) was yet another yellowish-brown pisé wall or bench (1326), which also incorporated many stones in its makeup. Neither of these walls or benches was excavated, but the stratigraphic relationships between Structure O84, pisé deposits (1326) and (1327) and burnt pisé wall (219) is clear.

19.3 Interpretation

Structure O84 is a small semi-subterranean elliptical structure. The sections excavated through the walls on two sides of Structure O84 revealed a complex history of construction that cannot be fully understood with the small amount of deposits exposed. There appears to be the reuse of substantial earlier pisé walls to which more ephemeral pisé cladding, relating to the new Structure (O84), was applied. This might have been an opportunistic reuse, although there is a possibility that new structures were deliberately positioned with regard to pre-existing structures. This can be seen in the relationships between Structures O56 and O84 and the earlier fragmentary wall line represented by (1049) and (1050) in the southern section.

Wall (219) was part of an as yet undefined structure and had been burnt before any of the contexts exposed in the northern section excavated through the wall were deposited, and also before the construction of Structure O84. On the south side of wall (219) a lower wall or bench (1327) abutted wall (219) and was in turn abutted by a still lower wall or bench (1326), thus creating a stepped appearance, although this could be the product of differential survival and demolition. Silts (1317) and (1314) subsequently accumulated at the southern side

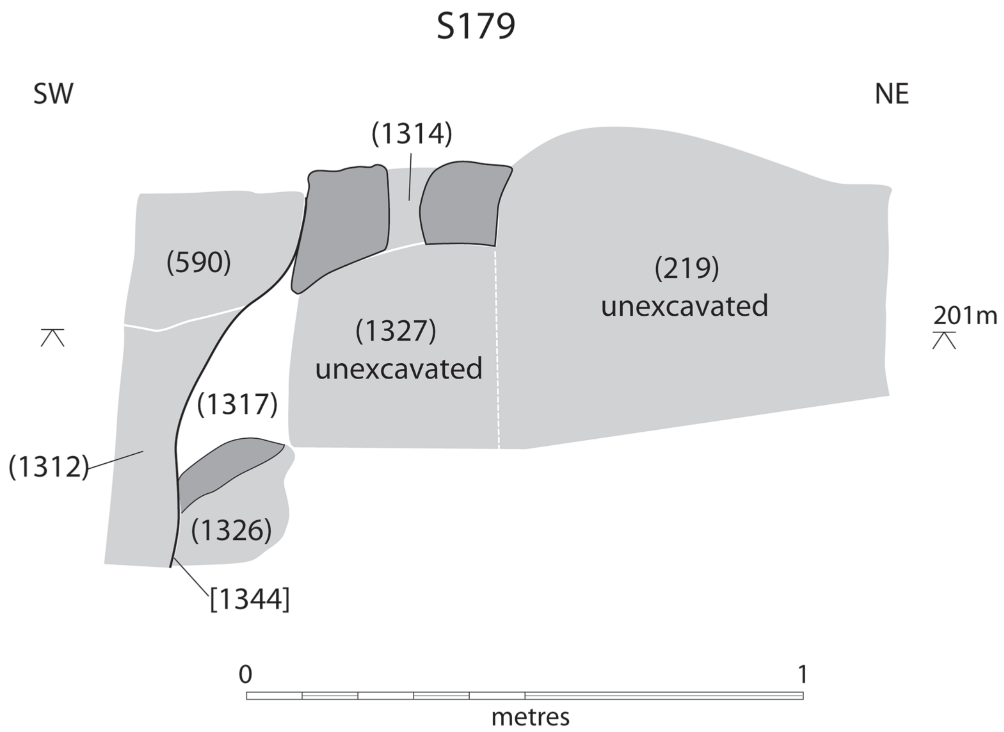


Figure 19.23 Southeast-facing Section S179 of the northern section excavated through the wall between Structure O84 and wall (219) (Figure 19.21).

of these structures and were cut through by construction cut [1344], which contained the subterranean wall (1312) of Structure O84. At its north side, wall (219) seems to have had wall (543) of Structure O75 attached onto it in a similar manner. This relationship has not yet been proved by excavation, but the fact that the pisé of wall (219) was burnt and adjacent wall (543) was not, indicates that (543) had not been constructed when (219) was burnt (Figure 19.23). Further evidence for this sequence of construction is provided by a continuous spread of mud plaster on the northern faces of (219) and (543).

The form of the structure to which wall (219) originally belonged is unknown, which is also the case for the structures to which walls (1049) and (1050) were related. The alignment and the surface appearance of walls (219) and (1049) might suggest that they were part of a single sub-rectangular structure present before Structure O84 was built between them (Figure 19.21). However, wall (219) is much more substantial than wall components (1049) and (1050). Neither of these two walls was burnt like wall (219), whose reddened appearance indicates it was exposed to substantial heat. Only the full excavation of the remaining part of Structure O84 can confirm the relationships between these walls.

The sequence of construction for Structure O84 was almost entirely established. The remaining uncertainty is whether mud-plaster floor (1022) represents the original floor of the structure or whether (1325), which was partly exposed in the southern section excavated through the wall, could be its predecessor. These two layers of mud plaster are unusually thick in comparison with other mud-plaster floors at WF16. It is clear that after the laying of (1022), new walls were constructed against the side of construction cut [1344]. Two pisé bands were identified in both of the sections excavated through the outer wall. The lower pisé band (1301)/(1312) was in places laid directly on top of floor (1022) with an upper pisé band (590) continuing the pisé lining of the construction cut upwards.

Apart from being exceptionally thick, floor (1022) was characterised by the particular care taken in the modelling of its surface. The southeast half of the interior was slightly raised with peripheral grooving along its eastern and southeastern edge, and a slight lip at the break of the slope towards the northwest half. The combination of these features might suggest that the intention was to keep the lower northwest half clean with regard to the materials, or residues, associated with activities taking place in the southeast half.

The central part of this half of the interior was occupied by feature [1043], which was filled with pisé rubble (1038). It is almost certain that the rubble was used to backfill the feature deliberately once it ceased to be used. The position, shape and size of the feature all suggest the location for a cup-hole mortar. Such mortars have been found set into the mud-plaster floors of several structures on the site, often in such way that the upper surface of the mortar was almost level with the surface of the floor, or marginally higher. In some instances (e.g. Structures O75 and O100) mortar stones were set into the raised part of the floor edged by a slight lip, just as in the case of the area of floor (1022), which surrounded feature [1043]. Grooving in the base of feature [1043] and the disturbance of its western edge may have derived from the removal of the mortar stone. Hollows similar to [1043] were found during the excavation of Structure O100.

The smaller of the two features cut into floor (1022) is more enigmatic. Due to its location off-centre, it seems unlikely that [1042] was a post-hole for a central roof support, but it could have served as a small storage pit that was later filled with rubbish. This could explain the presence of animal bones in the fill, although the long bone stuck vertically into its base is not consistent with rubbish disposal. Alternatively, the pit might have been dug in order to make a one-off deposition of animal bone as a symbolic offering, or similar ritualised gesture, towards the end of the structure's internal use. The spread of animal bone and burnt material (1037) immediately to its west could be associated. The charcoal and burnt stones in the deposit do not represent burning *in situ* and must have been put there, together with the bones on the floor of Structure O84 and a few scattered objects, such as bone tool SF2018 and pestle SF2045, whether as simply a small dump of food preparation waste, or in a more symbolic fashion, is unclear. It cannot be said whether backfilling of feature [1043] took place before or after the deposition of (1037), or infilling of [1042], but all these events directly preceded the beginning of the infilling of the structure as a whole.

Deposit (1019), which extended across the whole of the interior of the structure, represents the silting and accumulation of rubbish in the final stage of the use of the structure, when mud-plaster floor (1022) was no longer being cleaned. Greyish-brown silt accumulated over the objects, deposits and features associated with floor (1022), and during this time additional quantities of animal bone and chipped stone were introduced.

The final stage in the history of Structure O84 was more dramatic. The sequence of pisé rubble infilling deposits (1030), (1014), (1002) and (596)/(650), which overlay (1019) and contained few finds, probably represents collapse and subsequent dumping of predominantly structural material in the form of pisé and stone rubble. Deposit (1030), which lay directly above silt (1019) and contained no finds whatsoever, was probably created by the initial collapse of the structure (Figure 19.13). The rubble was thicker against the walls and thinner in the middle of the interior, but there was no way of distinguishing between material that might have derived from the roof or the walls. Rubble pieces with plant stem impressions were found throughout the rubble sequence and it is possible that these were parts of the roof that were in contact with reeds used in its construction. Structural samples have been collected from all the rubble deposits for comparative analysis.

The processes of filling the structure and the destruction of its superstructure were, therefore, one and the same; it is likely that it did not take very long before the subterranean part of the structure was completely filled in. We cannot determine whether the demolition of the structure was deliberate, or whether the initial collapse occurred accidentally. The final events and the deposition associated with floor (1022) can, on the one hand, be seen as symbolic acts of closure of the occupation, and in such a scenario deliberate destruction of the structure would perhaps be more plausible. On the other hand, the fact that the interior was left to silt up with (1019) could suggest prolonged abandonment, or sporadic use, during which Structure O84 fell into disrepair and finally collapsed. The possible removal of a mortar from feature [1043] could fit either of these scenarios.

Once the structure was filled in and the walls were level with the ground, more rubble and other material accumulated in the form of mixed deposit (638), which extended not only over Structure O84, but also over the adjacent area of Space O114 to the northwest. The material culture in this deposit was most likely brought from elsewhere and dumped across the area, perhaps in order to level it off. Fragmentary remains of a smooth silt surface (227) were found on top of this material, although, due to its ephemeral nature, it is unlikely that this deposit was purposefully laid, or that it could have acted as a floor. Most of the patches of silt (227) were around 0.01 m in thickness, sometimes less, and it is probable that they were laid by water.

There is no evidence for further structural activity in this location, although erosion may have been substantial. The evidence indicates that the area was used for burial. Three shallow burials were identified, although it was difficult to trace any cuts due to the similarity of the deposits inside the burials and those they were cut into. The burials were at the boundary level of erosion and hence preservation was patchy. It is not clear whether the partial nature of skeletons (11), (207) and (461) reflects the nature of their interment, or simply the truncation of their higher parts. Both partial interment and partial extraction of human remains have been noted elsewhere on the site. The burials are the last meaningful archaeological evidence in the area previously occupied by Structure O84. The stratigraphic levels from which the burials were cut have been entirely eroded. As such, we lack information about their context, including whether they were dug inside or outside contemporary structures.

20. Intramural Space O114

20.1 Location and relationship with other structures

Intramural Space O114 is within a chain of conjoined semi-subterranean oval structures flanking Structure O75 along its southwestern and western sides (Figure 20.1). It covers the area between Structure O84 and Structure O65 in this chain (Figure 20.1). This area contains a floor, which cannot be associated with any surviving walls. To the south and southwest Intramural Space O114 is also bordered by Structures O83, O66 and poorly defined Structure O113. The limited extent of excavation has prevented the stratigraphic relationships between O114 and all of its adjacent structures from being resolved.

Figure 20.2 provides the stratigraphic matrix for the excavated deposits, and Figure 20.3 a view of the excavation. Tables 20.1, 20.2 and 20.3 list the excavated contexts, bulk funds, and small finds respectively.

20.2 Description of the excavated deposits

Excavation of the overburden (1 and 187) exposed an amorphous concentration of loose stone rubble (4) and a burial, designated as Burial O27.

Burial O27 consisted of a sequence of greyish-brown silt deposits (239), (431), (450) and (457) overlying the partial remains of a juvenile skeleton (244), (Figure 20.4). Deposits (239), (450) and (457) were loose burial fills affected by erosion and insect burrowing, but deposit (431) formed several patches of friable silt with smooth surfaces. These patches came up to and abutted the cranium of a skeleton and were investigated as the possible remains of a mud-plaster surface. Upon excavation, however, it was clear that their hardened texture was most likely the result of insect activity. The burial contained two marine shell beads (SF363, SF2098), one in deposit (239) and the other in deposit (457), which also contained a non-perforated marine shell (SF2753).

Skeleton (244) lay in a crouched position with its head to the north and legs to the south (Figure 20.5). The body was tightly packed in sub-oval burial cut [531] measuring 0.53 m x 0.35 m. The feet were pressed against the southwest edge of the cut and the skull against the northwest edge. The skull lay on its right side facing west and was in a fragmentary state. One hand was placed in front of the chest/skull area and the other appears to have been under the skull. The legs were tightly tucked up so that the heels were almost touching the pelvis.

The cut [531] of Burial O27 clipped another burial to its southeast. This was designated as Burial O77, which was filled with similar greyish-brown silts (539) and (519) in a small sub-rectangular grave cut [513]. Skeletal remains (509) consisted of disarticulated long bones including left and right legs and a possible upper arm (Figure 20.5). Despite the general disarticulation of these remains, the long bones, which were unfused, had their epipheses present.

The removal of overburden (187) also exposed a post-hole [441], filled with loose mid-brown silt (440), (Figure 20.4). The post-hole was 0.12 m in diameter and survived to a depth of 0.07 m. Both the burials and the post-hole were cut into compact yellowish-brown silts, (235) and (433), which extended around an irregular line of stones set into the underlying deposits. Immediately to the south there was a localised spread of dark brown silt (447) and below all these deposits a small patch of compact orangish-brown silt (445).

Underlying these contexts there was a more extensive deposit (638), which was a mixture of yellowish-brown

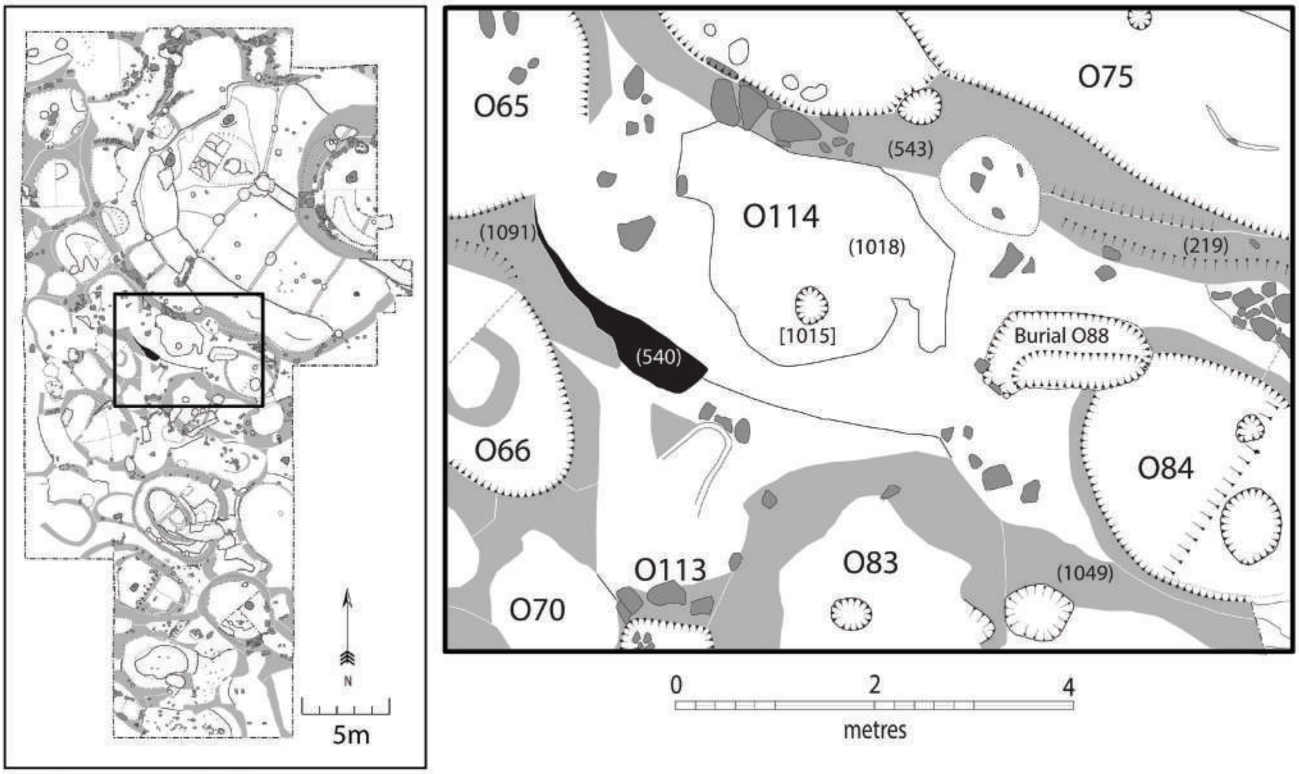


Figure 20.1 Location of Intramural Space O114 and plan showing its relationships with the surrounding Objects.

Figure 20.2 View of Intramural Space O114 showing burnt feature (651)[1015] set centrally in deposit (1018). Scale 2.0 m.

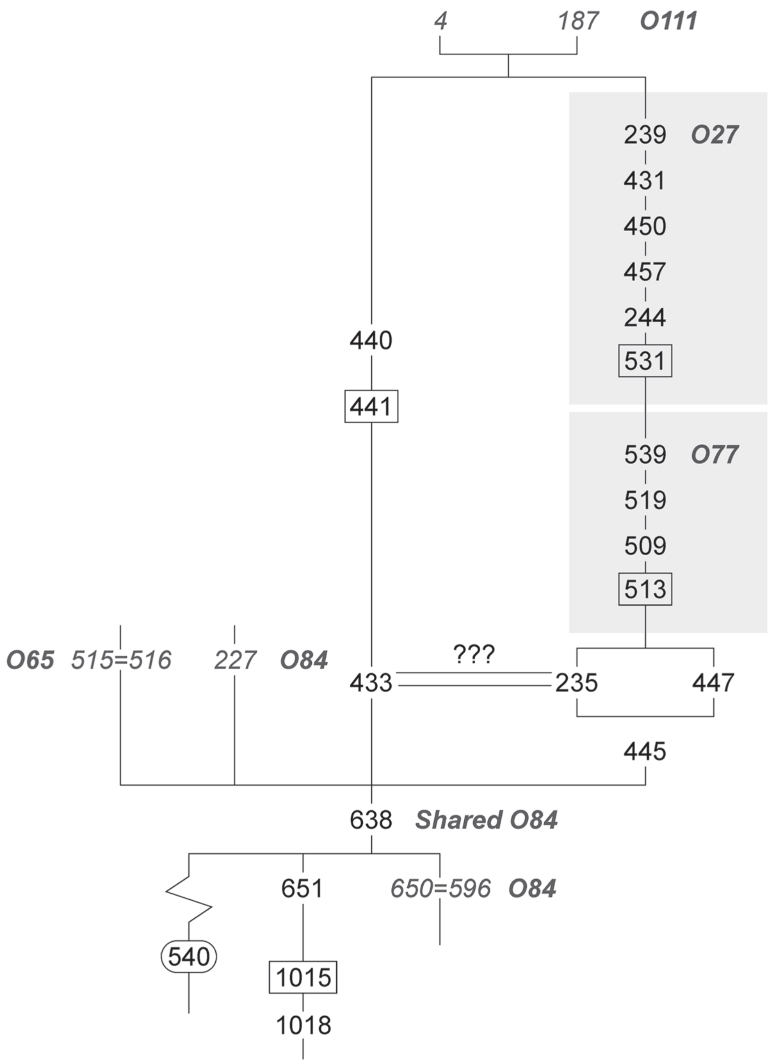


Figure 20.3 Stratigraphic matrix for Intramural Space O114.

pisé rubble in loose light greyish-yellow and light grey silt. This was between 2.5 m and 3 m wide and stretched for 8.6 m over the entire area of Intramural Space O114 and Structure O84. The excavation of this 0.05–0.10 m thick deposit exposed the oval outline of the pisé walls of Structure O84. In the area of Intramural Space O114 its excavation revealed a burnt feature (651) that filled cut [1015], 0.3 m diameter and 0.2 m deep, which was set into compact orangish-brown clay silt (1018). Silt (1018) is interpreted as a floor (Figures 20.3 and 20.6). Small finds (SF902, SF905, SF1310) of bitumen, bone and perforated stone were found in (638), along with significant quantities of animal bone and chipped stone. The removal of (638) also exposed remains of pisé wall (540) to the south of floor (1018), but no relationship has yet been established between this wall and the floor (Figure 20.1).

Feature [1015] was filled with loose light grey ashy silt (651) and charcoal. The fill was surrounded by a reddish halo from the scorching of the surrounding deposit (1018). The cut had steep, almost vertical sides. At the base of the cut was a flat stone, which showed no evidence of burning (Figure 20.6). Feature [1015] was central to (1018), which was oval in shape, although its northern edges were much more difficult to identify. The distinction between (1018) and the surrounding unexcavated deposits was much clearer in the south. Deposit (1018) was not excavated, investigation of this area ending with the excavation of feature [1015].

20.3 Interpretation

Investigation of the area of Intramural Space O114 was limited in comparison to the adjacent Structures O84 and O65. The possibility that a similar northwest–southeast orientated oval structure had been present between them only started to emerge following the excavation of the extensive rubble and silt deposit (638). Excavation of the same material uncovered the outline of Structure

Table 20.1 Contexts excavated within Space O114 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
235	compact pale yellowish-brown silt with frequent white flecks and occasional charcoal flecks	localised silty spread
239	mid-light brown loose silt	burial fill
244	partial remains of a juvenile human skeleton	partially preserved primary burial
431	mid-greyish-brown friable silt	burial fill
433	pale yellowish-brown compact silt	localised silty spread
440	loose mid-brown silt	fill of post-hole
441	circular cut with straight sides	post-hole
445	orangish-brown firm silt	localised silty spread
447	dark brown friable silt	localised silty spread
450	mid-greyish-brown loose-friable silt	burial fill
457	dark brownish-grey loose silt (compacted in area of insect burrowing)	burial fill
509	disarticulated human remains	secondary burial
513	sub-rectangular cut	cut for burial
515	loose light yellowish-grey sandy silt	localised silty spread
519	firm mid-greyish-brown silt	burial fill
531	sub-oval cut with sharp breaks of slope and steep sides	cut for burial
539	firm mid-greyish-brown silt	burial fill
540	compact light greyish-brown pisé	pisé wall
638	light greyish-yellow, light greyish/yellowish-brown pisé and silt	extensive accumulation of silt and pisé rubble over the area of disused structures
651	loose light grey ashy silt with a burnt red 'halo'	fill of hearth
1015	oval cut with sharp breaks of slope, vertical sides and a flat base	cut of hearth
1018	compact orangish-brown clay silt	mud-plaster surface

Table 20.2 Quantities of bulk finds from Space O114 by material and context number.

Object 114	Volume of sediment (l)				Weight of bulk finds per material (g)															
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Unworked stone	Animal bone	Human bone	Unidentified bone	Marine shell	Other shell	Plaster/Pisé	Textile	Basktery	Wood	Plant matter	Charcoal	Misc.
235	27.0	26.0	0.0	1.0	101.0	0.0	2.0	0.0	0.0	0.0	3.2	0.0	4.7	0.0	0.0	0.0	0.0	0.0	20.0	0.0
239	4.0	3.0	0.0	1.0	12.1	0.0	0.1	0.0	0.0	0.0	2.1	0.0	13.5	0.0	0.0	0.0	0.0	0.0	0.2	0.0
431	0.5	0.5	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
433	1.0	0.0	0.0	1.0	89.7	0.0	0.0	0.0	0.0	0.0	8.2	0.0	14.5	0.0	0.0	0.0	0.0	0.0	10.0	0.0
440	0.5	0.5	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.1	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
445	6.0	6.0	0.0	0.0	27.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	4.4	0.0	0.0	0.0	0.0	0.0	0.1	0.0
447	1.5	1.5	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	1.2	0.0	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
450	5.0	5.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	7.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
457	6.0	6.0	0.0	0.0	33.9	0.0	0.1	0.0	0.0	0.0	4.9	0.0	23.1	0.0	0.0	0.0	0.0	0.0	10.1	0.0
509	3.0	2.0	0.0	1.0	3.2	0.0	0.0	0.0	1.2	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.1	0.0
515	31.0	30.0	0.0	1.0	149.4	0.0	0.4	0.0	17.0	0.0	0.0	0.0	4.6	0.0	0.0	0.0	0.0	0.0	0.1	0.0
519	1.0	0.0	1.0	0.0	120.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
638	198.0	0.0	198.0	0.0	1660.0	0.0	30.0	0.0	2143.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
651	16.0	15.0	0.0	1.0	113.0	310.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	300.5	95.5	199.0	6.0	2333.8	310.0	32.6	0.0	2171.2	0.0	20.8	0.0	80.0	0.0	0.0	0.0	0.0	0.0	40.8	0.0

Table 20.3 Quantities of small finds from Space O114 by material and context number.

Object 114							
Context	**Chipped stone**	**Worked bone**	**Unworked animal bone**	**Marine shell beads**	**Marine shell other**	**Bitumen objects**	**Total small finds**
235	0	0	0	0	1	0	1
239	0	0	0	1	0	0	1
457	0	0	0	1	1	0	2
638	1	1	1	0	0	1	3
Total	1	1	1	1	2	1	7

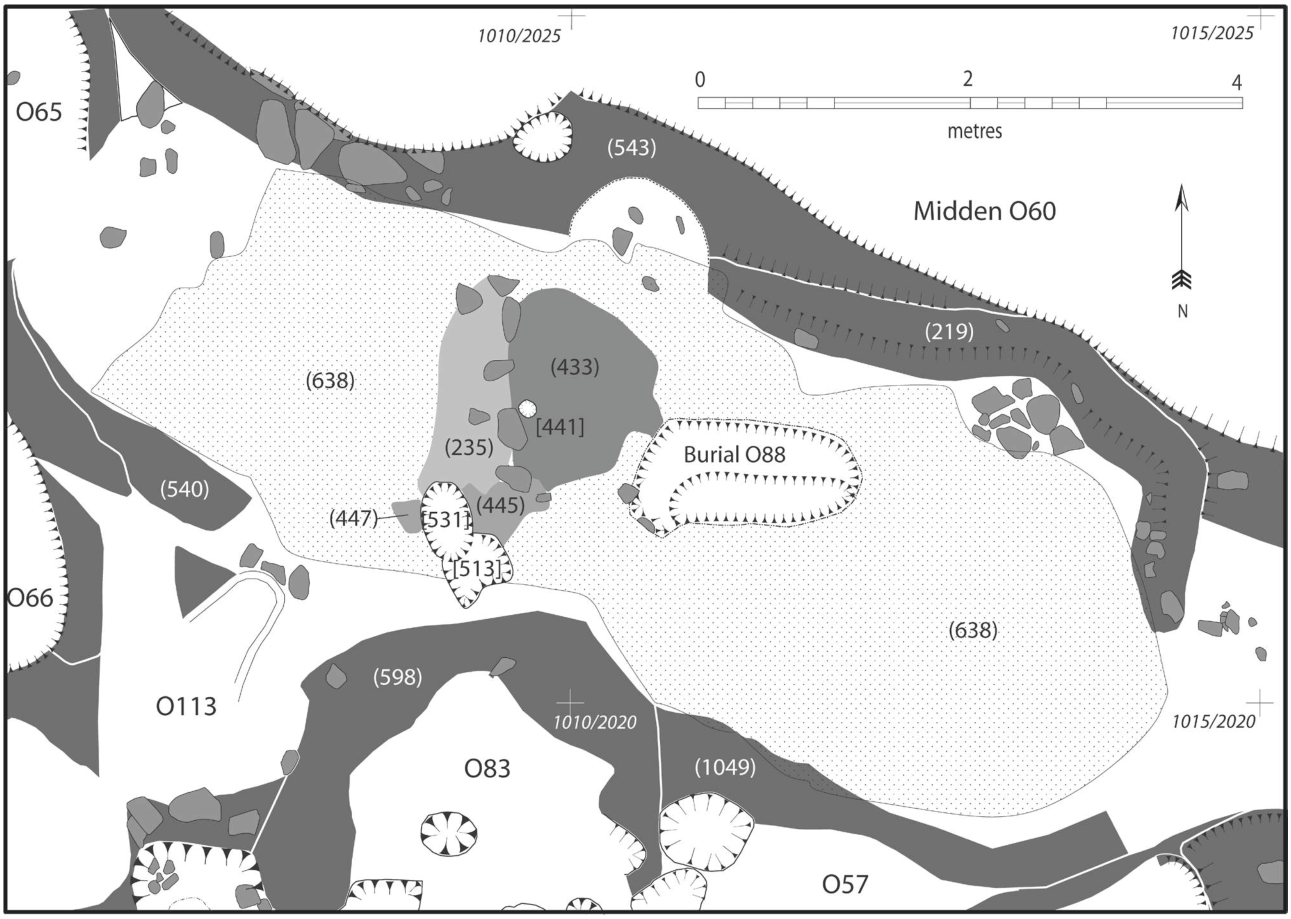


Figure 20.4 Plan showing the extent of deposits (638), (235), (433), (445) and (447) and the location of cuts [531], Burial O27and [513], Burials O77 and post-hole [441].

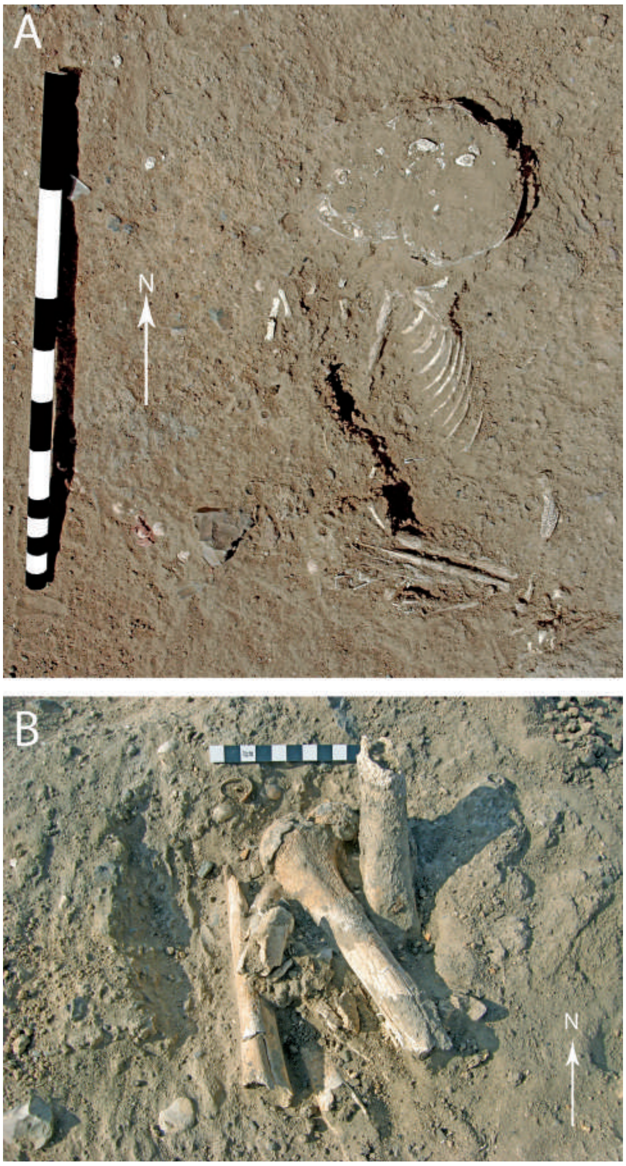


Figure 20.5 A — Skeleton (244) in Burial O27, scale 0.5 m; B — Skeletal remains (509) in Burial O77. Scale 0.1 m.

O84 (see Chapter 19). Context (1018) may have formed an interior mud-plaster floor, containing a small central pit [1015] in which burning had occurred. The fill (651) contained small amounts of chipped and ground stone, snail shells and charcoal, but without further analysis of this material and the phytolith samples, it is difficult to ascertain its purpose. The role of overlying deposit (638) is clearer. This extensive mixed deposit, which contained much stone and pisé rubble, appears to have

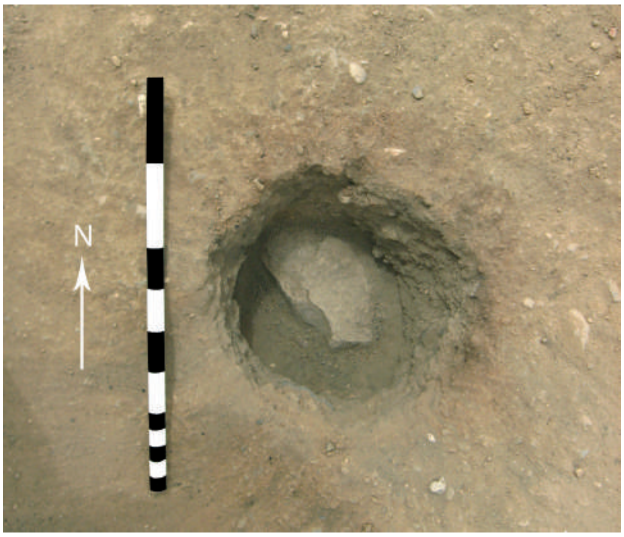


Figure 20.6 Post-excavation photo of burnt feature [1015] showing flat stone at the base. Scale 0.5 m.

been laid deliberately over the entire area of Space O114 and Structure O84, perhaps to level the area prior to some other use. Distinctive, localised spreads of silt (515, O65), (445) and (447) were incorporated into this wider levelling activity.

Wall fragment (540) could not be associated with the potential structure represented by floor (1018). We suspect that this wall is a remnant of an earlier structure that had been destroyed by subsequent activity. It may be associated with wall (1049), which runs on a similar alignment between Structures O84 and O56 (Figure 20.1).

The remnants of a patchy mud-plaster surface represented by (235) and (433) suggest that some later occupation within Space O114 had occurred. Similar patchy surfaces were recognised at this level over Structure O84, but it is impossible to say whether they were once spatially related, or whether the two areas continued as separate entities. A small post-hole [441] was set roughly in the middle of the surviving extent of surface(s) (235) and (433).

Burials O27 and O77 were at the top of the sequence. Although heavily truncated by the erosion, enough survived to identify differences in the treatment of the human remains found within them. While the crouched juvenile in Burial O27 represents a primary inhumation, the remains (509) in Burial O77 are from a secondary, or delayed, interment, being exclusively long bones with unfused epipheses. These were roughly in their correct anatomical positions suggesting the burial of a young person with some flesh or sinews still surviving.

21. Structure O83

21.1 Location and relationship with other structures

Structure O83 is located in the centre of the 2008–2010 excavation trench (Figures 21.1, 21.2). It is elliptical in shape with maximum internal dimensions of 2.5 m x 2.0 m, defined by the remains of a pisé wall. A large rectangular Antique Burial O87 (Chapter 6) had cut the southeast side of the Structure. In addition to Burial O87, Structure O83 was cut by five shallower burials (O36, O37, O38, O39 and O89), all of which are interpreted as belonging to the PPNA.

Structure O83 was not extensively excavated, but its surviving deposits were effectively sectioned by the Antique Burial O87. The full extent of Structure O85 to the south is not known, and loss of stratified deposits caused by Burial O87 makes the relationship between Structures O85 and O83 impossible to determine. The limited extent of excavation, other than that of the burials, means that the relationships between Structure O83 and Intramural Space O57 to the east, Structure O113 to the west, and Intramural Space O114 to the north, also remain largely undetermined.

Figure 21.3 provides the stratigraphic matrix, while the contexts are described in Table 21.1 with the bulk and small finds listed in Tables 21.2 and 21.3 respectively.

21.2 Description of the excavated deposits

Excavation of the overburden (1 and 123) exposed the surface of an orangish-brown pisé wall (598), which defined the boundary of Structure O83. This wall had been cut by a number of features, the largest being Burial O87 (Figures 21.4 and 21.5), described in Chapter 6. The cut for this burial had removed a significant part of the southeast side of Structure O83, including the upper part of wall (598). The base of the cut was stepped with the lower part of the cut that formed the burial chamber, being deeper than the base of Structure O83. The section through Structure O83, exposed by the cut for Burial O87, exposed the lower part of wall (598) and the interior sequence of the structure.

Four shallow burials had been cut into the circuit of wall (598): a single cut (Burial O36) at the western side and a group of three cuts (Burials O37, O38 and O39) at the eastern side of the structure (Figure 21.5). Burials O36 and O39 were in turn cut by small pits [49] and [51] respectively. Pit [49] contained two fills (48) and (268). The upper fill (48) was of loose greenish-grey silty sand, with a few pockets of charcoal from which a dentallium marine shell bead (SF2102) was recovered. The lower fill (268) was a loose dark brownish-grey silt, rich in charcoal. Both deposits contained small amounts of chipped stone and animal bone (Table 21.3). Cut [49] was sub-triangular with moderately sloping sides and a concave base.

Burial O36

Pit [49] cut the northernmost part of Burial O36 (Figure 21.6A), which was orientated northeast to southwest across the line of wall (598). The southwest end of the burial had also been truncated by a recent pit [3]. This had been cut from the present-day surface of the knoll and primarily located within Structure O113 (Chapter 25) to the southwest of Structure O83. Evidence for animal burrowing and related disturbance, such as a concentration of charcoal-rich silt (306) in an animal burrow at the southwest end of the burial, was evident. The upper fill of the burial, yellowish-brown sandy silt (286), had been particularly affected by the burrowing. This deposit contained chipped stone, animal bone and a small stone object shaped like a mushroom or a phallus (SF316) (Figure 21.6B).

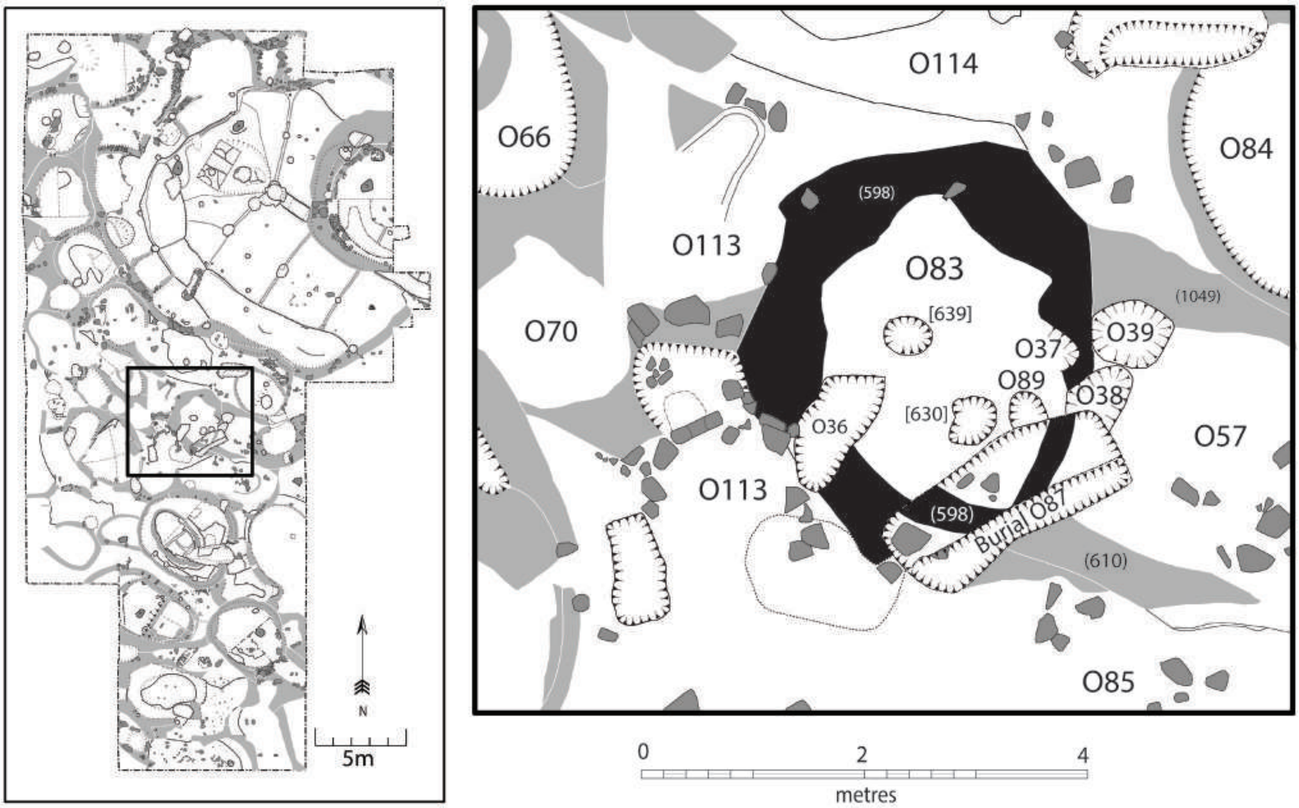


Figure 21.1 Location of Structure O83 and plan showing its relationships with surrounding Objects.

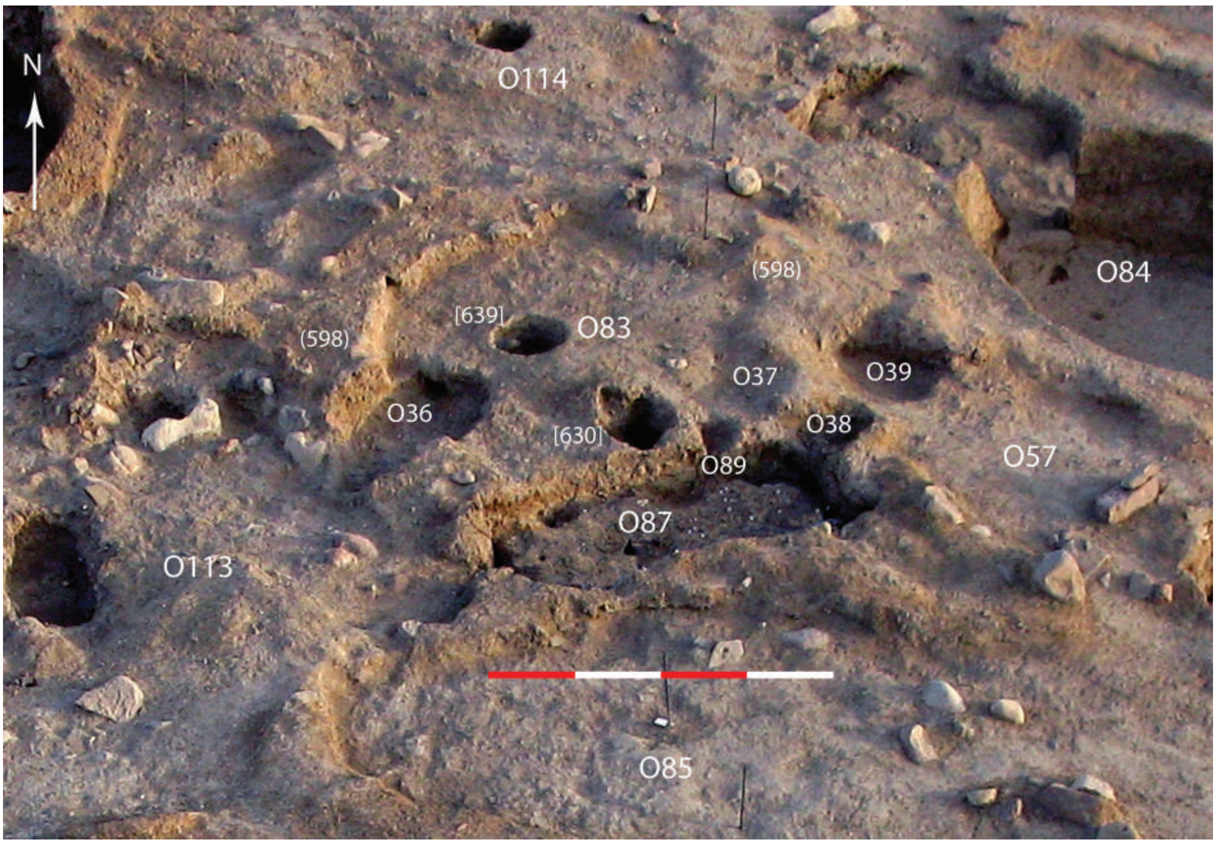


Figure 21.2 View of Structure O83 showing excavated burials and other features. Scale 2 m.

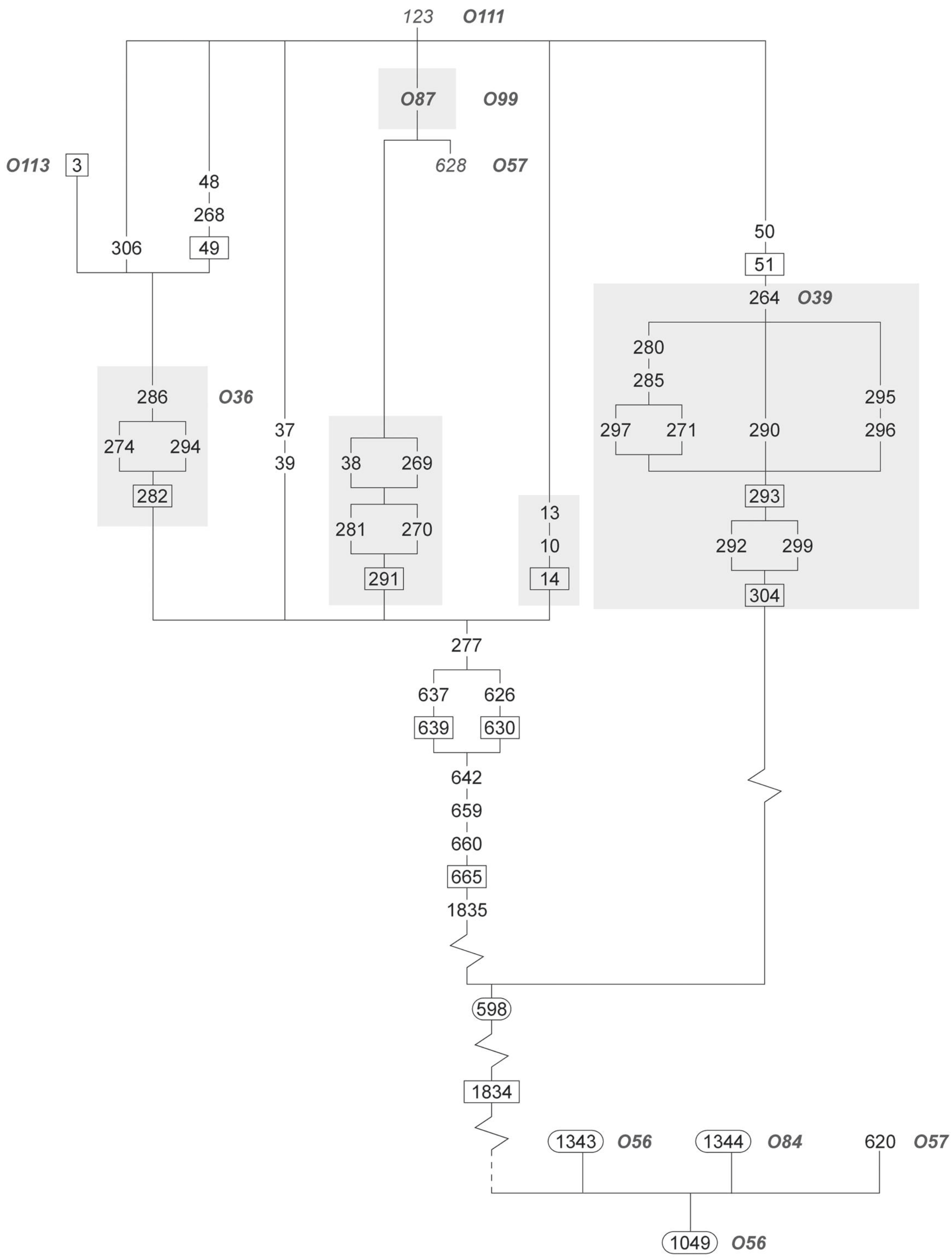


Figure 21.3 Stratigraphic matrix for Structure O83.

Underlying fill (286) there was a skeleton (274), positioned in a crouched manner on its right hand side facing eastwards. The bones were well preserved, with several marked by black staining. The skeleton (274) appeared too big for the burial cut [282] with the angles of the bones on the left hand and both feet suggesting the body had been crammed into the cut (Figure 21.7). It is possible that the left femur had been deliberately dislocated from its socket in order to flex the leg to fit into the burial pit. The right hand was positioned between the right shoulder and the head (Figure 21.8A). The finger bones were found splayed on either side of the top of the right humerus (Figure 21.8B). A serrated chipped-stone artefact (SF342) was found underneath the skull.

Table 21.1 Contexts excavated in Structure O83 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
10	articulated human skeleton	primary crouched inhumation burial
13	friable light brownish-grey silty sand	burial fill
14	sub-square shallow cut	cut for burial
37	friable mid-grey silt with small fragments of bone, shell, charcoal and chipped stone	contents of a stone bowl
38	loose mid-grey sandy silt with small whitish fleck, most likely (gypsum)	burial fill
39	stone installation formed from fragmented ground-stone bowl and a flat chipped slab	stone object-built installation
48	loose mid-greenish-grey silty sand	fill of small pit
49	sub-circular shallow cut	cut for small pit
50	loose mid-yellowish-grey silty sand	fill of small pit
51	sub-circular shallow cut	cut for small pit
264	soft/friable orangish-brown silt	burial fill
268	loose dark brownish-grey silt with a high concentration of charcoal	fill of small pit
269	fragmented neonate or infant cranium fragment	probable secondary burial
270	truncated badly preserved human remains	heavily truncated primary burial
271	semi-articulated jumbled human skeleton	secondary burial
274	articulated human skeleton	primary crouched inhumation burial
277	grey silt	silt accumulation inside structure
280	compact brownish-orange silt	localised burial fill
281	loose dark grey ashy-silt with gypsum flecks	localised burial fill
282	sub-rectangular cut with vertical sides and a flat base	cut for burial
285	greyish-white soft/friable clayey silt	content of an organic container accompanying burial
286	yellowish-brown sandy silt friable	grave backfill
290	white firm gypsum plaster/paste	gypsum lining of a woven basket containing human remains
291	irregular oval cut with steep sides except for the south which is moderately shallow	cut for burial
292	hard brownish-grey sandy silt with frequent stones	burial fill
293	oval cut with steep slightly convex sides and a concave base	cut for burial
294	compacted light grey silt	initially probably liquidised mud lining/capping burial
295	compact brownish-orange sandy silt	burial fill
296	friable light greyish-white gypsum and silt mix	localised burial fill
297	loose/soft light greyish-brown silt	decayed organic residue in association with skull of burial
299	soft and friable brownish-grey silt	burial fill
304	sub-rectangular cut	heavily truncated cut for burial
306	concentration of charcoal-rich silt	localised burial fill (animal burrow)
598	orangish-brown pisé	pisé wall of structure
626	loose pale grey sandy silt	fill of small pit
630	sub-circular cut with vertical sides and an irregular base	cut for small pit
637	soft/loose pale brown silt	fill of small pit
639	irregularly rounded cut with steep sides and an irregular base	cut for small pit

Table 21.1 Contexts excavated in Structure O83 with sedimentary descriptions and interpretations continued...

Context	Description	Interpretation
642	loose light orangish-brown silt with small stones, pisé and charcoal inclusions	silt and rubble accumulation inside structure
659	loose light brown silt	burial fill
660	partially surviving human remains	truncated remains of a neonate or infant burial
665	truncated oval-shaped cut with uneven sides and base	cut for burial
1834	probably oval but unexcavated cut with steep sloping sides	construction cut for Structure O83
1835	unexcavated grey silt exposed by later burial cut	possible occupation inside structure

Table 21.2 Quantities of bulk finds from Structure O83 by material and context number.

Object 83	Volume of sediment (l)				Weight of bulk finds per material (g)								
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Animal bone	Unidentified bone	Marine shell	Other shell	Charcoal	Misc.
13	22.5	20.5	0.0	2.0	84.9	0.0	0.0	0.0	20.0	0.0	129.3	30.4	0.0
37	0.1	0.1	0.0	0.0	1.4	0.0	0.0	0.0	0.1	0.0	1.2	0.0	0.0
38	38.0	37.0	0.0	1.0	163.1	0.0	0.0	0.0	31.0	1.0	34.4	20.3	0.0
39	10.0	10.0	0.0	0.0	27.4	0.0	0.0	0.0	4.5	0.0	14.9	0.1	0.0
48	11.0	10.0	0.0	1.0	39.8	0.0	0.0	0.0	2.3	0.0	13.2	0.2	0.0
50	15.0	14.0	0.0	1.0	94.8	0.0	2.0	0.0	4.2	0.0	8.2	0.0	0.0
264	31.0	30.0	0.0	1.0	107.2	0.0	0.0	0.0	13.0	0.0	13.7	20.6	0.0
268	23.0	10.0	12.0	1.0	124.0	0.0	0.0	0.0	10.6	0.0	5.0	0.0	0.0
277	130.0	20.0	110.0	0.0	431.0	0.0	10.1	10.0	3.5	0.0	0.0	0.1	30.0
281	1.0	1.0	0.0	0.0	12.91	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0
286	41.0	40.0	0.0	1.0	108.04	0.0	0.0	0.0	14.4	0.5	41.1	0.5	0.0
292	4.0	4.0	0.0	0.0	141.9	0.0	0.1	0.0	4.0	0.0	2.3	0.3	0.0
294	51.0	50.0	0.0	1.0	163.3	0.0	0.1	0.0	51.6	0.0	44.3	0.0	0.0
295	3.0	3.0	0.0	0.0	25.5	0.0	0.0	0.0	3.6	0.0	1.8	0.1	0.0
297	0.5	0.5	0.0	0.0	0.3	0.0	0.0	0.0	0.7	0.0	0.2	0.2	0.0
299	2.0	2.0	0.0	0.0	21.5	0.0	0.0	0.0	3.4	0.0	2.5	0.3	0.0
626	20.0	20.0	0.0	0.0	33.2	0.0	0.0	0.0	5.6	0.0	12.3	0.2	0.0
637	20.0	20.0	0.0	0.0	29.0	0.0	0.0	1.8	0.0	0.0	2.3	0.2	0.0
642	131.0	30.0	100.0	1.0	165.5	0.0	0.0	10.0	2.3	0.0	8.4	0.0	0.0
659	4.0	4.0	0.0	0.0	12.3	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0
Total	558.1	326.1	222.0	10.0	1787.05	0.0	12.3	21.8	176.7	1.5	335.2	73.5	30.0

Table 21.3 Quantities of small finds from Structure O83 by material and context number.

Context	Chipped stone	Ground stone	Other stone	Worked bone	Bone beads	Stone beads	Marine shell beads	Glass beads	Total small finds
13	2	0	0	0	0	0	1	0	3
38	0	0	0	1	0	0	0	0	1
39	0	2	0	0	0	0	0	0	2
48	0	0	0	0	0	0	1	0	1
50	0	1	0	0	0	0	0	0	1
264	5	0	0	0	0	1	0	0	6
277	0	1	0	0	0	0	1	0	2
286	0	0	1	0	0	0	0	0	1
292	0	0	0	0	0	0	0	1	1
294	1	0	0	0	0	1	0	0	2
598	1	0	0	0	0	2	0	0	3
Total	9	4	1	1	0	4	3	1	23

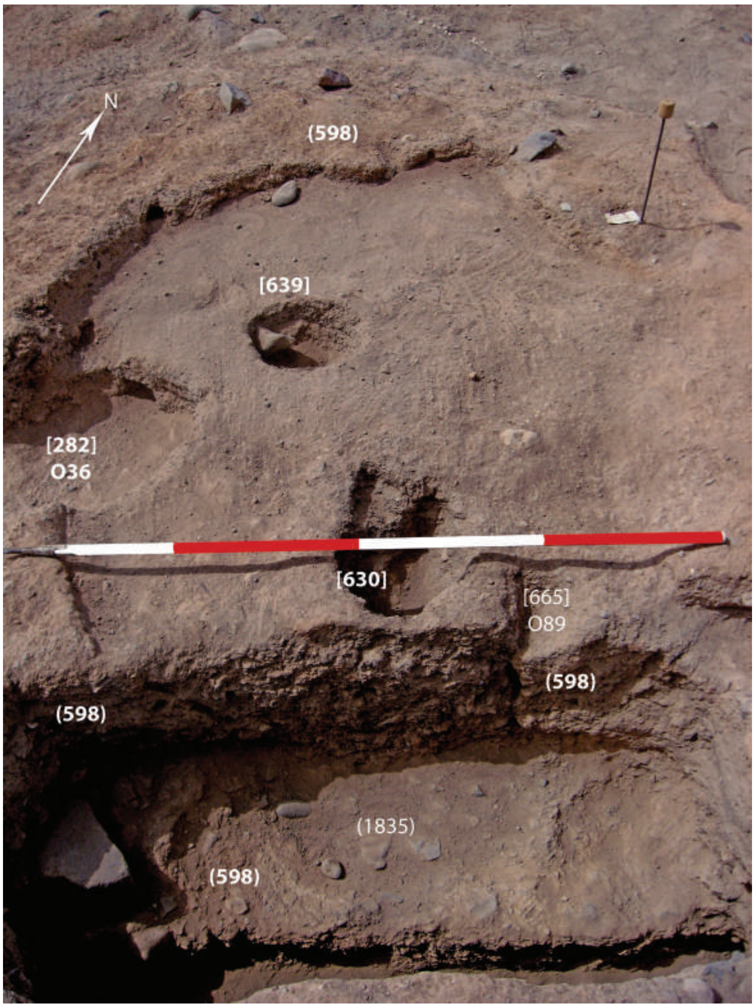


Figure 21.4 Structure O83 from the southeast with the excavated Burial O87 in the foreground showing continuation of truncated wall (598) around infilling deposit (1835). Scale 2.0 m.

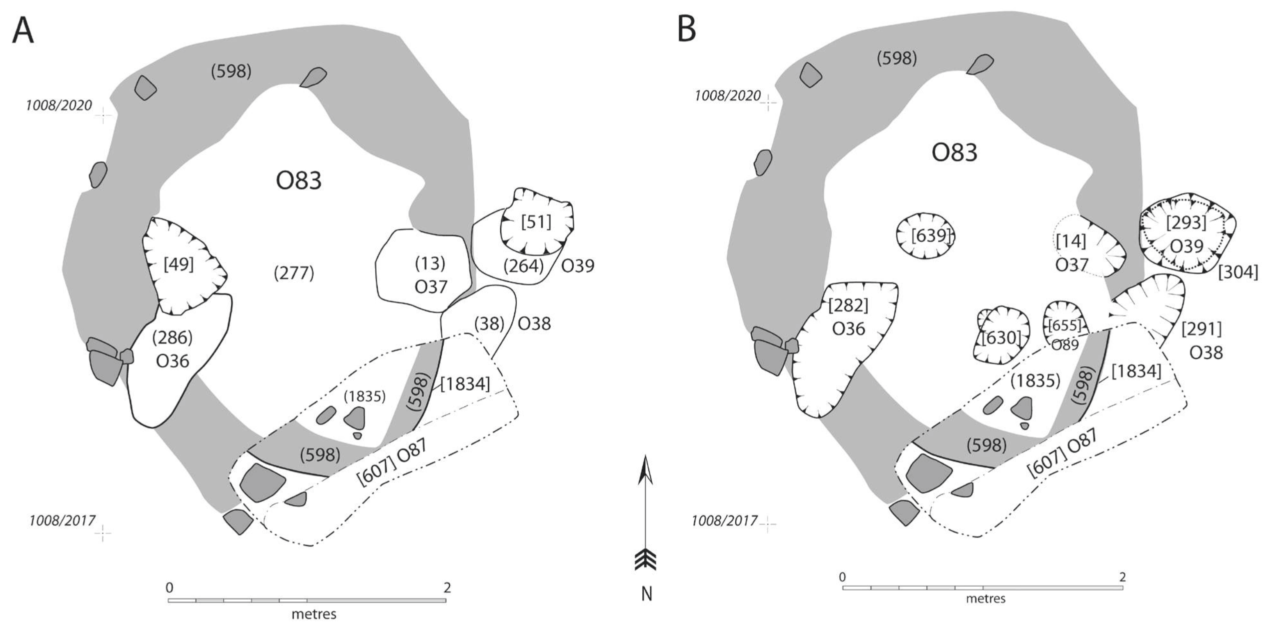


Figure 21.5 Plan of Structure O83 showing: A — the location of burials and pits at the top of the stratigraphic sequence; B — the location of pits [630] and [639] and Burial O89 at a lower stratigraphic level.

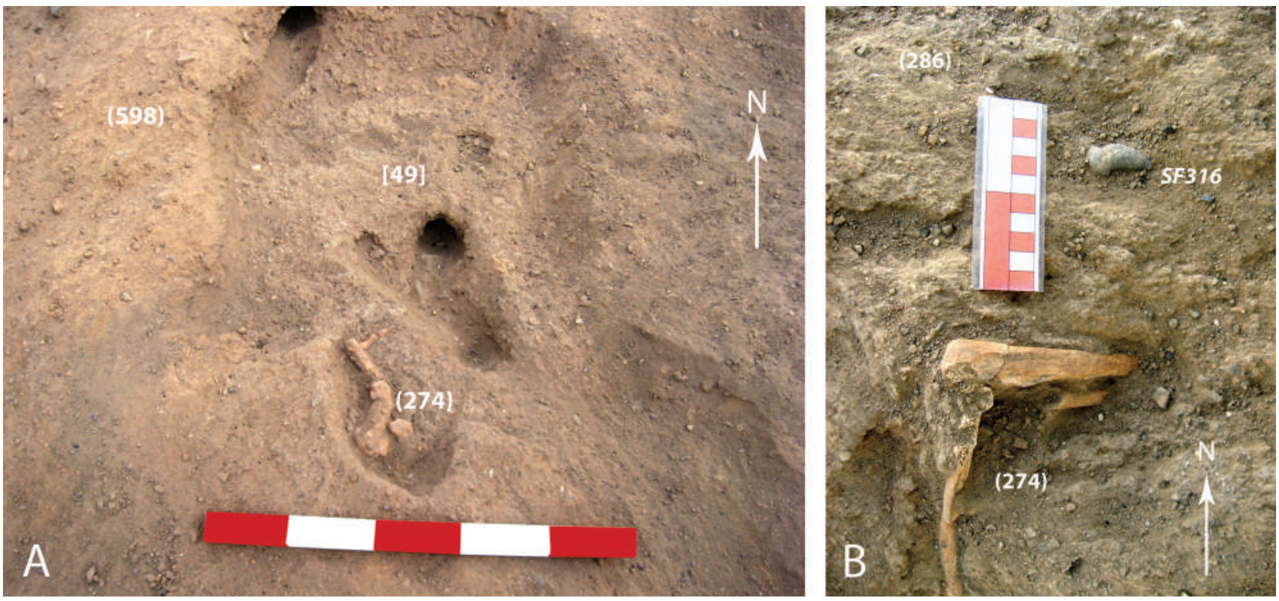


Figure 21.6 A — Pit [49] from the south showing disturbance by animal burrowing and the exposed bones of the left foot of skeleton (274), scale 0.5 m; B — stone object SF316 as found in fill (286) in relation to the left elbow of skeleton (274), scale 0.1 m.

Skeleton (274) was within a compacted light grey silt (294), which covered the sides and the base of the burial pit, forming a 0.10 m thick ledge at the northeast end (Figure 21.9A). This silt deposit encased the bones, suggesting that liquid mud had been poured from above onto the skeleton. Deposit (294) contained slightly higher quantities of chipped stone and animal bone than the overlying fill (286). The burial cut [282] was an elongated oval in shape across the full width of pisé wall (598), the lower part of which was visible in the base of the grave (Figure 21.9B).

Burial O37

At the eastern side of Structure O83 a cluster of features cut pisé wall (598) at its junction with the east-southeast–

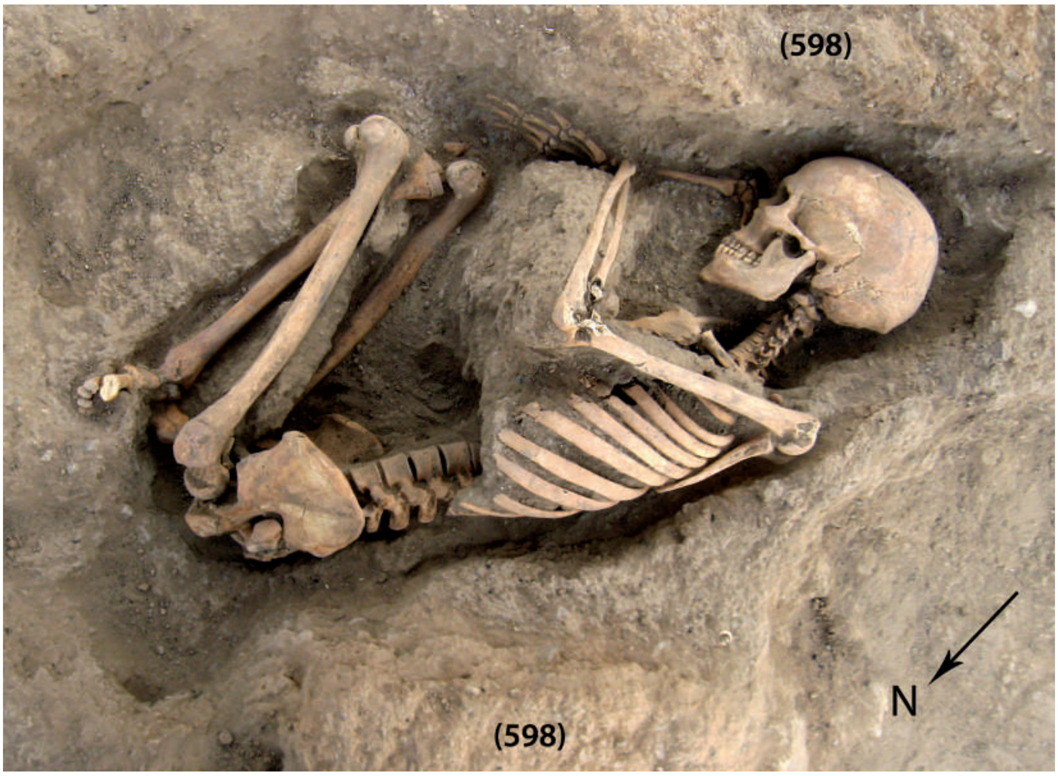


Figure 21.7 Skeleton (274) in Burial O36 cut through wall (598). Note the 90° angles of the upward angled right foot and the left hand.

Figure 21.8 A — View of the position of the right hand under the skull from the east; B — Detail of the bones of the right hand after the removal of the skull. Scale 0.1 m.

west-northwest orientated pisé wall (1049) (Figure 21.5). Burial O37 was cut [14] half into wall (598) and half into grey silt (277) inside Structure O83. The cut [14] was filled with a single deposit, a light brownish-grey silty sand (13) with occasional charcoal inclusions and small stones. The fill contained chipped stone and bone fragments, which appear unrelated to the well-preserved skeleton (10). Two flint blades were found (SF115, SF120), the larger of which was positioned underneath the skeleton. A marine shell bead (SF116) was also found.

Skeleton (10) was an inhumation of a crouched juvenile; it appeared complete except for the highest point on the left side of the skull, which had been damaged by ancient truncation (Figure 21.10). The body was placed on its right side with both legs flexed towards the chest. The right arm was flexed and the hand placed underneath the head, which was tilted to face downwards. The left arm was flexed between the knees. The top of the head was pointing northwest (Figure 21.11). The skull and torso of the skeleton were

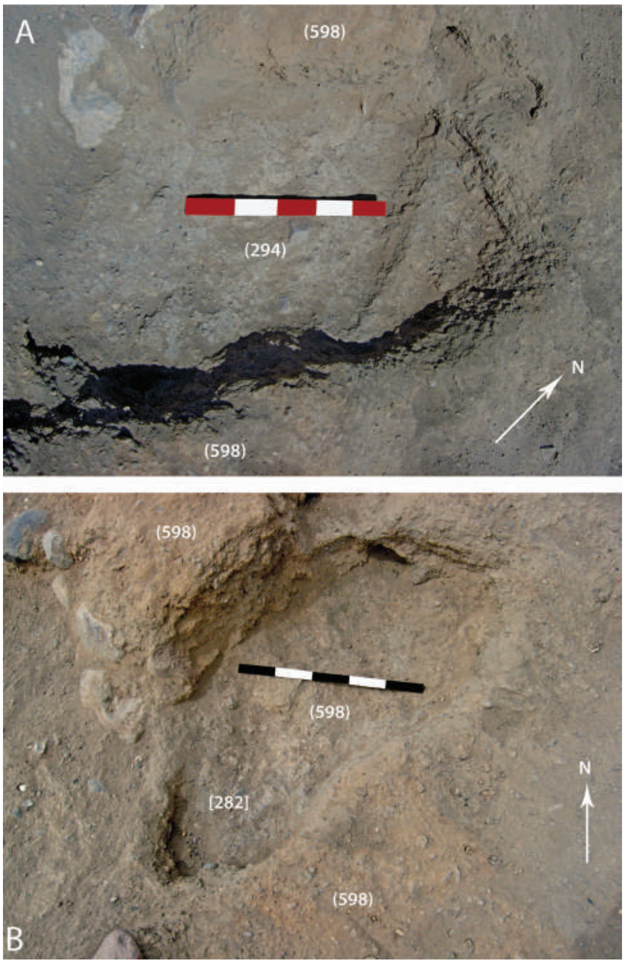


Figure 21.9 A — Mud fill (294) at the base of Burial O36 after the excavation of skeleton (274); B — Fully excavated Burial O36, showing cut [282] cut into the top of pisé wall (598). Scale 0.5 m.

lifted as individual blocks, together with the sediment contained within them.

The cut [14] of Burial O37 was sub-square in shape, measuring 0.49 m x 0.56 m and 0.20 m in depth. It was cut through wall (598), as were adjacent Burials O38 and O39. Immediately west of the burial there was a stone-built installation (39) composed of a fragment of a ground-stone bowl (SF121) and a flat slab (SF255), which had been shaped by chipping around its edge to produce an elongated sub-rectangular shape. The slab lay flat with one long edge pressed against the open side of the bowl (Figure 21.12). The slab was wedged at one side with a fragment of worked stone (SF124). The bowl contained a mid-grey silt (37), with small fragments of bone, shell, charcoal and chipped stone. All of these features, the burials and the installation, were directly below the deflated surface deposits (123) and (1). As such, the significance of their spatial association remains unclear.

Burial O38

Although Burials O37 and O38 were adjacent, no direct stratigraphic relationship between these could be established. Since Antique Burial O87 had been cut across the southwest extent of Burial O38, its original dimensions were impossible to determine and a significant number of skeletal elements may have been destroyed (Figure 21.5). The uppermost fill of Burial O38 was mid-grey sandy silt (38); the first human remains found were the front teeth of the maxilla of skeleton (270), which were facing upwards from within this fill of cut [291]. Cleaning revealed another fragmentary skull (269), placed on top of a cluster of large stones, placed within the fill of the burial (Figure 21.13). This second skull belonged to an infant and must have been placed in the burial pit after the placement of skeleton (270), which was contained deeper in the fill. Among the stones underlying skull (269) was a large nodule of flint. The cluster of stones was removed before skull (270) was excavated, so that its fragile remains could be lifted as a block together with the surrounding sediment.

Skull (270) faced north and had been severely damaged by an animal burrow leaving the bones poorly preserved (Figure 21.14). The fill (38) contained white flecks of what was probably gypsum; the skull (270) had similar traces on its top and left side (Figure 21.15). This white residue was of a similar appearance to that on the ribcage of skeleton (273) in Burial O35 (see Chapter 25). Furthermore, black staining marks on the bones of (270) were similar to those on the bones in several other burials (e.g. O36, O39).

Excavation of the cluster of stones in the north part of the burial revealed a localised deposit of dark grey ashy silt (281) with a high frequency of white inclusions, probably gypsum. Deposit (281) formed a thin concave lens (Figure 21.16), probably arising as a result of pressure from the large flint nodule which had been lying directly above.

Apart from the skull, the only other bones that could be assigned to skeleton (270) were the remains of an articulated lower arm and hand. The hand was placed under the head with the surviving part of the arm stretching from under the chin westwards (Figure 21.14). This suggests that the arm had been flexed with the rest of the skeleton, extending in a westerly or southwesterly direction, and that it was destroyed in antiquity by Burial O87.

Burial O39

Burial O39 had the most complicated history of all the burials found in the area of Structure O83. It was situated immediately to the north and northeast of Burial O38 and to the east of Burial O37 (Figures 21.5, 21.17). The burial was cut across its northeast extent by a pit [51], filled with mid-yellowish-grey silty sand (50) and contained a high concentration of small stones. A ground-stone pestle (SF254) was recovered from the base of the pit. Pit [51] cut orange-brown silt (264), which was the uppermost fill of Burial O39 (Figure 21.17). This deposit contained all of the human remains in the burial, as well as a small range

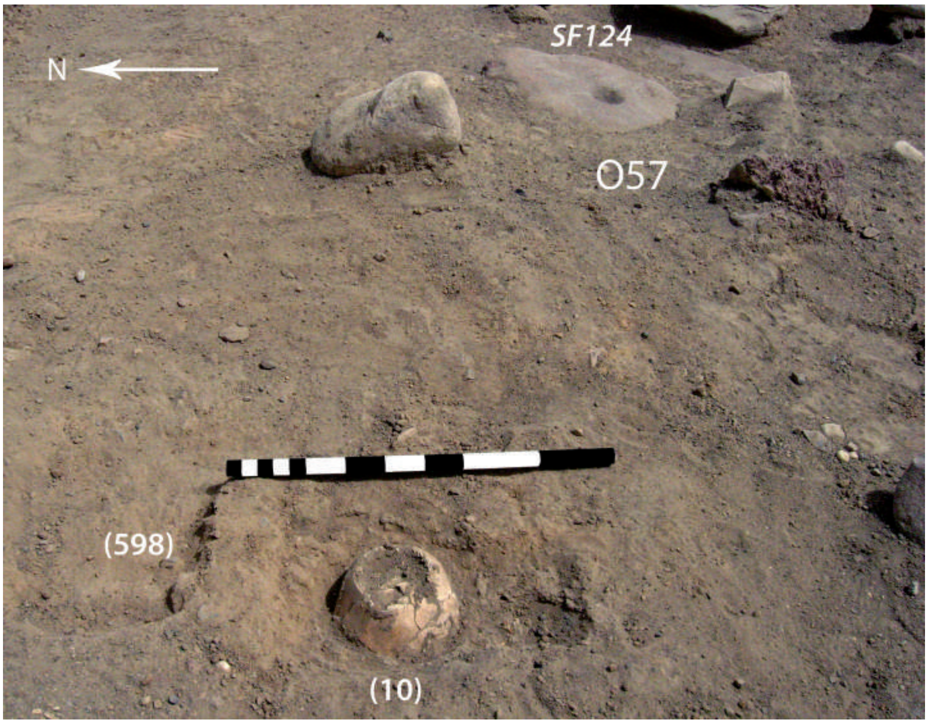


Figure 21.10 Truncated skull of skeleton (10) in Burial O37 looking east into Structure O57 Scale 0.5 m.

Figure 21.11 Child skeleton (10) under excavation.

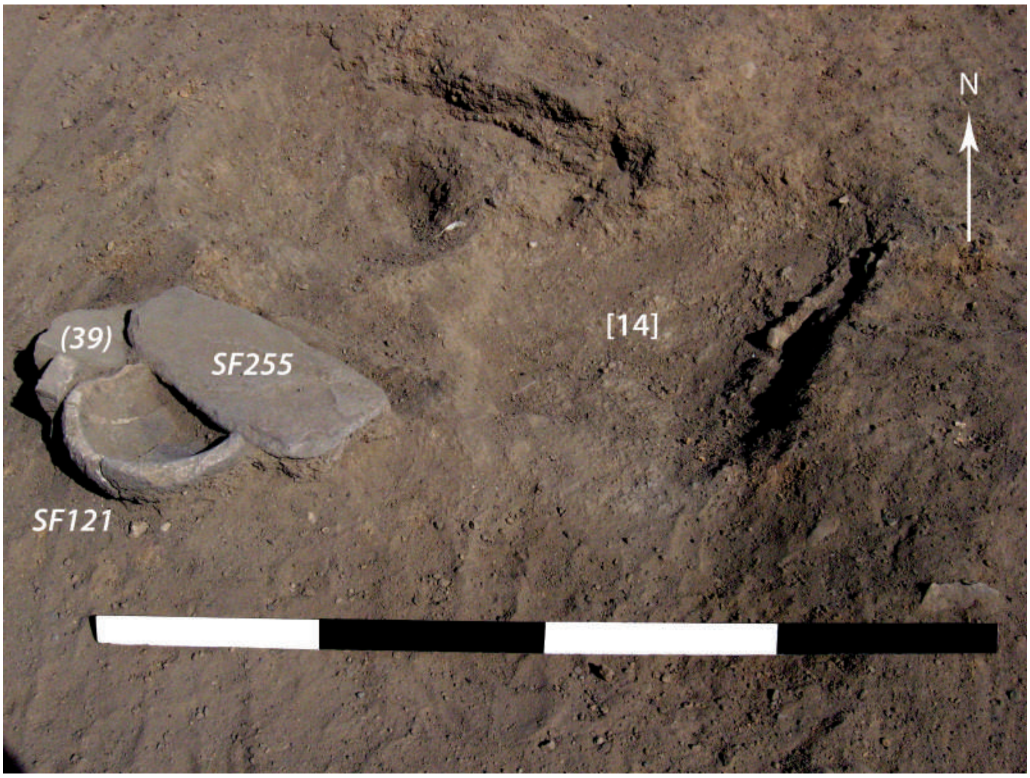


Figure 21.12 Excavated cut [14] of Burial O37 with a stone installation (39, SF255, SF121). Scale 1 m.

of chipped-stone tools and debitage, including a blade, an El-Khiam point and a possible borer (SF326, SF333, SF334, SF336, SF340). Some of these tools (SF333, SF334, SF336) and an unworked stone within the pit were coated in a white material. A green stone bead (SF329) was also found in the deposit.

The skull was the highest placed part of skeleton (271). It was tilted at *c.* 45° on its right side and faced north-northeast. Resting against the apex of the skull to the south-southwest was a greyish-white strip of clayey silt (285). This formed a bowl-like container filled with compact orangish-brown silt (280) (Figure 21.18). The combined diameter of these two deposits was 0.15 m with fill (280) forming the inner 0.12 m. Both deposits were sampled in their entirety for geochemical and phytolith analysis.

The excavation of the remainder of fill (264) in the north part of the burial revealed further disarticulated human remains. The mandible was tightly shut against the maxilla. The front teeth were touching the pelvis, which was partly overlain by the top part of the right femur (Figure 21.19). The femur was detached from the pelvis and partly coated by a white paste-like material (290) and associated with a 'bundle' of other bones. This had a well-preserved impression on its outer surface, resembling weaving or basketry (Figure 21.20).

Along the west and the south side of the skull there was a thin layer of fine loose greyish-brown silt (297), 1.5 cm thick. This was clearly distinguishable between the bone and the main fill of the burial. This localised deposit was sampled and partly excavated before the skull was bandaged and lifted as a block with some of the underlying sediment.

The bones associated with the right femur could not be identified during the excavation as they were all lifted as a block to preserve the impressed pattern on the white coating. Underlying this block were part of a tibia and some finger bones. The western part of the burial contained fragmented bones, including part of an upper arm, the head of the left femur, part of a tibia and the remains of a lower arm. A hand and the finger bones had been placed underneath the skull, although clearly detached from the upper arm and the rest of the body.

The eastern part of the burial contained a compact brownish-orange sandy silt deposit (295), which extended from the eastern edge of the burial up to the skull of skeleton (271). Only fine silt (297) separated the skull from this deposit. A compacted deposit, a near-spherical lump of light greyish-white silt (296), measuring 0.21 m x 0.12 m x 0.10 m, underlay deposit (295) at the base of the eastern part of cut [293] (Figure 21.21). The white colour of this deposit was similar to the bowl-shaped deposit (285), on top of the southern side of the skull. It is thought that both deposits contain some gypsum, which would explain their whitish colour.

Cut [293] was ovoid in shape and measured 0.58 m x 0.50 m x 0.20 m deep. Its slightly longer axis ran from the northwest to the southeast. The sides of the cut were

Figure 21.13 Remains of skull (270) in the foreground and infant skull (269) in Grave O38. View north. Scale 0.5 m.

Figure 21.14 Skeleton (270) from the south showing the animal burrow through the skull and the position of the truncated lower arm and hand. Scale 0.1 m.

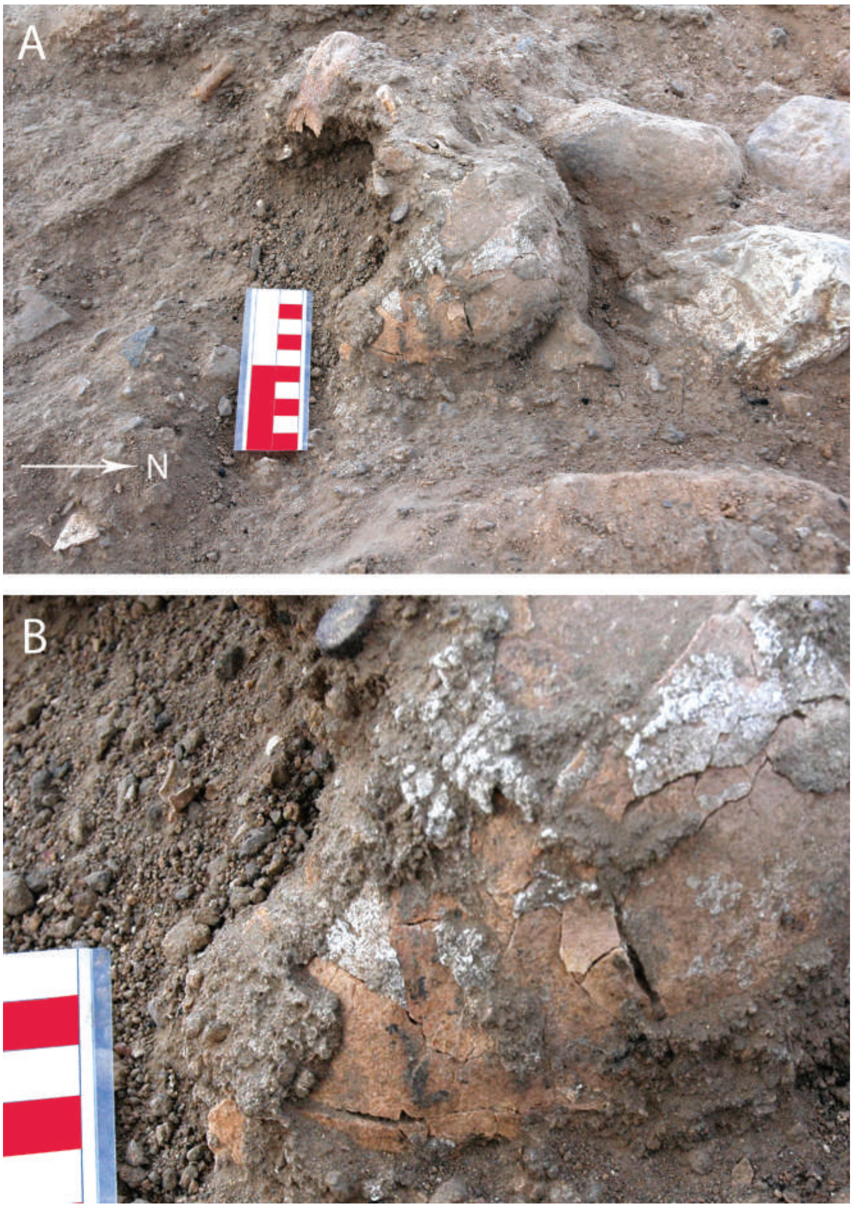


Figure 21.15 A — Skull (270) from the east; B — detail of the white residue and black staining on the top of the skull. Scale 0.1 m.

steep and slightly convex. The burial had been cut into the middle of an earlier pit [304], which was only slightly larger than the burial cut [293]. At the east part of this earlier feature the burial cut [293] went through gravelly brownish-grey sandy silt (292) and to the west it had cut through smooth brownish-grey silt (299), which had almost no inclusions. As a result of truncation, these two contrasting deposits had no stratigraphic relationship, but they were both fills of a sub-rectangular cut [304], which was 0.8 m x 0.7 m in extent and 0.32 m in depth. Both fills (292, 299) contained chipped stone and small fragments of bone, especially deposit (292), which was richer in chipped stone than any of the fills of burial cut [293]. Unexpectedly, a glass bead (SF2177) was also found in this deposit. Although not formally identified we believe this to be Late Antique in date and reflects disturbance to the deposits arising from Burial O87 and bioturbation, as evident from animal burrows.

Burial O89 and the interior of Structure O83

All of the features described so far were either completely peripheral to, or only marginally encroaching into, the interior of Structure O83. They all cut the pisé wall (598), indicating they were dug after the structure had been demolished or had collapsed. Only the stone installation (39) (Figure 21.22) was fully encompassed by wall (598).

Underlying installation (39) was a grey silt (277) that extended across the whole of the interior. Deposit (277) contained chipped stone, animal bone, an unidentifiable ground-stone object (SF634), and a bead (SF760) made

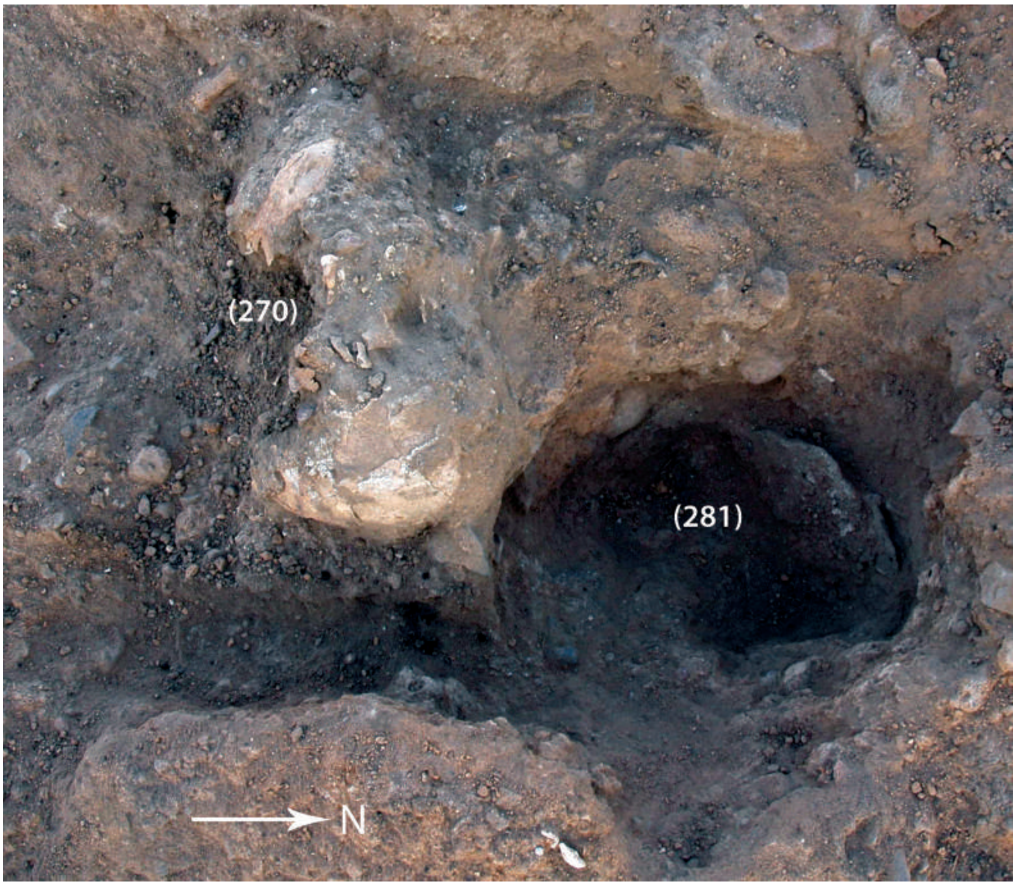


Figure 21.16 Bowl-shaped ashy deposit (281) next to skull (270) in Burial O38.

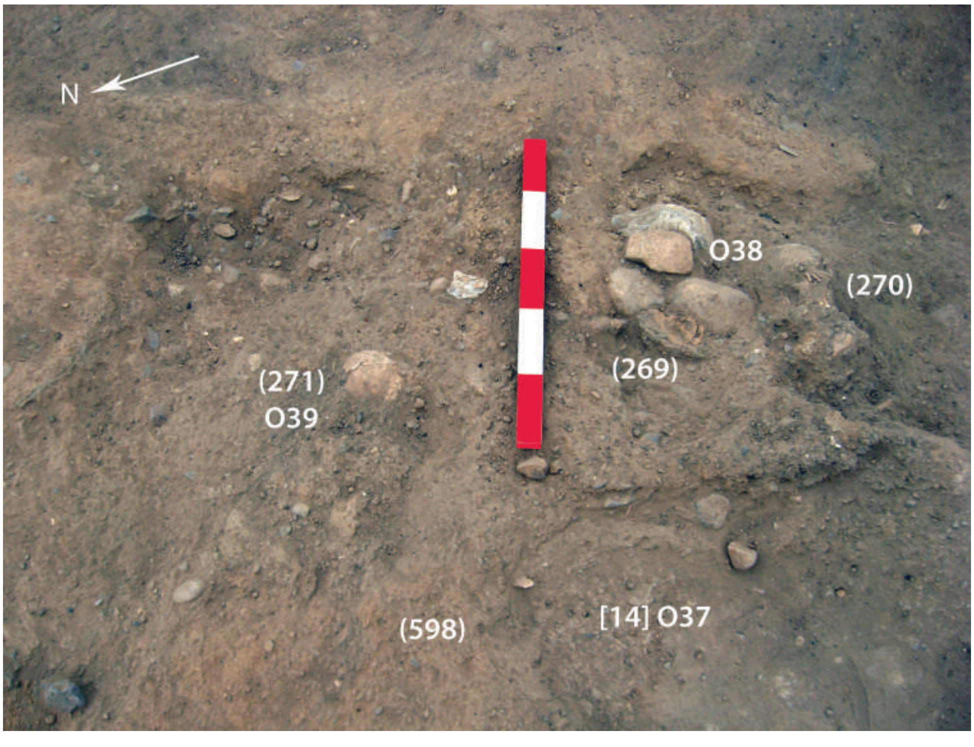


Figure 21.17 Adjacent Burials O38 and O39 prior to excavation, in relation to excavated Burial O37. Scale 0.5 m.

Figure 21.18 Bowl-like arrangement of whitish deposit (285) and its brownish-orange fill (280), next to and overlying skull (271), which has white residue and black staining in the foreground. Scale 0.1 m.

Figure 21.19 Human remains (271), partially wrapped in gypsum lining (290) in fill (264) within cut [293] which cuts through pisé wall (598) to the west and stony fill (292) of an earlier cut [304] to the east.

Figure 21.20 Close-up view of the pattern on the wrapping material (290) around the right femur and other bones. Note the black staining on the femur. Scale 0.1 m.

from dentalium shell. The excavation of (277) revealed two small features in the interior of Structure O83 (Figure 21.5). In the southern part of the interior there was a small pit [630] filled with pale grey sandy silt (626), containing charcoal fragments, chipped stone and animal bone. The cut of pit [630] was sub-circular in shape with near vertical sides and an irregular base. This feature was directly underneath the location of stone installation (39), although stratigraphically separated from it by silt (277). A similar small pit [639] was excavated one metre to the northwest. It was filled with loose pale brown silt (637) that contained small stones, charcoal and small quantities of chipped stone and animal bone. Both pits [630] and [639] were cut into a light orangish-brown silt (642), containing small stones, pisé rubble and occasional charcoal. This deposit extended across the entire interior of Structure O83, and it was the last such layer to be excavated. It was comparatively poor in finds with less than half the amount of chipped stone found in the overlying silt (277).

The final feature to be excavated in the interior of Structure O83 was Burial O89, which was initially identified in the southeast-facing section of Antique Burial O87 (Figure 21.23A). Burial O89 was filled with loose light brown silt (659) that contained charcoal fragments. What appeared to be neonatal human remains (660) were found in this fill. The skeleton only partially survived the truncation by Burial O87, but bone preservation was generally good (Figure 21.23B). The main part of the skeleton affected by the cut of Burial O87 was the skull, this being damaged due to its position in the southern part of the burial cut [665]. The bones of arms, legs, pelvis, ribs and the vertebrae were present.

In addition to Burial O89 the southeast-facing section of Antique Burial O87 revealed a 0.8 m deep sequence of loose grey silts and pisé rubble deposits that had accumulated in the subterranean part of Structure O83. Most appeared similar to deposit (642), but they remained unexcavated. The truncated remains of a pisé wall (598) curved across the basal step of Burial O87. The earliest visible part of the internal sequence of Structure O83 was exposed on this step in the form of a brownish-grey silt (1835). This deposit appeared to be free of pisé rubble and contained a ground-stone pestle on its surface (Figure 21.24). All finds were left *in situ* as deposit (1835) was not excavated.

The sections created by the cut of Burial O87 also revealed the nature of the construction of Structure O83, showing that its walls were contained within a cut [1834] that truncated wall (1049) (Structures O56 and O84) and was visible in the southeast-facing side and the stepped base of the burial (Figures 21.5 and 21.24). The base of the cut could not be seen as Burial O87 did not cut as deep as the full depth of Structure O83, but it was evident that the pisé wall (598) was constructed against the side of the cut, which almost certainly predetermined the shape of the structure. Additional insight was gained by observing the reduction of the internal space within the structure with the increased depth due to the inwards sloping nature of the interior face of wall (598) at the western side of the structure.

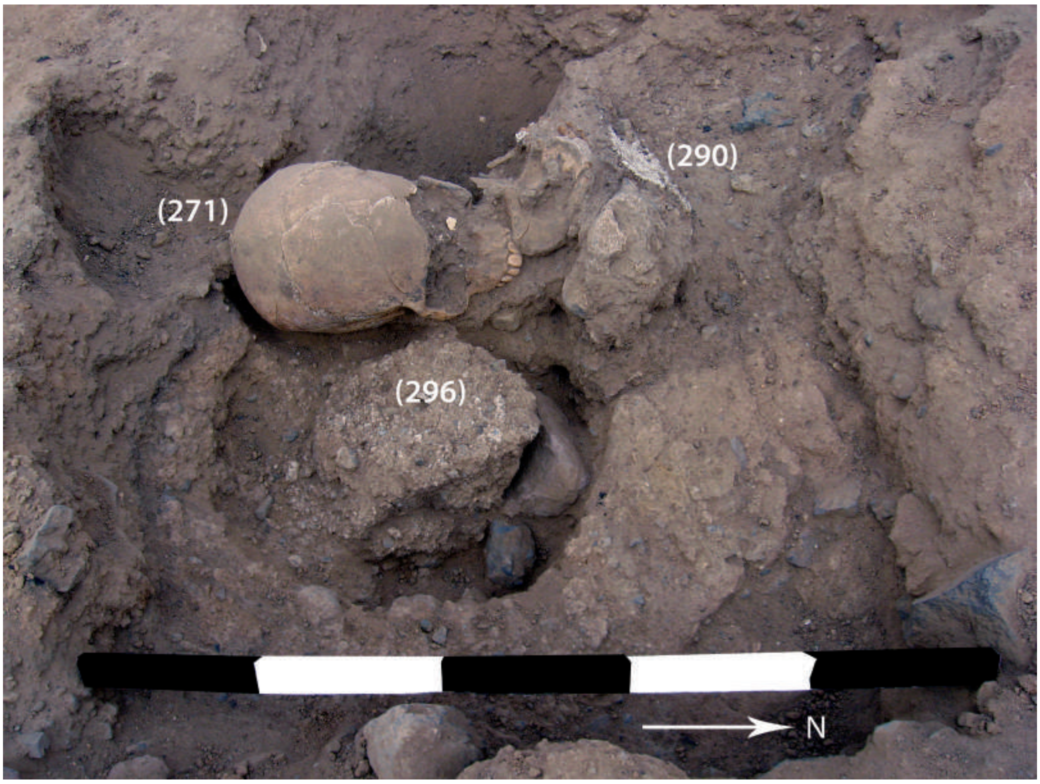


Figure 21.21 Whitish consolidated deposit (296) next to the skull (271) in burial cut [293]. Scale 0.5 m.

Figure 21.22 Ground-stone bowl fragment SF121 and chipped slab SF255 forming installation (39). Scale 0.5 m.

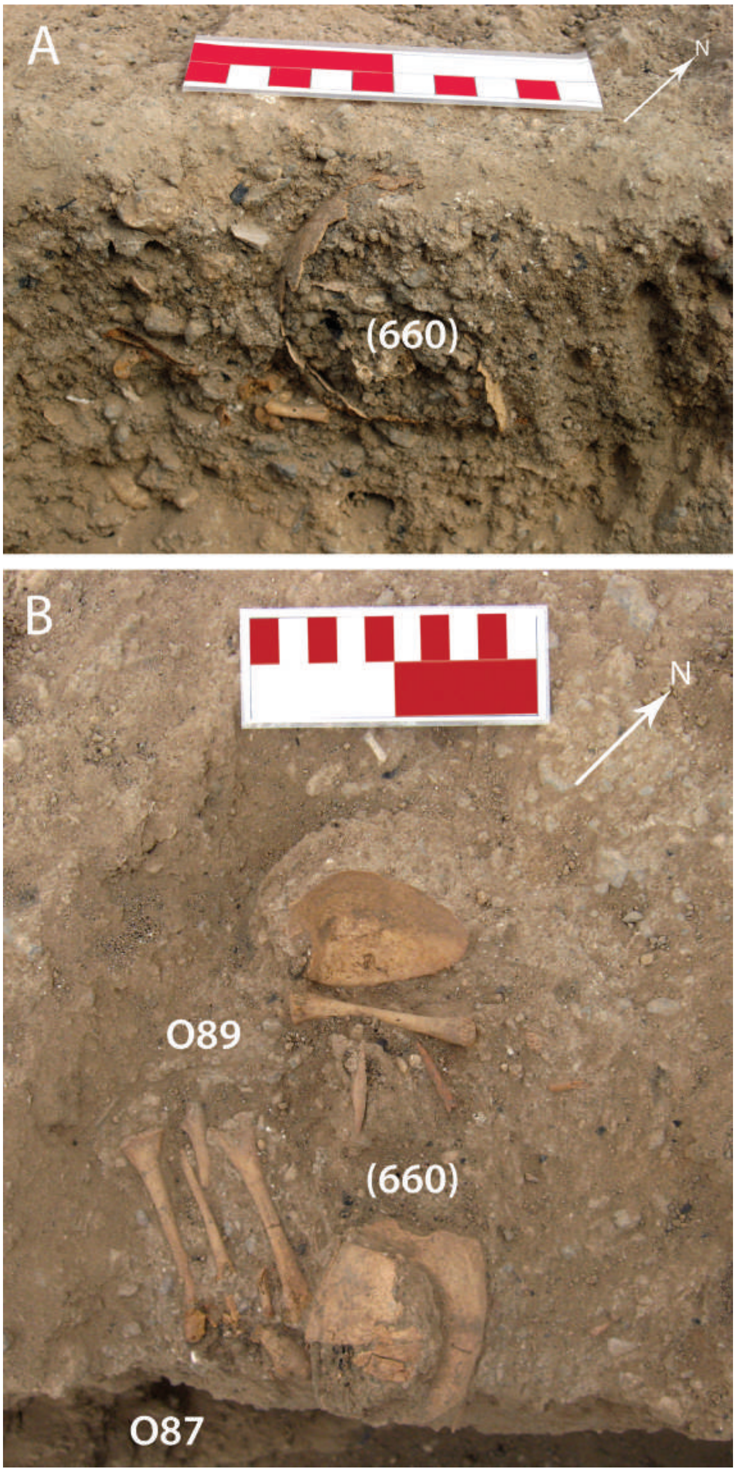


Figure 21.23 A — Truncated remains (660) of Burial O89 as seen in the southeast-facing side of Burial O87; B — Neonatal skeleton (660) during the excavation, view northwest. Scale 0.1 m.

21.3 Interpretation

Structure O83 is a medium-sized, semi-subterranean structure lying close to the centre of the WF16 settlement. A number of Neolithic burials had been placed over the structure, four of which had cut through its wall. Structure O83 was not extensively excavated and full details of its construction and use are still to be resolved, although some information relating to the construction of the structure was obtained from the sides and the base of Antique Burial O87, which cut through Structure O83 across its southeastern extent. Construction cut [1834] had been dug out to a depth greater than 0.8 m visible in the cut of Burial O87. The cut was probably oval in shape and predetermined the shape of the structure, which was constructed by the construction of pisé wall (598) against the side of cut [1834]. Wall (598) appeared to flare out from the base upwards at the western side of the structure resulting in a significantly reduced interior at the base of the structure in comparison to its extent at the top of the surviving sequence.

The earliest internal deposit was silt (1835) exposed on the basal step of Antique Burial O87. The rest of the sequence, which can be seen within the section of Antique Burial O87 is dominated by uniform grey silts packed with pisé rubble.

The excavated part of the sequence in Structure O83 relates to the period when the structure was almost completely filled up with sediment and a series of features was cut into its deposits and walls. The walls had presumably lost any above ground component by this time. The earliest of these features was Burial O89, which was sealed by further sediment accumulation (642) inside the structure. This burial contained the remains of an infant, possibly a neonate.

Two small pits [639] and [630] were dug inside the structure after the accumulation of silt and rubble (642). Whatever their purpose they probably represent only a brief episode of activity before further accumulation of silt (277) took place. Further evidence that this space was still being used is the stone installation (39), positioned in the same place as pit [630], although the two features were stratigraphically separated by deposit (277). The combination of a bowl fragment SF121 and flat slab SF255 is an almost identical arrangement to that found within wall niche (663) in Structure O45 (Figure 14.30) and on top of a post-pipe in the wall of Structure O75 (Figure 38.45).

By the time Burials O36, O37, O38 and O39 were dug into the remains of Structure O83 there were no upstanding walls remaining. All four burials were at least partially dug into wall (598), three of them squeezed together at the junction of (598) and earlier wall (1049). It is not clear whether the pisé remains were visible and perhaps purposefully targeted.

As elsewhere at WF16, there are no instances of major intercutting between the Neolithic burials within Structure O83. Their chronological order is therefore unknown, but their similar stratigraphic position suggests that either the time span between the burials was relatively short, or that there was prolonged knowledge of their location, perhaps aided by above ground markers of some description.

Burial O39 is notable because of the treatment and reburial of its human remains (271). The first part of the Burial O39 sequence may have involved primary burial of the body, either somewhere else on the site or in cut [304], which was almost completely destroyed by the secondary burial [293]. The jumbled arrangement of partly articulated, disarticulated and fragmented remains leaves little doubt that they were either brought from elsewhere in a semi-decomposed state, or were exhumed from cut [304] and then reinterred in the same spot in recut [293], after having been reconfigured. This involved the deposition of a lump of dirty gypsum, or other white mineral (296), in the eastern part of the new grave with sandy material (295) laid over it. Human remains (271) were than interred, probably in more than one batch, but with some attention to detail, to ensure that a severed lower arm and hand were placed underneath the skull, as was the case in many undisturbed primary burials. It is possible that a thin layer of fine dark silt (297) that surrounded the skull represents the remains of degraded organic matter, perhaps a garment. Once the skull was in place, the pelvis was positioned in front of it, followed by a package of bones that were either fully contained, or partly wrapped, in a basket, or a woven mat, lined with white paste (290) composed predominantly of gypsum, with calcite and quartz. Prior to the remains being covered with backfill (264), it appears that a bag, or a pouch, made of organic matter and containing white deposit (285) had

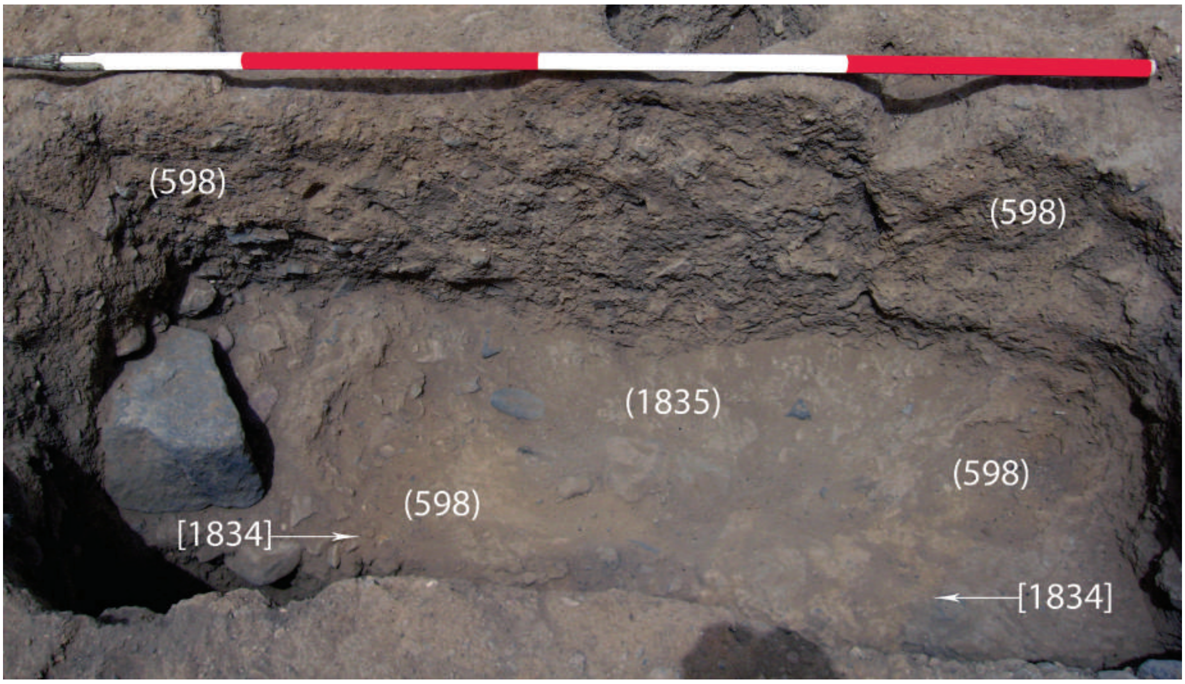


Figure 21.24 Basal step inside Burial O87 showing curved wall (598) and possible occupation (1835). Scale 2.0 m.

been placed against the top of the skull. Several flint tools and an unworked stone were also found coated in white film. The glass bead (SF2177) found within the fill of Burial O39 is evidently intrusive. Given the proximity to the surface, the softness of the fills, and frequent animal disturbance, its presence is unsurprising.

Burial O39 is the clearest instance of the use of a gypsum-based white material within burial ritual at WF16. Deposit (290) is the only example at WF16 of gypsum, or another white material, being used to line a basket or woven object. Several other probable basket linings have been found at WF16, but they were all made of bitumen, probably used as a waterproofing agent, and none came from within graves. Gypsum lacks waterproofing properties, and it is hard to think of a utilitarian reason for lining a basket with a concoction of gypsum, quartz and calcite. Nonetheless, this appears to have been the role of deposit (290) in Burial O39.

22. Intramural Space O57

22.1 Location and relationship with other structures

Intramural Space O57 is situated between Structures O56, O83, O84 and O85, and is cut by Antique Burial O87 from the west (Figures 22.1, 22.2). The surface of a cup-hole mortar (SF124) was exposed in the centre of the space, this being embedded within the underlying deposit. Pisé walls (610) and (1049) to the south and the north could represent the truncated remains of a northwest–southeast orientated structure, but this was not tested by excavation due to the relatively early stratigraphic position of these walls in relation to the surrounding structures. The excavation inside Intramural Space O57 was limited to some of the deposits formed after the construction of these later surrounding structures. Figure 22.3 provides the stratigraphic matrix for the contexts excavated within Intramural Space O57, which are described within Table 22.1. The bulk and small finds are listed in Tables 22.2 and 22.3 respectively.

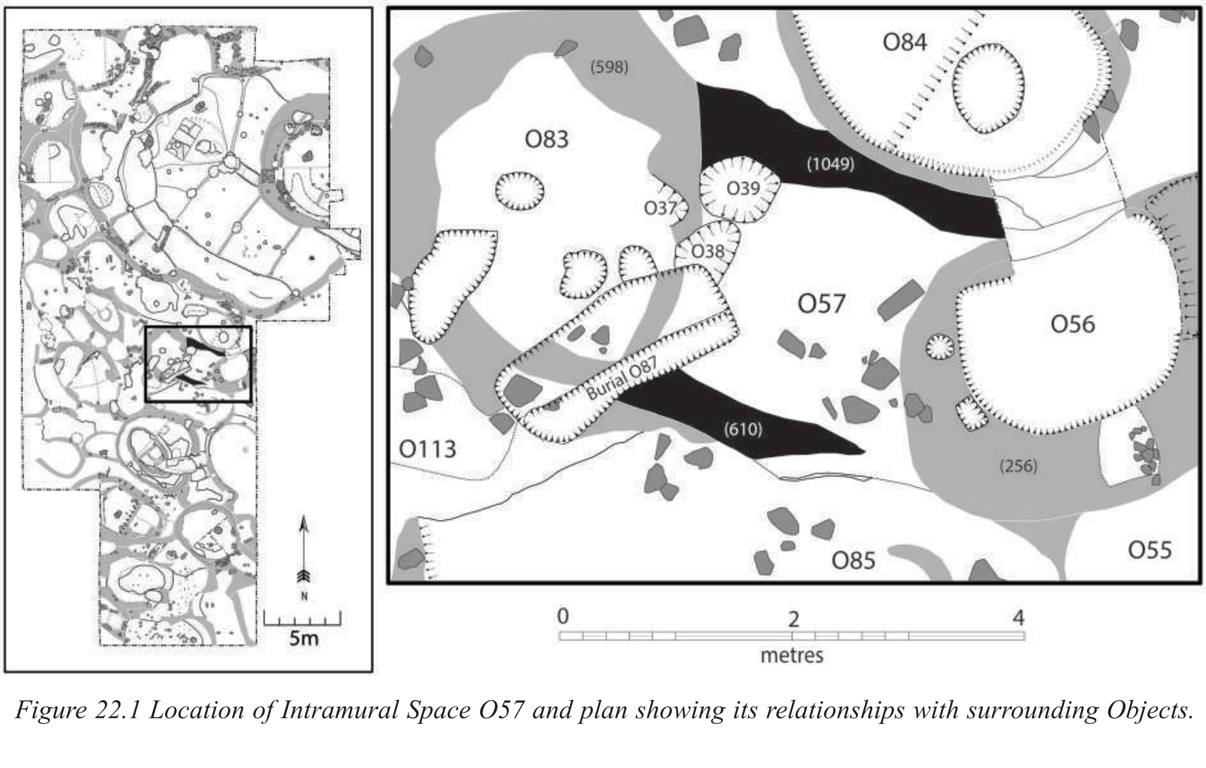


Figure 22.1 Location of Intramural Space O57 and plan showing its relationships with surrounding Objects.

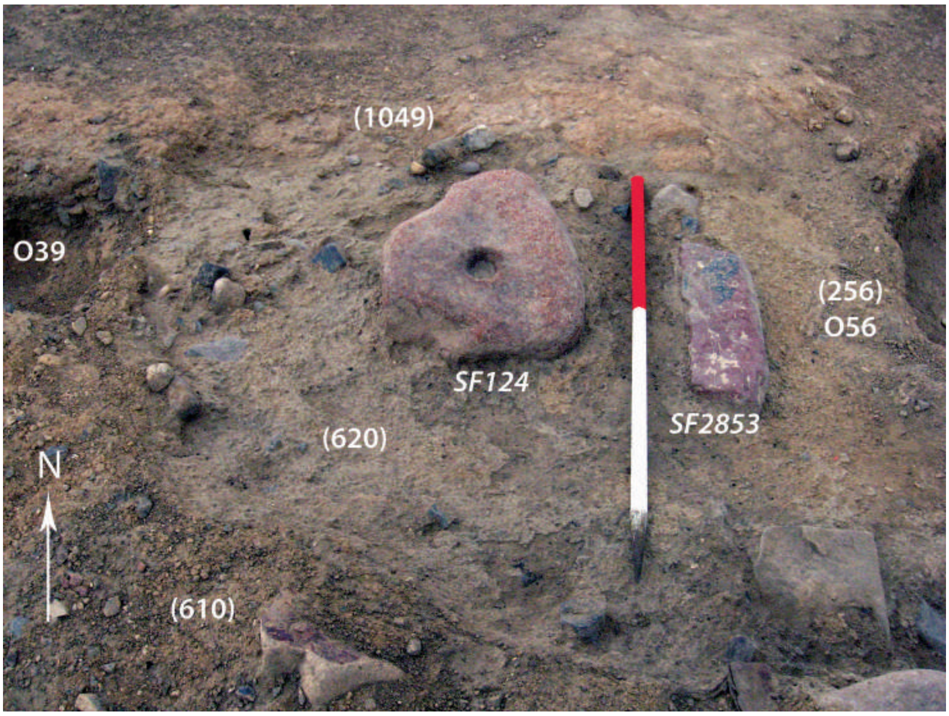


Figure 22.2 Intramural Space O57 from the south with exposed surface (620) with cup-marked stone SF124 in the centre and stone bench SF2853 to the east. Scale 1.0 m.

Table 22.1 Contexts excavated in Intramural Space O57 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
40	loose greyish-brown sandy silt with a concentration of stones of up to 0.5 m diameter	deflation horizon with a concentration of rubble
303	loose grey sandy silt with frequent stones	silt accumulation in intramural space
610	yellowish-brown pisé	pisé wall segment
620	compacted pale greyish-yellow clay silt with occasional stones	floor surface in intramural space
628	loose grey silt with frequent rubble	silt and rubble accumulation in intramural space
635	loose grey silt with some large stones	silt accumulation in intramural space
1049	bright orangish-brown pisé	pisé wall (partially excavated)

Table 22.2 Quantities of bulk finds from Intramural Space O57 by material and context number.

Object 57	Volume of sediment (l)				Weight of bulk finds per material (g)							
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Unworked stone	Animal bone	Unidentified bone	Other shell	Charcoal
303	71.0	30.0	40.0	1.0	238.3	0.0	0.0	0.0	10.0	6.2	11.1	10.0
620	83.0	32.0	50.0	1.0	1906.1	186.6	3.3	10.0	37.3	0.0	7.9	0.0
628	20.0	0.0	20.0	0.0	70.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0
Total	174.0	62.0	110.0	2.0	2214.4	186.6	3.3	10.0	57.3	6.2	19.0	10.0

Table 22.3 Quantities of small finds from Intramural Space O57 by material and context number.

Object 57							
Context	**Ground stone**	**Other stone**	**Animal bone**	**Disarticulated human bone**	**Stone beads**	**Marine shell beads**	**Total small finds**
40	5	0	0	0	0	0	5
303	3	0	1	0	0	0	4
620	5	3	0	0	3	0	11
628	0	0	0	1	0	1	2
Total	13	3	1	1	3	1	22

22.2 Description of the excavated deposits

The overburden deposits (1 and 123) in the area between Structures O83, O84, O56 and O85 contained a particularly dense concentration of large wadi stones (40), extending over Structures O56 and O85. There was no meaningful pattern to these stones, although they might have derived from a collapsed structure. Five ground-stone objects were recovered from within the wadi stones (SF122, SF123, SF125, SF126, SF128).

Removal of the overburden deposits (1 and 123) and these stones (40) exposed a loose grey sandy silt (303) and then a greyish-yellow silt (620) in which a cup-hole mortar (SF124) was embedded. This cup-hole mortar was positioned in the centre of the intramural space (Figure 22.3), which was demarcated by the surface of two parallel pisé walls, (1049) and (610), exposed to its north and south (Figure 22.1). On the basis of the surface evidence, it appeared that the western end of wall (1049) had been truncated by the construction cut [1834] of wall (598) of Structure O83. On the basis of excavation, (1049) was also truncated by cuts [1344] of Structure O84 and [1343] of Structure O56. The relationship between wall (610) and (598) could not be determined because Antique Burial O87 had destroyed their interface.

Three of the ground-stone objects within stone deposit (40) had been recovered from the area around cup-hole mortar SF124: pestle SF125 was found immediately to the east of it, while a fragment of large worked slab and unclassified stone objects (SF122, SF123), were found nearby to the southwest. Unlike the ground-stone objects and the wadi stones (40), cup-hole mortar SF124 was securely embedded into the underlying deposits (620).

The focus of the ensuing excavation was on several burials that had been truncated by erosion. Antique Burial O87 and Neolithic Burials O38 and O39 were partly cut into the deposits within Intramural Space O57 and partly into pisé wall (598) of Structure O83 to the west (see Chapter 21). These burials are described in Chapter 21.

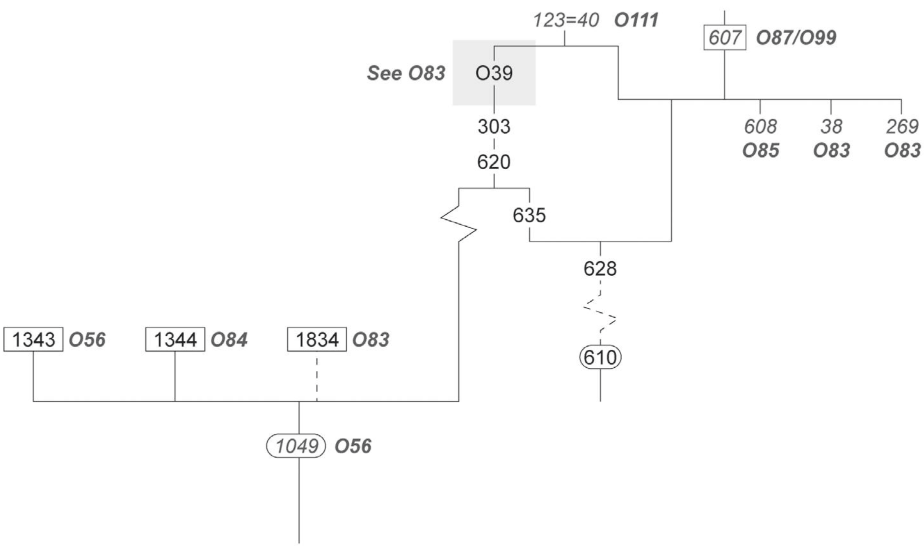


Figure 22.3 Stratigraphic matrix for Intramural Space O57.

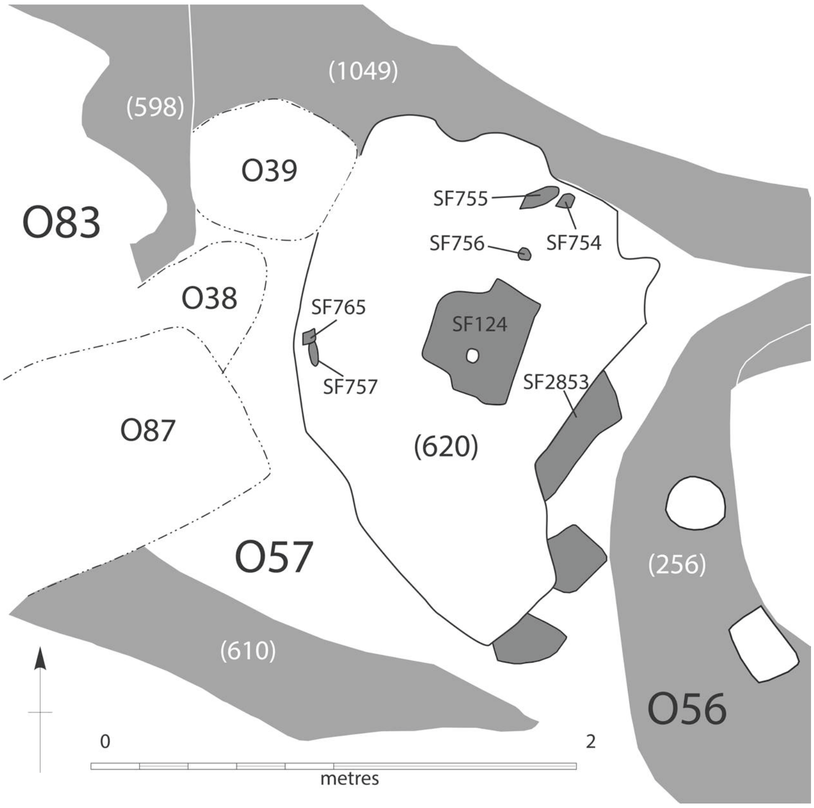


Figure 22.4 Compacted surface (620) in Intramural Space O57 with the location of cup-marked stone SF124 and possible working bench (SF2853) in relation to ground-stone objects shown in Figures 22.5, 22.6 and 22.7.

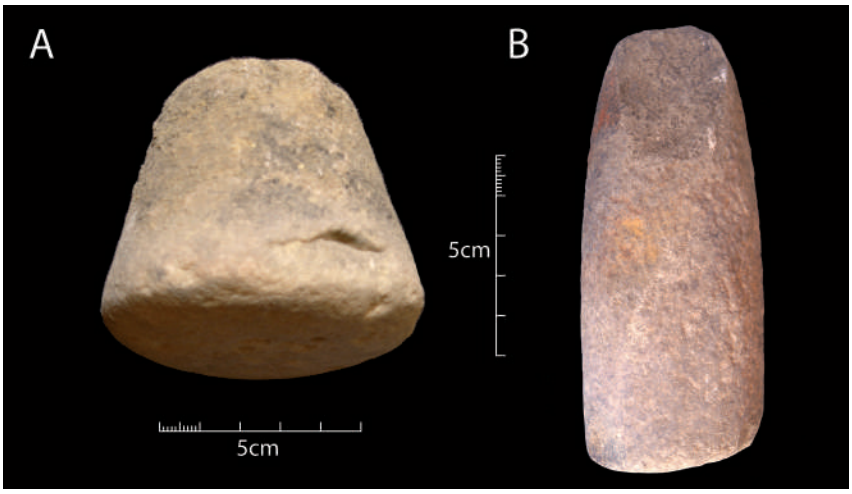


Figure 22.5 A — Bell-shaped pestle SF742 from deposit (303); B — Pestle SF757 from deposit (620) with visible yellow and red pigment residue.

Both (303) and (620) were rich in chipped-stone and ground-stone artefacts (Tables 22.2 and 22.3). To the north, these deposits were partly overlying the eroded remains of wall (1049), and to the east they roughly followed the shape of wall (256) of Structure O56, but did not have a physical relationship with the wall; similarly, neither deposit reached as far as wall (598) in the west, or wall (610) in the south (Figure 22.4). Several large stones separated the deposits from Structure O56, including an elongated and roughly rectangular block with a flat upper surface (SF2853) that appeared to be polished through use and is cautiously described as a 'work bench'. Although this stone block was set deeper into the ground than cup-marked stone SF124, they were both visible on the surface of deposits (303) and (620).

Deposit (303) contained a relatively small amount of chipped stone in comparison to the underlying deposit (620) (Table 22.2), while the presence of ground-stone objects,

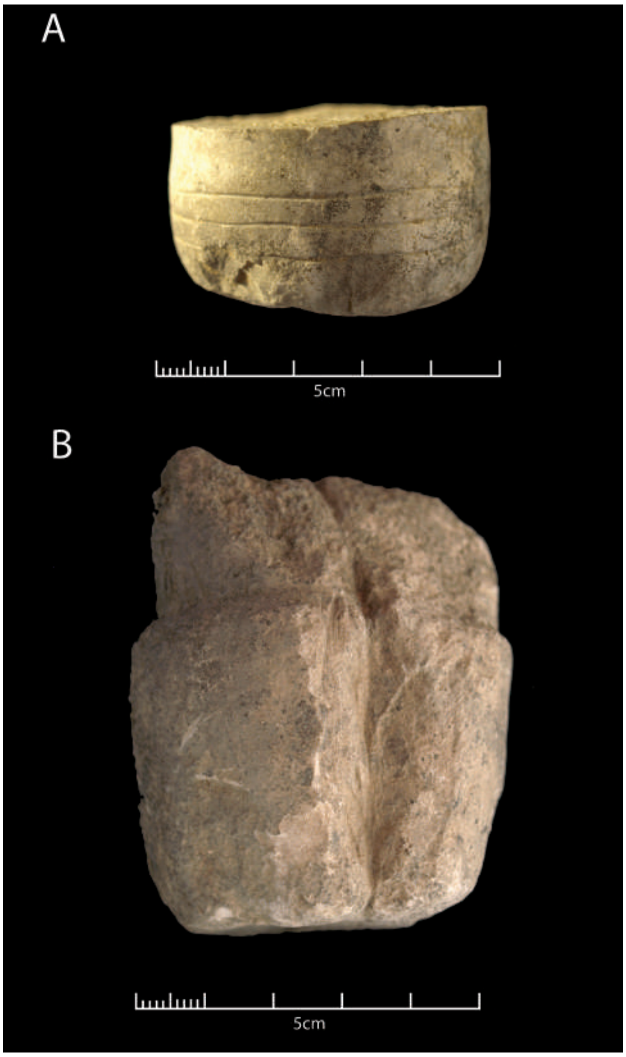


Figure 22.6 A — Butt of a probable pestle (SF756) decorated with parallel incised lines; B — Possible reworked figurine fragment SF765.

especially pestles, around cup-hole mortar SF124 continued throughout (Table 22.3). Two pestles (SF741, SF742) and a further ground-stone object (SF341) were removed from (303). One of the pestles was short and bell-shaped (Figure 22.5A), while the other was elongated. A piece of possibly worked animal bone was also found (SF343).

Deposit (620) was particularly rich in chipped stone and contained a range of ground-stone objects, four of which were pestles or pestle fragments (SF754, SF756, SF757, SF766), situated on the surface of the deposit around cup-marked stone SF124, and one a fragment of a possible anthropomorphic figurine (SF765) (Figure 22.6B). A probable pestle fragment SF756 was decorated with two incised parallel lines around its circumference (Figure 22.6A), while the other three pestles were each stained with either purple, yellow, or orange pigment (Figures 22.5B and 22.7).

Other finds from deposit (620) included a hammerstone (SF755), a fossil stone (SF767) and three stone beads (SF898, SF899, SF2697). The cup-hole mortar SF124 that dominated this space was lifted as part of the deposit (620) in which it was set.

Directly underlying the compacted deposit (620) was a loose grey silt (635) that contained large stones and had work bench SF2853 still firmly embedded into it. In the southwest part of Intramural Space O57 a different deposit of loose grey silt (628) was recognised containing frequent pisé rubble. Neither of these deposits was excavated, although some finds had to be retrieved from the surface of

Figure 22.7 Cup-marked stone SF124 and stone bench SF2853 in situ *with a selection of ground-stone objects from deposit (620) placed on the bench for a photograph. Pestles SF754, SF757 and SF766 clearly show staining with purple, yellow and orange pigment.*

deposit (628) because of disturbance caused by backfilling at the end of the season. These included small amounts of chipped stone and animal bone, a fragment of human cranium (SF768) and a marine shell bead (SF951).

22.3 Interpretation

Intramural Space O57 is a small area between structures, centred on a cup-hole mortar without recognisable walls or structures of its own. The cup-hole mortar SF124 was set in a deposit (620) with a compacted surface containing chipped-stone and ground-stone artefacts. The association between the range of pestles found in deposit (620) and the overlying deposit (303) and the cup-hole mortar SF124 is particularly intriguing, especially as three of the pestles from deposit (620) were stained with three different colours of pigment dust. This raises the possibility that one of the uses of the cup-hole mortars on the site was for grinding and preparing pigments. Ochre, burnt limestone and similar sources of red and yellow pigment, in particular, were found across the site in the form of small nodules that might represent raw material ready for grinding.

Because of the lack of stratigraphic relationships with surrounding structures it is difficult to determine whether excavated deposits within Intramural Space O57 represent the remains of a previous structure into which the adjacent buildings have been cut, or the later use of this space while the adjacent semi-subterranean structures were also in use. The relatively early stratigraphic position of wall (1049) was shown by excavation to be earlier than both Structures O56 and O84, and also appears to be truncated by the construction of Structure O83. Deposits (303) and (620), which define the use of Intramural Space O57 in association with cup-hole mortar SF124, overlie wall (1049), indicating that they were also later than this earlier phase of construction in this area. Although the deposits associated with cup-hole mortar SF124 appear to respect the walls around the space, excavation was unable to establish whether they had been cut by the construction pit for these walls, had been worn away by human activity, or simply had not been originally laid to reach the walls. An intriguing possibility is that the construction of Structures O83, O84, O56 and O85 had been undertaken in a manner to preserve a working area that had been within a structure that was otherwise destroyed and now remained within the intramural space.

23. Structure O72

23.1 Location and relationship with other structures

Structure O72 is located to the south of Structure O70, to the west of Structures O113 and O85 and directly to the north of Structure O52 (Figures 23.1, 23.2). It is orientated northwest to southeast and measures *c.* 4.5 m x 3.0 m. Excavation indicated that the walls of Structure O72 are inter-stratified with those of Structure O70, suggesting contemporaneity in their period of construction and use. A similarly complex stratigraphic relationship exists between Structure O72 and Structure O113. No

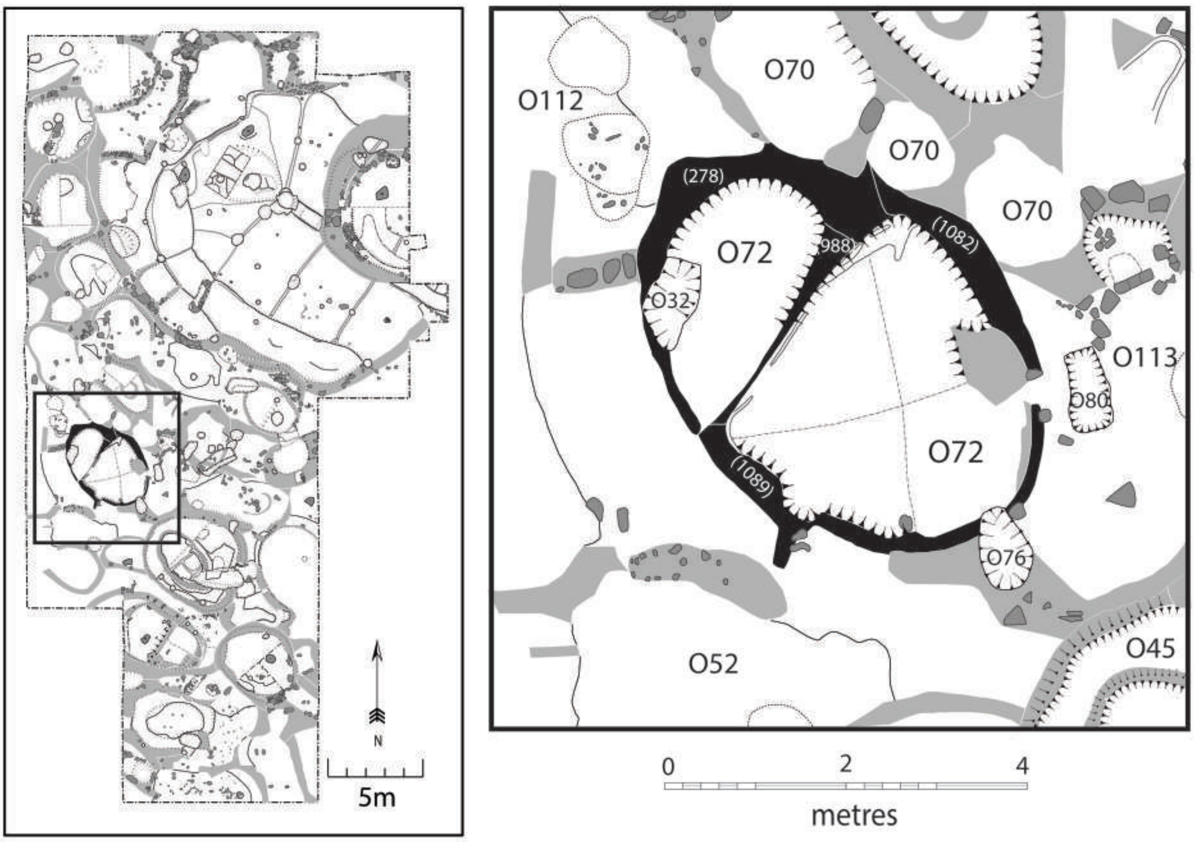


Figure 23.1 Location of Structure O72 and plan showing its relationships with surrounding Objects.

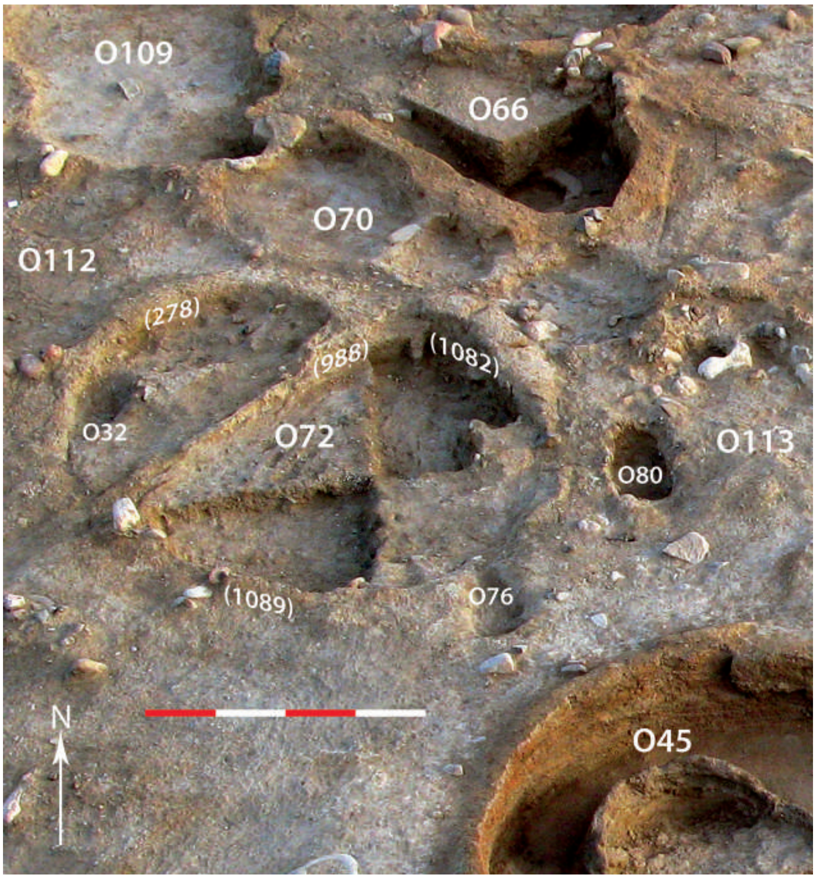


Figure 23.2 View of Structure O72 at the end of the excavation in 2010. Scale 2.0 m.

stratigraphic relationship was identified between Structure O72 and either Structure O52 or Structure O112. A number of burials (Burials O32, O76, O79, O80 and O125) and an isolated mandible O78 were located in the same area as Structure O72. Table 23.1 lists the excavated contexts while their stratigraphic relationships are illustrated in Figure 23.3. Tables 23.2 and 23.2 provide the bulk and small finds respectively.

23.2 Description of the excavated deposits

After the removal of the overburden (1 and 123) the surface of a pisé wall circuit consisting of three segments (278), (1082) and (1089) was partially exposed; these wall segments demarcating Structure O72. Within the interior there was a silty deposit (8) in which a cup-hole mortar (SF18) was embedded (Figure 23.4). External to the structure, towards Structure O113, a soft silt (973) was exposed.

The fill of the cup-hole mortar (SF18) was given context number (9). The silty deposit (8) in which it was embedded contained a number of small finds, including two ground-stone pestles (SF19 and SF20), two green stone beads and one marine shell bead (SF77, SF328 (Figure 23.5), and SF305) and a stone 'shaft straightener' or bead polisher (SF278). The removal of the cup-hole mortar (SF18) and deposit (8) exposed a wall (988) that divided the interior of Structure O72 into two parts, and a mid-yellowish-grey loose silt (307) that partially overlay the eastern walls of Structure O72 (1082, 1089). There were significantly fewer small finds in deposit (307) than in the overlying (8).

Located immediately below the overburden (123) and infilling silts (8) and (307) were three burials O32, O76 and O80, the first two of which cut through the walls of Structure O72 and the third lay just outside of the structure to the east (Figure 23.6).

Burial O32

Burial O32 contained evidence of a multiple-phase mortuary practice (Figures 23.7, 23.8). Because this burial was located downslope to the west, it was covered with thicker overburden than the other burials in this area. Burial O32 was first recognised by the remains of a single human cranium (25) (Figure 23.7A), which was found directly under deflated overburden deposit (123).

Excavation revealed that this was the first of ten substantial cranial fragments, which had been stacked together, contained within a silt fill [6] within a cut [12]. The upper four cranial fragments (25), (26), (27) and (28)

Table 23.1 Contexts excavated within Structure O72 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
6	soft and loose mid-grey silty sand	burial fill
8	loose dark grey silt	silt and midden accumulation over disused structure
9	loose grey sandy silt	deposit inside cup-holed mortar SF18
12	sub-rectangular cut with steep sides and a concave irregular base	cut for burial
20	articulated human skeleton	primary crouched inhumation burial
24	friable dark grey silty sand	burial fill
25	human cranium fragment	secondary burial
26	human cranium fragment	secondary burial
27	human cranium fragment	secondary burial
28	human cranium fragment	secondary burial
29	human cranium fragment	secondary burial
30	disarticulated human femur and tibia	secondary burial
31	human cranium fragment	secondary burial
32	human cranium fragment	secondary burial
33	human cranium fragment	secondary burial
34	human cranium fragment	secondary burial
35	human cranium fragment	secondary burial
36	human bone, possibly a tibia	secondary burial
278	friable/compact orangish-brown fine silt	pisé wall of structure
307	loose/soft mid-yellowish-grey silt	silt accumulation over disused structure
317	loose mid-brown silt	burial fill
318	articulated human skeleton	primary crouched inhumation burial
319	irregularly shaped cut with vertical sides and an irregular base	cut for burial
872	human mandible fragment	disarticulated human bone
874	loose dark greyish-brown ashy-silt with occasional pisé rubble	silt, midden and rubble accumulation inside structure
877	loose dark greyish-brown silt	silt and midden accumulation inside structure
881	articulated human skeleton	primary crouched inhumation burial
882	loose mid-greyish-brown silt	burial fill
883	elongated oval cut with moderate to steep sides and an irregular base	cut for burial
894	loose mid-grey silt with ashy lenses and some pisé rubble	silt, midden and rubble accumulation inside structure
961	soft mid-greyish-brown silt with frequent small stones	silt, midden and rubble accumulation inside structure
962	loose dark yellowish-grey silt with pisé rubble and some large stones	silt, midden and rubble accumulation inside structure
970	loose dark reddish-grey ashy silt with yellow lenses and occasional stones	silt, midden and rubble accumulation inside structure
972	friable/compact mid-grey silt with a high percentage of pisé rubble	rubble rich accumulation inside structure, possible collapse
973	soft mid-yellowish-grey silt	silt accumulation in intramural space
974	soft dark bluish-grey silt	silt accumulation in intramural space
977	ovoid cut with moderately steep sides and an irregular base	cut for burial
978	loose mid-greyish-brown silt	burial fill
979	articulated human skeleton	primary crouched inhumation burial
983	disarticulated human bones	incomplete infant burial
985	soft dark brownish-grey silt with pisé rubble and stones	silt and rubble accumulation inside structure
988	friable light yellowish-grey pisé	pisé wall of structure
1082	compact/concrete mid-yellowish-grey pisé	pisé wall of structure
1089	mid-orangish-brown friable-compact pisé	pisé wall of structure

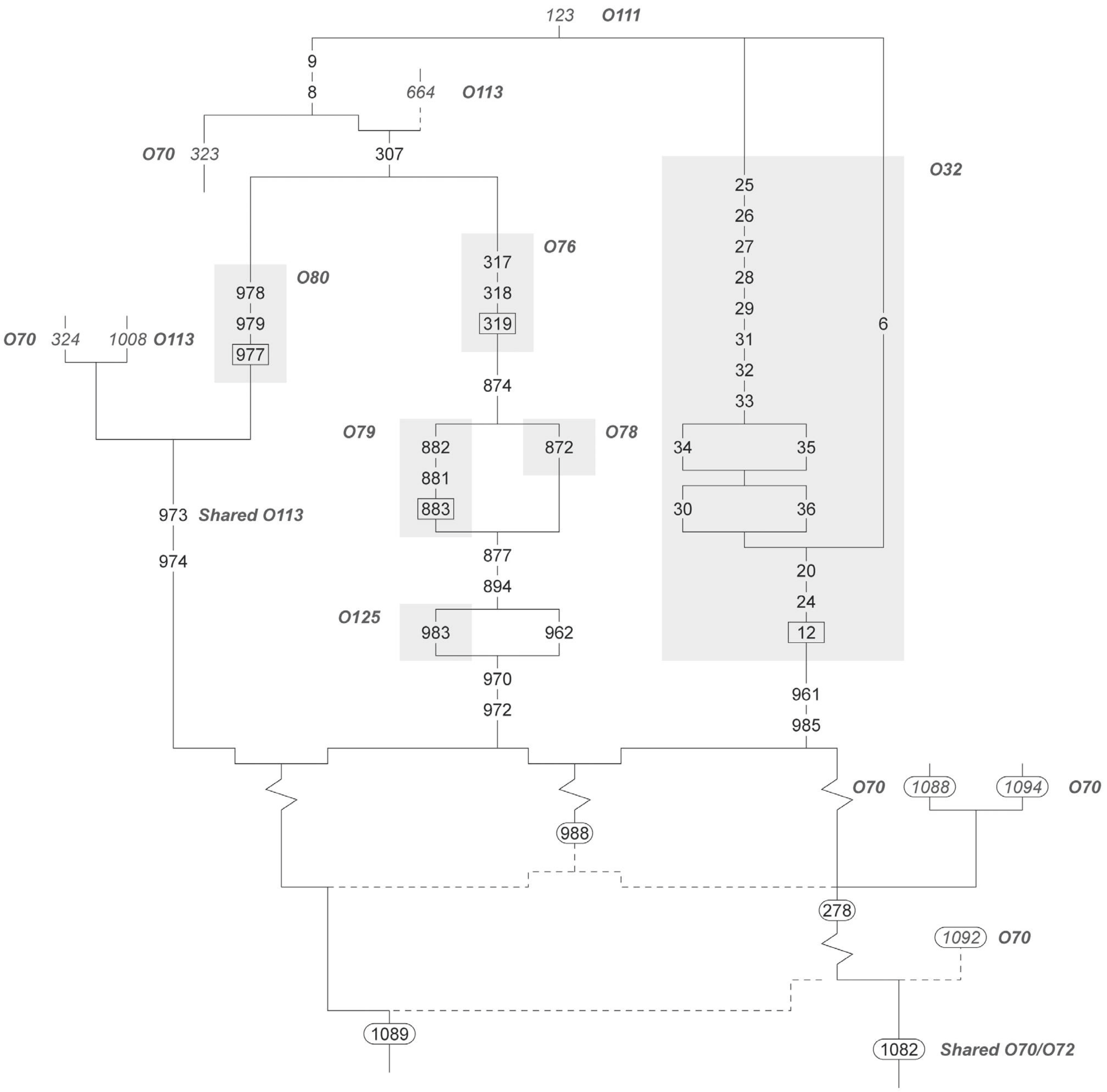


Figure 23.3 Stratigraphic matrix for Structure O72.

were in a better state of preservation than those below and almost certainly represent four different individuals (Figures 23.7B and 23.8D). The more fragmentary lower set were grouped by probable association as (29), (31), (32), (33) and (34, 35) (Figures 23.7C and 23.8C); these might represent a further four individuals.

The more extensive fracturing of the lower set of cranial fragments might have been caused by disturbance due to re-cutting of the burial, which may have happened on more than one occasion. It is possible that the better preservation of the upper four crania was due to their separate deposition at the end of the sequence. The evidence for re-cuts of the burial could not be confirmed through differences in the surrounding loose and mobile deposit (6), which was uniform throughout and contained much disarticulated bone.

Directly underlying the lowest cranial fragments (34) and (35) were disarticulated adult long bones identified in the field as a left femur and tibia (30) and a right tibia (36). These were placed at a right angle to each other with tibia (36) angled downwards (Figures 23.7D and 23.8B). These bones appeared to belong to an individual whose partial skeleton (20) lay in a crouched position on its right side at the base of the burial sequence (Figures 23.7D and 23.8). The right leg was *in situ* flexed towards the chest, but without the tibia, which had been moved towards the upper part of the body. The long bones of the left leg had all moved upwards, leaving only the foot bones in their

Table 23.2 Quantities of bulk finds from Structure O72 by material and context number.

Object 72	**Volume of sediment (l)**				**Weight of bulk finds per material (g)**									
Context	**Total volume**	**Flot. sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Ground stone**	**Other worked stone**	**Unworked stone**	**Animal bone**	**Human bone**	**Marine shell**	**Other shell**	**Charcoal**	**Misc.**
6	122.0	121.0	0.0	1.0	708.3	0.0	10.0	0.0	215.0	0.0	0.0	163.1	50.2	0.0
8	120.0	10.0	110.0	0.0	1150.0	0.0	1.0	20.0	170.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	3.4	0.0	0.0	2.8	0.0	0.0
24	5.0	5.0	0.0	0.0	6.4	0.0	0.0	0.0	1.6	0.0	0.0	6.4	10.0	0.0
79	841.0	30.0	810.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
307	451.0	30.0	420.0	1.0	4520.0	0.0	12.0	0.0	425.0	1.0	0.0	0.0	0.0	0.0
317	61.0	60.0	0.0	1.0	184.5	0.0	0.0	0.0	38.6	0.0	0.0	14.4	11.0	0.0
874	241.0	30.0	210.0	1.0	1777.4	540.0	10.1	0.0	388.6	1.0	0.0	45.2	0.1	0.0
877	154.0	30.0	122.0	2.0	1079.6	0.0	10.0	0.0	241.2	0.0	0.0	50.3	0.4	0.0
882	2.0	2.0	0.0	0.0	29.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0
894	424.0	40.0	380.0	4.0	3960.0	424.0	10.0	0.0	816.0	0.0	0.0	0.0	0.0	0.0
961	91.0	30.0	60.0	1.0	765.0	300.0	0.0	0.0	78.0	0.0	0.0	0.0	0.0	0.0
962	211.0	20.0	189.0	2.0	1690.0	0.0	1.0	0.0	268.0	0.0	0.0	0.0	20.0	0.0
970	179.5	40.5	137.0	2.0	2064.0	197.0	0.0	0.0	259.0	0.0	0.0	0.0	0.0	0.0
972	11.0	10.0	0.0	1.0	681.0	47.0	1.0	0.0	23.0	0.0	0.0	0.0	0.0	0.0
973	86.0	30.0	55.0	1.0	481.0	175.0	4.0	0.0	44.0	2.0	0.0	0.0	0.0	0.0
974	91.0	30.0	60.0	1.0	1136.0	400.0	1.0	0.0	60.0	0.0	0.0	0.0	0.0	0.0
978	101.0	100.0	0.0	1.0	491.0	850.0	0.0	0.0	79.0	0.0	0.0	0.0	0.0	0.0
985	86.0	30.0	55.0	1.0	300.6	0.0	0.0	0.0	88.4	0.0	0.0	1.2	0.2	0.0
Total	3277.5	648.5	2608.0	21.0	21025.4	2933.0	60.1	20.0	3200.8	4.0	0.0	283.4	91.9	0.0

Table 23.3 Quantities of small finds from Structure O72 by material and context number.

Object 72	**Quantities of small finds per material (nos)**											
Context	**Chipped stone**	**Ground stone**	**Other stone**	**Worked bone**	**Unworked animal bone**	**Disarticulated human bone**	**Bone beads**	**Stone beads**	**Marine shell beads**	**Marine shell other**	**Bitumen objects**	**Total small finds**
6	6	0	0	2	0	0	0	1	0	0	0	9
8	0	5	1	0	0	0	0	2	1	0	0	9
24	1	0	0	0	0	0	0	0	0	0	0	1
307	1	1	0	0	0	0	0	0	0	1	1	4
317	1	0	0	0	0	0	0	0	2	0	0	3
874	0	1	0	0	0	0	0	1	2	1	1	6
877	0	0	0	1	0	0	0	0	3	0	0	4
894	0	3	2	0	0	2	1	0	0	2	0	10
961	0	2	0	0	0	0	0	1	1	0	0	4
962	0	1	0	0	0	0	0	0	2	1	0	4
970	0	2	0	3	0	0	0	0	0	0	0	5
978	7	0	0	0	1	0	0	0	0	0	0	8
Total	16	15	3	6	1	2	1	5	11	5	2	67

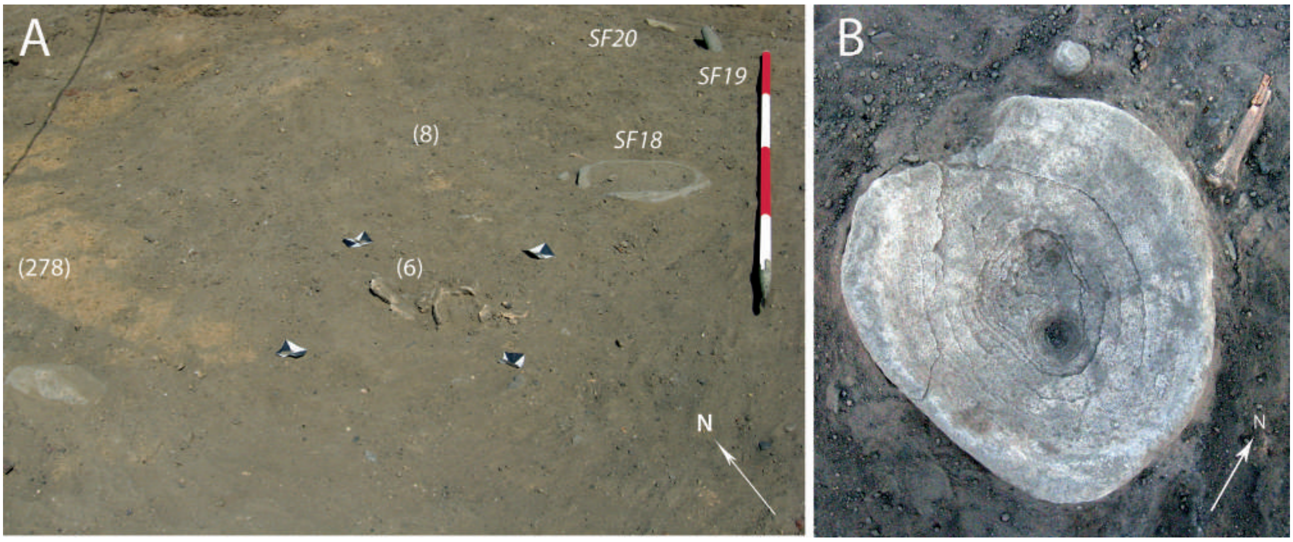


Figure 23.4 A — View of Structure O72 at the early stages of the excavation showing wall (278) emerging in the east, fill (6) of Burial O32 under excavation in relation to cup-hole mortar SF18 and ground-stone pestles SF19 and SF20 within deposit (8) in the background. Scale 2.0 m; B — Cup-hole mortar (SF18).

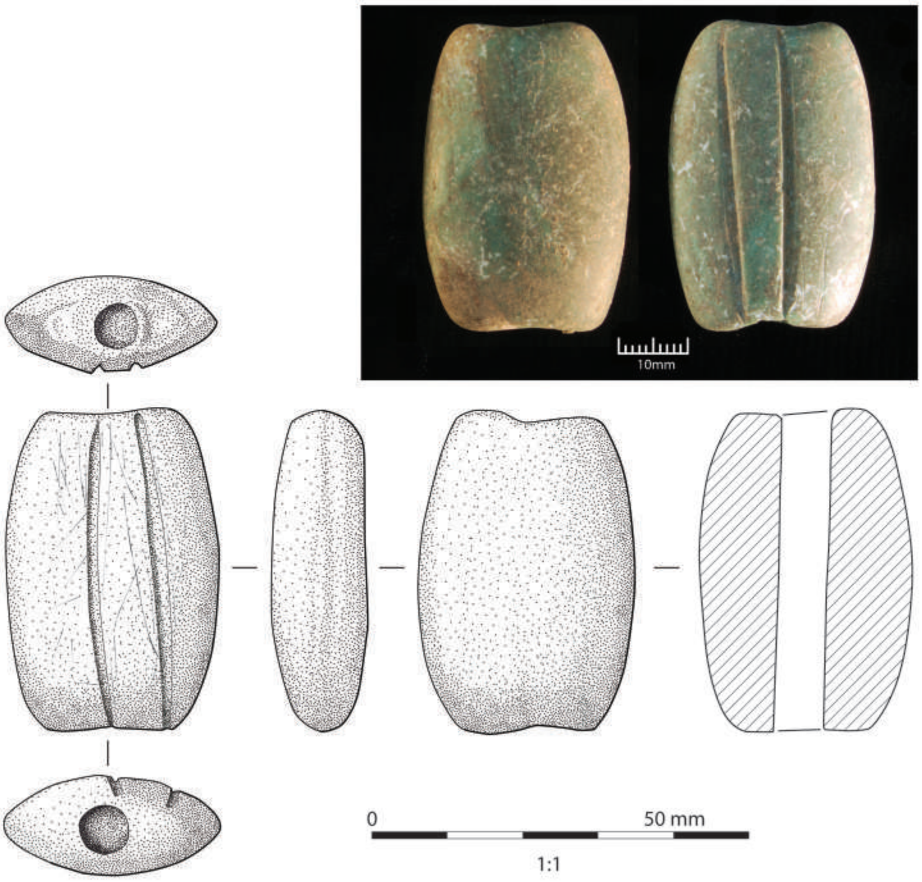


Figure 23.5 Large green stone bead SF328 from deposit (8).

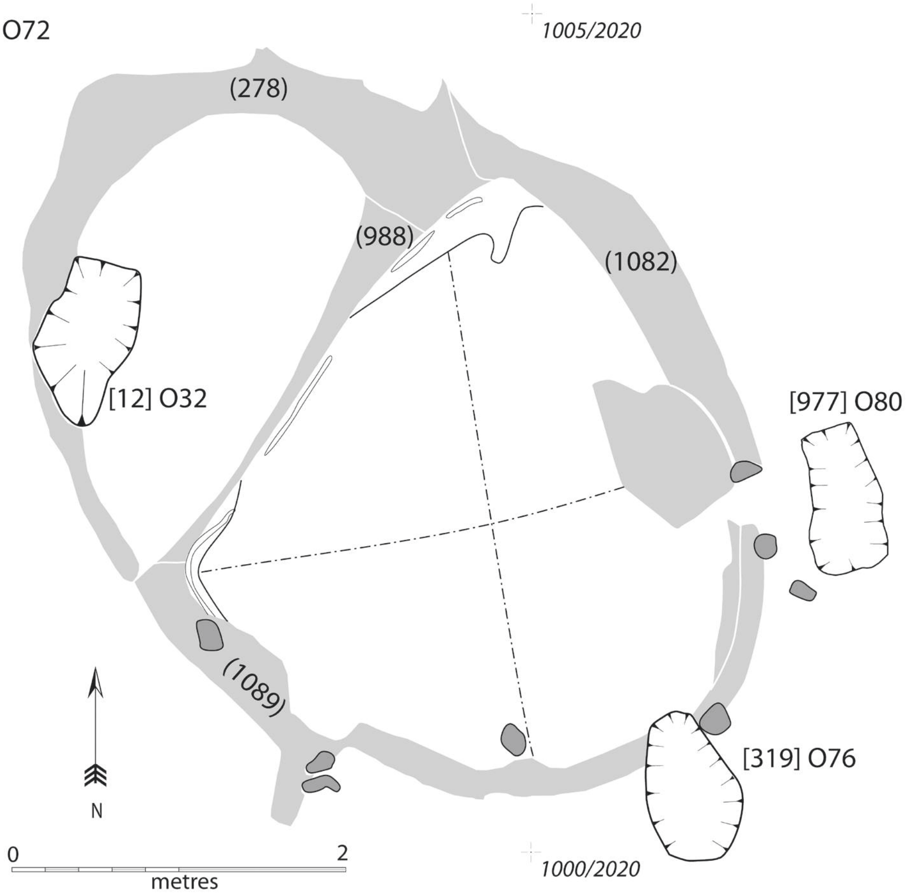


Figure 23.6 Plan of Structure O72 showing location of burials and walls.

original position. The left leg must have been originally flexed too, as there is no room within the north–south orientated sub-rectangular burial cut [12], 1.30 m x 1.40 m x 0.25 m deep, for any other articulated arrangement. The right knee met the right elbow and the right arm was flexed in the opposite direction, but the bones of the right hand were scattered throughout fill (6). The position of the right hand suggests that it may have originally been placed underneath the head, but the skull and mandible have been removed, and replaced by the long bones of the left leg (30), as well as the tibia of the right leg (36). The upper part of the left arm survived *in situ,* but the position of the lower arm and hand is not known. Whether it had been present within the original burial (and potentially included with the cranial fragments) or whether the body had been decapitated prior to burial cannot be established until osteological analysis has been undertaken.

Underlying skeleton (20) was a loose, dark, silty sand (24), excavated as the basal fill of the burial. It is possible that this could have been part of the underlying loose infill deposits (961) or (985) within Structure O72, which were disturbed by the digging of the original burial pit. The burial cut [12] was north–south orientated and had clipped the interior face of pisé wall (278), which formed the western arc of this oval structure. The cut [12] is roughly rectangular and there is only just enough space provided to fit an adult person crouched in a very restricted manner. A similar limitation of space appears as a common characteristic throughout the Neolithic burials on site.

Several objects were found in the burial (Table 23.3), but it is difficult to determine the stage and circumstances in which they had entered. It is possible that bird bone SF106 and flint core SF114 (Figure 23.9) belong to the primary phase, given their close association with the *in situ* part of the primary burial, but the latter mortuary activity was so intrusive that the finds are difficult to assign to a particular event. Judging by its position near skeleton (20), a flint blade (SF84) might belong to the primary burial, while a flint point (SF81), which was found under the repositioned tibia (36), might be a later addition or have been re-deposited. It is even more difficult to be sure about the provenance of the finds that were underlying skeleton (20) such as an El-Khiam point (SF118), which was found below the pelvis. These could have been brought up from the underlying loose deposits unrelated to the burial.

Burial O76

This burial truncated the southern wall (1089) of Structure O72. The cut [319] was an irregular sub-rounded oval, 0.9 m x 0.5 m x 0.2 m deep. The base was irregular and sloped from west to east, whilst the cut itself was orientated north–south. The skeleton (318) was positioned on its left

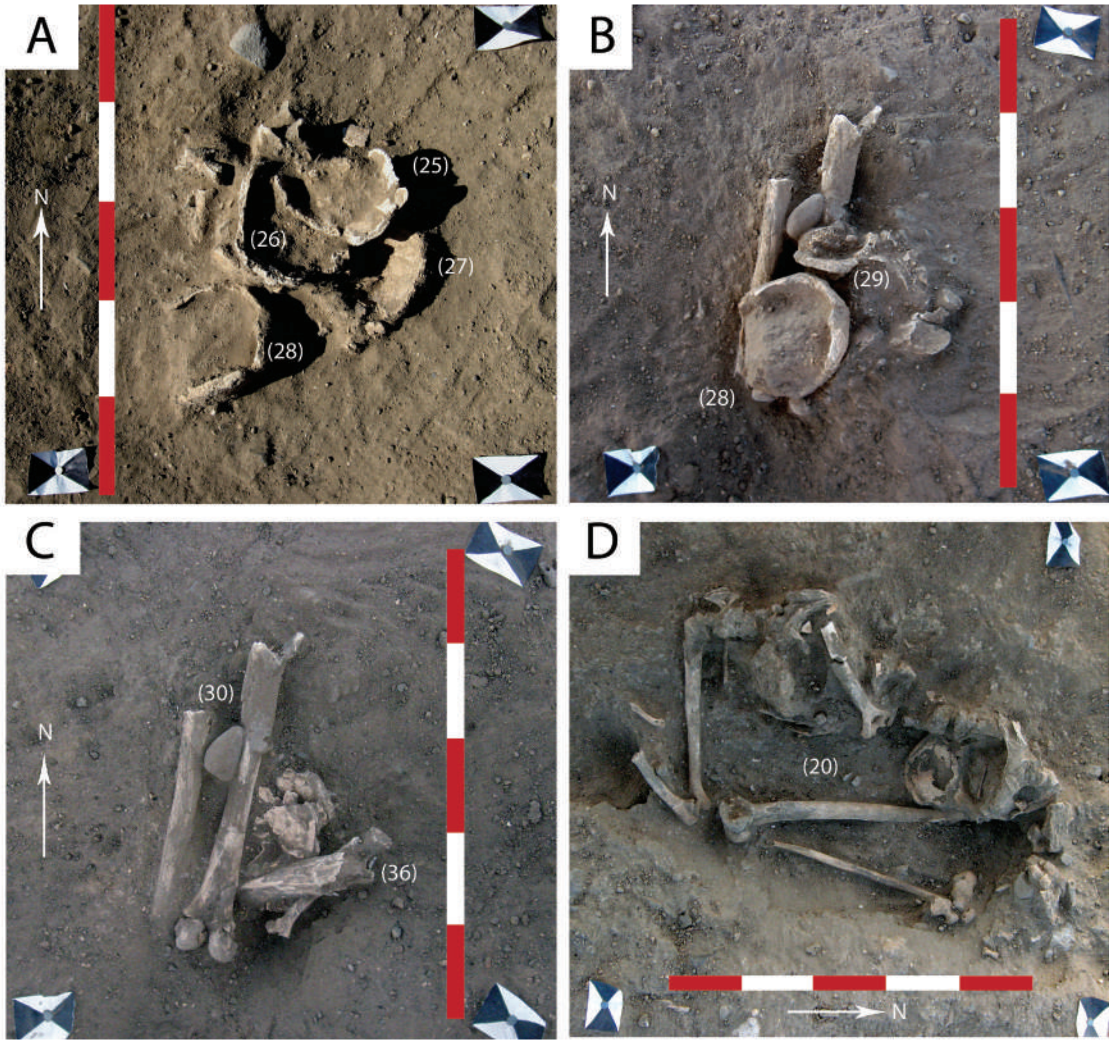


Figure 23.7 Four phases of the excavation of Burial O32 showing: A — upper crania group (25) to (28); B — crania (28) and (29); C — crossed-over long bones (30) and (36); and D — remains of the primary burial (20).

side with its head to the north, facing east (Figure 23.10). Both arms were bent up close to the chest with the hands near the mandible. The fingers of the right hand were curled closed. Both legs were bent up to the chest, the feet being in line with the pelvis. The right foot was squashed against the edge of the burial cut with the toes curled (Figure 23.11). A single chipped-stone tool was found near the head of the burial and two marine-shell beads and a chipped-stone blade were recovered from the fill (317) of this burial.

Burial O80

To the west of Structure O72, towards Structure O113, Burial O80 was formed by cut [977] through silty context (973). The burial pit was an irregular ovoid (0.90 m x 0.30 m) orientated north–south with rounded corners, vertical sides and an irregular base. The skeleton (979) was in a crouched position lying on its back but tilted to the left side, with its head to the north (Figure 23.12). Both arms were by the sides of the body. The right arm was bent up to the right shoulder with three fingers resting on the neck; the left arm was bent up the left side with the hand behind the skull (Figure 23.13). The left leg was raised up to the left-hand side of the chest so that the knee met the elbow of the left arm. The right leg was bent in such a way that the right knee lay over the left ankle and the right foot lay over the top of the right femur. It was, however, entirely articulated (Figure 23.13).

Within the silty fill (978) of cut [977] three chipped-stone blades lay adjacent to the left foot, one to the left ankle and a further blade lay close to the right leg. The disarticulated remains of a small (or possibly juvenile) canid, identified in the field as a fox, were found adjacent to the right foot. Removal of Burial O80 and silt (973) revealed a further portion of wall (1089) and a soft grey silt (974). Comparatively few finds were recovered from these contexts. Removal of deposit (974) uncovered more of the southern course of wall (1089).

Interior deposits

Two layers were removed from the space to the west of dividing wall (988), within the area enclosed by wall

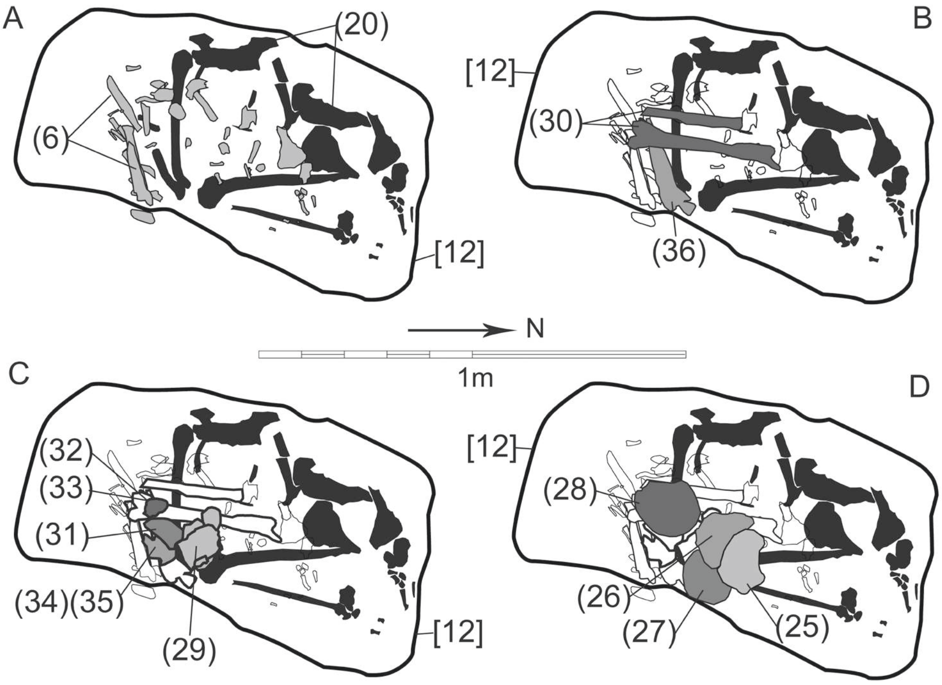


Figure 23.8 Phased plan of Burial O32 showing the sequence of deposition and disturbance of the human remains described in the text: A — remains of the primary burial (20) and disturbed bones in fill (6); B — deposition of crossed long bones (30) and (36); C — deposition of the lower group of cranial fragments (29), (31), (32), (33), (34), (35); D — deposition of the upper group of cranial fragments (25), (26), (27) and (28).

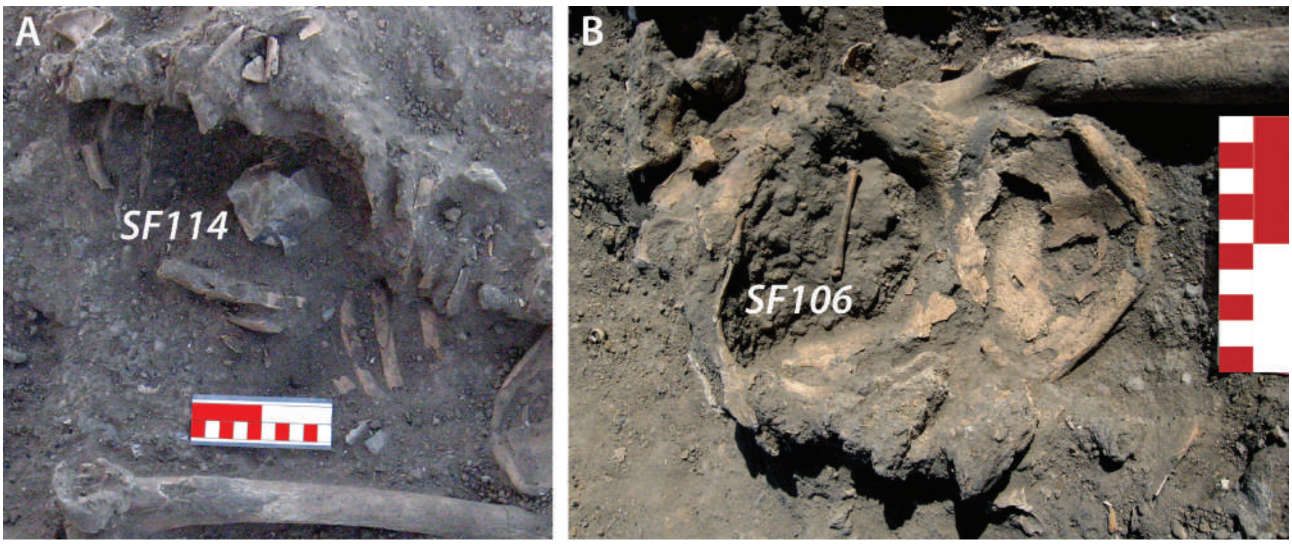


Figure 23.9 A — Flint core SF114 within the rib cage and B — bird bone SF106 in the pelvic cavity of skeleton (20). Scales 0.1 m.

(278) (Figure 23.6). Deposit (961), below the overburden (123) and into which cut [12] for Burial O32 had been made, consisted of a soft mid-greyish-brown silt with *c.* 15% inclusions of stones (6–60 mm). Two beads, one of marine shell (SF1418) and one of malachite (SF1414), were recovered as well as a ground-stone pestle and a hammer stone (SF1415 and SF1416). Below this, deposit (985) consisted of a dark brownish-grey silt with pisé and angular stone inclusions. Excavation then ceased in the area west of wall (988). To the east of this dividing wall deposit (307) was equivalent to (961). Below this there was a layer of rubble (874), which was equivalent to (985).

Several spits of deposit (874) were removed, this having an ashy consistency and 5% pisé rubble inclusions. A large

Figure 23.10 Skeleton (318) in Burial O76. Scale 0.5 m.

Figure 23.11 Right foot of skeleton (318) in Burial O76.

Figure 23.12 Skeleton (979) in Burial O80. Scale 0.2 m.

Figure 23.13 Upper torso and skull of skeleton (979) in Burial O80. Scale 0.1 m.

number of finds were recovered from this context, including marine-shell beads (SF733 and SF735), unworked marine shell (SF2601), a malachite bead (SF1255), bitumen (SF1311) and a ground-stone pestle (SF1249). This layer (874) overlay a second loose silty layer (877), a human mandible fragment O78 and a further burial, Burial O79.

The burial cut [883] for O79 was identified in silt (877) although it may have been cut from higher up but not visible in the loose deposits relatively close to the surface. The cut was an elongated ovoid (0.18 m x 0.20 m) orientated north–south with rounded corners and sharp to moderate break of slope. The skeleton (881) was in a crouched position on its left-hand side with its head to the north, facing east within a silty fill (882) (Figure 23.14). Considering the fragility of the bone, preservation appeared remarkably good with most bones broken but present. The right arm was flexed with the hand in front of the face. The left leg was tucked up tight to the chest whilst the right was fully extended with the foot in front of the skull. A piece of human mandible (872, Human Remains O78) probably from a different individual was also identified at the same level. It remains unclear whether this was associated with the burial.

Excavation continued by dividing the area to the east of wall (988) into quadrants, and excavating the northeastern and southwestern quadrants to maintain stratigraphic control through the spits (Figure 23.15). The next four contexts removed (877, 894, 962 and 970) all consisted of fine dark loose silts with moderate inclusions of snail shell, burnt stone and pisé. They had the character of midden deposits, containing a large number of finds. Marine-shell beads were particularly common in contexts (962) and (877), whilst a variety of human bone, ground stone, worked animal bone and coral were recovered from contexts (894) and (970), including bone object (SF1430) (Figure 23.16). Removal of these contexts revealed collapsed pisé blocks around the inside of wall (1089) and burnt lining against wall (988); neither was excavated. The partial remains of an infant (983) (Burial O125) were recovered from the northern quadrants above (970). No formal grave cut was identified, and the bones appeared to simply lie within the midden material. Below (970) deposit (972) consisted of up to 50% pisé and was considerably more compact. Deposit (972), at which level the excavation ceased, contained fewer finds and appeared more like a collapse deposit than a midden.

The walls

The walls of Structure O72 (Figure 23.6), as revealed by the excavation of the overburden, overlying silts and compacted rubble collapse, do not appear to have been made as a single event; however, the precise sequence of construction remains uncertain. The walls of the structure were not investigated by excavation and the description given here is based on their surface appearance once cleaned.

Wall (1082) had a maximum width of 0.48 m. The use of a mid-yellowish-grey silt tempered by 35% sub-angular grit and pea gravel for its construction differs to that of other walls in this structure (1089, 278). Wall (1082) appeared to have been abutted to the north by wall (1092), part of

Figure 23.14 Skeleton (881) in Burial O79 looking west. Scale 0.1 m.

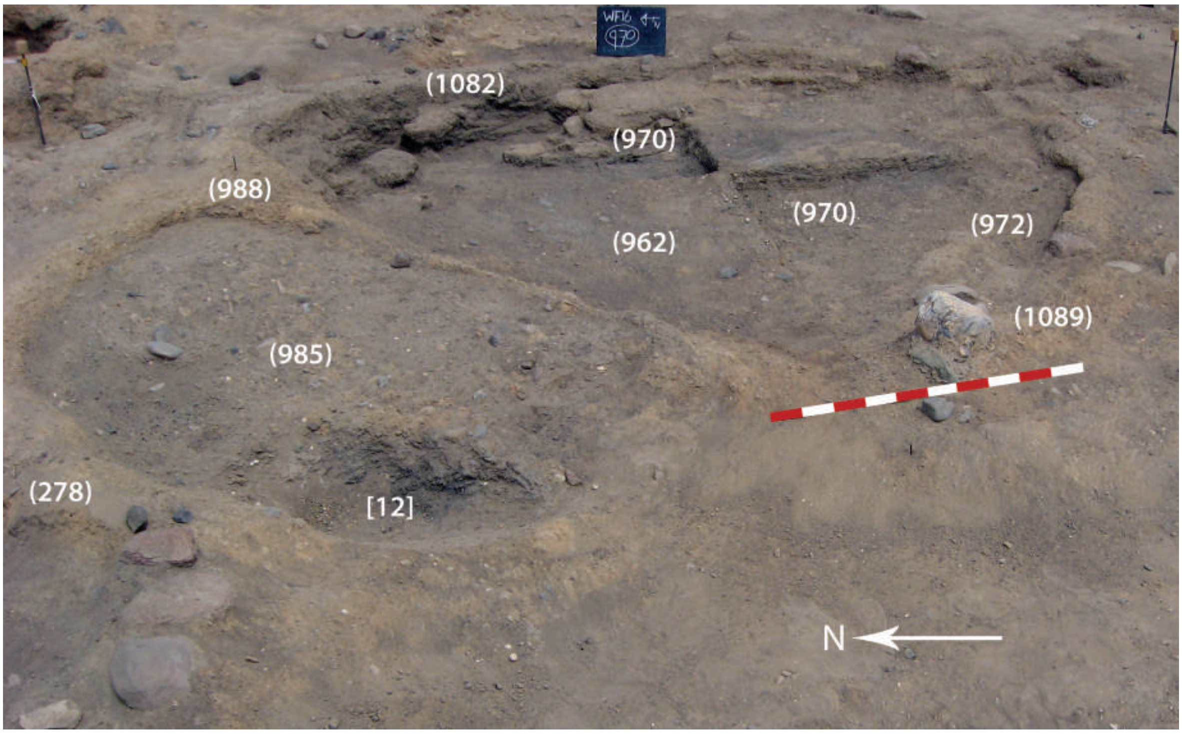


Figure 23.15 Excavation of interior deposits within Structure O72. Scale 1.0 m.

Structure O70, and was truncated to the west during the construction of wall (278).

It is likely that walls (278) and (1089) were constructed for the purpose of creating Structure O72 by building onto pre-existing wall (1082). Wall (278) formed the northwestern extent of the structure. It ran in a 'U' shape from its northern end where it abutted wall (1082) round to its southern end, where it probably abutted wall (1089), although deflation at this point makes the relationship unclear. Wall (278) was a maximum of 0.36 m wide. The northern part of wall (278) was abutted by walls (1088) and (1094) of Structure O70 and may itself have been included as part of this later structure. Wall (278) was constructed from a mid-orangish-brown compacted fine silt with occasional stone inclusions. Wall (1089) formed the southern and southeastern limits of Structure O72. It had a similar consistency to (278) and measured 2.9 m in length with a maximum width of 0.3 m. At the northeastern end there was a gap between this wall (1089) and wall (1082). A recess in the internal southern segment of wall (1089) may have formed a niche within Structure O72, but this was not explored by excavation.

Wall (988) ran northeast–southwest across the structure, forming a partition 1.5 m from the northwestern extent of wall (278) and dividing the structure into eastern and western spaces. Only the eroded upper level of this wall was exposed, but it appeared to abut wall (278) and may have abutted or been bonded to wall (1089) although fully defining these relationships requires further excavation.

Figure 23.16 Worked bone object SF1430 from deposit (970).

23.3 Sedimentary analysis

Three samples were taken for sediment analysis from O72: one from the surrounding wall (1082); one from the dividing wall (988); and one from midden and rubble accumulation (894). The data, results and interpretation are provided in Chapter 41.6.

23.4 Interpretation

Structure O72 is ovoid in shape, 4.7 m x 3.1 m in size, and partitioned by a dividing wall. Although the structure was only partially excavated, without reaching any floor horizons, sufficient data was recovered to suggest it had a complicated architectural history. Surface inspection suggests that wall (1082) is early in the sequence and may once have belonged to a building that was truncated by subsequent construction activities. Walls (278) and (1089) appear to have been constructed to complete the overall building shape. An internal dividing wall (988) was also added but it remains unclear whether or not this was part of the same construction phase. Excavation was unable to explore the whole history of this building, reaching a horizon (972) that appears to represent structural collapse. Over this deposit a sequence of midden and/or occupation deposits accumulated, containing a number of small finds. It was not clear whether a burial in this sequence (Burial O79) and a human mandible (872, O78) had been cut into this sequence from a higher level, or were created while this sequence of deposits was accumulating. After these interior deposits had accumulated, and the remaining walls been covered by silts (307, 8) a cup-hole mortar (SF18) was positioned over wall (988). It is not clear if this relates to a structure that has since been fully eroded, or to a use of Structure O72 above the level of the partitioning wall (988).

Three burials were cut into Structure O72, relating to a later phase of activity at WF16 that has been almost entirely lost by erosion. Burials O32 and O76 were cut through the walls of Structure O72, while Burial O80 was cut into deposits immediately to the west of the Structure. The creation of Burial O32 began with the digging of a simple rectangular pit [12] in which a primary adult crouched inhumation (20) was placed. The cut was located at the western end of partly subterranean Structure O72 whose walls (278), (988) and (1082) were by this time level with the ground surface and its interior filled up with loose backfill and windblown silt. The inner face of wall (278) had been clipped by the burial cut. The main part of the cut was dug through the soft infilling deposits (961) and (985), and the basal fill (24) could simply be the underlying sediment which was disturbed when the burial pit was dug. Only part of skeleton (20) survived *in situ* due to the later re-cutting and deliberate alterations made to the layout of the human remains. The fit within the burial pit must have been very tight. Flint core SF114 and flint blade SF84 could have been deliberate placements, and it is possible that bird bone SF106 was also significant in this respect. It is less certain when and how the rest of the finds arrived in the fills. The re-cutting of Burial O32 included the movement of bones, with the almost complete left leg (30) and the tibia of the right leg (36) being placed in a cross above the area where the right arm of skeleton (20) was flexed upwards. The skull of the primary burial was almost certainly missing by this point. The crossed bones (30) and (36) served as a platform for the placement of new crania. Figure 23.8 shows the multitude of disarticulated bones that were scattered within backfill (6) in the same area, probably as a direct result of re-cutting and movement of the long bones.

The biggest uncertainty in relation to the primary burial is whether the head of the individual was present. The length of the burial pit suggests that there was space for the complete individual. It is impossible to say whether in this case the skull was removed at the same time as the other rearrangements were made, or whether it was taken at an earlier occasion and then either kept in circulation for some time, buried elsewhere, or disposed of in some other manner. It may have been reintroduced into the burial as a part of a cache of cranial fragments (25–29, 31–35), which may have belonged to as many as eight different individuals. It is interesting to note the apparent absence of mandibles and the fragmentary nature of the cranial remains.

24. Structure O70

24.1 Location and relationship with other structures

Structure O70 is a pisé-walled structure divided into three discrete spaces or cells. It is located between Structures O66 to the northwest and O72 to the southwest (Figures 24.1, 24.2). Structure O70 was partly formed by using the walls of these adjacent and earlier structures, but the stratigraphic relationships between Structure O70 and Structures O66 and O72 have been impossible to fully determine with the level of excavation undertaken. To the north O70 is bounded by walls associated with O66, while the southern extent of O70 is defined by the walls of O72. Figure 24.3 provides the stratigraphic matrix for O70. Table 24.1 describes the contexts. Bulk and small finds are listed in Tables 24.2 and 24.3 respectively.

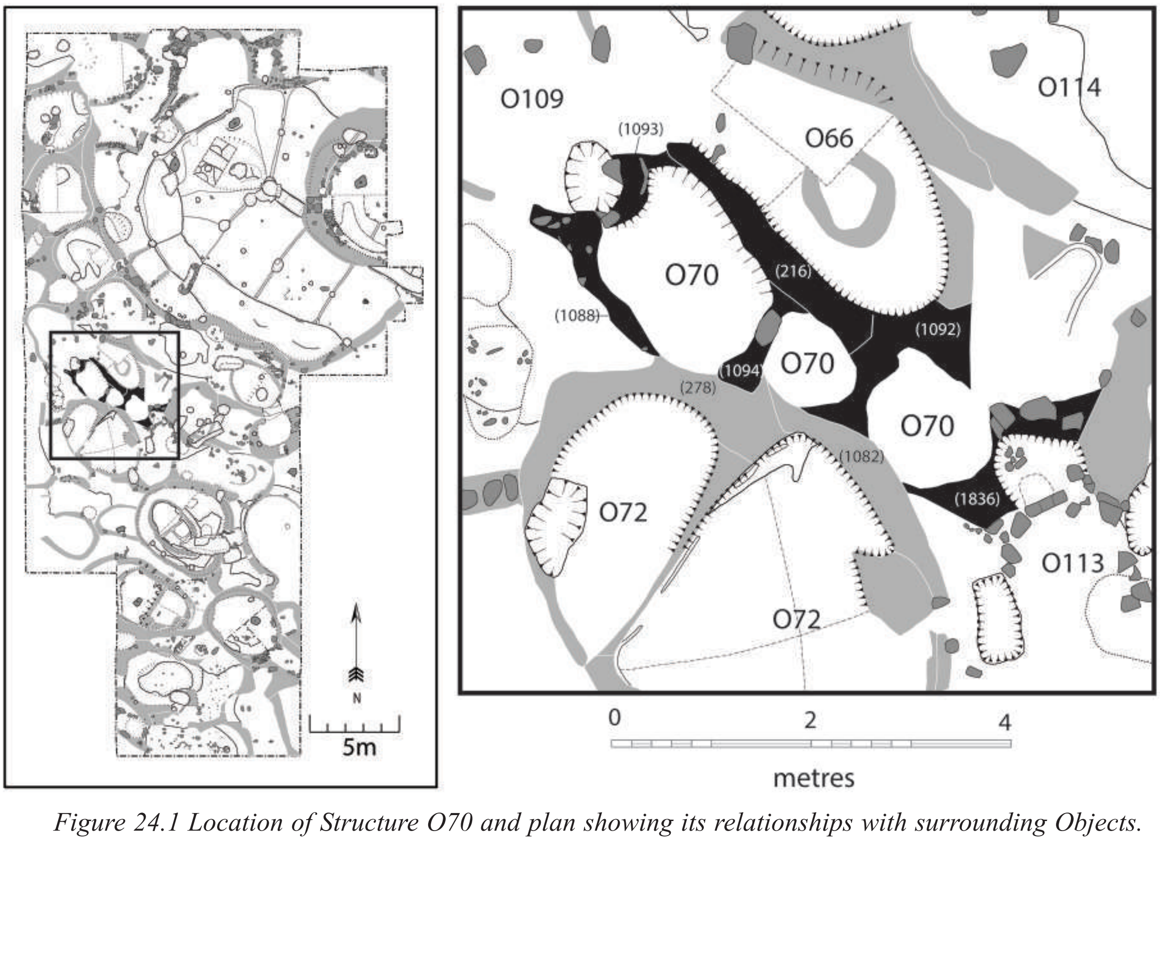


Figure 24.1 Location of Structure O70 and plan showing its relationships with surrounding Objects.

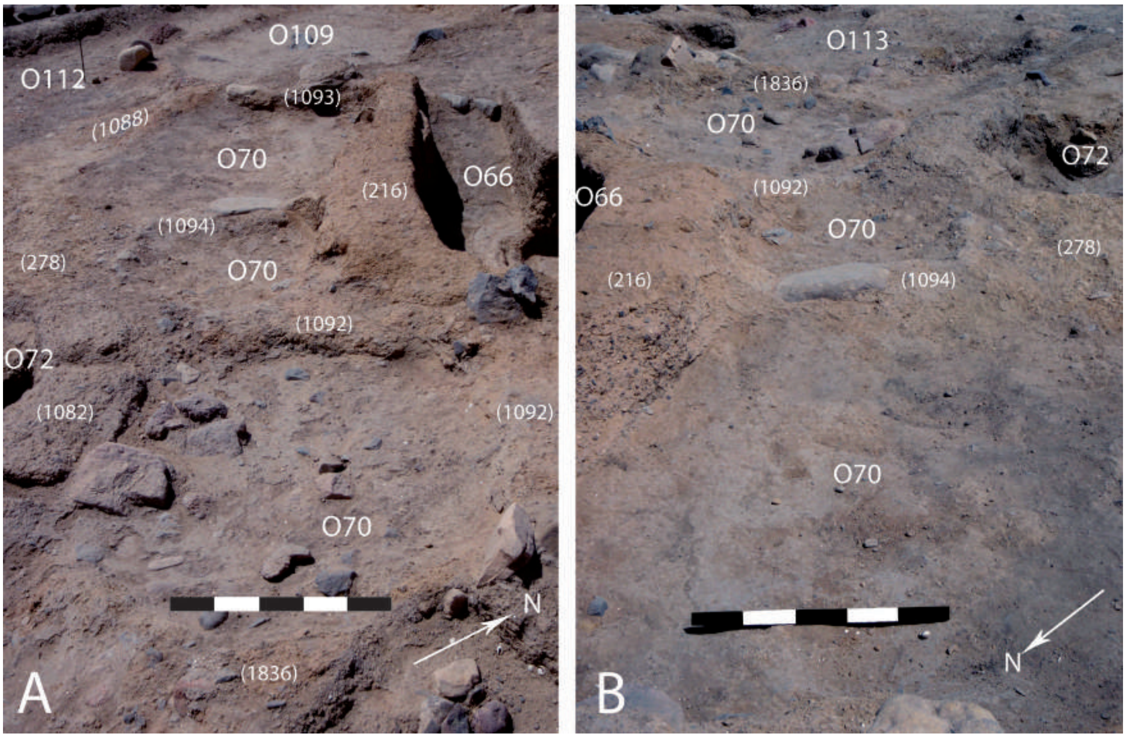


Figure 24.2 View of three cells belonging to Structure O70 from A — the southeast and B — the northwest. Scales 0.5 m.

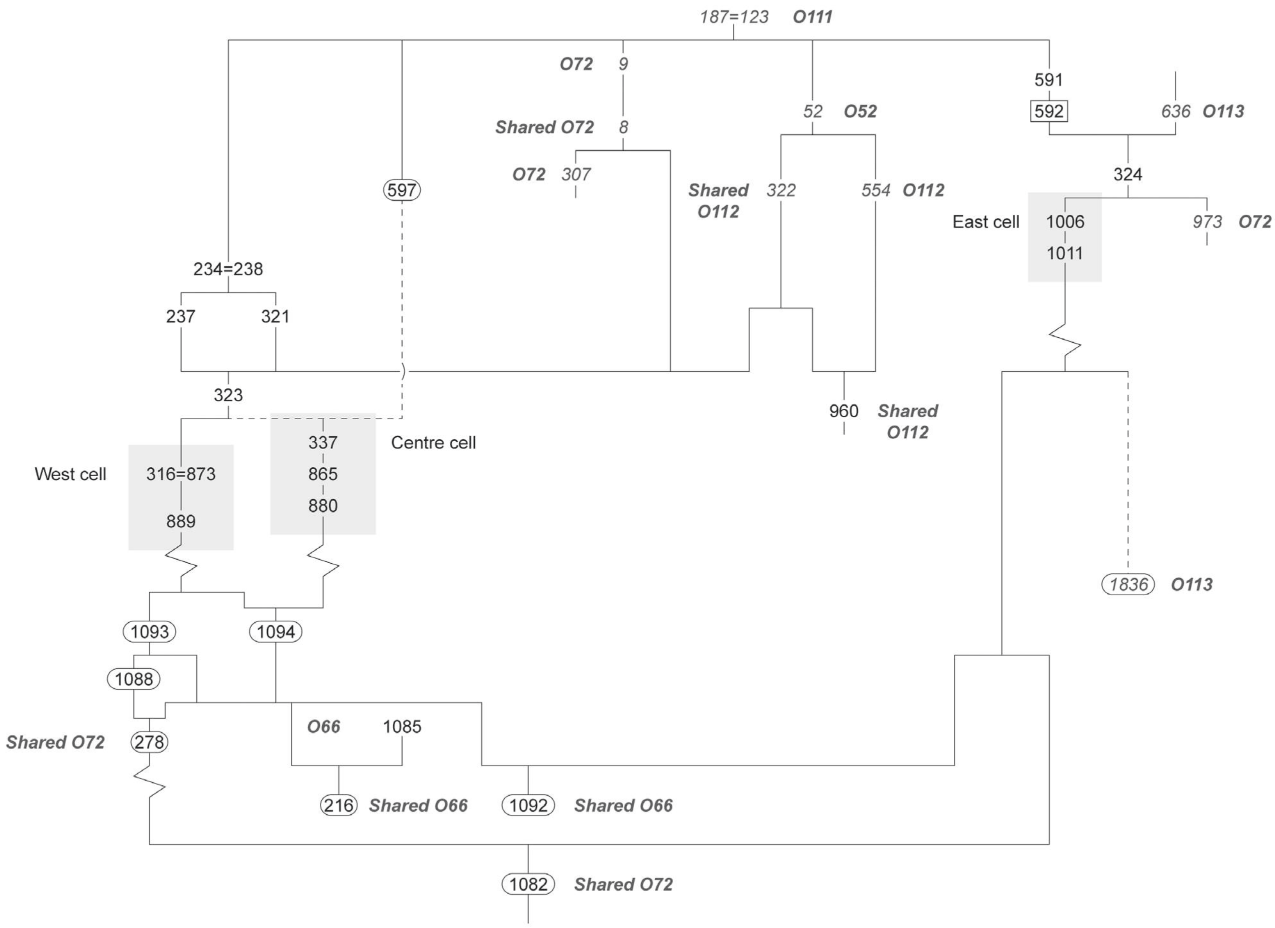


Figure 24.3 Stratigraphic matrix for Structure O70.

Table 24.1 Contexts excavated within Structure O70 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
8	loose dark grey silt	silt and midden accumulation over disused structure
216	friable light orangish-brown pisé	pisé wall of structure
234	loose dark greyish-brown silt	silt and midden accumulation inside structure
237	loose dark brownish-grey silt	silt and midden accumulation inside structure
238	loose dark greyish-brown silt	silt and midden accumulation inside structure
278	friable-compact orangish-brown pisé	pisé wall of structure
316	friable dark brownish-grey silt	occupation deposit
321	firm dark yellowish-grey silt	compacted deposit possibly used as retaining material outside pisé wall
322	loose mid-yellowish-grey silt	structural collapse over walls of structure
323	soft mid-yellowish-grey silt	occupation deposit
324	friable mottled dark greyish-yellow silty gravel	structural collapse over the walls of structure
337	dark grey silt	occupation deposit
591	loose dark grey ashy silt with burnt stone	fill of small pit
592	oval shallow pit with shallow sloping sides and a concave base	cut of small pit
597	compact mid-yellowish-grey clayey silt	degraded pisé wall
865	friable light greyish-orange silt with gravel inclusions	floor surface inside structure
873	friable dark brownish-grey silt	occupation deposit
880	compact mid-yellowish-grey silt	possible make-up layer
889	compact light yellowish-brown silt	mud-plaster floor surface inside structure
960	loose dark yellowish-grey silt	silt and midden accumulation over disused structure
1006	very loose dark grey silt with occasional stones	silt and midden accumulation inside structure
1011	loose grey ashy silt	silt and midden accumulation inside structure
1082	compact/concrete mid-yellowish-grey pisé	pisé wall of structure
1088	friable light yellowish-brown sandy pisé	pisé wall of structure
1092	friable-compact yellowish brown fine pisé	pisé wall of structure
1093	yellowish-brown pisé	pisé wall of structure
1094	yellowish-brown pisé	pisé wall of structure
1836	orangish-brown pisé with coarse stony inclusions	pisé wall of structure

24.2 Description of the excavated deposits

After the removal of overburden (123 and 187) a sequence of dark grey silts (8, 324, 960) was exposed and then partially removed, along with a cluster of stones (up to 0.6 m in maximum dimensions) set into a degraded pisé matrix (597). These stones included an up-turned cup-hole mortar (SF728, Figures 24.4, 24.5). After the removal of (597) and its collapse, an occupation deposit (337) and associated surface (865) were exposed. Removal of the silts and the overburden also exposed the surface of pisé walls (1088, 1093, 1092, 1094 and 1836), and a pit (591)/[592] (Figure 24.4).

This complex of walls defined three cells, designated as the western, central and eastern cells. Context (8) extended beyond the area of Structure O70 over most of Structure O72 to the south, whilst (960) extended across to Structure O112 and is discussed in Chapter 27. Layer (324) was rubble in a loose yellowish-grey matrix, located to the southwest of O70, overlying wall (1082) and (1092), and may have been the collapsed debris from one or both of these walls. Pit [592], 0.84 m x 0.51 m x 0.20 m deep, was cut into (324) and contained a single ashy fill (591) that may have been the result of dumping of burnt material. The three cells of Structure O70 were formed by both the construction of new walls, (1088), (1093) and (1094), and by making use of existing walls (1092) and (216) of Structure O66, and wall (1836) of Structure O113. Wall (1094) clearly abutted both wall (216) of Structure O66 and wall (278) of Structure O72. The circuit of wall surrounding the western cell was formed by the construction of two short stretches of wall (1088) and (1093). The eastern cell

Table 24.2 Quantities of bulk finds from Structure O70 by material and context number.

Object 70	**Volume of sediment (l)**				**Weight of bulk finds per material (g)**								
Context	**Total volume**	**Flot. sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Ground stone**	**Other worked stone**	**Unworked stone**	**Animal bone**	**Marine shell**	**Other shell**	**Plaster/Pisé**	**Charcoal**
8	120.0	10.0	110.0	0.0	1150.0	0.0	1.0	20.0	170.0	0.0	0.0	0.0	0.0
234	21.0	20.0	0.0	1.0	305.6	0.0	0.0	0.0	7.3	0.0	160.9	0.0	0.0
237	40.0	39.0	0.0	1.0	440.3	0.0	21.2	0.0	16.2	0.0	540.7	0.0	10.1
238	27.0	26.0	0.0	1.0	510.1	0.0	0.0	0.0	17.0	0.0	86.3	0.0	0.0
321	71.0	30.0	40.0	1.0	510.1	0.0	0.0	0.0	35.0	0.0	282.8	0.0	0.1
322	16.0	15.0	0.0	1.0	404.7	0.0	0.0	0.0	15.2	0.0	17.5	0.0	0.0
323	16.0	14.0	1.0	1.0	134.3	0.0	0.0	0.0	8.4	0.0	29.2	0.0	0.0
324	168.0	30.0	137.0	1.0	1605.0	680.0	0.0	0.0	116.5	0.0	17.4	0.0	0.1
337	6.0	5.0	0.0	1.0	55.3	0.0	0.0	0.0	5.5	0.4	3.4	0.0	0.0
597	61.0	20.0	40.0	1.0	248.8	0.0	0.0	0.0	42.5	0.0	13.8	0.0	0.0
865	26.0	25.0	0.0	1.0	185.2	0.0	0.0	0.0	9.9	0.0	10.3	0.0	0.1
873	51.0	50.0	0.0	1.0	377.8	2200.0	0.0	0.0	21.6	0.0	175.3	0.0	0.1
880	29.0	28.0	0.0	1.0	300.1	0.0	0.2	0.0	19.5	0.0	1.4	0.0	0.1
889	41.0	40.0	0.0	1.0	34.0	0.0	0.0	0.0	3.0	0.0	0.0	500.0	0.0
960	221.0	30.0	190.0	1.0	3680.0	175.0	20.0	0.0	140.0	0.0	0.0	0.0	0.0
1006	121.0	30.0	90.0	1.0	1300.0	300.0	0.0	0.0	35.0	0.0	0.0	0.0	0.0
1011	10.0	0.0	10.0	0.0	60.0	0.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0
Total	1045.0	412.0	618.0	15.0	11301.3	3355.0	42.4	20.0	682.6	0.4	1339.0	500.0	10.6

Table 24.3 Quantities of small finds from Structure O70 by material and context number.

Context	**Chipped stone**	**Ground stone**	**Other stone**	**Unworked animal bone**	**Disarticulated human bone**	**Bone beads**	**Stone beads**	**Marine shell beads**	**Plaster/Pisé**	**Total small finds**
8	0	5	1	0	0	0	2	1	0	9
237	0	2	0	0	0	0	0	0	0	2
238	0	0	0	0	0	0	1	0	0	1
316	0	1	0	0	0	0	0	0	0	1
324	0	1	0	0	1	0	0	0	0	2
597	0	2	0	0	0	0	0	0	0	2
865	0	1	1	0	0	0	0	0	0	2
873	1	0	0	0	0	0	0	0	0	1
880	0	2	0	0	0	0	0	0	1	3
960	0	0	0	1	0	0	0	0	0	1
1006	0	2	0	0	0	0	0	0	0	2
1011	0	4	0	0	0	0	0	0	0	4
Total	1	20	2	1	1	0	3	1	1	30

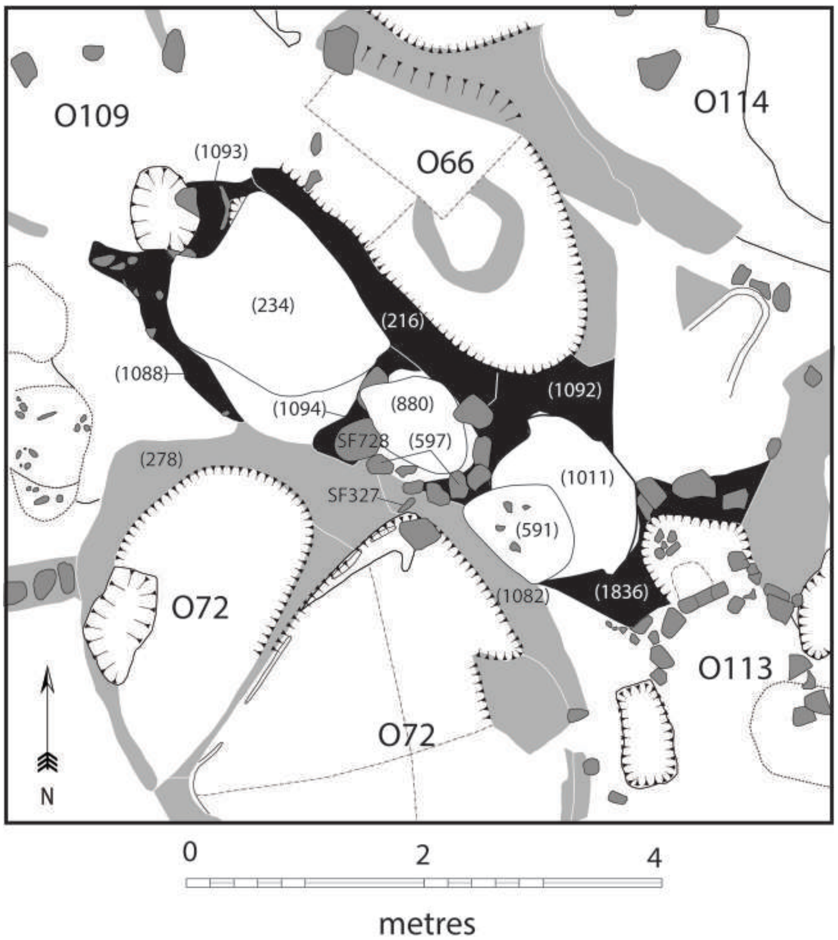


Figure 24.4 Plan of Structure O70 showing the upper fill of the western cell (234), stone setting (597) overlying pisé walls (1092) and (1094) of the central cell and fill (591) of pit [592] in relation to the eastern cell and Structure O72.

was formed entirely by reusing existing walls (1836) and (1092) (Figure 24.4).

Towards the western extent of O70, below overburden (187), three layers of silt (237), (234/238) and (321) were encountered. Layers (234) and (237) consisted of dark loose soft silts with frequent inclusions of snails as well as fire-cracked stones. A pestle (SF361) and another unclassified piece of ground stone (SF360) were uncovered in context (237). Deposit (321) abutted wall (216), and although it consisted of a similar material to the other deposits in this area, it was notably compact and may have been established to buttress the wall (Figure 24.6). Below (321) and (237) an area of mid-yellowish-grey silt was exposed (323); removal of this silt exposed (316=873) in the western cell of Structure O70.

Western cell

The uppermost deposit (316=873), below deposit (323), consisted of dark brownish-grey silt that had been compacted, possibly by trampling, over an underlying surface (889). Layer (316=873) abutted wall (216) to the northeast and lipped up against wall (1088) to the southwest. A ground-stone vessel (SF1250) was recovered from (316=873). Below (316=873), surface (889) consisted of a light yellowish-brown compact silt up to 0.04 m thick. This surface lipped up to wall (1093) at the northwest and sloped from the southwest and the northeast towards the centre of the cell where it was degraded (Figure 24.7). The surface measured 1.0 m north–south and 1.5 m east–west. Excavation did not extend below this surface.

Central cell

The eastern extent of the central cell of Structure O70 appeared to have been cut into a pre-existing wall (1092), while its western extent was formed by the insertion of wall (1094), which then abutted wall (216) to the north and (278) to the south. A possible upper part of wall (1094) had been identified higher up in the sequence within the deflated deposits and removed as (597) (Figure 24.4).

The uppermost deposit within the central cell was (337), which consisted of a small patch of ashy material, 0.37 m x 0.26 m wide, from which a variety of finds were recovered including marine shell (Tables 24.2 and 24.3). Below (337) there was a highly degraded surface (865) that measured only 0.54 m x 0.58 m wide and did not reach the northern or eastern limits of the cell. A fragment of decorated stone (SF1247) and a ground-stone pestle (SF1251) were recovered from this surface. Below (865) and (337) there was a compacted yellowish-brown silt

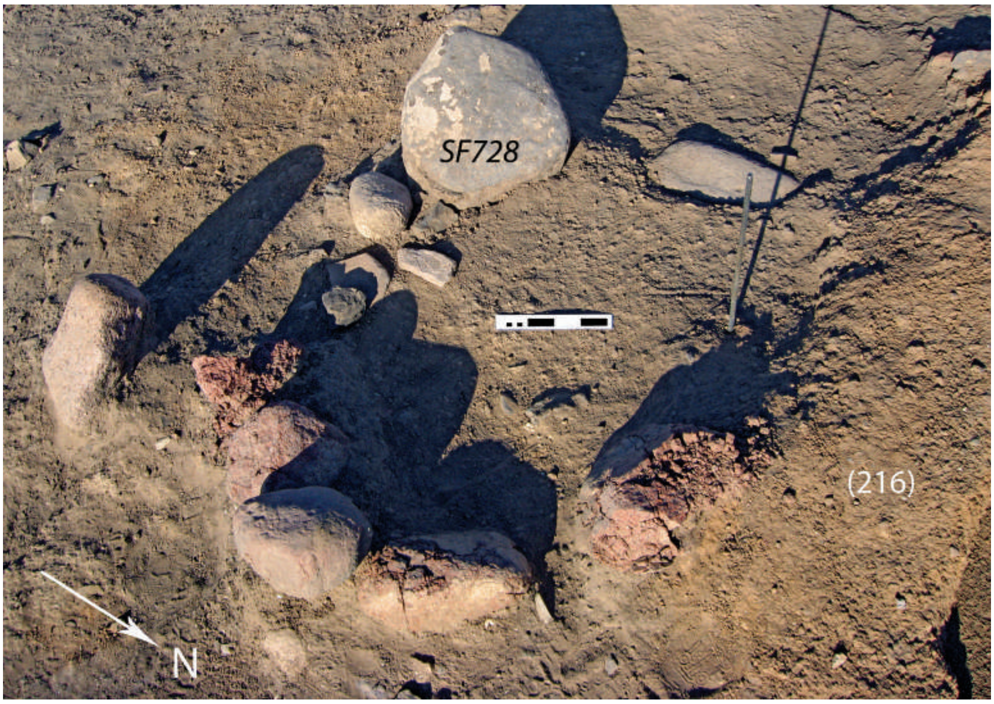


Figure 24.5 Stone setting (597) from the northeast forming upper phase of the central cell of structure O70. Scale 0.2 m.

Figure 24.6 View of section through (321) showing how this deposit abuts wall (216) of Structure O66 from the west. Scale 0.2 m.

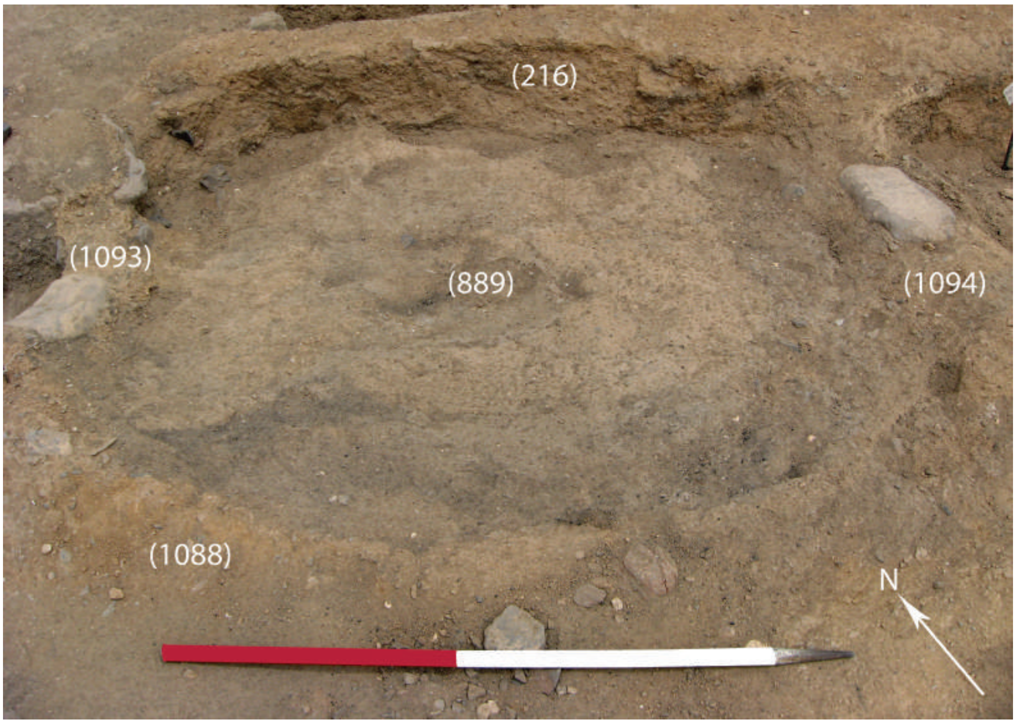


Figure 24.7 Surface (889) within the western cell of Structure 070. Scale 1.0 m.

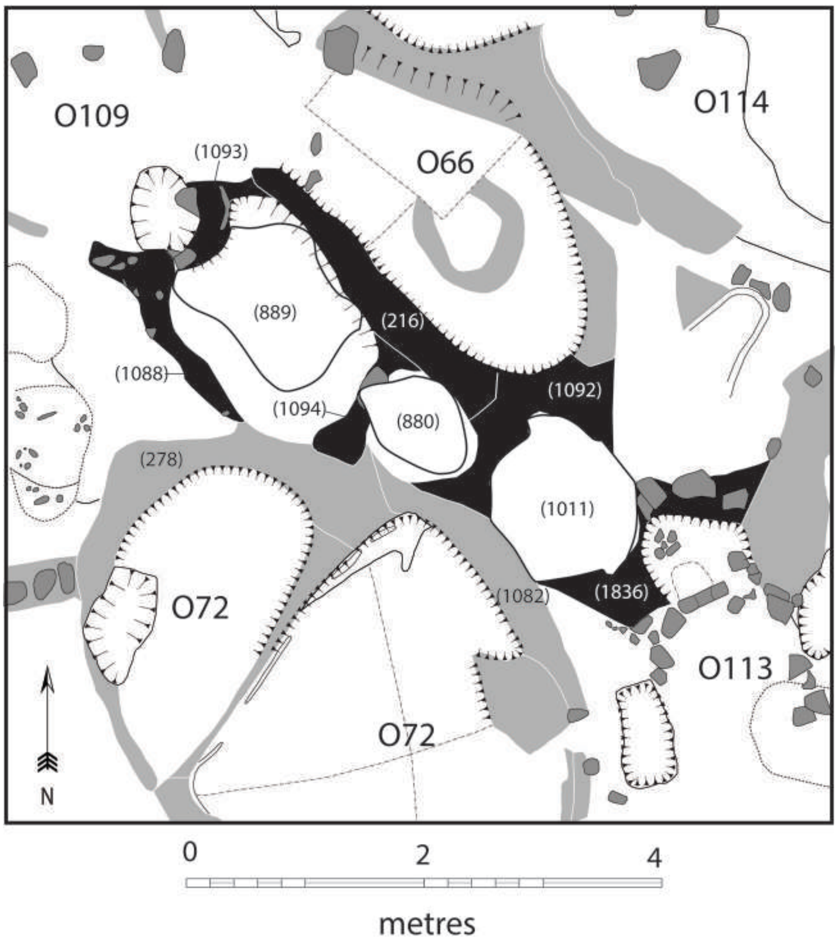


Figure 24.8 Plan of Structure O70 showing the lowest excavated deposits: surface (889) in the western and silts (880) and (1011) in the central and the eastern cells.

(880) that may have been a make-up layer for that surface (Figure 24.8). Deposit (880) was stratigraphically above walls (216), (1092) and (1094).

Eastern cell

Deposits in the eastern cell were not extensively explored during the excavation and no surfaces were encountered in this cell. This cell appeared to have been constructed by truncation of wall (1092), although the southern extent of the cell may have been defined by wall (1082) of structure O72. Wall (1836) of Structure O113 formed the cell wall to the southeast. The only deposit fully excavated in this cell was ashy fill (1006) representing a dump of burnt material. Layer (1006) overlay (1011) another ash-rich fill (Figure 24.8) that was partially removed. Four ground-stone pestles were recovered from these layers (SF1387, SF1390, SF1394 and SF1395) as well as two hammer-stones from the top of (1011) (SF1396 and SF1534).

24.3 Interpretation

Structure O70 comprises a stratigraphically complicated structure with three cells. Its cellular structure was formed by the construction of new walls (1088), (1094) and (1093), post-dating the construction of the walls of Structures O66 and O72. The easternmost partition was formed by reusing stratigraphically early wall (1092), which appears to have been truncated to the north during the construction of Structure O66, to the south during construction of Structure O72, and further truncated during construction of Structure O70 itself. Walls (1093) and (1094) are the stratigraphically latest walls in this sequence, suggesting that in an earlier phase Structure O70 may have featured fewer, but larger cells. The relationship between stratigraphically early walls (1082) and (1092) was not fully determined, but surface inspection suggests that (1092) may be later than (1082).

The central and eastern cells appear to be too small to have functioned as workspaces, suggesting storage rooms for Structure O66. The western cell was larger, and featured a relatively well made floor (889). It is possible that the central and western cells may once have been a single space in an earlier phase before wall (1094) was constructed. There was no obvious access route into any of the cells, suggesting these spaces may have been accessed from above, or that entrances may have been destroyed by post-PPNA erosion.

25. Structure O113

25.1 Location and relationship with other structures

Structure O113 is a poorly defined structure that continues the line of small cellular spaces (grouped as Structure O70) that run from the northwest to the southeast between Structures O72 and O66. Although not as well preserved as Structure O70, Structure O113 probably consisted of two cells situated at the southeast end of Structure O70 and between the pisé walls of Structure O72 in the west and Structure O83 in the east (Figures 25.1 and 25.2). Partly arbitrary borders were designated for Structure O113 in the southeast in relation to Structure O85, whose western end could not be satisfactorily established. Similarly in the southwest, where the intramural space between Structures O45 and O72 was not extensively explored beyond the excavation of Burials O76 and O80, the definition of O113 and its relationship to surrounding structures remains unclear. Unlike the cells in Structure O70, the area of Structure O113 was mainly characterised by features associated with burial and robbing, which truncated it to various degrees, resulting in a sequence of patchy and localised deposits. Figure 25.3 provides the stratigraphic matrix, with the contexts described in Table 25.1. Bulk and small finds are listed in Tables 25.2 and 25.3 respectively.

25.2 Description of the excavated deposits

The overburden (1 and 123) deposits partially filled an oval pit [3], which was 2.0 m long and 1.5 m wide, and which may have been of a relatively recent origin. Several large wadi stones (623) were exposed along the edge of the hollow (Figure 25.4). These stones (623) were embedded into the underlying deposits, unlike numerous other stones (4) scattered to the north that were loosely contained within the overburden. The base of the cut, at a depth of 0.35 m, was partially filled with loose light brownish-grey silt (284) and yellowish-brown silt (287).

Cut [3] clipped the ends of Burials O35 and O36. Burial O36 was located within adjacent Structure O83 (see Chapter 21). Burial O35 was located to the north of cut [3], which truncated it obliquely only affecting the southern part of the upper profile of the burial. The burial contained a juvenile skeleton (273) within dark brownish-grey silt (272) (Figure 25.5). Initial observations suggested that the burial had been placed within a cut [289], but subsequent excavation revealed cut [289] to be the face of a pisé wall (1836). The uppermost part of the skeleton was truncated, which meant that the right arm and the right leg were lost, as the skeleton was lying in the crouched position on its left side, facing eastwards. Cut [3] also clipped the skull of the skeleton, which had become heavily splayed with the front teeth dislodged. Apart from the damage caused by the truncation, the bones were in good condition. A white concretion, most likely constituted of gypsum, was present on the ribcage of skeleton (273) (Figure 25.6).

The skull and the ribcage were lifted as two separate blocks together with the sediment contained within them. The blocks may contain additional artefacts, which are not as yet quantified (Table 25.2). Safe lifting of the ribcage block required undercutting the skeleton, which exposed a layer of charcoal-rich silt (593). An upright stone with a notch carved into its upper surface protruded from below the burial (Figure 25.7). Wall (1836) skirted from Structure O83 in the east, around the northern side of the skeleton to form a cell containing Burial O35. Wall (1836) formed a dividing wall between the easternmost cell of Structure O70 and the northernmost cell of Structure O113 (Figure 25.1).

Table 25.1 Contexts excavated in Structure O113.

Context	Description	Interpretation
3	oval cut with sharp breaks of slope, steep sides and a flat base	robber cut/recent disturbance
272	dark brownish-grey friable silt	burial fill
273	articulated human skeleton	primary crouched inhumation
284	loose light brownish-grey silt	fill of robber cut
287	loose yellowish-brown silt	fill of robber cut
289	irregular sharp breaks of slope at the top of profile with intially vertical side at the north and west	initially thought to be cut for a burial but probably just an outline of a small cellular structure
307	loose/soft mid yellowish-grey silt	silt accumulation in intramural space
593	dark grey charcoal-rich silt	partially exposed deposit during block lifting of skeleton
623	a group of large stones in greyish-yellow silty clay	poorly preserved cellular structure
625	friable yellowish-brown clayey silt	localised spread, part of truncated sequence
629	loose dark grey ashy silt	localised spread, part of truncated sequence
631	loose yellowish-brown and greyish-brown clayey silt	localised spread, part of truncated sequence
632	friable to loose whitish-grey and dark grey ashy silt	localised spread, part of truncated sequence
636	friable to compact reddish-yellow gritty pisé	degraded pisé wall or dump of rubble
664	light brownish-yellow pisé and silt with occasional small stones	silt accumulation in intramural space
973	soft mid yellowish-grey silt	silt accumulation in intramural space
974	soft dark bluish-grey silt	silt accumulation in intramural space
1008	loose grey silt	silt accumulation in intramural space
1836	orangish-brown pisé with coarse stony inclusions	pisé wall of structure

Table 25.2 Quantities of bulk finds from Structure O113 by material and context number.

Object 113	**Volume of sediment (l)**				**Weigth of bulk finds per material (g)**															
Context	**Total volume**	**Flot. sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Ground stone**	**Other worked stone**	**Unworked stone**	**Animal bone**	**Human bone**	**Unidentified bone**	**Marine shell**	**Other shell**	**Plaster/Pisé**	**Textile**	**Basktery**	**Wood**	**Plant matter**	**Charcoal**	**Misc.**
272	60.0	60.0	0.0	0.0	783.9	161.5	0.0	0.0	0.0	10.0	87.8	0.0	148.9	0.0	0.0	0.0	0.0	0.0	10.2	0.0
284	80.0	20.0	60.0	0.0	329.9	10.0	0.8	0.0	0.0	0.0	52.4	0.0	30.9	0.0	0.0	0.0	0.0	0.0	0.1	0.0
307	451.0	30.0	420.0	1.0	4520.0	0.0	12.0	0.0	425.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
623	49.0	48.0	0.0	1.0	290.6	0.0	0.1	0.0	0.0	0.0	21.7	0.0	48.8	0.0	0.0	0.0	0.0	0.0	0.7	0.0
625	21.0	20.0	0.0	1.0	32.6	0.0	0.0	0.0	0.0	0.0	16.4	0.0	7.6	0.0	0.0	0.0	0.0	0.0	0.2	0.0
629	3.5	2.5	0.0	1.0	12.2	0.0	0.0	0.0	0.0	0.0	1.8	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
631	19.0	18.0	0.0	1.0	137.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	21.8	0.0	0.0	0.0	0.0	0.0	0.2	0.0
632	5.0	4.0	0.0	1.0	132.1	0.0	0.0	0.0	34.3	0.0	59.8	0.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
636	9.0	8.0	0.0	1.0	22.3	0.0	0.0	0.0	15.5	0.0	0.0	0.0	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
664	114.0	113.0	0.0	1.0	450.0	0.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
973	86.0	30.0	55.0	1.0	481.0	175.0	4.0	0.0	44.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1008	81.0	30.0	50.0	1.0	658.0	77.0	0.0	0.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	978.5	383.5	585.0	10.0	7849.6	423.5	16.9	0.0	0.0	13.0	239.9	0.0	269.8	0.0	0.0	0.0	0.0	0.0	11.4	0.0

Table 25.3 Quantities of small finds from Structure O113 by material and context.

Object 113	Quantities of small finds per material (nos)							
Context	**Ground stone**	**Chipped stone**	**Other stone**	**Worked bone**	**Unworked animal bone**	**Disarticulated human bone**	**Bitumen objects**	**Total small finds**
284	0	0	1	0	0	0	0	1
307	1	1	0	0	0	0	1	4
625	1	2	0	0	0	0	0	3
1008	0	1	0	1	1	1	0	3
Total	2	4	1	1	1	1	1	11

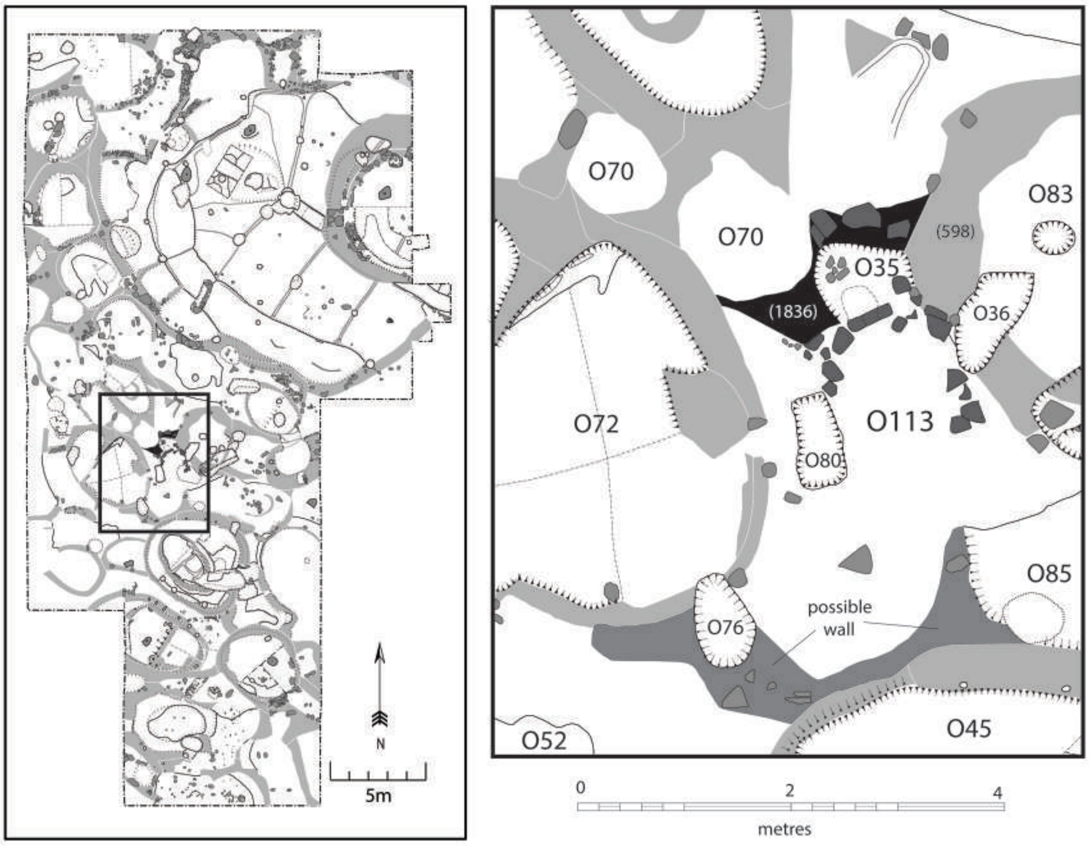


Figure 25.1 Location of Structure O113 and plan showing its relationships with surrounding Objects.

Some of the large wadi stones belonging to stone setting (623) were positioned on top of the western end of wall (1836) (Figures 25.5 and 25.7). Their removal revealed a sequence of small localised deposits sandwiched between the stones and the wall. Deposit (625), a yellowish-brown silt, was present only underneath the stone cluster (623) and was directly underlain by a patch of grey ashy silt (629), which was less than 0.5 m in diameter (Figure 25.8A). A stony yellowish-brown clay silt (631) was situated immediately to the west. This sequence of patchy deposits continued with ash (632), which was partly dark grey and partly whitish in colour (Figure 25.8B). Underlying (632) was a patch of reddish-yellow gritty pisé (636), which overlay mottled dark yellowish-grey silty gravel (324), which is part of the stratigraphic sequence described for Structure O70 (Chapter 24). Below this gravel deposit was a pisé wall (1836), which formed the sides of Burial O35 and separated Structure O113 from the eastern cell of Structure O70.

Stretching south from these lenses of localised deposits there was a thin band of light brownish-yellow pisé and silt (664). This elongated deposit had the appearance of a pisé

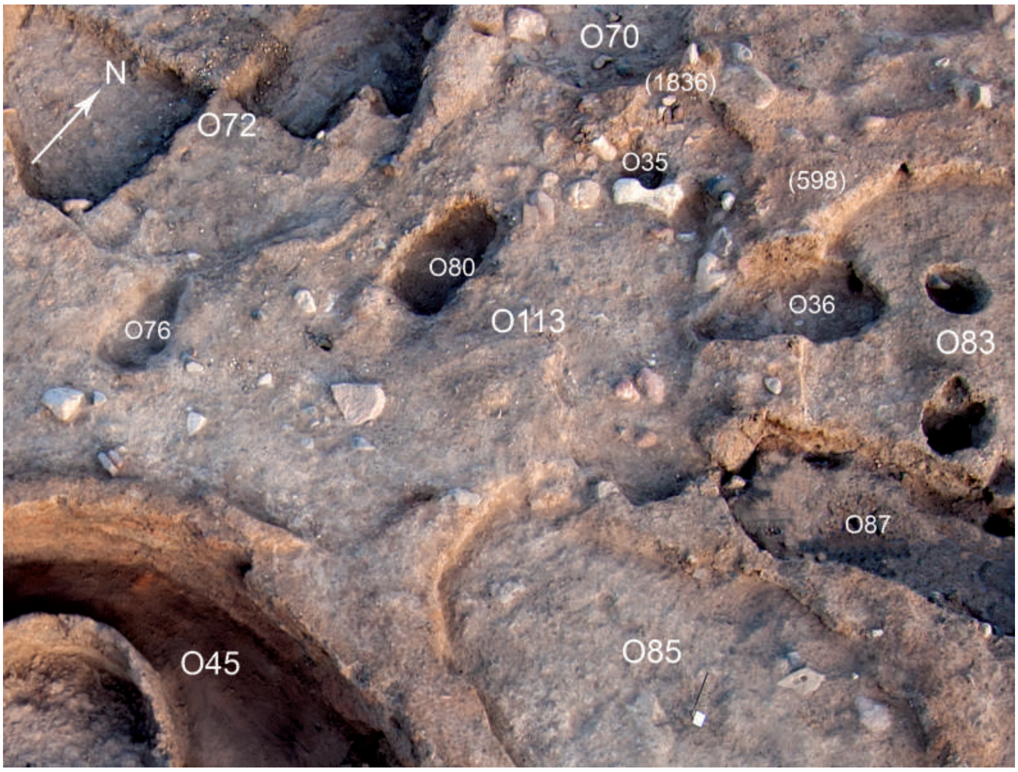


Figure 25.2 View of Structure O113 at the cessation of excavation.

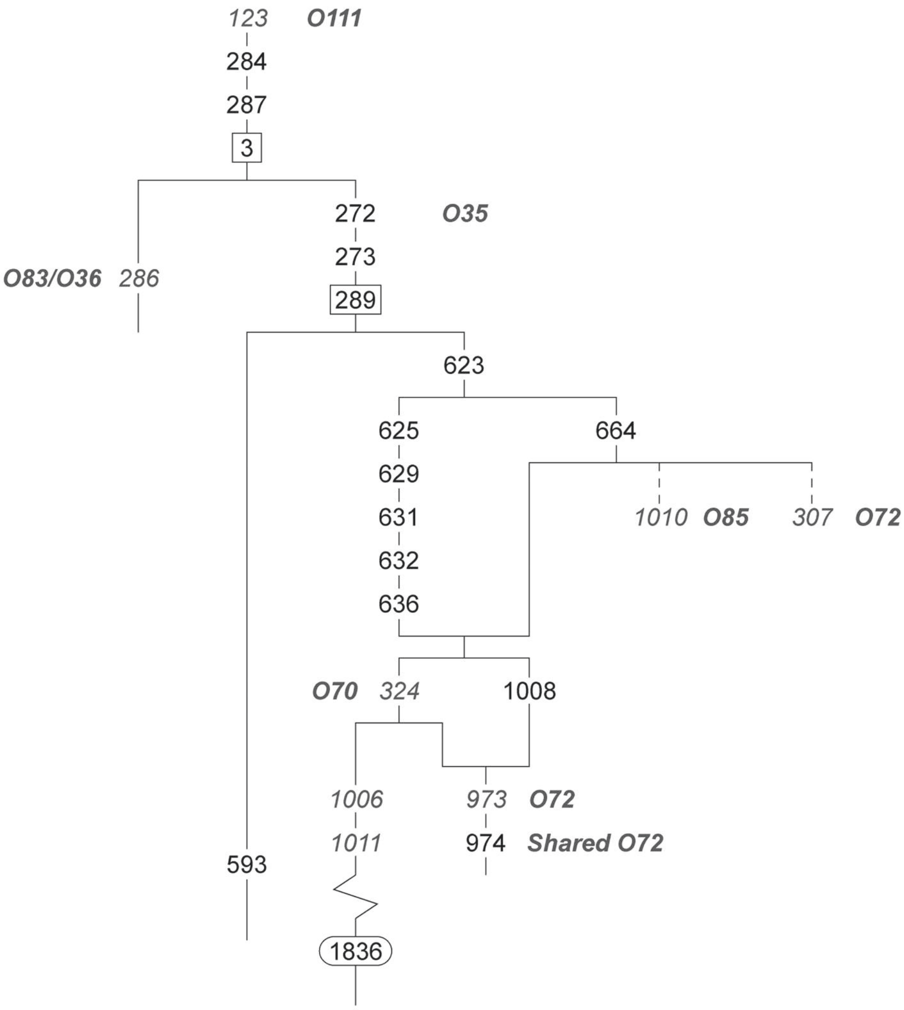


Figure 25.3 Stratigraphic matrix for Structure O113.

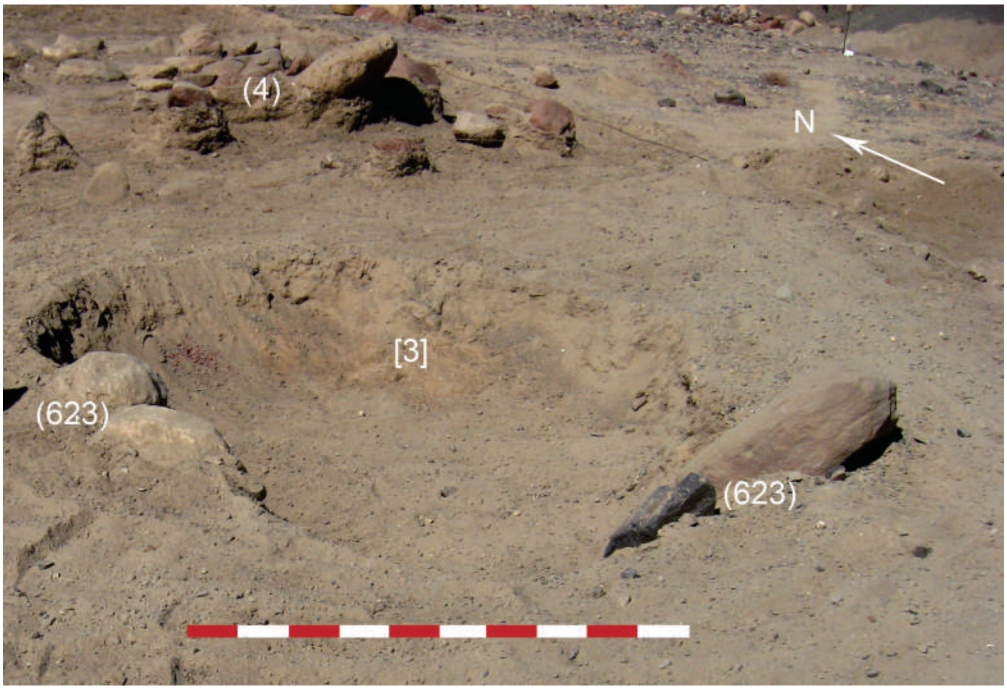


Fig. 25.4 Pit [3] with scatter of loose stones (4) within deflated horizon in the background. Scale 1 m.

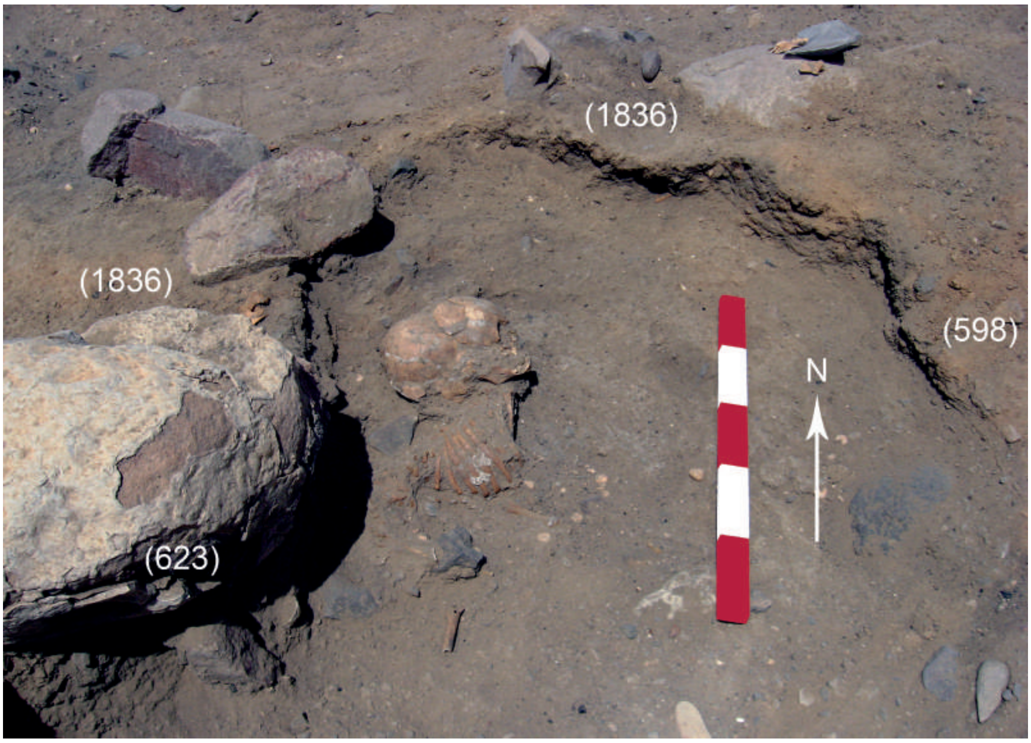


Figure 25.5 Skeleton (273) of Burial O35, within cut [289], from the south. Scale 0.5 m.

Figure 25.6 Close up of skeleton (273) showing white concretion on the ribcage. Scale 0.1 m.

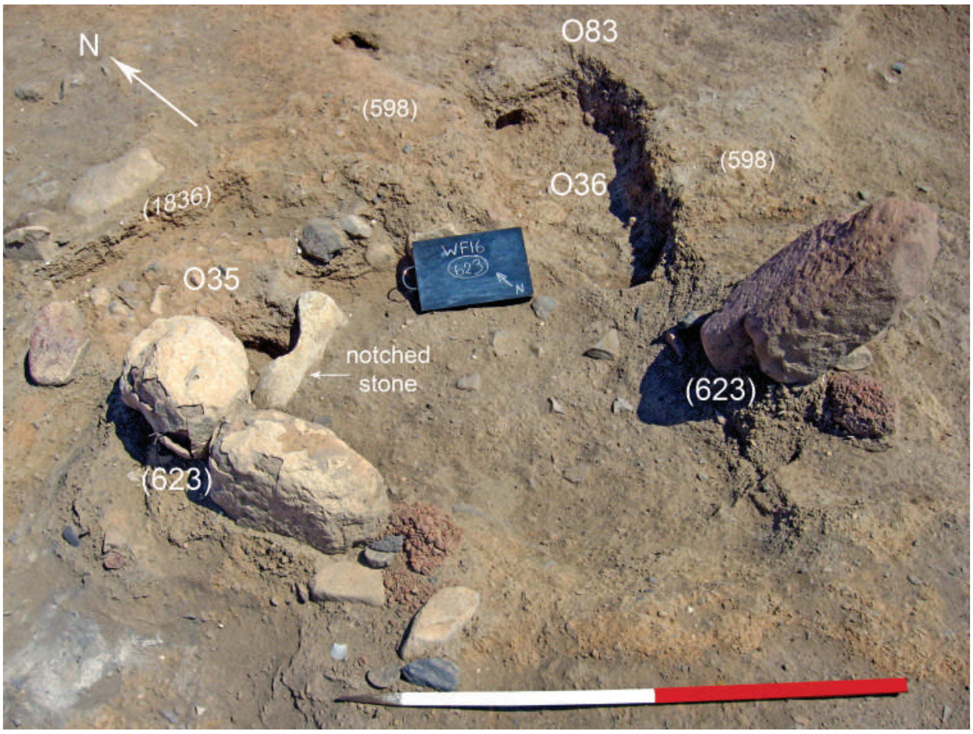


Figure 25.7 Wadi stones (623) composed of two large boulders in the northwest and a slab of angled red sandstone in the southeast. A notched stone protruding from the base of Burial O35 is also visible. Scale 1.0 m.

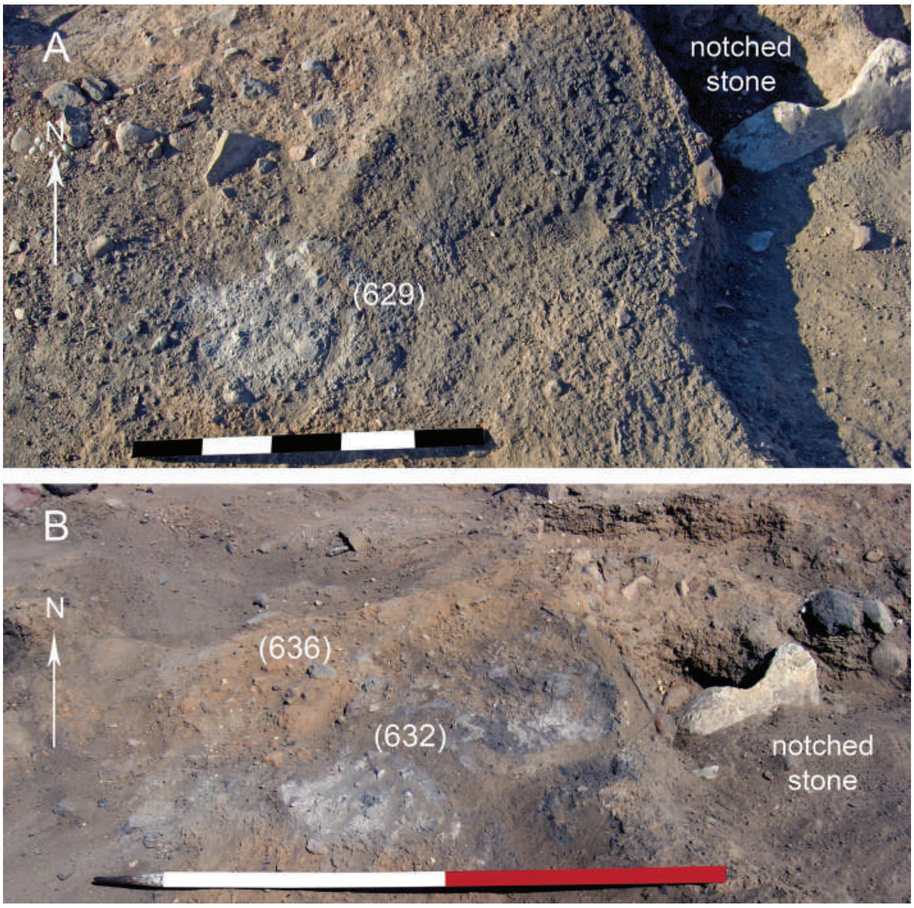


Figure 25.8 A — Light ashy deposit (629), scale 0.5 m; B — larger ashy spread (632) and pisé rubble spread (636), scale 1.0 m. All shown in relation to the notched stone at the base of Burial O35.

wall until excavation showed it to be an ephemeral crust of mixed material. Both this deposit (664) and the sequence of patchy deposits to its north stretched along the eastern perimeter of much more extensive mid yellowish-grey silt (307), which occupied the entire space between Structure O113 and Structure O72 in the west. The excavation of deposit (307) revealed Burials O76, O79 and O80, which are described as part of the stratigraphic sequence of Structure O72 (Chapter 23).

The pisé and silt band (664) overlay loose grey silt (1008), which extended over the space that hollow cut [3] occupied earlier in the excavation, as well as deposit (324). Embedded in deposit (1008) was an arc of stones (without any designated context number) that incorporated the notched stone exposed by the excavation of Burial O35 (Figures 25.7, 25.9). The excavation did not proceed further and the relationship between this possible stone structure and the pisé wall (1836) to the north was not established. Deposit (1008) was partially excavated within Structure O72 (Chapter 23) where it was shown to overlie an accumulation of yellow soft silt (973).

25.3 Interpretation

Two adjacent, but not necessarily contemporary, cells are visible in the space of Structure O113. The stone-built cellular structure set into deposit (1008) clearly differs from the large semi-subterranean pisé structures that surround it, but it is similar to the smaller cellular spaces of Structure O70 to the northwest. The middle cell of Structure O70 resembles the stone construction of Structure O113 most closely. The upper part of the O70 cell (597) was built of similarly sized wadi stones on top of a pisé base.

The role of the notched stone in the arc of stones remains unclear. Judging by its position at the edge of the structure it is possibly in a secondary position. The artificial notch on top of the stone suggests that its original role may have been as a beam-bearing floor support, probably used in some larger structure.

The northern part of Structure O113 was defined by a curved pisé wall (1836), which forms a similar cellular space, but its relationship with the stone-built cell to the south was not clear due to the oblique truncation by cut

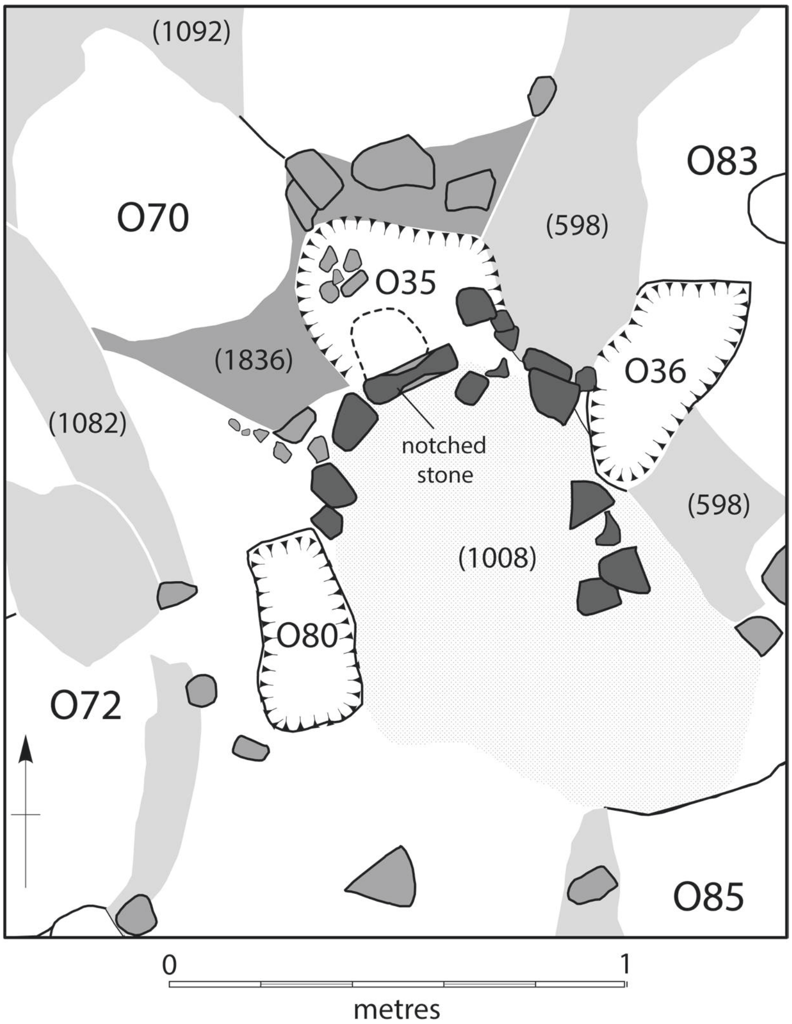


Figure 25.9 Plan of Structure O113 at the end of the excavation with the arc of stones in deposit (1008) and pisé partition (1836).

[3] at their intersection. Similarly, the relationship between wall (1836) and Structure O83 also remains uncertain.

The narrow space along the western edge of the northern cell was occupied by a dense sequence of localised deposits, which included several dumps of ash, pisé rubble, and gravel (629, 631, 632, 636). It is difficult to explain these deposits in relation to the use of a specific structure or construction event, but stratigraphically these were sandwiched between pisé wall (1836) and later stone-built structure (623), which survived only partially due to the later cut [3].

Wall (1836) enclosed the space within which Burial O35 was situated. It is probable that the body was simply placed within the cell. The body was that of a juvenile with a probable gypsum concretion smeared across some of its ribs. Cut [3] truncated this burial, as well as Burial O36 to the east. This cut [3] most likely represents relatively recent robbing activity on the site, which had targeted large wadi stones (623) for use elsewhere. The remaining stones were some of the most visible remains on the surface of the WF16 knoll.

26. Structure O66

26.1 Location and relationship with other structures

Structure O66 is a small elliptical structure positioned in the middle of the group of small cells that are located to the south and southwest of Structure O75 (Figure 26.1). It is bounded by four separate lengths of wall, (1091), (216), (1092) and (1090), that enclose a space measuring 1.7 m northeast–southwest x 3 m northwest–southeast. Wall (1091) also forms the southern boundary of Structure O65 to the north, which may indicate some aspects of contemporaneity with Structure O66. A series of three

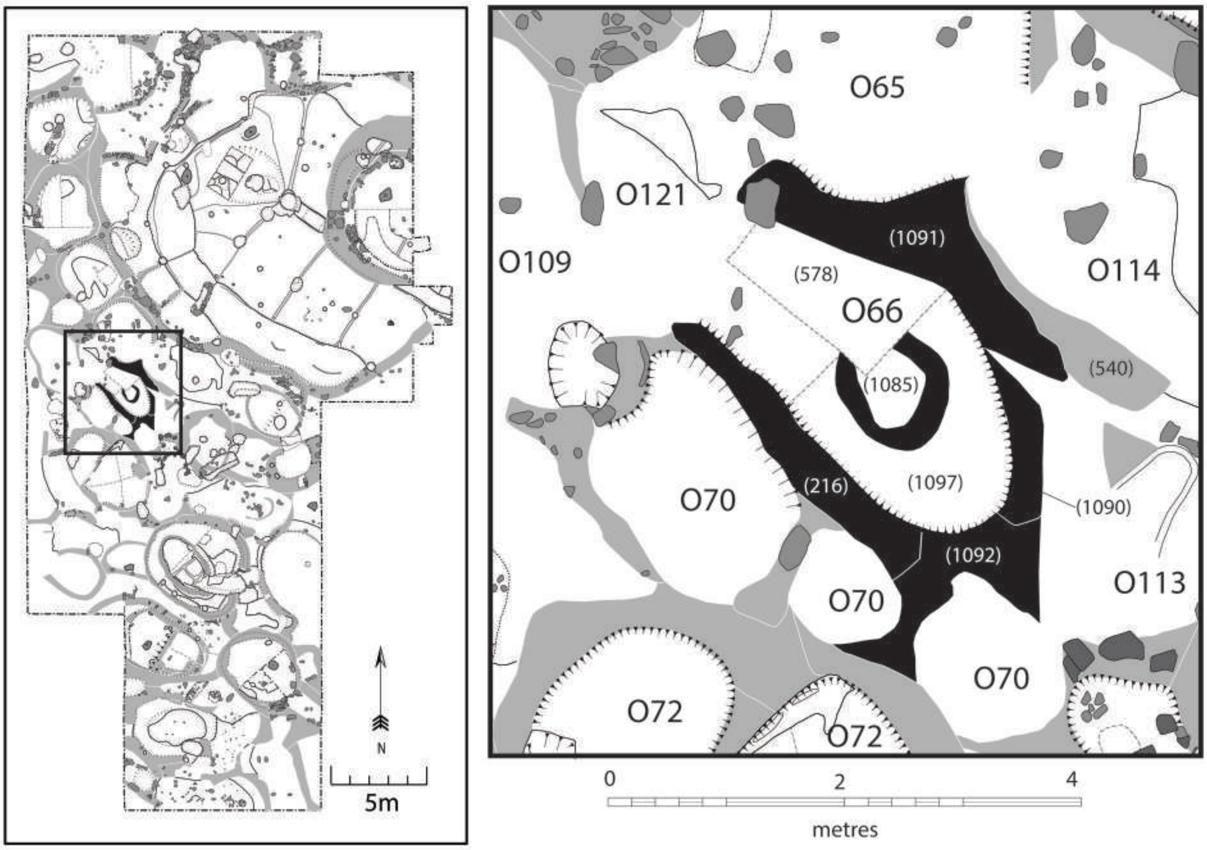


Figure 26.1 Location of Structure O66 and plan showing its relationships with surrounding Objects.

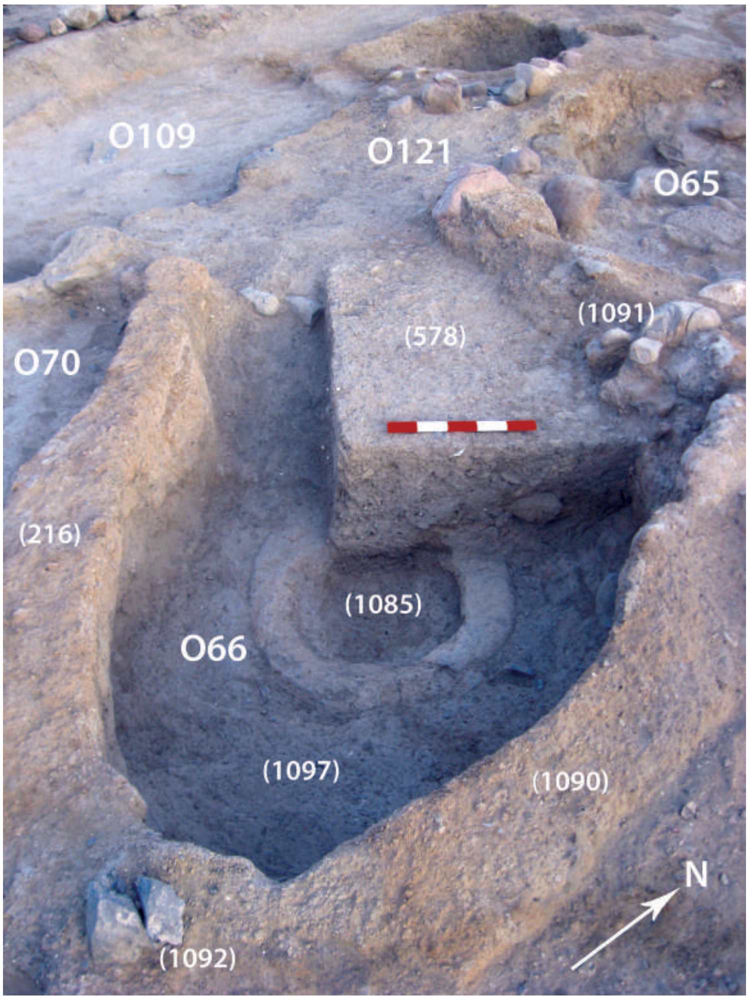


Figure 26.2 Structure O66 at a late stage of excavation showing mud-plaster feature (1085) in the centre with mud-plaster surface (1097) abutting from the outside. Scale 0.5 m.

cells to the south (collectively forming Structure O70) were constructed later than Structure O66 making use of walls (216) and (1092).

Figure 26.2 provides a view of Structure O66 towards the end of its excavation and Figure 26.3 the stratigraphic matrix for the excavated deposits. Tables 12.1, 26.2 and 26.3 list the excavated contexts, bulk finds and small finds, respectively.

26.2 Description of the excavated deposits

After the removal of overburden (1, 187 and 4), the surface of four contiguous wall segments was exposed which together defined Structure O66, (1091), (216), (1092) and (1090), and enclosed a deposit of pisé rubble within a silty matrix (222) (Figure 26.4). A deposit of silt (328), immediately below the overburden and to the southeast of Structure O66, was partially removed to clarify the character and relationships of walls (1090) and (1092). Within the structure, six spits were excavated through the pisé rubble (222), (228), (496), (498), (500) and (518).

Below these deposits the excavation was undertaken in three quadrants with the most northwesterly quadrant left unexcavated for stratigraphic control. This rubble deposit (222 and the spits below) consisted of mid-orange and grey-brown silts with up to 50% pisé lumps, fire-cracked stones, and possible sections of poorly preserved flooring. The upper layers contained two hammer stones (SF174; SF2111) and a stone bead (SF625). A small dump of ash (886) below the pisé rubble and deposited towards the eastern end of the room may represent some deliberate deposition within these fills, but in general the upper fills of the enclosed area appear to be collapse and natural infilling.

Below the ash deposit (886) and rubble (518) was further pisé rubble deposit (885) that contained a higher proportion of silt than (886) (Figure 26.5). Under (885) context (959) contained further pisé rubble within an orange-brown silt. Several of the pisé blocks from (959) featured plant impressions that appeared to be of reeds (Figure 26.6) and which were sampled (SA2699, SA2700, BF4652). Finds of heat-cracked stone, decorated stone (SF1438), pestles (SF1441, SF1589), a green stone bead (SF1596) and articulated animal bone may attest to activity

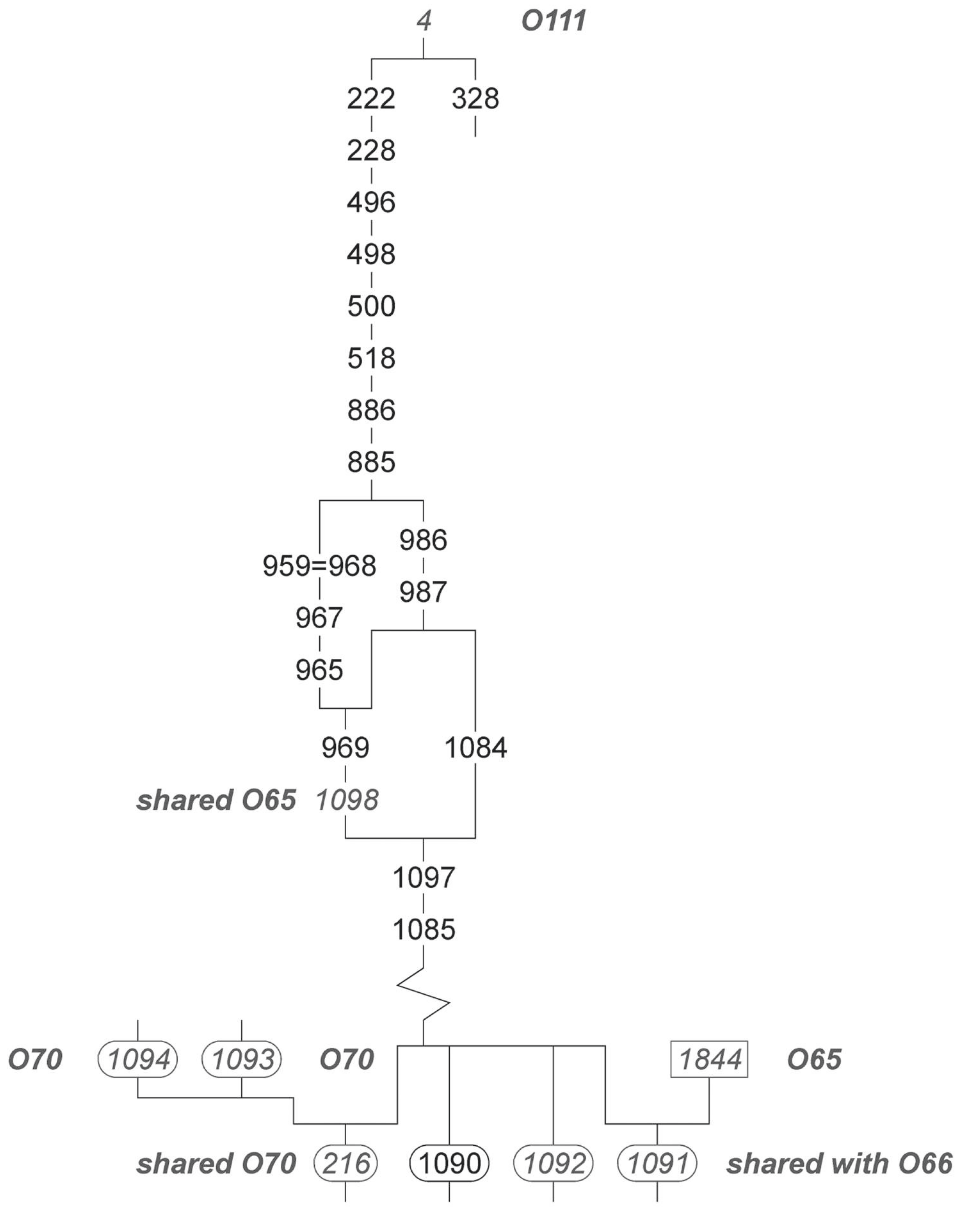


Figure 26.3 Stratigraphic matrix for Structure O66.

that took place within, or on the roof of, this structure prior to its collapse/destruction. Also below (885) and located against the northern wall (1091), there was a soft orange-brown silt (986) over a reddish-brown silt (987). These may have derived from the collapse and/or erosion of the rubble built wall (1091).

Within (959) the skeleton of a probable wading bird was uncovered (967, SF1827), located immediately adjacent to wall (1092) (Figure 26.7). This bird had been placed on its right side with its head facing north. The material around the bird skeleton was sampled as (968). Deposits (965) and (987) lacked rubble but remained rich in mud and clay fragments.

After the removal of silt fills (965) and (987), a layer of loose orange-brown silt (969) was encountered. This deposit, which was deeper to the southeast of the interior of the structure against wall (1090), contained occasional angular heat-cracked stones but less pisé rubble than overlying contexts. Pisé/mud-plaster fragments SF1437 and SF1443 with reed and basketry impressions, respectively, were found within this deposit (Figure 26.6). Three pestles (SF1799, SF1811 and SF1813), three hammer stones (SF1597, SF1812 and SF1814), two chipped-stone maul or pestle rough outs (SF1594, SF1595), a cup-hole mortar (SF1798) and various other objects were also recovered from this context.

In the northern area of Object O66 and directly below (987), there was a mid-red-brown friable silt (1084). Once (1084) was removed, it was seen to fill a raised mud-plaster feature (1085) protruding from below a surrounding mud-plaster surface (1097). Four pieces of ground stone were recovered from the surface of (1084) and (1085): a pestle (SF2486), two stone maul or pestle rough outs (SF2487 and SF2489) and an unclassified object (SF2488) (Figure 26.8).

Table 26.1 Contexts excavated within Structure O66 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
216	friable light orangish-brown pisé	pisé wall of structure
222	pale brown to mid-brown loose ashy silt with pisé rubble	silt and rubble accumulation inside structure
228	soft pale greyish-brown silt containing patches of yellow pisé and heat cracked stones	silt and rubble accumulation inside structure
328	soft mid-yellowish-brown silt with frequent small stones	silt accumulation in intramural space
496	soft light brownish-grey silt	silt and rubble accumulation inside structure
498	mid-yellowish-brown silt	silt and rubble accumulation inside structure
500	mid-yellowish-brown silt	silt and rubble accumulation inside structure
518	firm mid-orangish-brown silt	silt and rubble accumulation inside structure
885	firm/compact mid-orangish-brown silt	silt and rubble accumulation inside structure
886	loose light bluish-grey ashy silt	localised ashy dump among larger rubble collapse/ backfill
959	firm mid-orangish-brown silt and pisé	possible roof collapse
965	loose mid-orangish-brown silt with pisé and fired clay	possible roof collapse
967	articulated animal skeleton	bird skeleton
968	firm mid-orangish-brown silt with pisé and charcoal inclusions	possible roof collapse, sampled separately around bird skeleton SF1827
969	loose mid-orangish-brown silt	occupation deposit
986	soft mid-orangish-brown silt	localised dump or collapse
987	friable dark reddish-brown silt with a predominance of pisé rubble	burnt pisé rubble dump or collapse
1084	friable-soft mid-reddish brown silt	fill of moulded mud-plaster basin
1085	light yellowish-grey compacted slit	mud-plaster surface inside structure
1090	friable-compact mid-orangish-brown pisé	pisé wall of structure
1091	friable-compact mid-light orangish-brown pisé	pisé wall of structure
1092	friable-compact yellowish-brown pisé	pisé wall of structure
1097	light greyish-brown compacted silt	mud-plaster surface inside structure
1098	compacted dark greyish-brown silt	localised compacted rubble inside structure acting as possible ramp

Feature (1085) had a smooth surface made of compacted light yellowish-grey compacted silt with very few inclusions, forming a basin or possibly a setting for a mortar (Figure 26.9). It was only exposed where it lipped up, and it was covered everywhere else by surface (1097). Surface (1097) was less finely made than (1085) and consisted of light greyish-brown compacted silt that may have been eroded by use. The surface (1097) lipped up against wall (216). To the northwest the surface contained pisé rubble and sloped up at *c.* 30°. The sloping area of the surface was designated as (1098) (Figure 26.8).

The stratigraphic relationships between the walls ((216), (1090), (1091) and (1092)) of Structure O72 cannot be confirmed without further excavation. In the southwest, wall (216) ran for 2.5 m before joining wall (1092). The eastern wall, (1090), which was 1.4 m in length, ran from north to south and joined (1091) to the north and (1092) to the south. Walls (216) and (1090) were constructed from mid-orange-brown fine silts with 15–35% sub-angular stone inclusions. Wall (1092) consisted of light grey-brown silts whilst (1091) was constructed of pisé blocks of varying sizes with a grey-brown silt in between. Wall (1091) had partially collapsed into the structure and appears to have been built in a far less formal manner than most walls at WF16.

26.3 Chipped stone

The sample (n=690 pieces) includes artefacts from nine out of the 11 contexts with chipped stone in Structure O66. By weight, the sample (3256 g) constitutes 66% of the chipped stone bulk finds from this structure. The composition of the sampled assemblage is provided within Chapter 39.11.

26.4 Interpretation

Structure O66 is a small (1.7 m x 3.0 m) pisé-walled elliptical structure located just outside the ring of small structures immediately surrounding Structure O75, forming

Table 26.2 Quantities of bulk finds from Structure O66 by material and context number.

Object 66	Volume of sediment (l)				Weight of bulk finds per material (g)								
Context	**Total volume**	**Flot. sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Ground stone**	**Other worked stone**	**Unworked stone**	**Animal bone**	**Other shell**	**Plaster/Pisé**	**Charcoal**	**Misc.**
222	51.0	0.0	50.0	1.0	640.0	0.0	0.0	0.0	105.6	82.0	0.0	0.1	10.0
228	164.0	40.0	120.0	4.0	376.2	0.0	0.0	0.0	47.9	64.5	0.0	0.0	0.0
328	276.0	30.0	245.0	1.0	1718.9	0.0	1.0	10.0	57.0	21.9	0.0	2.0	0.0
496	185.0	84.0	97.0	4.0	488.9	0.0	0.0	0.0	29.5	105.8	0.0	0.2	0.0
498	259.0	80.0	175.0	4.0	1055.8	0.0	2.0	0.0	52.1	39.3	0.0	0.0	0.0
500	149.0	50.0	95.0	4.0	448.6	0.0	0.0	0.0	63.3	39.6	0.0	0.1	0.0
518	297.0	30.0	264.0	3.0	608.3	0.0	0.0	0.0	47.5	15.5	1200.0	1.0	0.0
885	279.0	20.0	256.0	3.0	601.0	0.0	1.0	0.0	40.0	0.0	5490.0	1.0	0.0
959	43.0	28.0	12.0	3.0	105.0	0.0	0.0	0.0	16.0	0.0	500.0	0.0	0.0
965	140.0	30.0	107.0	3.0	906.0	0.0	0.0	0.0	85.0	0.0	0.0	1.0	0.0
968	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
969	163.0	161.0	0.0	2.0	836.0	1660.0	0.0	0.0	167.0	0.0	0.0	0.0	0.0
986	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
987	54.0	10.0	43.0	1.0	1045.0	790.0	1.0	0.0	85.0	0.0	0.0	0.0	0.0
1084	11.0	10.0	0.0	1.0	48.1	78.0	0.0	0.0	15.5	12.3	0.0	0.0	0.0
Total	2077.0	579.0	1464.0	34.0	8877.8	2528.0	5.0	10.0	811.4	380.9	7190.0	5.4	10.0

Table 26.3 Quantities of small finds from Structure O66 by material and context number.

Object 66	Quantities of small finds per material (nos)								
Context	**Chipped stone**	**Ground stone**	**Other stone**	**Unworked animal bone**	**Bone beads**	**Stone beads**	**Marine shell beads**	**Plaster/Pisé**	**Total small finds**
228	0	1	0	0	0	1	0	0	2
496	0	1	0	0	0	0	0	0	1
518	0	2	0	0	0	0	1	0	3
885	0	0	0	0	0	1	0	0	1
965	1	2	1	3	0	1	0	2	10
967	0	0	0	1	0	0	0	0	1
969	2	10	0	3	0	0	1	0	16
1084	2	2	0	0	0	0	0	0	4
Total	5	18	1	7	0	3	2	2	38

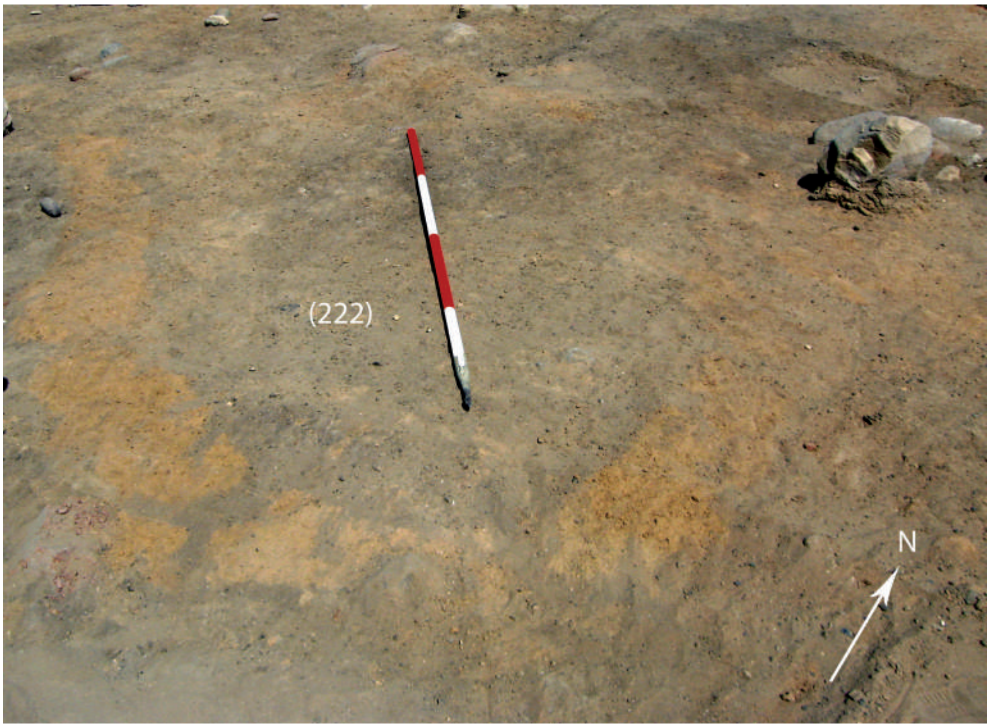


Figure 26.4 Structure O66 showing infilling deposit (222) before the excavation. Scale 2.0 m.

Figure 26.5 Structure O66 during the excavation, looking towards the north showing exposure of rubble deposit (885). Scale 1.0 m.

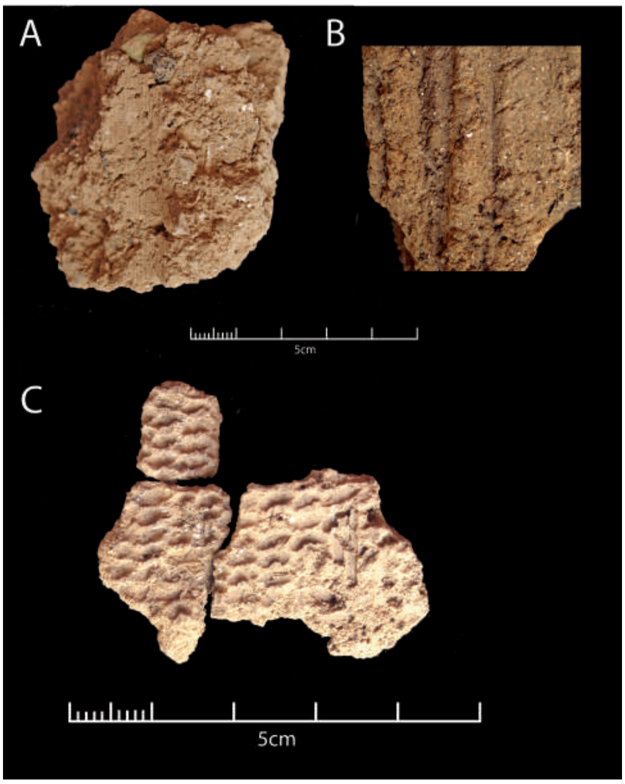


Figure 26.6 Pisé/mud-plaster fragments with reed and basketry impressions: A — BF4652 from deposit (959); B — SF1437 (965); and C — SF1443 (965).

part of what may be a second ring of small celled structures, including Structures O83, O57 and O56. The chipped stone indicates that the construction, utilisation and destruction of this area all occurred within the PPNA. Excavation has not reached the base of the deposits in Structure O66, which so far has mostly removed a series of collapse layers. The walls that make up the boundaries of Structure O66 do not all appear to have been built at the same time, with the structure possibly taking advantage of some previously existing wall segments. Access to Structure O66 appears to have been through a 1.0 m wide gap and via slope (1098) between walls (1091) and (216) at the northwestern end of the room. Deposit (1098) levelled off and continued into Structure O121, the western annex of structure O65. In addition, Structures O66 and Structure O65 shared a wall (1091), suggesting a period of contemporaneous use.

The earliest visible phase of Structure O66 is represented by feature (1085) and surrounding floor (1097). We suspect that (1085) may have been a setting for a mortar that was removed during the PPNA, as it appears similar to locations where mortars were removed from floors during excavation in O100. The pestle and pestle roughouts (or possibly mauls) provide further evidence for heavy duty processing in this structure.

Layer (969) may have accumulated originally as an occupation deposit and then continued to build up after the floor (1097) went out of use. After the first phase of collapse (965) the articulated body of a wading bird (967) was placed immediately adjacent to wall (1092). This

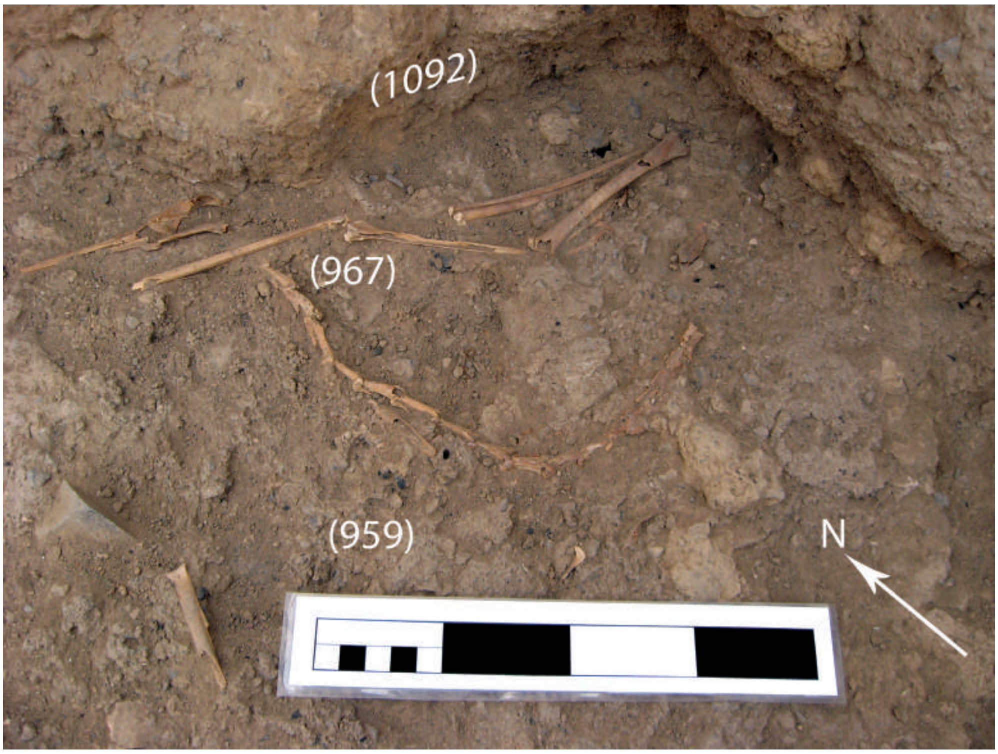


Figure 26.7 Skeleton (967) of a wading bird contained within (959) positioned adjacent to wall (1092), possibly within a niche. Scale 0.2 m.

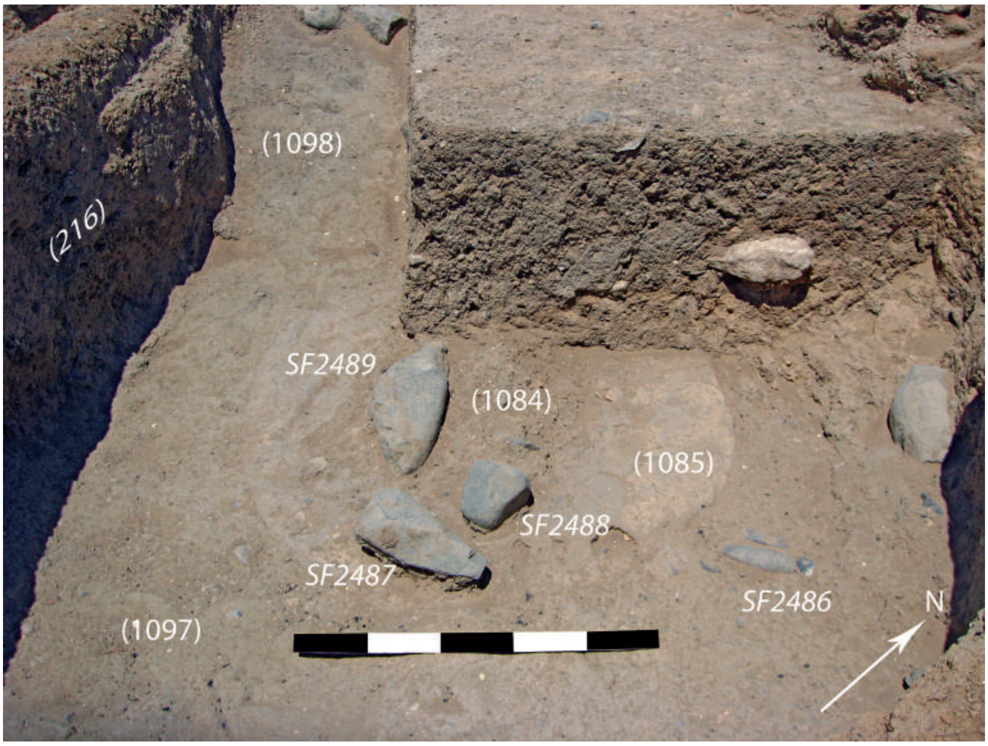


Figure 26.8 A pestle (SF2486) and two stone maul/pestle rough outs, (SF2487) and (SF2489) located centrally on raised mud-plaster structure (1085). Scale 0.5 m.

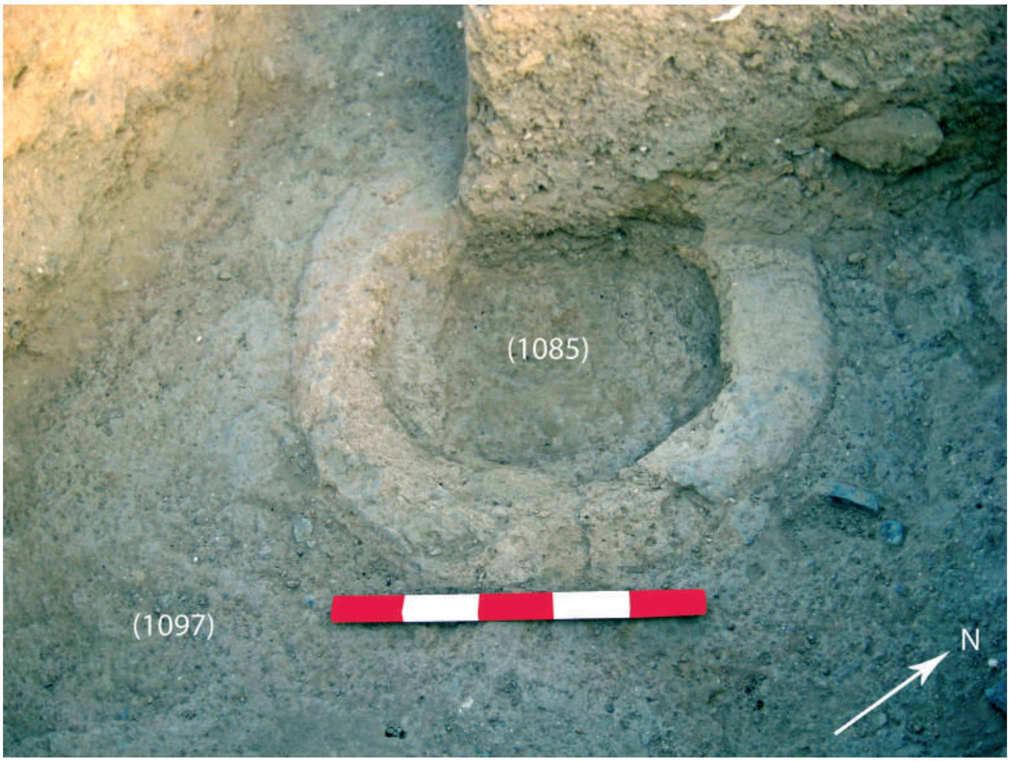


Figure 26.9 Close up of mud-plaster structure (1085) inside Structure O66. Scale 0.5 m.

appears to have been deliberately positioned and may be some kind of closing deposit for this building. After this event, substantial roof collapse (959) occurred followed by the accumulation of rubble.

27. Structures O109 and O112

27.1 Location and relationship with other structures

Structures O109 and O112 were located at the western edge of the middle part of the trench (Figure 27.1). Structure O109 was the better defined of the two, having almost a full circuit of its pisé walling uncovered by the excavation. It borders Structure O112 in the south, Structure O70 in the southeast, Structure O65 and Space O121 to the east, and Structure O64 with Pit O14 to the northeast. Excavation indicated that wall (231) of Structure O109 was truncated during the construction of Structures O65, O64, and also Pit O14. An unexplored intramural space appears present to the northwest of Structure O109, extending beyond the limit of the excavation.

Structure O112 could only tentatively be described as a structure on the basis of two small portions of pisé walling, which marked its southern extent. Structure O109 marked its northern limit, Structures O70 and O72 its eastern limits (Figure 27.1). To the south of Structure O112 there was an unexplored area that separated Structures O112 and O72 in the north from Structures O52, O115 and O45 in the south. Excavation indicated that the deposits removed from O112 are later than most of the stratigraphic sequences from Structures O70 and O72.

27.2 Description of the excavated deposits

Structure O109

Figure 27.2 provides a view of the excavation underway and Figure 27.3 the stratigraphic matrix for the excavated deposits. Tables 27.1, 27.2 and 27.3 list the excavated contexts, bulk finds and small finds, respectively.

The excavation of the overburden (1 and 187) revealed a kidney-shaped pisé wall (231) that defined Structure O109. The structure was orientated northwest–southeast with a gap in the wall to the southeast in the direction of Structures O70 and O66. Two discrete features were visible within the interior of the structure immediately below the overburden. The northernmost feature was a sub-rectangular cut [225], filled with loose mid-brownish-grey silt (215), containing the remains of a crouched skeleton (224), designated as Burial O28 (Figures 27.1, 27.4, 27.5). The skeleton was lying on its left side and facing towards the southeast. The skeletal remains were degraded, but the layout of the body and the limbs was clear. The small size of the skeleton was suggestive of a young individual. The body was laid with its back against the northwest edge of the cut, while there was space between the skeleton and the eastern edge of the cut. Five flint flakes and blades (SF167, SF169, SF170, SF171, SF172) were found within the fill in addition to smaller debitage (Tables 27.2 and 27.3). A large unworked stone (SF173) was found 0.3 m to the front of the skull in otherwise clean loose backfill.

The northeast end of the cut [225] of Burial O28 clipped a short pisé wall segment (1087) of Structure O65 (Chapter 28). This wall appeared to be a later structural addition between Structures O109 and Space O121, abutting wall (231) of Structure O109.

The second feature exposed by removal of the overburden was a small oval pit [313] filled with dark greyish-brown silt (312). This pit was located approximately one metre to the southeast of Burial O28, close to the side of pisé wall (1093) that formed the northwest side of Structure O70 (Figure 27.1).

Both Burial O28 and pit [313] were cut into mid-greyish-brown silt (502), which filled the interior of Structure O109 (Figure 27.5) and extended up to wall (1093) of Structure O70 (Figures 27.1 and 27.2). No stratigraphic relationship between (502) and (1093) could be determined. A fragment

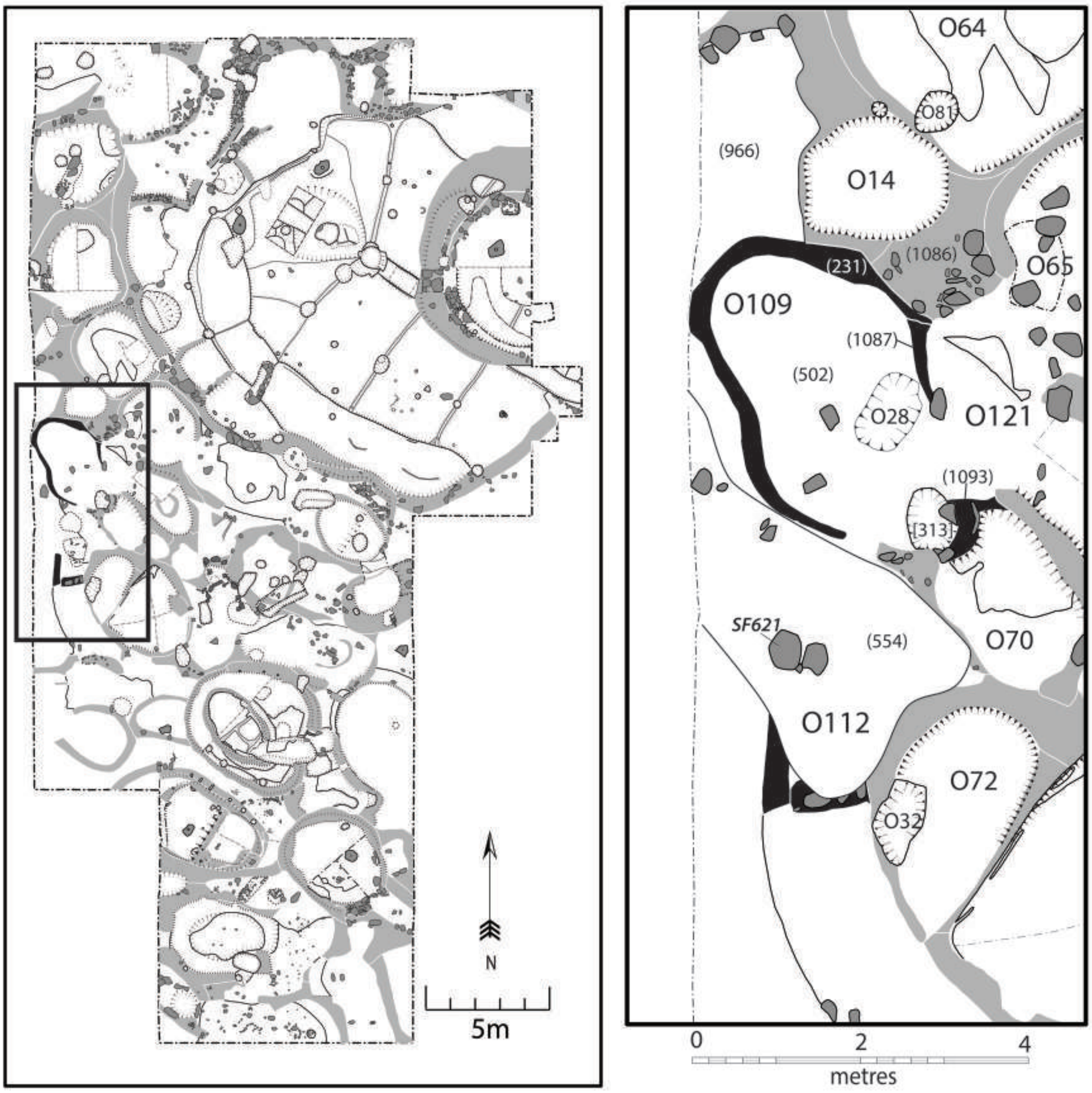


Figure 27.1 Location of Structures O109 and O112 and plan showing their relationships with surrounding Objects.

of a large green stone bead with parallel incisions (SF626, Figure 27.6) was also recovered from within (502).

Underlying (502) there was a grey silt (878), which was somewhat richer in chipped stone than (502) and was the lowest deposit exposed within Structure O109. Outside of Structure O109 and abutting wall (231) from the north was deposit (966) that extended beyond the limit of the excavation towards the west. Deposit (966) also overlay deposit (1095=1086), which is part of both Structure O65 and Structure O64.

Structure O112

Figure 27.7 provides the stratigraphic matrix for the excavated deposits within O112. Tables 27.4, 27.5 and 27.6 list the excavated contexts, bulk funds and small finds respectively.

The excavation of the overburden spits (1 and 123) directly south of Structure O109 exposed a layer of mid to dark greyish-brown sandy silt slopewash (52) (part of Structure O52, Chapter 13), extending beyond the limit of the excavation to the west. A small group of large stones (188) was recorded within the overburden (123).

Directly below (52) and (188) there was a greyish-brown silt (554) containing a mortar (SF621) (Figure 27.1), a marine shell bead (SF622), and a small area of yellowish-grey silt (322). Underlying deposits (554) and (322) was dark yellowish grey silt (960). Silt (322) was also over (323) in the adjacent Structure (O70, Chapter 24). Context (960) was the lowest deposit exposed in this area. Its partial excavation exposed two segments of pisé walling (not assigned context numbers), set perpendicularly against each other, suggesting earlier structural remains in this area.

27.3 Interpretation

The excavation in the area occupied by Structures O109 and O112 was limited, preventing any substantial interpretation

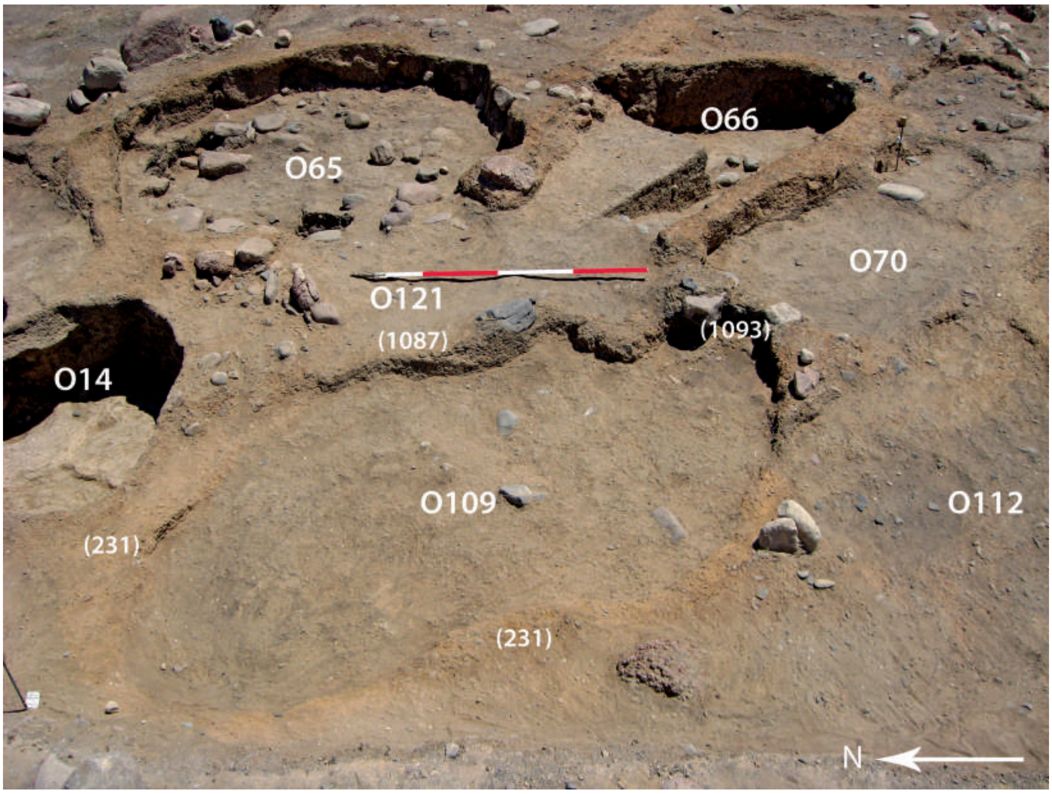


Figure 27.2. View of Structure O109 undergoing excavation from the west. Scale 2.0 m.

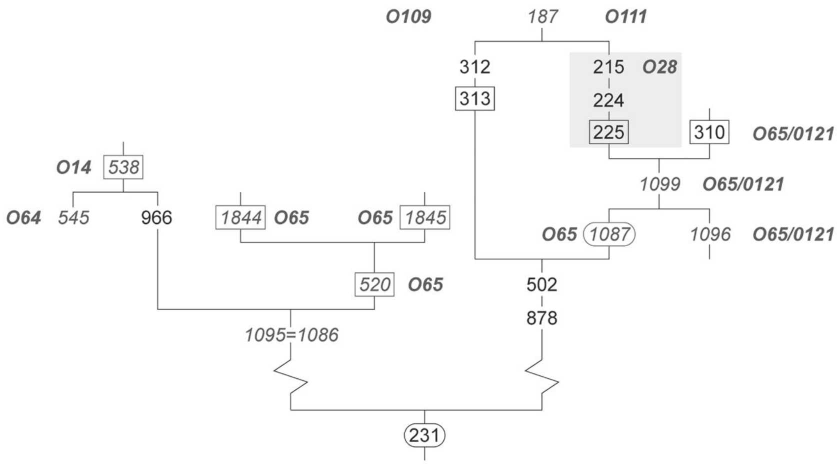


Figure 27.3 Stratigraphic matrix for Structure O109.

beyond the recognition of degraded pisé-walled structures. In the case of Structure O109, the pit [313], Burial O28 and the wall segment (1087) most likely postdate the use of Structure O109 represented by the partially revealed pisé wall (231). Wall (1087) might have been primarily related to the re-organisation of Space O121 (an annex to Structure O65, Chapter 28) to the east. Structure O112 was only being defined at the end of the current programme of excavation. The mortar (SF621) suggests that occupation deposits and mud-plaster floors may have been eroded at this location. Wall (231) appears to be one of the earliest structural features in this area of the excavation, being truncated during the construction of Structures O65, O64 and also Pit O14.

Table 27.1 Contexts excavated within Structure O109 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
215	loose mid-brownish-grey silt	burial fill
224	articulated human skeleton	primary crouched inhumation burial
225	sub-rectangular cut with concave sides and a flattish base	cut for burial
231	friable light orangish-brown pisé	pisé wall of structure
312	loose dark greyish-brown silt	fill of small pit
313	irregular oval cut with straight sides	cut of small pit
502	loose mid-greyish-brown silt with frequent small stones	silt accumulation inside structure
878	friable light grey silt with occasional small stones	silt accumulation inside structure
966	soft mid-greyish-brown silt with occasional stones, some large	silt accumulation in intramural space
1087	firm to friable mid brownish-grey pisé	pisé wall of structure

Table 27.2 Quantities of bulk finds from Structure O109 by material and context number.

Object 109	Volume of sediment (l)				Weight of bulk finds per material (g)					
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Other worked stone	Animal bone	Unidentified bone	Other shell	Charcoal
215	66.0	65.0	0.0	1.0	86.5	0.0	0.0	22.9	196.3	0.0
312	26.0	25.0	0.0	1.0	239.5	0.6	2.0	2.4	37.3	10.0
502	207.0	20.0	185.0	2.0	665.9	11.0	41.0	1.6	11.9	0.0
878	306.0	40.0	262.0	4.0	1261.0	20.0	36.0	0.0	0.0	0.0
966	30.0	0.0	30.0	0.0	530.0	0.0	10.0	0.0	0.0	0.0
Total	635.0	150.0	477.0	8.0	2782.9	31.6	89.0	26.9	245.5	10.0

Table 27.3 Quantities of small finds from Structure O109 by material and context number.

Object 109	Quantities of small finds per material (nos)				
Context	Chipped stone	Ground stone	Stone beads	Misc.	Total small finds
215	5	1	0	0	6
502	0	0	1	0	1
878	0	0	0	1	1
Total	5	1	1	1	8

Figure 27.4 Skeleton (224) from the southeast. Scale 0.5 m x 1.0 m.

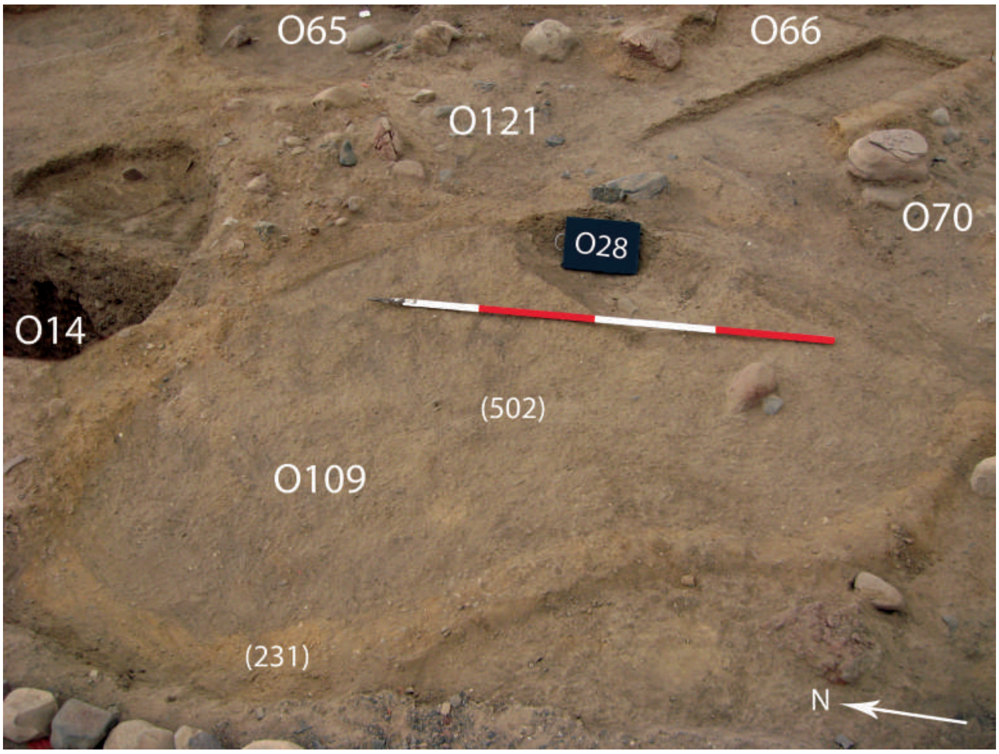


Figure 27.5 Deposit (502) with the location of Burial O28 marked by the board. Scale 2.0 m.

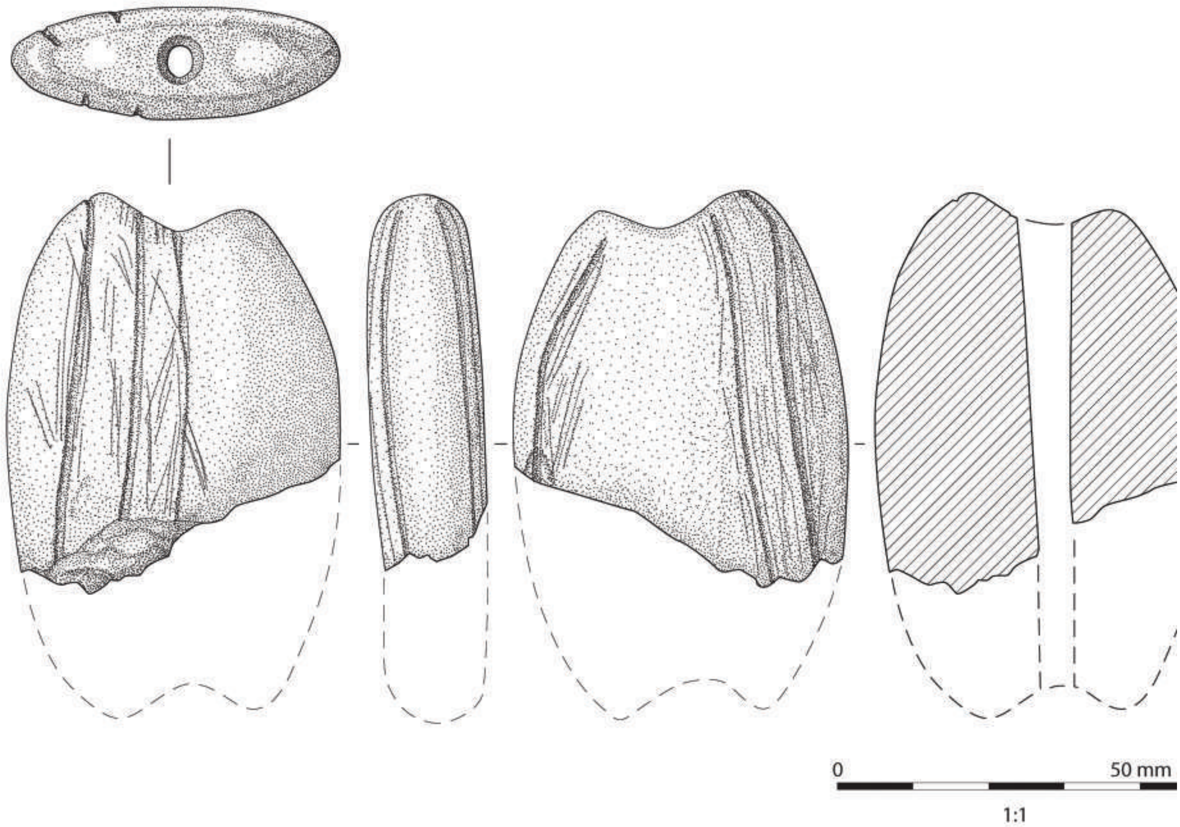


Figure 27.6 Bead SF626 found in context (502).

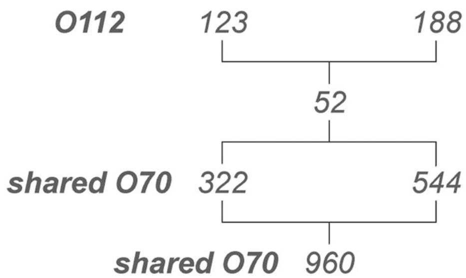


Figure 27.7 Stratigraphic matrix for Structure O112.

Table 27.4 Contexts excavated in Structure O112.

Context	Description	Interpretation
52	friable/loose mid to dark greyish-brown sandy silt	deflated deposits washed down the slope of the knoll
322	loose mid yellowish-grey silt with a high concentration of small and large stones	silt and rubble accumulation inside possible structure
554	friable/soft mid greyish-brown silt with occasional stones	silt and rubble accumulation inside possible structure
960	loose dark yellowish-grey silt	silt and rubble accumulation inside possible structure

Table 27.5 Quantities of bulk finds from Structure O112.

Object 112	**Volume of sediment (l)**				**Weight of bulk finds per material (g)**						
Context	**Total volume**	**Flot. Sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Ground stone**	**Other worked stone**	**Animal bone**	**Unidentified bone**	**Other shell**	**Charcoal**
52	61.0	30.0	30.0	1.0	3100.4	560.0	20.0	0.0	26.8	48.3	20.0
322	16.0	15.0	0.0	1.0	404.7	0.0	0.0	0.0	15.2	17.5	0.0
554	296.0	30.0	265.0	1.0	1577.8	0.0	10.0	34.4	0.0	20.5	0.0
960	221.0	30.0	190.0	1.0	3680.0	175.0	20.0	140.0	0.0	0.0	0.0
Total	594.0	105.0	485.0	4.0	8762.9	735.0	50.0	174.4	42.0	86.3	20.0

Table 27.6 Quantities of small finds from Structure O112.

Object 112					
Context	**Ground stone**	**Other stone**	**Unworked animal bone**	**Marine shell beads**	**Total small finds**
52	0	1	0	0	1
554	1	0	0	1	2
960	0	0	1	0	1
Total	1	1	1	1	4

28. Structure O65 and Intramural Space O121

28.1 Location and relationship with other structures

Structure O65 is a partially excavated sub-circular structure approximately 3.3 m long x 2.3 m wide. It is located between Structures O64 and O114 in the arc of structures immediately southwest of Structure O75, and although surface inspection suggests that the construction of Structure O65 truncated the wall of Structure O75, this relationship has not been confirmed by excavation (Figures 28.1, 28.2). Similarly, the stratigraphic relationships between Structure O65 and

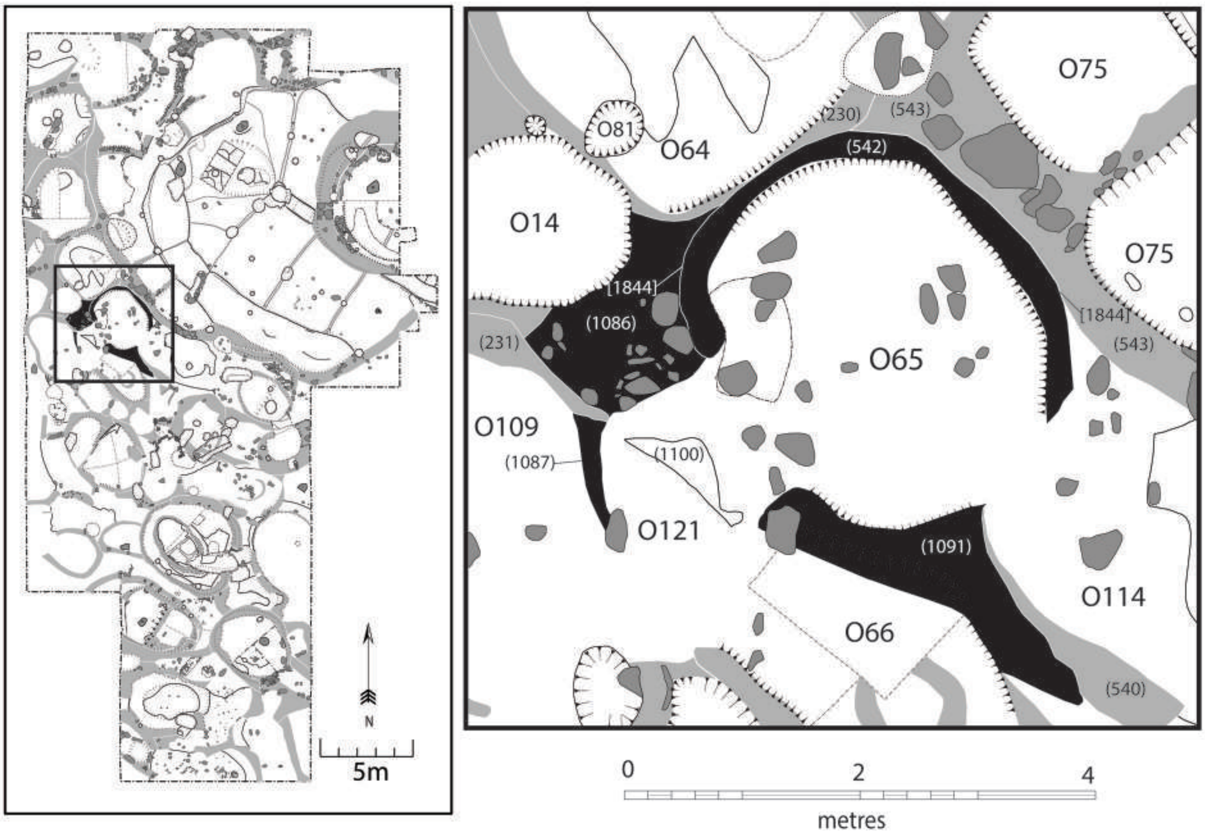


Figure 28.1 Location of Structure O65 and plan showing its relationships with surrounding Objects.

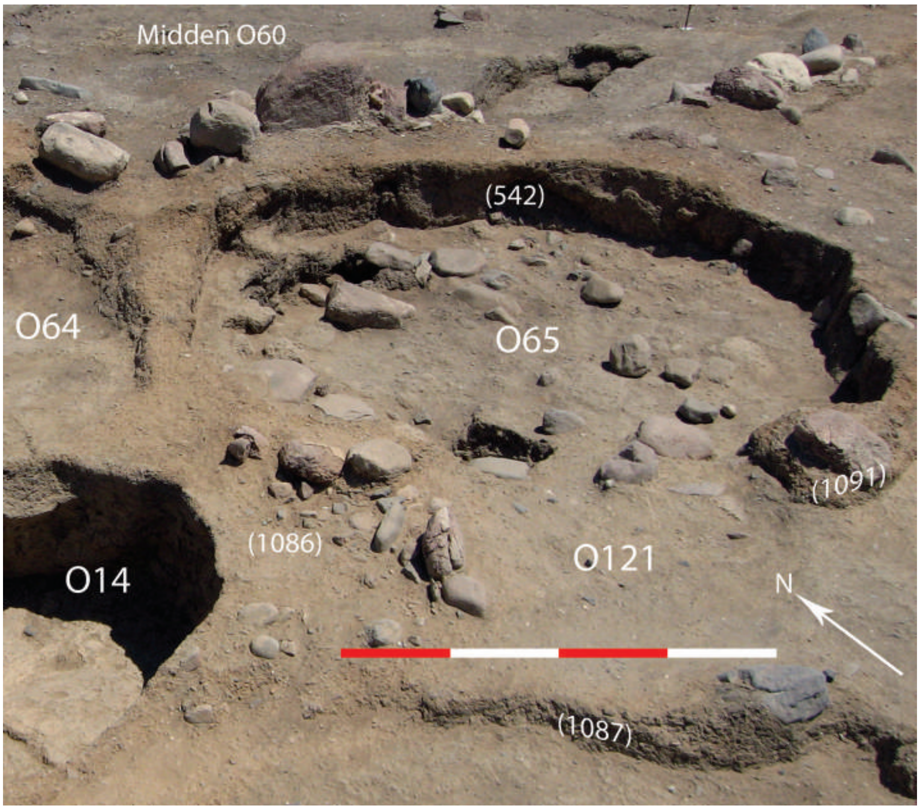


Figure 28.2 Structures O65 and O121 Scale 2.0 m.

Structures O64 and O114 were not fully resolved. To the south of Structure O65 is the outer arc of buildings, represented by Structure O66 and Structure O109. Between these two structures is Intramural Space O121, where only minimal excavation took place, but which appears to have been associated with Structure O65. Structure O66 is located to the south of Structure O65 and has interstratified deposits with Intramural Space O121. The construction of Structure O65 postdates the construction of walls associated with both Structures O109 and O66. A burial (Burial O9) was identified in the upper horizons of Structure O65; a second burial (Burial O82) was located at the base of the excavated sequence. Table 28.1 lists the excavated contexts while their stratigraphic relationships are illustrated in Figure 28.3. Tables 28.2 and 28.3 provide the bulk and small finds, respectively.

28.2 Description of the excavated deposits

Excavation of the overburden (1 and 187) exposed a burial, Burial O9, and two pits [327] and [310] (Figure 28.4) cut into a horizon of multiple contexts (208), (546) and (1099). It also exposed pisé walls (542), (1091) and (1087) which defined structures O65 and O121.

To the west of Structure O65 and to the north of Structure O121 there was a deposit of mixed stones and pisé rubble (520) overlying a similar deposit (1086=1095). From surface observation it appeared that the construction of both Structures O65 and O66 cut these deposits, with a cut [1844] (O65) and [1845] (O64) being observed in plan.

Intramural Space O121

Pit [310] cut deposit (1099) in Structure O121 to the southwest of Structure O65. The fills of the pit were divided into upper (506) and lower (511) contexts, both of loose dark greyish-brown silt with burnt stone. Lower fill (511) contained a higher concentration of chipped and ground stone (Table 28.2) and both deposits contained hammerstones (SF701, SF709). Pestle SF630 (Figure 28.5) was found in the upper fill (506). Friable dark silty fill deposit (1099) was above a diffuse dark silt (1096). Towards the end of the excavation a mud-plaster surface (1100) covering a sub-circular area of *c.* 0.8 m diameter was partially exposed below silt (1096). Although unexcavated, (1100) is likely to be over (315), the earliest layer excavated within Structure O65, which would provide a stratigraphic relationship between Structures O65 and O121. Surface (1100) also overlies (1098), the rubble ramp leading into Structure O66.

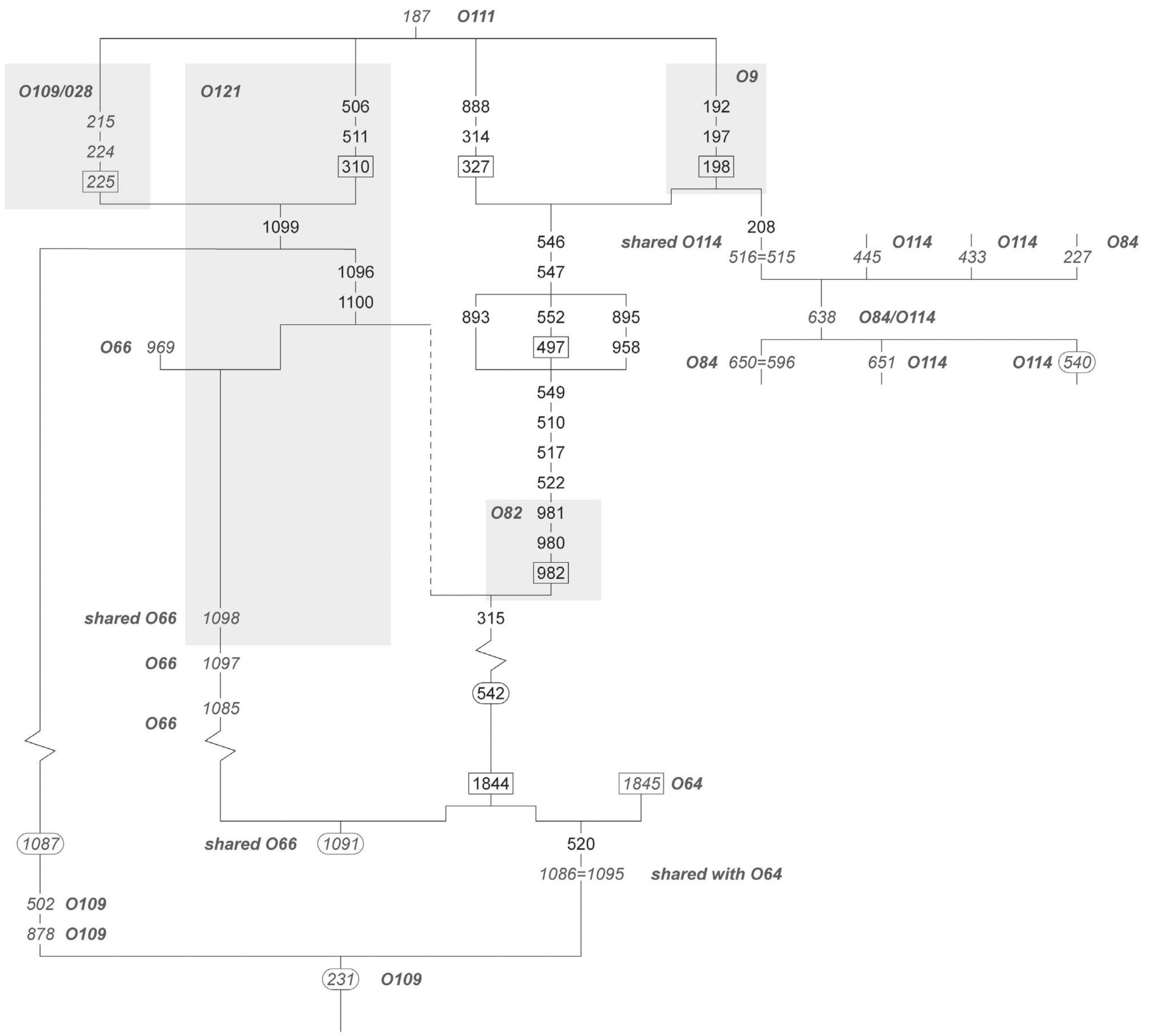


Figure 28.3 Stratigraphic matrix for Structures O65 and O121.

Table 28.1 Contexts excavated within Structures O65 and O121 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
192	loose mid-brownish-grey sandy silt with occasional charcoal flecks	burial fill
197	articulated human skeleton	primary crouched inhumation burial
198	sub-rectangular cut with gradually sloping sides and a flatish base	burial cut
208	loose dark greyish-brown silt	silt accumulation inside structure
310	oval cut with moderately sloping sides	cut of pit
314	soft dark greyish-brown silt	fill of pit
315	friable light grey silt with frequent pisé rubble, burnt stone and charcoal	silt and rubble accumulation inside structure
327	sub-rectangular cut with moderately sloping sides and a concave base	cut of pit
497	circular cut with straight steep sides and a concave base	cut of post hole

Table 28.1 Contexts excavated within Structures O65 and O121 with sedimentary descriptions and interpretations continued...

Context	Description	Interpretation
506	loose mid-greyish-brown silt	fill of pit
510	soft and friable mid-yellowish-grey fine sandy silt	silt accumulation inside structure
511	soft dark greyish-brown silt with some compact patches and occasional burnt stone	fill of pit
515	loose light yellowish-grey sandy silt with occasional charcoal and burnt stone	dump of burnt material
516	loose light yellowish-grey sandy silt with occasional charcoal and burnt stone	dump of burnt material
517	firm light grey silt with frequent pisé rubble	silt and rubble accumulation inside structure
520	friable mid-yellowish-grey sandy silt with frequent stones and pisé rubble	possible structure or compacted dump of structural material
522	light grey silt with frequent ashy patches, pisé and stone rubble	silt and rubble accumulation inside structure
542	friable mid-orangish-brown pisé	pisé wall of structure
546	soft mid-yellowish-brown clayey silt	silt accumulation inside structure
547	soft mid-yellowish-brown clayey silt	silt accumulation inside structure
549	friable mid-yellowish-grey silt with occasional pisé rubble	silt and rubble accumulation inside structure
552	soft/loose dark greyish-brown silt	fill of post hole
888	friable mid-greyish-brown silt	fill of pit
893	loose dark reddish-brown silt	dump deposit containing possible organic material
895	loose light grey very soft ash with frequent charcoal	ashy dump
958	friable brownish-red silt	dump deposit containing burnt material
980	articulated human skeleton	primary crouched inhumation burial
981	firm greyish-brown gritty-silt	burial fill
982	sub-rectangular cut with straight vertical sides and a flat slightly uneven base	burial cut
1086	friable light orangish-grey sandy silt with frequent stones and pisé rubble	possible structure or compacted dump of structural material
1087	firm to friable mid-brownish-grey pisé	pisé wall of structure
1091	friable-compact mid-light orangish-brown pisé	pisé and rubble wall of structure
1096	friable dark greyish-brown silt with occasional stones	silt and rubble accumulation inside structure
1098	compacted dark greyish-brown silt	localised compacted rubble inside structure acting as possible ramp
1099	soft-friable dark grey silt with occasional stones	silt accumulation inside structure
1100	friable mid-brownish-yellow sandy silt	unexcavated mud-plaster surface
1844	unexcavated sub-circular cut	construction cut

The western side of Intramural Space O121 was defined by short wall (1087) that was formed of firm silty, grey pisé. This wall ran for *c.* 1.5 m in a north–south direction. Wall (1087) overlay both wall (231) and silts (878 and 502) of Structure O109.

Structure O65

Burial O9 was identified immediately below overburden (187). The burial cut [198] measured 1.00 m x 0.64 m x 0.12 m deep and cut pisé wall (542). This east–west orientated oval burial contained a north-facing crouched sub-adult skeleton (197) within a sandy silt fill (192). The vertebrae, ribs, pelvis and legs were not evident and the remaining bone was very brittle (Figure 28.6). The feet were resting on a caprine pelvis. The hands were placed towards the face, with the skull appearing to rest on the fingers of the left hand and with the right hand curled in front of the face.

The burial cut [198] truncated dark brown deposit (208) and yellowish-brown clayey silt (546). Context (208) contained a number of human bone fragments. It overlay a light yellowish-grey sandy silt (515=516) surrounding

Table 28.2 Quantities of bulk finds in Structures O65 and O121 by material and context number.

Object 65	**Volume of sediment (l)**				**Weight of bulk finds per material (g)**										
Context no.	**Total volume**	**Flot. sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Ground stone**	**Other worked stone**	**Unworked stone**	**Animal bone**	**Human bone**	**Marine shell**	**Other shell**	**Plaster/Pisé**	**Charcoal**	**Misc.**
192	1.0	1.0	0.0	0.0	391.4	0.0	0.0	0.0	50.3	0.0	0.0	133.5	0.0	0.0	0.0
208	15.0	14.0	0.0	1.0	70.8	0.0	0.0	0.0	20.0	0.0	0.0	20.2	0.0	10.0	0.0
215	66.0	65.0	0.0	1.0	86.5	0.0	0.0	0.0	22.9	0.0	0.0	196.3	0.0	0.0	0.0
314	48.0	30.0	16.0	2.0	363.6	0.0	1.0	0.0	29.8	0.0	0.0	6.3	0.0	0.0	0.0
315	345.0	40.0	300.0	5.0	2463.5	34.0	0.0	70.0	479.4	0.0	0.0	22.8	7600.0	2.0	0.0
506	68.0	30.0	37.0	1.0	568.7	80.0	0.0	0.0	36.4	0.0	0.0	19.1	0.0	0.0	400.0
510	302.0	40.0	258.0	4.0	1292.9	0.0	0.0	0.0	99.1	0.0	0.0	20.6	0.0	0.0	1.0
511	61.0	20.0	40.0	1.0	1930.4	3550.0	11.3	0.0	44.3	0.0	0.0	6.6	0.0	30.1	0.0
515	31.0	30.0	0.0	1.0	149.4	0.0	0.4	0.0	17.0	0.0	0.0	4.6	0.0	0.1	0.0
516	41.0	30.0	10.0	1.0	401.4	0.0	1.2	0.0	21.9	0.0	0.1	33.7	0.0	0.0	0.0
517	227.4	20.0	205.0	2.4	645.6	100.0	0.0	0.0	170	0.0	0.0	8.1	0.0	10.3	26.0
520	51.0	10.0	40.0	1.0	262.4	0.0	0.0	700.0	0.4	0.0	0.0	1.6	0.0	0.0	0.0
522	327.0	20.0	305.0	2.0	981	0.0	0.0	0.0	334.8	0.0	0.0	17.3	2650.0	0.1	0.0
546	112.0	60.0	50.0	2.0	697.4	0.0	2.0	0.0	57.2	0.0	0.0	10.6	0.0	0.0	0.0
547	346.0	100.0	241.0	5.0	4245.2	177.3	10.0	0.0	266.5	0.0	0.2	75.4	0.0	0.1	0.0
549	581.0	80.0	497.0	4.0	2513.5	0.0	1.1	0.0	336.4	0.0	0.0	122.7	0.0	0.1	76.9
552	1.0	0.5	0.0	0.5	2.2	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0
888	123.0	80.0	42.0	1.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
893	6.0	5.0	0.0	1.0	141.0	160.0	0.0	0.0	29.0	0.0	0.0	0.0	0.0	0.0	0.0
895	9.0	8.0	0.0	1.0	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
958	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
980	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
981	61.0	60.0	0.0	1.0	376.0	102.0	4.0	0.0	125.0	4.0	0.0	0.0	0.0	0.0	0.0
Total	2823.4	743.5	2041.0	38.9	17624.87	4203.3	31.0	770.0	2140.8	4.0	0.3	699.4	10250.0	52.8	503.9

one large (*c.* 0.40 m wide) stone with a cluster of smaller stones immediately to the east. At this point excavation within Structure O65 ceased in this area, although context (515=516) was observed to overlie context (638) in adjacent Structure O114.

To the west of Burial O9, pit [327] was cut through fill (546) of Structure O65 and also partially truncated pisé and stone deposit (520) and wall (542). Pit [327] was sub-rectangular in shape measuring 0.68 m x 0.58 m in plan and was 0.9 m in depth. The base of the pit was irregular and defined by the pisé blocks that it was cut into. Cut [327] contained two fills; the upper fill (888) was a mid-grey-brown friable silt and the lower fill (314) was a dark grey-brown soft silt. The fills of the pit were differentiated from surrounding context (546) by their more friable consistency and lack of pisé inclusions. Both pit fills contained chipped stone and animal bone, and a worked bone point (SF1264) was removed from (888).

Following the removal of fills (314) and (197), excavation focussed on the removal of the deposits infilling Structure O65. The uppermost deposit (546) filled the entire interior of the structure and was a *c.* 0.4 m thick layer of a mid to dark yellow grey loose silt, with 10–20% pisé inclusions. Deposit (547) also filled the interior of the structure and was similar in nature to overlying deposit (546) with a higher frequency of pisé lumps and large stone inclusions which may represent roof/wall collapse. During excavation of both (546) and (547) the interior space of Structure O65 was divided into quadrants to provide spatial control of finds.

Below (547) were deposits (895), (893) and (552). Context (895) was a small crescent-shaped deposit of ash that was up to 0.04 m thick. Below context (895) there was a small area of scorched silt (958). Deposit (893) was a sub-circular dump of dark silt covering an area of *c.* 0.5 m diameter located in the northeast of O65. Silt deposit (893)

Table 28.3 Quantities of small finds from Structures O65 and O121 by material and context number.

Object 65	**Quantities of small finds per material (nos)**									
Context	**Chipped stone**	**Ground stone**	**Other stone**	**Worked bone**	**Unworked animal bone**	**Disarticulated human bone**	**Bone beads**	**Stone beads**	**Marine shell beads**	**Total small finds**
192	4	0	0	0	0	0	0	0	0	4
208	1	1	0	0	0	0	0	0	0	2
215	5	1	0	0	0	0	0	0	0	6
314	0	0	0	0	0	0	0	0	1	1
315	0	1	2	0	0	0	0	0	0	3
506	0	2	1	0	0	0	0	0	0	3
510	0	1	0	0	0	0	0	0	0	1
511	0	1	1	0	0	0	0	0	0	2
517	0	1	0	1	0	0	0	0	0	2
520	0	1	0	0	0	0	0	0	0	1
522	0	1	0	2	0	0	0	0	1	4
547	0	2	0	0	0	0	0	0	1	3
549	0	4	2	0	0	0	0	1	1	8
888	0	0	0	1	0	0	0	0	0	1
981	6	0	2	1	1	1	2	0	0	13
Total	16	16	8	5	1	1	2	1	4	54

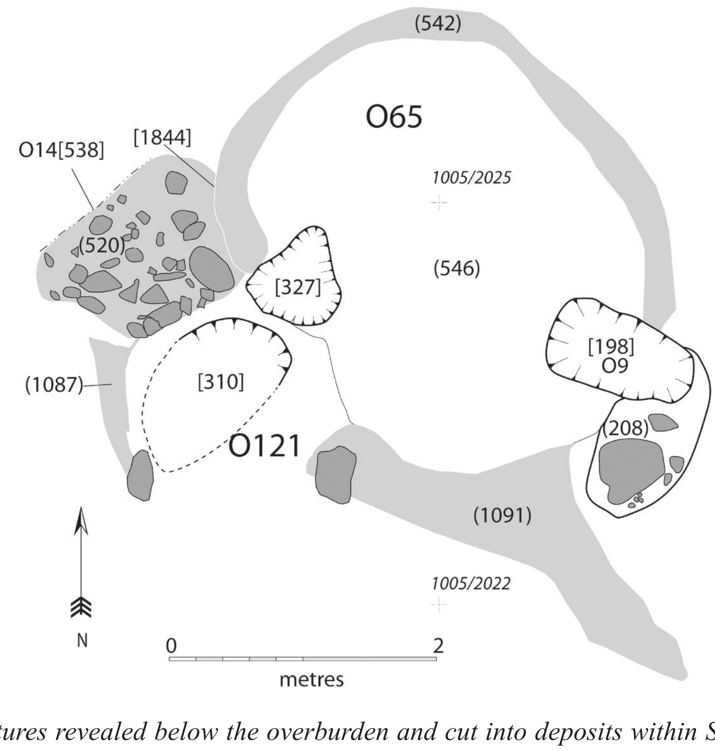


Figure 28.4 Plan of features revealed below the overburden and cut into deposits within Structures O65 and O121.

Figure 28.5 Ground-stone pestle SF630 from deposit (506).

Figure 28.6 Skeleton (197) in Burial O9 from the north. Scale 1.0 m.

contained few inclusions, and its colour and composition indicated that it had a high organic component. Deposit (552) was a dark grey-brown silt that filled a cut [497] which was *c.* 0.2 m deep and *c.* 0.15 m in diameter.

Underlying (893), [497] and (958) was a series of deposits (549, 510, 517 and 522) which again covered the entirety of the interior of Structure O65. As with contexts (546) and (547), the interior space of Structure O65 was divided into quadrants to provide spatial control of finds from these deposits. Context (549) was a *c.* 0.05 m thick horizon, largely composed of pisé blocks with fine silt filling in the spaces between the blocks. Underlying (549)

Figure 28.7 Possible zoomorphic figurine (SF711) carved out of limestone, found in deposit (517).

context (510) was another *c.* 0.05 m layer of collapsed pisé in a matrix of silt and fine sand. Below (510) there was a far more compact layer (517) containing higher proportions of pisé and mud plaster, which may indicate that this represents a degraded floor horizon. A possible zoomorphic figurine SF711, carved out of limestone, was found in this deposit (Figure 28.7). An ashy deposit near the centre of the structure was treated as part of this context because it did not have clearly defined boundaries. The compacted horizon of (517) lay over (522), consisting of ashy deposits and broken up floor material. A sample, SA2131, was taken for analysis from context (522).

The excavation of (522) exposed a silt and rubble deposit (315), that might have been a floor and which covered the interior space of Structure O65, into which a burial, Burial O82, had been cut (Figures 28.8 and 28.9). The cut [982] for this burial was sub-rectangular, 0.85 m x 0.45 m x 0.23 m deep, and orientated west-northwest–east-southeast. Skeleton (980) was a crouched inhumation lying on its right side, with its head to the west, facing south in a gritty silt fill (981). The arms had been placed together in front of the body, the right hand being under the skull and the left in front of the face. The bones were well preserved, apart from the skull which was more degraded. All long bone epiphyses were unfused indicating that this skeleton was a juvenile. Several significant finds were associated with this body. Four chipped-stone blades were located near the right hand (SF1819) with another (SF1807) near the neck. A probable ulna bone (SF1810), appearing to be from a canine, was uncovered at the western end of the burial near the base of the fill, orientated east–west. Five other chipped-stone points and a bone point (SF1579) were found within the fill (981). A large (unnumbered) burnt stone is located at the top edge of the burial cut and may represent a marker for the burial.

28.3 Interpretation

Although the extent of excavation in both Structure O65 and Structure O121 was limited, these structures were identified as part of a complicated sequence of building to the southwest of Structure O75. Structure O65 is primarily defined by wall (542), which appears to sit within construction cut [1844], which truncated a range of earlier deposits in this part of the excavation trench. This cut was only seen in plan and truncates pisé and rubble deposit (1086=1095), which is also truncated by [1845] of O64. Pisé wall (1091) may originally have been a more extensive deposit, perhaps a platform of pisé, that only began to function as a wall after it had been cut by [1844]. These relationships suggest that occupation within O65, O66 and O64 was broadly contemporary although further work is required to confirm this. Similarly the stratigraphic relationships between O65 and O114 to the east also remain unclear at the present level of excavation. Significantly, (1086=1095) and (1087) both postdate wall (231) of Structure O109. This indicates that O109 is earlier than this group (O64, O65, O66) of structures.

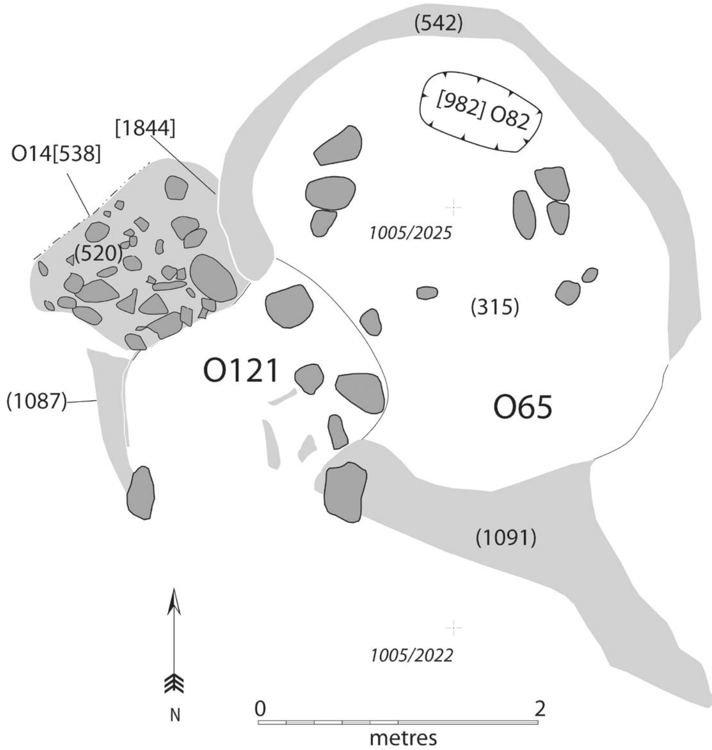


Figure 28.8 Plan of Structure O65 showing location of Burial O82.

Figure 28.9 Skeleton (980) in Burial O82 from the east. Scale 0.2 m.

In light of the limited excavation we are unable to infer the activities that occurred inside these structures. The earliest event reached by the excavation in Structure O65 was a possible floor (315) into which Burial O82 had been cut. A series of pisé and stone rubble deposits above the burial appear likely to derive from a combination of building collapse and dumping, indicating that the structure had gone out of use. During this period, however, there may have been intermittent occupation as represented by possible degraded floor (517). On one occasion hot ashes (895) were deposited and caused scorching of a surface (958). A small pit [321] may have functioned as a post-hole. The final documented event within the interior of the structure was the insertion of Burial O9 into these deposits.

The excavation within Structure O121 revealed complex relationships with Structures O65 and O66, which require further examination. Our current understanding is that the floor surface (1100) within O121 overlay a ramp (1098) leading into Structure O66. Material accumulated on the surface of (1100) into which a pit [310] and Burial O28 (Chapter 27) were cut.

29. Structure O64 and Pit O14

29.1 Location and relationship with other structures

Structure O64 is sub-rectangular and located on the western side of the WF16 knoll (Figure 29.1). A consequence of this location is that the archaeological remains were better preserved at the eastern side of the Structure (upslope) than that at the western side (downslope). Structure O64 was located to the south of Structure O33 and to the north of Structure O65 and may have had at least some periods of contemporary activity with both. Pit O14 is a small, mud-plaster-lined pit, located to the immediate southwest of Structure O64 and appears to have been constructed relatively late in the sequence of deposits representing

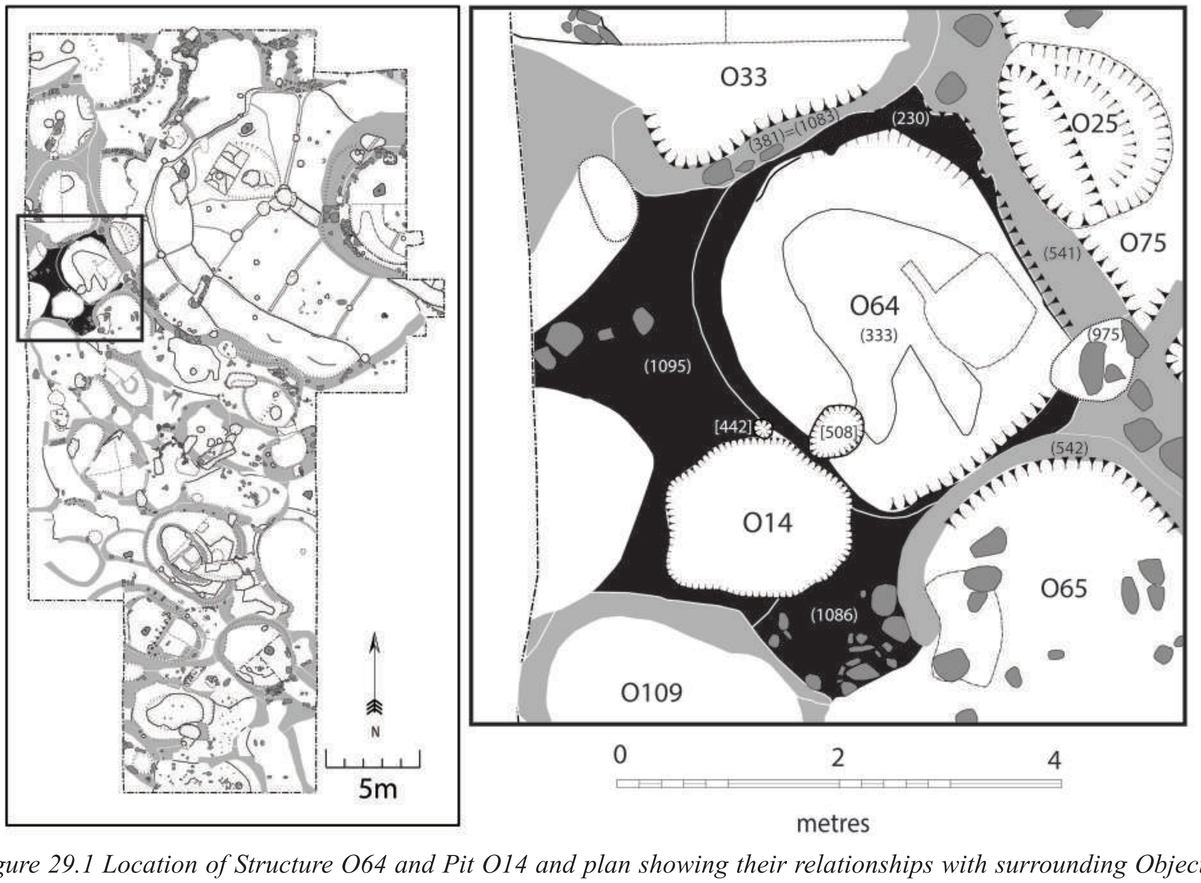


Figure 29.1 Location of Structure O64 and Pit O14 and plan showing their relationships with surrounding Objects.

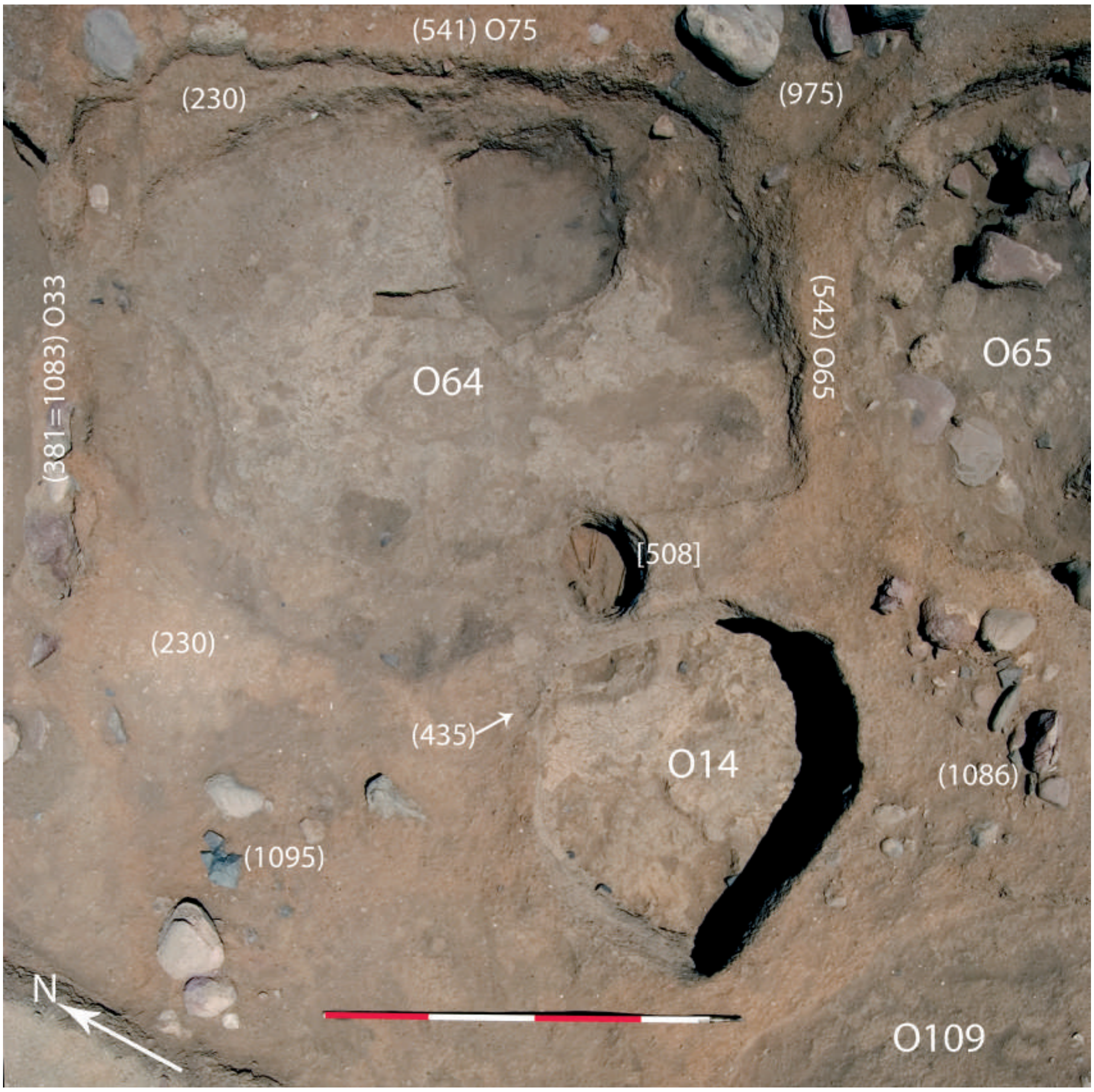


Figure 29.2 View of Structure O64 and Pit O14 during the course of excavation. Scale 2.0 m.

Structure O64. As with Structure O65, the construction of both Structures O64 and O14 truncated the wall (231) of Structure O109. Conversely, Burial O81, within Structure O64, was constructed relatively early in that sequence and appears to have been in use — in terms of the removal and deposition of bones — throughout the time that Pit O14 was in use.

Figure 29.2 provides a view of Structure O64 during the course of the excavation and Figure 29.3 the stratigraphic matrix for the excavated deposits. Tables 29.1, 29.2 and 29.3 list the excavated contexts, bulk finds and small finds, respectively.

29.2 Description of the excavated deposits Interior of Structure O64

Removal of the overburden (1 and 187) partially exposed the surface of a pisé wall (230), which defined Structure O64. Removal of the overburden also exposed greyish-brown silt and stone rubble (975), located to the southeast overlying walls (230) of Structure O64 and (541=543) of Structure O75.

Two features cut wall (230) in the southern area of this structure: a pit [508] filled with (507 and 976) and a post-hole [442] filled with (435) (Figure 29.1). The cut [508] of the pit was oval in plan with vertical edges. Its upper fill (507) contained a marine shell bead (SF2384) and a small amount of chipped stone and animal bone. Pit [508] was located directly over the human bones (984) of Burial O81, as discussed below. The post-hole [442], measuring *c.* 0.2 m in diameter and 0.15 m in depth, also cut through wall (230) and may have been the lower part of a structural feature built into an upper portion of the wall. The post-hole fill (435) was a loose light grey silt with frequent charcoal inclusions.

Once below the overburden, the first deposits removed from within the interior of Structure O64 were (545) and (550). Deposit (545) consisted of deflated sediment over the eastern part of the structure around a cup-hole mortar (SF618). Its removal revealed a single patch of friable

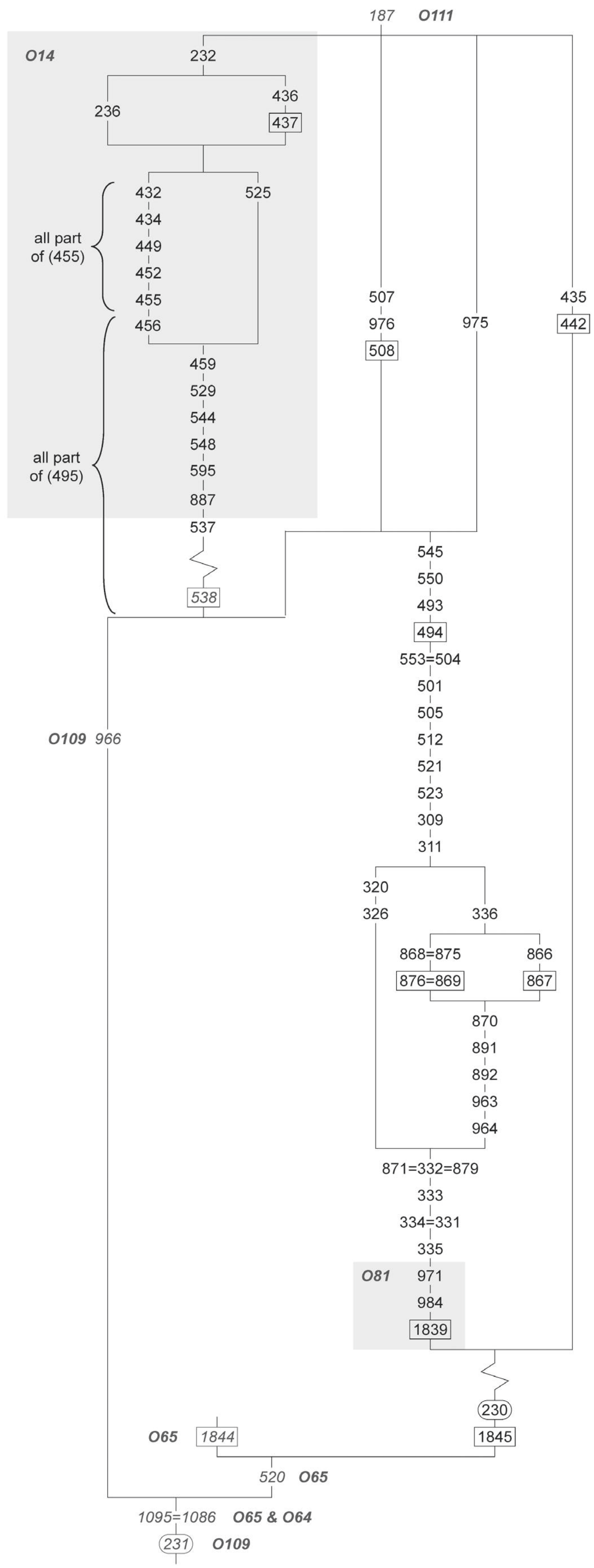


Figure 29.3 Stratigraphic matrix for Structure O64 and Pit O14.

Table 29.1 Contexts excavated within Structure O64 and Pit O14 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
230	friable light orangish-brown pisé	pisé wall of structure
232	loose pale yellowish-grey silt	silt accumulation inside structure
236	firm light grey silt	poorly preserved mud-plaster surface or possible capping
309	loose dark grey silt	occupation deposit
311	hard pale orangish-brown gritty silt	mud-plaster surface inside structure
320	loose dark grey silt	occupation deposit
326	friable light grey silt	mud-plaster surface inside structure
331	friable silt	possible occupation deposit seen in section only
332	loose dark grey silt	occupation deposit
333	very compact pale grey silt	mud-plaster surface inside structure
334	friable silt	possible occupation deposit seen in section only
335	compacted silt	mud-plaster surface inside structure
336	light orangish-brown gritty sandy-silt	mud-plaster surface inside structure
432	loose mid-yellowish-grey silt with occasional small stones and charcoal fragments	arbitrary spit through silt accumulation inside structure/pit
434	loose mid-yellowish-grey silt	arbitrary spit through silt accumulation inside structure/pit
435	loose very light grey silt with frequent charcoal flecks	fill of post-hole
436	moderately loose mid-brownish-grey silt with white and darker lenses	fill of pit
437	cut of unclear shape with concave sides and base	small pit cutting fills of a larger feature
442	circular cut with straight sides and a rounded base	cut of shallow post-hole
449	loose light greyish-brown silt with some firm areas due to insect nesting/burrowing and lumps of very light yellowish-brown pisé/building material	arbitrary spit through silt accumulation inside structure/pit
452	friable light greyish-brown silt with some firm lumps of very light yellowish-brown pisé/building material	arbitrary spit through silt accumulation inside structure/pit
455	friable light greyish-brown silt with some firm to compact lumps of very light yellowish-brown pisé/building material and plaster	silt accumulation inside structure/pit
456	friable light greyish-brown silt with some firm to compact lumps of very light yellowish-brown pisé/building material and finely sorted compact plaster and occasional heat cracked stone	arbitrary spit through silt accumulation and backfill inside structure/pit
459	friable light greyish-brown silt with some firm to compact lumps of very light yellowish-brown pisé/building material and finely sorted compact plaster and occasional heat fractured stones	arbitrary spit through silt accumulation and backfill inside structure/pit
493	loose greyish-brown ashy silt	fill of post-hole
494	circular cut with vertical staight sides	cut of post-hole
495	friable to firm greyish-yellow and brown silt with variable amount of pisé/mud-plaster rubble and stones with ashy patches	mixed backfill of the lower part of pit
501	friable greyish-brown silt	silt accumulation inside structure
504	friable light greyish-brown silt	silt accumulation inside structure
505	pale brown friable gritty silt	mud-plaster surface inside structure
507	moderately compact dark grey silt	fill of small pit
508	ovoid cut with straight vertical sides and a flat base	cut of shallow pit
512	friable pale orangish-brown silt	occupation deposit
521	compacted light brown silt	possible mud-plaster surface
523	compacted/hard pale brown gritty silt	mud-plaster surface inside structure
525	friable light greyish-brown silt with some firm lumps of very light yellowish-brown pisé/building material	silt accumulation inside structure/pit
529	friable to firm light brownish-grey silt with a high concentration of pisé inclusions and occasional light bluish-grey ashy patches	arbitrary spit through silt accumulation and backfill inside structure/pit
537	compact pale brownish-yellow/grey clay silt	mud-plaster lining of pit

Table 29.1 Contexts excavated within Structure O64 and Pit O14 with sedimentary descriptions and interpretations continued...

Context	Description	Interpretation
538	circular and sub rectangular cut with straight sides and a flat base	cut for a mud-plaster lined pit
544	loose light greyish-brown silt with pisé and stone rubble and ashy lenses	arbitrary spit through silt accumulation and backfill inside structure/pit
545	friable light brownish-grey silt	silt accumulation inside structure
548	firm light greyish-brown silt with a high concentration of pisé rubble and a small ashy lens	arbitrary spit through backfill inside structure/pit
550	friable yellowish-brown gritty silt	poorly preserved mud-plaster surface
553	friable light brown silt	silt accumulation inside structure
595	firm light greyish-brown silt with a high concentration of pisé rubble and a small ashy lens	arbitrary spit through backfill inside structure/pit
866	loose dark grey ashy silt	fill of pit
867	shallow cut with straight sides and a flat base	cut of shallow pit
868	loose dark grey ashy silt with burnt stone	fill of pit
869	elongated shallow cut with an irregular base	cut of shallow pit (same as 876)
870	pale orangish-brown compact sandy/gritty silt with crushed pisé rubble	levelling material inside structure
871	loose dark grey silt	occupation deposit
875	loose dark grey ashy silt with burnt stone	fill of pit
876	elongated shallow cut with irregular base	cut of shallow pit (same as 869)
879	loose dark grey silt	occupation deposit
887	loose dark grey/brown silt/ash with frequent burnt bone and ash/charcoal	silt accumulation inside structure/pit
891	fine dark greyish-brown silt	occupation deposit
892	pale brown gritty silt	ephemeral mud-plaster surface
963	fine dark grey silt	occupation deposit
964	firm pale brownish-grey gritty silt	ephemeral mud-plaster surface
971	loose dark grey/brown ashy silt	burial fill
975	greyish-brown silt and stone rubble	accumulation of silt and rubble at the junction of walls/structures
976	loose dark grey/brown silt	fill of pit
984	crouched human inhumation	primary human burial
1095	friable dark orangish-grey pisé with some larger stones and frequent smaller stones	pisé rubble from possible structural collapse (same as 1086 of Structure O65)
1839	cut for unexcavated and partially obscured burial	cut for unexcavated Burial O81
1845	sub-rectangular cut containing wall (230) and deposits within it	construction cut for wall (230)

yellow-brown compacted silt (550), measuring 0.6 m x 0.4 m, located in the north of the interior. The cup-hole mortar sat on this surface, but was not set into it. Removal of surface (550) revealed a small shallow post-hole [494]. This was circular, *c.* 0.2 m in diameter and 0.06 m deep. It contained a loose ashy fill (493).

Below (550), silty deposits (553=504) and (501) covered the whole of the interior of Structure O64. They contained a large number of finds including a marine shell bead (SF624) and were above a mud-plaster surface (505). The mud-plaster surface (505) consisted of pale brown gritty silt and covered only the eastern half of the structure, most likely having been eroded in the west (Figure 29.4). A piece of worked animal bone, SF2140, was recovered from (505). Below (505) there were three further mud-plaster surfaces (521), (523) and (311), with fine grit inclusions and only covering part of the interior (Figure 29.18). These surfaces were separated by thin occupation horizons (309) and (512) but no significant amounts of infill. A hammerstone, SF707, was found in occupation horizon (512).

Below these degraded mud-plaster surfaces there was a further silty occupation deposit (320) lying on a fine grey mud-plaster surface (326). This surface survived in only a small patch, 0.6 m north–south and 0.6 m east–west, in the southern area of the interior. Preserved on this surface were the remains of what appeared to be ochre decoration, although no discernible pattern was evident (Figure 29.5). The discrete nature of the ochre markings suggested that this was more than just an area where ochre had been

Table 29.2 Quantities of bulk finds from Structure O64 and Pit O14 by material and context number.

O64, O14	Volume of sediment (l)				Weight of bulk finds per material (g)							
Context	Total volume	Flot. Sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Animal bone	Marine shell	Other shell	Plaster/Pisé	Charcoal
232	91.0	30.0	60.0	1.0	235.8	0.0	0.0	10.0	0.0	0.0	10.0	0.0
236	26.0	25.0	0.0	1.0	65.0	0.0	0.0	0.6	12.8	0.0	0.0	0.0
309	11.0	10.0	0.0	1.0	29.5	0.0	0.0	4.5	0.0	0.8	0.0	0.1
311	71.0	10.0	60.0	1.0	205.9	0.0	0.0	34	0.0	0.0	0.0	0.0
320	11.0	10.0	0.0	1.0	12.0	0.0	0.0	0.8	0.0	0.8	40.0	0.0
331	70.0	0.0	70.0	0.0	230.0	0.0	0.0	171.0	0.0	0.0	0.0	0.0
333	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
336	31.0	20.0	10.0	1.0	77.4	0.0	0.0	2.3	0.0	0.2	0.0	0.1
432	35.0	10.0	24.0	1.0	173.0	0.0	0.0	30.7	4.0	0.0	20.1	0.0
434	39.0	10.0	28.0	1.0	135.4	0.0	0.0	11.3	6.2	0.0	0.1	0.0
435	1.0	1.0	0.0	0.0	0.3	0.0	0.0	0.0	0.4	0.0	10.0	0.0
436	14.0	12.0	0.0	2.0	33.8	0.0	0.0	4.5	8.5	0.0	0.0	0.0
449	37.0	10.0	26.0	1.0	126.1	0.0	0.0	15.6	5.4	0.0	20.1	0.0
452	41.0	10.0	30.0	1.0	135.7	0.0	0.0	55.1	9.1	0.0	0.0	0.0
455	342.0	20.0	320.0	2.0	753.1	0.0	0.0	38.9	10.4	0.0	0.4	1.0
456	41.0	10.0	30.0	1.0	340.3	0.0	0.0	13.6	18.3	0.0	10.4	0.0
459	71.0	10.0	60.0	1.0	280.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0
493	1.0	0.5	0.0	0.5	0.7	0.0	0.0	0.2	0.0	0.0	0.0	0.0
495	138.0	130.0	6.0	2.0	2398.3	1740.3	1.3	111.2	27.4	2040.0	21.8	0.0
501	112.0	60.0	50.0	1.0	218.0	0.0	0.3	6.8	0.0	32.2	0.0	0.0
504	152.0	60.0	90.0	2.0	222.4	0.0	0.0	17.9	0.0	33.6	0.0	0.0
505	142.0	40.0	50.0	52.0	225.7	0.0	0.0	8.7	0.0	14.5	0.0	0.1
507	21.0	20.0	0.0	1.0	89.5	0.0	0.1	14.3	1.4	0.0	0.3	0.0
512	187.0	30.0	155.0	2.0	147.1	132.7	0.0	15.9	0.2	6.0	0.0	0.0
521	164.0	60.0	100.0	4.0	465.2	0.0	0.4	21.3	0.0	25.4	0.0	0.0
523	31.0	30.0	0.0	1.0	87.5	0.0	0.0	2.0	0.0	1.6	0.0	0.0
525	19.0	10.0	8.0	1.0	135.6	0.0	0.0	16.0	19.5	0.0	20.2	0.0
529	51.0	10.0	40.0	1.0	48.9	0.0	0.0	11.4	8.1	0.0	20.5	0.0
537	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
544	46.0	30.0	15.0	1.0	628.6	0.0	0.0	15.5	20.8	0.0	0.0	0.0
545	101.0	20.0	80.0	1.0	142.9	0.0	11.0	2.6	0.0	13.3	0.0	0.0
548	56.0	30.0	25.0	1.0	387.2	0.0	0.0	59.3	13.5	0.0	0.1	0.0
550	46.0	30.0	15.0	1.0	124.7	0.0	0.0	1.5	0.0	3.6	0.0	0.0
553	122.0	30.0	90.0	2.0	180.0	0.0	0.0	30.0	0.0	0.0	0.0	0.0
870	16.0	10.0	5.0	1.0	98.7	0.0	0.0	2.0	0.0	0.0	0.0	0.0
871	41.0	10.0	30.0	1.0	35.6	150.0	0.0	12.7	0.0	5.0	0.0	0.0
875	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
876	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
879	36.0	15.0	20.0	1.0	79.0	0.0	6.0	17.0	0.0	0.0	0.0	0.0
887	2.0	0.0	0.0	2.0	753.0	1200.0	0.0	158	0.0	0.0	0.0	0.0
891	16.0	15.0	0.0	1.0	32.0	0.0	0.0	7.0	0.0	0.0	0.0	0.0
892	6.0	5.0	0.0	1.0	14.8	0.0	0.0	9.0	0.0	4.4	0.0	0.0
963	6.0	5.0	0.0	1.0	10.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0

Table 29.2 Quantities of bulk finds from Structure O64 and Pit O14 by material and context number continued...

O64, O14	Volume of sediment (l)				Weight of bulk finds per material (g)							
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Animal bone	Marine shell	Other shell	Plaster/Pisé	Charcoal
964	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
971	1.0	1.0	0.0	0.0	36.6	0.0	0.0	9.4	0.0	4.6	0.0	0.4
975	81.0	80.0	0.0	1.0	311.0	910.0	1.0	11.0	0.0	0.0	0.0	0.0
976	31.0	30.0	0.0	1.0	139.0	200.0	0.0	24.0	0.0	0.0	0.0	0.0
Total	2559.0	959.5	1497.0	101.5	9845.3	4333.0	20.1	997.6	166.0	2186.0	174.0	1.7

Table 29.3 Quantities of small finds from Structure O64 and Pit O14 by material and context number.

O14, O64	Quantities of Small Finds per material (nos)								
Context	Chipped stone	Ground stone	Worked bone	Bone beads	Stone beads	Marine shell beads	Other shell	Plant matter	Total small finds
236	0	0	0	0	1	0	0	0	1
456	0	1	0	0	0	0	0	0	1
495	7	6	1	1	1	2	2	1	21
505	0	0	1	0	0	0	0	0	1
507	0	0	0	0	0	1	0	0	1
512	1	0	0	0	0	0	0	0	1
525	0	0	0	0	1	0	0	0	1
548	0	1	0	0	0	0	0	0	1
550	1	0	0	0	0	0	0	0	1
553	0	0	0	0	0	1	0	0	1
891	0	1	0	0	1	1	0	0	3
976	0	0	0	1	0	0	0	0	1
963	0	0	0	0	1	0	0	0	1
Total	9	9	2	2	4	5	2	1	34

worked. The area of decorated floor was lifted in its entirety as sample number SA2231. This sample also removed part of several underlying surfaces.

Also lying below (311) and adjacent to (326) and its overlying occupation material (320) was a thick (*c.* 0.2 m) compact layer of orange-brown sandy silt (336). This lacked the smooth surface of most of the mud-plaster floors. Removal of this layer exposed layer (870) consisting of crushed pisé that was up to 0.2 m thick in places. Two pits were cut into this horizon: [876=869] and [867]. These contained dark ashy material and burnt stone (868=875) and (866) and may represent the remains of hearths. Layer (870) was over a thin occupation deposit (891) and a thin patch of mud-plaster surface (892). Below this was another thin layer of silty occupation deposit (963) over another small patch of surface (964). Surface (964) consisted of compacted silt 0.01 m thick (Figure 29.18). This material had the same consistency as the later surfaces seen in the interior of O64 and was interpreted as an insubstantial floor; it contained a green stone bead (SF1421).

Below (326) and (964) there was another silty deposit (879=332=871), above a hard mud-plaster floor surface (333), which only survived in the centre of the structure (Figure 29.6). This lay above silt (334=331), which was above surface (335), which consisted of pale grey compacted fine silt. These contexts were not excavated,

Figure 29.4 Mud-plaster surface (505). Scale 1.0 m.

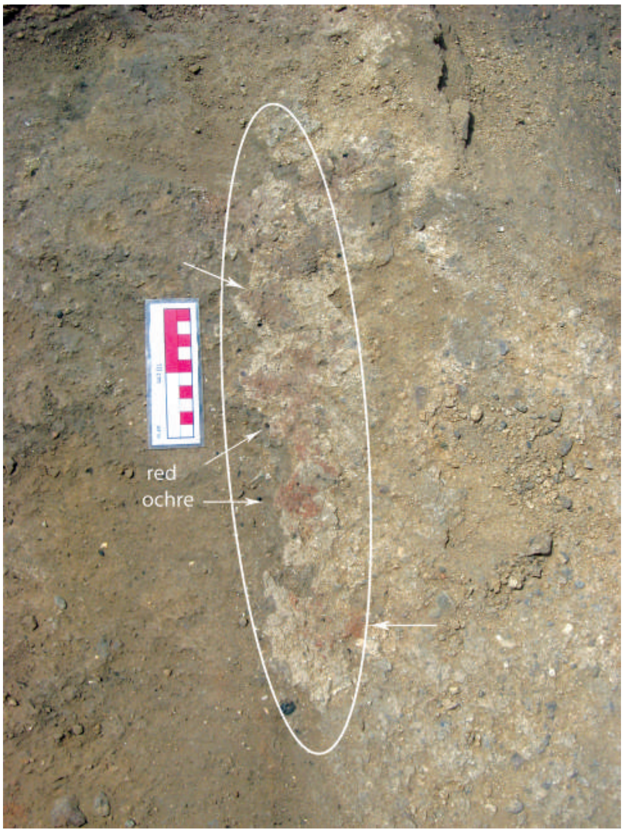


Figure 29.5 Red ochre colouration on mud-plaster surface (326). The boundary is showing overall extent with major concentrations marked by arrows. Scale 0.1 m.

but were recorded from the section created from removing block sample SA2231. An additional block sample SA2770 was taken from the section created by the removal of SA2231 for microstratigraphic assessment.

Walls

Wall (230) consisted of a light orange-brown friable pisé which was cut by pit [508], post-hole [442] and by the cut [538] of Pit O14. Wall (230) connects to wall (381=1083) of Structure O33 to the north, wall (542) of Structure O65 to the southeast, and wall (541=543) of O75 to the northeast. The construction cut [1845] for (230) truncated pisé rubble and silt layers (1095=1086) and (520), which are part of Structure O65 to the south and west, but further excavation is required to define the other stratigraphic inter-relationships between the walls located in this area of the excavation trench.

Burial O81

During the excavation of Structure O64 and Pit O14 a burial was partially exposed by the excavation of pit [508]. This revealed skeletal remains, including a pelvis, lower limbs and ribs (984), within fill (971) of a burial designated as Burial O81. The fill (971) was also partially exposed during the excavation of Pit O14 to the south. It seems likely that the cut of Burial O81 [1839] had been made through an early floor layer in Structure O64, one prior to floor (335). The body had been placed on its left side in a crouched position with its feet to the south (Figure 29.7). Although the right tibia, fibula and femur were removed, this burial was not fully excavated, leaving a degree of uncertainty over its precise stratigraphic position. No skull was observed.

Pit O14

Pit O14 was a large pit located to the southwest of Structure O64. Its construction cut [538] truncated layers within Structure O64 as well as wall (230) from Structure O64, rubble (520) from Structure O65, and also deposits from Structure O109. At the highest level that this feature was exposed it measured 1.45 m north–south and 1.68 m east–west, although the shape of cut [538] was irregular (Figure 29.8).

Pit O14 was first identified after the removal of the overburden (187) and a loose yellowish-grey silt (232), which was located to the immediate southwest of Structure O64. Excavation revealed a poorly preserved mud-plaster surface (236), later identified as similar to the lining of Pit O14 (537), and which possibly formed a deliberate capping to the pit. Surface (232) partially overlay (432), the uppermost deposit within the pit, which was removed as a 5 cm spit in the western half of the feature. Spit (532) was truncated by a cut [437] for a small ovoid pit (*c.* 0.4 m x 0.2 m x 0.09 m) filled by loose ashy deposit (436), which featured laminated bands of charcoal and ash. The majority of cut [437] continued into the unexcavated

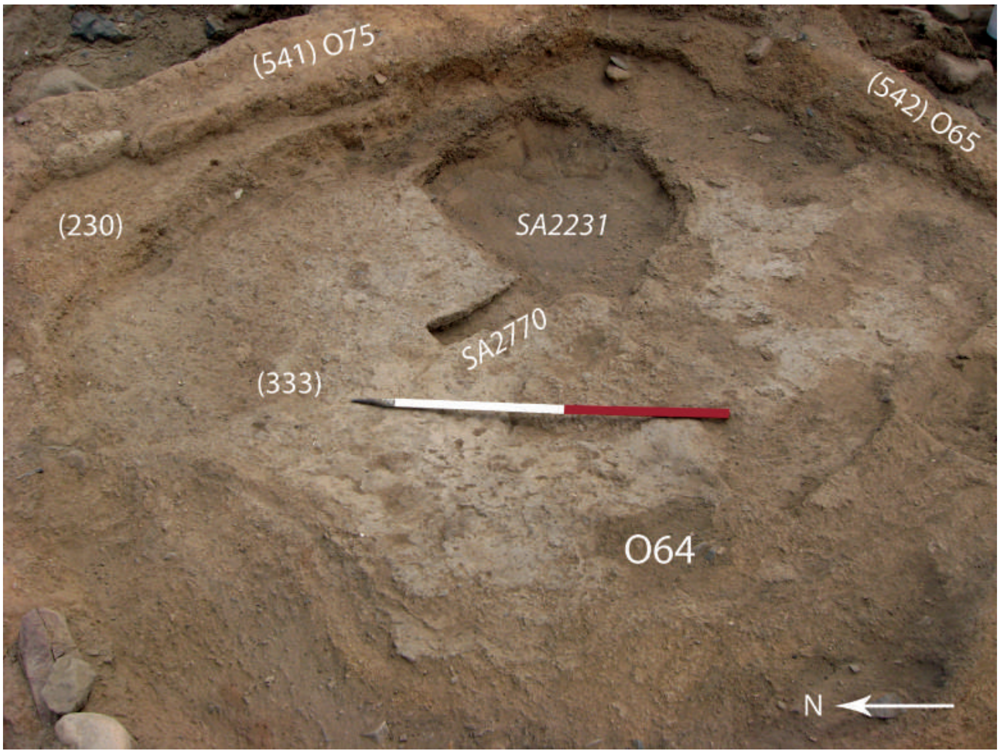


Figure 29.6 Floor (333) within Structure O64, showing the areas removed as block sample SA2231 and microstratigraphy sample SA 2770. Scale 1.0 m.

Figure 29.7 Skeleton (984) within Burial O81 as seen through excavated pit [508]/(507, 976). Scale 0.1 m.

eastern half of Pit O14. Excavation of the western half of Pit O14 continued with the removal of the pit fill by 5 cm thick spits (434), (449), (452), (455), (456), (459), (529), (544), (548) and (595) to create a section (Figure 29.9). A block sample SA1729 was taken from the lower part of the section, through spits (456) and (459) immediately above the hard plaster lining (537) at the base of the pit. All spits consisted of loose silt with occasional charcoal and with increasing quantities of pisé and mud-plaster fragments. Context (525) was a further removal of fill material in subsequent cleaning of the edges of the pit. Below (548) and immediately on the base of the pit (537) was an ashy deposit (887). The lining (537) formed a flat base with a lip around a sub-oval hollow in the northeast corner of the base, undercutting the near vertical edge by 0.18 m (Figure 29.8).

At least two layers of mud plaster adhered to the side of the pit (Figure 29.10), although it is not clear whether these were simply made as patches in areas where the lining had collapsed, rather than as complete re-linings of the pit. The lining (537) was sampled for phytoliths. The hollow in the northeast corner of the base of the pit lay directly beneath Burial O81. The left foot of skeleton (984) had intruded through the side of the pit where the lining had fallen away (Figure 29.11). The ashy deposit (887) continued into the hollow, which was not fully excavated because the unexcavated skeletal remains (984) within Burial O81 were supported on three large rocks located in (887). Although some uncertainty remained about stratigraphic relationships, it appears most likely that Burial O81 was made within Structure O64 and was then cut by the creation of Pit O14.

Examination of the section that resulted from removing the western half of the fill of Pit O14 (Figure 29.9) showed that the deposits excavated in spits comprised three major depositional units; an ashy basal fill which was *c.* 0.04 m thick and concentrated in the northern half of the section, overlain by a thicker (*c.* 0.4 m thick) layer of pisé rubble and silt, and an upper deposit (again *c.* 0.4 m thick) consisting of a light grey-brown friable silt with mixed inclusions of small and large stones, bone, charcoal, pisé and plaster\ lining material. Following the numbering system used during the removal of the western half of the structure, these deposits were removed as contexts (887), (495) and (455), respectively. Removal of these contexts from the eastern half of Pit O14 revealed that (495) contained considerably more artefacts than (455) (Tables 29.2 and 29.3), including several El-Khiam points (SF1800-1804), hammerstones, a pestle, marine shell and worked animal bone. Four samples of pisé were taken from this context for comparative analysis (Figure 29.12).

29.3 Sedimentary and micro-stratigraphic assessment

Two samples were taken from Structure O64: one from the upper floor (333) and one from the lower floor (335). Four

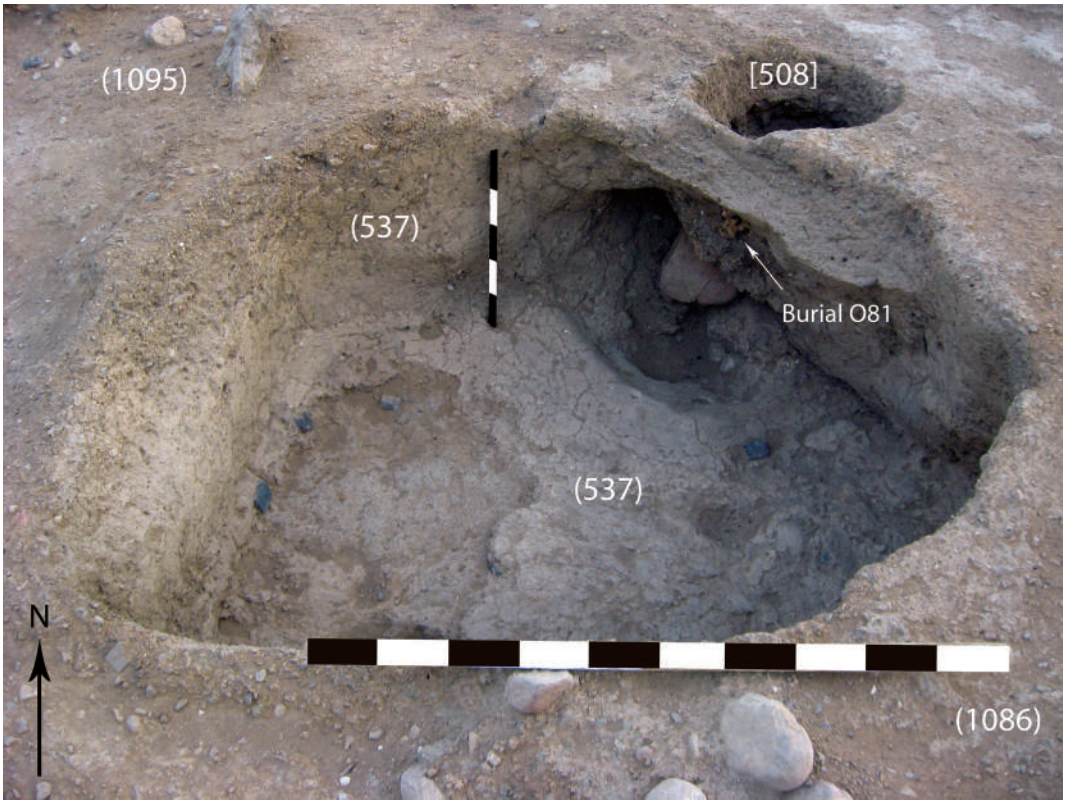


Figure 29.8 View of Pit O14 from the south showing its base of pit and sub-oval niche extending below Burial O81. Scales 1.0 m and 0.5 m.

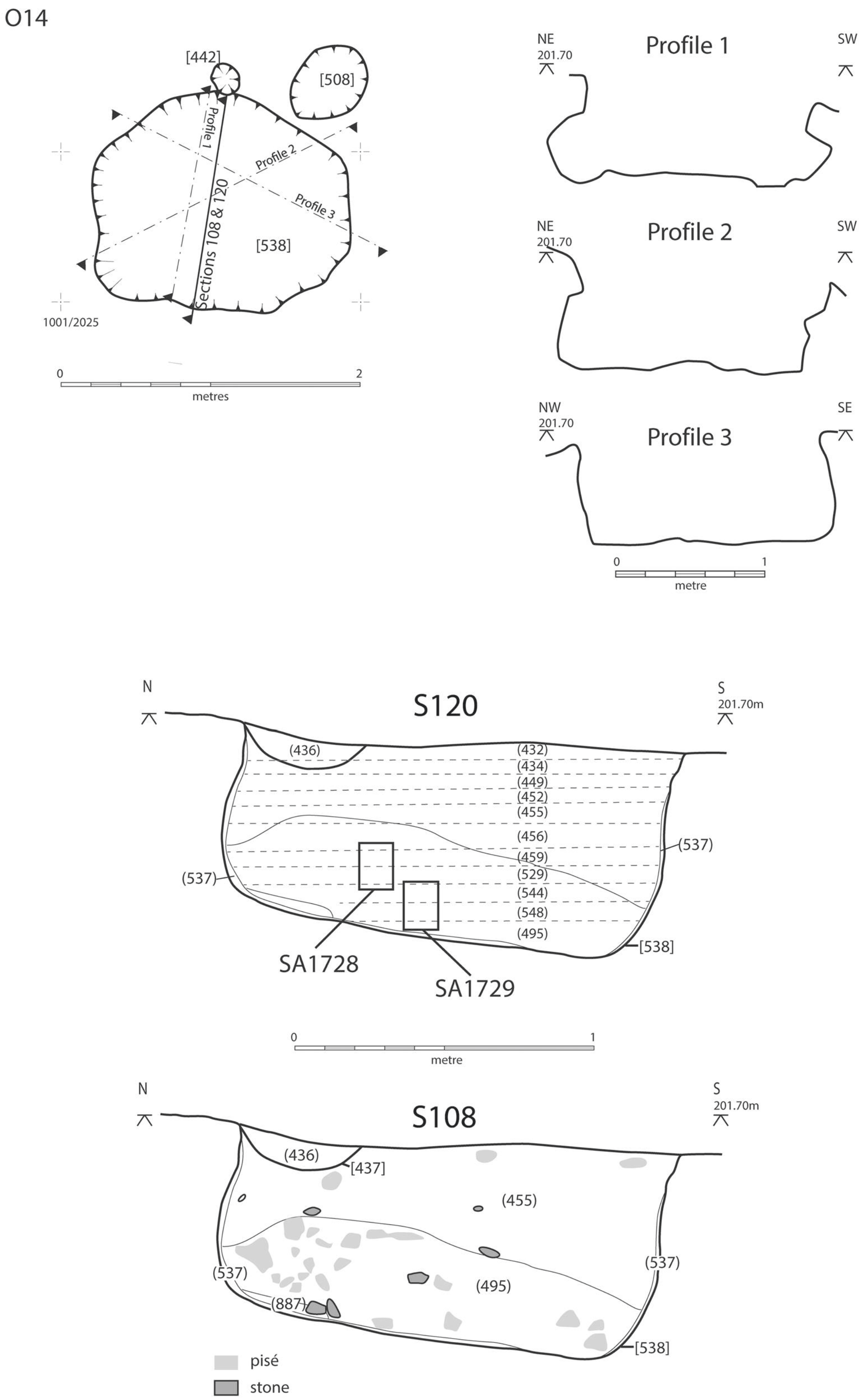


Figure 29.9 Post-excavation plan and profiles of Pit O14 and Sections S120 and S108 showing arbitrary spits and depositional units, respectively.

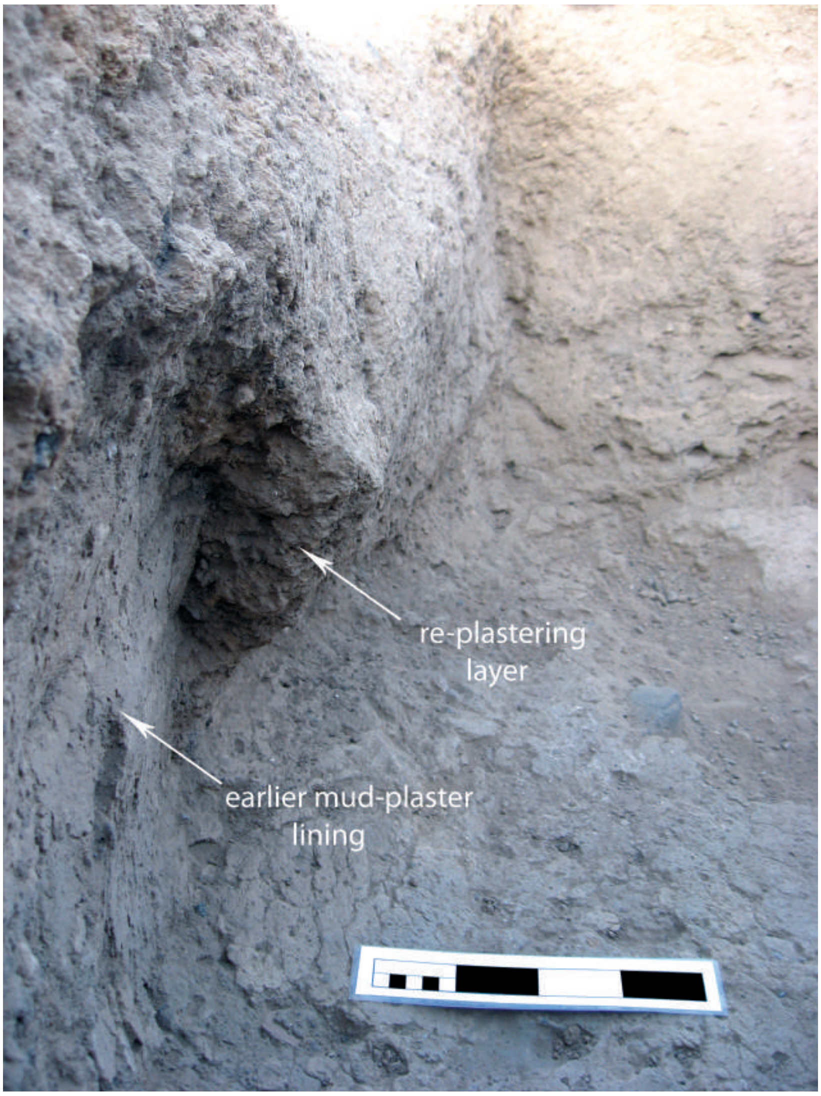


Figure 29.10 The interior of Pit O14 showing two layers of mud-plaster lining Scale 0.2 m.

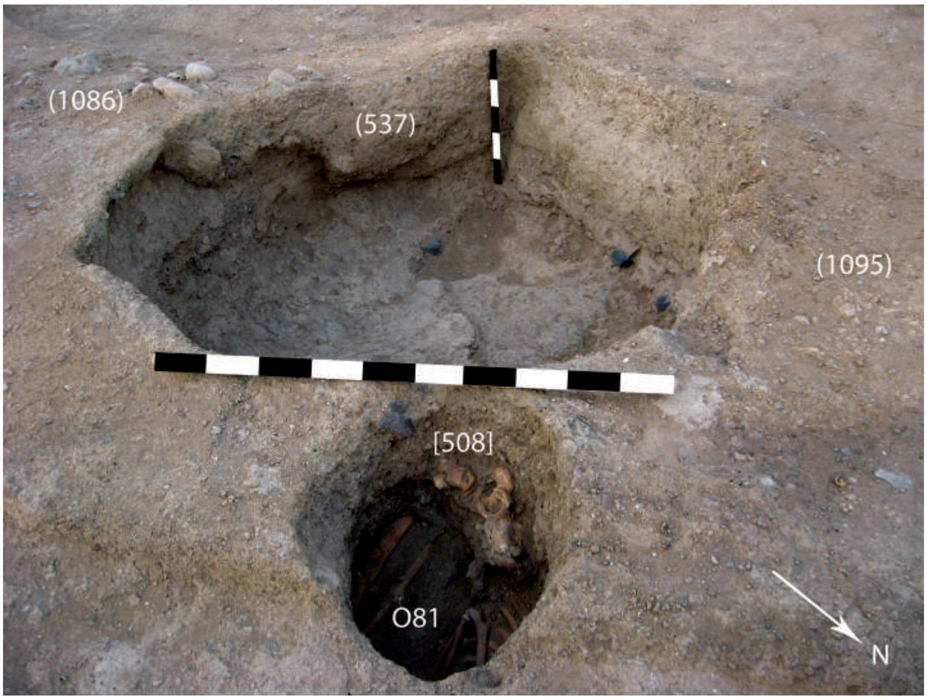


Figure 29.11 Pit O14 from the northeast showing the location of Burial O81 Scales 1.0 m and 0.5 m.

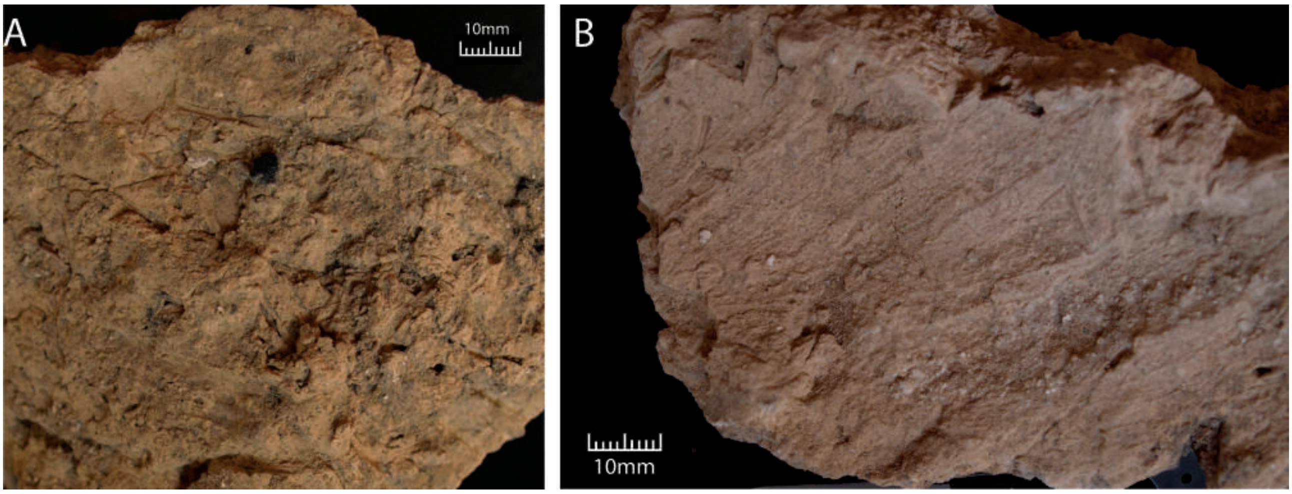


Figure 29.12 Pisé/mud-plaster samples BF4657 showing: A — plant impressions and charcoal in the make up of the pisé; B — surface reed impressions.

sediment samples were analysed from Pit O14, all from the plaster lining (537). The data, results and interpretation are provided in Chapter 41.6.

A block sample SA2770 was removed from the section created within O64 when sample SA2231, ochre-decorated floor, was removed (Figure 29.13). This block sampled three contexts observed in the field: (333, 331 and 335). Analysis indicated four units were present (Figure 29.13; Table 29.4): (333) being correlated with unit 1, (331) with unit 2 and (335) with units 3 and 4, indicating that there were two floors rather than one single floor within this context.

Mud-plaster units 1 (333), 3 (335) and 4 (335) are all relatively clean and devoid of anthropogenic remains in comparison to occupation unit 2 (331). The mud plasters vary in composition and represent slightly different manufacture techniques. Two of the mud plasters are relatively coarse, one with larger mud-plaster aggregates and the other with a high percentage of rock inclusions (units 1 and 3, plaster types 1 and 2); both have large voids between the mud-plaster particles. These coarse mud plasters are less compact, probably due to their larger particles. The fine mud-plaster unit (4) has some longitudinal voids running parallel to the boundary. This could be caused by compaction of the floor surface causing stress fractures. The occupation unit 2 (331) had charcoal, shell, burnt and unburnt bone, and an area that looks like fine mixed ashy material with charred flecks (Figure 29.14). The boundary between units 2 and 3 provides some evidence that mats may have been placed on the floor surface identified as unit 3 (335). This evidence comes from a fairly long undulating void (Figure 29.15) that could have previously contained organic matting that has long decayed.

Block sample SA1729 was taken from the section made through the lower part of the fill of Pit O14 (Figure 29.16). The fill (455, 495) had been excavated in a number

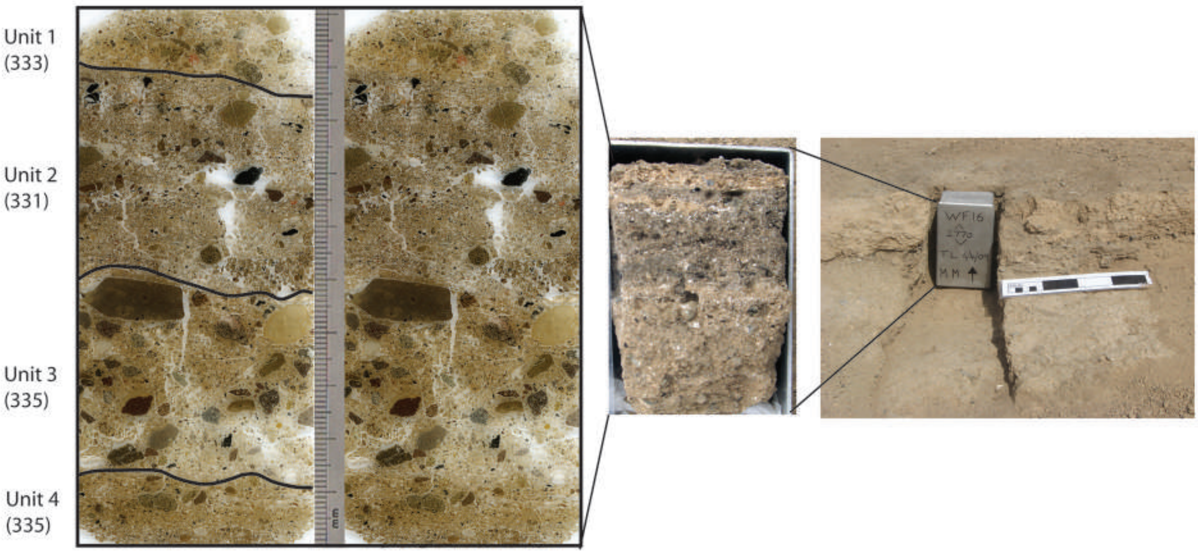


Figure 29.13 Extraction and extracted block sample SA2770 and the corresponding thin section with interpretation. Scale 0.2 m.

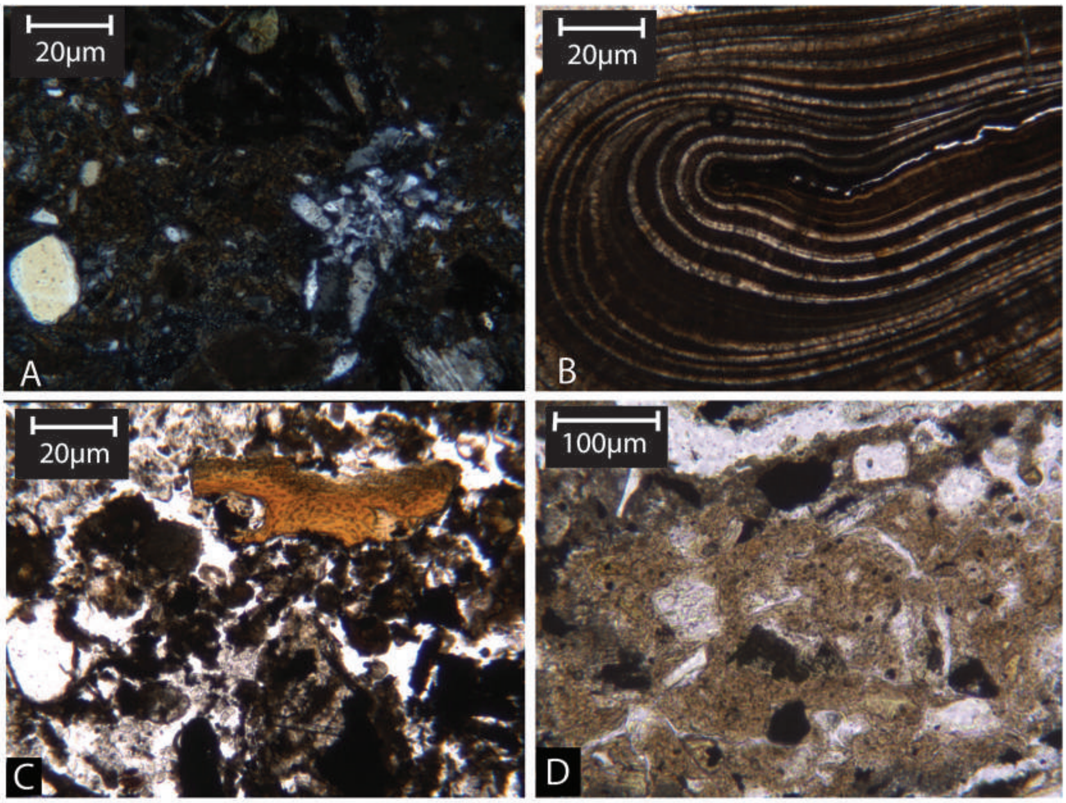


Figure 29.14 Images of different inclusions from a micromorphological thin section taken from sample SA2770: A — gypsum under polarised light; B — shell (Unit 2); C — bone (Unit 2); and D — ash with charred flecks (Unit 2).

of spits of similar composition (Figure 29.3). Analysis of the sample identified two units (Figure 29.16; Table 29.4), the lower one of which was identified with context (495), as excavated from Pit O14, and was immediately above the hard plaster lining of the pit (537).

Both units are interpreted as dumped deposits. They consist of a mixture of collapsed building material, anthropogenic aggregates and medium to large rock fragments. All types of anthropogenic remains are distributed throughout the two layers: shell, bone, flint and plaster aggregates (Figure 29.17). There are also numerous voids and gypsum present. The plaster aggregates in unit 1 are fairly large (1–3 cm diameter) and fall into the pisé/plaster category 4 with 10–15% pseudomorphic voids from plants added as a tempering agent. Many of these voids in the pisé aggregates are orientated the same way. The lower unit is bioturbated from burrowing or root action. This is probably due to the hard plaster lining immediately below this unit that formed the base of the lined pit. It is unlikely that a burrowing creature would have been able to penetrate the plaster lining, hence creating considerable disturbance at the base of the fill deposits.

29.4 Chipped stone

Structure O64

The sample (n=403 pieces) includes material from 14 out of the 16 contexts with chipped stone in Structure O64. By weight, the sample (1292 g) constitutes 84% of the chipped stone bulk finds from this this structure. The composition of the sampled assemblage is provided within Chapter 39.11.

Pit O14

The sample (n=906 pieces) includes material from nine out of the 12 contexts with chipped stone in Pit O14. By weight, the sample (3055 g) constitutes 88% of the chipped stone bulk finds from this structure. The composition of the sampled assemblage is provided in Chapter 39.11.

29.5 Interpretation

The interior space of Structure O64 measured 2.8 m from east–west and 3.4 m from north–south and was sub-circular in shape, the north and northwest sides being almost straight. The room contained 11 surfaces of varying quality of preservation, some only visible as small patches of degraded mud plaster, and some only visible in the section of the block sample (SA2231) and not revealed in plan. The lower two (333) and (335) were higher quality mud-plaster surfaces. The chipped stone assemblage indicates that all activity associated with Structure O64 is attributable to the PPNA.

The sequence of surfaces and occupation in Structure O64 is indicative of repeated use of this space. Four major phases of use can be drawn out from the excavated

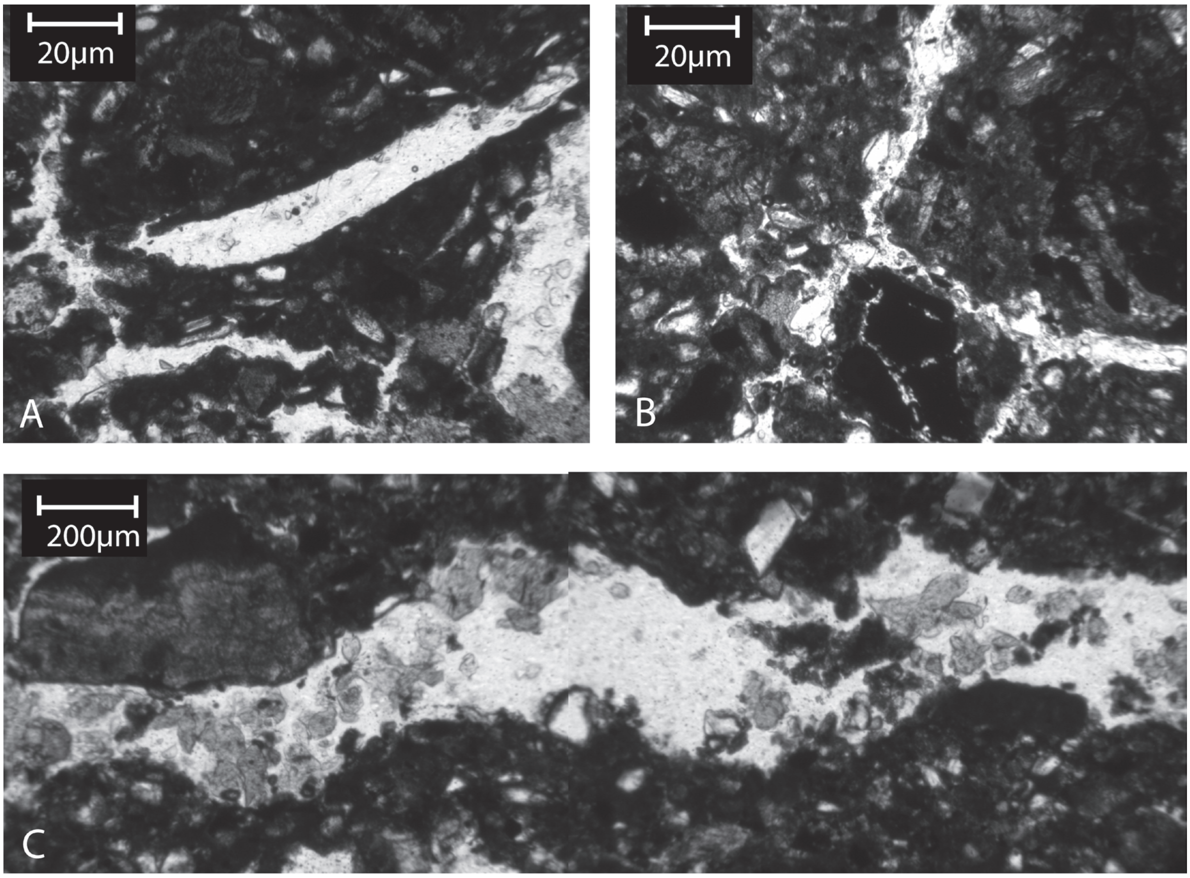


Figure 29.15 Elongated pseudomorphic voids formed by the decay of plant matter in: A — Unit 2; B — Unit 4; and C — a long undulating void within Unit 3 (335) of block sample SA2770 that might derive from the decay of organic matting.

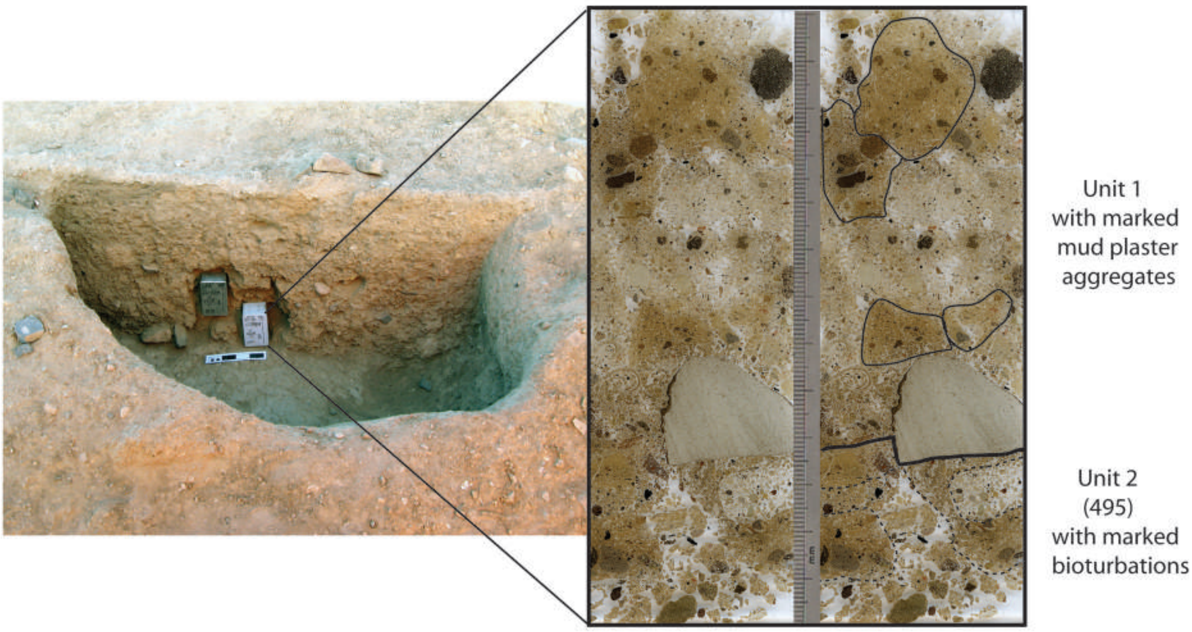


Figure 29.16 Extraction of block sample SA1729 and the corresponding thin section with interpretation. Scale 0.2 m.

Table 29.4 Unit descriptions for block sample SA1729.

Layer	Particle size/sorting	Anthropogenic remains	Other	Aggregates/Large inclusions/Voids	Plaster type if applicable	Clean/Dirty
1	Pisé/plaster lumps have a moderately sorted matrix whereas the main matrix itself incorporating the plaster/pisé aggregates is a poortly sorted sandy silt loam.	10–15% Charred material. Unburnt bone 2–5%.	Shell	Pseudomorphic voids in large pisé/plaster aggregates 10–15%, many orientated the same way	Aggregates only — Plaster 4	Dirty
2	Moderately sorted silty clay loam	10% charred material, burnt and unburnt bone 5%, angular flint	Shell. Very bioturbated towards the bottom-post depositional	Pisé/plaster aggregates, broken up into small to medium pieces. Pseudomorphic voids 8–10%	Aggregates only — Plaster 4	Dirty

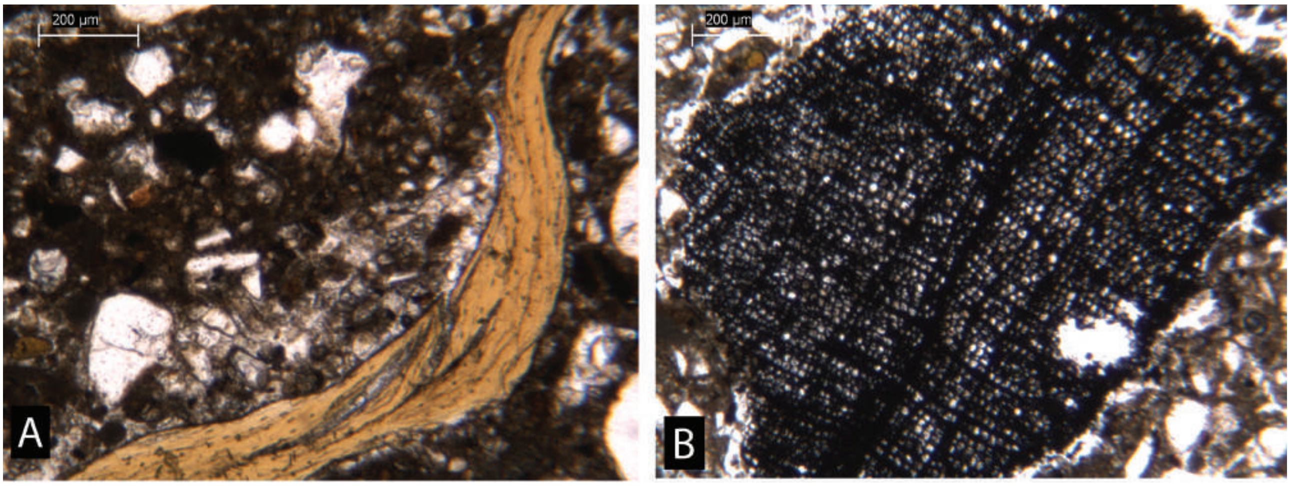


Figure 29.17 A — burnt bone within sample SA1729; B — Pinus fragment within sample SA1729 showing resin canal.

evidence, although the presence of Burial O81 indicates the complexity of the deposits below these floor surfaces. The earliest phase identified so far relates to the best quality mud-plaster floors (333) and (335) (Figure 29.18). The next phase is represented by a series of poorer quality surfaces made of compacted mud or crushed pisé. The third consists of some better quality mud-plaster-like flooring (326), some of which was decorated, and foundation layers (336), associated with possible hearth pits [876\869] and [867]. The fourth phase of activity consisted of a further four degraded mud-plaster surfaces. How much the variation in quality is the result of taphonomic processes is not entirely clear, but it is tempting to see a difference in function or longevity of occupation relating to the floor variations. As most of the silts between the floor layers are thin, it seems likely that there was only a short period between each resurfacing episode. The silts may represent the last uncleaned use of each floor.

Several of the surfaces appeared to slope towards the centre, or may have been more degraded there. This may be because a mortar or grinding stone had been located in the centre of the interior. A single cup-hole mortar (SF618) was found, located at the top of the sequence. It may have been the case that with each resurfacing activity the stone had been repositioned. Following this long sequence of floor deposits, a larger cut [508], for a pit, and a smaller cut [442], appearing to be a post-hole, were dug through wall (230) after Structure O64 went out of use and may have been in a state of collapse. There is no direct evidence for the stratigraphic relationship between Structures O64 and O75.

It is clear that there were several phases of activity in Pit O14; the only mud-plaster lined pit so far identified

Figure 29.18 Plans of the surviving extents of mud-plaster surfaces in Structure O64.

at WF16. Whether this was deliberately constructed in association with Structure O64 remains unclear. The chipped stone from Pit O14 indicates that all of its associated activity relates to the PPNA. The sides were irregular in all places and undercut to varying degrees, up to 0.18 m. The base also undulated with a distinct ridge running east–west in the centre. The lining covered all the sides and the base, although it had fallen away in patches in the southwest and northeast. This consisted of several different compositions of mud plaster ranging from light yellow-grey to mid-brown-grey in colour. In certain areas, for example the upper southern edge, one lining was clearly overlain by another lining; this was interpreted as a repair. The lining on the base to the west was clearly degraded and running below a thicker lining in the rest of the pit.

The lining and relining, as well as the irregular shape of the pit, suggest that the shape that survives is the result of several modifications of the original cut. Collapse of loose material from the sides may explain their uneven nature and the need for patching up and relining. A sub-square cut forming the southwest corner, associated with a degraded lining, may have been the remains of the original cut.

The association with Burial O81 is intriguing. The fact that Pit O14 was located just next to the foot of this skeleton, but did not damage it, may be indicative of the deliberate positioning of this feature. This might be supported by the presence of cut [508] that appears to have been dug specifically to access Burial O81, although the gap between the establishment of that burial early within the Structure O64 sequence and the excavation of this cut [508], after Structure O64 had gone out of use, would require some form of marker that is no longer visible. The apparent rapid accumulation of floors within Structure O64 may indicate that time depth would not necessarily have been a problem in this apparent continuity in burial rites.

30. Structures O31 and O33

30.1 Location and relationship with other structures

Structure O31 is the remains of a heavily eroded building in the northwestern part of the trench. It had been built over an in-filled earlier structure, Structure O33, with its surviving floor and internal deposits broadly confined to the area enclosed by the walls that demarcated Structure O33 (Figures 30.1 and 30.2). This suggests that the walls of Structure O33 had been reused to form the foundation of an enclosing wall for Structure O31. Nothing of this later wall has been identified, although this might reflect the difficulty in distinguishing between two successive phases of pisé

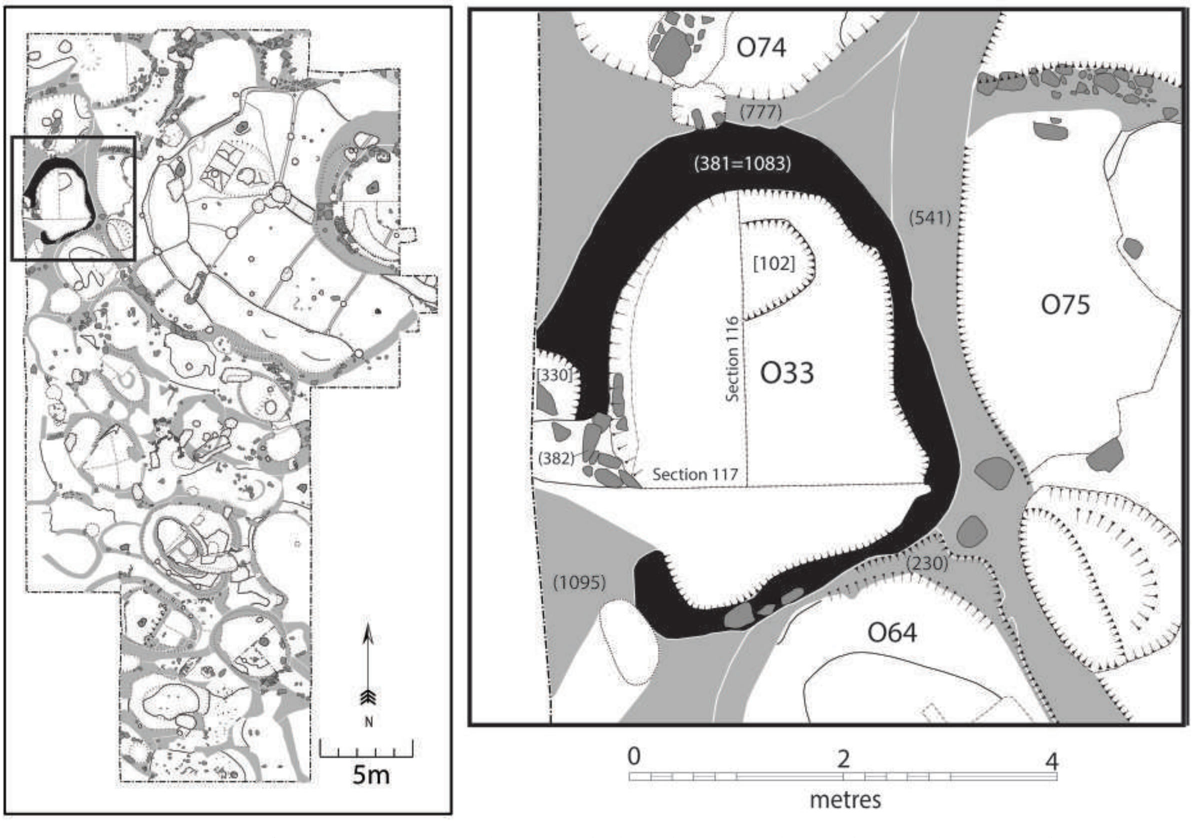


Figure 30.1 Location of Structures O31 and O33 and plan showing relationships with surrounding Objects.

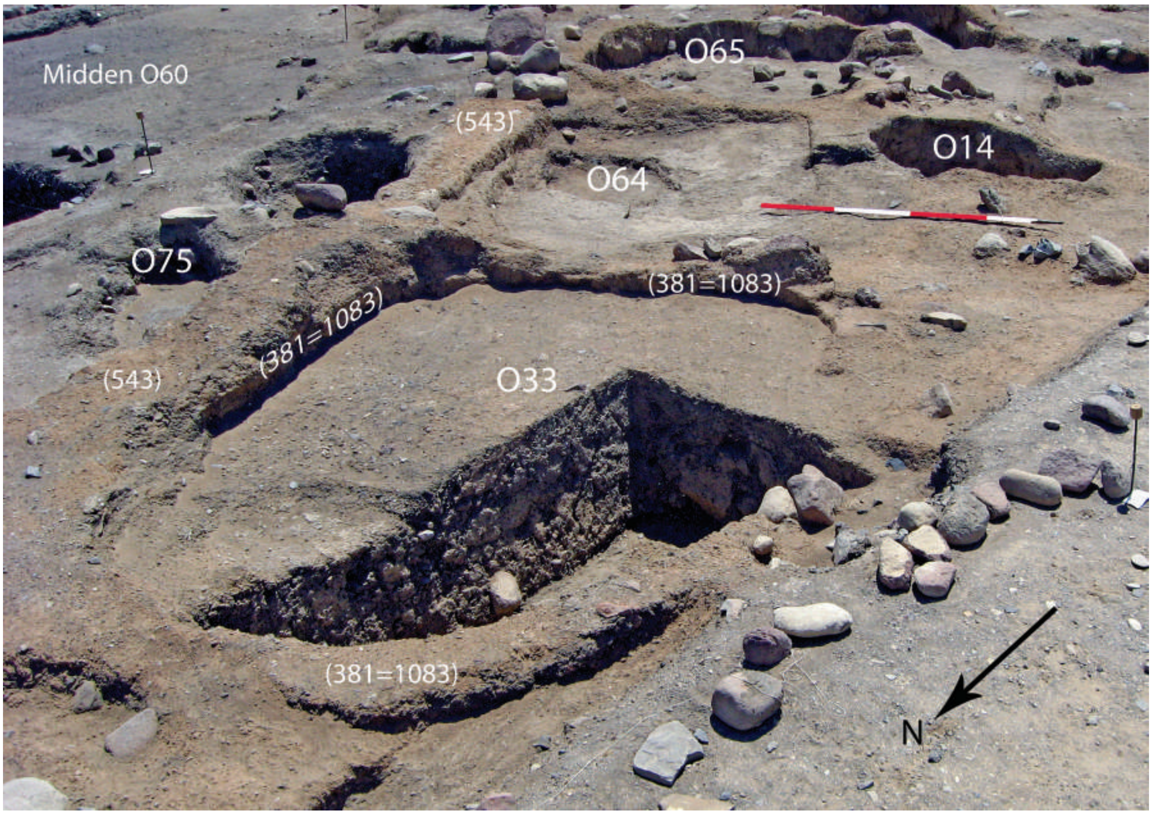


Figure 30.2 View of partly excavated Structure O33 from the northwest showing its position in relation to the wall (543) of Structure O75 and Structure O64 in the background. Scale 2.0 m.

wall, especially so close to the present ground level where preservation is poor. The relationship of Structure O31 to other structures in the northeastern corner of the trench remains uncertain.

Structure O33 (Figure 30.2) is a sub-circular pisé-walled structure, measuring approximately 4.0 m x 4.9 m, located towards the northern end of the trench, adjacent to its western edge (Figure 30.1). It is stratigraphically below the heavily eroded Structure O31, although part of Structure O33 lies immediately below the overburden (O111). To the north, the upper part of the wall of the structure is truncated by the construction cut for Structure O74. The relationships to Structure O64 to the south and Structure O75 to the east remain unclear. Figure 30.3 provides the stratigraphic matrix, with the contexts described in Table 30.1. Bulk and small finds are listed in Tables 30.2 and 30.3, respectively.

30.2 Description of the excavated deposits of Structure O31

Directly under the overburden (62), very close to the surface, were the remains of a burial, designated as Burial O3, filled by a loose sandy silt (77) in a sub-circular cut [78] measuring 0.62 m x 0.50 m x 0.09 m deep. The only skeletal remains (73) present were a few fragmentary and fragile elements including phalanges, ribs and one long bone. This burial was cut [78] into a fill deposit (67) confined by a pisé wall (381=1083) that demarcated Structure O33. Wall (381=1083), constructed from compact orange pisé, formed an oval circuit that was broken to the southeast. It contained rounded stones that could be seen in a number of locations where the pisé had been lost. At the present degree of excavation it is unclear whether the break in the wall circuit represents a deliberate opening, or simply an area where the wall fabric has become degraded. Fill (67) was *c.* 0.20–0.25 m thick and is interpreted either as an accumulation of material between occupations of the structure, or as a deliberate makeup deposit for a later eroded floor. The western part of deposit (67) was cut by small pit [114] (1.34 m x 0.50 m x 0.34 m deep) filled with a number of large unworked stones in an ashy silt (112). Part of this pit was excavated to the south as [330] filled with (329). Below cut [330] there was a sequence of mixed silty deposits, (499), (503) and (514), which appear to represent the gradual filling of Structures O31 and O33.

Below deposit (67) a small area of a mud-plastered floor (94) survived, 0.15 m x 0.23 m, which in section comprised a series of thin laminations. Clearly sealed by the floor surface (94) was another burial, designated as Burial O7. This contained a skeleton (82) of an adult in a crouched position, lying on its left side with the head to the north (Figures 30.4 and 30.5). Although fairly complete,

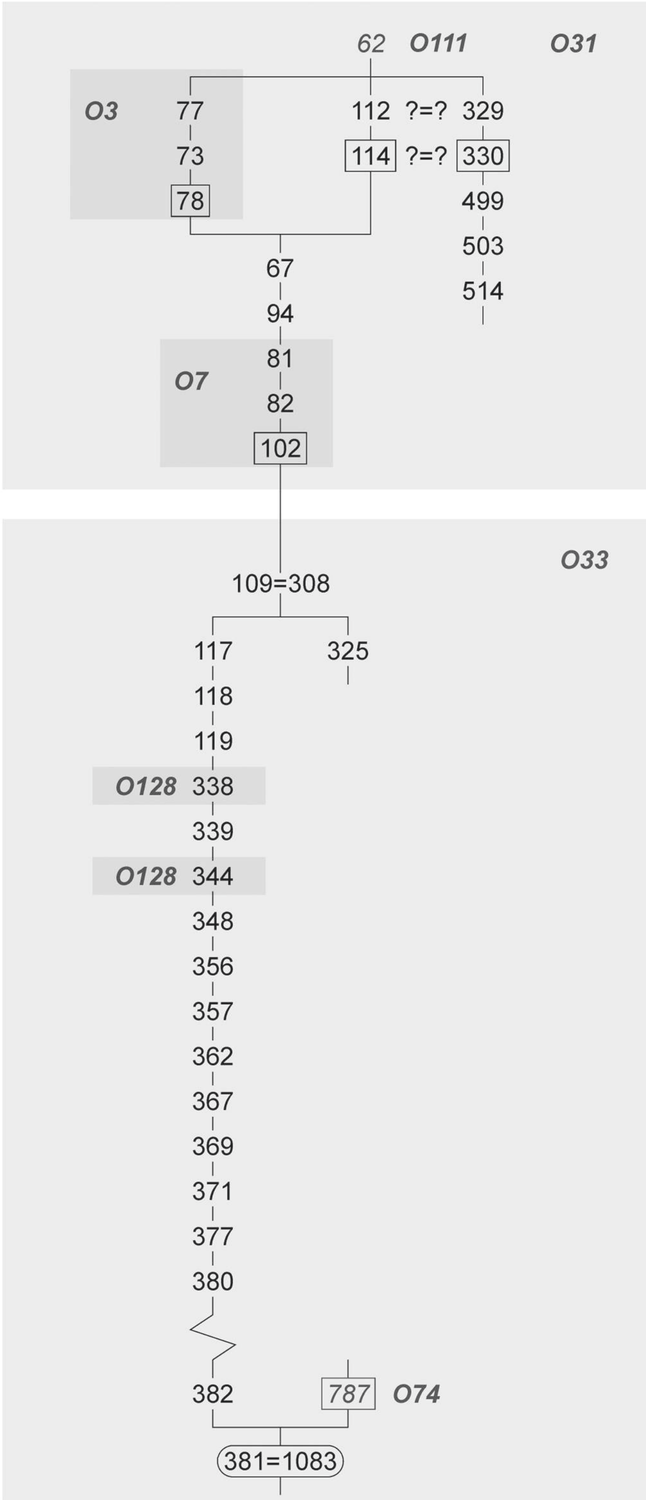


Figure 30.3 Stratigraphic matrix for Structures O31 and O33.

Table 30.1 Contexts forming and filling Structures O31 and O33 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
67	loose brownish-grey silty sand with occasional stones	silt accumulation inside structure
73	fragmentary skeletal remains	heavily truncated burial
77	loose mid-brownish-grey sandy silt with frequent gravel inclusions	burial fill
78	sub-circular cut with moderately sloping sides and a flat base	burial cut
81	loose greyish-brown sandy silt with some charcoal	burial fill
82	articulated human skeleton	primary crouched inhumation burial
94	compact light yellowish-brown clayey-silt	mud-plastered floor
102	sub-circular cut with verticle sides and an uneven base	burial cut
109	dark brown friable silt with pisé lumps	rubble backfill inside structure
112	loose greyish-brown ashy silt with charcoal, snail shells and small stones	fill of pit
114	elongated oval cut with vertical sides and an uneven base	cut of pit
117	dark brown friable silt with pisé lumps and ash	rubble backfill inside structure
118	dark brown and mid-yellowish-orange ashy silt and sandy silt with pisé lumps	rubble backfill inside structure
119	mid-brown and orangish-yellow ashy silt and sandy silt with pisé lumps	rubble backfill inside structure
308	dark brown friable silt with pisé lumps	rubble backfill inside structure
325	mid-greyish-brown sandy silt with a high percentage of pisé lumps	rubble backfill inside structure
329	loose mid-greyish-brown sandy silt	fill of pit
330	partially exposed irregular cut with moderate sides and a flatish base	cut of pit
338	disarticulated human maxilla fragment	re-deposited human remains
339	dark brown and orangish-yellow ashy silt and pisé lumps	rubble backfill inside structure
344	human cranium fragments	re-deposited human remains
348	greyish-yellow and brown pisé and ashy silt	rubble backfill inside structure
356	yellow, grey and orange pisé and ashy silt	rubble backfill inside structure
357	yellow, orange and brown pisé and ashy silt	rubble backfill inside structure
362	yellow and brown pisé and ashy silt	rubble backfill inside structure
367	yellow and dark brown pisé and ashy silt	rubble backfill inside structure
369	dark yellowish-brown silt and pisé	rubble backfill inside structure
371	greyish-brown and reddish-yellow silt and pisé	rubble mixed in with silty occupation
377	dark blackish-brown and light bluish-grey silt and ashy silt with occasional charcoal	occupation deposit
380	light grey compact clayey-silt	mud-plaster floor
381	compact mid-orangish-yellow pisé	pisé wall of structure
382	mid-brown sandy silt with large sub-rounded stones	possible blocking in pisé wall
499	loose mid-greyish-brown silt with shell, and stone inclusions	silt accumulation inside structure
503	mottled medium greyish-brown silt with occasional pisé lumps	silt accumulation inside structure
514	friable dark greyish-brown silt	silt accumulation inside structure
1083	mid-orangish-brown pisé with wadi stones	wall between two structures

the bones of the skeleton were in poor condition due to their proximity to the present ground surface. The burial had been placed in a sub-circular cut [102], cutting the fill sequence of Structure O33 below. The cut [102] was relatively large, 1.00 m x 0.94 m in area and 0.23 m deep, and was filled with a loose sandy silt (81). Deposits below the burial were designated as belonging to Structure O33.

30.3 Description of the excavated deposits of Structure O33

Only the northwest quadrant of the interior deposits of Structure O33 was excavated, being those deposits below floor (94) and cut [102] of Structure O31 (Figure 30.6). The deposits were excavated as a series of spits of orange pisé

Table 30.2 Quantities of bulk finds from Structures O31 and O33 by material and context number.

Object 33	Volume of sediment (l)				Weight of bulk finds per material (g)								
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Unworked stone	Animal bone	Marine shell	Other shell	Charcoal	Misc.
67	421.0	30.0	390.0	1.0	4088.6	1810.0	11.5	0.0	364.1	0.0	64.1	0.0	0.0
77	8.0	8.0	0.0	0.0	38.5	3.9	0.0	0.0	24.5	0.0	16.7	0.0	0.0
81	110.0	110.0	0.0	0.0	817.6	0.0	1.6	0.0	117.1	0.0	232.1	10.0	0.0
94	8.0	8.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0
109	221.0	10.0	210.0	1.0	718.2	30.0	20.0	0.0	54.7	0.0	26.4	0.0	0.0
112	96.0	30.0	65.0	1.0	242.2	0.0	0.0	0.0	15.5	0.0	73.0	0.0	0.0
117	131.0	10.0	120.0	1.0	465.4	0.0	0.0	0.0	63.4	0.0	10.7	0.0	10.0
118	131.0	10.0	120.0	1.0	348.5	0.0	0.0	10.0	45.8	0.3	12.4	10.2	0.0
119	263.0	30.0	232.0	1.0	685.4	0.0	0.0	0.0	165.5	0.0	17.2	20.0	40.0
308	181.0	30.0	150.0	1.0	1698.4	0.0	0.0	0.0	245.0	0.0	36.2	0.0	0.0
325	211.0	30.0	180.0	1.0	845.2	0.0	1.0	0.0	18.7	0.0	13.8	0.0	0.0
329	9.0	8.0	0.0	1.0	29.8	0.0	0.0	0.0	0.4	0.0	2.0	0.0	0.0
339	291.0	10.0	280.0	1.0	777.4	0.0	0.0	0.0	60.7	0.0	13.2	20.0	40.0
348	11.0	10.0	0.0	1.0	368.9	0.0	0.0	0.0	51.4	0.0	9.4	20.0	0.0
356	11.0	10.0	0.0	1.0	636.0	10.0	0.0	0.0	27.1	0.0	17.4	10.1	0.0
357	226.0	10.0	215.0	1.0	426.8	10.0	0.0	0.0	23.2	0.0	9.9	30.0	0.0
362	121.0	10.0	110.0	1.0	240.2	0.0	0.0	0.0	45.1	0.0	17.5	0.2	0.0
367	151.0	10.0	140.0	1.0	884.9	0.0	0.0	0.0	33.6	0.0	12.5	10.0	10.0
369	105.0	10.0	94.0	1.0	324.5	0.0	0.0	0.0	23.4	0.0	11.1	0.0	10.0
371	104.0	30.0	73.0	1.0	230.9	125.0	0.2	0.0	31.8	0.0	50.5	10.0	0.0
377	128.0	10.0	118.0	0.0	1716.8	30.0	0.4	350.0	67.5	0.0	25.5	80.0	0.0
499	111.0	30.0	80.0	1.0	1768.6	0.0	0.0	0.0	27.9	0.0	72.4	0.0	0.0
503	31.0	30.0	0.0	1.0	1270.0	250.0	10.0	0.0	16.0	0.0	0.0	0.0	0.0
514	261.0	10.0	250.0	1.0	2229.0	0.0	10.0	0.0	53.0	0.0	0.0	0.0	0.0
Total	3341.0	494.0	2827.0	20.0	20851.9	2268.9	54.7	360.0	1575.4	0.3	744.4	220.5	110.0

Table 30.3 Quantities of small finds from Structures O31 and O33 by material and context number.

Object 33	Quantities of small finds per material (nos)								
Context	Chipped stone	Ground stone	Other stone	Worked bone	Unworked animal bone	Stone beads	Marine shell beads	Plaster/Pisé	Total small finds
67	0	1	1	0	0	0	1	0	3
81	0	1	0	0	0	0	0	0	1
117	0	0	1	0	0	0	0	0	1
308	0	2	0	0	0	1	0	0	3
325	0	0	1	0	0	1	1	0	3
348	0	0	0	0	0	0	1	2	3
357	0	0	0	1	0	0	0	0	1
369	0	1	0	0	0	0	2	0	3
371	0	2	0	1	0	0	0	0	3
377	0	7	0	1	1	0	0	0	9

Table 30.3 Quantities of small finds from Structures O31 and O33 by material and context number continued...

Object 33	Quantities of Small Finds per material (nos)								
Context	**Chipped stone**	**Ground stone**	**Other stone**	**Worked bone**	**Unworked animal bone**	**Stone beads**	**Marine shell beads**	**Plaster/Pisé**	**Total small finds**
382	1	0	0	0	0	0	0	0	1
499	0	2	0	0	0	0	0	0	2
514	0	1	2	0	0	1	0	0	4
Total	1	17	5	3	1	3	5	2	37

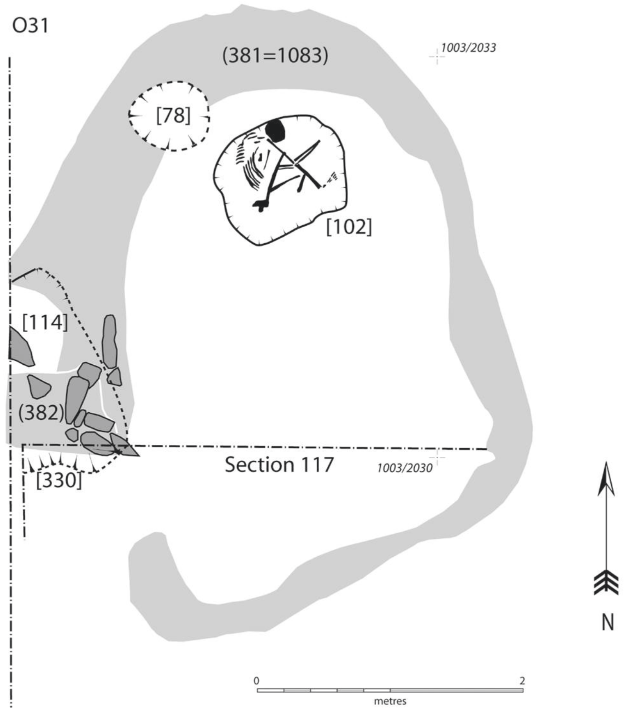


Figure 30.4 Plan of deposits and features assigned to Structure O31.

blocks and ashy silt (109=308, 117, 118, 119, 339, 348, 356, 357, 362, 367 and 369) which together amount to a depth of *c.* 1.0 m, down to an occupation deposit (371). Deposit (371) also contained some pisé material and was above a thin occupation deposit (377) on a mud-plaster floor surface (380) (Figure 30.7). An additional context number (325) was assigned to sediment arising from cleaning wall (381=1083) to better define its edge. No remains of any floor layers were noted within the sequence above (380), and subsequent examination of the north and west-facing sections confirmed that no partial eroded floor surfaces had been present (Figures 30.8, 30.9). The infilling deposits consisted of pisé rubble, some of which had sufficient regularity to suggest mudbrick, with silt filling the spaces between the blocks. Relatively few finds were recovered from the fill, although there were some human bone fragments including an isolated maxilla fragment (338) and skull fragments (344), combined as Human Remains O128. The number of small finds increased in occupation deposit (377), although occasional small finds were present throughout the rubble infill of the structure (Table 30.3, Figure 30.10).

The mud-plaster floor (380) was constructed from light grey silty clay. A number of finds were found within the thin occupation deposit (377) that lay directly on the floor. These included a long polished stone batôn (SF351), two hammerstones and a bone point (Figure 30.11). The floor surface lapped up over the edges of the pisé wall to the north, where it had been cut by animal burrows on its western side. The floor also extended over the edge of a cluster of large stones (382) in the southwestern corner of the excavated quadrant. These stones include one large stone maul/pestle rough out (SF1828), which may have been used for the construction process (Figure 30.12). It is unclear whether these stones are part of the original construction of wall (381=1083),

Figure 30.5 Skeleton (82) buried under the remains of a floor in Structure O31. Scale 0.5 m.

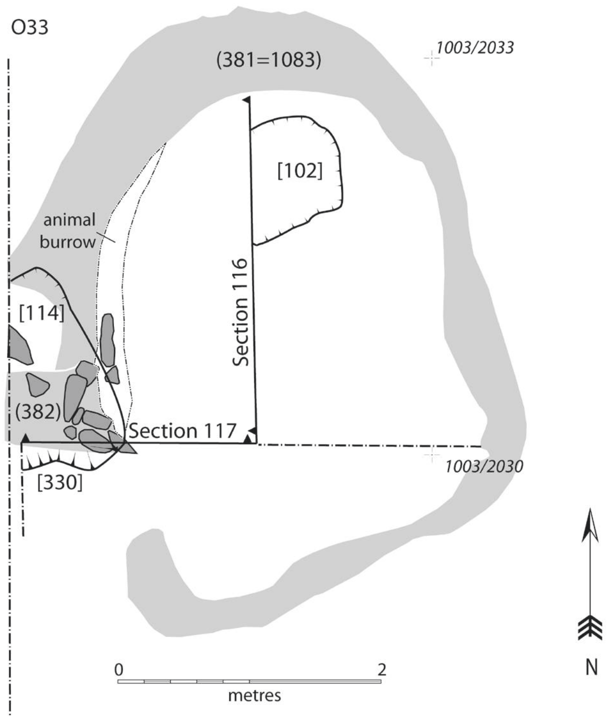


Figure 30.6 Plan of Structure O33.

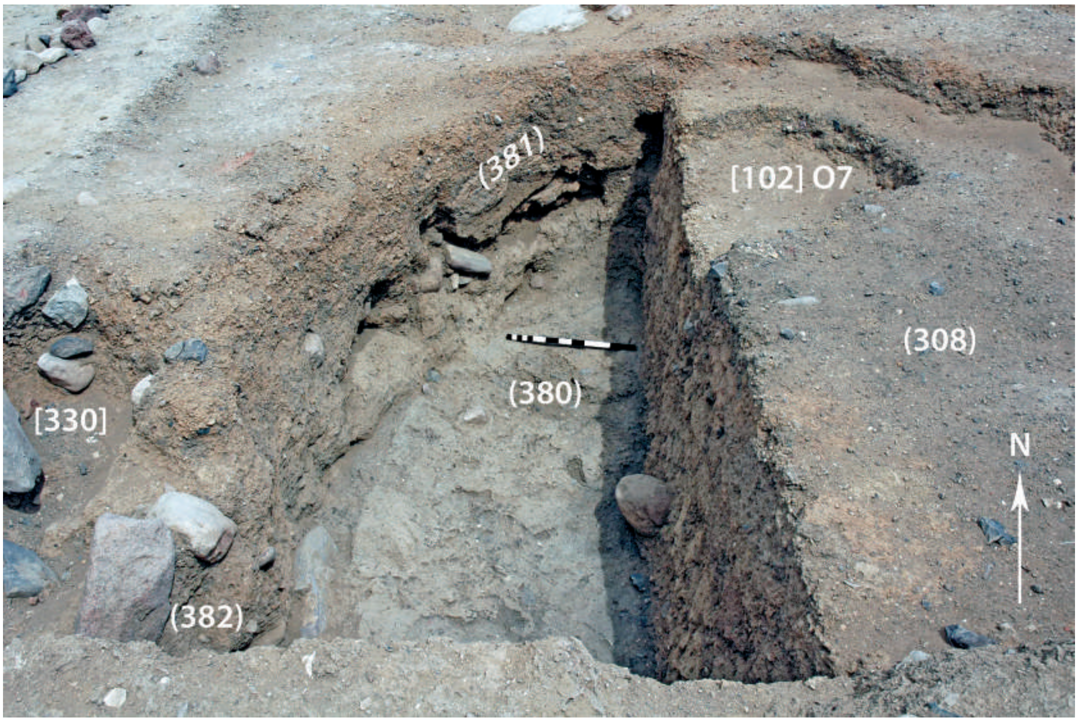


Figure 30.7 Structure O33 after excavation showing floor surface (380) and wall (381). Scale 0.5 m.

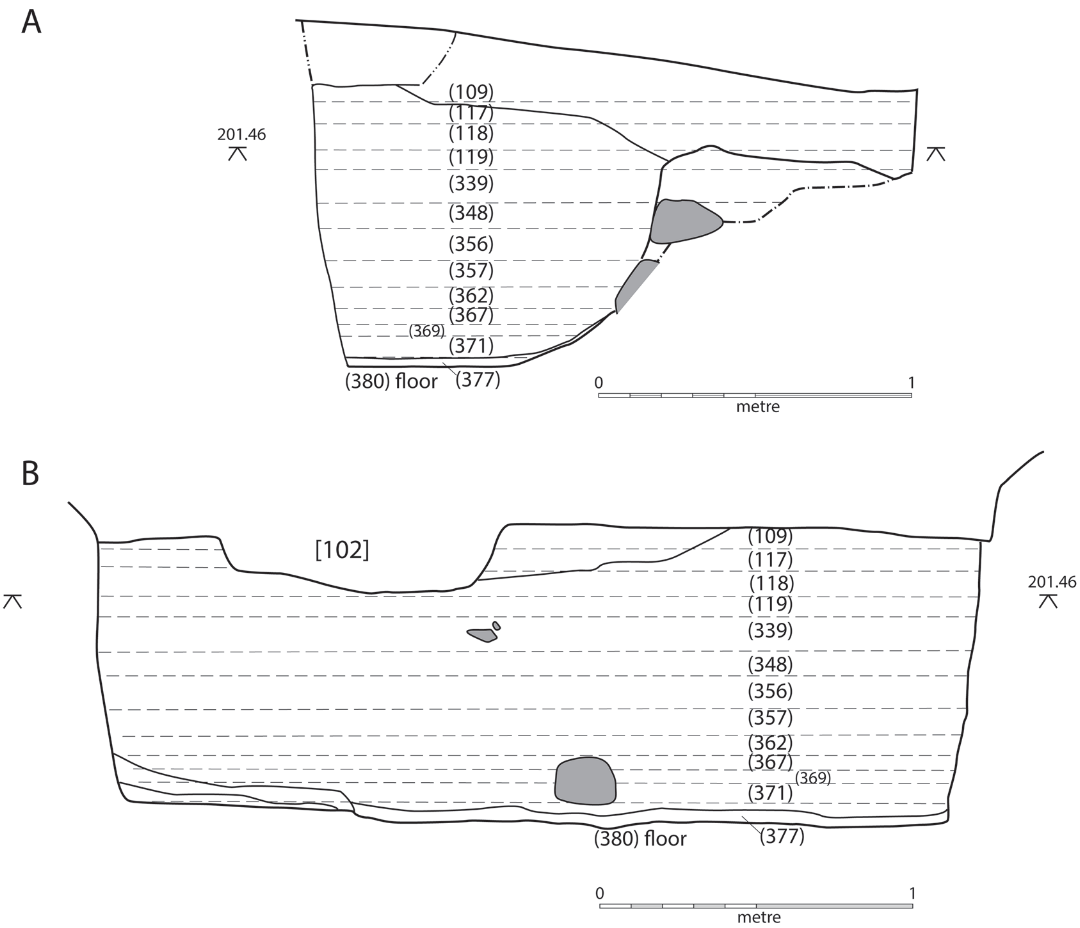


Figure 30.8 A — North-facing Section S117; and B — West-facing Section S116.

stones also being visible elsewhere in the wall when exposed by animal burrowing (Figure 30.7). Alternatively, they may have been used to block a previous gap in the pisé wall circuit.

30.4 Sedimentary analysis

Three sediment samples were analysed from Structure O33: one from a pisé block coming from the infill of (117), and two from wall (381=1083). The data, results and interpretation are provided in Chapter 41.6.

30.5 Chipped stone

No chipped stone was examined from Structure O31. The sample of chipped stone examined from Structure O33 (n=1452 pieces) came from material from 13 out of the 15 contexts that contained chipped stone. By weight, the sample (6950 g) constitutes 77% of the bulk chipped stone from this structure. The composition of the sampled assemblage is provided in Chapter 39.11, while a sample of artefacts is illustrated in Figures 30.13 and 30.14.

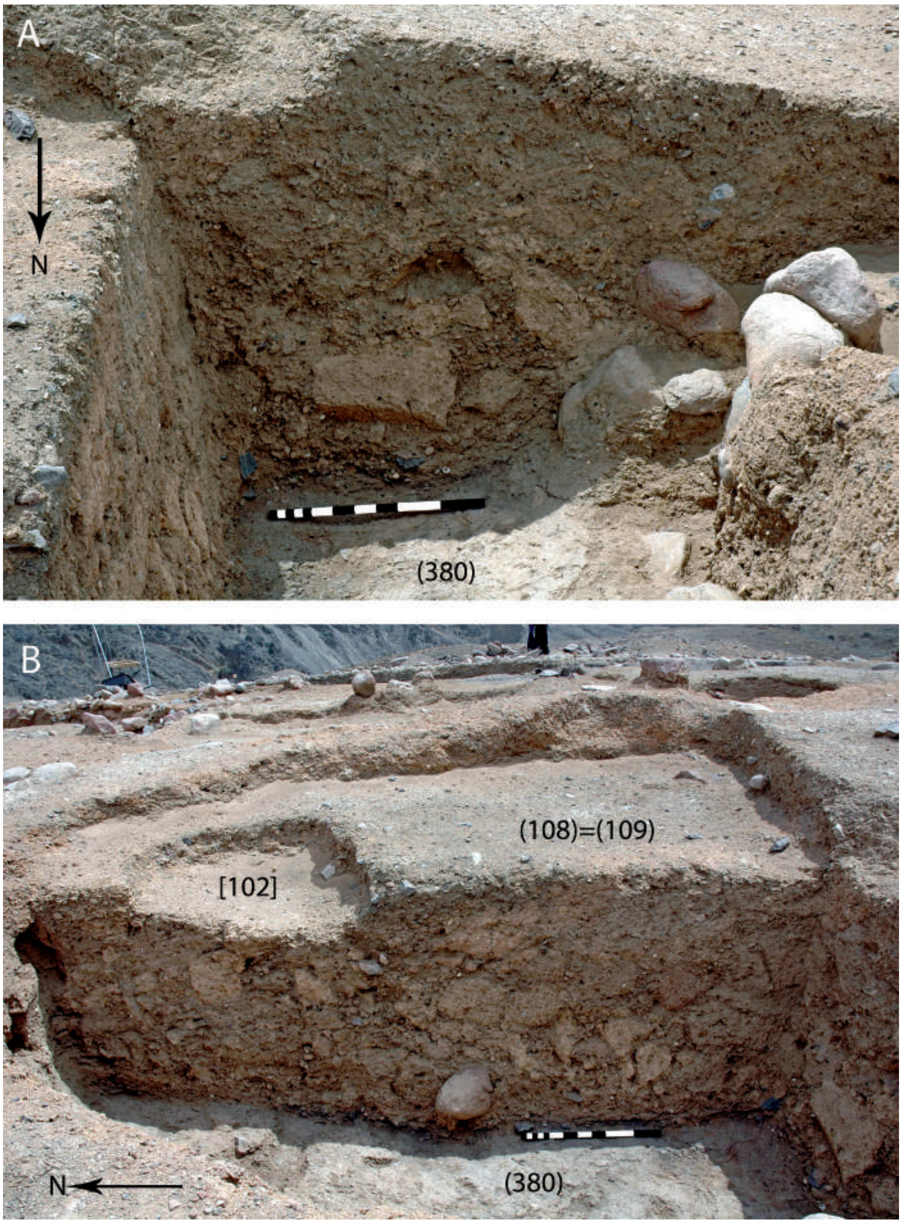


Figure 30.9 A — North-facing Section S117; and B — West-facing Section S116 through Structure O33 showing pisé collapse in the fill sequence. Scale 0.5 m.

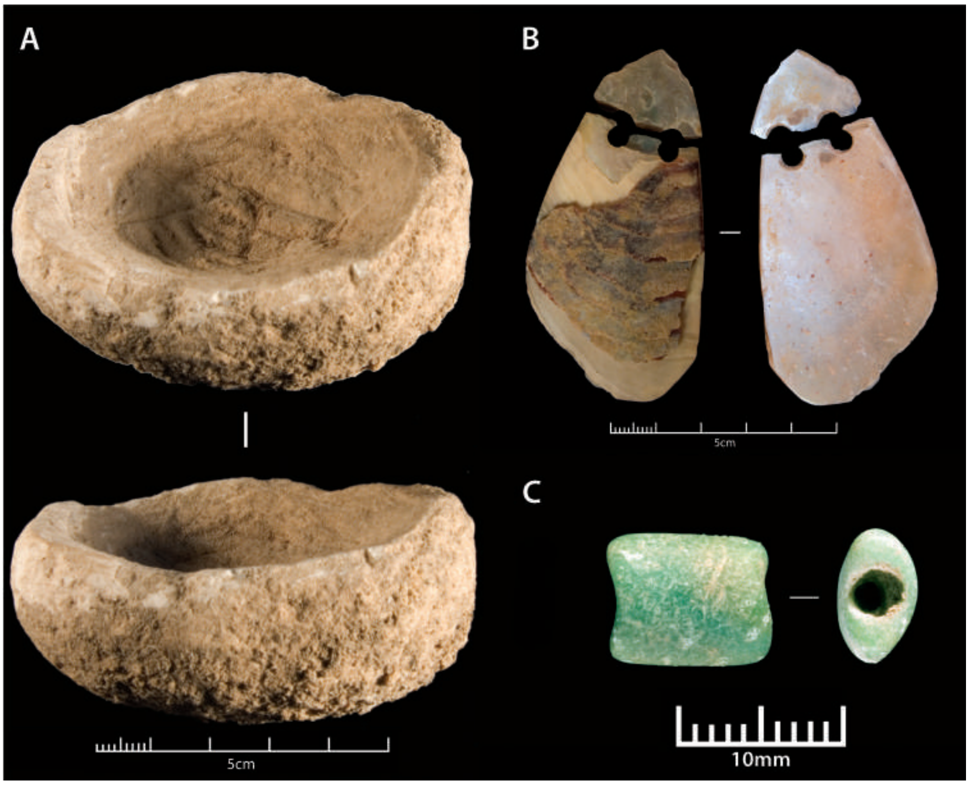


Figure 30.10 A — Stone bowl SF245 from context (117); B — marine shell pendant SF397 from context (348); C — green stone bead SF496 from context (369).

30.6 Radiocarbon dates

Three AMS radiocarbon dates were acquired from samples taken from within the thin occupation deposit (377) that rested directly on a mud-plaster floor (380), (Table 30.4). The analysis of these dates, with calibrated values, Bayesian model and chronological interpretation is provided in Chapter 40.5 (Tables 40.1, 40.2, 40.3; Figure 40.14).

In summary, the sum (SCPD) of the chronological model suggests a series of pulses of activity contributing to the accumulation of deposits (377) on the floor of Structure O33 (Figure 40.14). Although coming from a well defined, relatively thin and deeply stratified context, the three samples provided inconsistent values, separated by periods of up to *c.* 450 years between each radiocarbon-dated event. Three explanations, and combinations of these explanations, are possible. First, it may be the case that the thin occupation debris (377) accumulated across a period of more than 1100 years. Second, it might be the case that the material used to construct the underlying floor and/or the thick layer of fill immediately above occupation deposit (377) on the floor, involved recycled pisé deposits of varying age from elsewhere within the site and from which charcoal of quite different ages had eroded into the occupation deposit. This may have arisen by rodent activity, evident from burrows within sediments. A third possibility is one of old wood; the three samples come from quite different types of wood: the oldest date (Beta-253735) being on Cupressaceae, the second oldest (Beta-253734) on *Tamarix* and the youngest (Beta-253733) on a member of the Chenopodiaceae family. Of these the chenopod is the least likely to involve an old wood effect and the Cupressaceae the type most susceptible. If this is the case, the most likely date for the horizon comes from Beta-253733, centred on 11.13 ka cal BP.

30.7 Interpretation

Structure O33 appears to have been a small sub-circular structure (Figure 30.2). It is possible that before floor (380) was laid, there had been some modifications to the structure. The large stones of context (382) may represent the blocking of an opening in the side of Structure O33, suggesting that the layout was altered during the period of its use. The high density of finds on floor (380) and associated occupation deposit (377) suggests that the floor was not cleaned before the process of filling the structure commenced, for which the best chronological estimate is 11200–10870 cal BP (1σ).

The fill is composed of remarkably clean pisé blocks, suggesting deliberate and rapid filling and levelling of the structure. Some of the blocks have a very angular form, indicating that they may derive from shaped mudbricks,

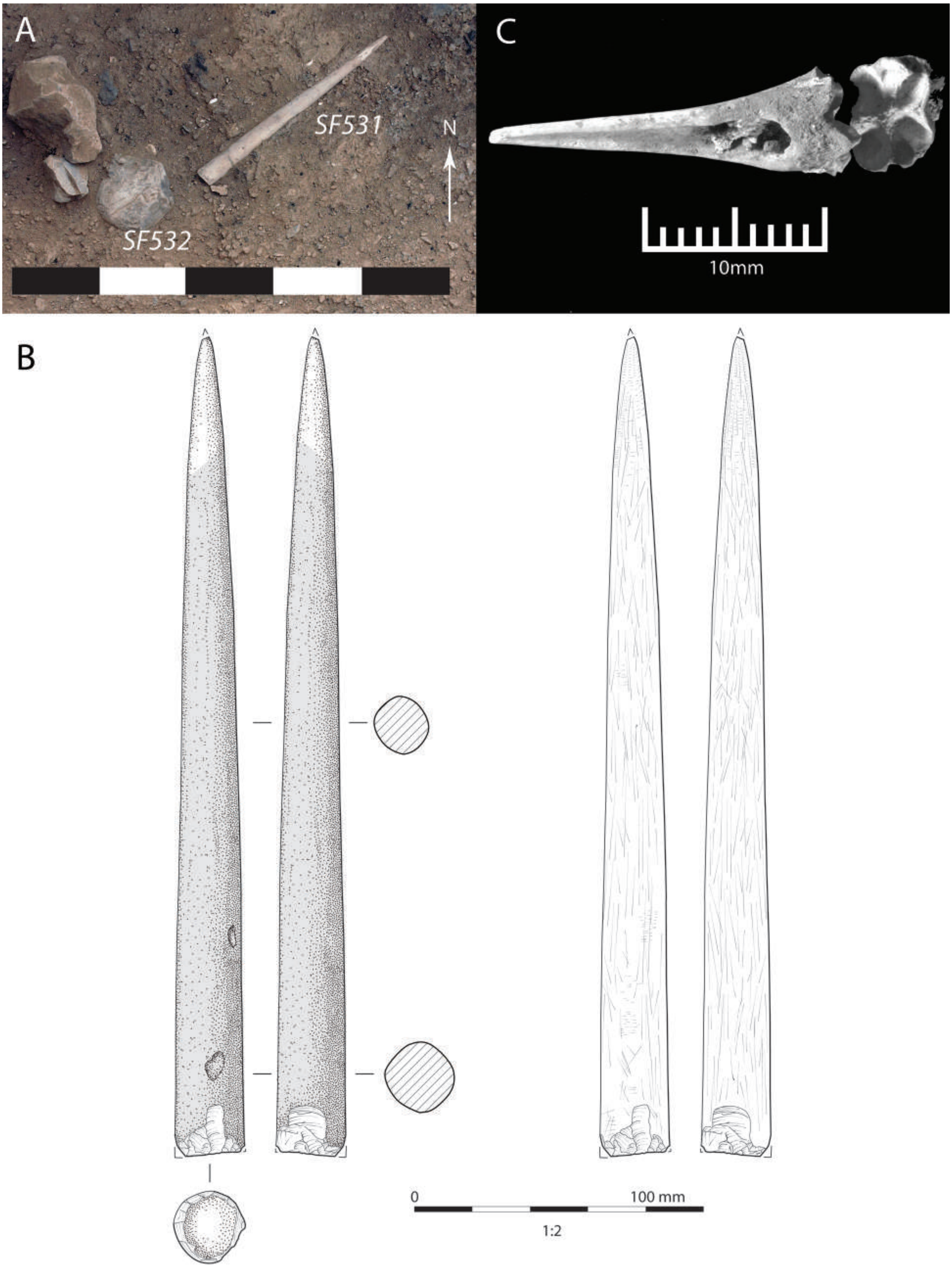


Figure 30.11 A — Polished stone implement SF531 and hammerstone SF532 in lowest room fill deposit (377) in Structure O33, scale 0.5 m; B — polished stone implement SF531; C — bone point SF559.

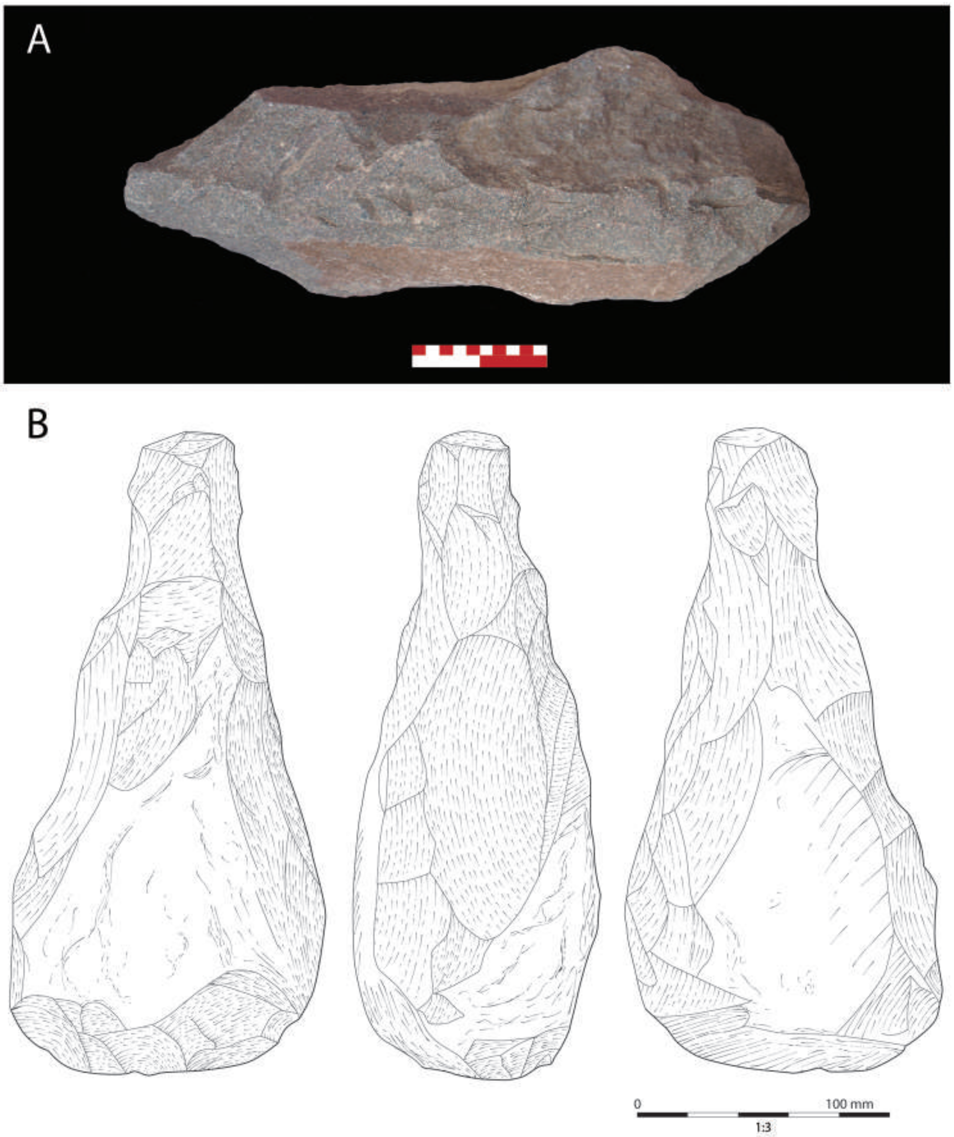


Figure 30.12 A — A stone maul or a pestle rough out SF1828 from deposit (382); B — similar or possibly more progressed chipped-stone object SF1675 found unstratified on the surface of the site.

Table 30.4 Radiocarbon dates from Structure O33.

						Chronological model Posterior density estimates cal BP	
Object and Laboratory Code	**Context**	**^{14}C yrs BP**	**Δ^{13}C ‰**	**Taxa**	**Form**	**68%**	**95%**
O33							
Beta-253733	377	9670±50	-10.5	Chenopodiaceae	Indeterminate	*11,220–11,070*	*11,240–10,790*
Beta-253734	377	9850±50	-25.6	*Tamarix*	Indeterminate	*11,270–11,200*	*11,340–11,170*
Beta-253735	377	10,130±60	-21.7	Cupressaceae	Indeterminate	*11,280–10,820*	*11,370–10,400*

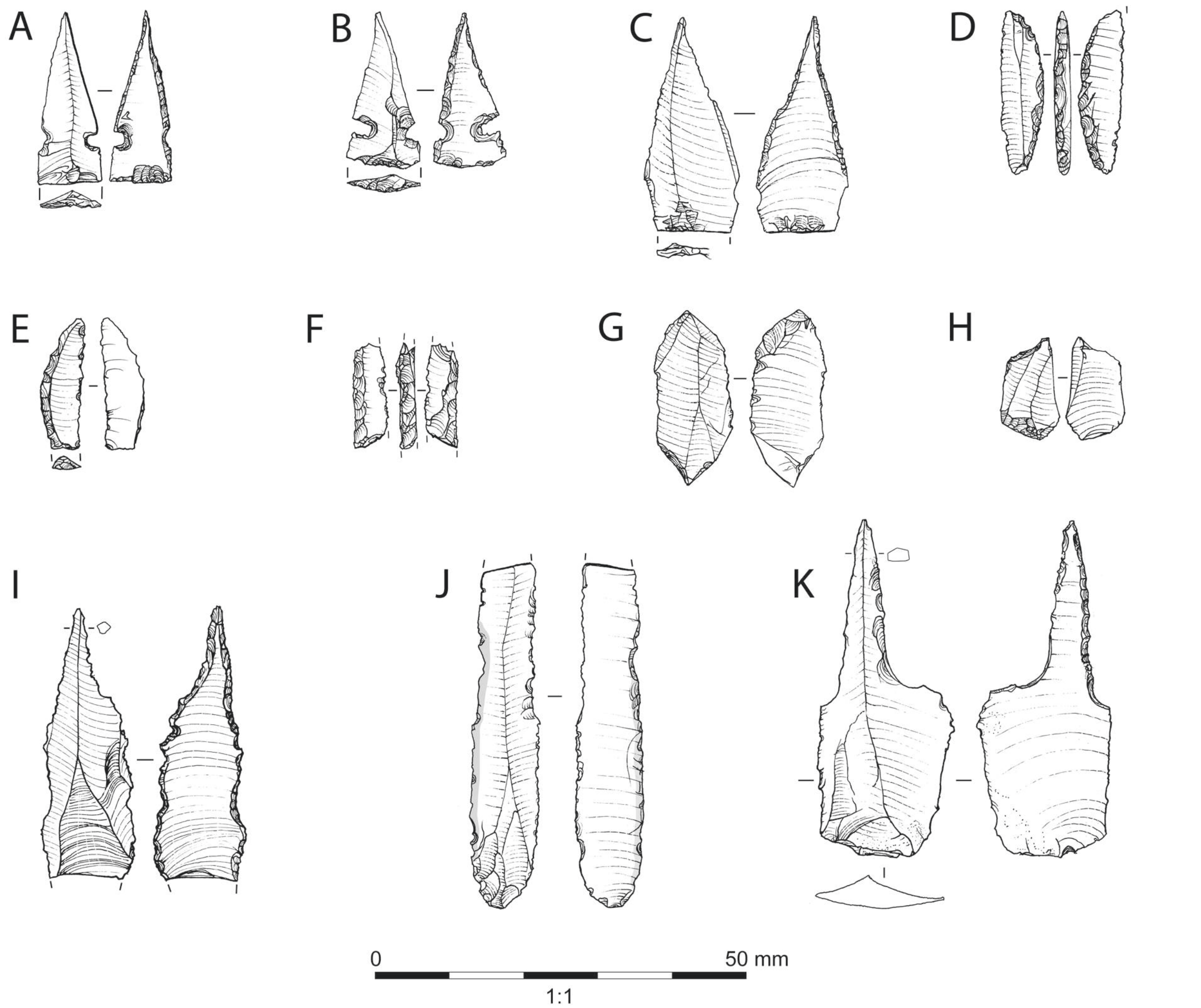


Figure 30.13 Chipped-stone artefacts from Structure O33. A — El-Khiam point (377); B — El-Khiam point (356); C — Salibiya point (377); D — Helwan lunate (357); E — arched backed bladelet (377); F — fragment of Helwan backed bladelet (377); G — distal microburin (356); H — proximal microburin (356); I — awl (377); J — glossed blade (377); K — borer (377).

possibly used in an above ground part of the structure. No direct evidence for a superstructure was identified. There is no evidence for any floor layers, or temporary trampled or water laid surfaces, above mud-plaster floor (380), supporting the impression that the filling of Structure O33 was rapid. In light of the chipped stone, this appears to have occurred within the PPNA.

Structure O31 is the remains of a heavily eroded building just below the surface of the WF16 knoll. There is little that can be directly attributed to the structure, other than Burial O7, which was sealed by floor (94). The walls of Structure O33 generally surround the area of contexts assigned to Structure O31, but they are not directly connected to these contexts and therefore the inference that they were reused cannot be proven. The final activity prior to the accumulation of the overburden was the insertion of Burial O3 into the wall (381) and interior deposits (67) of Structure O31.

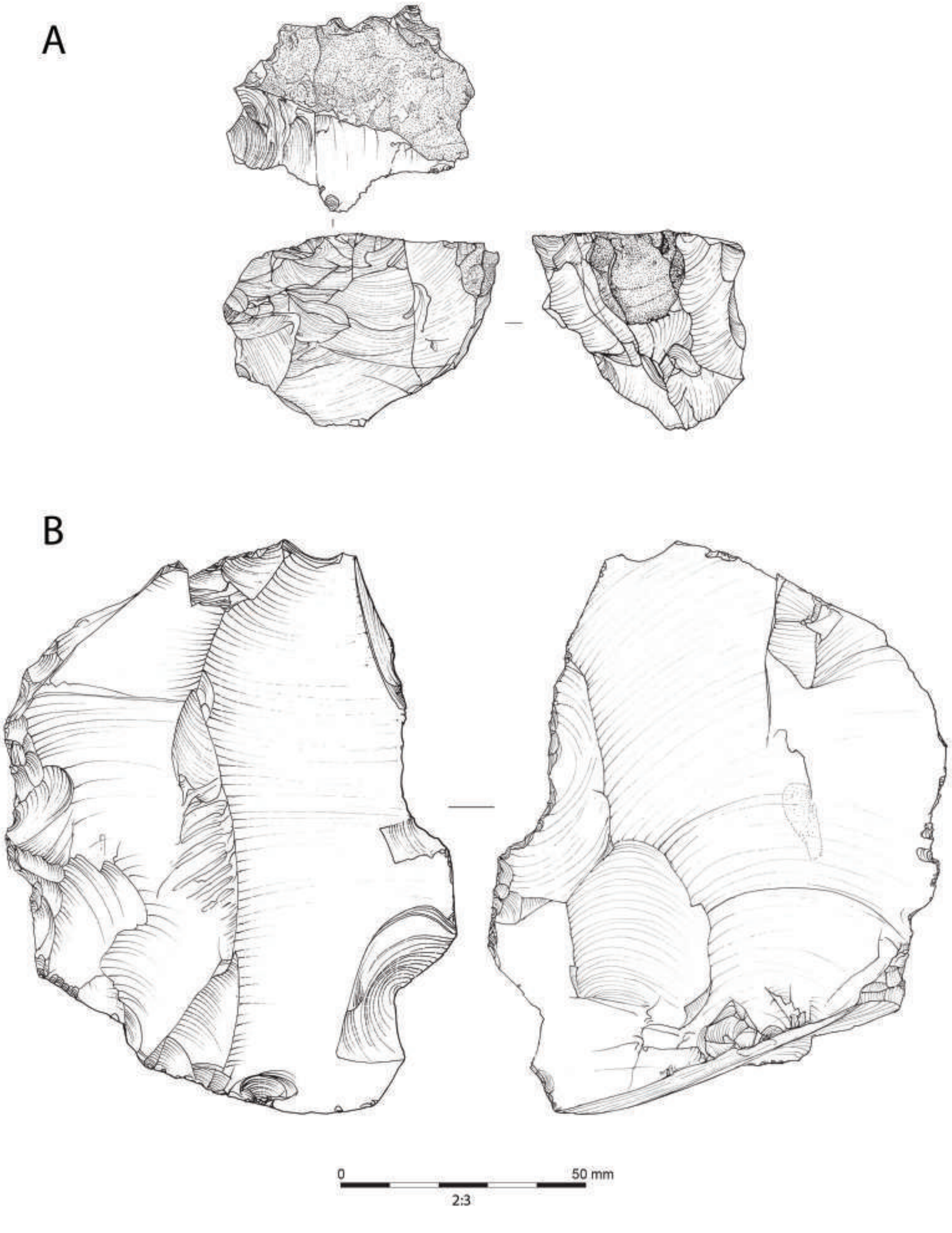


Figure 30.14 Chipped-stone artefacts from Structure O33 context (377): A — single platform mixed flake/ bladelet core: B — scraper.

31. Midden O69

31.1 Location and relationship with other structures

A substantial area of midden deposits was excavated from the northeastern corner of the trench. These deposits were designated as Midden O69 and were the uppermost stratigraphic group beneath the overburden in this area of the trench (Figures 31.1, 31.2). The midden deposits accumulated within a cut that truncated Structures O73, O90 and O75 (Figure 31.3) and the midden deposits sealed Structure O74 (Figures 31.1 and 31.2). Figure 31.4 provides the stratigraphic matrix for Midden O69, while Table 31.1 describes the contexts. Tables 31.2 and 31.3 list the bulk and small finds, respectively.

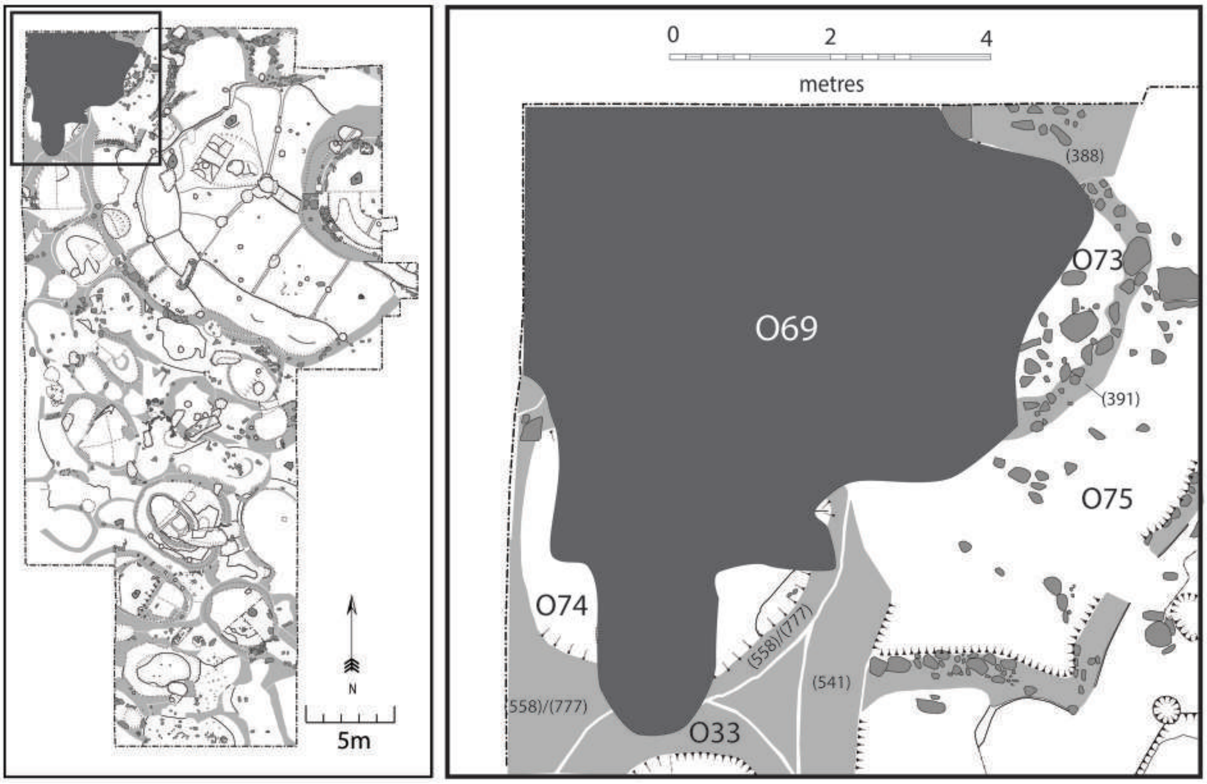


Figure 31.1 Location of Midden O69 and plan showing its relationships with surrounding and underlying Objects.

Figure 31.2 View of the northwest corner of the trench following removal of the overburden showing the extent of Midden O69 in relation to Midden O60, with Structures O75 and O33 in the background. Scale 2.0 m.

Figure 31.3 Post-excavation view of the area previously occupied by Midden O69. Scale 2.0 m.

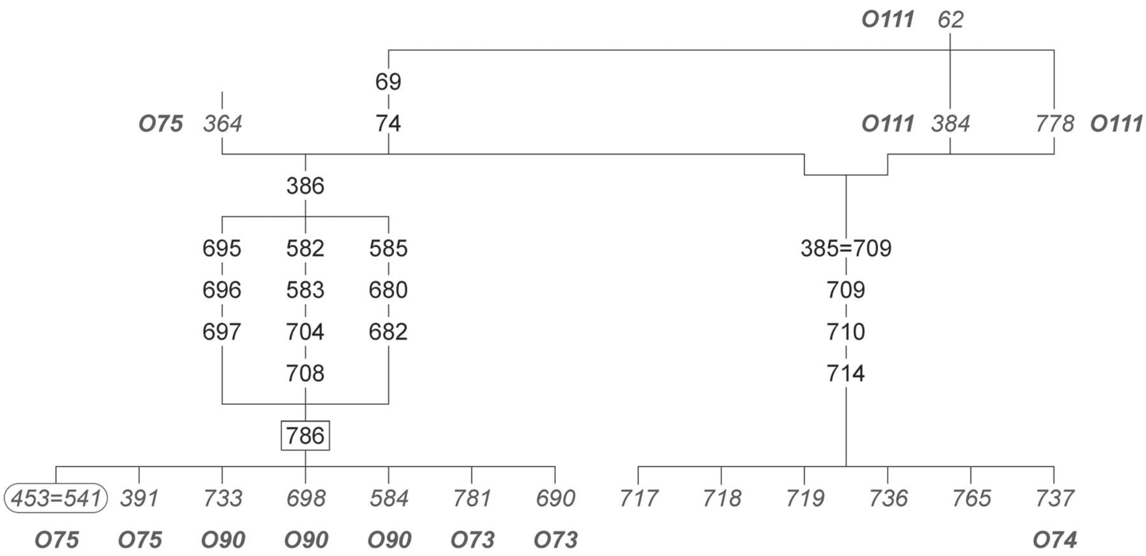


Figure 31.4 Stratigraphic matrix for Midden O69.

Table 31.1 Contexts forming Midden O69 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
69	loose dark grey slightly sandy silt	midden accumulation
74	loose grey to brown sandy silt	midden accumulation
385	loose mid-grey sandy silt	midden accumulation (same as 709)
386	loose to friable mid-to dark grey ashy silt	midden accumulation
582	loose mid-grey brown ashy silt with very frequent fire cracked stone	midden accumulation
583	loose mid-grey brown ashy silt with yellow patches	midden accumulation
585	loose mid-grey brown ashy silt with yellow patches	midden accumulation
680	loose mid-grey ashy silt	midden accumulation
682	loose mid-grey ashy silt	midden accumulation
695	loose dark grey silt with ash lenses	midden accumulation
696	loose yellowish-grey silt	midden accumulation
697	loose dark grey sandy silt	midden accumulation
704	loose grey and yellowish-grey silt with pisé fragments	midden and pisé rubble accumulation
708	friable yellowish-grey silt with pisé fragments	midden and pisé rubble accumulation
709	loose mid-grey sandy silt	midden accumulation (same as 385)
710	loose dark grey ashy silt	midden accumulation
714	loose mid-grey silt	midden accumulation
786	large irregular cut in the northwest corner of the site	truncation of earlier structures prior to midden formation in the resulting hollow

Table 31.2 Quantities of bulk finds from Midden O69 by material and context number.

Object 69	Volume of sediment (l)				Weight of bulk finds per material (g)								
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Unworked stone	Animal bone	Marine shell	Other shell	Charcoal	Misc.
69	891.0	30.0	860.0	1.0	6775.2	40.0	20.0	0.0	137.2	8.0	139.3	0.0	50.0
74	911.0	30.0	880.0	1.0	2150.7	0.0	10.0	0.0	396.7	10.0	28.3	0.0	0.0
582	931.0	30.0	900.0	1.0	10090.0	110.0	22.0	0.0	847.0	10.0	0.0	10.0	1.0
583	691.0	10.0	680.0	1.0	12992.9	1023.8	11.0	50.0	1014.1	0.0	65.2	0.7	0.0
585	1731.0	30.0	1700.0	1.0	17815.6	104.5	40.0	0.0	886.7	10.0	202.0	10.0	50.0
680	461.0	60.0	400.0	1.0	7674.9	0.0	13.3	20.0	336.5	1.0	403.8	0.0	0.0
682	510.0	0.0	450.0	60.0	2711.7	0.0	1.0	0.0	606.8	0.0	181.7	0.0	0.0
695	141.0	30.0	110.0	1.0	1427.0	0.0	10.4	0.0	73.5	0.0	124.0	0.0	0.0
696	121.0	30.0	90.0	1.0	855.0	0.0	0.4	0.0	172.2	0.1	38.4	0.3	0.0
697	431.0	30.0	400.0	1.0	4098.5	0.0	0.0	0.0	753.2	0.0	489.4	10.8	0.0
704	30.0	30.0	0.0	0.0	3818.2	0.0	10.0	10.0	152.2	10.0	38.1	0.0	0.0
708	611.0	10.0	600.0	1.0	326.0	891.0	10.0	0.0	24.0	0.0	0.0	0.0	0.0
709	431.0	30.0	400.0	1.0	2568.0	600.0	111.0	0.0	164.0	0.0	0.0	0.0	0.0
710	431.0	30.0	400.0	1.0	2910.0	1850.0	16.0	0.0	367.0	0.0	0.0	0.0	0.0
714	481.0	30.0	450.0	1.0	1701.0	1300.0	10.0	0.0	383.0	0.0	0.0	0.0	0.0
Total	8803.0	410.0	8320.0	73.0	77914.7	5919.3	285.1	80.0	6314.1	49.1	1710.2	31.8	101.0

Table 31.3 Quantities of small finds from Midden O69 by material and context number.

Object 69	Quantities of small finds per material (nos)									
Context	Chipped stone	Ground stone	Other stone	Worked bone	Unworked animal bone	Bone beads	Stone beads	Marine shell beads	Marine shell other	Total small finds
69	1	1	0	0	0	0	0	0	0	2
74	0	0	0	1	0	0	0	0	0	1
582	0	2	0	2	0	0	2	0	0	6
583	0	3	0	2	0	0	1	0	0	6
585	5	0	0	4	0	0	4	4	1	18
680	2	0	0	1	0	0	0	2	0	5
682	3	1	0	0	1	0	0	0	0	5
696	0	0	0	0	0	0	1	0	0	1
697	3	1	2	4	0	0	3	2	0	15
708	1	0	0	0	0	0	1	2	0	4
709	3	2	1	1	0	0	2	1	3	13
710	9	0	0	3	0	0	2	0	0	14
714	5	1	3	3	0	0	1	2	0	15
Total	32	11	6	21	1	0	17	13	4	105

Figure 31.5 Concentration of fire-cracked stones in midden deposit (583). Scale 1.0 m.

Figure 31.6 Horn core SF874 in midden deposit (682). Scale 0.1 m.

Figure 31.7 Bone objects from Midden O69: A — bone point SF851 from deposit (680); B — bone point SF1209 from deposit (710); C — bone pendant SF1339 from deposit (714).

Figure 31.8 — Stone objects: A — SF1046 from deposit (697); B — SF1356 from deposit (714).

31.2 Description of the excavated deposits

Once exposed by removal of the overburden (1, 62 and 384), the midden was excavated as far as possible by stratigraphic context, although the minor changes of colour and frequency of inclusions within the loose midden deposits were hard to follow and assign significance. Removal of the overburden in this area also exposed an amorphous pile of stones (778), which are part of O111 and described in Chapter 5.

The uppermost midden deposit (69) and the underlying midden deposit (74) were excavated as single units. Below these the surface of wall (558=777) of Structure O74 was exposed (Figure 31.3). The midden deposits to the south of these walls, i.e. within the area of Structure O74, were excavated as a sequence of contexts (385=709, 710 and 714) with the lower-most context having a substantial quantity of bone and chipped stone, with a high proportion of fire-cracked stones throughout the sequence. To the north of wall (558=777) the uppermost midden deposit was a loose ashy silt (386). Below this the midden was excavated in three sections, leaving baulks between them for stratigraphic recording and with each section having a sequence of deposits: (695, 696, 697), (582, 583 [Figure 31.5], 704, 708), and (585, 680, 682). These midden deposits were all contained within cut [786]. These deposits were all ashy silts with high concentrations of bones and fire-cracked stones, except for (708) which was relatively stone free, but which contained numerous clay lumps. Within context (682) a horn core was uncovered (SF874, Figure 31.6), notable for being a rare type of find at WF16. The midden contained a variety of other types of objects, notably stone and marine shell beads, chipped- and ground-stone tools, bone implements and carved stone objects (Table 31.3, Figures 31.7 and 31.8).

31.3 Interpretation

Midden O69, located in the northwest corner of the trench, provided a large number of finds that will allow interesting comparison to those recovered from Midden O60 (Chapter 35). Midden O69 postdates (seals or truncates) Structures O73, O74, O90 and O75. It contained a diverse range of material including fire-cracked rocks and discrete dumps of rubble.

32. Structure O74

32.1 Location and relationship with other structures

Structure O74 is located along the western side of the trench and truncates three earlier Structures, O33, O73 and O90 (Figures 32.1, 32.2). The structure is ovoid in shape, measuring 3.60 m east–west and 4.00 m north–south. It is one of the structures that follows the perimeter of Structure O75, although its stratigraphic relationship with O75 has not been established. Structure O74 was sealed by Midden O69. The stratigraphic matrix for Structure O74 is shown in Figure 32.3, descriptions of the contexts are given in Table 32.1, while the bulk finds are listed in Table 32.2 and small finds in Table 32.2.

32.2 Description of the excavated deposits

Removal of the overburden exposed rubble pile (778, part of Horizon O111 see Chapter 5) and the deposits of Midden O69 (Chapter 31). Below deposit (714) of Midden O69, the outline of an oval structure defined by wall (558=777), built from pisé and small- to medium-sized sub-rounded stones, was exposed. This wall was set into a construction cut [787]. Within the interior of this wall, Structure O74 contained *c.* 0.30 m of silty deposits (765), (737), (719) and (764) above a patch of mud plaster (780) in the southeast and compacted silt (779) in the northeast, which may have once been part of a continuous surface. Two shallow pits, one filled by ashy material (717) in a sub-circular cut [773] 0.50 m x 0.42 m x 0.20 m deep, and a second filled by ashy material (718) in a sub-circular cut [774] 0.5 m x 0.42 m x 0.10 m deep, were excavated within the central part of the structure (Figure 32.4), while the fill of a third pit (736) was identified but not excavated. The wall (558=777) survived to a height of approximately 0.30 m above the surface of these infill deposits and pit fills.

32.3 Interpretation

Minimal excavation was conducted in Structure O74, and most of the contexts relate to its abandonment and gradual infilling. From what has been exposed, it appears that the structure is not well preserved. It underlies Midden O69 and its construction cuts the walls of Structures O33, O73 and O90, although all of these structures might have been in contemporaneous use.

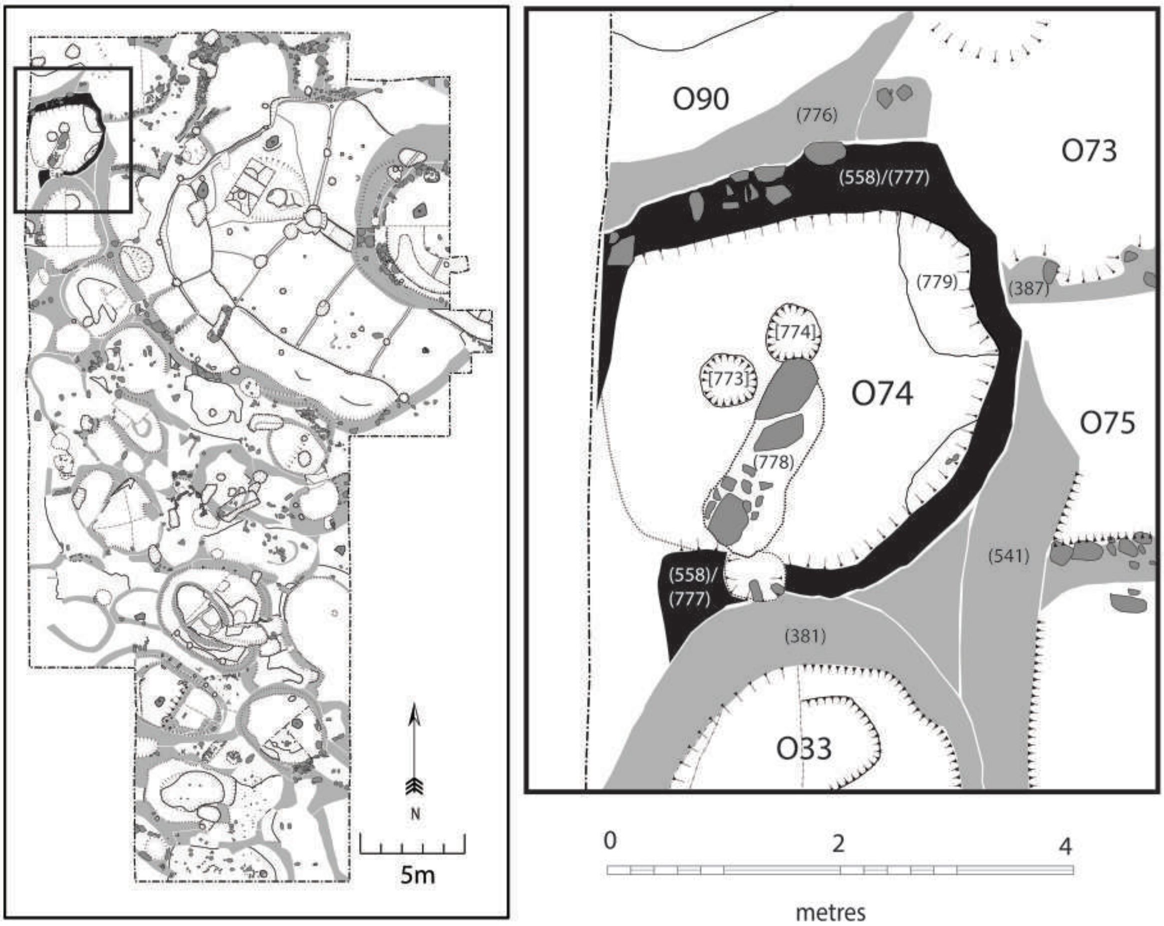


Figure 32.1 Location of Structure O74 and plan showing its relationships with surrounding Objects.

Table 32.1 Contexts forming and filling Structure O74 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
558	yellowish-brown pisé with set in stones	pisé and stone wall of structure
717	dark grey ashy silt	fill of pit
718	dark grey ashy silt	fill of pit
719	silt and rubble	accumulation inside structure
736	dark organic silt rich in snail shells	fill of pit
737	silt and rubble	accumulation inside structure
764	silt and rubble	accumulation inside structure
765	silt and rubble	accumulation inside structure
773	sub-circular cut	cut of pit
774	sub-circular cut	cut of pit
777	sub-circular pisé and stone wall bonded with ashy grey material	pisé and stone wall of structure
779	light brown compact silt	ephemeral surface inside structure
780	light brown compact silt	mud-plaster surface remnant inside structure
787	large sub-circular cut, not excavated	construction cut for structure

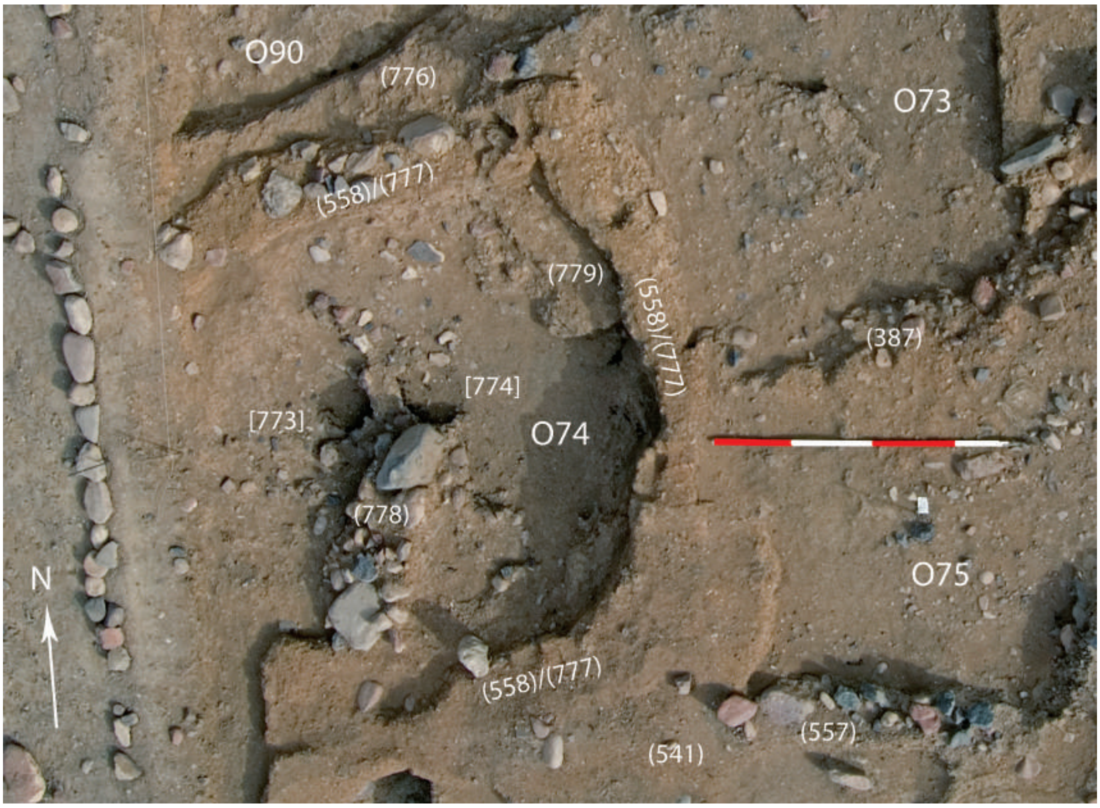


Figure 32.2 View of O74 at the cessation of the excavation. Scale 2.0 m.

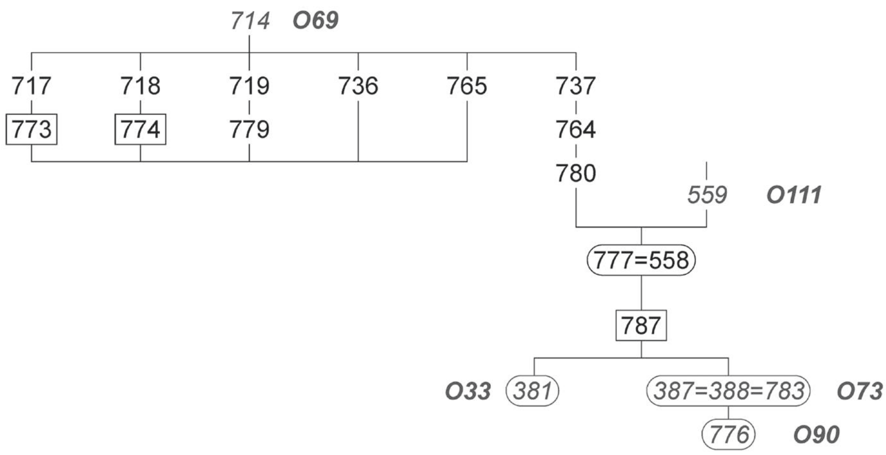


Figure 32.3 Stratigraphic matrix for Structure O74.

Table 32.2 Quantities of bulk finds from Structure O74 by material and context number.

Object 74	Volume of sediment (l)				Weight of bulk finds per material (g)					
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Animal bone	Other shell	Charcoal
717	21.0	20.0	0.0	1.0	439.6	490.2	0.0	51.0	2.2	0.3
718	11.0	10.0	0.0	1.0	302.0	310.0	0.0	6.0	0.0	0.0
719	331.0	30.0	300.0	1.0	1611.0	430.0	10.0	231.0	0.0	0.0
736	231.0	30.0	200.0	1.0	2526.0	650.0	10.0	46.0	0.0	0.0
737	31.0	30.0	0.0	1.0	1561.0	350.0	1.0	55.0	0.0	0.0
764	281.0	30.0	250.0	1.0	2470.0	0.0	0.0	110.0	0.0	0.0
765	181.0	30.0	150.0	1.0	1526.0	650.0	10.0	77.0	0.0	0.0
Total	1087.0	180.0	900.0	7.0	10435.6	2880.2	31.0	576.0	2.2	0.3

Table 32.3 Quantities of small finds from structure O74 by material and context number.

Object 74	Quantities of small finds per material (nos)							
Context	Chipped stone	Other stone	Worked bone	Bone beads	Stone beads	Marine shell beads	Marine shell other	Total small finds
719	9	2	2	0	2	3	2	20
736	1	1	1	0	0	1	0	4
737	3	1	0	0	0	4	0	8
764	0	1	4	0	0	2	1	8
765	3	0	0	0	0	1	0	4
Total	16	5	7	0	2	11	3	44

Figure 32.4 Two dark ashy hearth fills (717) and (718) within accumulating fill of Structure O74. Scale 0.2 m.

33. Structure O73

33.1 Location and relationship with other structures

Structure O73 is oval in shape, measuring approximately 5.0 m x 4.1 m and orientated on a northeast–southwest alignment. The structure is located in the northwest part of the trench (Figures 33.1 and 33.2), located to the east of Structures O90 and O74. The southwest part of the external wall of the building was cut by the construction of Structure O74, while the northwest part of the wall was cut prior to the midden formation (Midden O69) in the northwest part of the trench. Stratigraphically, the western part of the wall is built over the top of the earlier Structure O90. Any direct relationship between Structures O73 and O75 is complicated by the poor preservation of shallow deposits in this part of the trench (Figure 33.1). The stratigraphic matrix for Structure O73 is shown in Figure 33.3. Descriptions of the contexts are given in Table 33.1, list of bulk finds in Table 33.2 and small finds in Table 33.3.

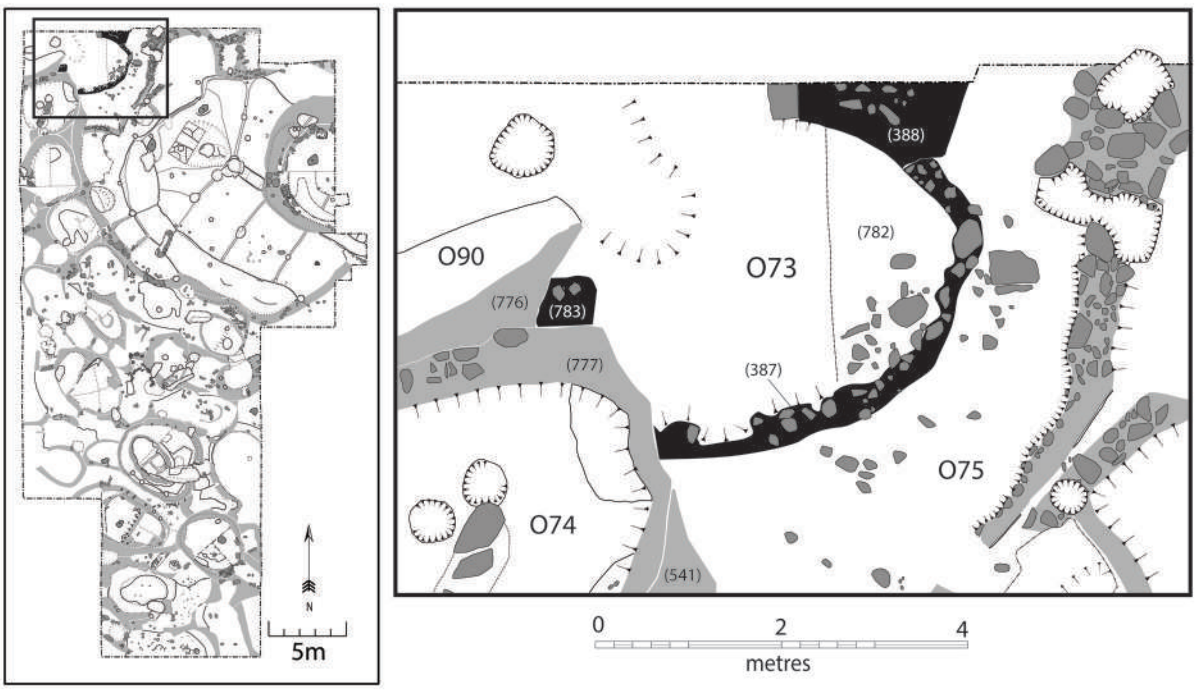


Figure 33.1 Location of Structure O73 and plan showing its relationships with surrounding Objects.

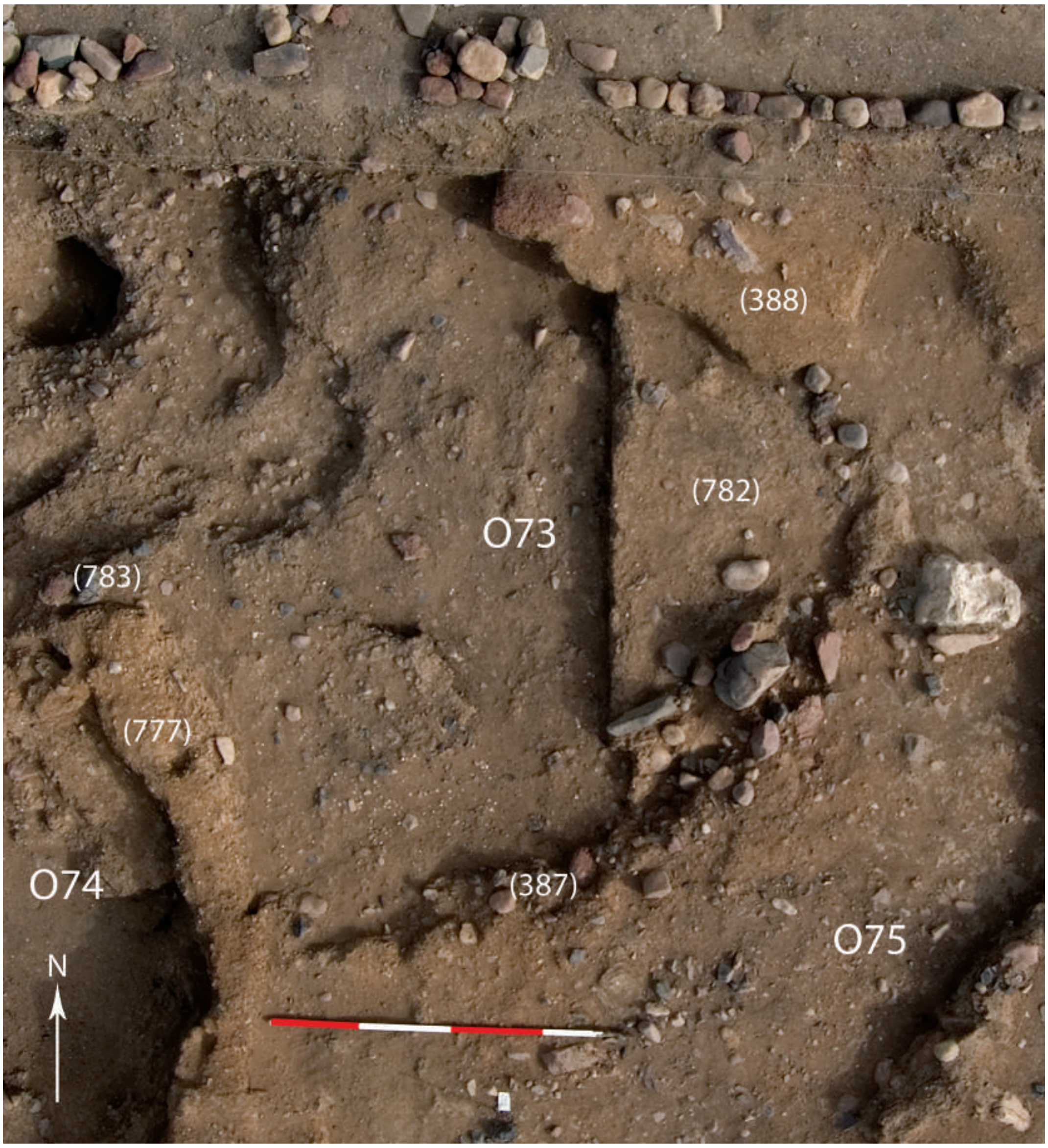


Figure 33.2 Overhead post-excavation photograph of Structure O73. Scale 2.0 m.

33.2 Description of the excavated deposits

Only limited excavation took place within Structure O73 because it is stratigraphically below the partially excavated Structure O74. Removal of Midden O69 exposed wall (387=388=783), which defined Structure O73 (Figure 33.2). This wall was constructed from sub-rounded stones measuring 50–150 mm held together by a mud mortar. The wall had been cut by the construction of O74, and also by a cut that contained the deposits of Midden O69, which may have been intended to form a pit for midden deposition. Within the interior of Structure O73 excavation of an ashy silt (690) exposed a similar deposit, but one that also contained small stones and clay lumps (694), and that sloped towards the west. There was a mix of ash and stones (702) in the western part of the structure and a poorly preserved mud-plaster surface (781) in the east of the structure. This surface may have once been continuous with a patch of mud-plaster surface (782) located below (702).

33.3 Chipped stone

The small sample (n=661 pieces) includes material from two out of the three contexts with chipped stone in Structure O73 (Tables 39.29 and 39.30). By weight, the sample (3720 g) constitutes 55% of the bulk find chipped stone from this structure. The composition of the sampled assemblage is provided within Chapter 39.11.

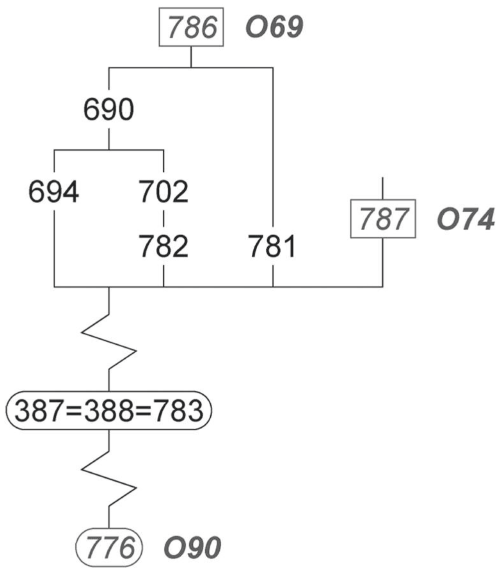


Figure 33.3 Stratigraphic matrix for Structure O73.

Table 33.1 Contexts forming and filling Structure O73 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
387	sub-rounded stones 50–150 mm in size bonded with mud mortar	stone and mud wall of structure (same as 388, 783)
388	sub-rounded stones 50–150 mm in size bonded with mud mortar	stone and mud wall of structure (same as 387, 783)
690	loose mid grey ashy silt	silt accumulation inside structure
694	loose yellowish-grey silt with small stones, clay lumps and occasional charcoal	silt accumulation inside structure
702	loose mid grey ashy silt with medium to large sub-rounded stones	probable wall collapse
781	compact light brown silt	mud-plaster surface inside structure
782	compact light brown silt	mud-plaster surface inside structure
783	sub-rounded stones 50–150 mm in size bonded with mud mortar	stone and mud wall of structure (same as 387, 388)

Table 33.2 Quantities of bulk finds from Structure O73 by material and context number.

Object 73	Volume of sediment (l)				Weight of bulk finds per material (g)				
Context	**Total volume**	**Flot. sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Other worked stone**	**Animal bone**	**Other shell**	**Charcoal**
690	261.0	30.0	230.0	1.0	3025.9	10.0	219.3	50.2	0.0
694	131.0	30.0	100.0	1.0	3894.4	1.0	408.8	66.6	0.2
702	21.0	20.0	0.0	1.0	1288.5	1.0	35.6	14.9	10.1
Total	413.0	90.0	330.0	3.0	8208.8	12.0	663.7	131.7	10.3

Table 33.3 Quantities of small finds from Structure O73 by material and context number.

Object 73	**Quantities of small finds per material (nos)**					
Context	**Chipped stone**	**Other stone**	**Bone beads**	**Stone beads**	**Marine shell beads**	**Total small finds**
690	3	0	0	1	1	5
694	1	3	0	3	0	7
702	3	0	0	0	0	3
Total	7	3	0	4	1	15

33.4 Interpretation

Structure O73 is an oval structure coming early in the archaeological sequence located in the northwest corner of the excavation trench, lying below Structure O74 and Midden O69.

Minimal excavation was conducted in Structure O73, partially exposing the uppermost floor (781), possibly including (782). The wall construction method is interesting as it consists mostly of stone, held together by mud mortar. It is possible that this is all that remains of a badly degraded pisé wall; some of the pisé walls elsewhere at WF16 were constructed around a stone core. The infill and collapse within the structure suggests that there was certainly more stone used in the walls, as context (702) appears likely to be the stone collapse from a wall. Context (694) contains some clay lumps and, given its sloping nature, may also be wall collapse.

The relationship between Structure O73 and Structure O75 is intriguing, but not yet resolved. Inspection of both Figure 33.1 and Figure 33.3 shows that Structure O73 is positioned where the outer wall for Structure O75 may have been. However, because of the presence of the eroded deposits of Stratigraphic Block 1 (O75) it is not clear whether O73 may have underlain the wall, or whether it was inserted into the wall's former position.

34. Structure O90

34.1 Location and relationship with other structures

Structure O90 is a segment of a partially exposed structure in the northwest corner of the trench (Figure 34.1). It received minimal excavation because it is stratigraphically earlier than partially excavated Structure O73 and extends beyond the trench boundary. It underlies Structure O73 and is truncated by the construction cut for Structure O74, and also by the cut that is filled by Midden O69. An overhead post-excavation view is provided in Figure 34.2, while Figure 34.3 illustrates the stratigraphic matrix. Table 34.1 describes the excavated contexts, while Tables 34.2 and 34.3 list the bulk and small finds, respectively.

34.2 Description of the excavated deposits

Removal of the final layers of Midden O69 (Chapter 31) revealed two features cutting a compacted silty-horizon, interpreted as a floor surface (775), to the northwest of an arc of pisé wall (776), which extended beyond the trench. The cut for one of these features [772] measured 0.7 x 0.5 m and was lined on the north side with small stones. Its fill (733) was ashy and suggested this feature had been used as a hearth. The second cut [679] was circular in plan, and approximately 0.4 m in depth with a diameter of about 0.6 m. Cut [679] contained two fills (698) and (584) (Figure 34.4).

Both these cut features truncated a light brown compact silt surface (775) with a thickness of 0.04–0.07 m (Figure 34.2). This surface was not excavated but lipped up to the wall (776). This wall was partially truncated to the south by the construction cut [787] for Structure O74, and to the west side by cut [786], within which Midden O69 subsequently accumulated. Wall (776) was also partially overlain by wall (783=388=387) of Structure O73. Neither the floor (775) nor the wall (776) was excavated.

34.3 Interpretation

Structure O90 is only partially within the excavation trench and lies below Structures O73 and O74. The exposed arc of wall (776) is interpreted as the southeast corner of a sub-circular structure. The only evidence for use were two small features cut through the floor (775), one of which might have been a hearth [772].

Although Structure O90 has only been partially exposed, it indicates significant stratigraphic complexity in this part of the site: it is below Structure O73, is later cut by Structure O74 and is finally covered by Midden O69. The limited extent of excavation in this part of the trench means that the form and development of its partially exposed structures remain unclear. It is evident, however, that these structures overlie one another with neither a significant build-up of floor deposits, nor the deliberate infilling of the individual structures. Instead, each structure (including a pit cut for Midden O69) cuts into the preceding structures, and the location of each phase moves horizontally and is not constrained by the location of existing semi-subterranean foundations. This is a significant contrast to most other areas of the site.

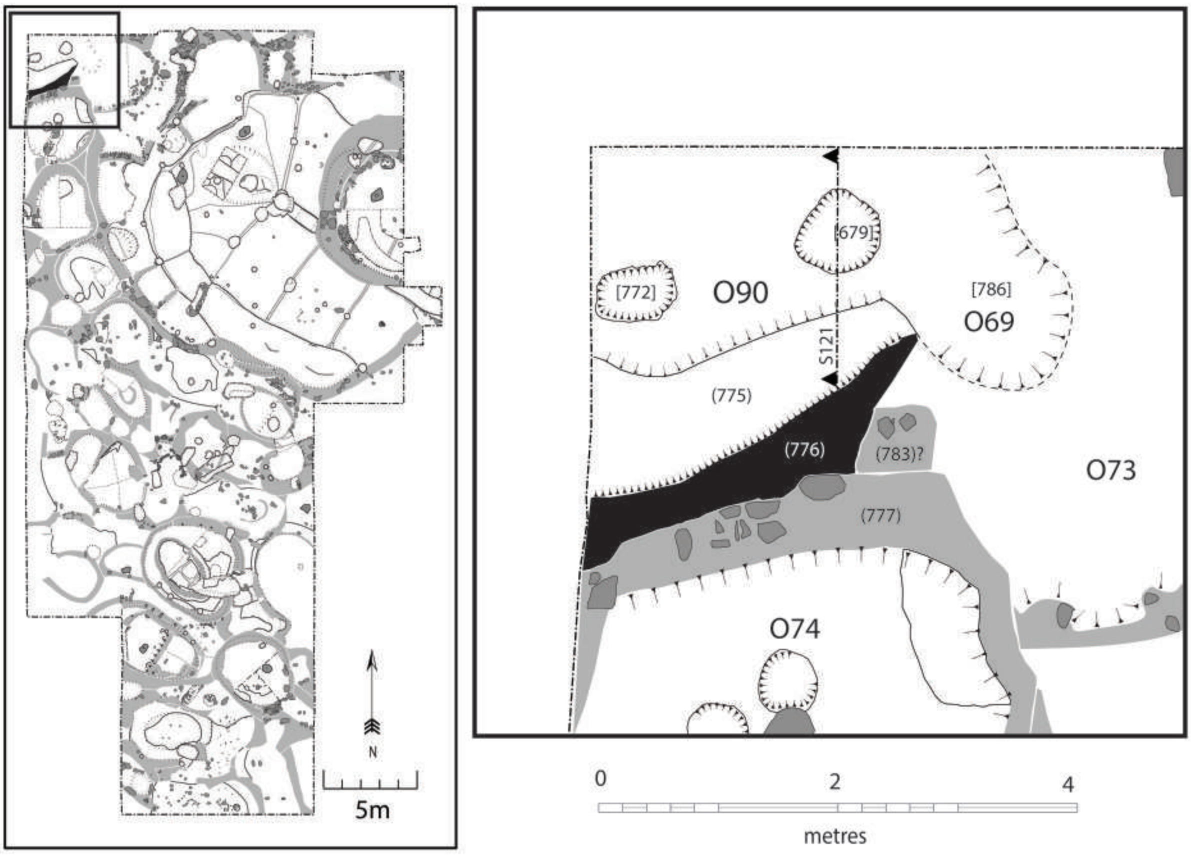


Figure 34.1 Location of Structure O90 and plan showing its relationships with surrounding Objects.

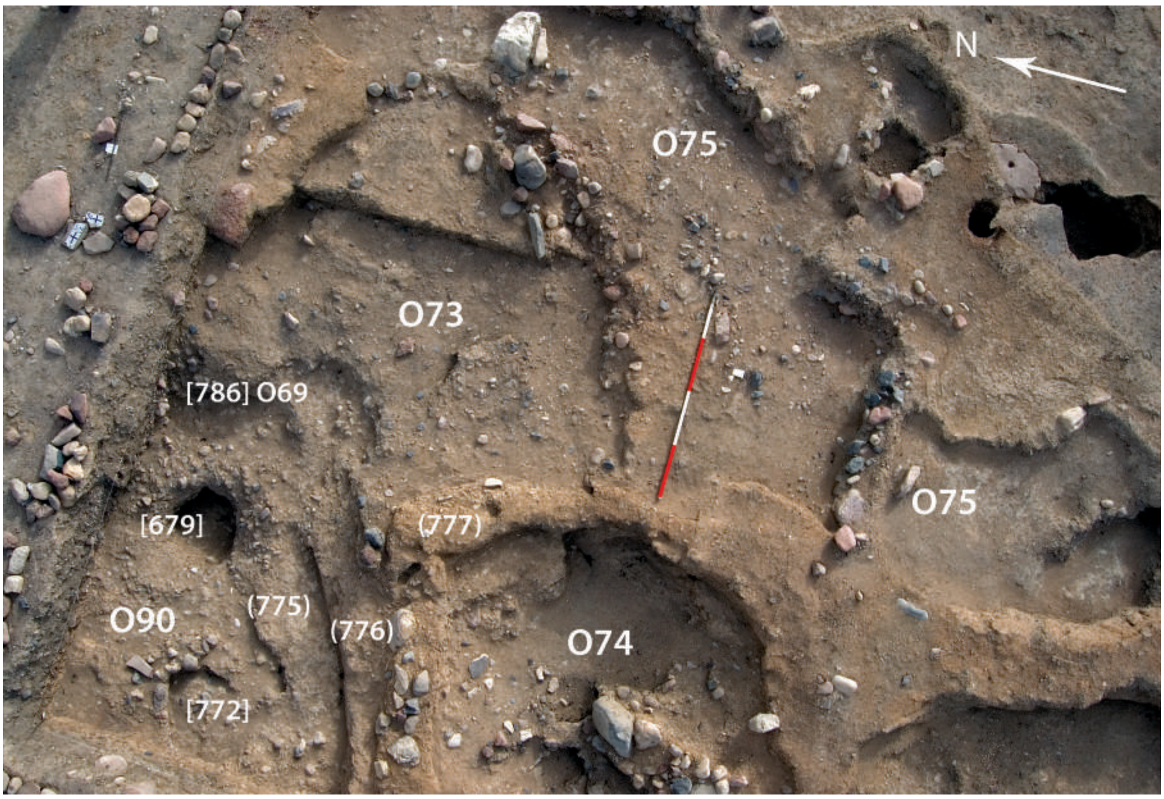


Figure 34.2 Overhead photo of Structure O90. Scale 2.0 m.

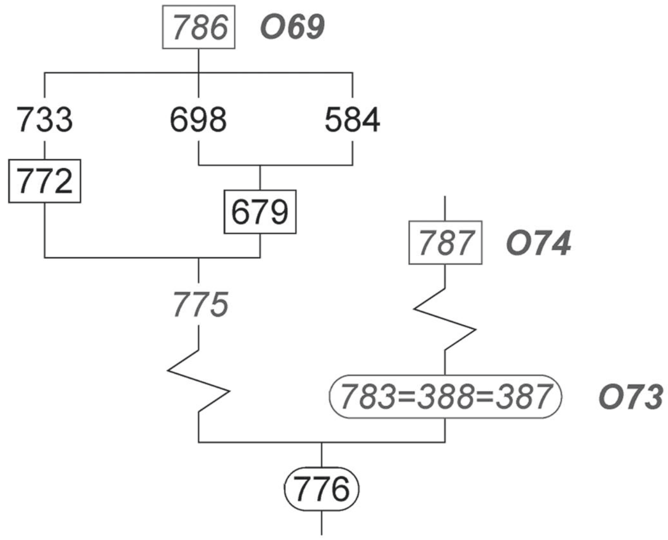


Figure 34.3 Stratigraphic matrix for Structure O90.

Table 34.1 Contexts forming and filling Structure O90 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
584	loose dark yellowish-grey ashy silt	fill of pit
679	circular cut with steep sides and a concave base	cut of pit
698	loose dark grey ashy silt	fill of pit
733	loose grey ashy silt	fill of hearth
772	sub-circular cut partially lined with stones	cut of hearth
775	light brown compact silt	mud-plaster floor surface
776	yellow brown pisé	pisé wall segment

Table 34.2 Quantities of bulk finds Structure O90 by material and context number.

Object 90	**Volume of sediment (l)**				**Weight of bulk finds per material (g)**				
Context	**Total volume**	**Flot. sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Ground stone**	**Animal bone**	**Other shell**	**Charcoal**
584	691.0	10.0	680.0	1.0	902.4	291.2	77.9	13.3	0.0
698	31.0	30.0	0.0	1.0	896.7	0.0	112.2	261.6	0.1
733	21.0	20.0	0.0	1.0	154.0	0.0	3.0	0.0	0.0
Total	743.0	60.0	680.0	3.0	1953.1	291.2	193.1	274.9	0.1

Table 34.3 Quantities of small finds from Structure O90 by material and context number.

Object 90	**Quantities of small finds per material (nos)**								
Context	**Chipped stone**	**Ground stone**	**Other stone**	**Unworked animal bone**	**Bone beads**	**Stone beads**	**Marine shell beads**	**Marine shell Other**	**Total small finds**
584	0	0	0	0	0	4	0	0	4
698	2	0	1	1	0	4	0	2	10
776	0	1	0	0	0	0	0	0	1
Total	2	1	1	1	0	8	0	2	15

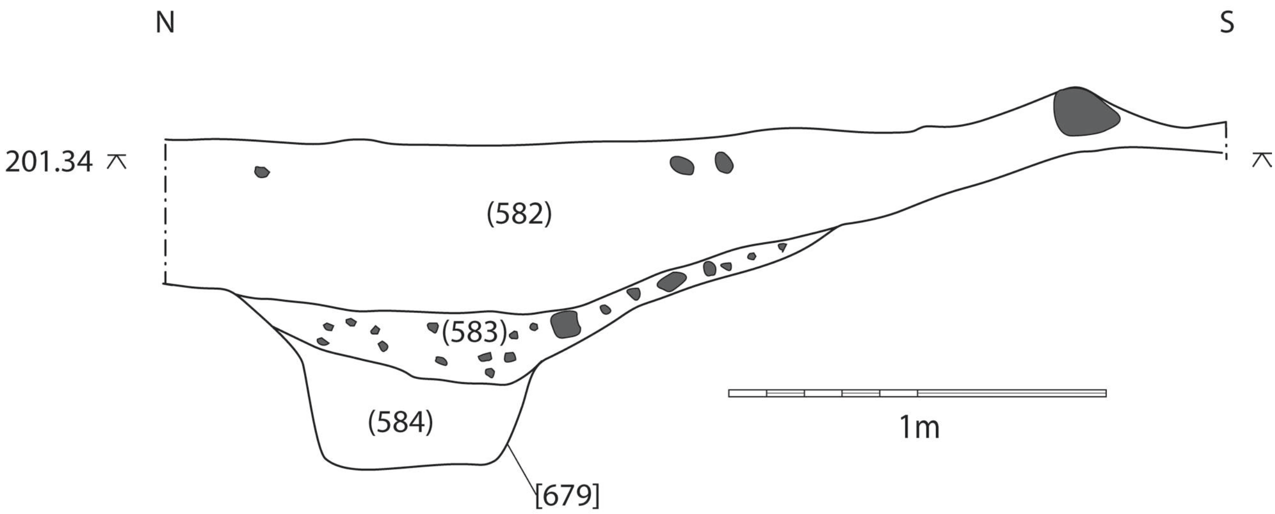


Figure 34.4 East-facing Section S121 through deposits of Midden O69 (582, 583) and cut [679] in Structure O90 (see Figure 34.1 for location).

35. Midden O60

35.1 Location and relationship with other structures

The most extensive area of midden at WF16 was excavated from within the walls of Structures O75 and O68 (Chapter 38). These structures had been abandoned before Midden O60 began to form. It accumulated over a floor or trampled surface, Surface O91 (Chapter 37), which partially sealed abandonment deposits within Structures O75 and O68. Midden O60 is located outside Structure O100 (Figure 35.1) and fills the interior of Structure O75 up to a level immediately below the overburden (Horizon O111), which contained deflated remains of stone structures (116) and (70) built over, or into, the midden (Chapter 5). Midden O60 amounts to an elliptical area measuring close to 16 m from east–west and over 17 m from north–south, with a volume estimated at 83m^3 (Figures 35.2 and 35.3).

The stratigraphic matrix for Midden O60 is given in Figure 35.4, descriptions of contexts are provided in Table 35.1 and quantities of bulk finds and small finds in Table 35.2 and Table 35.3, respectively.

35.2 Description of the excavated deposits

The contexts within Midden O60 fall into two Stratigraphic Blocks: Block 1 contains cuts and fills made into the uppermost horizons of the midden, these being exposed following removal of the overburden, Horizon O111. Block 2 contains the midden itself, consisting of a suite of discrete features within a dense matrix of silt, pisé rubble, ash, fire-cracked stones, bone, charcoal, chipped and coarse stone, snail shells and beads.

Stratigraphic Block 1 — Upper features in Midden O60

Below contexts (62) and (186) of Horizon O111 there was an extensive gravel spread (194) composed of approximately 50% stone and flint in a fine dark grey silt matrix. This gravel spread was poorly differentiated from the fills of five large and shallow depressions: [214], [200], [202], [205] and (223) (Figure 35.5). Where possible, these fills were excavated as separate contexts (203)/[214], (199)/[200] and (201)/[202], discrete fills could not be identified for depressions [205] and (223). These depressions are likely to have arisen from erosion, resulting in relatively high concentrations of stone within their fills, following the deflation of the finer silt component of the midden. A further pit [785], filled by a laminated ashy silt (784), could only be identified in section.

The traces of three other pits [93], [1142] and [1186] were located in the upper surface of the midden. Due to post-depositional disturbance, it was not possible to determine whether they had derived from relatively late activity within Midden O60, or from post-midden activity relating to the now unstructured deposits within Horizon O111. Cut [93] measured 0.8 m x 0.6 m x 0.3 m and contained sandstone lining (91) and silty fill (84). In the eastern area of the midden, located within the 2010 trench extension, two inter-cutting pits had been cut into Midden O60 and wall (795) of Structure O100: [1186] which was filled by a dark brownish-grey silt (1185) and then an orangish-brown silt (1184), before being cut by pit [1142], filled by a grey silt (1141). Additionally, a stone-lined burial (Burial O110) was excavated close to the eastern extent of the surviving midden deposits (Figure 35.5). This contained the disturbed remains of a crouched skeleton (1293) (Figure 35.6), within a cut [1787] with a

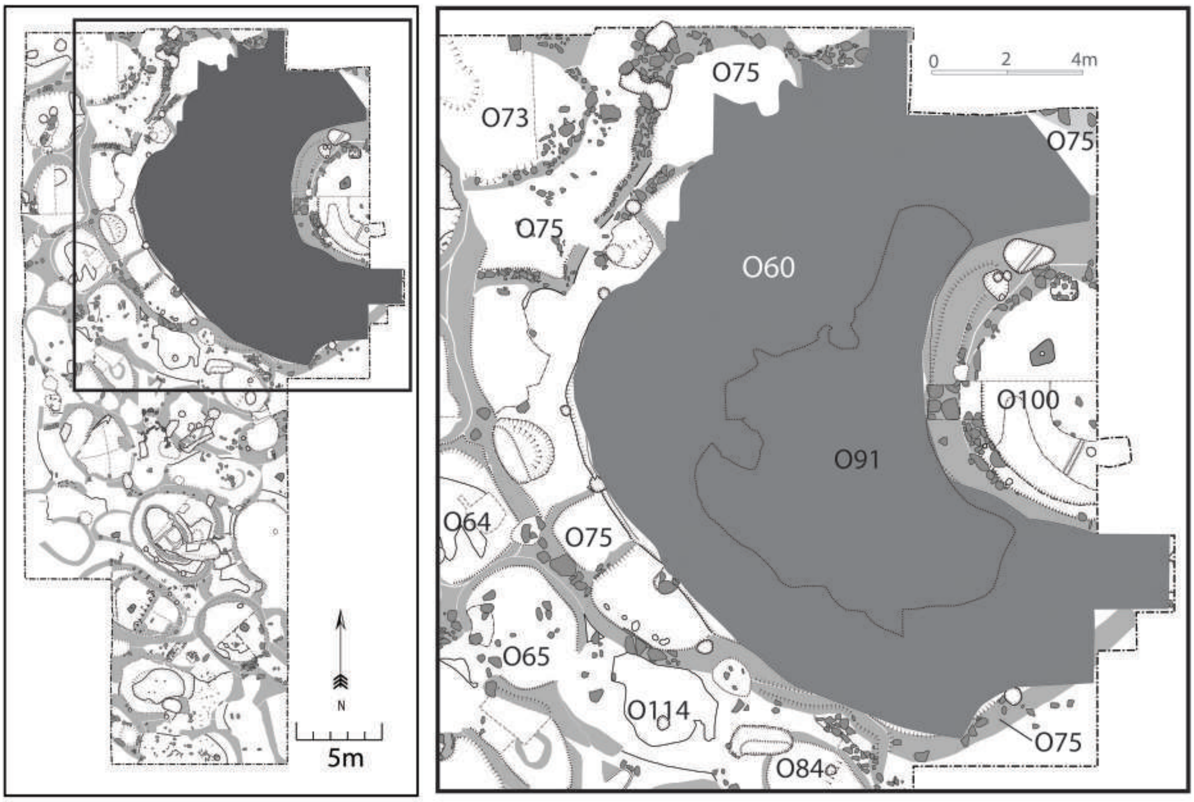


Figure 35.1 Location of Midden O60 and plan showing its relationships with surrounding and underlying Objects.

Figure 35.2 The surface of Midden O60 exposed at the northern end of the trench at the start of the 2009 excavation season.

Figure 35.3 Midden O60 prior to excavation in 2009. Scale 2.0 m.

stone lining (1788). A number of the stones were reused Neolithic objects including a stone bowl fragment (SF2492) and part of a cup-hole mortar (SF2491). A sherd of Bronze Age pottery was found within the loose fill (1278), possibly dating the burial, although the sherd could be intrusive into the fill.

Stratigraphic Block 2 — Midden deposits

Below the contexts of Stratigraphic Block 1, all of the deposits within Midden O60 are securely within the PPNA stratigraphy of WF16. They were excavated over the course of the three field seasons, 2008, 2009 and 2010. During 2008 the northern part of the midden and, to a lesser extent, the southern part within the original limit of excavation, was removed in arbitrary (10 cm) spits within the 5 m squares of the site grid. To provide spatial control, the upper spit of the midden was given a separate context number in each 5 m grid square, even though these contexts are all stratigraphically equivalent. This layer, composed of dark greyish-brown loose silt and ash containing frequent inclusions of shell, bone, stone, burnt stone and chipped stone was assigned the following context numbers: (691=97=107=211=233=229 =121=1147=797=1164=796=1139), (Figure 35.7). It was not feasible to excavate the individual dumps within the midden stratigraphically because of their diffuse nature, although some tip-lines were visible in sections (Figures 35.9 and 35.10). All deposits from each of the 5 m squares were dry-sieved and a 30-litre sample was taken from the central area of each 5 m square for flotation.

During the 2009 season, excavation focused on the northern part of the midden in the area to the north of Section S122 and west of Section S140, with each 5 m square being sub-divided into 1 m^2 units (Figure 35.8). Each of these units was assigned a letter (A–Y). Each 5 m square was excavated in 10 cm spits, with each spit being given a unique context number and excavated in the 1 m^2 units designated by a unique letter. Initially, all midden deposits continued to be 100% dry-sieved and a 10-litre sample was taken from each of the 1 m^2 units. The full scale of the midden only became apparent in the 2009 field season, causing the intensity of the sampling for flotation to be reduced by 80%, with only selected 1 m^2 units being sampled. This still resulted in 7359 litres of sediment being taken for flotation. During 2010 the southern part of the midden (to the south of Section S122) was excavated using the same methodology as in 2009, while more deposits of Midden O60 were exposed and excavated by the eastward extension to the trench, undertaken to fully uncover Structure O75.

In order to leave sections running through the midden deposits, a series of 1 m wide baulks was left in place along Sections S122, S140 and S171 (Figure 35.8, Figures 35.9 and 35.10 for sections) until all the deposits of Midden O60 had been excavated to the underlying surface of O91 (Chapter 37), or the deposits associated with underlying Structure O75 (Chapter 38), at which point the sections were recorded. The baulks were then removed in spits. These spits were given their own unique context numbers.

The sequence of spits excavated within each 5 m square through the midden is illustrated within the schematic matrix for Midden O60 (Figure 35.4) and described in Table 35.1. The midden deposits consisted of variable, but consistently high, densities of, pisé rubble, ash, fire-cracked stones, bone, charcoal, chipped and coarse stone, snail shells and beads within a silty matrix. Excavation removed the entirety of the midden deposits, involving between one and 11 spits depending on the specific area being excavated.

The following features were found at various levels within Stratigraphic Block 2 of Midden O60 (Figure 35.11):

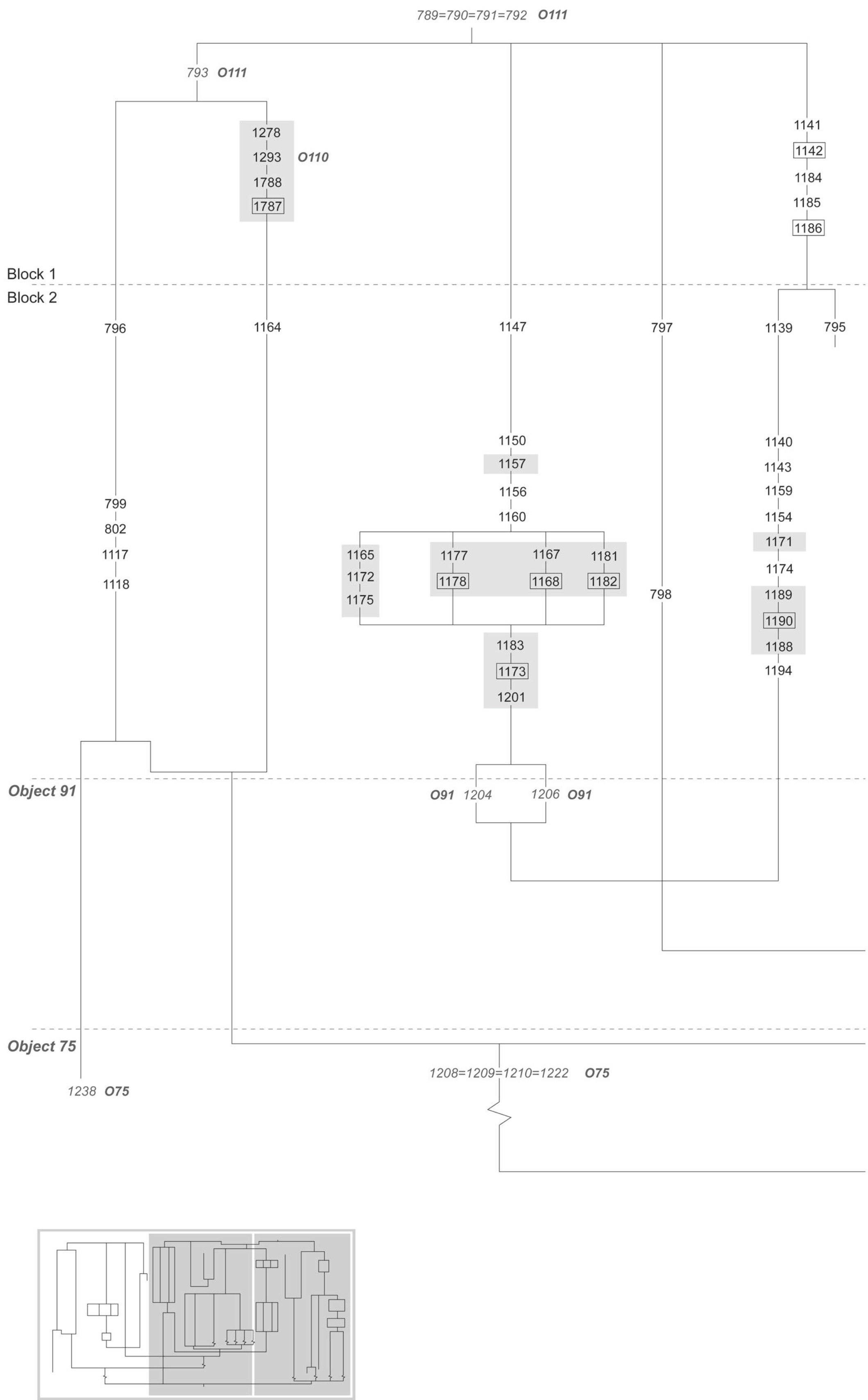


Figure 35.4A (A–C) Stratigraphic matrix for Midden O60.

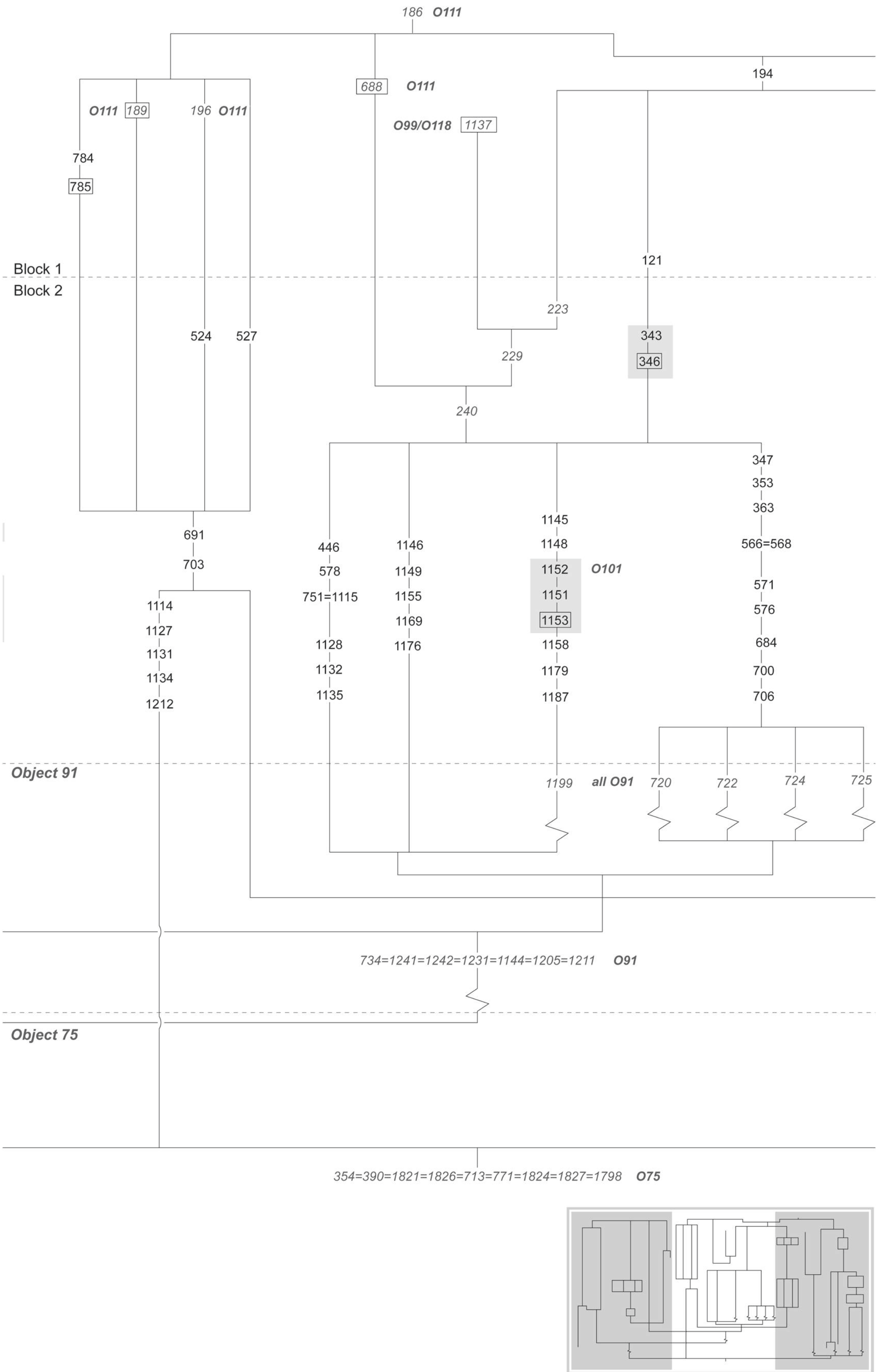


Figure 35.4B (A–C) Stratigraphic matrix for Midden O60.

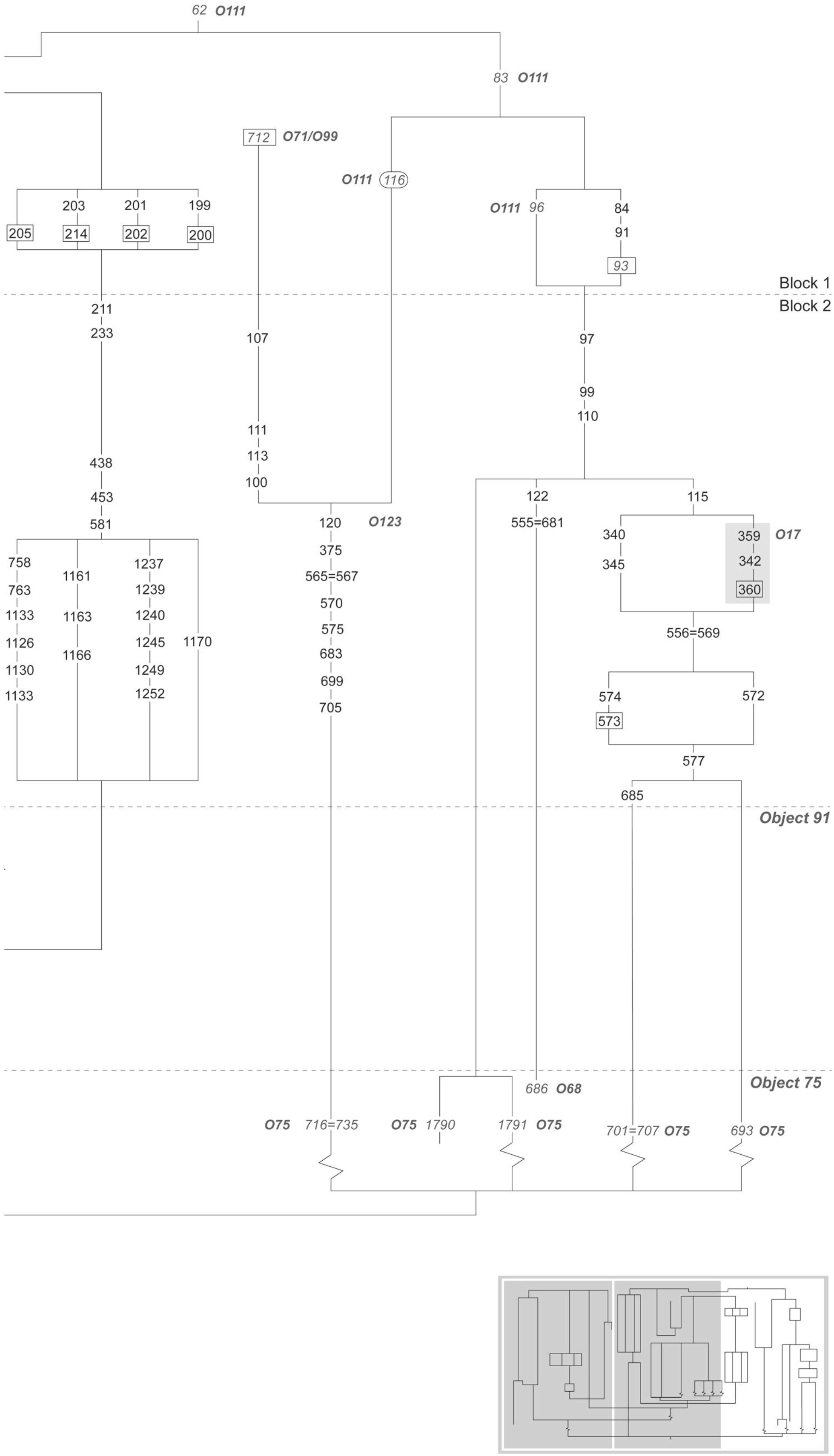


Figure 35.4C (A–C) Stratigraphic matrix for Midden O60.

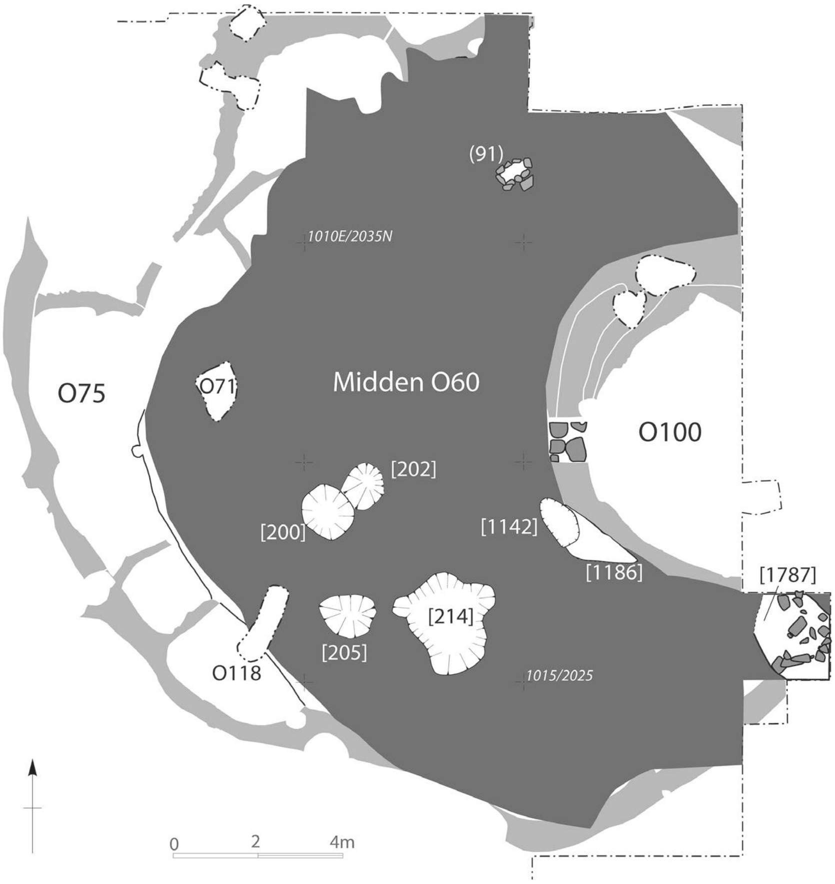


Figure 35.5 Plan showing location of discrete features in Stratigraphic Block 1 of Midden O60, including Antique Burial O71 (see Chapter 6).

- A concentration of green beads (SF1725-SF1729) was found in the midden deposit excavated as (1113) in addition to other stone (SF1722, SF1724, SF1843, SF1848) (Figure 35.15) and marine shell beads (SF1842, SF1874, SF2143) scattered throughout the deposit. A total of 372 beads were recovered from Midden O60, ranging in shape, size, colour and material (Table 35.3, Figures 35.16 and 35.17).
- Below the midden excavated as (121) a stone-rich fill (343) of pit [346] was exposed. This roughly circular pit was 2.4 m x 3.2 m x 0.3 m (Figure 35.11), and it contained stone mortar fragments SF362, SF395, and a stone bowl SF364. Midden O60 contained more than 40% of the stone vessels found during the 2008–2010 excavations, some of which were bowls and others cup-sized vessels (Figure 35.24).
- Below the midden excavated as (453) there was a notable density of artefacts lying on the exposed surface including ground-stone vessel SF1065 (Figure 35.24) and a concentration of chipped stone, green stone fragments and marine shell. These artefacts were collected as (581).
- Below the midden excavated as (100) the bones of an articulated human foot (120) were found. Several other bones were present but not articulated, these all being designated as Human Remains O123. There was no sign of a cut, suggesting that the bones derive from the deposition of skeletal remains into the midden (Figure 35.12).
- Another indication of specific activities taking place within the midden was a hearth measuring 0.35 m x 0.32 m made from stones (345), located within midden deposits excavated as (556=569). Stones chosen for use in the construction of the hearth were angular pieces of porphyry and smaller numbers of flint and granite (Figure 35.13). The stones measured *c.* 80 mm x 60 mm x 40 mm. All of the stones had been heat-affected by the use of the hearth. There was a single fill (340) comprised of 90% charcoal.
- Immediately to the east of the hearth (345) a crouched burial (Burial O17) was located within a cut [360] within midden excavated as (556=569) (Figure 35.14). Cut [360] was filled with a loose grey silt (359) and skeletal remains (342). The

Table 35.1 Contexts excavated in Midden O60 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
84	loose greyish-brown silt	fill of pit
91	large sandstone pebbles set on their side to form the lining of a cut	stone lining in pit
93	oval cut with steep to vertical sides and a u-shaped base	cut of stone-lined pit
97	loose brownish-grey sandy silt	midden accumulation
99	loose mid-grey sandy silt with orange patches	midden accumulation
100	loose to friable mid-to dark grey sandy-ashy silt	midden accumulation
107	friable mid-grey sandy silt	midden accumulation
110	loose grey sandy silt	midden accumulation
111	friable mid-to dark grey sandy silt	midden accumulation
113	loose to friable light orangish-grey ashy sandy silt	midden accumulation
115	loose grey sandy silt	midden accumulation
120	articulated human foot and other disrticulated human bones	redeposited human bone, possible secondary burial
121	loose to friable mid-grey sandy ashy silt	midden accumulation
122	loose mid-grey sandy silt	midden accumulation
194	loose mid-to dark grey silt with a dense concentration of gravel and occasional larger stones	gravel spread in midden
199	loose mid-to dark grey silt with frequent fire cracked stone	fill of an erosion hollow
200	shallow circular cut	cut of an erosion hollow
201	loose light grey fine sandy silt with a high concentration of small stones	fill of an erosion hollow
202	shallow circular cut	cut of an erosion hollow
203	loose mid-grey fine sandy silt with occasional small stones	fill of an erosion hollow
205	irregular shallow cut	cut of an erosion hollow
211	loose light grey fine sandy silt	midden accumulation
214	irregular shallow cut	cut of an erosion hollow
223	loose mid-to dark grey silt	midden accumulation
229	loose mid-to dark grey silt	midden accumulation
233	loose dark greyish-brown silt with a high percentage of stones	midden accumulation
240	friable mottled dark brown and yellow silt	midden accumulation
340	loose dark grey silt with dense charcoal	fill of hearth
342	articulated human skeleton	poorly preserved primary crouched inhumation burial
343	firm mid-brown silt with a high concentration of stones	fill of pit
345	circular setting of large fire-cracked stones	heat damaged hearth lining
346	roughly circular shallow cut	cut of pit
347	loose grey ashy sandy silt	midden accumulation
353	friable to loose mid-brown to grey ashy sandy silt	midden accumulation
359	loose grey sandy silt with occasional charcoal	burial fill
360	roughly circular cut with moderately sloping sides and an uneven base	burial cut
363	loose brownish-grey sandy silt	midden accumulation
375	loose mid-to dark grey silt with patches of pisé collapse	midden and pisé rubble accumulation
438	firm mid-to dark greyish-brown silt	midden accumulation
446	loose to friable dark greyish-brown sandy silt	midden accumulation
453	friable dark brown silt	midden accumulation
524	loose mid-greyish-brown silt	midden accumulation
527	loose mid-greyish-brown silt	midden accumulation
555	friable mid-to dark grey ashy sandy silt	midden accumulation (same as 681)
556	loose dark grey ashy sandy silt	midden accumulation
565	friable dark grey ashy silt	midden accumulation (same as 567)
566	friable dark grey to mid-brown ashy silt	midden accumulation (same as 568)
567	friable dark grey ashy silt	midden accumulation (same as 565)
568	friable dark grey to mid-brown ashy silt	midden accumulation (same as 566)
569	friable dark grey to mid-brown ashy silt	midden accumulation

Table 35.1 Contexts excavated in Midden O60 with sedimentary descriptions and interpretations continued...

Context	Description	Interpretation
570	friable dark grey to mid-brown ashy silt	midden accumulation
571	loose to friable dark greyish-brown ashy silt	midden accumulation
572	friable dark grey ashy silt with patches of pisé rubble	midden and pisé rubble accumulation
573	irregularly shaped cut with vertical sides and a concave base	cut of pit
574	friable dark grey sandy silt	fill of pit
575	friable dark grey with pisé rubble	midden and pisé rubble accumulation
576	friable dark grey with pisé rubble	midden and pisé rubble accumulation
577	friable mid-grey and greyish-yellow ashy silt with compact areas of pisé rubble	mostly pisé collapse but with some midden material mixed in the deposit
578	loose mid-grey ashy silt	midden accumulation
581	horizon of exposed artefacts on a surface within the midden	artefact scatter within the midden
681	friable dark grey sandy silt	midden accumulation (same as 555)
683	compact orangish-brown pisé rubble and grey ashy silt	midden and pisé rubble accumulation
684	loose mid-to dark grey ashy silt and pisé rubble	midden and pisé rubble accumulation
685	loose mid-to dark grey ashy silt and pisé rubble	midden and pisé rubble accumulation
691	friable dark grey ashy silt	midden accumulation
699	firm mid-orangish-grey to mid-grey silty-clay and ashy silt	midden accumulation
700	loose dark grey to mid-brown ashy silt with pisé rubble	midden and pisé rubble accumulation
703	loose mid-brownish-grey ashy silt with infrequent lenses of pisé rubble	midden and pisé rubble accumulation
705	friable mid-grey to mid-brown ashy silt	midden accumulation
706	friable mid-grey ashy silt	midden accumulation
751	friable mid-greyish-brown sandy silt	midden accumulation (same as 1115)
758	friable mid-to dark grey ashy silt	midden accumulation
763	loose to friable mid-grey ashy silt	midden accumulation
784	friable dark grey ashy silt	fill of pit
785	cut seen only in section	cut of pit
796	loose mid-to dark grey sandy silt	midden accumulation
797	loose dark greyish-brown sandy silt	midden accumulation
798	loose mid-to dark grey sandy silt	midden accumulation
799	loose mid-grey sandy silt	midden accumulation
802	loose to firm mid-grey to mid-yellow sandy silt	midden accumulation
1113	loose to friable mid-to dark grey sandy silt	midden accumulation
1114	friable mid-greyish-brown silt with light orange pisé fragments	midden and pisé rubble accumulation
1115	friable mid-greyish-brown sandy silt	midden accumulation (same as 751)
1117	loose to firm mid-grey to mid-greyish-yellow sandy silt	midden accumulation
1118	firm mid-grey sandy silt	midden accumulation
1126	loose mid-to dark grey sandy silt	midden accumulation
1127	friable to firm mid-yellowish-grey to dark grey sandy silt	midden accumulation
1128	loose to friable mid-grey sandy silt	midden accumulation
1130	friable yellowish-brown to dark brown silt	midden accumulation
1131	loose to firm mid-greyish-yellow to dark grey sandy silt	midden accumulation
1132	loose mid-to dark grey sandy silt	midden accumulation
1133	loose to friable mid-to dark grey sandy silt	midden accumulation
1134	loose to friable mid-to dark grey sandy silt	midden accumulation
1135	loose to friable mid-to dark grey sandy silt	midden accumulation
1139	loose mid-to dark grey sandy silt	midden accumulation
1140	loose to friable mid-grey to mid-greyish-yellow sandy silt	midden accumulation
1141	loose mid-to dark grey silt	fill of pit
1142	oval cut with steep sides and a flat base	cut of pit
1143	friable mid-greyish-brown to mid-yellowish-brown silt	midden accumulation
1145	loose to friable mid-grey sandy silt	midden accumulation

Table 35.1 Contexts excavated in Midden O60 with sedimentary descriptions and interpretations continued...

Context	Description	Interpretation
1146	loose to friable mid-grey sandy silt	midden accumulation
1147	loose mid-grey sandy silt	midden accumulation
1148	loose to friable mid-to dark grey sandy silt	midden accumulation
1149	loose to friable mid-to dark grey sandy silt	midden accumulation
1150	friable to loose mid-to dark greyish-brown sandy silt	midden accumulation
1151	articulated human skeleton	disturbed primary crouched inhumation burial
1152	loose mid-grey sandy silt	burial fill
1153	diffuse cut with uncertain edges	burial cut
1154	friable mid-to dark greyish-brown silt	midden accumulation
1155	friable mid-to dark grey sandy silt	midden accumulation
1156	friable to loose mid-to dark greyish-brown with patches of light orange-yellow sandy silt	midden accumulation
1157	small cluster of rounded wadi pebbles and angular fire-cracked stones	concentration of stones in midden
1158	loose to friable mid-to dark grey sandy silt	midden accumulation
1159	compact light brown fine silt	pisé erosion from a wall
1160	loose dark greyish-brown sandy silt with patches of light orange yellow mottling	midden accumulation
1161	friable mid-to dark grey sandy silt	midden accumulation
1163	loose to friable mid-to dark grey sandy silt	midden accumulation
1164	friable to firm mid-to dark greyish-brown silt	midden accumulation
1165	friable mid-yellowish-brown silt	midden accumulation
1166	loose mid-to dark grey sandy silt	midden accumulation
1167	loose dark orangish-brown silt	fill of pit
1168	sub-circular cut with steep sides and a flat base	cut of pit
1169	friable mid-grey sandy silt	midden accumulation
1170	friable mid-orangish-brown silt	midden accumulation
1171	friable mid-yellowish-brown silt	pisé erosion from a wall
1172	loose mid-to dark greyish-brown slightly sandy silt	fill of hearth
1173	sub-circular cut 0.72 x 0.36 x 0.17 m	cut of hearth
1174	friable dark brown silt	midden accumulation
1175	friable vary dark greyish-brown mixed with mid-orangish-brown silt	fill of hearth
1176	loose mid-to dark grey sandy silt with a high concentration of fire cracked stones	midden accumulation
1177	mid-orangsih-brown slightly sandy silt	fill of pit
1178	sub-circular cut with moderately sloping sides and a concave base	cut of pit
1179	friable mid-to dark grey pisé rubble with frequent fire cracked stone	midden and pisé rubble accumulation
1181	loose mid-orangish-brown with moderate charcoal and frequent pisé lumps	fill of pit
1182	sub-round cut 0.52 x 0.18 x 0.11 m	cut of pit
1183	firm to friable light yellowish-brown silt	localised external mud-plaster surface in area of midden
1184	friable mid-orangish-brown silt	fill of pit
1185	friable to loose dark brownish-grey with frequent angular stones	fill of pit
1186	irregular cut with steep sides and a flat base	cut of pit
1187	loose to friable mid-to dark grey sandy silt with patches of light greyish-yellow pisé fragments and frequent angular heat cracked stone	midden and pisé rubble accumulation
1188	friable light brownish-yellow silt	pisé erosion from a wall
1189	friable mid-brownish-grey silt	fill of pit
1190	circular cut with steep sides and a concave base	cut of pit
1194	friable dark greyish-yellow silt	midden accumulation
1201	loose to friable mid-to dark greyish-brown slightly sandy silt	midden accumulation
1212	loose to friable mid-grey sandy silt	midden accumulation
1237	loose to friable very dark greyish-brown sandy silt	midden accumulation
1239	loose to friable dark greyish-brown silt	midden accumulation

Table 35.1 Contexts excavated in Midden O60 with sedimentary descriptions and interpretations continued...

Context	Description	Interpretation
1240	loose to friable dark greyish-brown slightly sandy silt	midden accumulation
1245	irregular circuit of of large angular and sub-angular stones up to 0.25 m in size (not heat cracked)	stone setting in midden
1249	loose to friable mid-to dark grey sandy silt	midden accumulation
1252	loose to friable mid-to dark grey sandy silt	midden accumulation
1278	friable mid-brown sandy silt	burial fill
1293	articulated human skeleton	primary crouched inhumation burial
1787	sub-circular cut with steep sides and a concave base reaching flat stone in the deposit below	burial cut
1788	roughly hewn large stones in two courses within a cut and includes a number of broken ground-stone fragments	stone lining of burial cut

Table 35.2 Quantities of bulk finds from Midden O60 by material and context number.

Object 60	**Volume of sediment (l)**				**Weight of bulk finds per material (g)**											
Context	**Total volume**	**Flot. sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Ground stone**	**Other worked stone**	**Unworked stone**	**Animal bone**	**Human bone**	**Marine shell**	**Other shell**	**Plaster/Pisé**	**Charcoal**	**Misc.**	
84	31.0	30.0	0.0	1.0	281.2	0.0	4.4	0.0	67.6	0.0	0.0	69.7	0.0	0.0	0.0	
97	685.0	30.0	654.0	1.0	7716.2	3770.0	40.3	0.0	1050.8	0.0	10.0	116.0	0.0	0.0	0.0	
99	31.0	30.0	0.0	1.0	6007.2	1260.0	31.1	200	1440.6	0.0	0.0	142.8	0.0	0.0	10.0	
100	794.0	42.0	750.0	2.0	7902.4	2100.0	20.1	0.0	599.7	0.0	10.0	279.6	0.0	0.0	10.0	
107	571.0	30.0	540.0	1.0	5932.2	280.0	20.0	0.0	492.2	0.0	0.0	80.5	0.0	0.0	40.0	
110	881.0	30.0	850.0	1.0	7806.8	470.0	90.0	0.0	1011.9	0.0	0.0	102.2	0.0	10.0	50.0	
111	431.0	30.0	400.0	1.0	5557.9	0.0	25.1	0.0	612.9	0.0	0.0	326.6	0.0	0.0	10.0	
113	144.0	30.0	113.0	1.0	6878.6	40.0	30.7	0.0	167.1	0.0	0.0	473.5	0.0	10.0	0.0	
115	666.0	30.0	635.0	1.0	8411.0	380.0	12.2	0.0	749.8	0.0	0.0	64.2	0.0	80.0	10.0	
121	1431.0	30.0	1400.0	1.0	14271.5	350.0	120.0	0.0	3436.8	0.0	0.0	46.8	0.0	10.0	70.0	
122	184.0	30.0	153.0	1.0	1959.5	0.0	6.5	0.0	129.9	0.0	0.0	51.0	0.0	0.1	0.0	
194	1291.0	30.0	1260.0	1.0	48669.2	10310.0	179.0	0.0	7461.5	0.0	30.0	145.0	0.0	0.0	120.0	
199	31.0	30.0	0.0	1.0	4283.6	550.0	88.3	0.0	532.3	0.0	0.0	204.0	0.0	0.0	2.0	
201	31.0	30.0	0.0	1.0	1805.3	1152.0	3.3	0.0	69.7	0.0	0.0	48.8	0.0	0.0	0.0	
203	611.0	30.0	580.0	1.0	31521.1	1690.0	206.6	0.0	4506.2	0.0	0.0	44.7	0.0	0.0	145.0	
211	0.0	0.0	0.0	0.0	1240.0	0.0	10.0	0.0	35.0	0.0	0.0	0.0	0.0	0.0	0.0	
223	156.0	30.0	125.0	1.0	2951.6	1180.0	10.0	0.0	56.4	0.0	0.0	37.5	0.0	0.0	0.0	
229	411.0	30.0	380.0	1.0	5387.4	0.0	10.3	0.0	262.2	0.0	0.0	75.2	0.0	0.0	0.0	
233	613.0	30.0	582.0	1.0	8969.1	10.0	50.3	0.0	7966.1	0.0	0.9	103.3	0.0	0.0	30.0	
240	31.0	30.0	0.0	1.0	16150.7	1490.0	70.0	0.0	852.7	0.0	10.0	156.7	0.0	50.0	60.0	
340	10.0	10.0	0.0	0.0	37.9	0.0	0.0	0.0	1.2	0.0	0.0	23.6	0.0	5700.5	0.0	
343	1210.0	30.0	1179.0	1.0	23632.8	3500.0	260.0	0.0	4391.8	0.0	0.0	55.8	0.0	20.0	60.0	
345	0.0	0.0	0.0	0.0	0.0	0.0	0.0	700.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
347	1077.0	30.0	1046.0	1.0	11036.9	950.0	80.0	0.0	2842.7	0.0	10.0	89.9	0.0	0.0	30.0	
353	1331.0	30.0	1300.0	1.0	20983.5	560.0	160.0	0.0	4065.7	0.0	0.0	37.6	0.0	0.0	30	
359	27.0	27.0	0.0	0.0	410.5	0.0	0.0	0.0	27.3	0.0	0.0	94.7	0.0	0.0	0.0	
363	1977.0	90.0	1886.0	1.0	56412.3	405.0	866.2	0.0	27865.6	0.0	0.5	223.4	0.0	40.3	40.0	
375	821.0	30.0	790.0	1.0	18290.0	1700.0	50.7	0.0	2541.9	0.0	20.0	945.2	0.0	30.0	10.0	

Table 35.2 Quantities of bulk finds from Midden O60 by material and context number continued...

Object 60	Volume of sediment (l)				Weight of bulk finds per material (g)										
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Unworked stone	Animal bone	Human bone	Marine shell	Other shell	Plaster/Pisé	Charcoal	Misc.
438	31.0	30.0	0.0	1.0	30725.9	1320.0	125.0	0.0	4935.8	0.0	70.0	82.7	0.0	10.0	180.0
446	709.0	30.0	678.0	1.0	11766.9	0.0	120.0	0.0	515.4	0.0	11.9	96.7	0.0	10.0	25.0
453	31.0	30.0	0.0	1.0	25655.0	205.0	331.0	0.0	3527.2	0.0	0.0	60.2	0.0	10.0	20.0
524	41.0	30.0	10.0	1.0	600.0	0.0	0.0	0.0	51.5	0.0	0.0	81.7	0.0	0.0	0.0
527	31.0	30.0	0.0	1.0	140.1	0.0	0.0	0.0	15.6	0.0	0.0	137.8	0.0	0.1	0.0
567	1134.0	140.0	992.0	2.0	20180.1	1900.0	62.5	20.0	1520.7	0.0	3.0	1229.7	0.0	11.1	0.0
568	2072.0	240.0	1831.0	1.0	44675.8	2051.8	702.5	1.7	21104.4	11.0	3.8	321.8	0.0	0.7	40.0
569	515.0	80.0	435.0	0.0	8655.0	150.0	73.1	0.0	1372.1	0.0	1.0	678.9	0.0	1.1	0.0
570	952.0	140.0	811.0	1.0	21938.1	757.1	90.0	70.0	1691.5	0.0	0.0	1747.0	0.0	2.5	33.0
571	2007.0	250.0	1756.0	1.0	47792.2	1566.9	986.3	0.2	23624.4	0.0	33.6	554.5	0.0	11.5	20.0
572	280.0	40.0	240.0	0.0	2457.3	80.0	1.1	0.0	116.7	0.0	0.0	376.7	810.0	0.2	0.0
574	20.0	10.0	10.0	0.0	696.5	0.0	0.1	0.0	6.4	0.0	0.0	53.1	0.0	0.0	0.0
575	1033.0	140.0	892.0	1.0	20672.1	977.4	37.1	0.0	1738.6	20.0	2.2	2475.5	250.0	21.8	10.7
576	1796.0	250.0	1545.0	1.0	49007.5	1162.3	1502.8	50.0	22001.0	0.0	1.3	841.0	170.0	1.5	50.3
577	766.0	80.0	685.0	1.0	4526.8	153.9	21.5	0.0	246.3	0.0	0.5	327.8	2350.0	1.3	0.0
578	736.0	30.0	705.0	1.0	8738.0	0.0	203.1	20.0	451.1	0.0	0.0	61.8	0.0	0.0	0.0
581	0.0	0.0	0.0	0.0	400.0	0.0	101.0	0.0	602.0	0.0	1.0	0.0	0.0	0.0	0.0
681	181.0	30.0	150.0	1.0	1368.5	0.0	1.0	0.0	65.4	0.0	0.0	50.0	0.0	0.0	0.0
683	928.0	140.0	787.0	1.0	20820.5	1651.4	67.8	510.0	1820.2	0.0	2.5	664.5	700.0	10.3	40.0
684	1891.0	250.0	1640.0	1.0	42266.1	5168.9	568.7	151.0	20069.1	0.0	1.0	268.5	0.0	41.0	0.0
685	614.0	70.0	543.0	1.0	2940.8	367.0	33.5	0.0	416.1	0.0	0.0	14.0	0.0	23.0	3.3
687	284.0	0.0	283.0	1.0	1480.0	0.0	20.0	0.0	110.0	0.0	0.0	0.0	0.0	0.0	0.0
691	981.0	30.0	950.0	1.0	8290.9	650.0	37.2	10.0	729.8	0.0	0.0	40.9	0.0	0.0	0.0
699	872.0	140.0	731.0	1.0	22692.5	7460.5	102.0	0.0	2431.8	0.0	0.0	296.8	20.0	43.2	0.0
700	2564.0	230.0	2333.0	1.0	73197.1	5407.1	639.1	160.0	34500.1	0.0	20.0	180.3	0.0	0.7	60.0
703	441.0	30.0	410.0	1.0	4031.7	20.0	19.6	0.0	334.1	0.0	0.0	211.1	0.0	0.9	0.0
705	1201.0	169.0	1017.0	15.0	18959.7	3852.0	33.3	0.0	1054.9	10.0	0.0	236.6	144.0	0.4	0.0
706	2439.0	240.0	2198.0	1.0	61448.4	19499.4	798.0	10.0	21225.3	0.0	0.0	309.8	0.0	5.7	15.0
758	31.0	30.0	0.0	1.0	11731.1	0.0	352.0	0.0	2258.3	0.0	0.0	12.7	0.0	0.0	0.0
763	31.0	30.0	0.0	1.0	8237.1	770.0	56.7	10.0	115.9	0.0	0.0	40.2	0.0	0.0	0.0
796	31.0	30.0	0.0	1.0	17710.0	2600.0	61.0	50.0	2205.0	0.0	21.0	0.0	0.0	0.0	0.0
797	1171.0	30.0	1140.0	1.0	20207.2	1577.6	132.6	30.0	2934.7	0.0	0.0	32.6	0.0	0.0	0.0
798	2621.0	60.0	2560.0	1.0	8470.3	1770.0	99.2	20.0	1060.4	0.0	20.0	0.4	0.0	3.0	0.0
799	1127.0	111.0	1015.0	1.0	7424.7	3600.0	69.0	0.0	914.0	0.0	5.0	20.4	0.0	18.0	10.0
802	1093.0	130.0	960.0	3.0	6065.7	2525.0	34.7	1.0	430.5	0.0	0.0	23.3	0.0	24.0	0.0
1113	1455.0	160.0	1294.0	1.0	27309.8	6740.0	294.5	61.0	5656.6	0.0	0.0	30.0	0.0	13.1	0.0
1114	540.0	70.0	469.0	1.0	5882.0	1710.0	9.1	0.0	4211.0	0.0	0.0	0.0	0.0	8.0	0.0
1115	749.0	80.0	668.0	1.0	8964.2	830.0	46.0	10.0	524.7	0.0	0.0	98.7	0.0	12.4	3.0
1117	629.0	80.0	548.0	1.0	2977.0	3735.0	24.9	30.0	1027.4	0.0	0.0	23.29	0.0	1.0	0.0
1118	419.0	70.0	348.0	1.0	3662.8	1225.0	2.4	45.0	624.3	0.0	0.0	112.8	0.0	13.1	0.0
1126	1189.0	220.0	967.0	2.0	28267.4	5575.0	381.5	3.0	5358.1	0.0	11.2	219.8	0.0	17.2	10.0
1127	596.0	70.0	525.0	1.0	7513.1	4148.0	72.0	0.0	440.7	0.0	10.0	41.6	0.0	65.1	1.0
1128	571.0	90.0	480.0	1.0	7317.7	3441.9	17.0	0.0	1044.4	0.0	1.0	516.0	0.0	2.4	0.0
1130	1264.0	160.0	1103.0	1.0	26680.0	5539.7	408.0	0.0	10590.2	0.0	20.6	216.1	0.0	129.1	10.0

Table 35.2 Quantities of bulk finds from Midden O60 by material and context number continued...

Object 60	Volume of sediment (l)				Weight of bulk finds per material (g)										
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Unworked stone	Animal bone	Human bone	Marine shell	Other shell	Plaster/Pisé	Charcoal	Misc.
1131	645.3	60.0	583.3	2.0	4608.6	890.0	18.0	0.0	442.8	0.0	0.0	10.8	0.0	132.2	0.0
1132	626.65	150.0	475.65	1.0	9310.7	3910.0	21.0	20.0	437.0	0.0	1.1	551.6	0.0	18.3	0.0
1133	1771.5	130.0	1639.5	2.0	52530.8	22430.0	362.6	20.0	21886.8	0.0	1.0	52.8	0.0	134.4	10.9
1134	51.0	35.0	15.0	1.0	372.4	275.0	0.1	0.0	48.5	0.0	0.0	7.8	0.0	50.1	0.0
1135	709.5	80.0	628.5	1.0	13048.5	4636.4	21.0	40.0	757.9	0.0	20.0	241.8	0.0	72.0	0.0
1139	1481.0	10.0	1470.0	1.0	26695.5	10595.0	295.0	0.0	6635.0	0.0	0.0	0.0	0.0	0.0	0.0
1140	1142.0	130.0	1011.0	1.0	17581.3	13597.8	134.1	30.0	10369.9	0.0	1.0	50.9	0.0	0.0	0.0
1141	191.0	10.0	180.0	1.0	752.0	500.0	0.0	0.0	108.0	0.0	0.0	0.0	0.0	0.0	0.0
1143	1343.0	140.0	1202.0	1.0	18744.6	13669.0	86.2	0.0	7376.9	0.0	1.0	24.8	0.0	10.0	1.9
1145	1043.0	30.0	1012.0	1.0	31874.4	11664.8	93.1	1.1	1784.0	0.0	2.1	21.7	0.0	48.0	10.0
1146	809.0	40.0	768.0	1.0	20216.7	12790.0	267.5	0.0	4819.8	0.0	0.0	23.3	0.0	16.2	0.0
1147	1226.0	10.0	1215.0	1.0	24248.7	4413.9	246.2	0.0	8727.5	0.0	0.0	14.0	0.0	9.0	0.0
1148	436.0	30.0	405.0	1.0	13787.7	15760.0	44.2	0.0	1571.0	0.0	0.0	3.8	1.0	72.1	0.0
1149	620.0	40.0	580.0	0.0	16077.5	11950.0	174.8	0.0	10002.5	0.0	0.0	8.4	0.0	15.1	0.0
1150	581.0	60.0	520.0	1.0	10054.3	2665.0	477.8	0.0	3273.4	0.0	0.0	2.0	0.0	3.0	0.0
1152	15.0	15.0	0.0	0.0	221.7	0.0	0.6	0.0	29.5	0.0	0.0	7.5	0.0	0.0	0.0
1154	2743.0	130.0	2612.0	1.0	53750.1	14795.0	195.8	95.0	16986.8	0.0	1.0	28.3	0.0	43.0	0.0
1155	1025.0	30.0	995.0	0.0	25773.9	9050.0	344.7	5.0	15007.1	0.0	10.0	8.3	0.0	65.9	0.0
1156	639.0	70.0	567.0	2.0	12526.0	6470.0	142.3	40.0	5524.9	0.0	1.0	7.1	0.0	2.0	0.0
1158	143.0	30.0	112.0	1.0	6226.6	1640.0	11.1	1.0	652.6	0.0	0.0	11.2	0.0	17.0	5.2
1159	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1160	191.0	50.0	136.0	5.0	4673.8	1550.0	1.5	0.0	2669.0	0.0	0.0	16.5	0.0	2.0	0.0
1161	544.0	40.0	503.0	1.0	10009.7	3135.0	63.8	70.0	2664.8	0.0	0.0	7.1	0.0	0.0	0.0
1163	414.0	40.0	374.0	0.0	8239.4	3135.0	99.0	40.0	4273.2	0.0	10.0	5.2	0.0	0.0	40.0
1164	265.0	20.0	244.0	1.0	1181.4	0.0	3.2	0.0	26.3	0.0	0.0	24.7	10.0	10.0	0.0
1165	3.0	2.0	0.0	1.0	123.5	0.0	0.2	0.0	20.6	0.0	0.0	0.0	0.0	0.1	0.0
1166	1307.0	40.0	1267.0	0.0	23934.8	4945.0	55.1	0.0	14322.2	0.0	0.0	37.2	0.0	33.0	0.0
1167	2.0	2.0	0.0	0.0	69.5	0.0	0.0	0.0	12.2	0.0	0.0	0.6	0.0	0.0	0.0
1169	461.0	10.0	450.0	1.0	8533.9	3720.0	10.0	0.0	4050.1	0.0	0.0	4.6	0.0	20.2	0.0
1170	121.0	10.0	110.0	1.0	217.1	60.0	10.2	0.0	134.2	0.0	0.0	13.3	0.0	1.0	0.0
1171	33.0	10.0	22.0	1.0	1436.9	0.0	4.1	0.0	280.3	0.0	0.0	62.8	0.0	0.0	0.0
1172	5.0	4.0	0.0	1.0	88.7	0.0	0.0	0.0	108.1	0.0	0.0	6.0	0.0	0.0	0.0
1174	508.0	50.0	457.0	1.0	14556.0	6171.0	46.0	10.0	7362.0	0.0	10.0	0.0	0.0	15.0	0.0
1175	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0
1176	401.0	30.0	370.0	1.0	12338.7	3009.1	20.2	0.0	5246.7	0.0	0.0	17.5	0.0	6.1	0.0
1177	10.0	9.0	0.0	1.0	189.8	0.0	0.3	0.0	115.7	0.0	0.0	0.0	0.0	10.0	0.0
1179	230.0	10.0	220.0	0.0	13564.2	760.0	4.5	0.0	1076.5	0.0	0.0	5.7	0.0	6.1	7.3
1181	2.0	1.0	0.0	1.0	172.0	236.9	0.0	0.0	88.2	0.0	0.0	0.0	0.0	10.1	0.0
1183	59.0	30.0	28.0	1.0	200.0	0.0	0.0	0.0	305.5	0.0	0.0	666.6	0.0	10.0	0.0
1184	111.0	30.0	80.0	1.0	1349.7	0.0	10.0	0.0	186.2	0.0	0.0	3.0	0.0	1.0	0.0
1185	11.0	10.0	0.0	1.0	141.6	0.0	0.2	0.0	20.5	0.0	0.0	3.9	0.0	0.0	0.0
1187	286.0	50.0	234.0	2.0	12298.8	5735.5	3.0	0.0	1807.0	0.0	0.0	17.0	0.0	33.0	0.0
1188	51.0	20.0	30.0	1.0	1186.7	470.1	0.2	0.0	157.0	0.0	0.0	20.1	0.0	0.2	0.0
1189	11.0	10.0	0.0	1.0	204.4	0.0	0.3	0.0	125.2	0.0	0.0	26.2	0.0	0.1	0.0

Table 35.2 Quantities of bulk finds from Midden O60 by material and context number continued...

Object 60	Volume of sediment (l)				Weight of bulk finds per material (g)										
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Unworked stone	Animal bone	Human bone	Marine shell	Other shell	Plaster/Pisé	Charcoal	Misc.
1194	161.0	30.0	130.0	1.0	3537.5	340.0	1.6	0.0	728.0	0.0	0.0	320.0	0.0	0.0	0.0
1201	174.0	40.0	130.0	4.0	3069.3	1100.0	2.0	0.0	740.0	0.0	0.0	0.0	0.0	21.0	0.0
1212	570.0	50.0	515.0	5.0	2090.5	925.1	17.1	0.0	238.5	0.0	0.0	8.7	0.0	152.1	0.0
1237	242.0	20.0	221.0	1.0	2098.0	5762.0	10.8	0.0	2146.6	0.0	0.0	6.5	0.0	0.0	0.0
1239	159.0	20.0	138.0	1.0	2712.9	760.0	60.2	0.0	1786.3	0.0	0.0	18.5	0.0	5.0	0.0
1240	131.0	20.0	110.0	1.0	1262.6	1800.0	33.9	0.0	1677.1	0.0	0.0	3.4	0.0	0.0	0.0
1249	291.0	20.0	270.0	1.0	4640.8	450.0	7.9	0.0	4870.4	0.0	0.0	9.9	0.0	1.1	0.0
1252	296.0	20.0	275.0	1.0	11289.5	1760.0	62.0	0.0	4810.8	0.0	0.0	4.0	0.0	0.1	0.0
1278	241.0	240.0	0.0	1.0	1279.2	2013.4	3.1	0.0	75.9	0.0	0.0	135.7	0.0	6.0	0.0
Total	78079.0	7299.0	70637.0	143.0	1584142.9	341874.9	14649.5	2535.0	457478.3	41.0	390.2	19346.39	4455.0	7535.8	1333.6

proximity of the grave and hearth was probably a coincidence; it remains possible that the grave was cut from a higher level than was identified during excavation. The poorly preserved and incomplete adult skeleton (342) was lying on its right side, in a crouched position, with the head facing to the west.

- Below the midden excavated as (556=569) there was an irregular cut [573], 0.8 m x 0.6 m x 0.02 m, filled with grey sandy silt (574) (Figure 35.11).
- Below the midden excavated as (1148) another burial (Burial O101) was exposed. This comprised the bones of a child (1151) in a crouched position with the right arm lying by the body and the left arm extended; the legs had been disturbed. The skeletal remains lay within a sandy silt (1152) (Figure 35.15). The possible grave cut [1153] was difficult to determine within the midden layers; it is possible that the skeleton may not have actually been placed in a cut.
- Below the midden excavated as (1150) lay a cluster of stones (1157) including rounded wadi cobbles, angular fire-cracked stones, and ground-stone tools SF1926 and SF1927.
- Below (1157), midden context (1160) overlay several features, including the truncated remains of a mud-plaster surface (1183) that was formed of compact yellowish-brown silt/silty clay and which covered an area of *c.* 4 m x 1 m. Surface (1183) had been cut by three pits or possible hearths (Figure 35.11): [1178] was a sub-circular pit 0.7 m x 0.3 m x 0.1 m, appearing to have a thin mud-plaster lining, and with a charcoal rich fill (1177); [1168] was a sub-circular pit, 0.7 m x 0.2 m x 0.1 m, with its base possibly making use of surface (1183), filled by midden material (1167); and [1182] was a sub-circular pit, 0.5 m x 0.2 m x 0.1 m, with a patch of mud plaster at its base lying on the mud-plaster surface (1183), and filled by (1181), rich in charcoal and pisé lumps. Also below (1160) and overlying (1183) was a patch of mid-yellowish-brown silt (1165) (covering an area of *c.* 1.6 m x 0.7 m), which may represent a degraded mud-plaster floor surface. Context (1165) also overlay the upper fills (1172) and (1175) of a cut [1173]. This steep-sided cut was *c.* 0.1 m x 0.4 m in area and *c.* 0.15 m deep. The upper fill (1172) comprised sandy silt, whilst the lower fill (1175) was rich in charcoal, suggesting that this feature may have served as a hearth. The relationship between hearth [1173] and floor surface (1183) is complex, and excavation revealed that surface (1183) lay partially with cut [1173] but was sealed by the basal fill (1175).
- Below the midden excavated as (1143) and immediately next to the southern external face of wall (795) of Structure O100, three lenses of pisé wash, (1159), (1171) and (1188), interspersed with thin midden deposits were excavated. These lenses likely derive from the erosion of the external face of Structure O100. The lowest lens (1188) appears to have been cut by a sub-circular pit, or a possible post-hole, [1190], which measured 0.35 m x 0.45 m x 0.15 m deep and was filled with friable brown silt (1189). Due to the ephemeral and heterogeneous nature of these deposits, the relationship between cut [1190] and the pisé wash (1188) was difficult to define.

Midden O60 produced over 1760 kg of chipped stone, over 520 kg of animal bone and a wide variety of small

Table 35.3 Quantities of small finds from Midden O60 by material and context number.

Object 60	Quantities of small finds per material (nos)													
Context	Chipped stone	Ground stone	Other stone	Worked bone	Unworked animal bone	Bone beads	Stone beads	Marine shell beads	Marine shell other	Other shell	Bitumen objects	Plaster/Pisé	Plant matter	Metal	Total small finds
97	0	0	0	0	0	0	1	2	1	0	0	0	0	0	4
99	0	1	0	1	0	0	1	1	2	0	0	0	0	0	6
100	0	0	0	3	0	0	1	1	0	0	0	0	0	0	5
107	0	0	0	0	0	0	3	0	1	0	0	0	0	0	4
110	1	0	2	0	1	0	2	0	1	0	0	0	0	0	7
111	0	0	1	0	0	0	0	0	1	0	0	0	0	0	2
113	0	1	0	0	0	0	0	1	0	0	0	0	0	0	2
115	1	0	0	0	0	0	0	0	1	0	0	0	0	0	2
121	0	0	0	0	0	0	3	2	0	0	0	0	0	0	5
194	5	3	3	1	0	0	0	1	3	0	0	0	0	0	16
201	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
203	1	0	0	0	0	0	0	0	1	0	0	0	0	0	2
211	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
229	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
233	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
240	0	1	0	0	0	0	0	2	0	0	0	0	0	0	3
343	0	3	1	0	0	0	0	0	0	0	0	0	0	0	4
347	0	0	0	0	0	0	2	2	0	0	0	0	0	0	4
353	0	1	1	1	1	0	2	1	1	0	0	0	0	0	8
363	3	1	14	1	0	0	29	3	8	1	0	0	1	1	62
375	0	2	1	3	1	0	3	1	1	1	0	0	0	0	13
438	1	0	2	2	1	0	1	7	3	0	0	0	0	0	17
446	0	4	2	1	0	0	3	3	3	0	0	0	0	0	16
453	2	0	2	0	0	0	5	3	2	1	0	0	0	0	15
527	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
567	0	1	1	2	0	0	1	2	0	0	0	0	0	0	7
568	1	4	4	1	0	0	11	3	0	0	0	0	0	0	24
569	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
570	0	7	0	1	0	0	0	0	2	0	0	0	0	0	10
571	1	7	6	1	0	0	10	1	1	0	0	0	0	0	27
572	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
575	2	7	3	1	0	0	1	0	2	0	0	0	0	0	16
576	8	4	4	3	0	0	13	7	4	0	0	1	0	0	44
577	3	2	1	0	0	0	2	1	0	0	0	0	0	0	9
578	0	4	0	0	0	0	1	1	0	0	0	0	0	0	6
579	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
581	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
681	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2
683	0	6	1	1	0	0	2	1	2	0	0	0	0	0	13
684	1	1	4	4	0	2	4	2	1	0	0	0	0	0	19
685	1	1	1	0	0	0	1	1	0	1	0	0	0	0	6
691	3	1	0	0	0	0	3	1	1	0	0	0	0	0	9

Table 35.3 Quantities of small finds from Midden O60 by material and context number continued...

Object 60	Quantities of small finds per material (nos)													
Context	**Chipped stone**	**Ground stone**	**Other stone**	**Worked bone**	**Unworked animal bone**	**Bone beads**	**Stone beads**	**Marine shell beads**	**Marine shell other**	**Other shell**	**Bitumen objects**	**Plaster/Pisé**	**Plant matter**	**Metal**	**Total small finds**
699	2	4	4	2	0	0	2	1	1	0	0	0	0	0	16
700	2	3	3	4	0	1	7	10	3	0	0	0	0	0	33
703	3	3	2	0	0	0	1	1	0	0	0	0	0	0	10
705	1	2	4	1	0	0	2	1	0	0	0	0	0	0	11
706	1	5	2	2	1	3	0	6	5	1	0	0	0	0	26
758	0	2	0	1	0	0	3	7	0	0	0	0	0	0	13
763	0	6	1	0	0	0	1	3	0	0	0	0	0	0	11
796	0	0	2	0	0	1	1	2	0	0	0	0	0	0	6
797	0	2	0	0	0	0	0	0	1	0	0	0	0	0	3
799	0	2	1	0	0	0	2	0	0	0	0	0	0	0	5
802	0	3	1	0	0	0	3	5	0	0	0	0	0	0	12
1113	0	1	1	2	0	0	9	3	0	0	0	0	0	0	16
1114	0	0	0	1	0	0	1	0	1	0	0	0	0	0	3
1115	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
1117	0	2	0	0	0	0	2	2	1	0	0	0	0	0	7
1118	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
1126	0	1	2	2	0	0	7	2	1	0	0	0	0	0	15
1127	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
1128	0	7	0	1	0	0	0	2	0	0	0	0	0	0	10
1130	0	0	2	2	0	0	3	5	1	0	0	0	0	0	13
1131	0	0	0	0	0	0	2	0	1	0	0	0	0	0	3
1132	0	1	0	1	1	0	1	0	1	0	0	0	0	0	4
1133	0	3	1	4	1	0	7	6	4	0	1	0	0	0	27
1135	0	1	0	0	0	0	3	1	0	0	0	0	0	0	5
1139	0	0	0	1	0	0	4	1	0	0	0	0	0	0	6
1140	0	0	0	1	0	0	3	1	1	0	0	0	0	0	6
1143	2	3	0	2	2	0	3	2	0	1	0	0	0	0	15
1145	2	0	1	0	0	0	3	3	1	0	0	0	0	0	10
1146	1	2	1	1	1	0	4	1	1	0	0	0	0	0	12
1147	0	3	0	0	0	0	5	4	3	0	0	0	0	1	16
1148	1	2	0	3	0	0	0	1	1	0	0	0	0	0	8
1149	0	0	1	0	0	1	4	3	0	1	0	0	0	0	10
1150	0	1	0	0	0	0	1	0	0	0	0	0	0	0	2
1152	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
1154	3	9	6	2	2	0	5	2	3	0	0	0	0	0	32
1155	2	1	1	0	0	2	1	1	2	0	0	0	0	0	10
1156	0	0	1	0	0	0	1	0	3	0	0	0	0	0	5
1157	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
1158	0	4	0	0	0	0	0	1	0	0	0	0	0	0	5
1160	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
1161	1	1	1	1	0	0	0	2	0	0	0	0	0	0	6
1163	0	0	0	0	0	0	2	0	1	0	0	0	0	0	3

Table 35.3 Quantities of small finds from Midden O60 by material and context number continued...

Object 60	Quantities of small finds per material (nos)													
Context	Chipped stone	Ground stone	Other stone	Worked bone	Unworked animal bone	Bone beads	Stone beads	Marine shell beads	Marine shell other	Other shell	Bitumen objects	Plaster/Pisé	Plant matter	Metal	Total small finds
1166	0	1	1	2	2	0	5	2	3	0	0	0	0	0	16
1174	0	1	0	2	0	0	2	7	0	0	0	0	0	0	12
1176	0	3	0	0	0	0	1	1	0	0	0	0	0	0	5
1177	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
1179	0	9	0	0	0	0	1	0	0	0	0	0	0	0	10
1184	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
1187	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
1189	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2
1194	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
1212	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
1237	0	1	0	0	0	0	1	0	0	0	0	0	0	0	2
1239	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
1240	0	1	0	1	0	0	1	0	0	0	0	0	0	0	3
1249	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
1252	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2
1278	3	3	0	0	0	0	4	0	0	0	0	0	0	0	10
Total	61	164	98	69	15	10	217	145	82	7	1	2	1	1	873

Figure 35.6 Skeleton (1293), possibly dating to the Bronze Age. Scale 0.2 m.

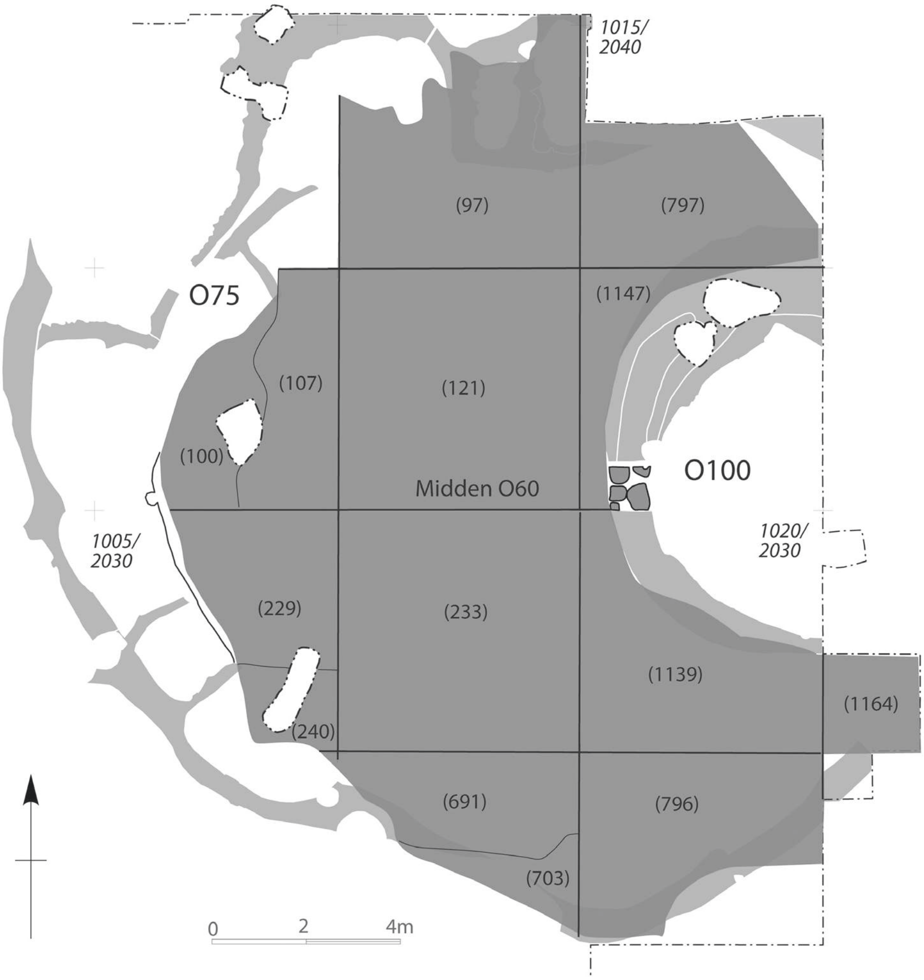


Figure 35.7 Plan of Midden O60 showing deposit (97=797=107=121=1147=229=233=1139=1164=691=796) at the top of Stratigraphic Block 2, excavated in 5 m x 5 m squares and underlying peripheral contexts (100), (240) and (703).

finds, some of which are shown in Figures 35.16 to 35.24. The high concentration of beads (Figures 35.16, 35.17) and stone vessels (Figure 35.24) has already been noted, but other objects made of bone and stone are also notable. Perhaps most striking are the incised stone objects (Figures 35.19 and 35.20), bearing a range of geometric patterns and carved stone figurines, many of which appear to be stylised zoomorphic and anthropomorphic images (Figures 35.20–35.23).

35.3 Chipped stone

The sample (n=4640 pieces) includes material from 10 out of 109 contexts with chipped stone in Midden O60. By weight, the sample (30810 g) constitutes 2% of the chipped stone bulk finds from this midden. The composition of the sampled assemblage is provided in Chapter 39.11 and a sample of artefacts is illustrated in Figures 35.25–35.27.

35.4 Radiocarbon dates

AMS radiocarbon dates were acquired from two samples of wood charcoal, both identified as tamarix, taken from the fill (340) of a hearth (345) that had been constructed within the midden and sealed by the midden deposit excavated as (556) (Table 35.4). The analysis of these dates, with calibrated values, Bayesian model and chronological interpretation is provided in Chapter 40.5 (Tables 40.1, 40.2, 40.3; Figure 40.18).

In summary, the sum (SCPD) of a chronological model suggests at least two pulses of activity represented within this hearth situated in Midden O60, this confirmed by the inconsistency of the two dates that are separated by, potentially, at least *c.* 340 years. Two explanations appear possible. First, the older sample, Beta-253738, coming from the mature stem wood of a *Tamarix* tree, might be more influenced by an old wood effect than the younger sample, Beta-253739, which derived from twig wood. The

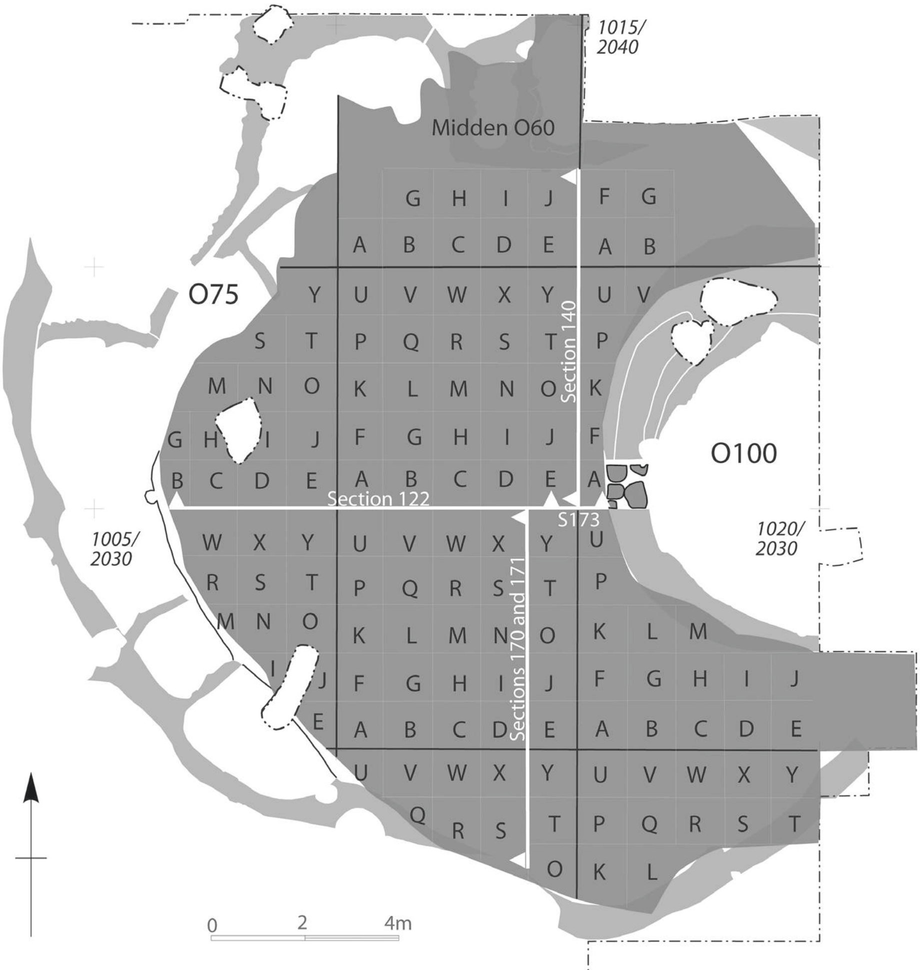


Figure 35.8 Plan showing 5 m x 5 m and 1 m x 1 m squares and the location of Sections S122, S140, S170, S171 and S173.

posterior density estimate for the younger determination, *11.26–10.79 ka cal BP*, is likely, therefore, to provide the most reliable estimate for the use of the hearth. Alternatively, all of the firewood used for the hearth in the midden might have been drawn from discarded wood found within the midden, perhaps from old structures or previous firewood. In that case, it is possible that neither of the samples have yielded a ^{14}C determination that is contemporary with the actual use of the hearth. As such, we regard the posterior density estimates for the lower and upper boundaries shown in Fig. 40.16 with caution (Table 40.2). Overall, posterior estimates place the age of the charcoal within the hearth at *13.85–11.18 ka cal BP*, with the end of associated activity estimated at *11.26–8.81 ka cal BP*.

35.5 Interpretation

Midden O60 is a large accumulation of bone, charcoal, rubble, ash and artefact-rich sediment contained within the two lower tiers of Structure O75. It abutts the outside of Structure O100 and overlies Surface O91. It amounts to a crescentic area measuring close to 16 m from east–west and over 17 m from north–south, with a volume estimated as 83 m^3. Numerous tip lines and separate dumps can be seen in sections through the midden. The midden space, while the midden was accumulating, had been used for burials, hearths and probably a range of activities including the manufacture of stone artefacts.

In light of its stratigraphic position, Midden O60 accumulated late in the history of WF16 and could feasibly consist of refuse arising from the occupation of Structure O100, and other contemporary structures, which have since been eroded and are represented by the unstructured deposits of Horizon O111. This relatively late date for the midden accumulation is confirmed by the technological and typological characteristics of the chipped-stone assemblage (Chapter 39). The two radiocarbon samples, taken from a single hearth fill, are of limited value with regard to establishing an absolute date for the midden accumulation. The inconsistency of

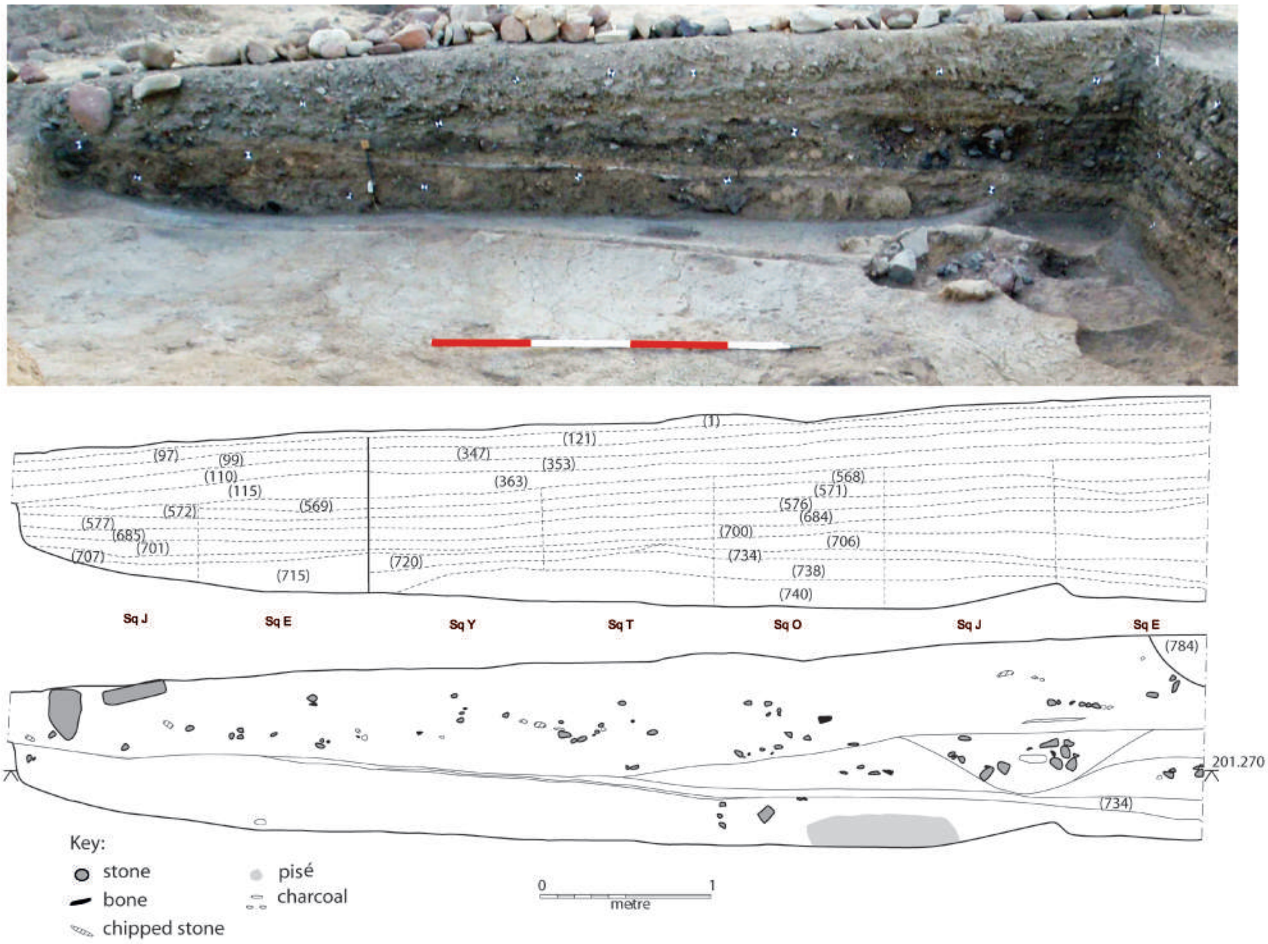


Figure 35.9 Photograph and section drawing of the west-facing Section S140 through the midden, showing numbered spits and squares (above) and the true context stratigraphy (below) that only became evident from the section. Scale in photograph 2.0 m.

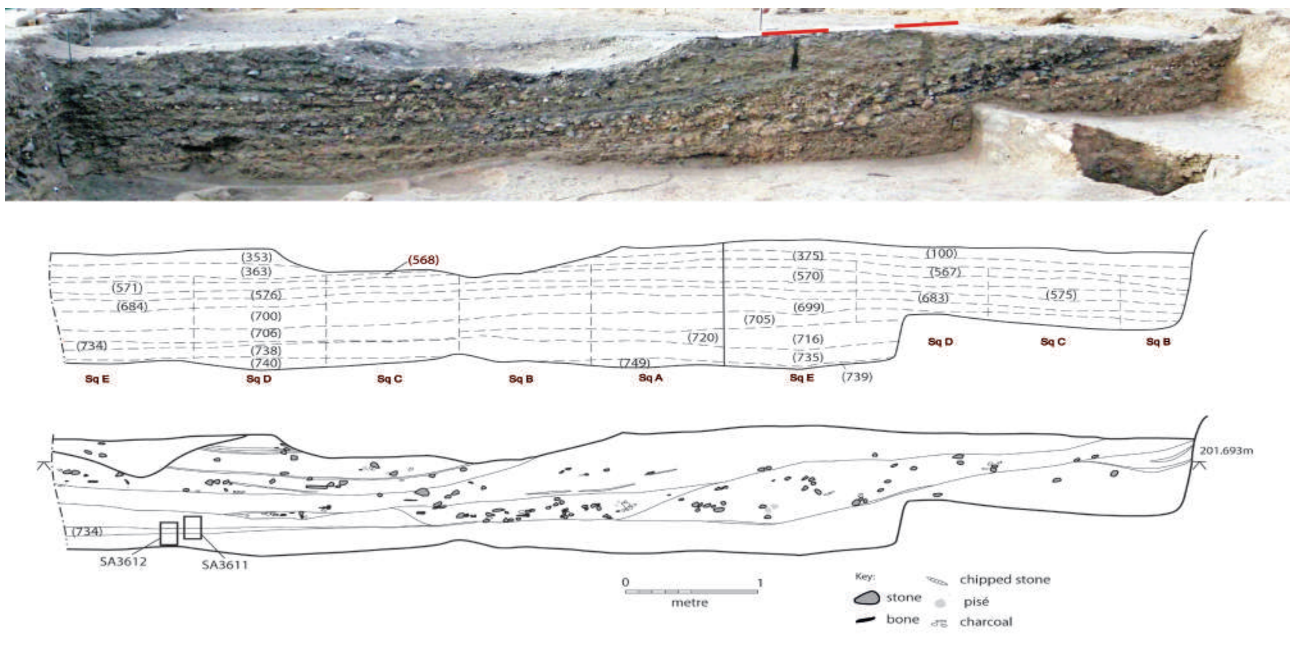


Figure 35.10 Photograph and section drawing of the north-facing Section S122 through the midden showing numbered spits and squares (above) and the true context stratigraphy (below) that only became evident from the section. Scale in photograph 2.0 m.

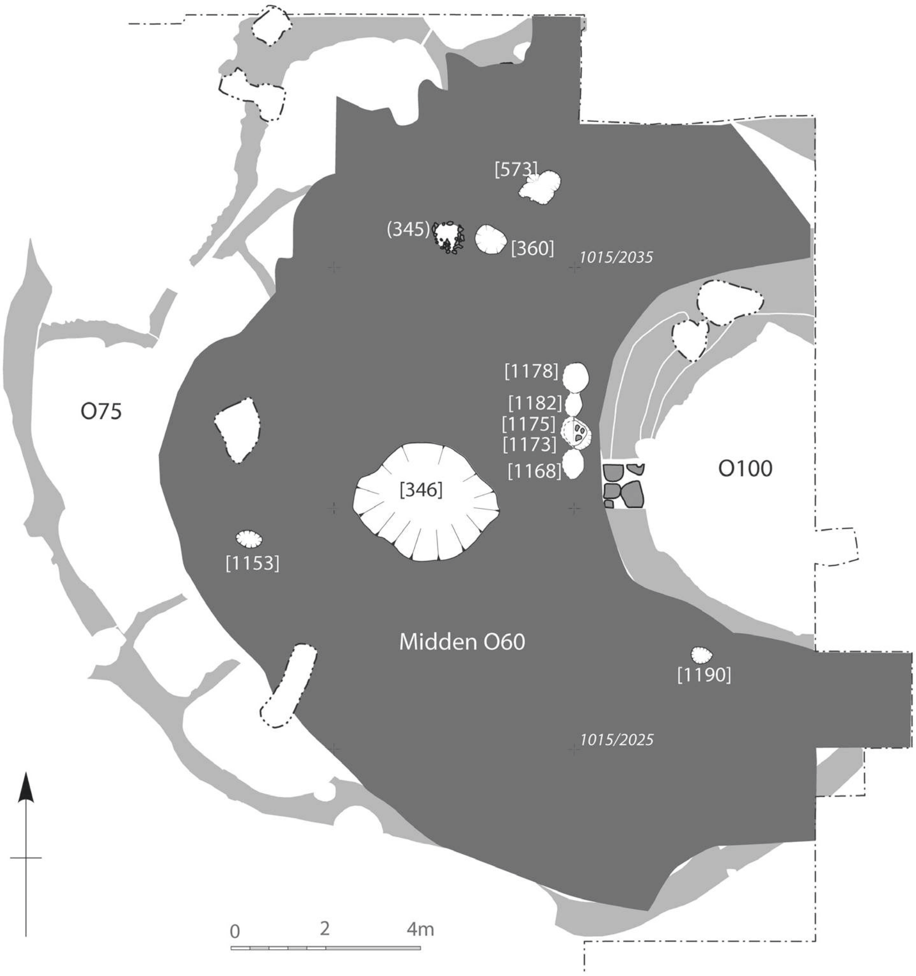


Figure 35.11 Discrete features found at various depths within Stratigraphic Block 2 of Midden O60.

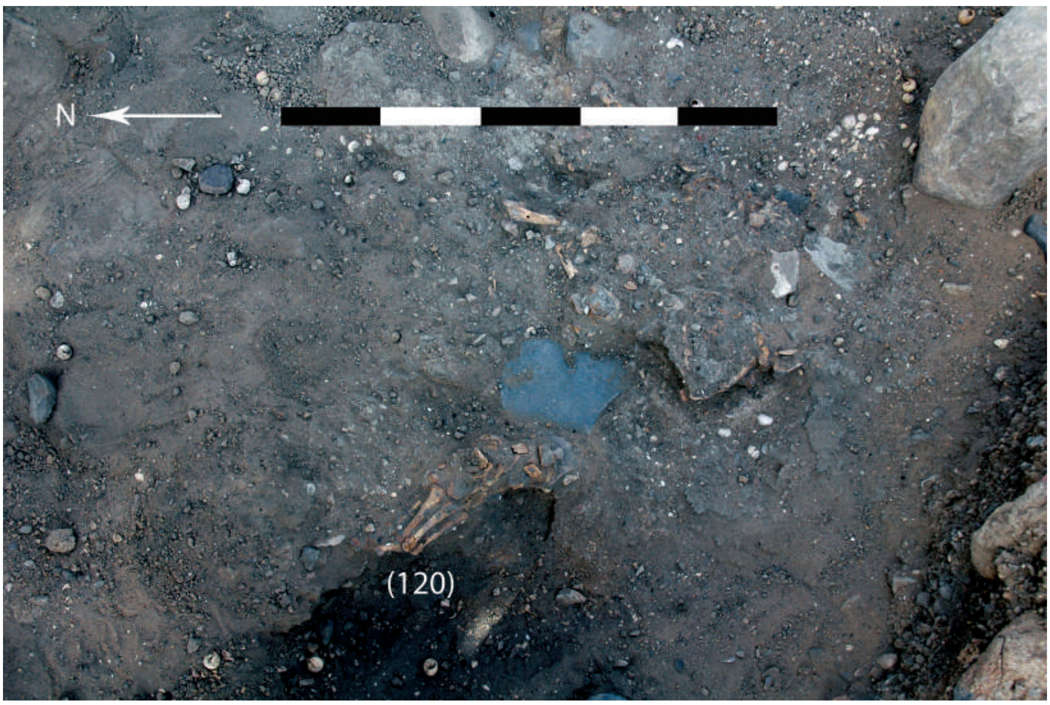


Figure 35.12 Articulated foot (120) in midden deposit (375). Scale 1.0 m.

Figure 35.13 Hearth lining (345) in Midden O60 after excavation of fill (340). Scale 0.5 m.

Figure 35.14 Adult skeleton (342) of Burial O17 within Midden O60. Scale 0.5 m.

Figure 35.15 Child skeleton (1151) of Burial O101 excavated from Midden O60. Scale 0.2 m.

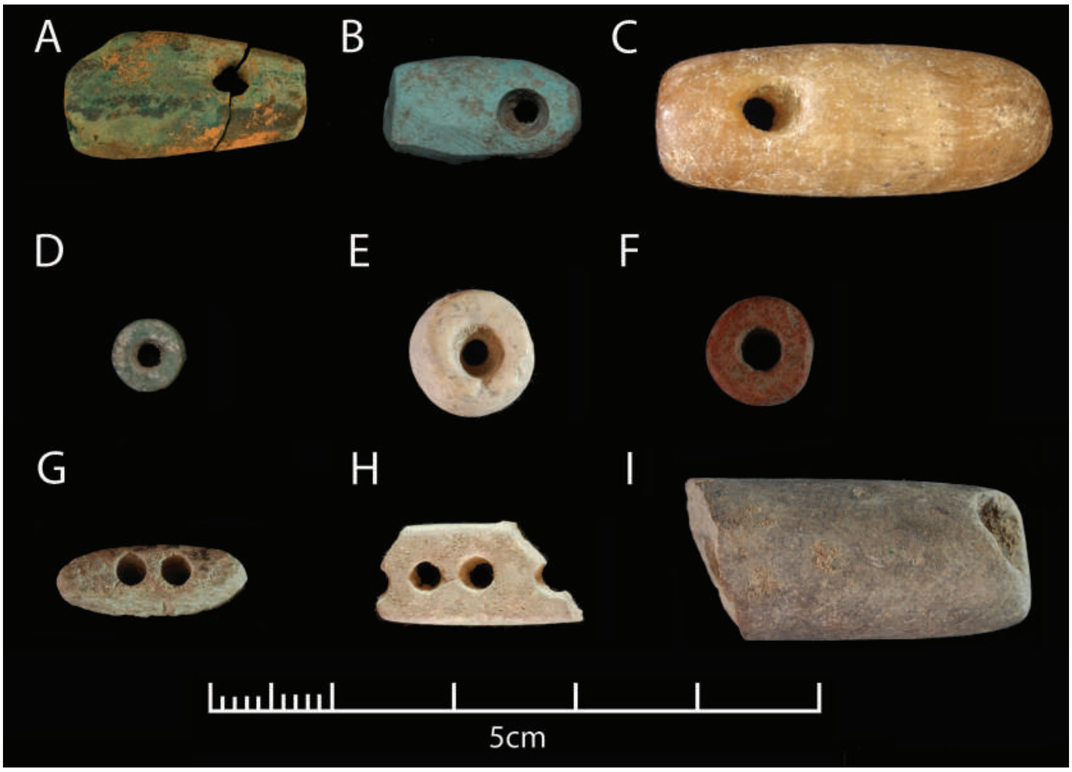


Figure 35.16 Stone beads/pendants from Midden O60: A — SF409 (context 353); B — SF506 (363); C — SF1862 (1126); D — SF607 (453); E — 1701 (796); F — 1708 (802); G — SF1723 (1117); H — 2349 (1143); and I — SF1848 (1113).

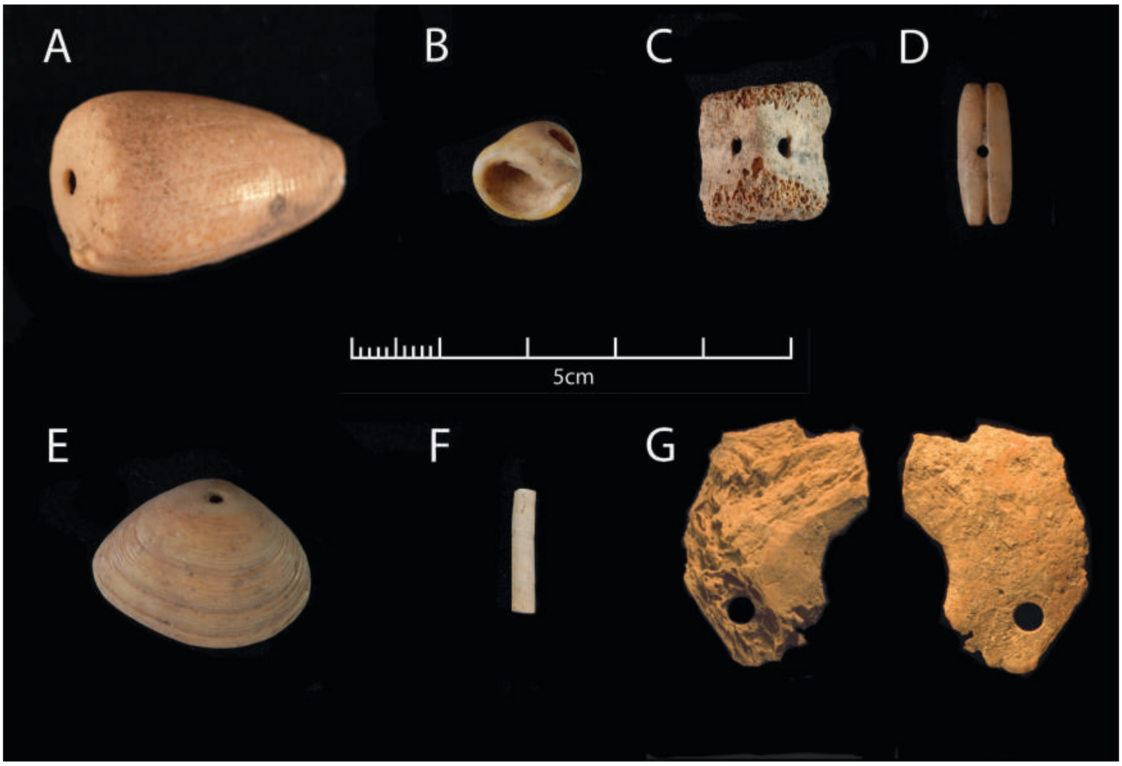


Figure 35.17 Shell and bone beads and pendants from Midden O60: A — SF998 (context 578, marine shell); B — SF1716 (1115, marine shell); C — SF2365 (1155, bone); D — SF1696 (796, bone); E — SF1710 (802, marine shell); F — SF2186 (1174, marine shell); and G — SF566 (363, bone).

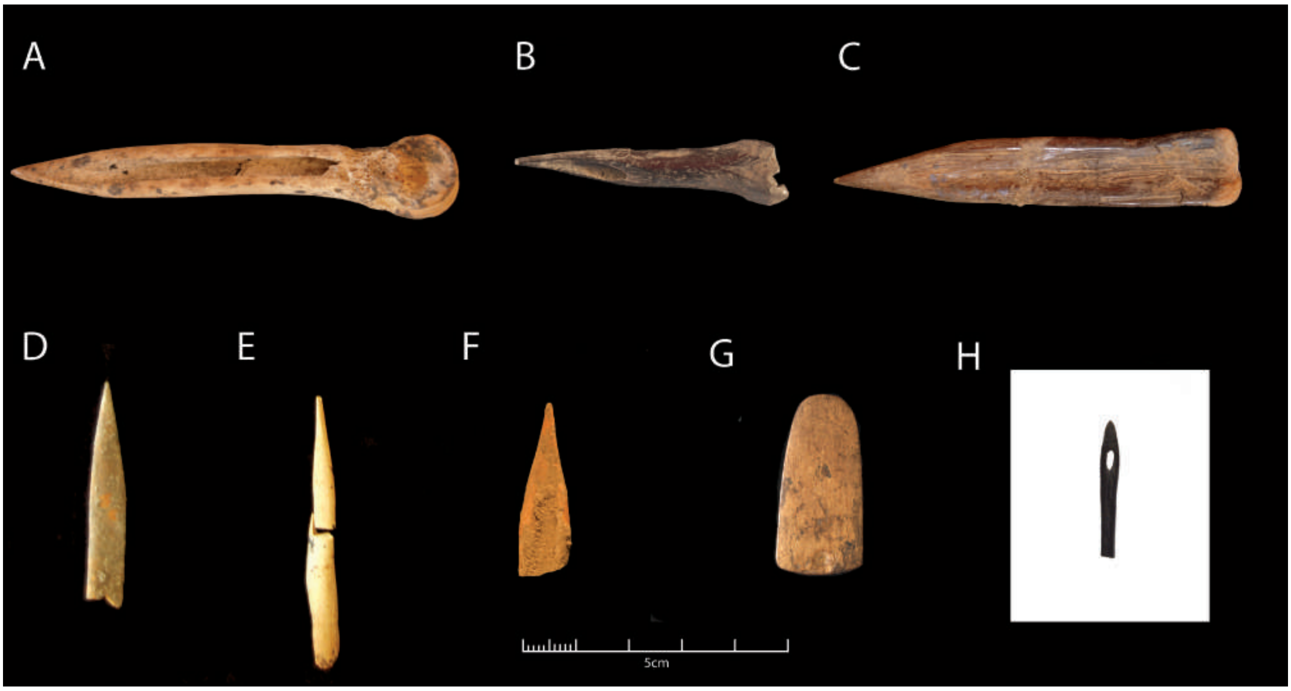


Figure 35.18 Bone tools from Midden O60: A — SF815; B — SF862 (context 570); C — SF1102 (699); D — SF529 (375); E — SF512 (375); F — SF375 (438); G — SF1898 (1133); and H — SF2200 (1148).

Figure 35.19 Incised stone objects from Midden O60: A — SF853 (context 575); B — SF481 (363); C — SF1003 (684); D — SF1096 (699); E — SF1306 (446)/SF1127 (700); F — SF1859 (1126); G — SF1712 (802); H — SF1700 (796); and I — SF1897 (1130).

the two dates suggests that one or both pieces of charcoal derive from old wood that had been burned within that hearth. As a consequence, the dates provide limited information as to when the hearth was used and the date of midden accumulation.

It is not necessary to describe each context of the midden in detail as many of these divisions are arbitrary; much of the variation will only be understood once the artefacts and environmental evidence from the deposits is analysed. The presence of burials, mud-plaster surfaces, hearths and evidence for trampling indicate that Midden O60 had functioned as an activity area, potentially including artefact manufacture and raw material procurement, in addition to being a refuse dump.

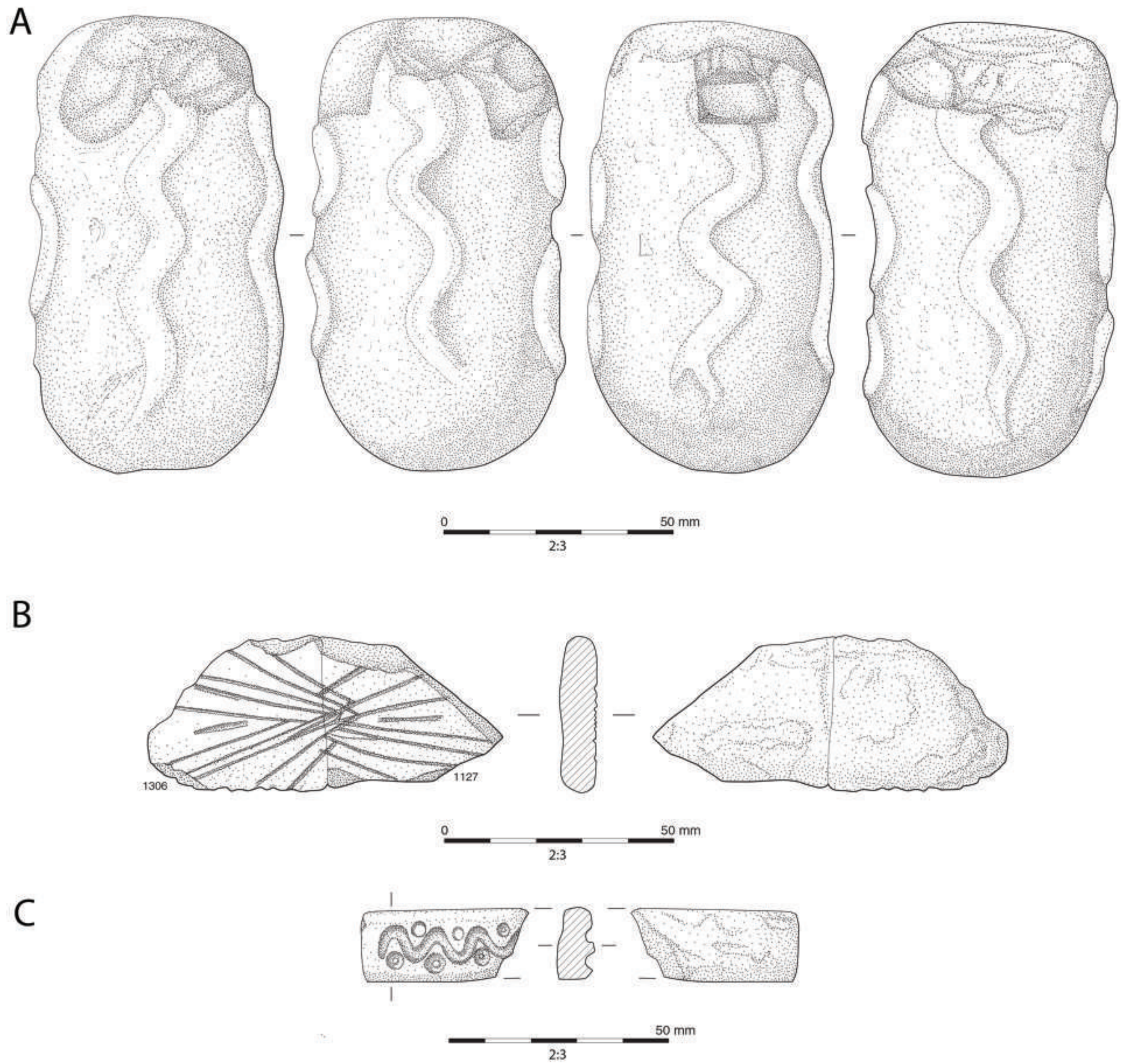


Figure 35.20 A — Decorated carved pestle SF1298 from context (706); B — refitted incised stone object SF1306/ SF1127. SF1127 was found in deposit (700) and SF1306 in deposit (446) c. 7 m apart laterally and 0.6 m in vertical difference within the midden, see also Figure 35.18E; C — incised stone object SF853 from deposit (575).

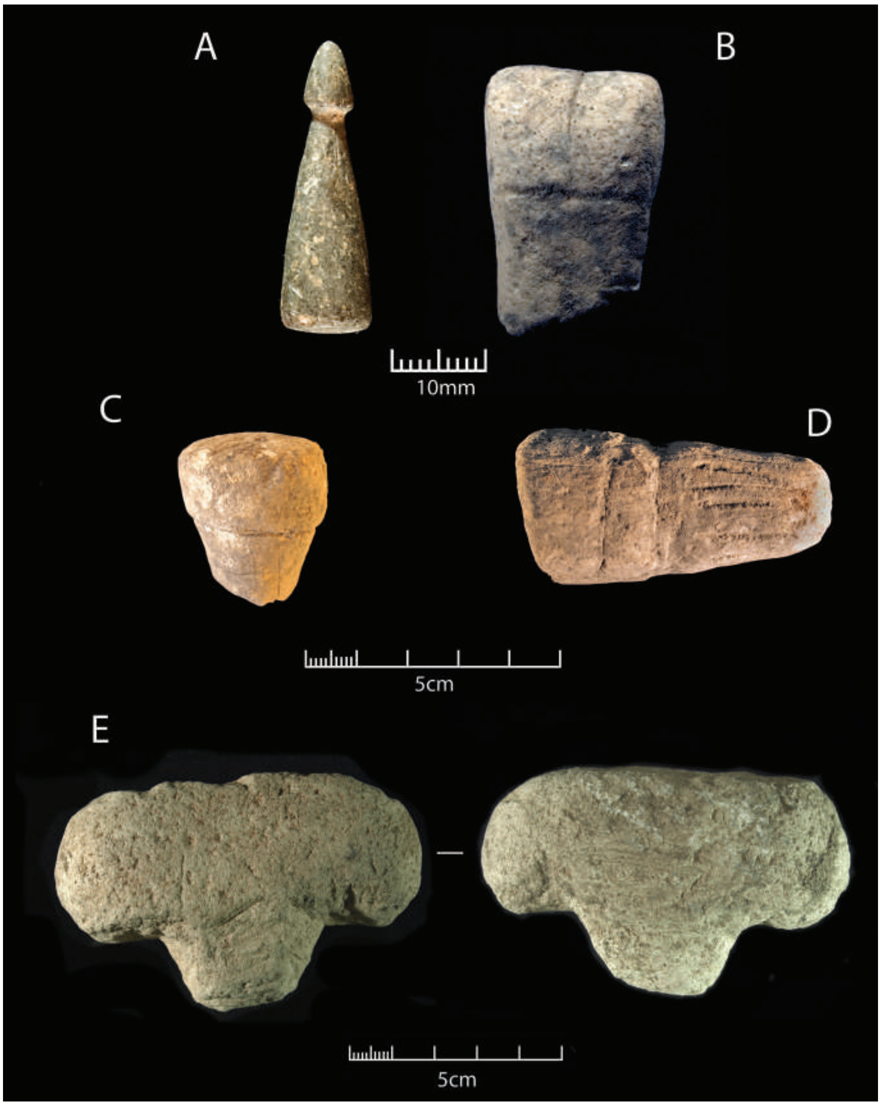


Figure 35.21 Carved stone objects from Midden O60: A — SF2177 (context 1154); B — SF103 (194); C — SF827 (571); D — SF1297 (571); E — SF1930 (1156). Note different scales.

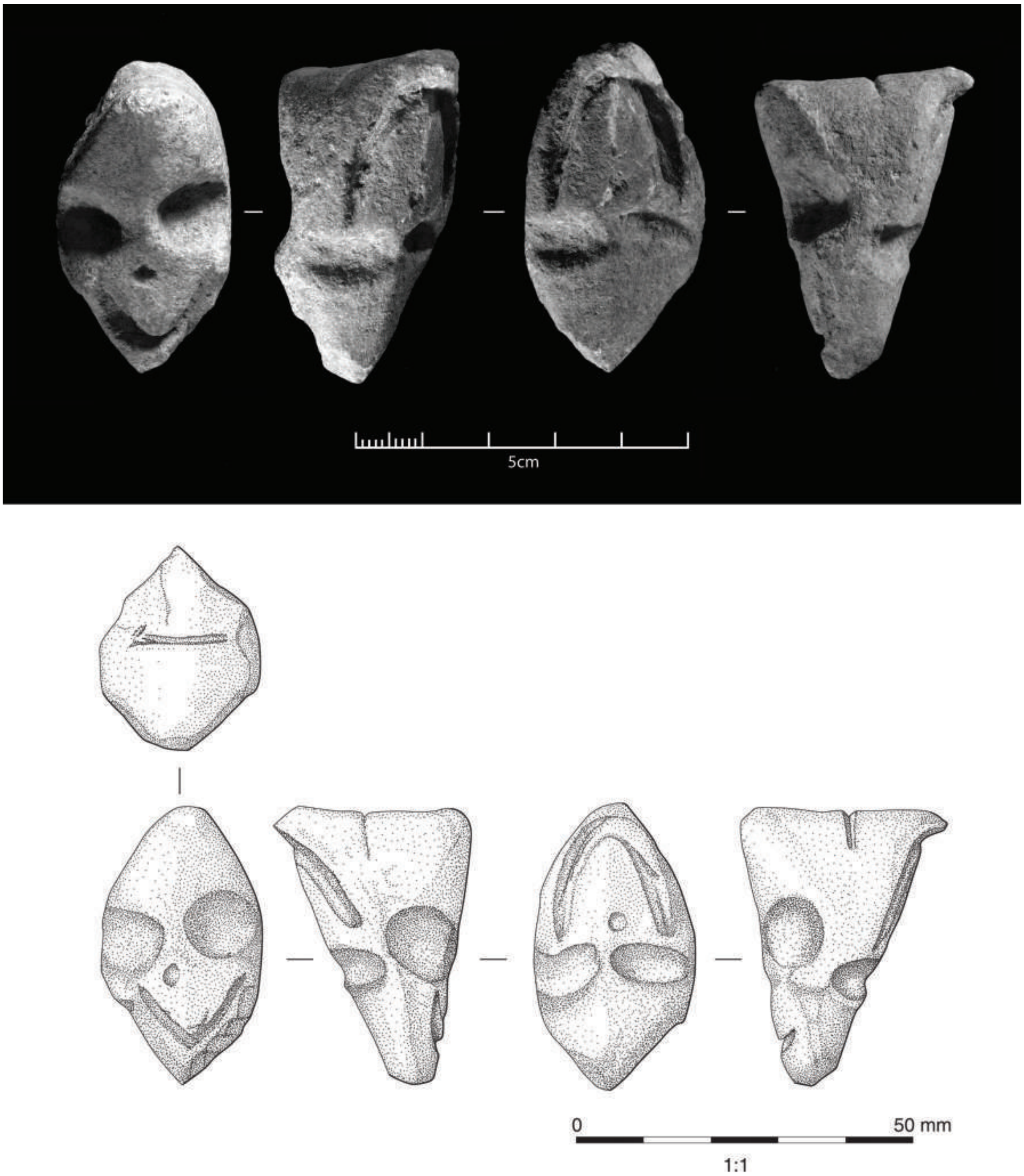


Figure 35.22 Carved stone double-faced figure SF238 from context (111).

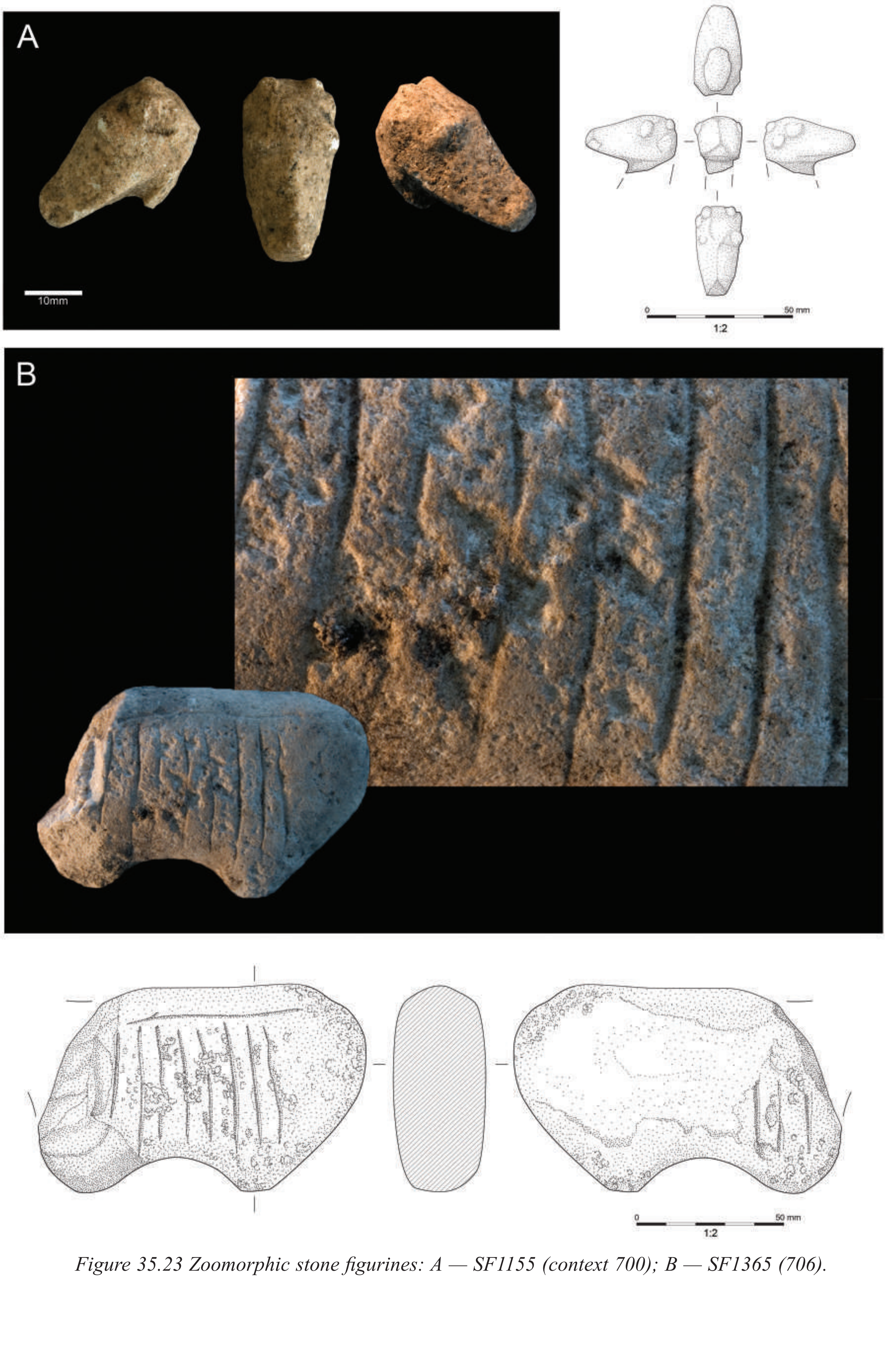


Figure 35.23 Zoomorphic stone figurines: A — SF1155 (context 700); B — SF1365 (706).

Figure 35.24 Stone cups from Midden O60: A — SF1695 (context 797); B — SF869 (575); C — SF1065 (581).

Table 35.4 AMS radiocarbon dates from Midden O60, hearth (345).

						Chronological model Posterior density estimates cal BP	
Object and Laboratory Code	**Context**	**^{14}C yrs BP**	**$\Delta^{13}C$ ‰**	**Taxa**	**Form**	**68%**	**95%**
O60							
Beta-253739	340	9660±70	-25.9	*Tamarix*	Juvenile	*11,220–10,880*	*11,260–10,790*
Beta-253738	340	9950±70	-25.6	*Tamarix*	Mature	*11,470–11,230*	*11,700–11,200*

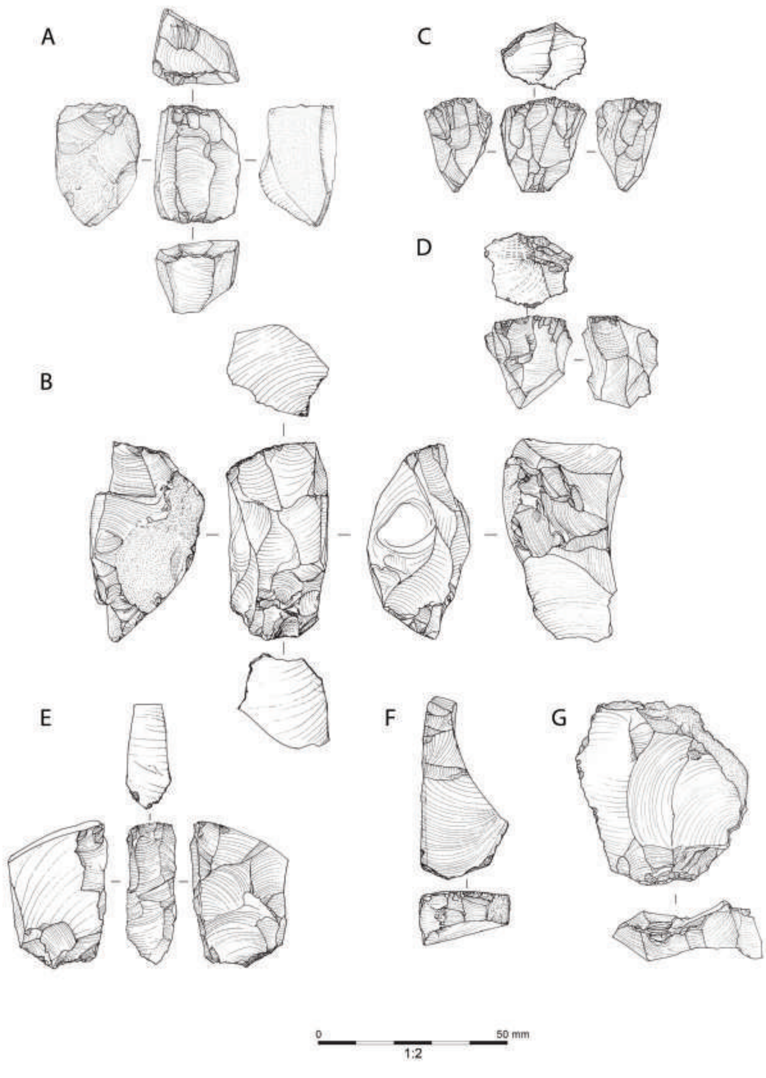


Figure 35.25 Chipped-stone artefacts from context (438) Structure O60: A — opposed platform bladelet core; B — opposed platform mixed flake/blade core; C–E single platform bladelet cores; F–G core tablets.

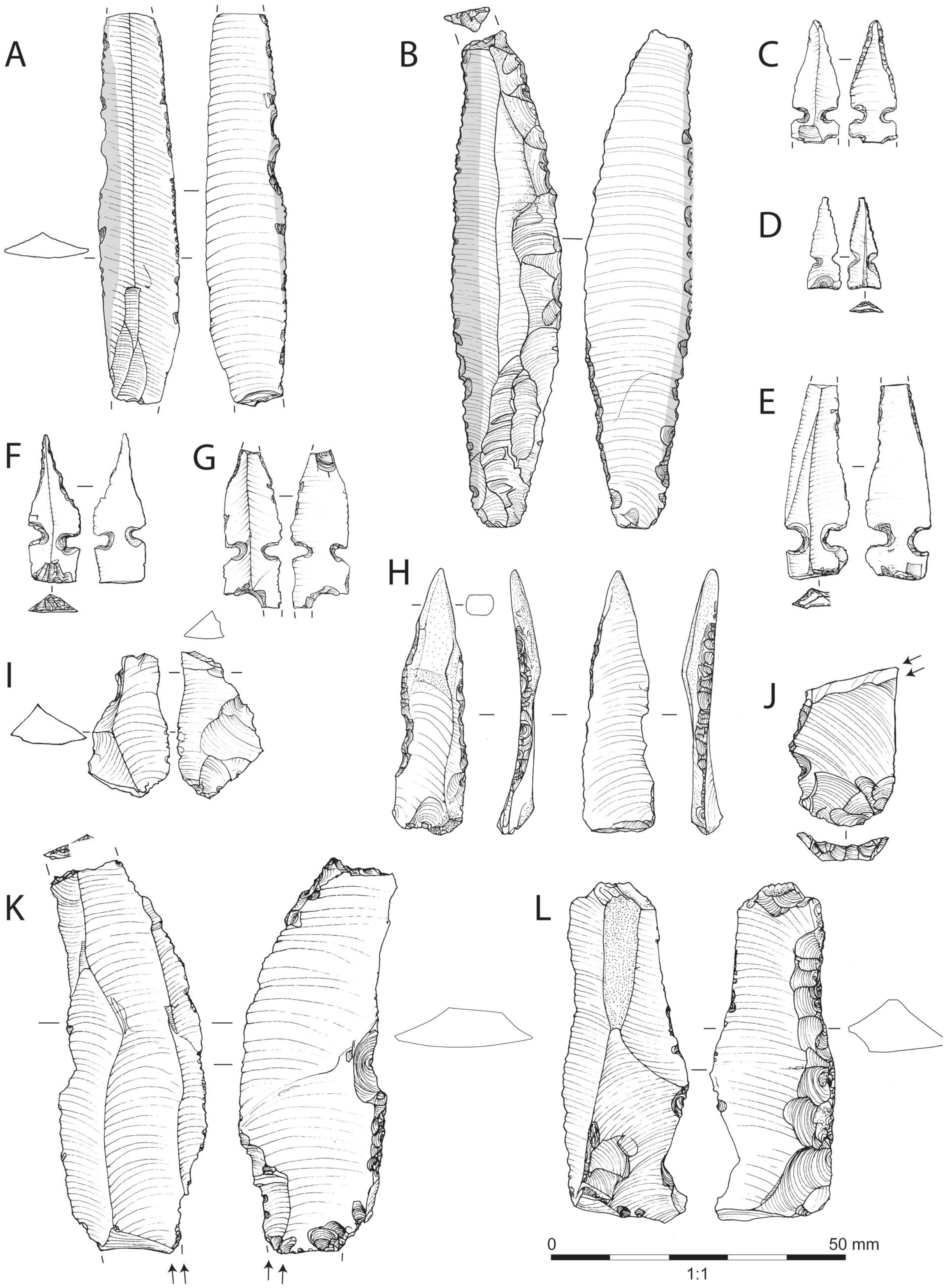


Figure 35.26. Chipped-stone artefacts from Structure O60: A — glossed blade (SF841) (571); B — glossed blade (SF2694) (1161): C — El-Khiam point (SF1011) (684); D — El-Khiam point (SF1129) (700); E — El-Khiam point (SF966) (576); F — El-Khiam point (SF983) (576); G — El-Khiam point (SF993) (576); H — awl (438); I — tranchet spall (203); J — multiple burin on core tablet (438); K — multiple burin (438); L — backed blade (438).

Figure 35.27 Polished stone artefacts from context (700) Structure O60: A — Polished basalt axe (SF1137); B — fragment of polished basalt axe (SF1130).

36. Structure O100

36.1 Location and relationship with other structures

Structure O100 is located close to the northern edge of the 2008–2010 trench and against its eastern baulk (Figure 36.1). It is a large structure, up to 9 m in diameter, with massive walls up to 2 m thick, and is positioned within the walls of Structure O75 (Chapter 38). Its construction is associated with a floor or trampled surface (O91, Chapter 37) located to the exterior of O100 and above the initial in-filling deposits of Structure O75. Structure O100 is positioned in the eastern area of Structure O75, with its eastern side extending beyond the limit of excavation and having suffered from erosion at the edge of the knoll. Overhead post-excavation views are provided in Figures 36.2 and 36.3 and the stratigraphic matrix in Figure 36.4. Table 36.1 describes the excavated contexts, while Tables 36.2 and 36.3 list the bulk and small finds, respectively.

36.2 Description of the excavated deposits

Excavation of overburden (790=791=792) in the northeast corner of the trench revealed an incomplete semi-circular circuit of stone and pisé wall (795) enclosing a space of *c.* 5.5 m x 7 m (Figure 36.5). This wall had been eroded on its eastern side following the contours of the knoll that sloped down towards the wadi and extended beyond the limit of excavation. The continuation of wall (795) could, however, be sufficiently traced on the unexcavated surface to suggest a circular shape for Structure O100. On its western side, the original thick pisé wall (795) had been later modified with the addition of stone faces (929) and (920) to the interior wall face, in a similar fashion to the addition of later pisé skins seen in other structures across the site (Figure 36.6). Wall faces (929) and (920) formed a continuous arc but, as described below, appear to be have been made using different construction methods.

The most recent deposit below the overburden and within the interior of Structure O100 was a stone-rich silty fill (801) of a large (*c.* 1.1 m x 1.4 m) oval pit [1121], that was cut, to a depth of *c.* 0.35 m, into a mid-greyish-brown sandy silt (800) that otherwise filled most of the interior of the structure.

Pit [1121] also cut the silty fills (1122) and (1124) of a second, smaller pit [1123]. At the base of pit [1123] a mud-plaster floor deposit was encountered, subsequently identified as the floor (1827) of Structure O75, where it survived below Structure O100 (Figure 36.7). It is possible that the lower fill (1124) had been over-excavated into layers of silty accumulation (923, of Structure O75). Also cutting layer (800) a third pit cut [910] was identified, filled with sandy silt (911). Another pit [925] cut into silt (923) was filled by sandy silt (926) containing mud-plaster lenses, this being excavated as part of Structure O75 (Chapter 38). This complex of pits was located at the southeastern edge of Structure O100 (Figure 36.6) and continued beyond the limit of excavation. The sections visible following removal of the pit fills exposed a sequence of mud-plaster floors and infilling deposits that had accumulated within Structure O100.

It was evident that considerable erosion of the interior deposits and the walls themselves had occurred, this having been especially severe on the eastern side of the structure leaving the wall difficult to define at its northeastern extent. The top of the northern segment of wall (795) of Structure O100 had been cut by a series of pits and post-holes (Figures 36.6 and 36.8). Pit [1191] was *c.* 1 m x 1 m in size and *c.* 0.4 m deep, containing a sandy silt with pisé lumps (1192) and ground-stone artefacts (1215). This pit was adjacent to a smaller (*c.* 0.8 m x 0.6 m x 0.2 m deep) pit [1193], which was also filled by sandy

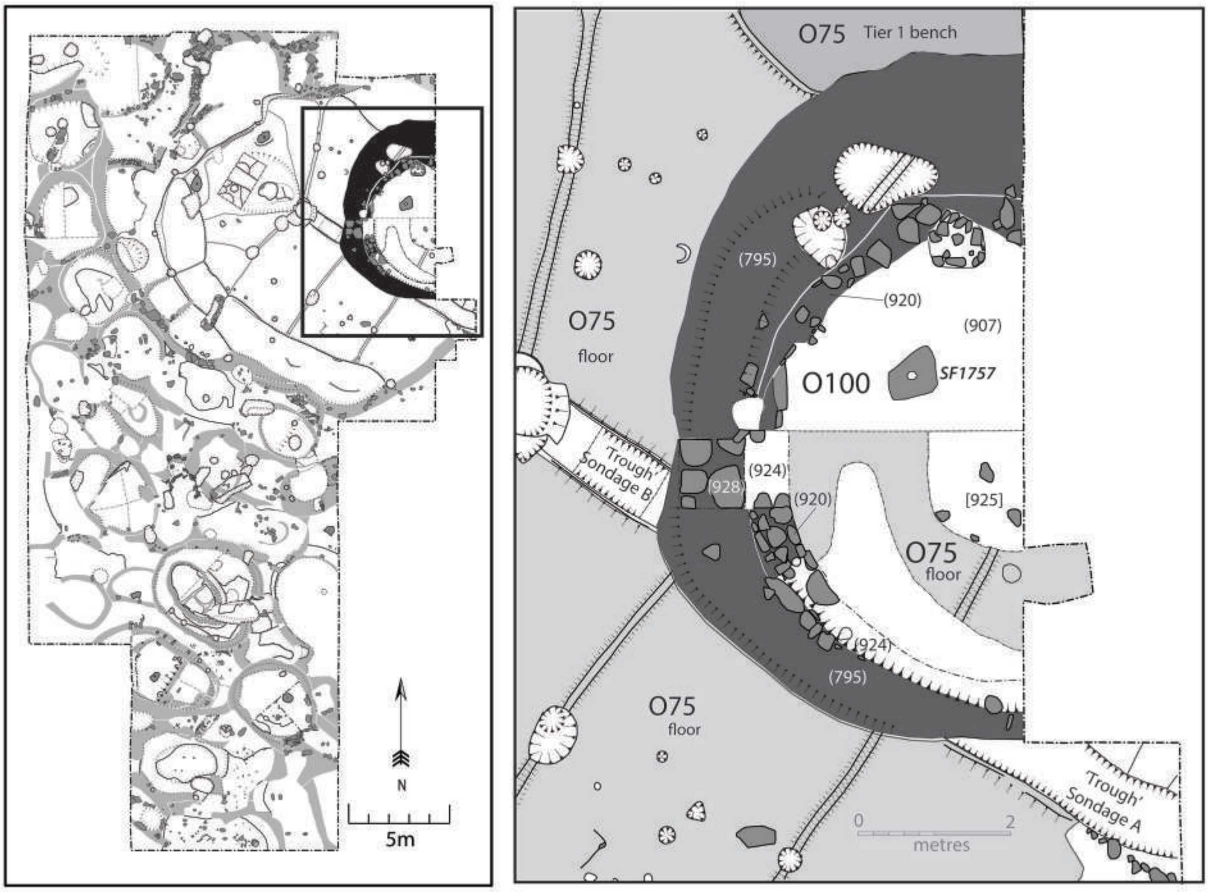


Figure 36.1. Location of Structure O100 and plan showing its relationships with surrounding and underlying Objects.

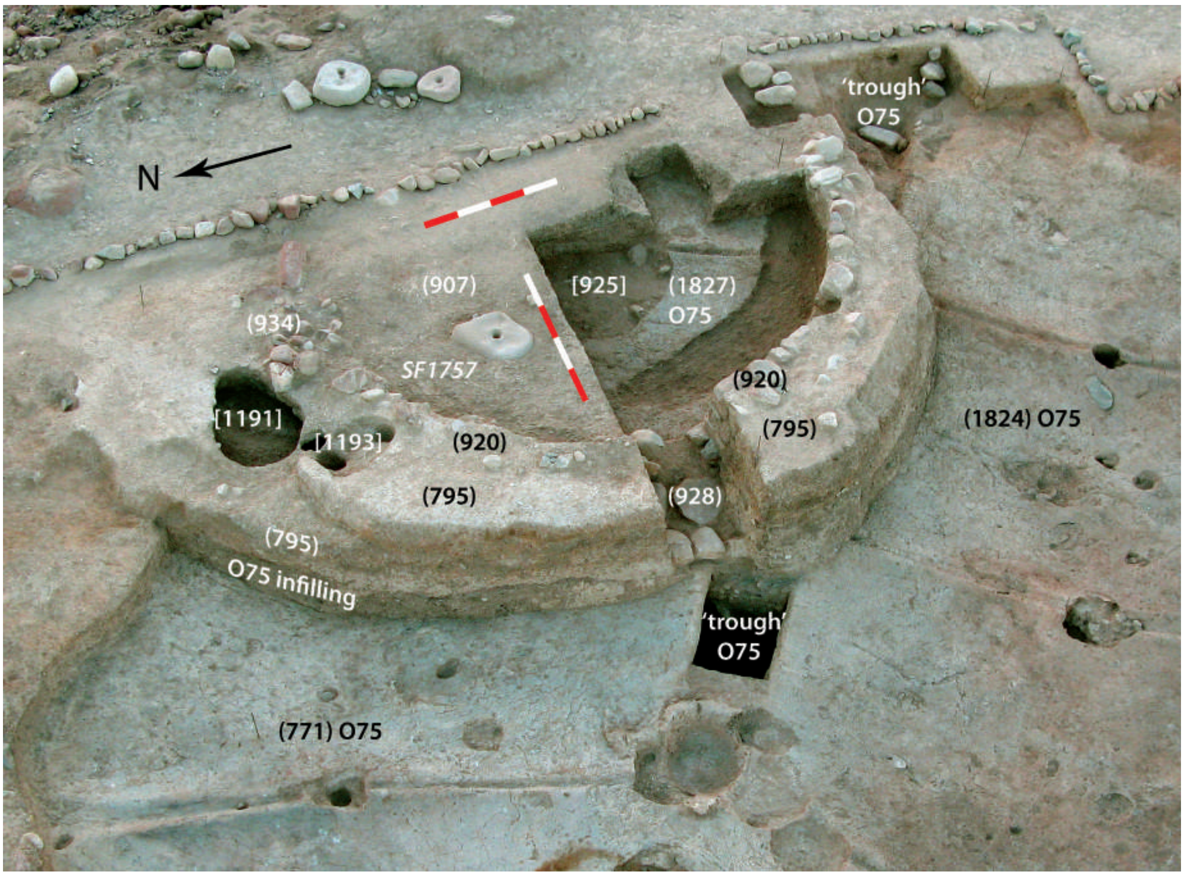


Figure 36.2. View for Structure O100 looking towards the east-southeast. Scale 2.0 m.

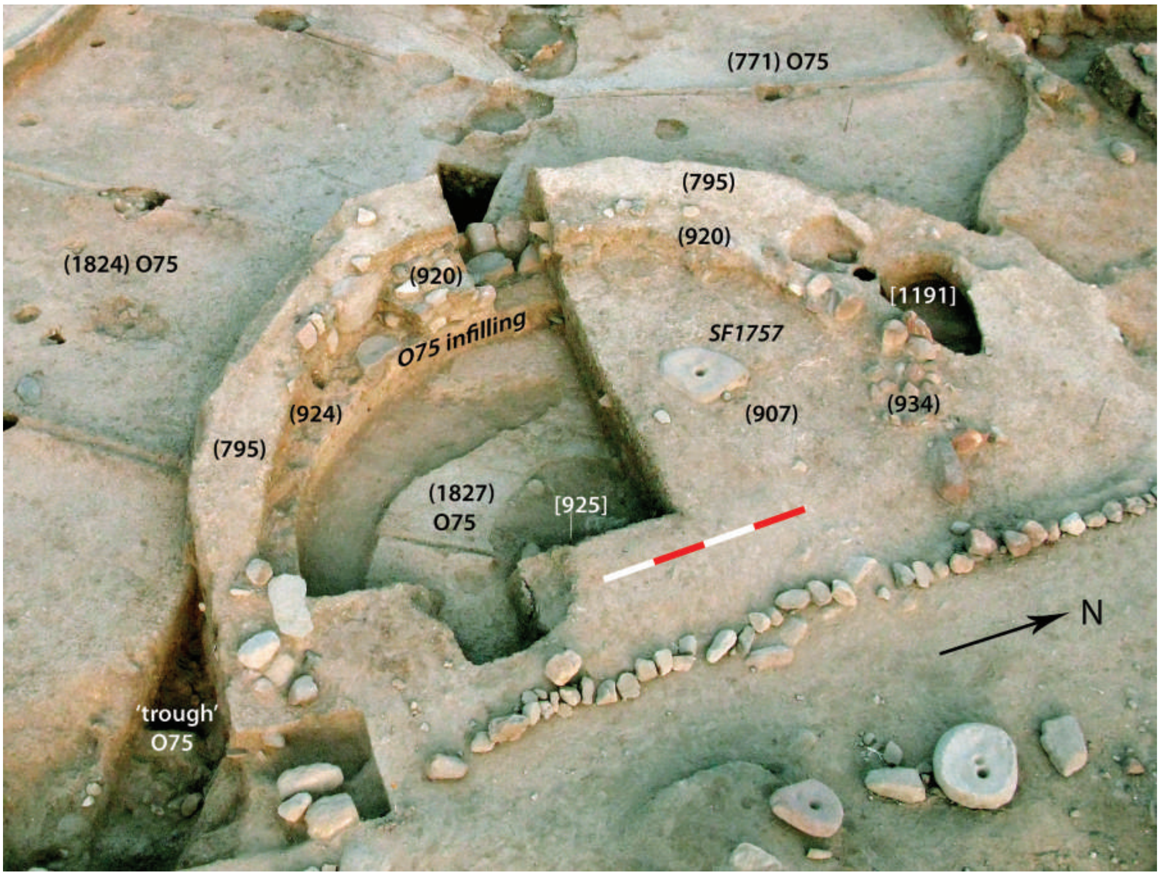


Figure 36.3. View of Structure O100 looking towards the west-northwest. Scale 2.0 m.

silt with occasional pisé lumps (1180). Removal of this fill revealed post-holes [1195] and [1197], with a similar fill, (1196) and (1198) respectively. A substantial post-hole [1202], *c.* 0.5 m deep, filled by a sandy silt (1203), was also exposed by the removal of pit [1193] (Figure 36.8). A roughly circular stone arrangement or rubble filled feature (934) was located on the inside of this section of the wall.

Below deposit (800) there was silt deposit (1116) that contained a high percentage of grey/white gypsum plaster flecks suggesting it may have been the remnants of a floor. Its poor preservation may have arisen from the insect activity that was evident throughout this horizon (1116) and the underlying deposits. Upon removal of deposits (800) and (1116), two clusters of stones (1120) and (934) were revealed near to the western and northern walls of the structure (Figure 36.9). Stones (1120) formed a roughly circular arrangement, appearing to be an informal hearth, although no scorching was present either on the stones, or in the surrounding deposits. The other cluster (934) was a denser concentration of somewhat smaller stones, which may have been a hearth construction or simply the rubble backfill of a pit or similar feature.

Underlying (1120) there was another mud-plaster-rich degraded silt deposit (1125). This contained a large cup-hole mortar (SF1846), lying close to the eastern edge of the structure, suggesting there had once been surfaces at this level. Below (1125) there was another silt deposit (896) containing a double cup-hole mortar with shallow depressions around the cup-holes (SF1753), together with a number of large flat stones (901) distributed around the mortar suggestive of work benches associated with use of the mortar (Figure 36.10). The double cup-hole and shallow depressions are not common in cup-hole mortars recovered elsewhere in the excavations at WF16, although similar examples of complex mortars were found close to the surface of the knoll in badly deflated horizons (Finlayson and Mithen 2007).

Removal of (896) revealed a poorly defined oval of dark silt (897) located in the centre of the structure. Below (897) there was a silty deposit containing a significant amount of burnt limestone (899). This was above the first of a series of laminated plaster floor surfaces (898), which was best preserved against the western wall (920) of structure O100. In places surface (898) lipped up against the stones of the wall (Figure 36.11).

Another large cup-hole mortar (SF1757) was revealed at this horizon, embedded within surface (898). Due to the discontinuous nature of (898) and the effects of bioturbation, it was difficult to establish whether mortars SF1753 and SF1757 would have been at a contemporary horizon (Figure 36.10, 36.13). The laminated floor deposits (898) appear to have accumulated around them, suggesting

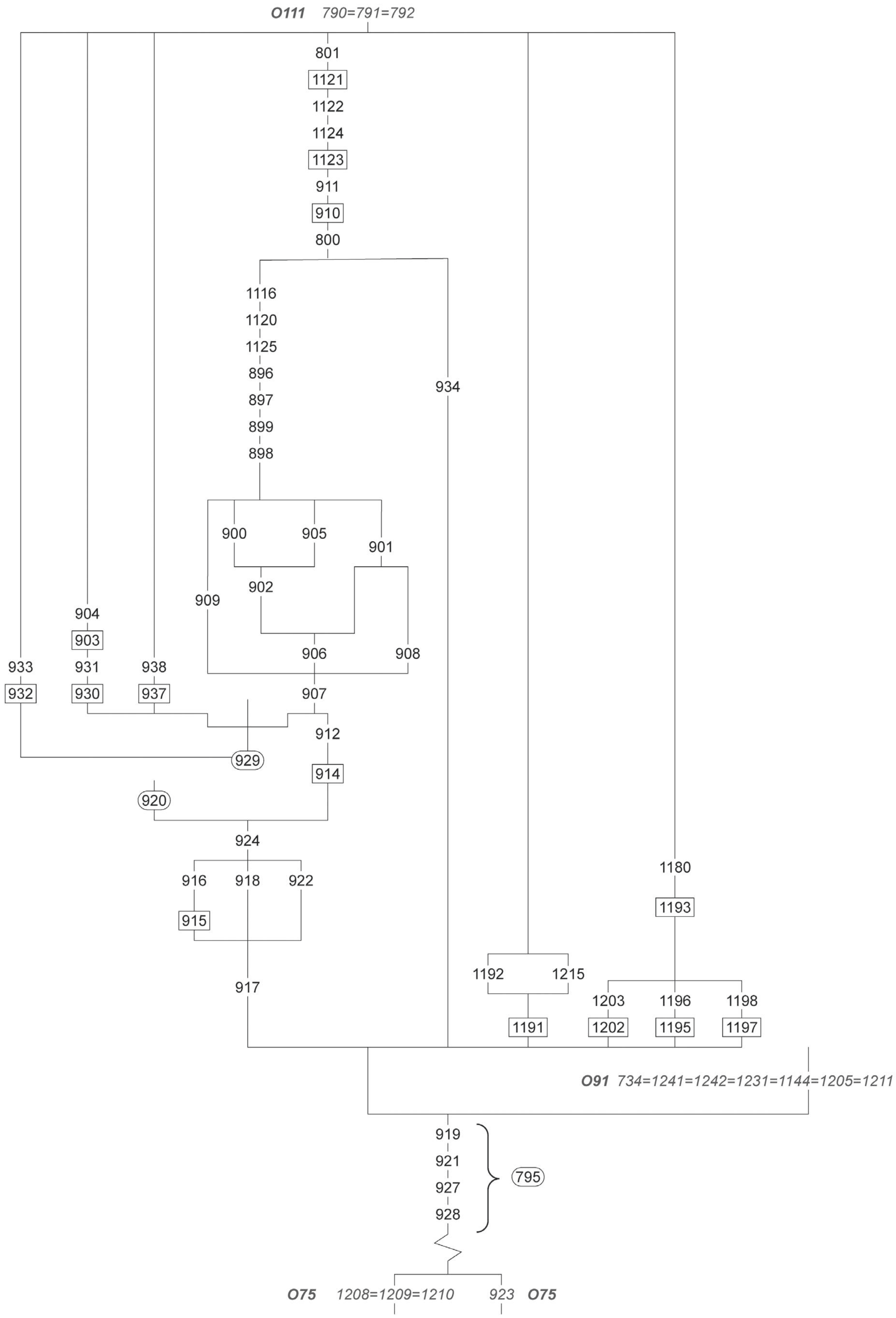


Figure 36.4. Stratigraphic matrix for Structure O100.

Table 36.1. Contexts forming and filling structure O100 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
795	semi-circular circuit of stone and pisé walling, incorporates pisé bands 921 and 927	pisé and stone wall of structure
800	loose mid-greyish-brown sandy silt	silt accumualtion inside structure
801	loose mid-to dark grey loamy silt with a high concentration of stones and flint	fill of pit
896	friable light grey sandy silt	silt accumualtion inside structure
897	soft dark greyish-brown sandy silt	silt accumualtion inside structure
898	friable mid-to dark greyish-brown sandy silt	degraded mud-plaster surface and underlying make up
899	loose dark greyish-brown sandy silt with burnt limestone	localised area of burning or dump of burnt material
900	loose dark greyish-brown sandy silt	lenses of degraded surfaces and associated occupation debris
901	collection of stones and small finds in a loose dark greyish-brown sandy silt	occupation deposit rich in small finds surrounding cup-holed mortar SF1753
902	friable mid-to dark greyish-brown sandy silt with yellowish-brown lenses	lenses of degraded surfaces and associated occupation debris
903	sub-circular cut with steep sides and a concave base	post retrieval pit
904	friable mid-greyish-brown sandy silt	fill of pit
905	friable yellowish-brown sandy silt with pisé rubble and burnt stones	lenses of degraded surfaces and associated occupation debris
906	mid-dark greyish-brown sandy silt soft with friable lenses and frequent stones	occupation deposit
907	friable light greyish-brown fine sandy silt	composite of multiple eroded mud-plaster surfaces
908	loose dark greyish-brown sandy silt	localised make-up deposit underneath cup-holed mortar
909	friable light greyish-brown sandy silt with occasional stones	degraded mud-plaster floor surface
910	sub-circular cut with steep sides and a concave base	cut of shallow pit
911	friable light greyish-brown sandy silt with stones and plaster	fill of shallow pit
912	firm mid-yellowish-brown sandy silt with occasional stones and plaster flecks	mud-plaster surface surrounding cup-holed mortar
914	sub-circular cut with moderate sides and a concave base	cut for cup-holed mortar
915	sub-circular cut with shallow sides and a concave base	cut of shallow pit
916	loose mid-grey sandy silt	fill of pit
917	mid-yellowish-brown silt with occasional small stones, firm in places friable in others	degraded mud-plaster floor surface
918	firm dark grey sandy silt	occupation deposit
919	friable light grey sandy silt (degraded pisé)	stone-faced pisé, band of pisé and stone wall 795
920	six courses of roughly hewn stone blocks bonded with light greyish-brown sandy silt	stone and mud wall of structure
921	firm mid-greyish-brown degraded pisé coarse sandy silt with occasional stones, plaster flecks and charcoal	stone-faced pisé, band of pisé and stone wall 795
922	firm/indurated light yellowish-brown sandy silt	possible localised levelling
923	dark greyish-brown sandy silt, soft with some stones	silt accumulation inside Structure O75, underlying structure O100
924	friable mid-greyish-brown sandy silt	composite of multiple eroded laminated mud surfaces
927	friable light greyish-brown and yellowish-brown sandy silt with occasional stones and some charcoal	stone-faced pisé, band of pisé and stone wall 795
928	large stones set in light yellowish-brown sandy silt pisé	massive stone and pisé foundation of wall 795
929	three courses of roughly hewn large wadi cobbles set in pisé	stone and pisé wall of structure
930	circular cut with steep sides and a concave base	cut of post-hole
931	soft mid-to dark greyish-brown sandy silt	fill of post-hole
932	circular cut with vertical sides and a flat base	cut of post-hole
933	soft mid-to dark greyish-brown sandy silt	fill of post-hole
934	stones and wadi cobbles unworked	possible hearth (unexcavated)
937	unexcavated sub-circular cut	possible post-hole
938	dark greyish-brown sandy silt	fill of possible post-hole
1116	friable mid-greyish-brown sandy silt with light yellowish-grey flecks	silt accumualtion inside structure
1120	a roughly circular setting of stones	possible fireplace, structure
1121	oval cut with moderate sloping sides and a concave base	cut of shallow pit
1122	friable mid-grey loamy silt	fill of pit
1123	rectangular cut with vertical or slightly incaving sides and a flat base	cut of pit
1124	friable mid-to dark grey silt	fill of pit

Table 36.1. Contexts forming and filling structure O100 with sedimentary descriptions and interpretations continued...

Context	Description	Interpretation
1125	friable light greyish-brown sandy silt	silt and degraded plaster accumualtion inside structure
1180	friable mid-greyish-brown sandy silt with occasional lumps of pisé, large stones and a plentitude of finds	fill of pit
1191	ovoid cut with gradually sloping sides and an irregular base	cut of pit
1192	friable mid-greyish-brown sandy silt with pisé lumps and occasional stones	fill of pit
1193	sub-oval cut with vertical sides and a sloping irregular base	cut of pit
1195	oval cut with mostly vertical sides and a concave base	cut of post-hole
1196	friable mid-greyish-brown sandy silt with very occasional small lumps of pisé	fill of post-hole
1197	oval cut with steep sides and a concave base	cut of post-hole
1198	friable mid-greyish-brown sandy silt	fill of post-hole
1202	cut with suboval top, rounded corners, a sharp break of slope and sides of varied gradient	cut of post-hole
1203	friable mid-greyish-brown sandy silt	fill of post-hole
1215	concentration of stones; ground-stone and chipped-stone artefacts	fill of pit

Table 36.2. Quantities of bulk finds from Structure O100 by material and context number.

Object 100	Volume of sediment (l)				Weight of bulk finds per material (g)								
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Unworked stone	Animal bone	Marine shell	Other shell	Charcoal	Misc.
800	532.5	40.0	490.5	2.0	3356.1	0.0	58.9	0.0	462.0	1.0	2.5	0.0	0.0
801	141.0	40.0	100.0	1.0	12808.4	2960.0	0.5	0.0	581.0	0.0	13.8	0.0	0.0
896	162.0	30.0	130.0	2.0	3043.7	63.7	60.9	0.0	295.3	1.0	14.9	11.0	0.0
897	60.0	30.0	30.0	0.0	398.6	0.0	2.7	0.0	19.9	0.0	15.6	0.0	0.0
898	692.5	60.0	630.5	2.0	1721.6	680.0	37.5	0.0	412.4	1.0	24.3	1.0	0.0
900	106.0	30.0	75.0	1.0	1366.1	0.0	24.4	0.0	447.2	0.0	15.1	0.0	0.0
901	0.0	0.0	0.0	0.0	81.7	0.0	1.0	0.0	4.4	0.0	2.1	0.0	0.0
902	481.0	30.0	450.0	1.0	3354.1	595.0	70.3	0.0	1333.4	0.0	32.7	0.0	0.0
904	20.0	20.0	0.0	0.0	360.4	0.0	5.4	0.0	4.8	0.0	7.6	0.0	0.0
905	201.0	30.0	170.0	1.0	2572.1	650.0	42.9	0.0	833.1	0.0	15.1	0.1	0.0
906	131.0	30.0	100.0	1.0	1332.2	0.0	100.3	0.0	294.3	0.0	4.6	0.0	0.0
907	412.5	30.0	380.5	2.0	1216.5	0.0	15.3	0.0	166.5	0.0	1.3	1.0	0.0
908	10.0	10.0	0.0	0.0	35.4	0.0	1.0	0.8	7.6	0.0	0.0	0.0	0.0
909	20.0	0.0	20.0	0.0	100.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0
911	11.0	10.0	0.0	1.0	58.6	0.0	0.3	0.0	22.8	0.0	4.9	0.0	0.0
912	21.0	20.0	0.0	1.0	98.1	0.0	0.3	0.0	2.4	0.0	0.0	0.0	0.0
916	51.0	30.0	20.0	1.0	330.4	0.0	2.0	0.0	41.1	0.0	0.9	0.0	0.0
917	32.0	30.0	0.0	2.0	1051.8	200.0	25.3	0.0	91.1	0.0	1.8	15.0	0.0
918	10.0	10.0	0.0	0.0	43.4	0.0	0.0	0.0	2.9	0.0	0.0	0.0	0.0
919	156.0	10.0	145.0	1.0	370.2	0.0	15.4	0.0	11.2	0.0	0.0	0.0	0.0
920	256.0	10.0	245.0	1.0	772.1	0.0	20.1	0.0	79.9	0.0	0.0	0.0	0.0
921	271.0	30.0	240.0	1.0	714.0	0.0	0.0	0.0	18.0	0.0	0.0	0.0	0.0
922	31.0	30.0	0.0	1.0	137.2	0.0	0.0	0.0	0.5	0.0	1.2	0.0	0.0
923	1599.0	70.0	1522.0	7.0	13134.9	6175.0	33.5	0.0	511.5	1.0	21.6	32.1	0.0
924	10.0	10.0	0.0	0.0	72.2	0.0	0.2	0.0	1.3	0.0	0.0	0.2	0.0
926	46.0	30.0	15.0	1.0	186.9	1100.0	0.3	0.0	32.9	0.0	15.2	0.0	0.0
927	181.0	30.0	150.0	1.0	256.2	0.0	0.3	0.0	5.6	0.0	0.0	0.1	0.0
928	31.0	30.0	0.0	1.0	298.8	0.0	0.1	0.0	2.8	0.0	0.0	0.0	0.0
929	121.0	30.0	90.0	1.0	417.1	0.0	0.0	0.0	14.4	0.0	0.0	0.0	0.0

Table 36.2. Quantities of bulk finds from Structure O100 by material and context number continued...

Object 100	Volume of sediment (l)				Weight of bulk finds per material (g)								
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Unworked stone	Animal bone	Marine shell	Other shell	Charcoal	Misc.
931	5.0	5.0	0.0	0.0	15.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0
1116	532.0	30.0	500.0	2.0	3496.4	0.0	51.4	0.0	632.8	1.0	13.6	0.0	0.0
1122	291.0	0.0	290.0	1.0	1217.5	5100.0	10.2	0.0	65.6	0.0	29.6	0.0	10.0
1124	0.0	0.0	0.0	0.0	204.4	0.0	1.0	0.0	8.7	0.0	17.9	0.1	0.0
1125	312.0	30.0	280.0	2.0	3219.5	191.5	31.1	0.0	503.4	0.0	21.1	0.0	0.0
1180	93.0	30.0	62.0	1.0	797.8	0.0	10.4	0.0	421.5	0.0	3.0	0.0	1.0
1192	31.0	30.0	0.0	1.0	3678.6	800.0	114.7	0.0	97.3	0.0	2.2	0.0	0.0
1196	2.0	1.0	0.0	1.0	19.1	0.0	0.1	0.0	2.5	0.0	0.0	0.1	0.0
1198	3.0	2.0	0.0	1.0	66.8	60.6	3.6	0.0	3.4	0.0	0.0	0.0	0.0
1203	13.0	0.0	12.0	1.0	676.2	243.5	2.9	0.0	44.8	0.0	1.7	0.0	0.0
1215	0.0	0.0	0.0	0.0	150.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	7078.5	888.0	6147.5	43.0	63230.1	18819.3	744.3	0.8	7491.1	5.0	284.3	60.7	11.0

Table 36.3. Quantities of small finds from Structure O100 by material and context number.

Object 100	Quantities of small finds per material (nos)									
Context	Chipped stone	Ground stone	Other stone	Worked bone	Unworked animal bone	Disarticulated human bone	Bone beads	Stone beads	Marine shell beads	Marine shell other	Total small finds
800	0	1	0	0	0	0	0	1	1	0	3
896	2	2	0	0	0	0	0	1	0	1	6
898	2	4	0	1	0	0	0	0	2	0	9
900	0	1	0	0	0	0	0	0	0	0	1
901	2	5	0	0	0	0	0	0	0	0	7
902	1	1	0	0	0	0	0	0	1	1	4
905	2	0	0	0	0	0	0	0	0	0	2
906	0	1	0	0	0	0	0	1	0	0	2
907	0	0	0	0	0	0	0	0	1	0	1
912	1	1	0	0	0	0	0	0	0	0	2
916	2	3	1	0	0	0	0	0	0	0	6
917	0	0	1	0	0	0	0	1	0	2	4
921	1	1	0	0	0	0	0	0	0	0	2
923	0	2	0	0	1	0	0	0	4	14	21
927	1	0	0	0	0	0	0	1	0	0	2
929	1	1	0	0	0	0	0	1	0	0	3
1116	0	1	0	0	0	0	0	1	0	0	2
1120	0	1	0	0	0	0	0	0	0	0	1
1122	0	0	0	0	0	0	0	1	1	0	2
1124	0	0	0	0	0	1	0	0	0	0	1
1125	0	1	0	0	0	0	0	0	0	0	1
1180	0	1	0	0	0	0	0	1	0	0	2
1192	0	2	0	0	0	0	0	0	0	0	2
1215	0	5	0	0	0	0	0	0	0	0	5
Total	15	34	2	1	1	1	0	9	10	18	91

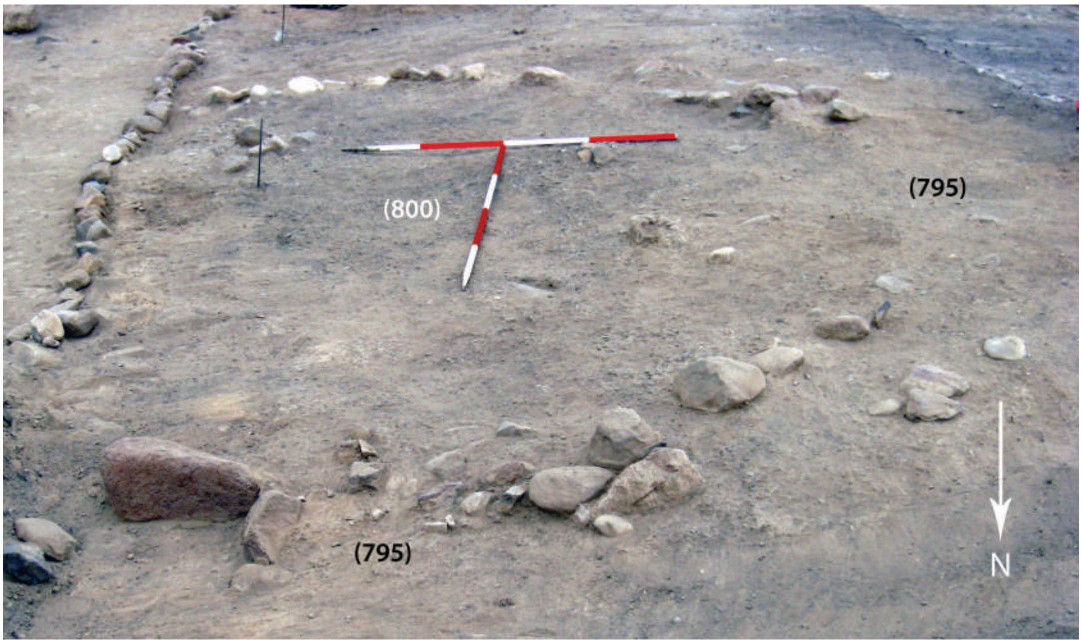


Figure 36.5 Initial exposure of wall (795) of Structure O100 from the north following removal of the overburden. Scale 2.0 m.

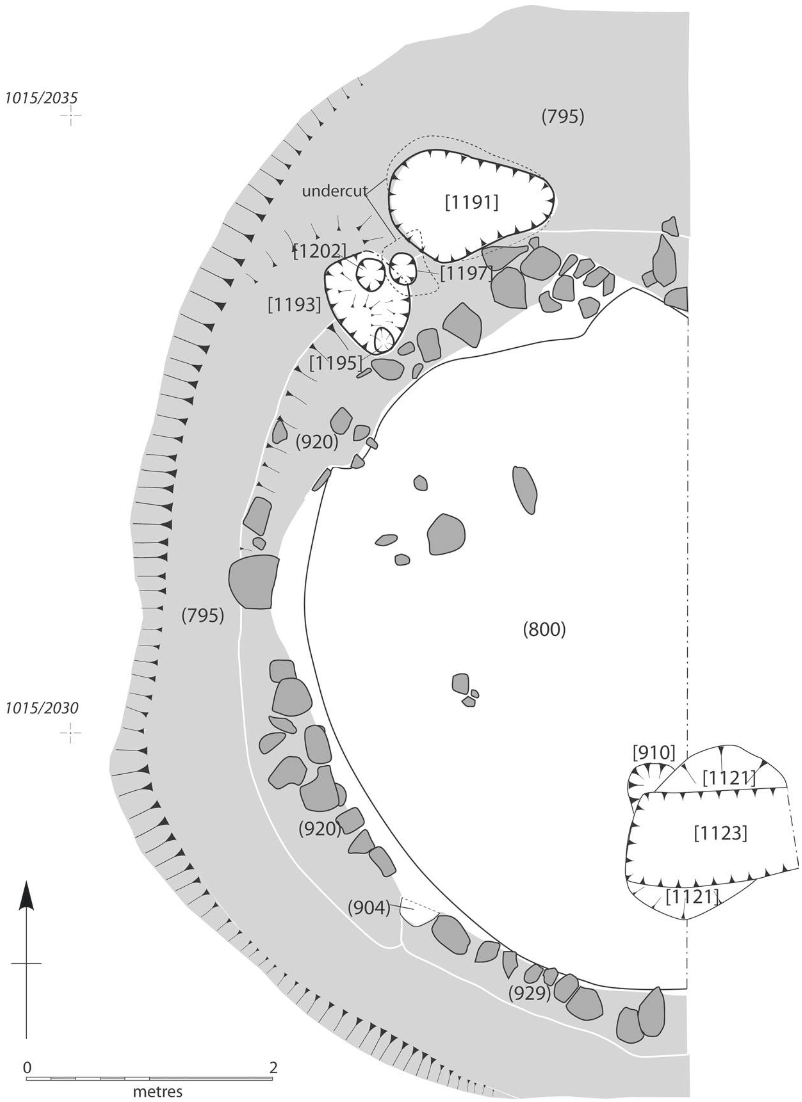


Figure 36.6 Plan of features cutting through the walls and the latest deposits inside Structure O100.

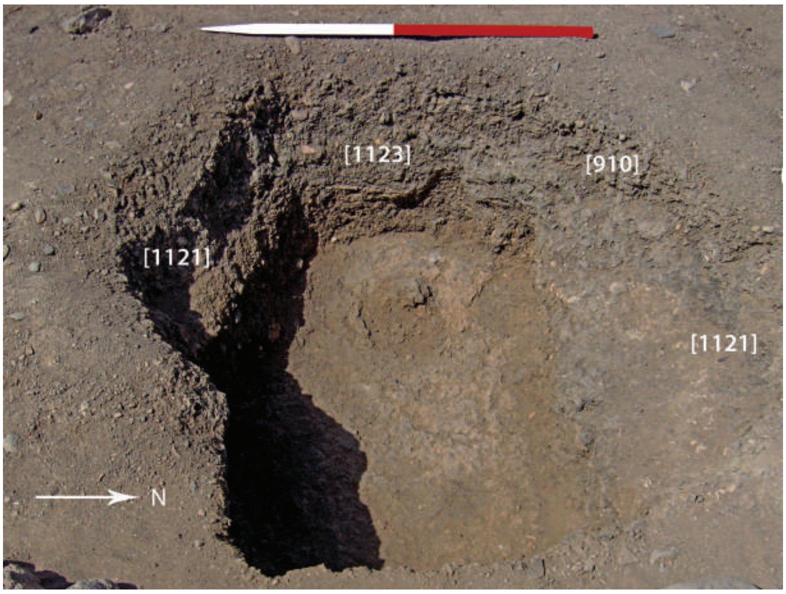


Figure 36.7. Excavated intercutting pits [1121], [1123] and [910] with mud-plaster floor of Structure O75 visible at the base of pit [1123]. Scale 1.0 m.

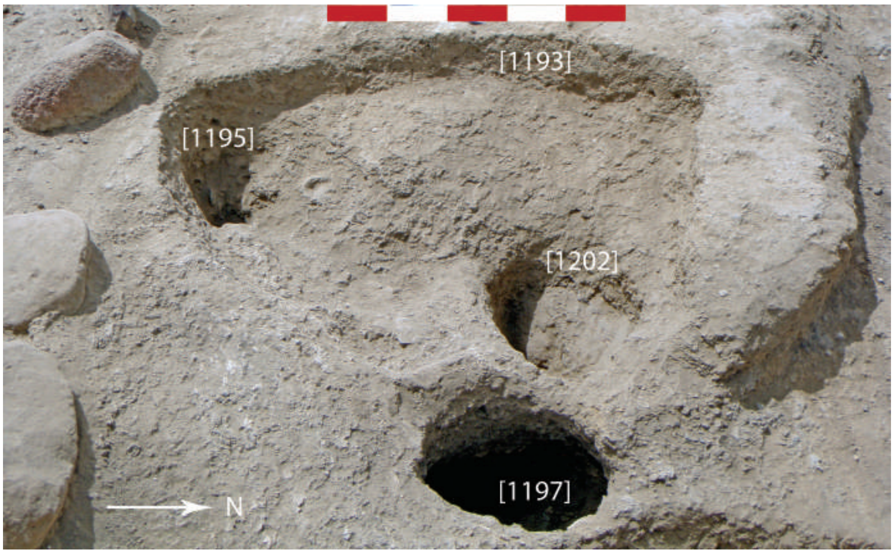


Figure 36.8. Post-excavation view of pit [1193] and post-holes [1195], [1197] and [1202]. Scale 0.5 m.

that they could have both been in use following several re-flooring episodes. A number of ground-stone objects were recovered from (898), notably pestles SF1764 and SF1765 that may have been utilised with the mortars.

The patchy floor deposit (898) sealed two silt lenses (900, 905) containing possible degraded mud-plaster and pisé lenses; together, these likely represent degraded surfaces and associated occupation debris. At the same horizon as these silts, a series of stones and ground-stone objects (901) was revealed surrounding cup-hole mortar SF1753 (Figure 36.12). This collection included pestle SF1771 and flaked coarse stone mauls/pestle rough outs SF1783, SF1786. Two large flat stones flanking large cup-hole mortar SF1753 were possibly associated benches. Upon removal of SF1753 a dark silt (908) was exposed that contained a number of burnt limestone fragments that appeared to have been deliberately positioned to support the mortar.

Below degraded surface (898) and occupation silts (900) and (905), there were further lenses of silt and degraded mud plaster or pisé (902). This layer was darker towards the eastern limit of the excavation in the centre of the building, possibly suggesting the dumping of organic materials or occasional burning, although there was an absence of charcoal. At the same horizon as this infilling,

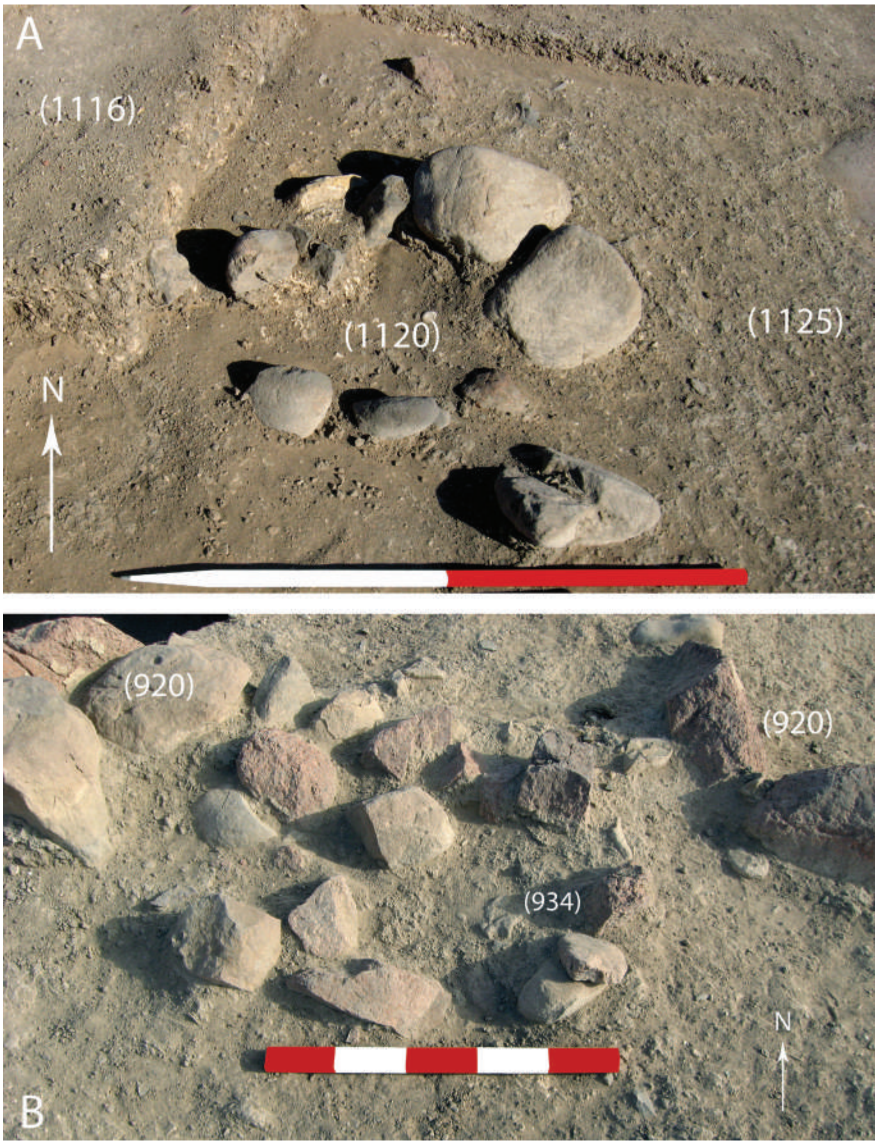


Figure 36.9. A — Stone cluster (1120), scale 1.0 m; B — stone cluster (934), scale 0.5 m.

a spit of degraded mud-plaster surfaces (909) was removed to the north, around cup-hole mortar SF1757, in an attempt to identify its contemporary surface. Removal of deposit (902) revealed a layer of laminated silts (906), which was darker towards the centre of the structure, as was the case with the overlying deposit (902, Figure 36.13).

Deposit (906) sealed a series of laminated whitish-grey mud-plaster floors, grouped together as deposit (907) (Figure 36.14), these having been observed in the sections created by cuts [1121] and [1123]. This series of thin, patchy mud-plaster layers was best preserved against the western wall where larger stretches of contiguous mud plaster were present. At this point, layers of plaster (907) lipped up against the wall (920), as was noted with overlying floor deposit (898). At the western edge of this deposit, close to the wall, several degraded plaster mouldings were revealed adjacent to the cup-hole mortar SF1753 (Figure 36.15). This consisted of a plaster lip that may have been made to form a shallow platform abutting the cup-hole mortar. These plaster mouldings lie directly under one of the stone work benches and hence appear to be associated with the use of cup-hole mortar SF1753 prior to the insertion of those benches.

The floor deposits (907) and all underlying deposits within Structure O100 were excavated from the south of Section S193, which was established east–west across the structure's interior (Figures 36.16, 36.17). The removal of laminated floors (907) exposed a third cup-hole mortar (SF1791) sitting directly below (SF1753), within a mud-plaster lens (912) that filled a cut [914] truncating beaten earth laminated floor deposits (924) (Figure 36.15). Floor (924) continued below wall (920), running up to and abutting the earlier pisé wall (795) behind/below (920), (Figure 36.16). Excavation of the floor sequence continued through floor (924), dark grey compacted silt (918), and a light yellow-brown silt (922), to an underlying mud-plaster floor (917), which also abutted

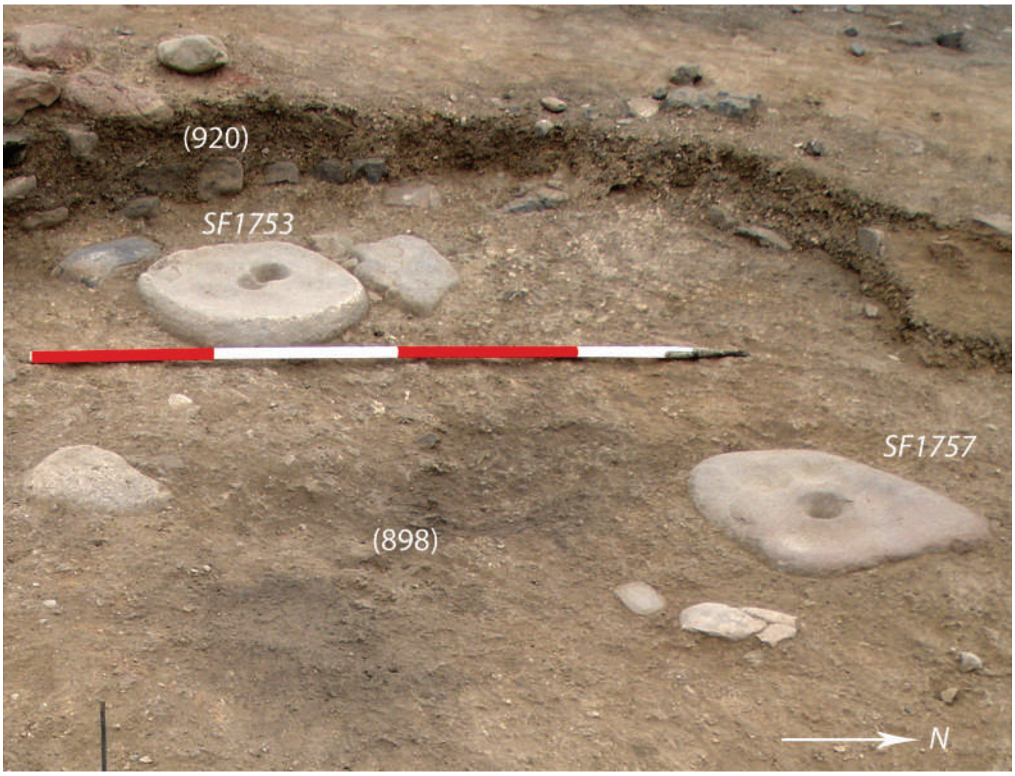


Figure 36.10 Mortars SF1753 and SF1757. Scale 2.0 m.

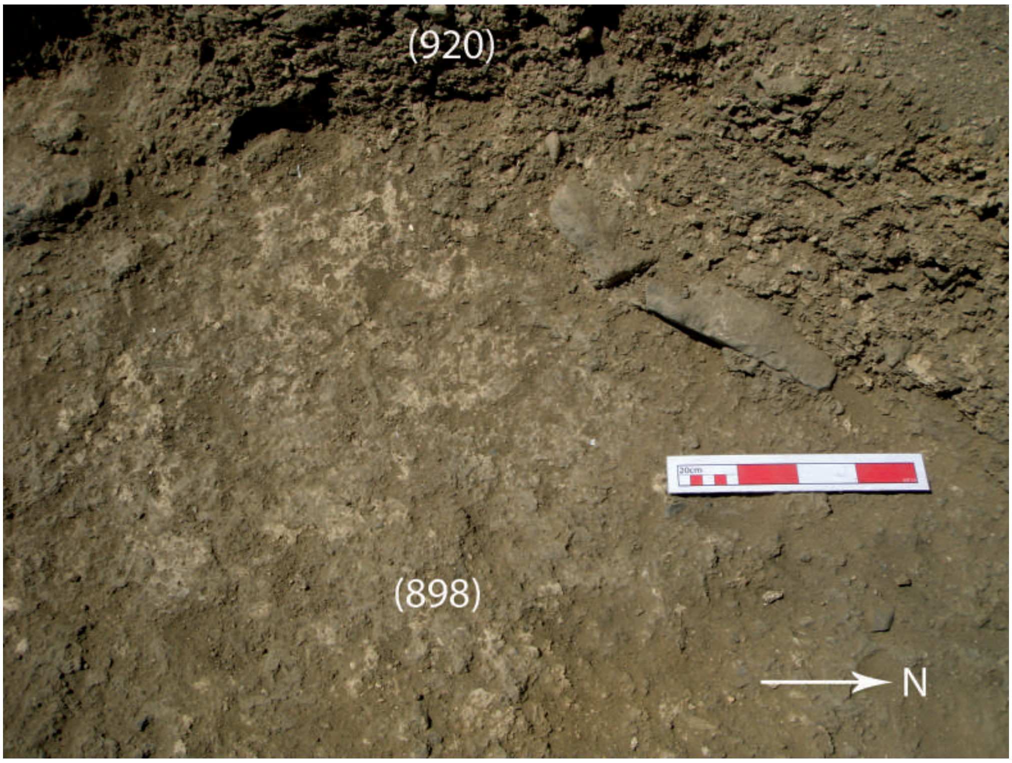


Figure 36.11 Detail of plaster floor (898) against wall (920). Scale 0.2 m.

Figure 36.12. Cup-hole mortar SF1753 and associated stones and finds (901). Scale 1.0 m.

wall (795) (Figure 36.16). The yellow-brown silt (922) sat in a shallow depression towards the southern edge of the structure (Figure 36.18), which may have been created by the removal of a cup-hole mortar once set into lower floor (917). Floor (917) was the earliest identified floor of Structure O100. A block sample for micro-morphological analysis SA6551 was taken from the section containing floors (907) and (924) (Figures 36.17 and 36.23).

Floor (924) also sealed the ground- and chipped-stone rich fill (916) of shallow pit [915] that cut floor (917). This feature was a shallow scoop into the floor that may have been created by activity associated with the objects recovered from the fill (916), which includes two pestles, SF2261 and SF2262, and two hammerstones SF2263 and SF2264.

Floor surface (917) consisted of a thick yellow mud plaster, which, as with other floors in Structure O100, was differentially preserved across the excavated area. As with overlying floor deposit (924), (917) ran below wall (920) to abut wall (795). Floor (924) directly overlay sandy silt (923), which is part of Structure O75, Stratigraphic block 2 (See Chapter 38).

36.3 Walls of O100

The architectural sequence of the walls of Structure O100 is complex (Figures 36.17, 36.19). To the north of the structure the original thick pisé wall (795) had been modified by the addition of a stone face (920), in a similar fashion to the addition of later pisé skins seen in other structures across the site. This stone face, however, may represent several phases of construction and/or renovation. At the southern end of Structure O100, a wall of three courses (929) contiguous with wall (920) was constructed from a combination of light grey-brown pisé and large wadi cobbles (Figures 36.14, 36.20). The junction of wall (929) with wall (920) to the west was truncated by a pit [903] that was backfilled with grey-brown silt (904). Below this shallow pit was post-hole [930] filled by (931); it appears that pit [903] had been cut to retrieve the post in [930] (Figure 36.14). Removal of wall (929) revealed the continuation of floor deposit (924) as described above.

Wall (920) consisted of six variable courses of roughly hewn pink granite and limestone blocks with light grey-brown mud-plaster bonding. This wall component was located on the western side of the structure, running for 2.10 m from the east–west Section S193 to the north, and surviving to 0.70 m at its highest and 0.46 m at its widest. As with all deposits within Structure O100, the wall had been more substantially eroded to the east. As the western end of the wall (920) was being removed, a post-hole [932], filled by (933), and an unexcavated post-hole [937], filled by (938), were revealed in section (Section S194, Figures 36.16, 36.17). These were either later cuts into the top of the wall (920) or had been integral features in its construction.

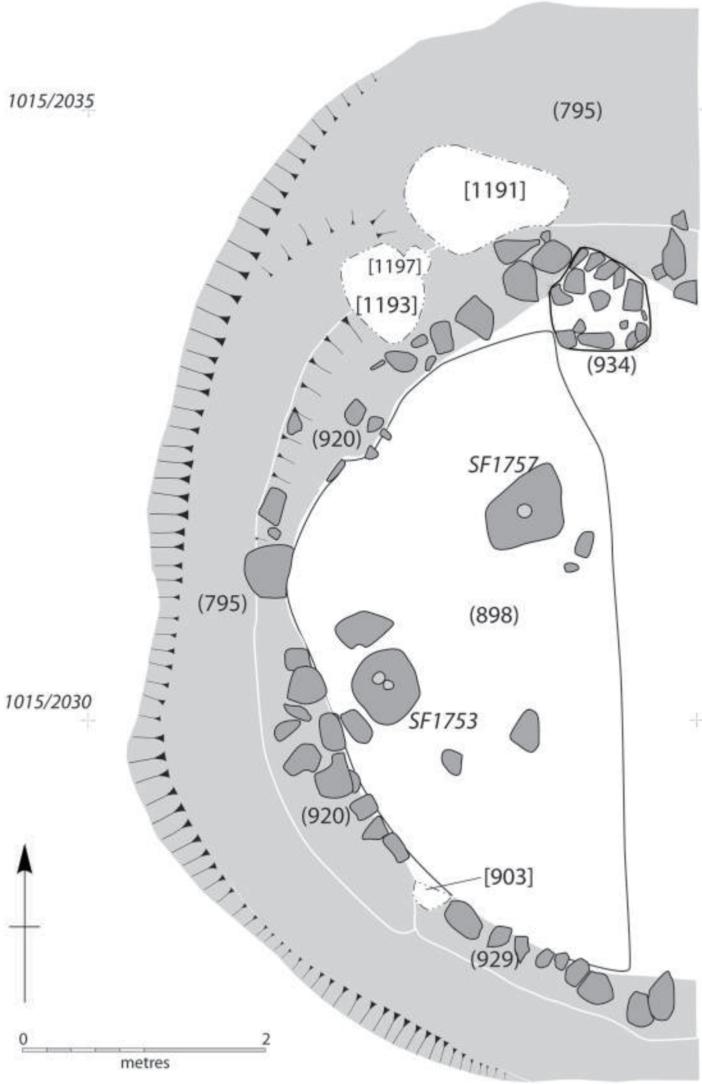


Figure 36.13 Plan of floor surface (898) showing exposed cup-hole mortars SF1753 and SF1757.

Excavation of wall (920) also revealed the face of the underlying and substantial pisé wall (795), (Figure 36.19). This incorporated a short stretch of stone facing containing a large block of limestone (Figure 36.21). This facing was located on the southwest stretch of the wall, potentially continuing to the north behind the unexcavated stretch of wall (920). Within deposit (924), directly in front of the large block of limestone, there was a cup-hole mortar, although the cup-hole itself had not been completed (Figure 36.21). A 1.0 m slot excavated through pisé wall (795) extended the section (Section S185) established through the floor sequences of the building (Figure 36.17). In this slot, (795) was seen to consist of several horizontal bands of pisé (919), (921) and (927). The wall was extremely degraded on its surface, but below this the pisé was well preserved and a rubble core was evident. At the base of the wall (795) the firm surfaces that projected westward into the infilling of Structure O75 were exposed. Below the pisé of wall (795) there was a foundation level of massive stones set into light yellow-brown sandy pisé (928) (Figure 36.22). It is possible that this foundation sat within a cut, but without the excavation of the stone foundation (928) this cannot be confirmed.

36.4 Micro-stratigraphic assessment

A block sample SA6551 was taken through floor deposits (907) and (924) (Figures 36.17, 36.23) to explore the laminations within these deposits that were evident from

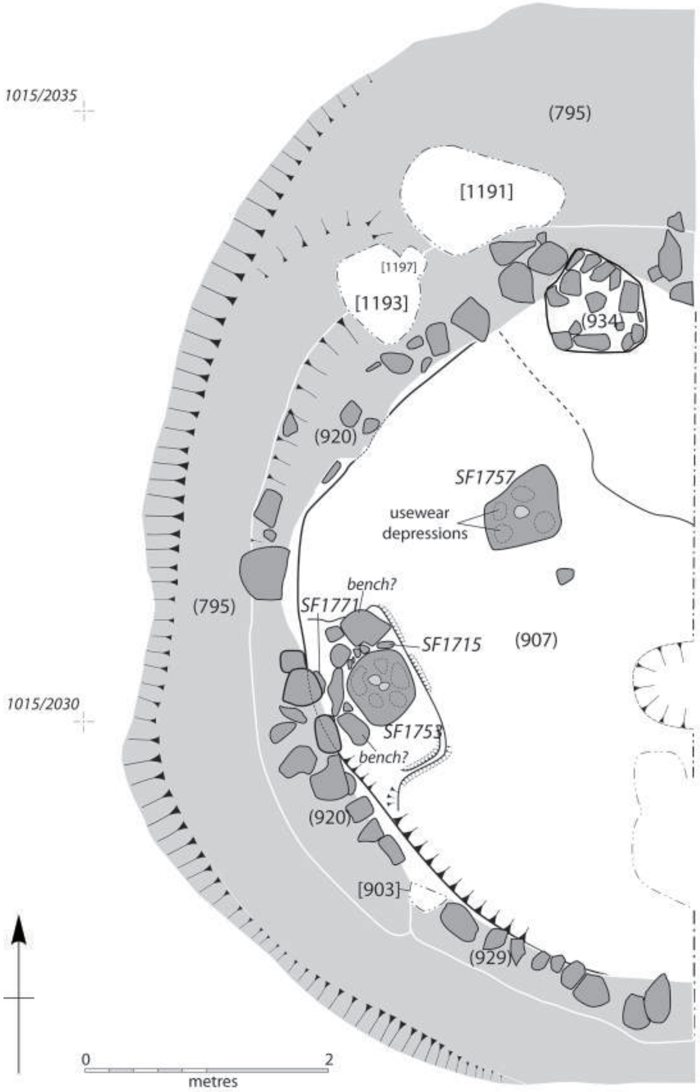


Figure 36.14 Plan of mud-plaster floor surface (907) showing cup-hole mortars SF1757 and SF1753 with associated stone benches and ground-stone objects (901).

field observation. Analysis divided the block into eight units consisting of plasters sandwiched between horizons of trampled occupation debris (Figure 36.23, Table 36.4). Above one of the occupation units in the centre of the block there is a distinct horizon of ochre with a sharp lower boundary that is partly mixed with ash (Figure 36.24). Quite what this ochre represents is unclear: it may be the remnants of a painted surface, although that might be expected to have been located on one of the plaster units, rather than occupation debris. Alternatively, it might reflect some activity being undertaken within the structure that left ochre residue on the floor. Although the block cut through two sets of floor laminations observed in the field (907 and 924), a distinction between these could not be ascertained from the micro-stratigraphy.

36.5 Chipped stone

The sample (n=2496 pieces) includes material from eight out of the 40 contexts with chipped stone in Structure O100. By weight, the sample (15090 g) constitutes 24% of the bulk chipped stone from this structure. The composition of the sampled assemblage is provided within Chapter 39.11, and a sample of artefacts is illustrated in Figures 36.25–36.27.

36.6 Radiocarbon dates

Two samples were selected for radiocarbon dating, one derived from floor surface (917), the stratigraphically

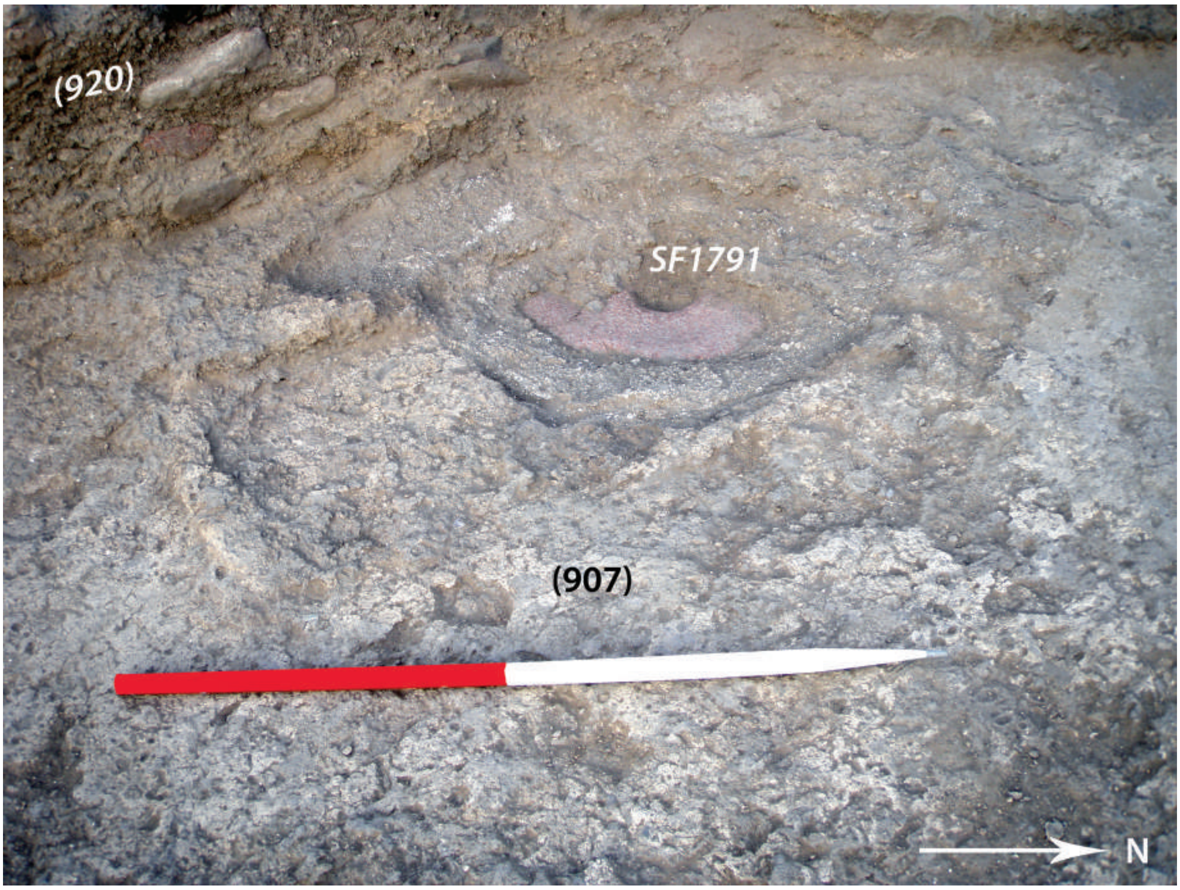


Figure 36.15. Detail of plaster mouldings in surface (907) associated with removed mortar SF1753. An earlier cup-hole mortar SF1791 can be seen emerging in the same place occupied by removed mortar SF1753. Scale 1.0 m.

earliest constructed element of O100 yet identified, and one from within the matrix of wall (920) that was constructed directly above floor (917; Table 36.5). The analysis of these dates, with calibrated values, Bayesian model and chronological interpretation, is provided in Chapter 40.5 (Tables 40.1, 40.2, 40.3; Figure 40.18).

In summary, the sum (SCPD) of a chronological model suggests at least one pulse of activity associated with the construction of the base of O100, this being confirmed by the statistical consistency of the two dates contained in the model (χ^2-test: df=1; T=0.0; 5% critical value=3.8) providing a calibrated combined value centred on 11.20 ka cal BP (Table 40.3). As such, activity associated with the construction of the base of Structure O100 appears to have occurred as a single event or series of episodes in close succession. Posterior density estimates for the lower and upper boundaries bracketing this construction activity fall at *12.55–11.13 ka cal BP* and *11.25–9.78 ka cal BP* respectively.

36.7 Interpretation

Structure O100 is a large structure sitting within a hollow on the surface of the WF16 knoll, this hollow arising from the construction of Structure O75. The walls of O100 include massive pisé and coursed stone components, with the earliest phase of its construction (floor 917 and wall 920) dating to 11,250–11,150 cal BP (68.2% probability). Due to erosion and the limited extent of excavation, the overall dimensions of Structure O100 must be extrapolated — giving an external diameter of *c.* 9 m, enclosing an oval area of *c.* 5.5 m x 7 m. The internal space would have been larger before stone faces (929) and (920) were added to the interior of the wall. Structure O100 is unique in its architectural form at WF16.

Unlike all of the other excavated structures at WF16 Structure O100 appears to have been freestanding. There are several massive cup-hole mortars within the structure, with their cup-holes surrounded by shallow depressions. Similar types of mortar have been found on the surface of WF16, in completely deflated contexts. These might be the remnants of free-standing structures similar to O100 that have been entirely eroded, not enjoying the same protection that O100 received by virtue of it being located in the hollow formed by Structure O75.

As the excavation of Structure O100 involved the removal of sections of walls more insight has been gained into its construction than with most structures at WF16. Further

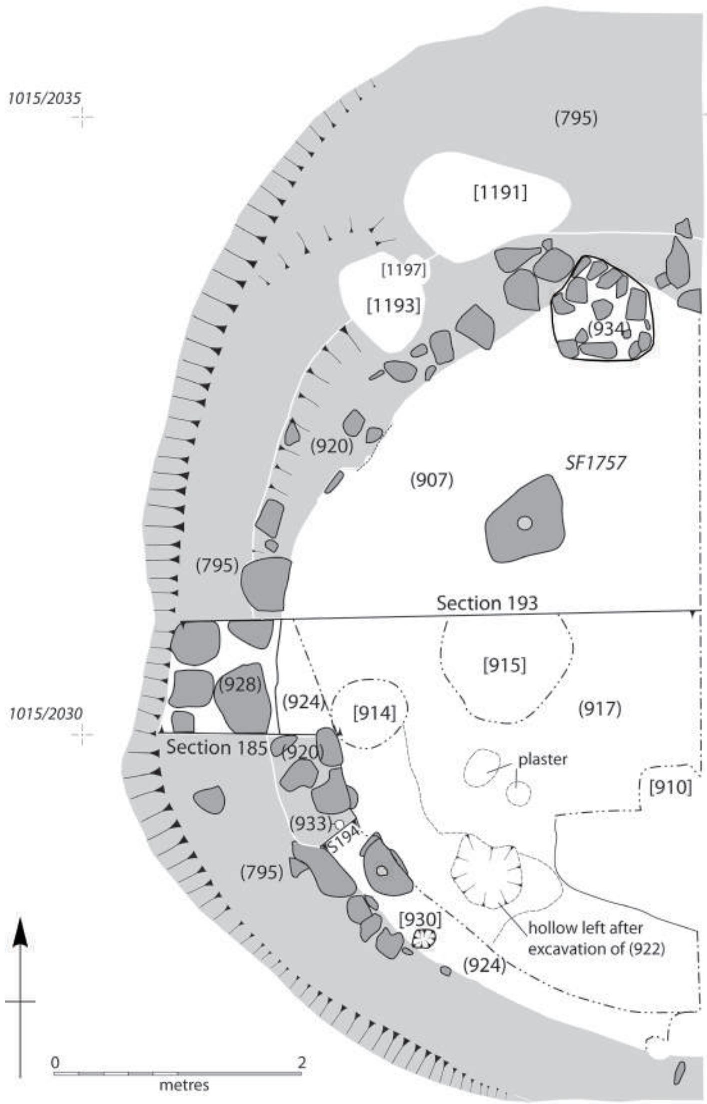


Figure 36.16 Plan of floor surfaces (917) and (924), showing location of Sections S194, S193 and S185.

information has come from the removal of deposits within Structure O75 to the west of Structure O100, allowing the investigation of a full stratigraphic sequence of deposits. The earliest pisé wall (795) of Structure O100 was built either directly onto the soft silts (923) associated with the initial infilling of Structure O75, or within a cut made into these deposits. At the lowest point of this wall a foundation deposit (928), was exposed within a 1.0 m wide slot through this wall. The relationship between Structure O100 and the surfaces to its west is clear, with Surface O91 deposits abutting wall (795). It remains uncertain how much time may have elapsed between the construction of wall (795) and Surface O91, and both may be broadly contemporary.

Structure O100 has the only coursed stone walls, (920) and (929), discovered during the 2008–2010 excavations, although freestanding coursed stone walls were a feature of the final PPNA structures identified in Trench 3 of the initial evaluation project (Finlayson and Mithen 2007).

The lowermost floor (917) within O100 was firm and solid, made from pisé, and was associated with wall (795). This may have doubled as a foundation for constructing the building. The upper floors of Structure O100 were badly degraded by bioturbation, although the presence of a number of well-laid mud-plaster floors was evident. The laminated nature of floors suggests a strict cleaning regime because little or no material had accumulated between resurfacing, although some could be detected by the micro-stratigraphic analysis including a deposit of ochre. The accumulation of laminated floor horizons around some of the cup-hole mortars (SF1753

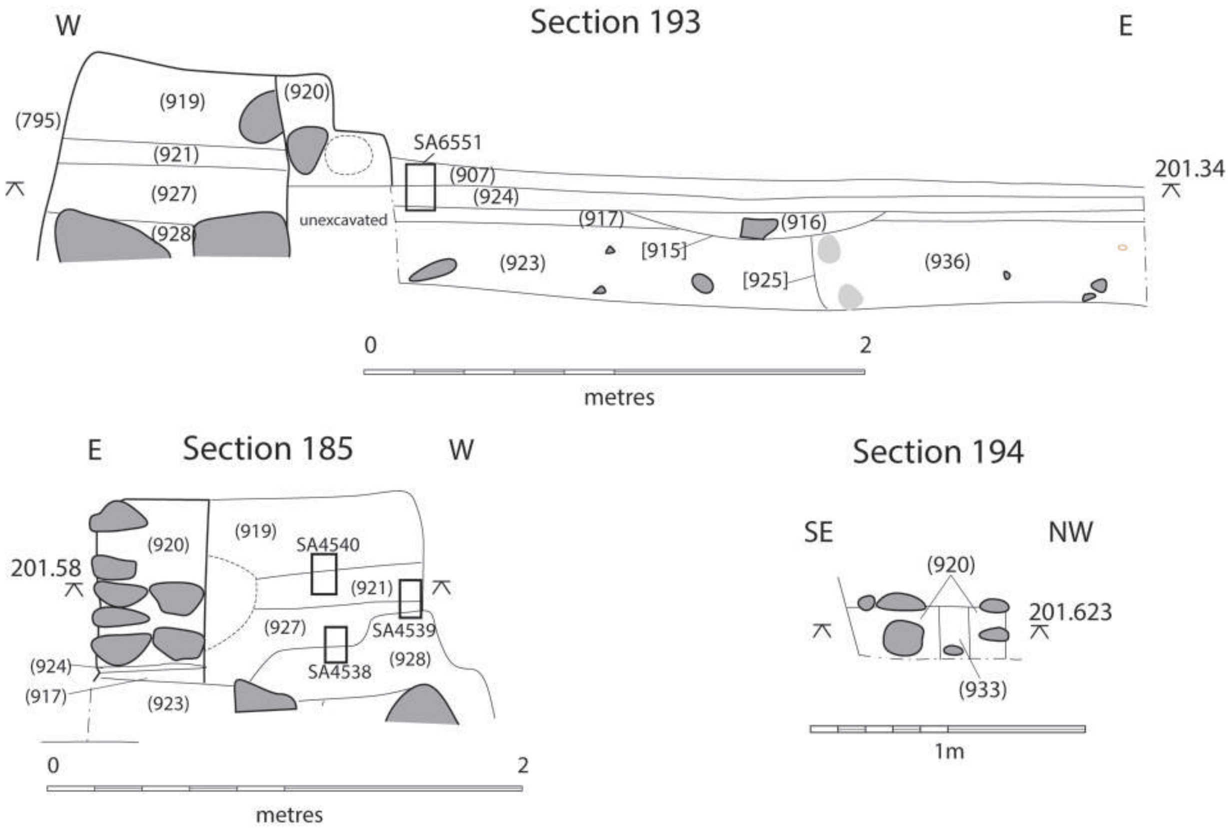


Figure 36.17. South-facing Section S193 through internal deposits and walls of Structure O100 (and also infilling deposits from Structure O75 (923) and (936)) showing location of micromorphology sample SA6551; north-facing Section S185 through walls (795, contexts 928, 927, 921 and 919) and (920) showing relationship of the floor deposits to the walls; southeast-facing Section S194 showing post-hole (933)[932] in wall (920).

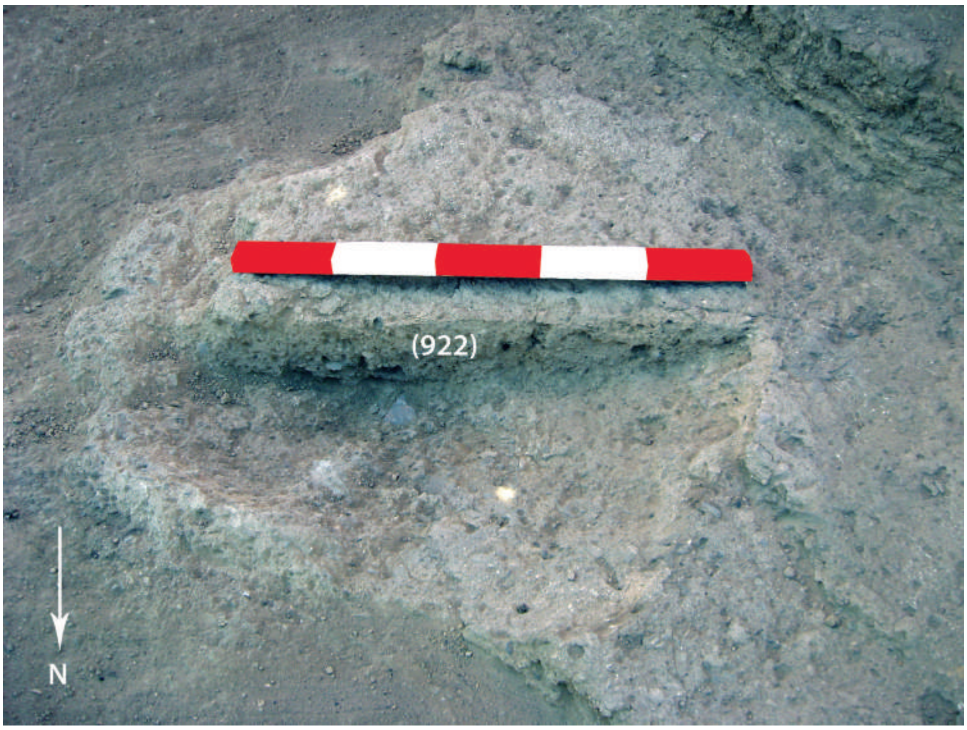


Figure 36.18 Floor patch (922). Scale 0.5 m.

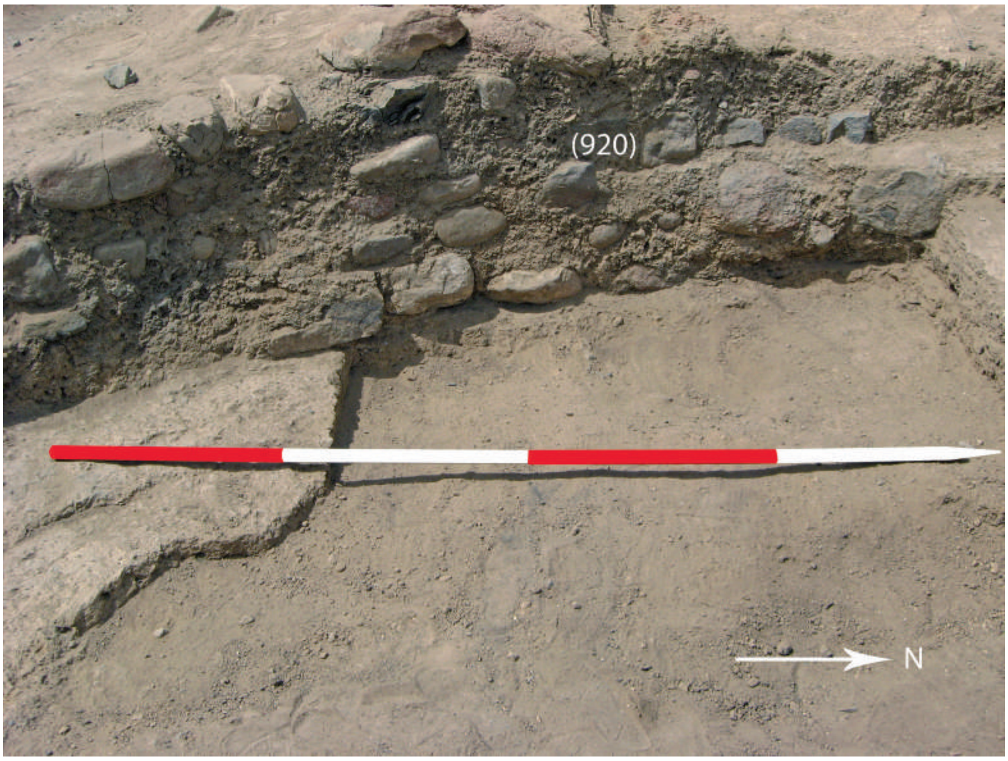


Figure 36.19 Southern arm of east-facing wall (920) prior to excavation. Scale 2.0 m.

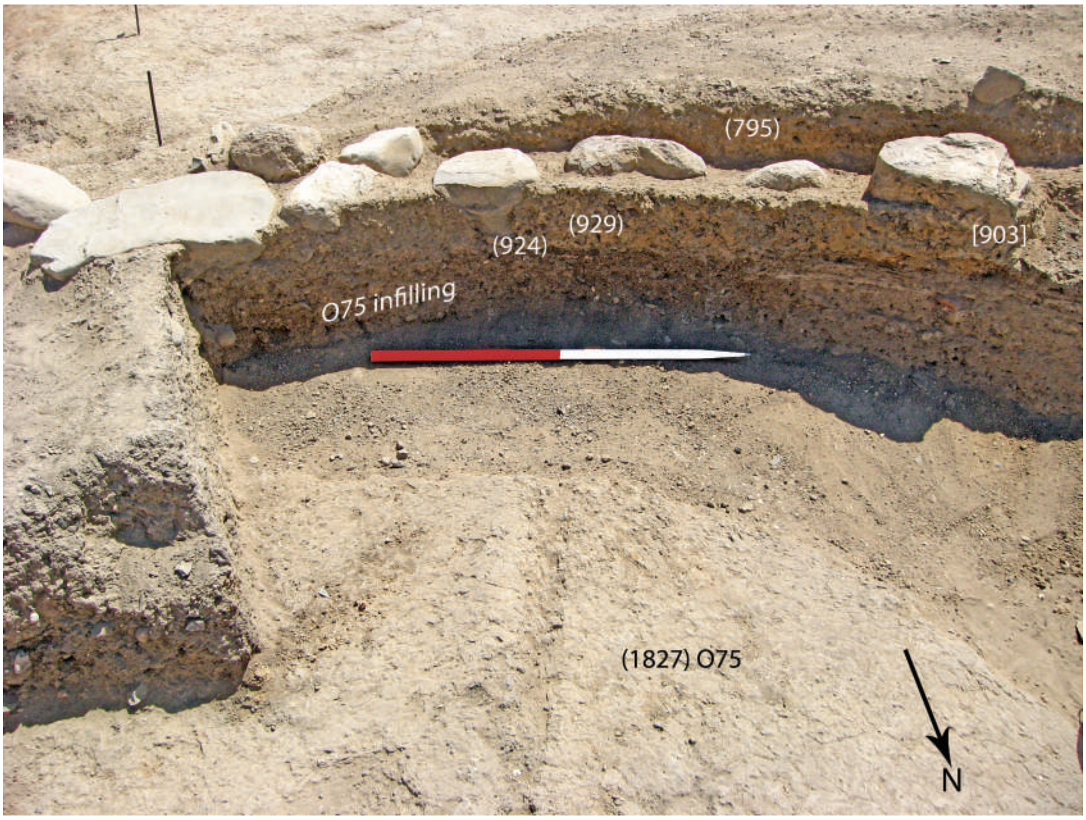


Figure 36.20 Wall (929) during the excavation, showing underlying floor (924) and the deposits infilling Structure O75. Scale 1.0 m.

Figure 36.21 Large limestone block in wall (795) and adjacent cup-hole mortar in floor (924), view from northeast. Scale 0.5 m.

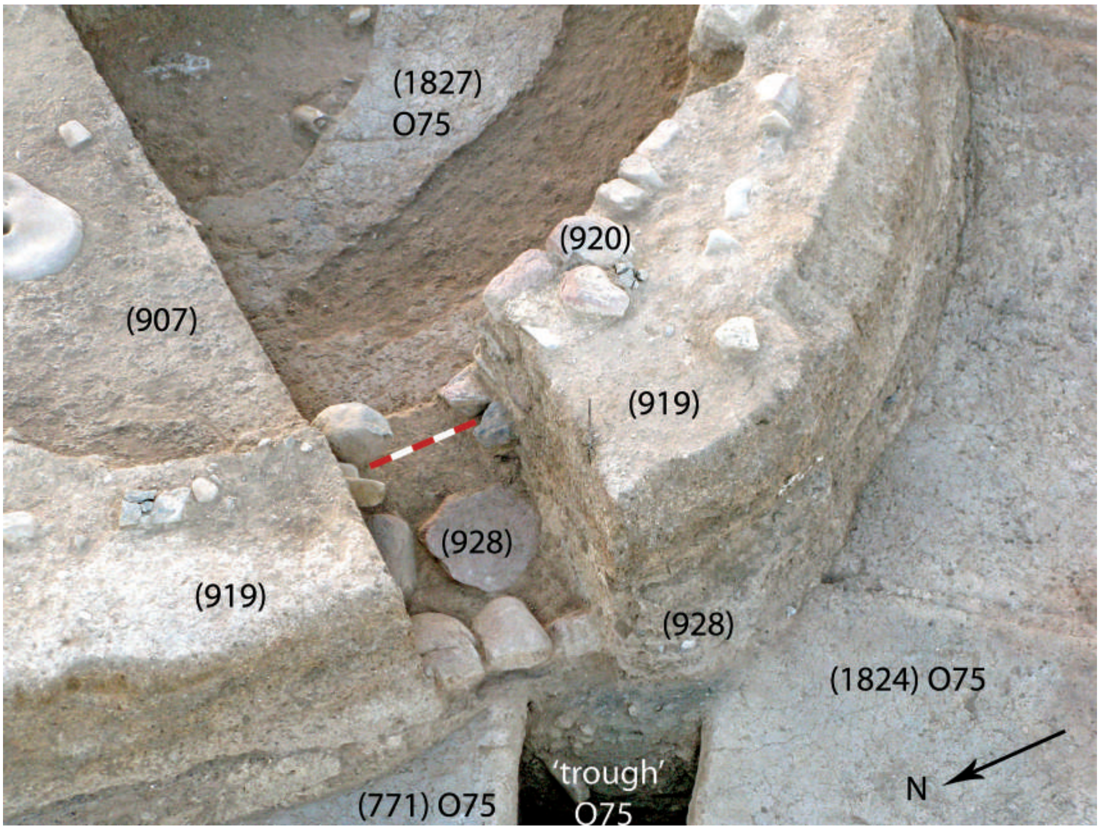


Figure 36.22 Section through wall (795) showing foundation stones (928) and top pisé layer (919) from west-northwest. Also showing section through underlying 'trough' of Structure O75. Scale 0.5 m.

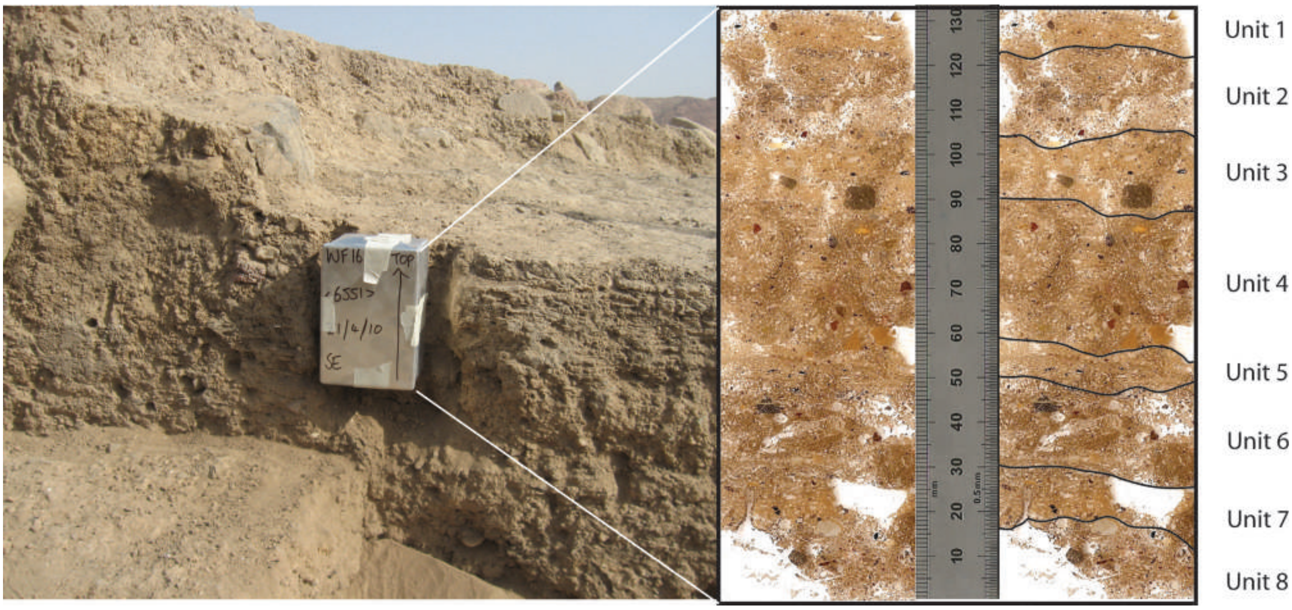


Figure 36.23. Micromorphology block sample SA6551 in Section S193 (Figure 36.17) and identified units.

and SF1757), as well as the insertion of stone work benches around SF1753, after its initial use with the plaster moulded floor, possibly to form a bench, indicates that these mortars remained as fixed installations during a number of episodes of re-flooring. Moreover, a spatial continuity of activity within Structure O100 is apparent from the location of cup-hole mortar SF1753 directly above cup-hole mortar SF1791.

The stratigraphic relationships of Structure O100 to its surrounding structures are clearer than in any other building across the site, and in its final form it appears to be one of the youngest surviving structures within the 2008–2010 excavation trench. The freestanding walls may represent a local development towards the end of the PPNA that becomes common in the subsequent PPNB. This is reflected in the chipped stone from the upper levels. As

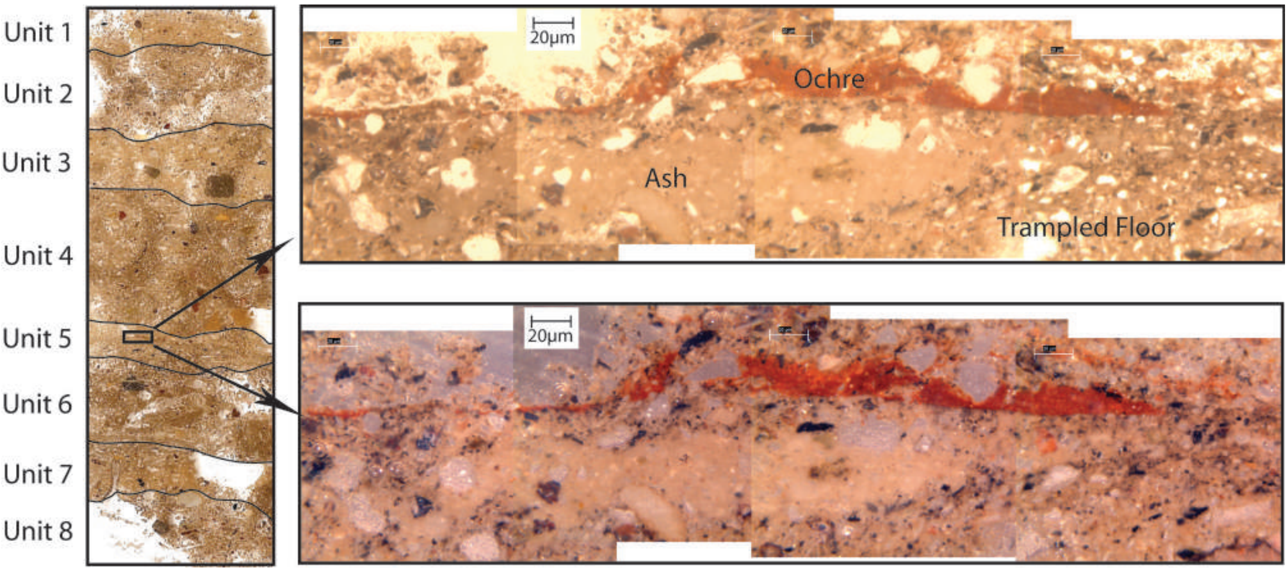


Figure 36.24. Photos stitched together showing the layer of ochre in plain polarized light (PPL) and reflective light with sharp lower boundary. Ash mixed in with trampled floor can be seen more clearly with PPL. Scale 20 microns.

Table 36.4. Micro-stratigraphic units within block sample SA6551.

Layer	Particle size/ sorting	Anthropogenic remains — charred material	Plant impression	Shell	Plaster/Pisé type if applicable	Clean/Dirty	Other comments
1	Silty clay	5%	5%		Plaster/pisé 3	Clean	
2	Silty clay loam	20%–60%	2–5%	2%		Dirty	
3	Silty clay	5–10%	10%	<1%	Plaster/pisé 4	Clean	
4	Silt clay loam	5%		5%		Dirty	Ochre and ash in occupation trampled into floor surface
5	Silty clay	5%	<1%		Plaster/pisé 3	Clean	Surface of floor is trampled
6	Silt loam	5%	1–2%	<1%		Dirty	
7	Silty clay	2–5%	1%		Plaster/pisé 8	Clean	
8	Sandy silt loam	10–15%	2–5%	2%		Dirty	

Table 36.5 AMS radiocarbon dates from O100.

						Chronological model Posterior density estimates cal BP	
Object and Laboratory Code	**Context**	**14C yrs BP**	**Δ13C ‰**	**Taxa**	**Form**	**68%**	**95%**
O100							
Beta-290708	920	9760±50	-24.7	Cupressaceae	Juvenile	*11,230–11,170*	*11,250–11,120*
Beta-290707	917	9770±50	-20.7	Unidentified	Juvenile	*11,240–11,180*	*11,260–11,130*

described in Chapter 39, the assemblage from these levels is similar to some of the chronologically latest contexts excavated in evaluation Trench 3 (Pirie 2007). While the presence of atypical El-Khiam points in context (906) acts to further differentiate these levels from most of the WF16 assemblage, their presence nevertheless supports the attribution of these levels to the PPNA. It is also significant that several of the contexts sampled in Structure O100 include diagnostic PPNA elements, such as the Beit Tamir sickle from (896), which are manufactured on the Type 5 raw material, strongly suggesting that this raw material was used at the site during the PPNA. Taken together, these factors suggest that whilst the assemblages from the upper levels of Structure O100 are generally atypical of WF16, they most likely to derive from (relatively late) PPNA activity at the site.

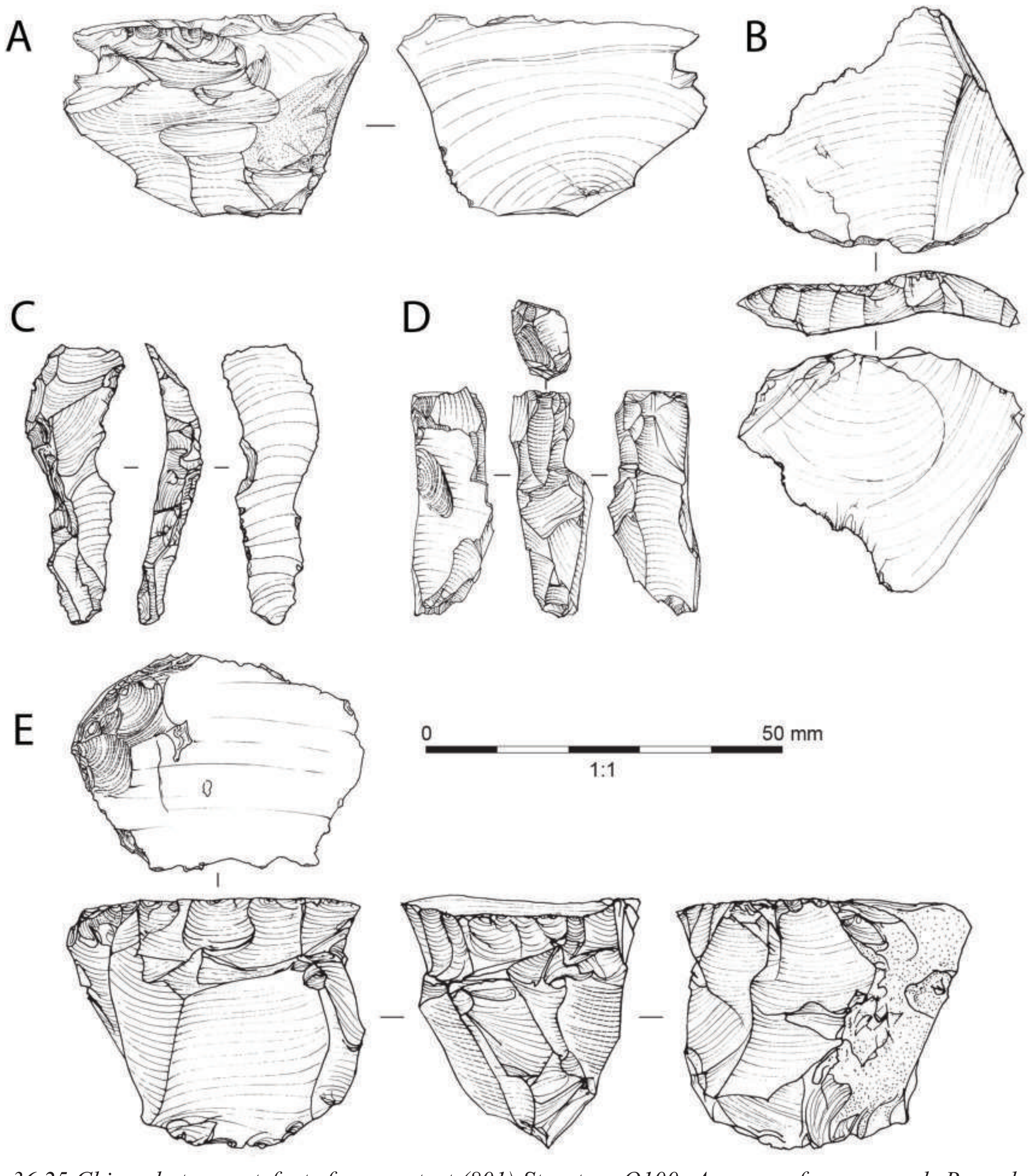


Figure 36.25 Chipped-stone artefacts from context (801) Structure O100: A — core face removal; B — platform rejuvenation flake; C — partially crested piece; D — bladelet core/multiple burin; E — single platform bladelet core.

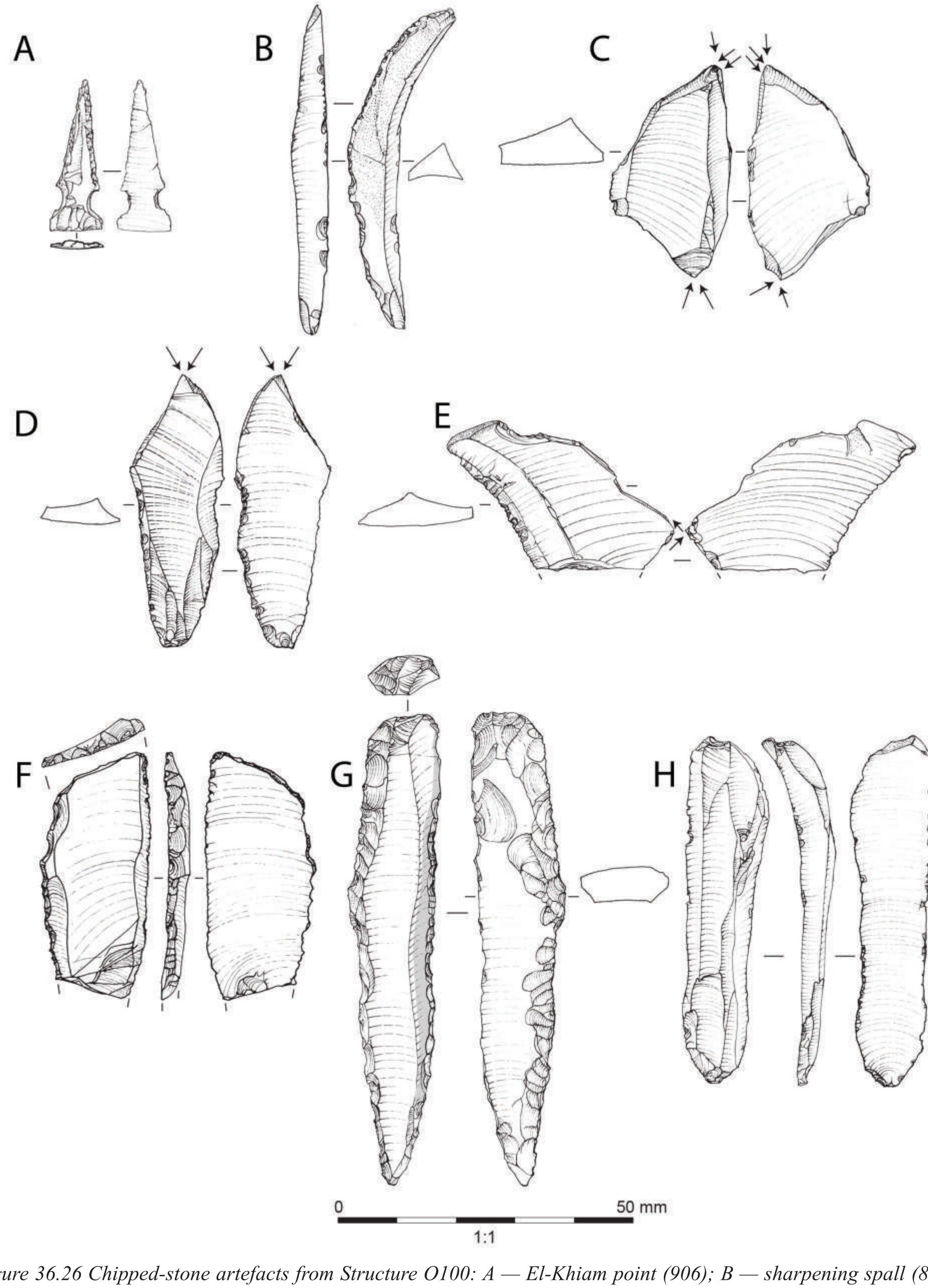


Figure 36.26 Chipped-stone artefacts from Structure O100: A — El-Khiam point (906); B — sharpening spall (896); C — multiple burin (801); D — dihedral burin (801); E — burin (907); F — varia: 'massive' trapeze? (907); G — glossed piece (Beit Tamir?) (SF2567, SF896); H — retouched blade (801).

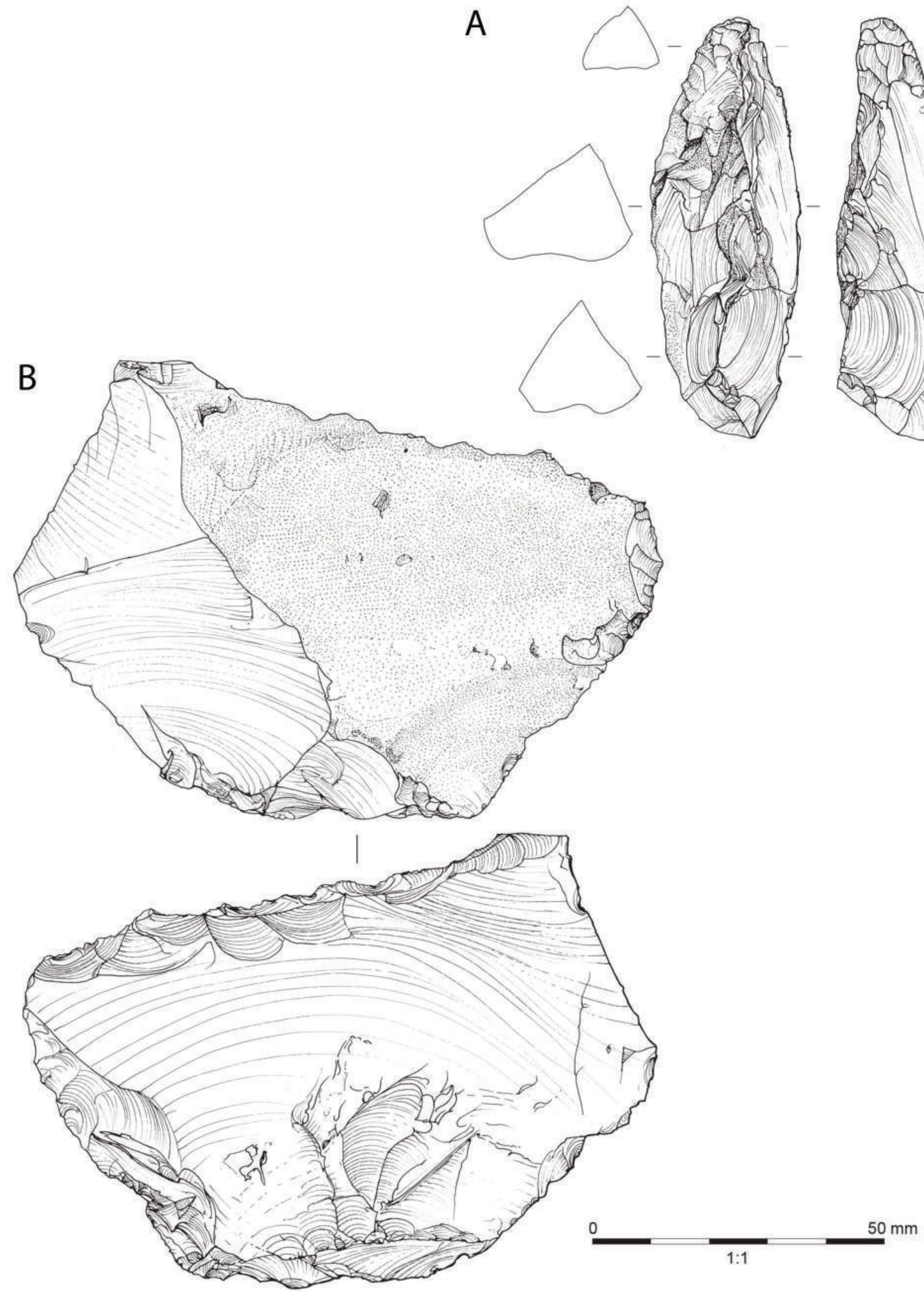


Figure 36.27. Chipped-stone artefacts from Structure O100: A — trihedral pick (801); B — massive scraper (SF1763)(898).

37. Surface O91

37.1 Location and relationship with other structures

The contexts grouped as Surface O91 relate to deposits within the walls and above the silts that overlie the floor of Structure O75 (Chapter 38). Surface O91 is also exterior to Structure O100 (Chapter 36), (Figure 37.1). The contexts of Surface O91 formed after the initial construction of the wall of Structure O100 and probably during its initial occupation, but before Midden O60 had begun to accumulate. As such, Surface O91 is stratigraphically between the occupation deposits and silts overlying the floor of Structure O75 and the midden deposits of Midden O60 (Figure 37.2). The surface measured *c.* 11 m from north–south and *c.* 8 m from east–west. It did not extend to the walls of the abandoned Structure O75 and was thicker immediately outside of Structure O100.

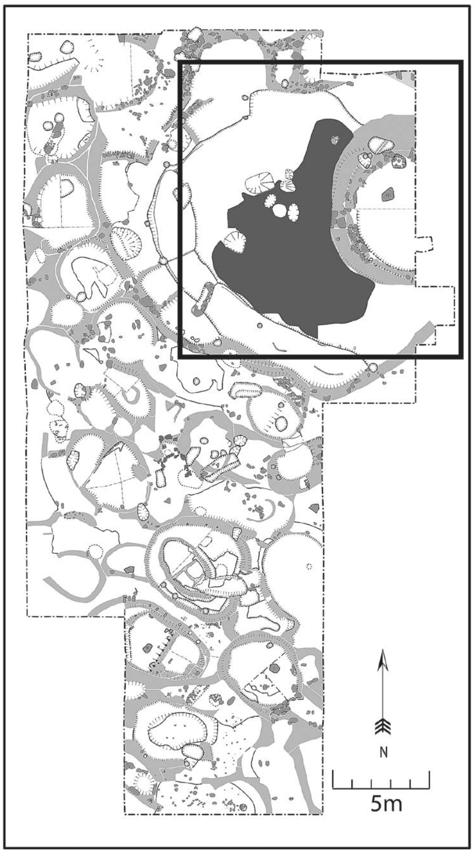
The stratigraphic matrix for Surface O91 is shown in Figure 37.3. Descriptions of the contexts are given in Table 37.1, a list of bulk finds in Table 37.2 and small finds in Table 37.3.

37.2 Description of excavated deposits

Below the deposits of Midden O60 there was an extensive layer (>5 m^2) of compact sandy silt (720) containing frequent moulded fragments of (often burnt) pisé, several of which carried the impression of timber and, in some cases, were adhered to by charcoal. Two pisé fragments were taken as samples SA2940 and SA2941, the latter being a possible rounded mudbrick. In addition to bulk finds of chipped and ground stone and animal bone (Table 37.2), this deposit contained a selection of ground-stone objects including fragments of mortar SF1370, large bowl SF1459, platter SF1461 and pestles SF1460 and SF1462. Smaller objects included incised stone plaque SF1463, stone beads (SF1448, SF1465 and SF1993) and marine shell bead SF1497. Excavation of deposit (720) revealed mud-plaster surface (734), (Figure 37.2). This surface and the overlying deposit (720) were sampled by two adjacent micromorphology samples, SA3611 and SA3612, taken from the eastern end of Section S122 (Figure 37.10) through the deposits of Midden O60 (Figure 37.4) and the underlying contexts (720, 734) of Surface O91 (see below, section 37.3).

Surface (734) was excavated in 5 m x 5 m squares as (1241), (1242), (1231), (1144), (1205) and (1211) to provide spatial control over the finds (Figure 37.4). These contexts jointly produced almost 80 kg of chipped stone and over 13 kg of animal bone (Table 37.2), as well as a range of small finds. The ground-stone objects included a large bowl fragment (SF2202), pestles (SF2197, SF2205) and hammerstones (SF2195, SF2208), all from context (1144), which also contained leaf-patterned incised stone SF2193 (Figure 37.5), beads (SF2287, SF2821) and unworked coral fragments (SF2244, SF2250). A stone cup fragment (SF2199) was found in context (1205) and marine shell beads SF2209 and SF1498 in contexts (1205) and (734), respectively. Bone tools were represented by a polished scapula SF2340 from context (1241) and a bone point SF2292 from (1211). At its most northwestern extent the mud-plaster surface (734) had been moulded to form a hearth, which contained midden-like debris and heat-cracked stones (722) above a charcoal-rich primary fill (723). There were also two elliptical cuts, [726] and [721], either side of the hearth (Figures 37.6, 37.7). Cuts [726] and [721] were filled by silts (725) and (724), respectively.

Adjacent to the external face of the northwest section of the wall of Structure O100, there was a group of stones (1206) above the main external surface (734/1211) (Figures 37.4 and 37.8). These stones (1206) formed a



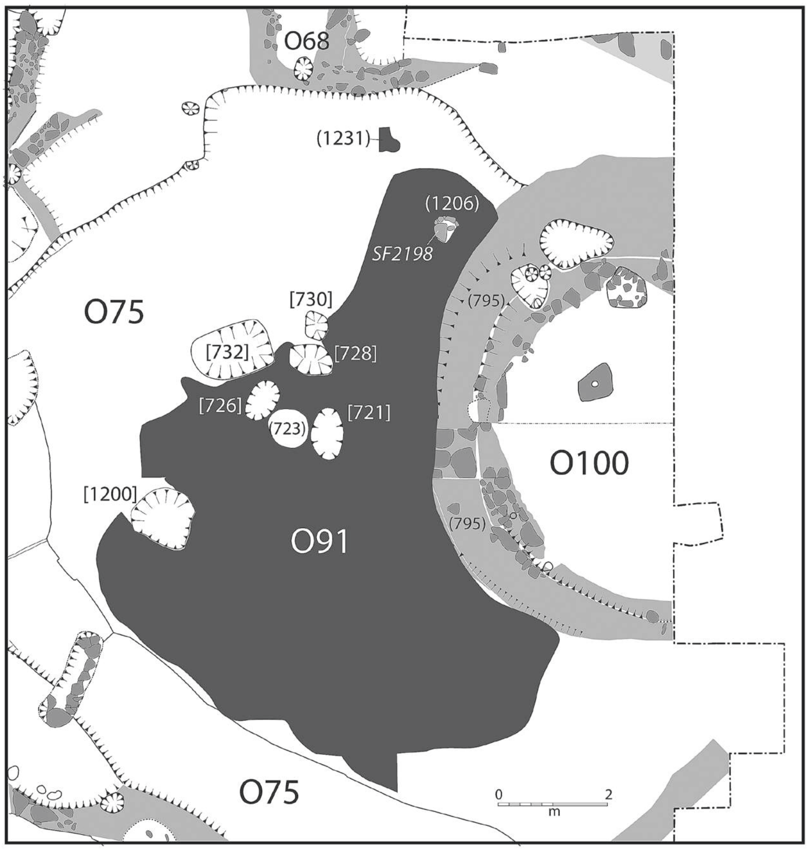


Figure 37.1 Location of Surface O91 and plan showing its relationships with surrounding and underlying Objects.

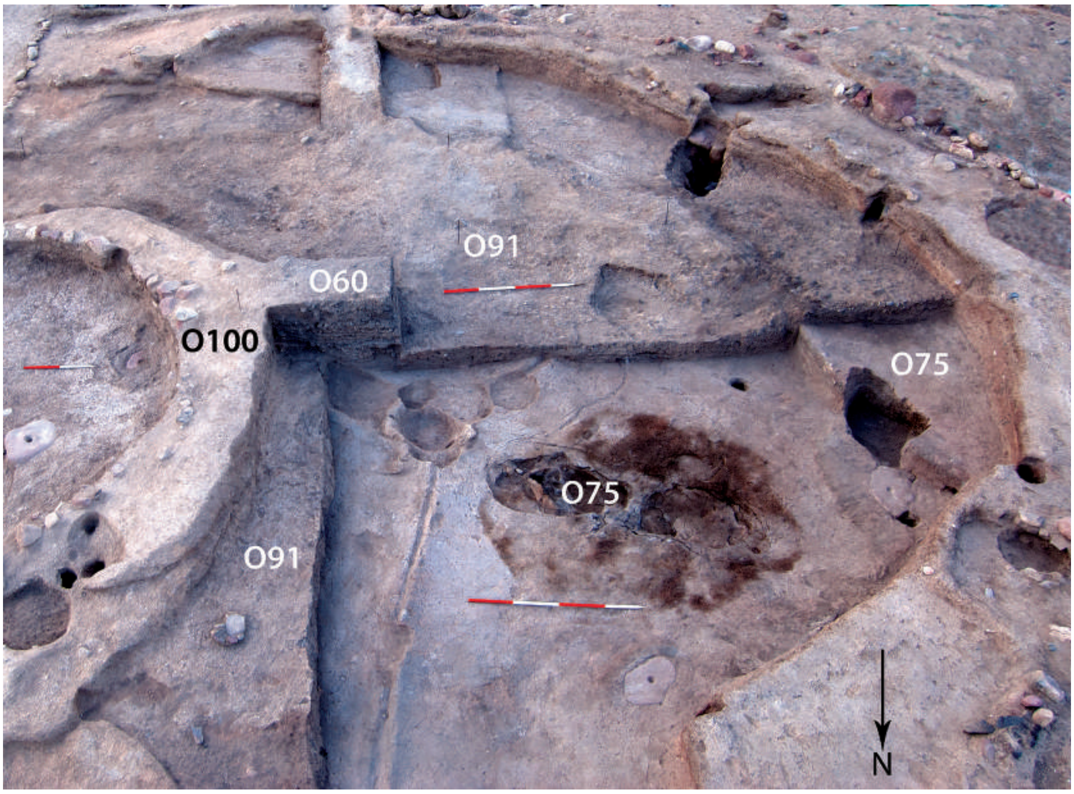


Figure 37.2 2010 photograph showing Surface O91 (734) outside Structure O100 removed by excavation in northwest corner showing the floor of earlier Structure O75. Unexcavated deposits of Midden O60 can be seen as a rectangular baulk abutting the wall of Structure O100. Scales 1.0 m and 2.0 x 2.0 m.

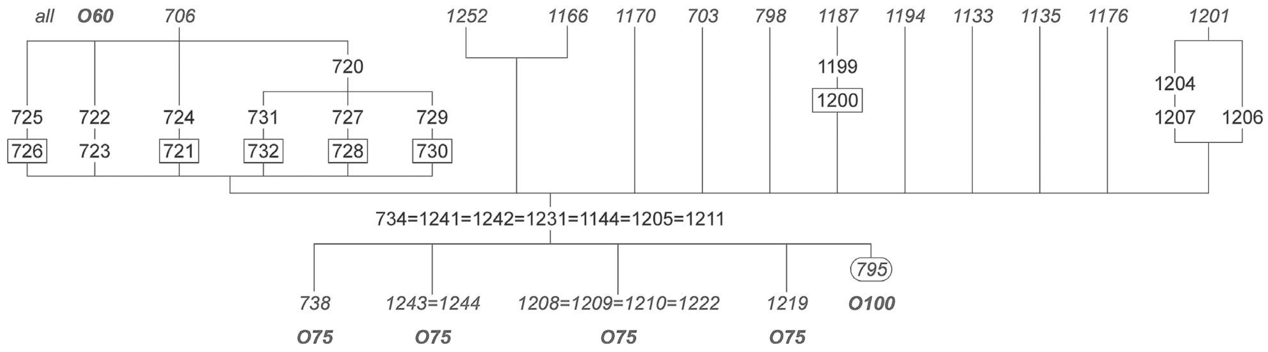


Figure 37.3 Stratigraphic matrix for Surface O91.

Table 37.1 Contexts forming and filling Surface O91 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
720	compact mid-greyish-orange sandy silt with dense pisé rubble	silt and rubble accumulation
721	oval cut with steep sides and a flat base	cut of small pit
722	friable mid-brownish-grey sandy silt with frequent fire-cracked stones	fill of hearth
723	loose dark grey silty-ash, light grey ash and frequent charcoal	fill of hearth
724	friable mid-greyish-brown sandy silt	fill of pit
725	friable mid-brownish-grey sandy silt	fill of pit
726	oval cut with sloping sides and a slightly concave base	cut of pit
727	loose greyish-brown fine silty-ash with charcoal inclusions	fill of hearth
728	roughly square cut with opposing vertical and gradual sides and a sloping base	cut for hearth
729	loose greyish-brown silty-ash	fill of hearth
730	circular cut with vertical sides and a sloping base which rests on an earlier floor surface	cut for hearth
731	friable greyish-brown sandy silt with high concentrations of sub-rounded to sub-angular stone and pisé rubble	fill of pit
732	oval cut with steep to vertical sides and a flat base	cut of pit
734	compact light yellowish-grey silty clay	external mud-plaster surface
1144	firm light yellowish-grey silty clay	external mud-plaster surface
1199	friable mid-brownish-grey sandy silt	fill of pit
1200	irregular cut with sides of varied gradient and a slightly concave base	cut of pit
1204	compact mid-yellowish-grey sandy clay	thin external mud-plaster surface overlying thin occupation layer
1205	firm mid-greyish-yellow sandy silt and silty clay	patchy mud-plaster external surface
1206	stone setting incorporating one large flat pecked stone	possibly a working bench with pecked surface of flat stone caused by use
1207	compact mid-greyish-yellow silty clay	thin external surface overlying thin occupation layer
1211	concreted light orange-yellow-brown slightly sandy silt	external mud-plaster surface
1231	firm light yellowish-brown silty clay	external mud-plaster surface
1241	compact mid-brownish-yellow silt	external mud-plaster surface
1242	compact mid-brownish-yellow silt	external mud-plaster surface

Table 37.2 Quantities of bulk finds from Surface O91 by material and context number.

Object 91	Volume of sediment (l)				Weight of bulk finds per material (g)									
Context	**Total volume**	**Flot. sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Ground stone**	**Other worked stone**	**Unworked stone**	**Animal bone**	**Marine shell**	**Other shell**	**Plaster/Pisé**	**Charcoal**	**Misc.**
720	1483.0	150.0	1322.0	11.0	25984.9	6955.5	11.3	0.0	5994.4	0.0	433.8	151.0	1701.0	0.0
722	121.0	30.0	80.0	1.0	2553.0	357.4	1.0	0.0	1414.5	0.0	9.6	0.0	0.2	0.0
723	23.0	22.0	0.0	1.0	150.0	0.0	0.0	0.0	17.6	0.0	0.0	0.0	0.1	0.0
724	31.0	30.0	0.0	1.0	522.7	0.0	0.2	0.0	87.2	0.0	21.9	0.0	0.0	0.0
725	23.0	23.0	0.0	0.0	398.0	159.7	0.0	0.0	123.4	0.0	39.9	0.0	0.0	0.0
727	1.0	0.0	0.0	1.0	705.9	145.0	0.6	0.0	80.0	0.0	6.9	0.0	0.0	0.0
729	13.0	12.0	0.0	1.0	81.3	0.0	0.0	0.0	8.3	0.0	4.4	0.0	10.2	0.0
731	321.0	30.0	280.0	1.0	10640.6	4800.0	0.0	0.0	4534.1	0.0	52.2	0.0	0.1	0.0
734	531.0	500.0	30.0	1.0	6588.1	1059.6	20.0	0.0	376.8	1.0	35.1	2350.0	0.1	0.0
1144	2147.0	160.0	1972.0	15.0	51833.7	18925.0	123.0	190.0	8428.5	0.0	5.1	0.0	119.1	0.0
1199	61.0	30.0	30.0	1.0	4014.0	840.0	0.0	0.0	556.2	0.0	32.9	0.0	1.0	0.0
1204	24.0	18.0	5.0	1.0	146.7	0.0	0.1	0.0	15.3	0.0	1.5	0.0	0.1	0.0
1205	429.0	80.0	313.0	36.0	5885.9	5410.0	26.0	0.0	2116.6	0.0	3.6	0.0	40.0	0.0
1206	3.0	2.0	0.0	1.0	161.2	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0
1207	47.0	20.0	25.0	2.0	71.0	0.0	0.0	0.0	15.9	0.0	1.7	0.0	6.0	0.0
1211	263.0	62.0	194.0	7.0	1598.1	310.0	0.0	0.0	80.1	0.0	1.1	0.0	37.0	0.0
1231	8.0	8.0	0.0	0.0	71.4	0.0	0.1	0.0	1.4	0.0	2.8	0.0	0.1	0.0
1241	1312.0	60.0	1248.0	4.0	16634.8	3182.0	28.1	0.0	3177.5	15.0	21.7	0.0	74.0	1.0
1242	121.0	10.0	110.0	1.0	332.2	36.0	0.0	0.0	207.0	0.0	2.2	0.0	0.1	0.0
Total	6962.0	1247.0	5609.0	86.0	128373.5	42180.2	210.4	190.0	27239.3	16.0	676.4	2501.0	1989.1	1.0

Table 37.3 Quantities of small finds from Surface O91 by material and context number.

Object 91	Quantities of small finds per material (nos)								
Context	**Ground stone**	**Other stone**	**Worked bone**	**Unworked animal bone**	**Bone beads**	**Stone beads**	**Marine shell beads**	**Marine shell other**	**Total small finds**
720	5	2	0	0	0	3	1	1	12
727	0	0	1	0	0	0	0	0	1
729	0	0	0	0	0	0	1	0	1
731	0	0	3	1	0	0	0	0	4
734	0	0	0	0	0	0	1	0	1
1144	4	3	0	0	0	1	1	2	11
1199	1	0	0	0	0	0	0	0	1
1205	1	0	0	0	0	0	1	0	2
1206	1	0	0	0	0	0	0	0	1
1211	0	0	1	0	0	0	0	0	1
1241	0	0	1	0	0	0	0	0	1
Total	12	5	6	1	0	4	5	3	36

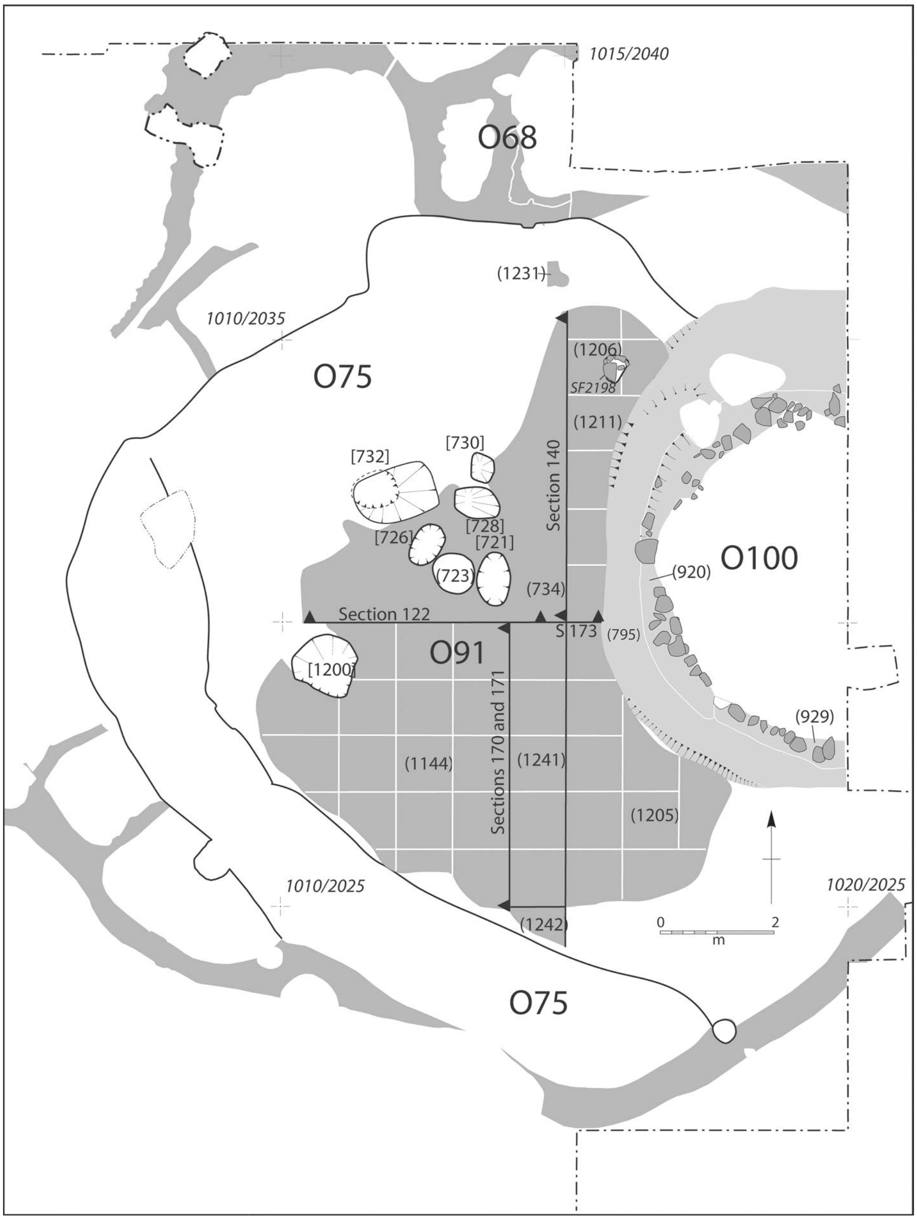


Figure 37.4 Plan of surface (734=1144=1241=1242=1205=1211=1231) showing the excavation grid dividing different context numbers and the location of cut features and sections.

Figure 37.5 Incised stone object SF2193 from surface deposit (1144).

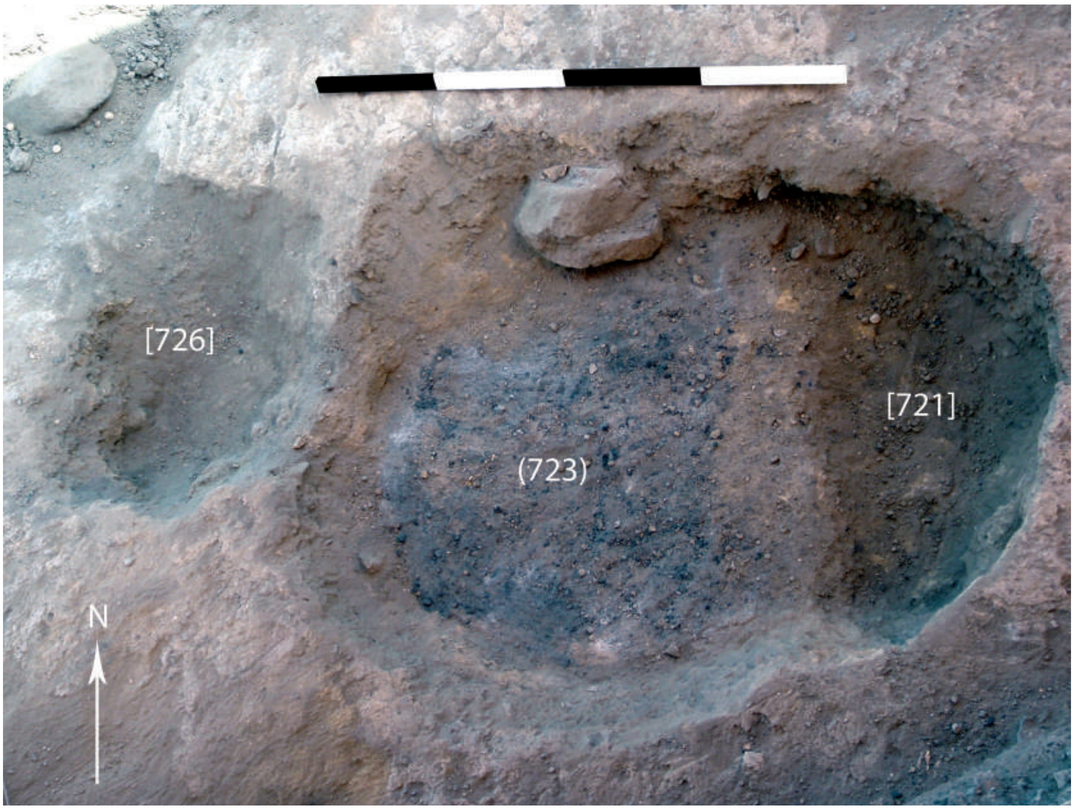


Figure 37.6 Charcoal-rich primary fill (723) of hearth moulded into surface (734) with two adjacent pits [726] and [721]. Scale 1.0 m.

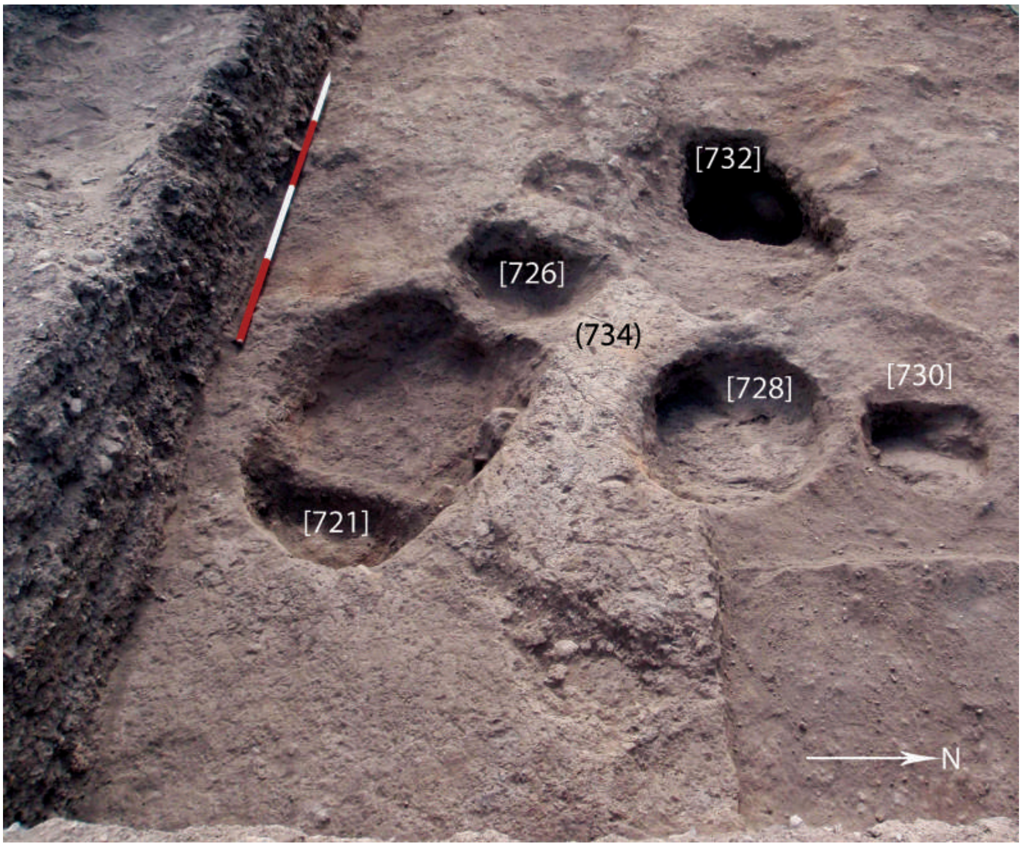


Figure 37.7 Post-excavation view of features cut into surface (734). Scale 2.0 m.

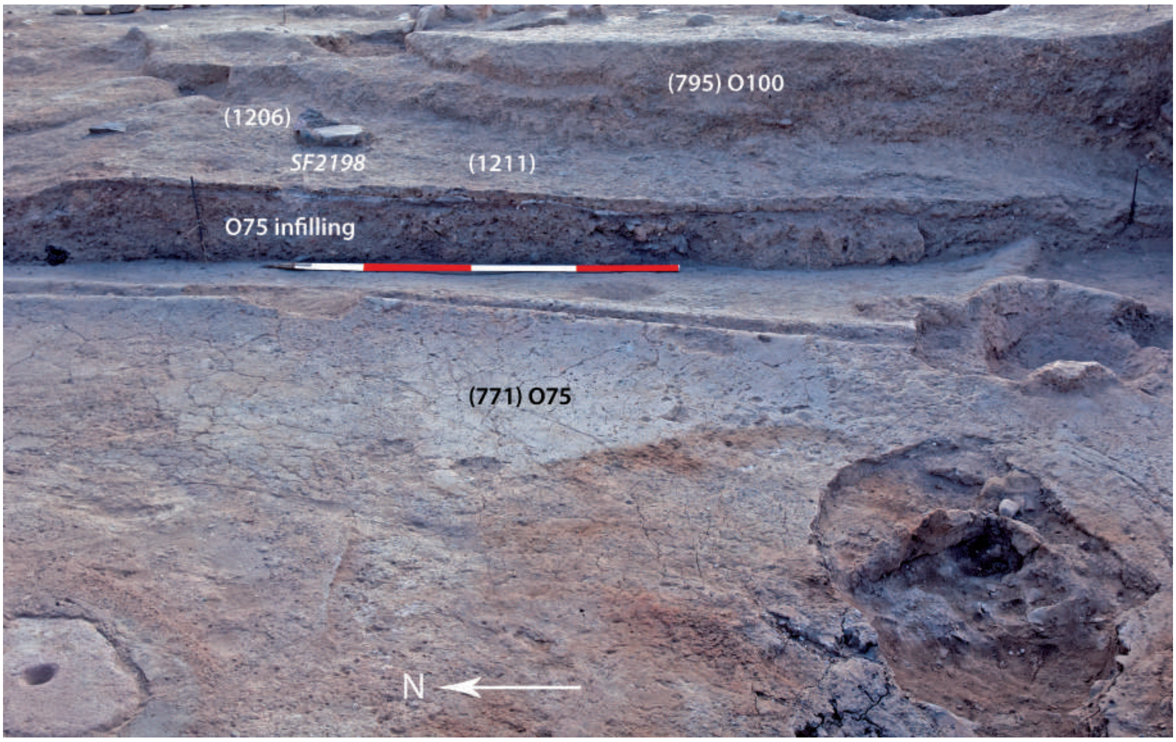


Figure 37.8 Section through surface (1211) showing floor (771) of Structure O75 in the foreground and wall (795) Structure O100 in the background. Scale 2.0 m.

small platform with a large flat stone SF2198 that had a pecked surface. Just to the south of this feature and sealing the main external surface (734=1211), were two additional layers of mud plaster. These were excavated as (1204) and (1207), and may represent construction debris from the addition of courses of pisé to the wall (795) of Structure O100. Each of these layers sealed a fine spread of occupation material that could not be easily distinguished during excavation, but that was visible as micro-stratigraphy in block sample SA5893 taken through the build-up of the surfaces. These additional surfaces (1204, 1207) were only found immediately adjacent to wall (795) of Structure O100 and did not extend further to the west.

Two additional hearth cuts, [728] and [730], were excavated to the north of the moulded hearth, part of surface (734). Both cuts were filled with a silty ash with charcoal inclusions (727) and (729) respectively. A large pit [732] (measuring *c.* 1.9 m x 1.0 m and 0.6m deep) was also dug in the vicinity of the hearths and contained a silt fill (731) with a high density of large animal bone fragments and burnt stones (Figure 37.7). Amongst the bone were the horncores of a caprid, and a bone fragment with an incised zig-zag pattern (Figure 37.9).

Further to the south, another pit [1200], cutting the external surface (734=1144), was excavated below Midden O60 (1187). This was an irregular cut, 1.2 m x 1.1 m x 0.2 m, located towards the westernmost limits of Surface O91 (Figure 37.4). As with pit [732] the silty fill (1199) contained a high proportion of animal bone and heat-cracked stone.

37.3 Sedimentary and micro-stratigraphic assessment

One sediment sample was analysed from O91, from an external floor surface (734), the data, results and interpretation of which are presented in Chapter 39.

Two block samples, SA3611 and SA3612, were taken through context (734) immediately below Midden O60 at the eastern end of Section S122 (Figures 37.4 and 37.10). The samples were adjacent to each other but at different, although overlapping heights. Analysis divided these into five and six units respectively, with the lower three units in SA3611 being the same as the upper three units in SA3612 (Figure 37.11, Table 37.4).

The six units fall into three categories: midden/rubbish material, mud-plaster layers and possible levelling deposits. The top two units in SA3611 contain a considerable amount of anthropogenic material, such as plant voids, charcoal, shell, burnt and un-burnt bone and flint (Figure 37.12), interpreted as midden debris and equating to (706) of Midden O60. These units have a very ‘dirty’ appearance compared to the following three units, which are mud-plaster surfaces, equated with (734) but showing greater complexity than appreciated from field observation alone. Two of the mud-plaster layers are classed as plaster/pisé 3

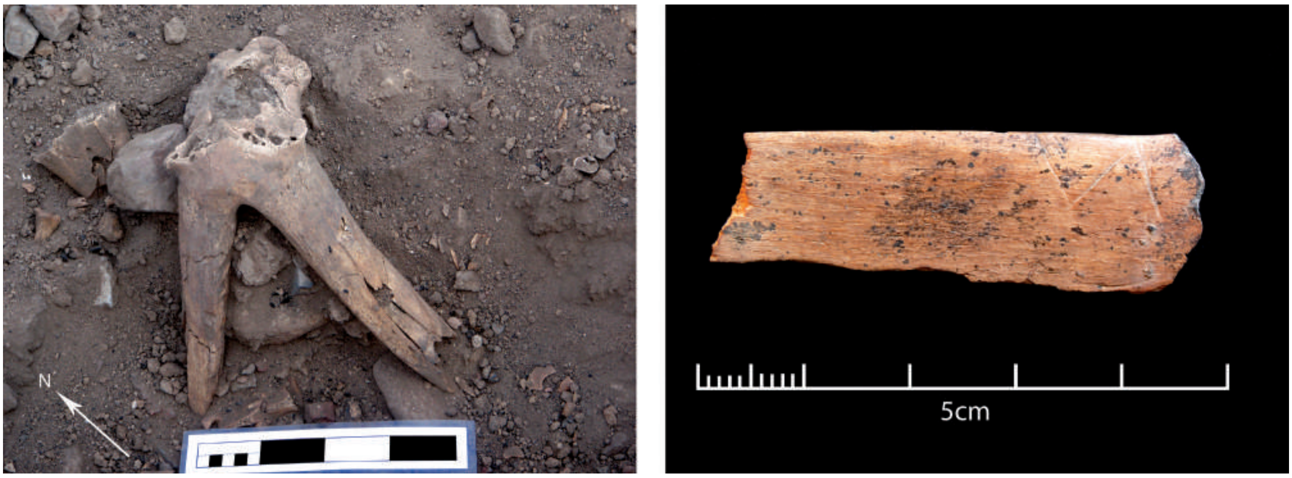


Figure 37.9 Caprid horncores SF1489 (scale 0.2 m) and incised bone fragment SF1494 excavated from the fill of pit [732].

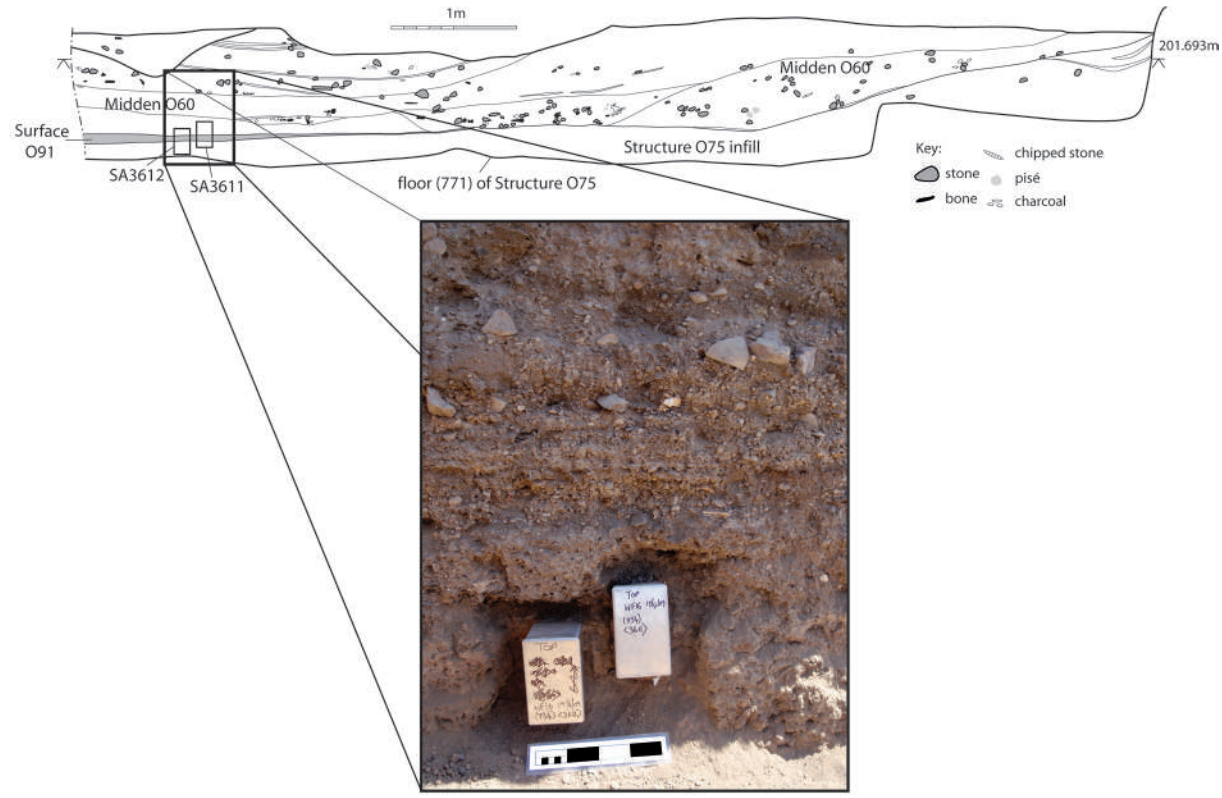


Figure 37.10 Location of block samples SA3611 and SA3612 through mud-plaster surface (734) in Section S122 (as located on Figure 37.4). Photograph scale 0.2 m.

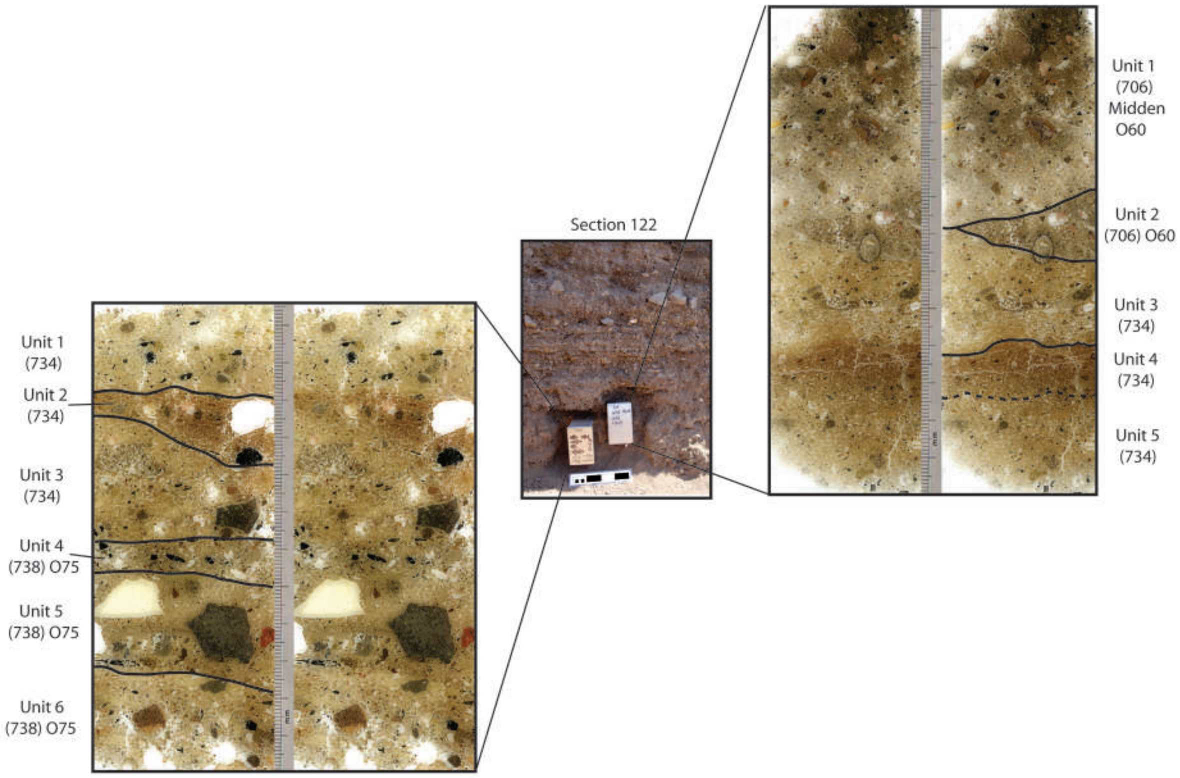


Figure 37.11 Division of block samples SA3611 and SA3612 into five and six units respectively, with the lower three units in SA3611 being the same as the upper three units in SA3612. Scale 0.2 m.

and the other plaster/pisé 5. All these layers are very similar in texture and composition but vary in colour. The top and bottom mud-plaster layers (plaster/pisé 3) are a brownish-yellow colour, whereas the middle layer (pisé/plaster 5) is a dark brownish-red colour. The boundary between the two lower layers is rather diffuse, occurring over 3–5 mm. This might suggest that these three layers were in fact made of the same material, but the middle one may have been burnt *in situ*, therefore reddening the deposits. Further evidence for *in situ* burning is the presence of a grey thin layer of ash crystals between the dark brown/red plaster and the top yellow/brown plaster. This ash appears to be caught in the voids that suggest ash was swept off this surface. The two lowest units in SA3612 are composed of looser materials with larger stone inclusions. These inclusions are orientated in random directions and are not compacted. These units correspond to the infill (738) of Structure O75 which underlies Surface O91.

Three block samples were taken through the deposits in Section S173 (the eastward extension of Section S122) located externally and adjacent to the northwest corner of Structure O100 (Figures 37.4 and 37.13), one of which, SA5893, has been subjected to micro-stratigraphic analysis. These deposits consisted of contexts (1204) and (1207), which were observed in the field as consisting of numerous laminations. Analysis divided the block into seven units, three of which were interpreted as representing occupation/accumulation (units 1, 5 and 6), two as mud-plaster surfaces (units 2 and 7) and two as water-laid sediments (units 3 and 4) (Figure 37.14; Table 37.5). The water-laid sediments are below the thickest mud-plaster unit (unit 2) that runs roughly through the middle of the sample (Figure 37.15). This water-laid sediment below the plaster consists of two episodes, evident from two sequences of increasing particle size from small to large down the profile (units 3 and 4). The large particles settled in the water while the smaller particles remained suspended, giving a particle size gradient from small to large. The main mud-plaster unit (unit 2) tips downwards east–west away from Structure O100 (Figure 37.15). The charcoal-rich layer of midden material (unit 6), interpreted as occupation debris, is orientated west–east; Figure 37.16 shows tip lines with the long axis of the charcoal pointing from right to left.

37.4 Chipped stone

The sample (n=1489 pieces) includes material from four out of twelve contexts with chipped stone in Surface O91. By weight, the sample (13620 g) constitutes 12% of the bulk find chipped stone from this structure. The composition of the sampled assemblage is provided within Chapter 39.11.

Table 37.4 Units and their characteristics from block samples SA3611 and SA3612.

Layer	Particle size/ sorting	Anthropogenic remains	Other	Aggregates/Large inclusions/Voids	Plaster type if applicable	Clean/Dirty
SA3611-1	Poorly sorted sandy silt loam	30% small charred material in upper 2 cm. Burnt and unburnt bone 5%. Two fragments of angular flint	Shell	Plaster/pisé aggregates 5%. Pseudomorphic voids 5–10%.		Dirty
SA3611-2	Poorly sorted silt loam	2–5% small broken up charred material. Burnt and unburnt bone. Calcitic ashes in lower boundary. Angular flint x2	Bioturbated channels	Pseudomorphic voids 5–10%.		Dirty
SA3611-3 SA3612-1	Poorly sorted silty clay loam	5–15% charred material. <2% Burnt and unburnt bone	Shell	Pseudomorphic voids 5%.	Plaster/pisé 3	Clean
SA3611-4 SA3612-2	Moderately sorted silty clay loam	5–10 % charred material. <1% burnt and unburnt bone. Calcitic ashes in upper boundary	Shell	Pseudomorphic voids 10–15%. Planes parallel to surface	Plaster/pisé 5	Clean
SA3611-5 SA3612-3	Poorly sorted silty clay loam	5–8% charred material. Burnt and unburnt bone 1-2%	Shell	Pseudomorphic voids 10–15%.	Plaster/pisé 3	Clean
SA3612-4	Poorly sorted sandy silt loam	1–2% charred material-large	Shell	Small plaster aggregates, broken up 2–5%		Dirty
SA3612-5	Moderately sorted sandy silt loam	Small 1–2% charred material. Angular flint	Shell	2–3 large rock fragments		Clean
SA3612-6	Poorly sorted silt loam	5% charred material. Burnt and unburnt bone 5%	Shell			Clean

37.5 Radiocarbon dates

Two samples were selected for radiocarbon dating from the stratified contexts (1207) and (1211), (Table 37.6). The analysis of these dates, with calibrated values, Bayesian model and chronological interpretation is provided in Chapter 40.5 (Tables 40.1, 40.2, 40.3; Figure 40.20).

In summary, the sum (SCPD) of a stratified sequence model suggests a minimum of two pulses of activity associated with Surface O91.The dates form a coherently stratified sequence of events, over a period, potentially, of at least *c.* 1625 years, which is unexpectedly lengthy in light of the limited extent of sediment accumulation. We have more confidence in the younger date from sample Beta-290709 (11,190–10,880 cal BP 1σ), because this comes from Chenopodiaceae with a relatively low risk of being susceptible to old wood effects, whereas the older sample Beta-290710 (11,800–11,400 cal BP 1σ) is from unidentified wood type, which was likely to have been a small branch. This latter sample provides one of the oldest dates from the site as a whole and is stratigraphically inconsistent with the dates coming from Structure O75, which are sealed below the Surface O91 deposits. Therefore, given that Beta-290710 has been identified as juvenile wood and is, therefore, unlikely to be substantially influenced by an old wood effect, it may derive from charcoal that had been reworked into a chronologically younger deposit. Although it may not date the construction of O91, it does contribute to the overall chronology of the site. Posterior density estimates for the lower boundary marking the start of activity associated with the use of this area fall at *14.21–11.41 ka cal BP*, with the upper boundary suggesting this had ceased by *11.18–8.75 ka cal BP,* respectively (Table 40.2).

37.6 Interpretation

O91 is a mud-plaster surface located within the area of the former Structure O75 and outside Structure O100. It is believed to be an outdoor surface relating to the early history of Structure O100, although it is unclear whether Surface O91 was intentionally built, derives from mud spilt during construction or from mud runoff washing from the pisé walls of Structure O100, or a combination of formation processes. Micro-stratigraphic analysis of block sample SA5893 indicated a complex formation history involving the deposition of mud-plaster horizons that may, or may not, have been intentional, the accumulation of occupation debris, and the in wash of sediments. Additional surfaces formed immediately adjacent to the wall (795) of Structure O100, with a best estimate for a date coming from Beta-290709 at 11,190–10,880 cal BP (1σ). Support for the idea that Surface O91 was at least partially a deliberately made floor comes from the hearth moulded in (734). A number of other features were cut into the surface around the hearth, together with a stone arrangement (1206) indicating that the surface was used as a work area, an interpretation supported by the chipped stone analysis. A layer of silt containing pisé fragments (720) represents the start of the midden accumulation (Midden O60) within the abandoned Structure O75.

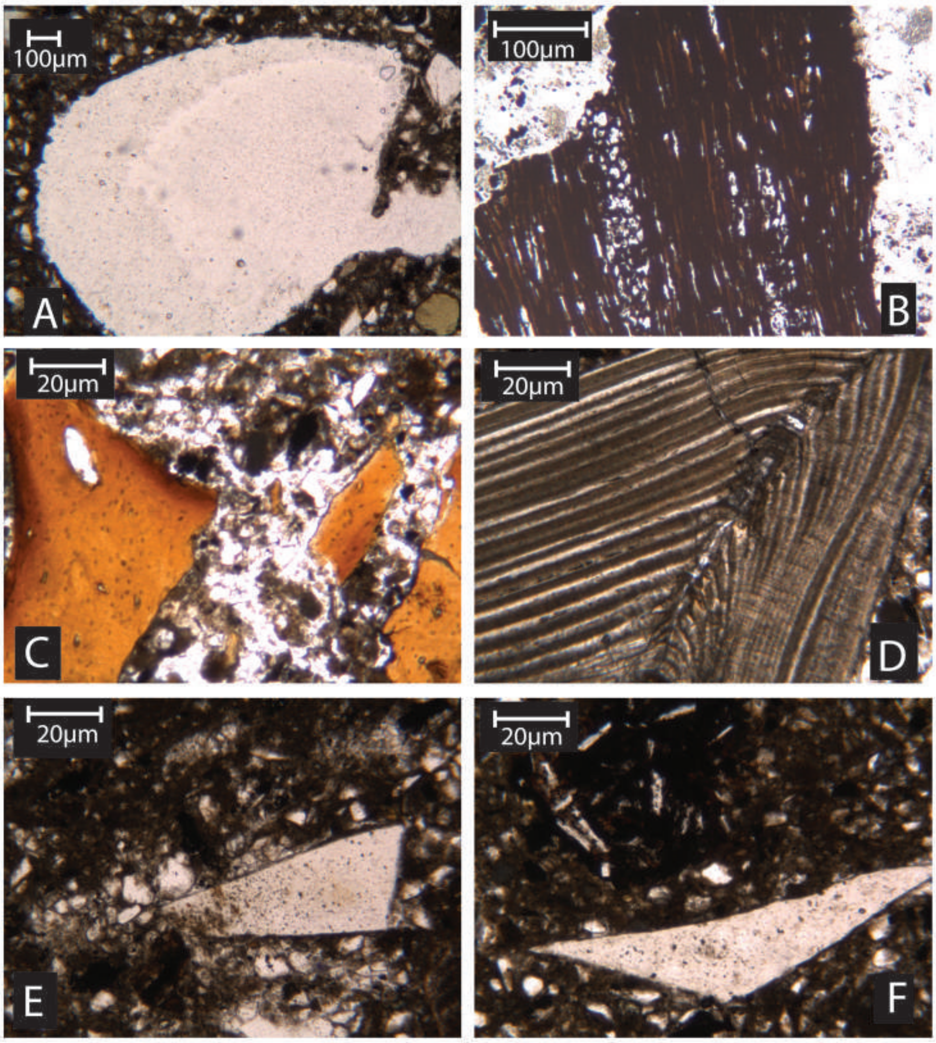


Figure 37.12 Images of different inclusions from a micromorphological thin section taken from samples SA3611 (A–B) and SA3612 (C–F): A — seed void; B — pistachio charcoal; C — burnt bone; D — shell; E and F — angular flint micro debitage.

As described in Chapter 39, the chipped stone assemblage from Surface O91 has some unusual characteristics, notably being heavily dominated by non-formal tool types (NFT) and other ad hoc tools, with a paucity of typical PPNA tool types, such as microliths, perforators and bi-truncations. It is difficult to interpret the causes for these unusual characteristics, particularly given the relatively small sample of material. However, the reduced proportions of formal bladelet tools, such as points, microliths and bi-truncations, coupled with the scarcity of the microburin technique, appears to be part of a general chronological trend apparent in this area of the site (through Structures O75, O91, O100, O60). Preliminary indications are that the rather unusual assemblage from Surface O91 appears to be a consequence of both functional (intensive initial core reduction) and chronological factors, and that the Surface O91 assemblage represents a somewhat transitional aspect of the WF16 assemblage, sharing affinities with both earlier (Structure O75) and later (Midden O60, Structure O100) phases at the site.

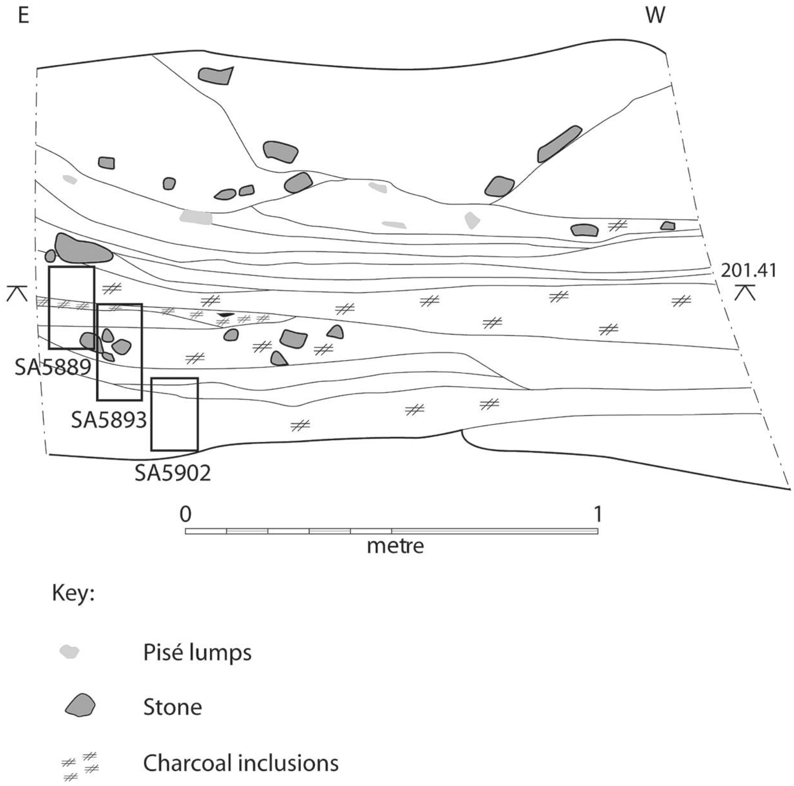


Figure 37.13 North-facing Section S173 (Figure 37.4) through surfaces that built up adjacent to Structure O100 showing the location of micromorphology sample SA5893.

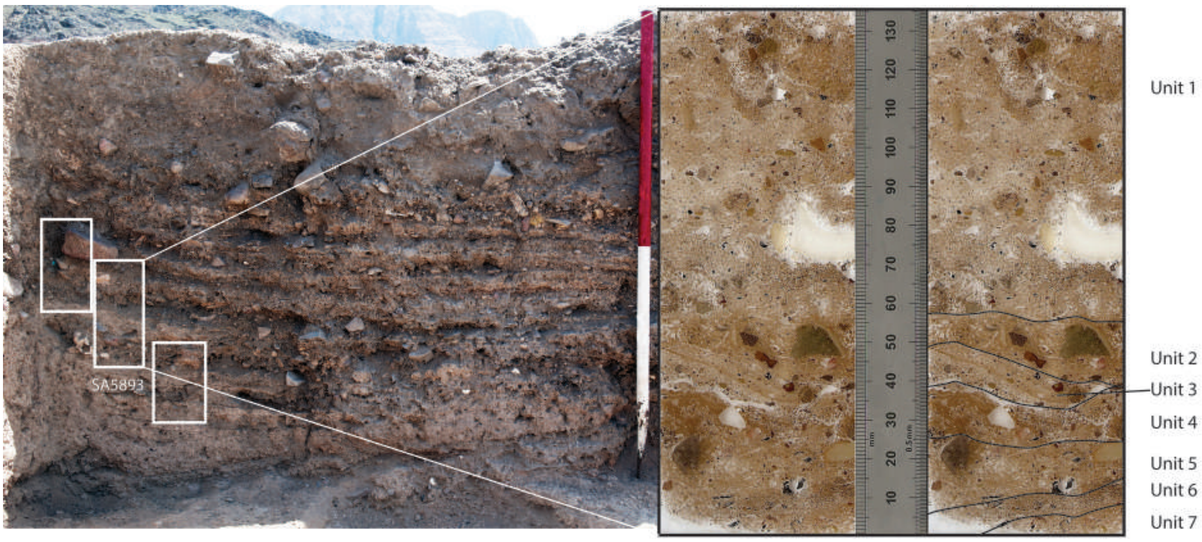


Figure 37.14 Division of sample block SA5893 showing seven units. Photographic scale 1.0 m.

Table 37.5 Units and their characteristics from block samples SA5893.

Layer	Particle size/ sorting	Anthropogenic remains — charred material	Plant impression	Shell	Plaster/Pisé type if applicable	Clean/ Dirty	Other comments
1	Silty clay loam	20–30%	10%	2–5%	Aggregates of plaster, types 2, 4 and 6	Dirty	
2	Clay loam	10%	20%	<1%	Plaster/pisé 4	Dirty	Charcoal and bone inclusions within plaster layer
3	Silt loam with bands of silty clay		<1%			Clean	Sediment inwash only, predominantly silt and sand
4	Silty clay/clay loam	30%	1–2%	<1%		Dirty	Sediment inwash, predominantly clay, with high percentage of micro charcoakl inclusions mixed evenly throughout
5	Silty clay	10–15%	2–5%	<1%		Dirty	
6	Silty clay loam	50–60%	<1%	<1%	Two lumps of pisé protruding into upper boundary	Dirty	Tipped material, charcoal rich
7	Silty clay	5%	2%		Plaster/pisé 3	Clean	

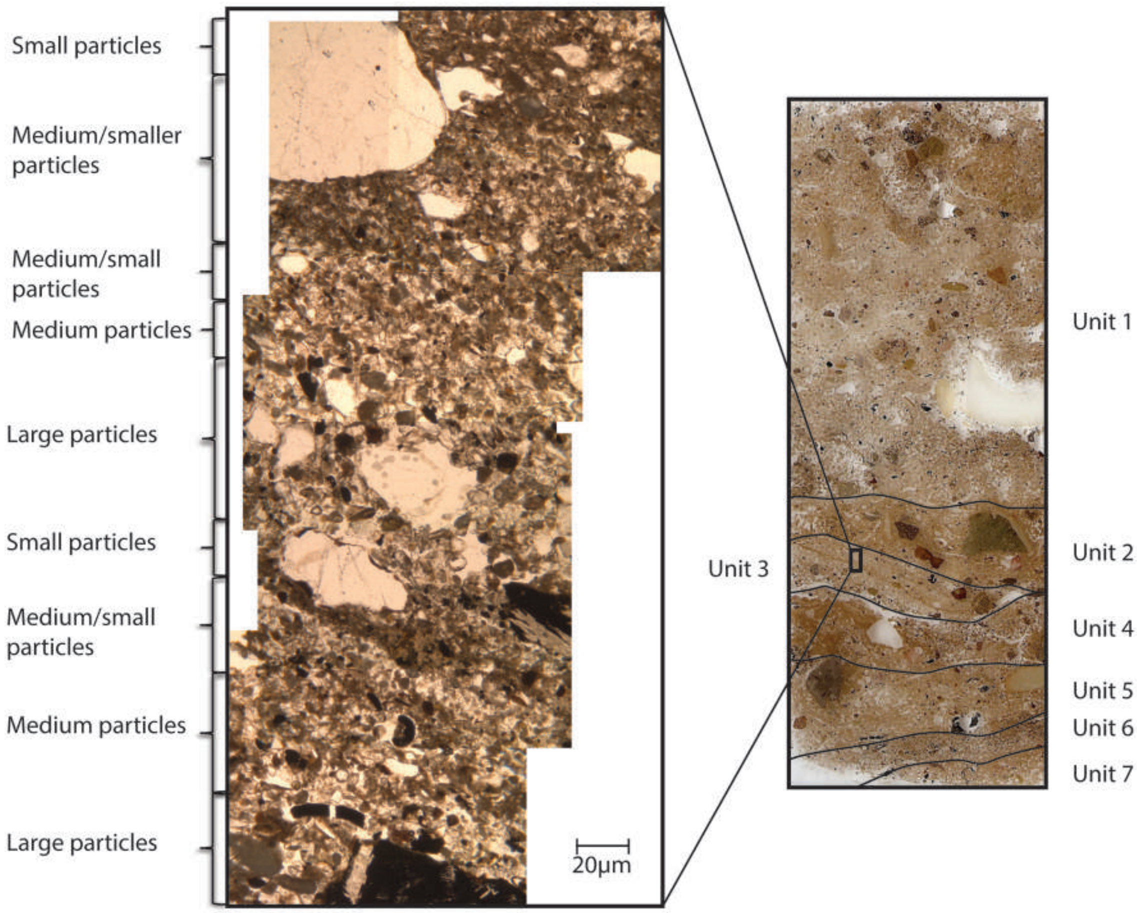


Figure 37.15 Stitched photos from layer/unit 3 showing two episodes of in-wash represented by the increase in particle size down the profile.

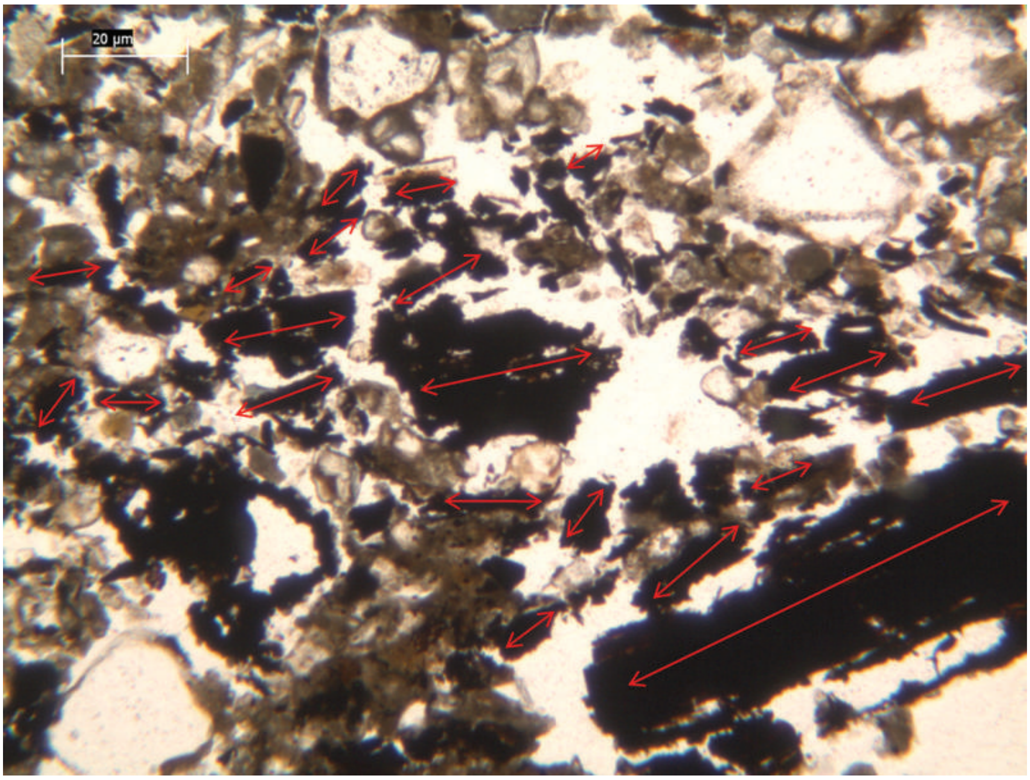


Figure 37.16 Photo highlighting the long axis of charcoal fragments, from occupation layer/unit 6. Material is 'tipped' from the west towards Structure O100.

Table 37.6 AMS radiocarbon dates and their calibration from O91.

						Chronological model Posterior density estimates cal BP	
Object and Laboratory Code	**Context**	**^{14}C yrs BP**	**Δ^{13}C ‰**	**Taxa**	**Form**	**68%**	**95%**
O91							
Beta-290709	1207	9650±50	-23	Chenopodiaceae	Juvenile	*11,190–10,880*	*11,210–10,790*
Beta-290710	1211	10,100±50	-21.5	Unidentified	Juvenile	*11,800–11,400*	*11,970–11,350*

38. Structures O75 and O68

38.1 Location and relationship with other structures

Structure O75 is an exceptionally large elliptical structure, *c*. 20 m x 18 m, in the northeast corner of the trench extending beyond the 2008–2009 excavation limits. In 2010, an eastward extension of the 2008–2009 trench was made to expose the entirety of the structure, which also revealed an additional and later structure, Structure O100 (Figure 38.1; Chapter 36). Structure O75 probably lay at the eastern edge of the settlement because of the steep downward slope from the knoll into a gully to its immediate east, although the slope's gradient may have been exaggerated by post-Neolithic erosion. In addition to its size, Structure O75 is unique by virtue of the character and complexity of its architecture (Figures 38.2, 38.3). In summary, it has a central floor measuring *c.* 15 m x 11 m composed of multiple mud-plaster surfaces with two tiers of benches extending around the south and southwest perimeter, and a probable platform at the northwest apex of the structure. The benches appear to have been heavily eroded on the north and northeast sides of the structure. The central floor area is divided by a herringbone pattern of raised moulded gullies, running between a central trough lined with mud plaster and the perimeter of the structure. Although modified by later construction, partially obscured by Structure O100 and eroded at the edge of the knoll, the original form of Structure O75 appears to have been broadly symmetrical along the line of the central trough.

To the south and west, Structure O75 is surrounded by a number of relatively small, oval shaped and closely packed semi-subterranean structures (Figure 38.1): O74, O33, O64, O65, O114 and O84 (Chapters 19, 20, 29, 30 and 32). They follow the perimeter of Structure O75 with each of their long axes running approximately parallel to its curving external wall. This suggests either a planned layout of the whole architectural complex, or that the surrounding structures to O75 were later additions. To the immediate northeast of Structure O75, a complex of badly eroded walls were located, designated as Structure O68. While this appears to be architecturally related to Structure O75, erosion prevented the relationship to be fully resolved. Structure O73 (Chapter 33) is located immediately beyond the northwest apex of Structure O75. This has been established as earlier than Structure O74, but its relationship with Structure O75 remains unclear because of erosion. Wall (219), described in Chapter 19 as part of Structure O84, is earlier than the wall of O75. The construction and use of Structure O75 was followed by the successive construction of Surface O91 (Chapter 37), Structure O100 (Chapter 36), and the formation of Midden (O60) (Chapter 35).

Structure O75 has a complicated history of construction, use and abandonment. In this chapter we describe its excavation in five stratigraphic blocks, prior to describing Structure O68:

- Stratigraphic Block 1: features cut into eroded western and northern sides of Structure O75;
- Stratigraphic Block 2: the infilling deposits within Structure O75, including those from a major burning event;
- Stratigraphic Block 3: features cut into the architecture of O75;
- Stratigraphic Block 4: the floor, benches, platform and other architectural features of O75 and O68;
- Stratigraphic Block 5: contexts relating to one or more early phases of Structure O75, their exposure being restricted to a small sondage made within its central floor area.

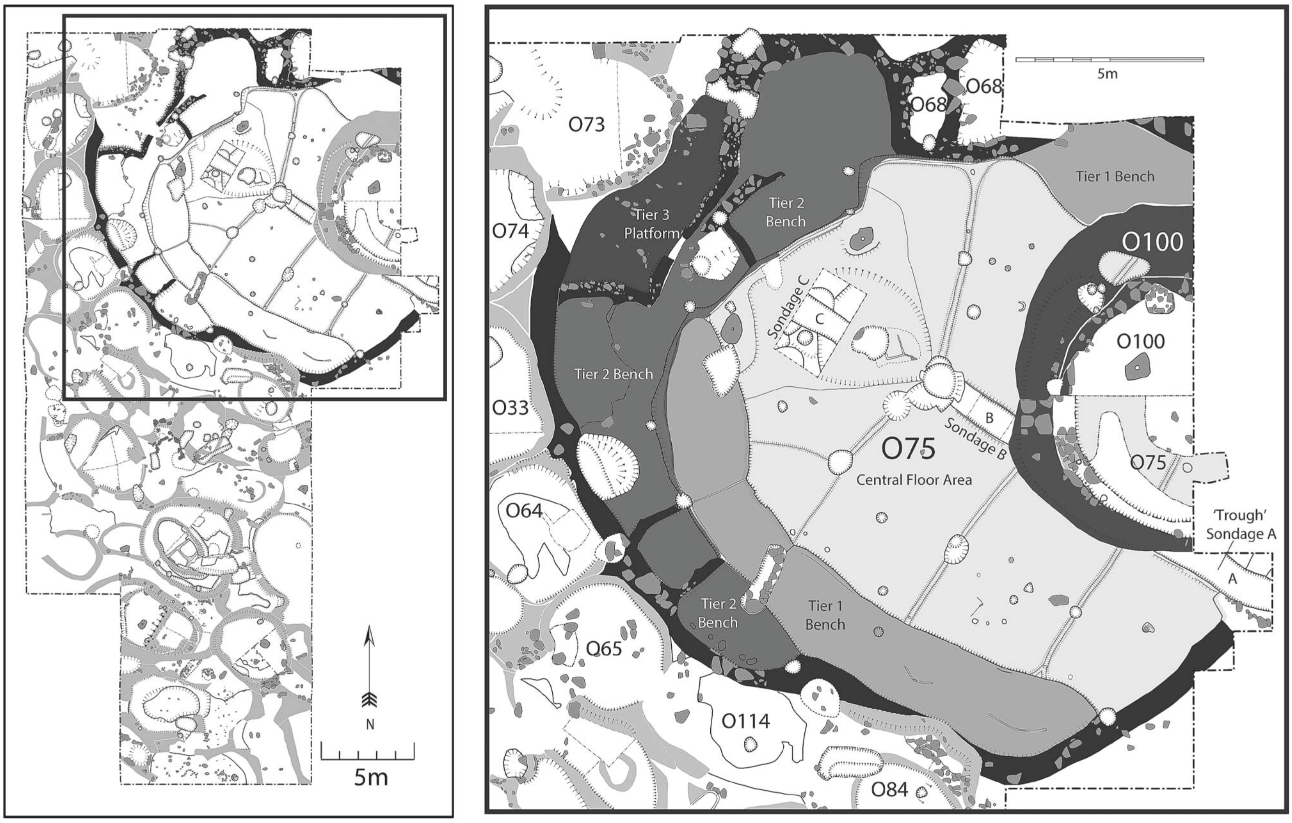


Figure 38.1 Location of Structures O75 and O68 and plan showing their relationships with surrounding and overlying Objects.

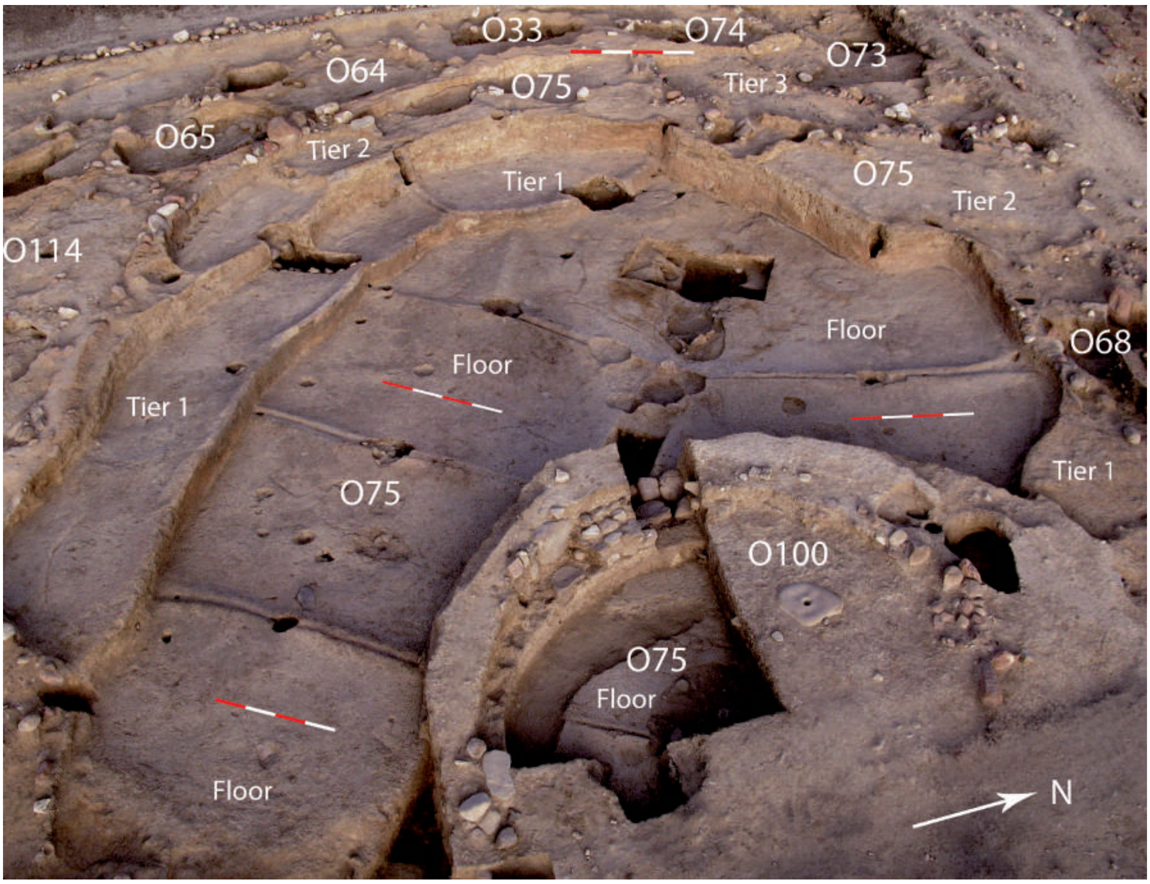


Figure 38.2 Structure O75, towards the end of the excavation. Scales 2.0 m.

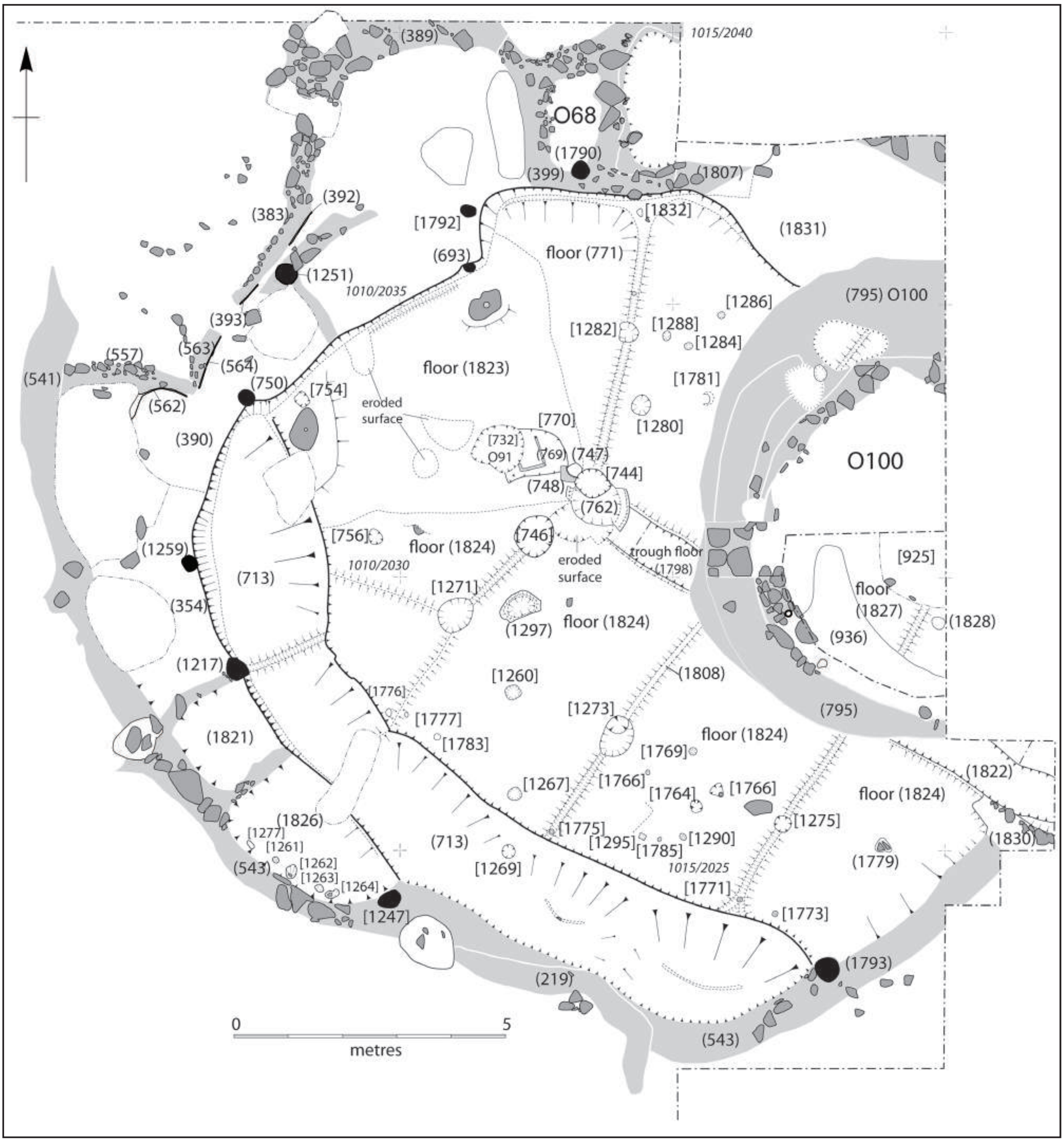


Figure 38.3 Plan of Structure O75 showing contexts from Stratigraphic Blocks 3 and 4.

Figure 38.1 provides the location of Structure O75 and O68, Figure 38.2 an overhead photograph towards the end of its excavation, and Figure 38.3 a plan showing contexts from Stratigraphic Blocks 3 and 4. The stratigraphic matrix for Structures O75 and O68 is given in Figure 38.4 and description of their contexts in Table 38.1. Their bulk and small finds are listed in Tables 38.2 and Table 38.3, respectively.

38.2 Description of excavated deposits

Stratigraphic Block 1: features cut into eroded western and northern sides of Structure O75

Figure 38.5 illustrates the contexts assigned to Block 1. The removal of the overburden (Horizon O111) deposits (1), (83), (186), (187), (790) and (1162) exposed stone and

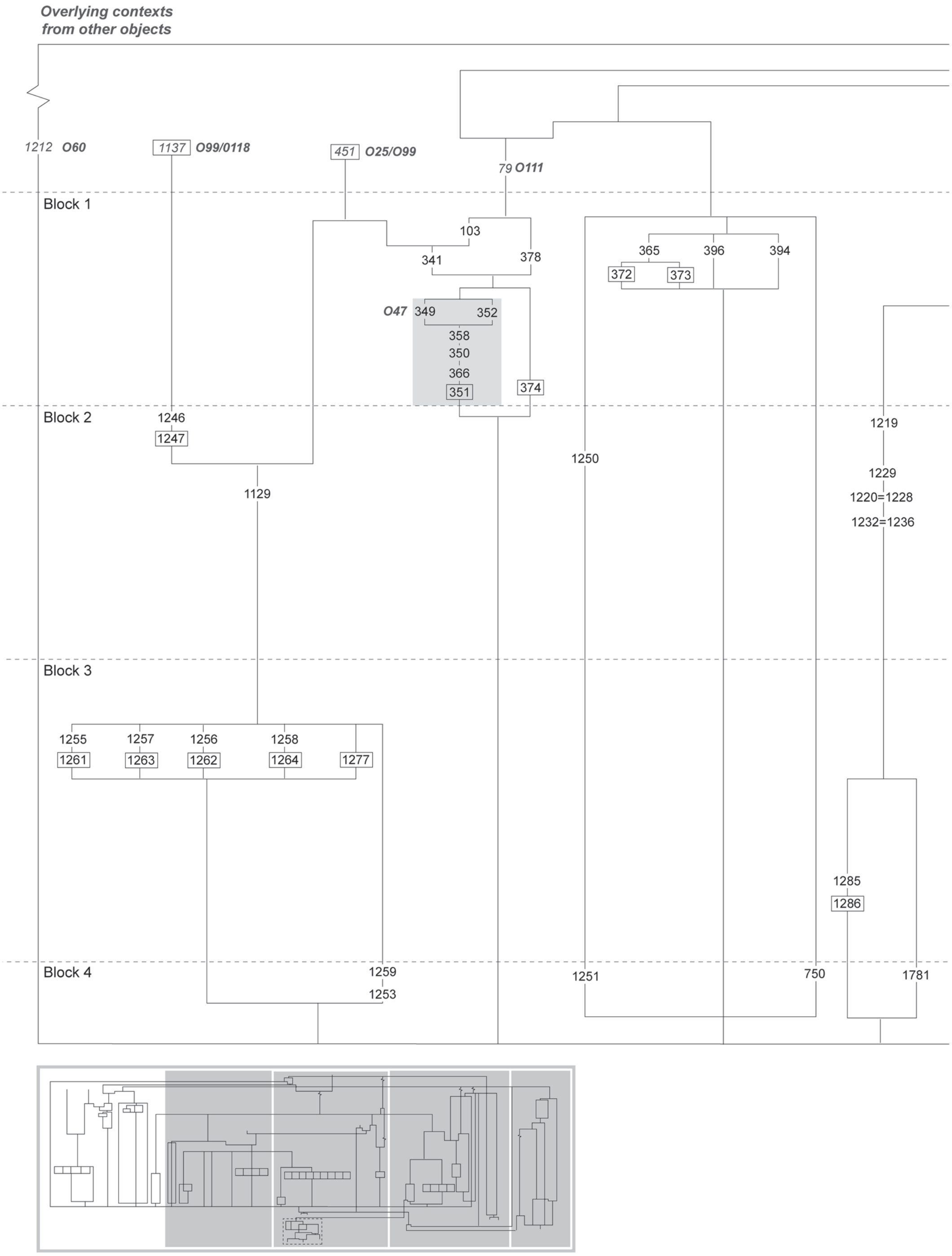


Figure 38.4a Section 1 of 5 of the stratigraphic matrix for Structures O75 and O68 as shown in the schematic legend representative of the overall matrix.

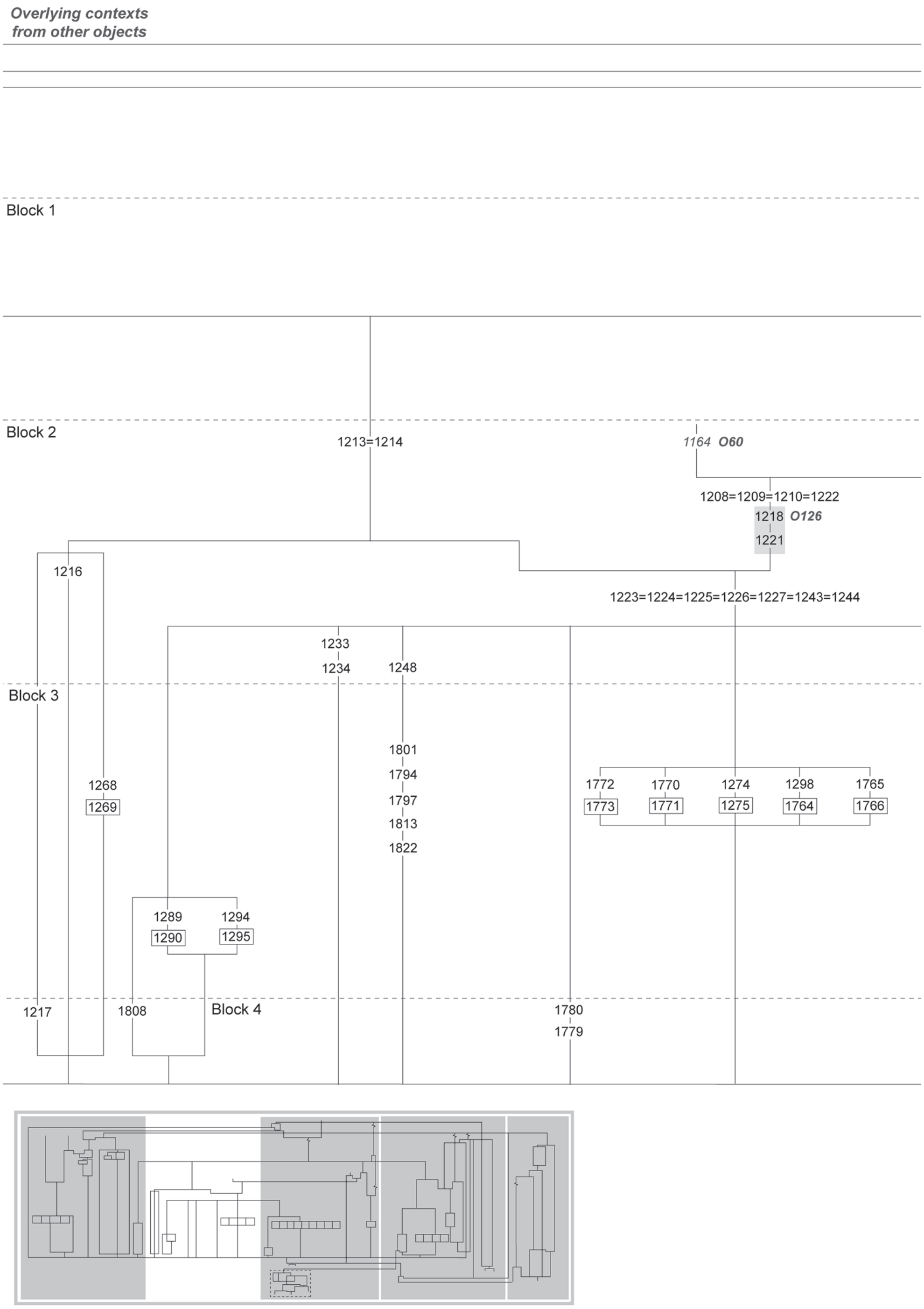


Figure 38.4b Section 2 of 5 of the stratigraphic matrix for Structures O75 and O68 as shown in the schematic legend representative of the overall matrix.

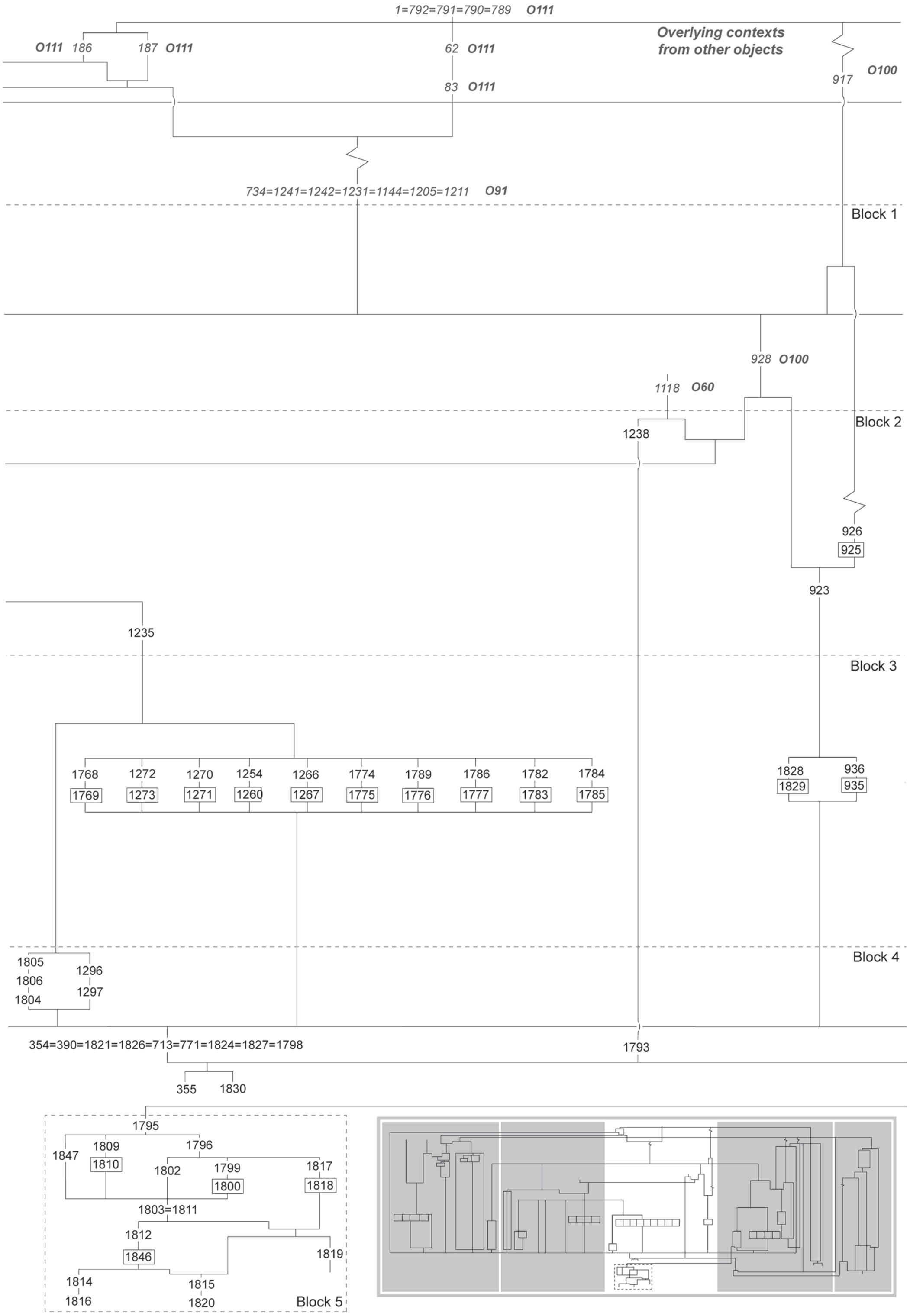


Figure 38.4c Section 3 of 5 of the stratigraphic matrix for Structures O75 and O68 as shown in the schematic legend representative of the overall matrix.

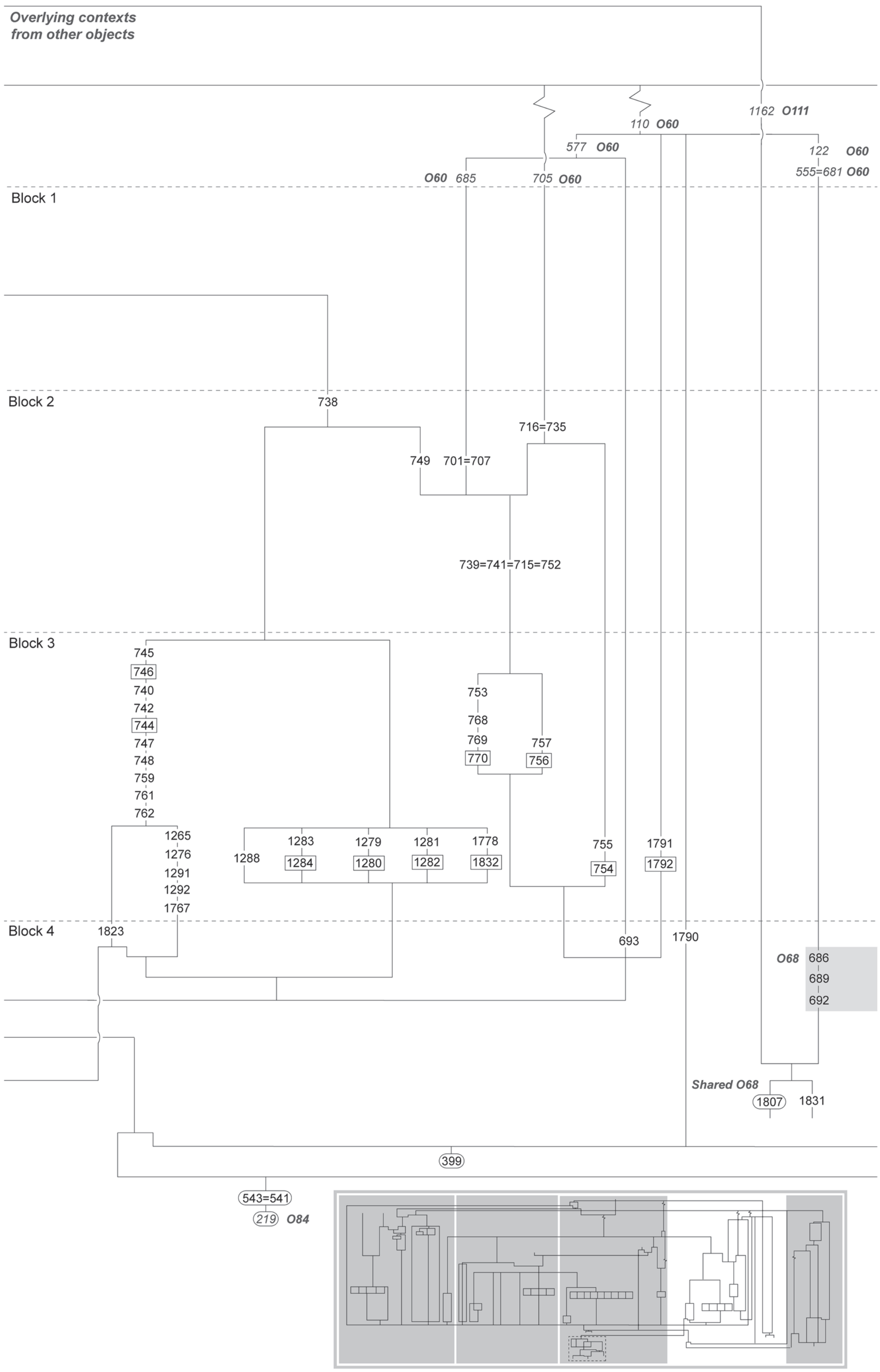


Figure 38.4d Section 4 of 5 of the stratigraphic matrix for Structures O75 and O68 as shown in the schematic legend representative of the overall matrix.

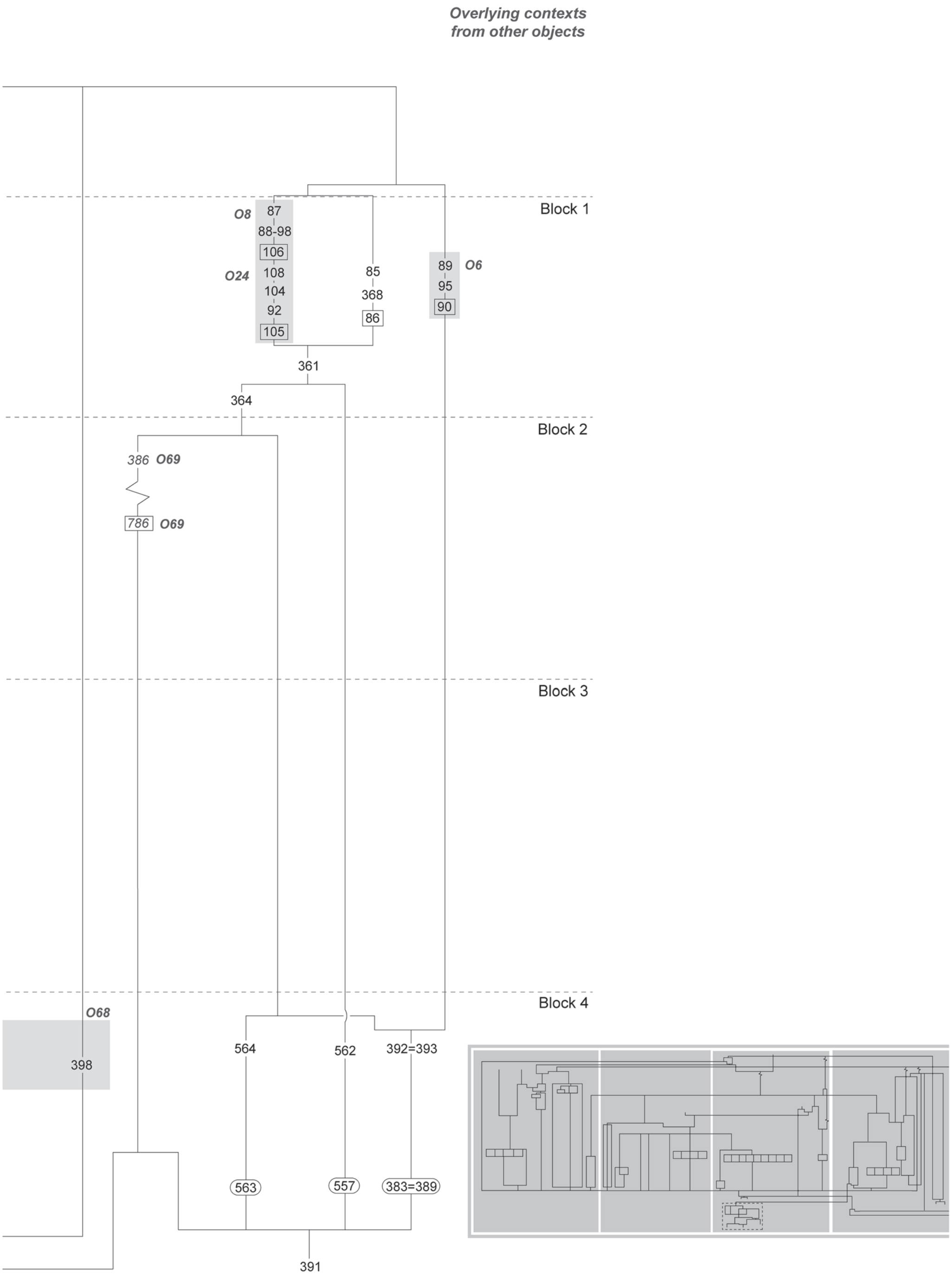


Figure 38.4e Section 5 of 5 of the stratigraphic matrix for Structures O75 and O68 as shown in the schematic legend representative of the overall matrix.

Table 38.1 Contexts forming and filling Structures O75 and O68 with sedimentary descriptions and interpretations.

Context	Description	Interpretation
85	firm grey sandy silt	fill of pit
86	roughly rectangular cut with steep sides and an uneven base	cut of stone-lined pit
87	compact light to mid-brownish-grey sandy silt	burial fill
88	human cranium	skull belonging to skeleton (98), disturbed primary burial
89	firm mid-grey sandy silt with frequent stones	burial fill
90	sub-rectangular cut with near vertical sides and a flat base	burial cut
92	articulated human skeleton	primary crouched inhumation burial
95	articulated human skeleton	primary crouched inhumation burial
98	articulated human remains	primary crouched inhumation burial (possibly same individual as (88) and (108))
103	small area of flat stone cobbling	remnant of truncated cobbled surface
104	compact light to mid-brownish-grey sandy silt with patches of orange	burial fill
105	sub-circular cut with sloping and vertical sides and an uneven base	burial cut
106	oval cut with moderately sloping sides and an uneven base	burial cut
108	articulated human remains	human ribs, possibly from the same skeleton as (98) and (108)
341	friable mid-brownish-grey sandy silt and gravel	foundation deposit for stone surface (103) contained in cut [374]
349	friable dark greyish-brown silt	burial fill
350	articulated human skeleton	primary crouched inhumation burial
351	sub-rectangular cut with vertical sides and an uneven base	burial cut
352	compact to friable mid-greyish-brown sandy silt	burial fill
354	friable where worn but otherwise compact mid-yellowish-brown clayey silt	mud-plaster surface of the upper bench in eroded area of structure (not excavated)
355	compact mid-orangish-brown silty sand with reddish-yellow pisé lumps, gravel and occasional charcoal	make-up deposit under mud-plaster surface of the upper bench
358	compact mid-to light greyish-brown silt	burial fill
361	loose to friable mid-grey sandy silt	silt accumulation over the area of disused structures
364	firm to friable mid-grey sandy silt with sub-rounded stones	silt accumulation over the area of disused structures
365	loose to friable dark grey ashy-sandy silt	redeposited midden backfill of pits
366	disarticulated human remains	redeposited human bone disturbed by later burial
368	granite and sandstone pebbles forming two courses of a pit-lining	stone lining inside pit
372	one of two inter-cutting pits oval in shape with steep sides and a slightly concave base	cut of pit
373	one of two inter-cutting pits oval in shape with steep sides and a flat base	cut of pit
374	sub-rectangular wide and shallow cut with vertical sides and an uneven base	construction cut for laying of cobbled surface
378	disarticulated human remains	redeposited human bone disturbed by later burial
383	orangish-brown pisé with two courses of rounded stones protruding along the northwest 'face' and with plaster coating on the other face	pisé and stone wall of truncated platform inside Structure O75
389	orangish-brown pisé with large stones throughout	pisé and stone wall of Structure O75, continuation of wall (383) and connecting to wall (399) of Structure O68
390	mid-orangish-yellow clayey silt	mud-plaster surface of the upper bench in eroded area of structure (not excavated)
391	firm mid-greyish-yellow silt with frequent sub-rounded stones and pisé rubble	silt and rubble accumulation inside structure, possible core material of the eroded platform inside Structure O75
392	firm light greyish-yellow sandy silt	mud-plaster coating on one side of wall (383=389)
393	firm light greyish-yellow sandy silt	mud-plaster coating on one side of wall (383=389)
394	loose to friable mid-grey sandy silt	unexcavated localised deposit, silt accumulation of feature fill
396	friable mid-to dark grey sandy silt	unexcavated localised deposit, silt accumulation of feature fill
398	friable mid-grey sandy silt	silt accumulation inside structure
399	orangish-brown pisé with large stones throughout	pisé and stone wall of Structure O68 also forming internal face to Structure O75 in the north, contiguous with wall (389)
541	friable mid-orangish-brown pisé with occasional large stones in its make up	western part of the outer wall of Structure O75 (same as 543)
543	friable mid-greyish-brown pisé with occasional large stones in its make up	southern part the outer wall of Structure O75 (same as 541)
557	orangish-brown pisé with rounded stones protruding along the north 'face'	pisé and stone wall of truncated platform inside Structure O75
559	pisé rubble	mixed pisé collapse deposit
562	firm light greyish-yellow sandy silt	mud-plaster coating on one side of wall (557)
563	orangish-brown pisé with two courses of rounded stones protruding along the northwest 'face' and with plaster coating on the other face	pisé and stone wall of truncated platform inside Structure O75
564	firm light greyish-yellow sandy silt	mud-plaster coating on one side of wall (563)
686	friable light yellowish-brown sandy silt with occasional pisé lumps	silt and rubble accumulation inside structure
689	friable greyish-brown to light yellowish-brown sandy silt with patches of compact pisé fragments	silt and rubble accumulation inside structure
692	compact light brown to greyish-brown sandy silt and pisé collapse	silt and rubble accumulation inside structure

Table 38.1 Contexts forming and filling Structures O75 and O68 with sedimentary descriptions and interpretations continued...

Context	Description	Interpretation
693	friable mid-grey sandy silt	fill of post pipe with fox skull towards the base (not fully excavated)
701	compact mid-orange silty clay and ashy silt	silt and rubble accumulation inside structure
707	friable mid-grey sandy silt with occasional pisé fragments	silt and rubble accumulation inside structure
713	compact light orangish-grey silty clay	mud-plaster surface of the lower bench of Strcuture O75
715	firm mid-orangish-grey sandy silt and pisé fragments	silt and rubble accumulation inside structure
716	friable mid-orangish-grey sandy silt and pisé fragments	silt and rubble accumulation inside structure
735	friable mid-orangish-grey sandy silt and pisé fragments	silt and rubble accumulation inside structure
738	friable mid-orangish-grey sandy silt and burnt pisé fragments	silt and rubble accumulation inside structure
739	loose mid-orangish-grey sandy silt and pisé fragments	silt and rubble accumulation inside structure
740	friable to firm mid-orangish-grey sandy silt and pisé fragments	silt and rubble accumulation inside structure
741	friable greyish-brown sandy silt and pisé fragments	silt and rubble accumulation inside structure
742	friable dark grey fine silt with pisé fragments	fill of hearth
744	oval cut with shallow sloping sides and a slightly concave base	cut for hearth truncating earlier hearths
745	loose dark greyish-brown ashy silt with frequent charcoal	fill of hearth
746	circular cut with shallow sloping sides and a flat base	cut of hearth
747	friable very dark grey ashy silt with frequent charcoal	fill of hearth
748	reused pisé/mud-plaster fragments set on edge	hearth lining made of pisé or mud-plaster rubble
749	friable mid-orangish-grey sandy silt and pisé fragments	silt and rubble accumulation inside structure
750	loose mid-grey sandy silt and pisé fragments	fill of post pipe capped by stone bowl SF1600 and stone slab instalation SF1602
752	loose mid-grey sandy silt	occupation deposit
753	friable mid-grey sandy silt	fill of hearth
754	circular cut with vertical sides and a dipped base	cut of post-hole
755	loose mid-greyish-brown sandy silt	fill of post-hole
756	circular cut with sloping sides and a flat base	cut of post-hole
757	dark greyish-brown gritty-silt	fill of post-hole
759	friable mid-grey silty sand with a high concentration of angular stones	fill of hearth
761	loose mid-grey ashy silt with frequent charcoal	fill of hearth
762	mid-greyish-yellow mud plaster	moulded mud-plaster hearth
768	pisé and stone rubble	hearth lining made of pisé or mud-plaster rubble
769	broken fragments of mud-plaster surface reused and set on edge	hearth lining made of mud-plaster rubble
770	truncated oval cut with stepped sides and an uneven base	cut of hearth
771	compact mid-grey silty clay	mud-plaster surface in central area of Structure O75 (same as 1824, 1827)
923	loose dark greyish-brown sandy silt	silt accumulation inside structure
925	partially excavated sub-circular cut with steep sides	cut of pit
926	firm mid-yellowish-brown sandy silt with frequent stones and pisé rubble	fill of pit
935	irregular cut (unexcavated)	cut of pit
936	dark grey silt	fill of unexcavated pit
1129	loose to friable mid-grey silt and pisé fragments	silt accumulation inside structure
1208	loose mid-to dark grey silt	silt accumulation inside structure
1209	loose mid-to dark grey silt	silt accumulation inside structure
1210	loose to friable mid-to dark grey silt	silt accumulation inside structure
1213	loose mid-grey sandy silt	silt accumulation inside structure
1214	firm mid-greyish-brown sandy silt and pisé fragments	silt and rubble accumulation inside structure
1216	loose mid-greyish-orange sandy silt and pisé fragments	silt and rubble accumulation inside structure
1217	loose to friable mid-greyish-brown sandy silt	fill of post pipe
1218	disarticulated human remains	redeposited human remains, possibly a secondary burial
1219	loose to friable mid-to dark orangish-brown slightly sandy silt and pisé fragments	silt and rubble accumulation inside structure
1220	friable mid-to dark orangish-brown slightly sandy silt and pisé fragments	silt and rubble accumulation inside structure
1221	disarticulated human remains	redeposited human remains possibly related to 1218, possible secondary burial
1222	friable mid-yellowish-grey silt	silt accumulation inside structure
1223	friable mid-orangish-grey sandy silt and pisé fragments	silt and rubble accumulation inside structure
1224	friable mid-orangish-grey sandy silt and pisé fragments	silt and rubble accumulation inside structure
1225	loose to friable mid-to dark greyish-brown silt	silt accumulation inside structure

Table 38.1 Contexts forming and filling Structures O75 and O68 with sedimentary descriptions and interpretations continued...

Context	Description	Interpretation
1226	loose to friable mid-to dark greyish-brown silt	silt accumulation inside structure
1227	loose to friable mid-to dark greyish-brown silt	silt accumulation inside structure
1228	friable to firm mid-reddish-brown and light brownish-grey clayey silt and pisé fragments	silt accumulation inside structure
1229	loose very light grey ash	localised ashy dump
1232	friable mid-to dark orangish-brown slightly sandy silt and burnt pisé fragments	burnt silt and rubble accumulation inside structure
1233	friable very dark grey charcoal	burnt carbnonised timber/wood
1234	friable mid-greyey-orange clayey silt and pisé fragments with ash and charcoal	burnt silt and rubble accumulation inside structure
1235	friable mid-greyish-orange clayey silt and pisé fragments with ash and charcoal	burnt silt and rubble accumulation inside structure
1236	friable to firm mid-reddish-brown and greyish-brown ashy clayey silt and pisé fragments	burnt silt and rubble accumulation inside structure
1238	loose mid-brown silty sand	silt accumulation inside structure
1243	loose to friable mid-to dark brownish-grey silt	silt accumulation inside structure
1244	loose to friable mid-to dark brownish-grey silt	silt accumulation inside structure
1246	loose mid-grey sandy silt	fill of post retrieval pit
1247	oval cut with moderately sloping sides and a concave base	cut of post retrieval pit
1248	friable mid-brownish-grey silt	silt accumulation inside structure
1250	friable mid-brownish-grey silt with 5—15% sub-rounded stones	silt and rubble accumulation inside structure
1251	loose to moderate light brownish-grey silty-ash	fill of post pipe
1253	compact light greyish-orange clayey silt	mud-plaster remodelling of part of lower bench (713)
1254	loose mid-grey sandy silt	fill of post-hole
1255	loose to compact mid-greyish-brown clayey silt	fill of possible post pad
1256	loose mid-greyish-brown sandy silt	fill of possible post pad
1257	loose to friable mid-greyish-brown sandy silt	fill of possible post pad
1258	loose to friable mid-greyish-brown sandy silt	fill of possible post pad
1259	friable light orangish-grey slightly sandy silt	fill of post pipe
1260	circular cut with steep sides and a slightly concave base	cut of post-hole
1261	shallow oval cut within thickness of mud-plaster surface	possible post pad
1262	shallow oval cut with stones at the base	possible post pad
1263	shallow oval cut within thickness of mud-plaster surface	possible post pad
1264	shallow pear-shaped cut with stone at the base	possible post pad
1265	loose mid-brownish-grey silt	fill of trough
1266	friable light greyish-brown silt	fill of post-hole
1267	circular cut with straight moderately sloping sides and a flat base	cut of post-hole
1268	loose brownish-grey silt	fill of post-hole
1269	circular cut with vertical sides and a flat base	cut of post-hole
1270	loose grey silt with ocassional pisé lumps	fill of post retrieval pit
1271	oval cut with moderately sloping sides and an irregular base	cut of post retrieval pit
1272	friable mid-yellowish-grey silt	fill of post retrieval pit
1273	sub-circular cut with vertical sides and a flat base	cut of post retrieval pit
1274	loose brown orange fine sandy silt	fill of post retrieval pit
1275	sub-circular cut with straight sides and an uneven base	cut of post retrieval pit
1276	loose dark reddish-grey silt and pisé fragments	infill of trough
1277	very shallow oval depression in mud-plaster surface	possible post pad
1279	friable light orange silt	fill of post-hole
1280	circular cut with slightly slanted sides and a flat base	cut of post-hole
1281	loose light grey silt	fill of post retrieval pit
1282	sub-rectangular cut with moderately sloping sides and a concave base	cut of post retrieval pit
1283	loose light greyish-brown silt	fill of post-hole
1284	sub-circular cut with vertical sides and a flat stone at the base	cut of post-hole
1285	loose light greyish-brown silt	fill of post-hole
1286	sub-circular cut	cut of post-hole
1288	sub-circular shallow cut with a flat base	cut of post-hole or post pad
1289	loose light greyish-brown silt	fill of post-hole

Table 38.1 Contexts forming and filling Structures O75 and O68 with sedimentary descriptions and interpretations continued...

Context	Description	Interpretation
1290	oval shallow cut with a flat base	cut of post-hole or post pad
1291	friable mid-yellowish-brown silt	tertiary mud-plaster surface within trough
1292	firm dark brownish-grey laminated silts	occupation and possibly washed in material in base of trough (not fully excavated)
1294	loose greyish-brown silt	fill of post-hole
1295	semi-circular cut with vertical sides and an uneven base	cut of post-hole
1296	loose mid-to dark greyish-brown slightly sandy silt with concentrations of charcoal	fill of hearth
1297	compact orangish-yellow pisé	moulded mud-plaster hearth
1298	loose greyish-brown silt	fill of post-hole
1764	oval cut with moderate sides and a flat base	cut of post-hole
1765	loose brownish-grey silt	fill of post-hole
1766	irregular cut which appeared as three narrow post-holes or stake holes joined up	possible recutting of post-hole
1767	friable dark yellowish-grey silt	secondary mud-plaster surface within trough
1768	loose greyish-brown silt	fill of post-hole
1769	triangular-shaped cut with vertical or steep sides and an uneven base	cut of post-hole
1770	loose greyish-brown silt	fill of post-hole or post pipe
1771	narrow circular cut with steep sides and a flat base, could be moulded into a mud-plaster gully/ridge	cut of post-hole or post pipe
1772	loose greyish-brown silt	fill of post-hole
1773	oval cut with steep sides and an uneven base	cut of post-hole
1774	loose greyish-brown silt	fill of post-hole or post pipe
1775	narrow oval cut with steep sides and a flat base, could be moulded into a mud-plaster gully/ridge	cut of post-hole or post pipe
1776	roughly triangular cut with gradual sides, base not seen	cut of post-hole
1777	roughly circular cut with gradual rather than vertical sides and a pointed base	cut of post-hole
1778	oval cut with steep sides and a concave base	cut of post-hole
1779	two flat stones set in a mud-plaster floor	post pad (not excavated)
1780	compact mid-grey siltey-clay	moulded mud-plaster lip around post pad
1781	compact mid-grey siltey-clay	moulded mud-plaster lip around post pad
1782	loose greyish-brown silt	fill of stake hole
1783	oval cut with steep sides and a flat stepped base	cut of post-hole
1784	loose greyish-brown silt	fill of post pad depression
1785	sub-triangular cut with shallow sides	post pad depression
1786	loose greyish-brown silty sand	fill of post-hole
1789	loose greyish-brown silt	fill of post-hole
1790	loose mid-grey sandy silt	fill of post-hole
1791	loose mid-to dark grey slightly sandy silt	fill of post-hole
1792	sub-circular cut with steep sides and an uneven base	cut of post-hole
1793	loose mid-greyish-brown silt	fill of post pipe
1794	loose to firm mid-brownish-grey silt and pisé fragments	fill of post pipe
1795	compact light yellowish-grey sandy-clay	composite mud-plaster surface excavated in sondage C
1796	compact mid-grey silty clay burnt black on top	patchy mud-plaster surface excavated in sondage C
1797	circular cut with steep sides and an uneven base	post pipe within a block of pisé dumped inside trough
1798	compact mid-grey siltey-clay	mud-plaster lining and base of trough contigious with floor surfaces 771=1824=1827
1799	friable light yellowish-grey sandy silt	fill of stake hole
1800	narrow circular cut with steep sides and a concave base	cut of stake hole
1801	firm mid-grey silt	fill of trough
1802	loose to friable mid-grey with patches of light brown pisé fragments	silt accumulation between floor surfaces in sondage C
1803	friable mid-grey sandy silt	thick silt accumulation over the trough in sondage C (same as (1811))
1804	compact mid-greyish-orange silty clay	burnt plaster layer on face of lower bench (not excavated)
1805	compact mid-grey silty clay	plaster layer on face of bench with circular decoration exposed in patches (not excavated)
1806	compact mid-orangish-grey silty clay	plaster layer on face of lower bench with wavy decoration (not excavated)
1807	pisé segment with set in stones	possible blocking wall between structures O68 and O75
1808	compact mid-grey silty clay	mud-plaster infill of moulded gully in the floor of Structure O75

Table 38.1 Contexts forming and filling Structures O75 and O68 with sedimentary descriptions and interpretations continued...

Context	Description	Interpretation
1809	friable mid-grey sandy silt	fill of pit
1810	circular cut with concave sides and base	cut of pit
1811	friable dark grey sandy silt	thick silt accumulation over the trough in sondage C (same as (1803))
1812	friable mid-grey silt	fill of trough in sondage C
1813	firm mid-reddish-brown to dark grey silt and pisé fragments	large pisé segment containing post pipe 1797 dumped within trough fills
1814	friable very dark grey silty clay	blackened plaster surface lipping up to bench/step in sondage C
1815	friable very dark grey silty clay	blackened plaster surface lipping up to bench/step in sondage C
1816	compact mid-orangish-grey silty sand	partially exposed mud-plaster surface in sondage C
1817	firm mid-grey sandy silt	fill of pit
1818	circular cut, not fully exposed	cut of pit
1819	firm to compact mid-orangish-grey silty clay	partially exposed mud-plaster surface in sondage C
1820	compact mid-orangish-grey silty clay	partially exposed mud-plaster surface in sondage C
1821	compact mid-grey silty clay	mud-plastered surface on the upper bench in southwest part of Structure O75
1822	firm light to mid-yellowish-grey pisé fragments and silt	fill of trough (not fully excavated)
1823	compact mid-grey silty clay	area of replastering in northwest part of Structure O75
1824	compact mid-grey silty clay	mud-plaster surface of Structure O75 to southwest of trough (same as 771=1827)
1826	compact mid-grey silty clay	mud-plastered surface on the upper bench in southwest part of Structure O75
1827	compact mid-grey silty clay	mud-plaster surface of Structure O75 to southwest of trough (same as 771=1824)
1828	friable mid-grey sandy silt	fill of possible post-hole
1829	unexcavated circular cut	possible post-hole
1830	compact mid-orangish-grey silty clay with frequent stones	make-up deposit exposed by erosion of the mud-plaster surface at the edge of the trough (not excavated)
1831	compact to firm mid-orange silty clay	core material of an eroded bench in northeast of Structure O75
1832	circular cut with steep sides and a flat base	cut of post-hole

Table 38.2 Quantities of bulk finds from Structures O75 and O68 by material and context number.

Object 75	Volume of sediment (l)				Weight of bulk finds per material (g)										
Context	**Total volume**	**Flot. sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Ground stone**	**Other worked stone**	**Unworked stone**	**Animal bone**	**Human bone**	**Marine shell**	**Other shell**	**Plaster/Pisé**	**Charcoal**	**Misc.**
85	256.0	30.0	225.0	1.0	1010.8	0.0	10.0	0.0	0.0	119.6	0.0	52.5	0.0	0.1	50.0
87	101.0	100.0	0.0	1.0	629.5	109.2	1.6	0.0	0.0	19.4	0.0	53.7	0.0	10.0	0.0
89	81.0	80.0	0.0	1.0	500.6	140.0	0.0	0.0	0.0	66.9	0.0	157.3	0.0	10.0	0.0
104	24.0	23.0	0.0	1.0	412.0	20.0	10.0	0.0	10.0	17.2	0.0	273.5	0.0	0.0	0.0
341	681.0	30.0	650.0	1.0	6070.0	170.0	10.0	0.0	0.0	420.0	0.0	84.5	0.0	0.0	0.0
349	13.0	13.0	0.0	0.0	76.7	0.0	0.0	0.0	0.0	8.4	0.0	37.1	0.0	0.1	0.0
352	20.0	20.0	0.0	0.0	165.2	400.1	0.0	0.0	0.0	44.3	0.0	62.4	0.0	1.4	0.0
355	71.0	30.0	40.0	1.0	475.8	0.0	0.0	0.0	49.7	0.0	0.0	66.4	0.0	0.1	10.0
358	81.0	80.0	0.0	1.0	775.1	320.0	0.1	0.0	25.4	169.0	0.0	185.2	0.0	0.9	7.6
361	1601.0	30.0	1570.0	1.0	10280.8	3060.0	41.6	0.0	0.0	433.2	0.0	87.2	0.0	0.0	20.0
364	1191.0	30.0	1160.0	1.0	17845.0	400.0	100.1	0.0	0.0	604.4	0.0	78.1	0.0	10.0	260.0
365	121.0	30.0	90.0	1.0	1523.9	0.0	0.0	0.0	0.0	97.3	0.0	166.5	0.0	0.0	0.0
686	185.0	30.0	154.0	1.0	1010.2	0.0	11.7	0.0	220.6	0.0	0.0	27.4	0.0	0.1	0.0
689	226.0	30.0	195.0	1.0	1209.5	0.0	31.2	0.0	46.1	0.0	0.0	11.5	0.0	1.1	0.0
692	171.0	30.0	140.0	1.0	2421.8	0.0	0.0	10.0	33.0	0.0	0.0	23.3	0.0	0.0	0.0
693	26.0	25.0	0.0	1.0	167.3	0.0	0.1	0.0	15.9	0.0	0.0	17.0	0.0	20.1	0.0
701	289.0	70.0	218.0	1.0	1996.8	12.0	22.4	0.0	1605.6	0.0	0.0	13.9	0.0	20.4	0.0
707	359.0	70.0	284.0	5.0	1836.5	0.0	34.1	0.0	153.2	1.0	0.0	28.8	0.0	11.8	0.0
715	527.0	90.0	428.0	9.0	2411.0	300.9	2.4	0.0	210.4	0.0	0.1	73.6	0.0	0.7	0.0
716	1015.0	60.0	952.0	3.0	4679.0	357.5	31.8	100.0	432.3	10.0	0.0	79.0	1300.0	0.3	0.0

Table 38.2 Quantities of bulk finds from Structures O75 and O68 by material and context number continued...

Object 75	Volume of sediment (l)				Weight of bulk finds per material (g)										
Context	Total volume	Flot. sediment	Dry-sieved sediment	Archive and other	Chipped stone	Ground stone	Other worked stone	Unworked stone	Animal bone	Human bone	Marine shell	Other shell	Plaster/Pisé	Charcoal	Misc.
735	551.0	50.0	497.0	4.0	2253.7	214.4	10.2	0.0	130.6	0.0	0.0	15.9	337.2	1.6	0.0
738	1781.0	240.0	1518.0	23.0	20317.7	4887	47.6	10.1	1221.6	0.0	0.0	170.6	234.8	0.4	0.0
739	349.0	40.0	305.0	4.0	1254.4	620.7	0.0	0.0	86.4	0.0	0.0	10.7	0.0	0.1	0.0
740	381.0	50.0	326.0	5.0	4989.8	650.0	10.3	0.0	316.6	0.0	0.0	68.2	0.0	0.1	0.0
741	86.0	20.0	64.0	2.0	271.8	500.0	0.0	0.0	14.3	0.0	0.0	2.4	0.0	0.1	0.0
742	31.0	30.0	0.0	1.0	1511.0	725.0	0.0	0.0	73.0	0.0	0.0	0.0	0.0	0.0	0.0
745	16.0	15.0	0.0	1.0	40.7	28.0	1.5	0.0	1.7	0.0	0.0	2.5	0.0	0.4	0.0
747	1.0	1.0	0.0	0.0	19.7	0.0	0.0	0.0	2.8	0.0	0.0	1.6	0.0	0.0	0.0
749	1049.0	120.0	919.0	10.0	7306.9	2131.3	30.3	170.0	552.8	0.0	0.0	35.6	0.0	0.2	10.0
750	41.0	40.0	0.0	1.0	408.3	0.0	0.0	0.0	7.4	0.0	0.0	24.3	0.0	0.2	0.0
752	229.0	50.0	178.0	1.0	2101.9	1000.0	33.6	0.0	212.7	0.0	0.0	9.0	0.0	0.1	0.0
753	86.0	30.0	55.0	1.0	507.5	0.0	10.0	0.0	227.0	0.0	0.0	24.1	0.0	0.0	0.0
755	11.0	10.0	0.0	1.0	96.5	0.0	0.0	0.0	0.3	0.0	0.0	3.2	0.0	0.1	0.0
757	9.0	8.0	0.0	1.0	55.3	0.0	0.0	0.0	0.6	0.0	0.0	83.5	0.0	0.0	100.0
759	41.0	30.0	10.0	1.0	562.3	157.6	0.0	0.0	23.1	0.0	0.0	122.5	0.0	0.0	0.0
761	5.0	4.0	0.0	1.0	17.7	328.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
771	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0
923	1599.0	70.0	1522.0	7.0	13134.9	6175.0	33.5	0.0	511.5	0.0	1.0	21.6	0.0	32.1	0.0
926	46.0	30.0	15.0	1.0	186.9	1100.0	0.3	0.0	32.9	0.0	0.0	15.2	0.0	0.0	0.0
1129	1711.0	30.0	1680.0	1.0	5154.2	3150.0	26.3	0.0	565.4	0.0	0.0	14.3	0.0	38.1	0.0
1208	1692.0	130.0	1560.0	2.0	16114.0	13280.0	73.0	0.0	2203.9	0.0	0.0	40.1	0.0	106.1	0.0
1209	969.0	40.0	928.0	1.0	5636.7	1140.0	31.1	0.0	542.8	0.0	5.0	14.1	0.0	33.0	0.0
1210	221.0	30.0	190.0	1.0	970.4	620.0	5.7	0.0	105.6	0.0	0.0	5.8	0.0	0.0	0.0
1213	1328.0	130.0	1195.0	3.0	20043.4	7518.6	24.0	0.0	3304.9	0.0	6.0	150.9	0.0	353.1	0.0
1214	1269.0	200.0	1065.0	4.0	26530.2	16855.2	13.1	20.0	1934.9	0.0	20.0	73.5	0.0	194.1	0.0
1216	343.0	20.0	320.0	3.0	2336.0	0.0	0.0	0.0	212.9	0.0	0.0	8.0	0.0	172.1	0.0
1217	26.0	25.0	0.0	1.0	101.4	0.0	0.0	0.0	23.9	0.0	0.0	114.0	0.0	0.2	0.0
1219	1.0	0.0	0.0	1.0	405.6	20.0	0.1	0.0	43.4	0.0	0.0	3.3	0.0	5.0	0.0
1220	649.0	190.0	455.0	4.0	7225.9	160.0	61.0	0.0	332.8	0.0	0.0	15.0	0.0	119.0	0.0
1222	1.5	1.0	0.0	0.5	3.4	0.0	0.0	0.0	5.2	0.0	0.0	1.5	0.0	0.1	0.0
1223	800.0	20.0	780.0	0.0	2113.3	880.0	0.0	0.0	178.1	0.0	0.0	7.4	0.0	199.0	0.0
1224	2292.0	170.0	2120.0	2.0	16311.8	5605.0	32.0	50.0	1154.7	0.0	0.7	24.4	0.0	405.1	0.0
1225	1789.0	120.0	1655.0	14.0	7981.1	1630.0	129.1	60.0	447.2	0.0	1.0	20.0	0.0	108.1	0.0
1226	680.0	70.0	604.0	6.0	1739.8	575.0	12.2	0.0	194.4	0.0	0.0	29.6	0.0	47.0	0.0
1227	696.0	60.0	634.0	2.0	3048.5	850.0	20.2	0.0	192.7	0.0	0.0	68.5	0.0	10.0	10.0
1228	666.0	30.0	634.0	2.0	3294.4	206.7	1.0	0.0	253.3	0.0	0.0	0.8	0.0	43.0	0.0
1229	33.0	30.0	1.0	2.0	546.0	53.0	0.0	0.0	23.0	0.0	0.0	0.0	0.0	0.0	0.0
1232	580.0	50.0	525.0	5.0	3011.9	850.0	1.0	0.0	174.3	0.0	0.0	2.7	0.0	77.2	0.0
1233	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.0	0.0
1234	142.0	20.0	120.0	2.0	260.1	250.0	0.0	0.0	64.3	0.0	0.0	3.4	0.0	35.1	0.0
1235	1724.0	170.0	1537.0	17.0	9457.3	920.0	21.0	5.0	640.3	0.0	0.0	0.0	0.0	556.1	0.0
1236	338.0	30.0	305.0	3.0	1219.9	145.0	0.0	0.0	168.7	0.0	0.0	3.5	0.0	374.0	0.0
1238	71.0	10.0	60.0	1.0	1374.4	238.0	0.1	0.0	16.9	0.0	0.0	16.1	0.0	0.0	0.0
1243	1116.0	60.0	1050.0	6.0	6997.0	2300.0	40.0	0.0	940.8	0.0	20.0	9.9	0.0	40.0	0.0
1244	1185.0	30.0	1152.0	3.0	6510.0	2295.0	96.0	0.0	561.0	0.0	0.0	0.0	0.0	89.0	0.0
1246	71.0	30.0	40.0	1.0	175.4	0.0	0.0	0.0	22.3	0.0	0.0	2.4	0.0	38.1	0.0
1248	133.0	30.0	102.0	1.0	560.0	0.0	20.0	0.0	186.0	0.0	0.0	0.0	0.0	2.0	0.0
1250	131.0	30.0	100.0	1.0	665.3	0.0	2.6	0.0	59.2	0.0	0.0	8.3	0.0	10.0	0.0
1251	71.0	70.0	0.0	1.0	87.9	0.0	0.0	0.0	3.9	0.0	0.0	20.2	0.0	85.5	0.0
1254	3.0	2.0	0.0	1.0	43.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 38.2 Quantities of bulk finds from Structures O75 and O68 by material and context number continued...

Object 75	Volume of sediment (l)				Weight of bulk finds per material (g)										
Context	**Total volume**	**Flot. sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Ground stone**	**Other worked stone**	**Unworked stone**	**Animal bone**	**Human bone**	**Marine shell**	**Other shell**	**Plaster/Pisé**	**Charcoal**	**Misc.**
1255	1.0	1.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
1256	1.0	1.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
1257	1.0	1.0	0.0	0.0	0.4	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.5	0.0
1258	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
1259	3.0	3.0	0.0	0.0	14.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
1265	106.0	40.0	65.0	1.0	3117.3	0.0	0.6	0.0	197.0	0.0	0.0	425.0	0.0	0.0	0.0
1266	31.0	30.0	0.0	1.0	5.7	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.0
1268	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1269	3.0	3.0	0.0	0.0	19.2	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0
1270	41.0	30.0	10.0	1.0	372.4	0.0	0.0	0.0	19.8	0.0	0.0	1.2	0.0	10.0	0.0
1272	33.0	30.0	2.0	1.0	259.1	0.0	0.5	0.0	0.5	0.0	0.0	1.6	0.0	5.0	0.0
1274	11.0	10.0	0.0	1.0	179.6	0.0	0.3	0.0	2.2	0.0	0.0	0.0	0.0	0.1	0.0
1276	361.0	30.0	330.0	1.0	4360.8	677.5	0.0	0.0	131.6	0.0	0.0	35.2	0.0	21.0	0.0
1279	2.0	1.0	0.0	1.0	13.7	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0
1281	6.0	5.0	0.0	1.0	7.7	0.0	0.0	0.0	1.4	0.0	0.0	1.0	0.0	0.1	0.0
1283	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1285	0.5	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1289	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1291	6.0	5.0	0.0	1.0	65.4	0.0	0.9	0.0	2.9	0.0	0.0	0.8	0.0	0.1	0.0
1292	71.0	70.0	0.0	1.0	336.0	0.0	1.5	0.0	25.4	0.0	0.0	24.9	0.0	0.2	0.0
1294	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1296	4.0	2.0	0.0	2.0	41.6	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.2	0.0
1297	12.0	11.0	0.0	1.0	81.2	0.0	2.3	0.0	2.1	0.0	0.0	2.7	0.0	0.0	0.0
1298	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1765	0.5	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1767	14.0	13.0	0.0	1.0	52.0	0.0	1.0	0.0	9.0	0.0	0.0	0.0	0.0	0.0	0.0
1768	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1770	0.2	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
1772	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1774	1.0	1.0	0.0	0.0	0.1	0.0	0.0	0.0	0.11	0.0	0.0	0.0	0.0	0.1	0.0
1782	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1784	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0
1786	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1789	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1790	31.0	30.0	0.0	1.0	75.9	0.0	0.0	0.0	15.7	0.0	0.0	20.0	0.0	0.2	0.0
1791	6.0	5.0	0.0	1.0	58.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
1793	61.0	30.0	30.0	1.0	446.7	0.0	0.0	0.0	14.6	0.0	0.0	14.0	0.0	20.1	0.0
1794	41.0	30.0	10.0	1.0	216.5	0.0	0.4	0.0	11.8	0.0	0.0	37.7	0.0	0.0	0.0
1795	431.0	30.0	400.0	1.0	298.1	0.0	0.0	0.0	31.4	0.0	0.0	0.0	0.0	9.0	0.0
1796	31.0	30.0	0.0	1.0	87.0	0.0	0.0	0.0	3.9	0.0	0.0	0.6	0.0	1.0	0.0
1799	3.0	3.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
1801	81.0	30.0	50.0	1.0	302.2	0.0	1.0	0.0	14.8	0.0	0.0	12.7	0.0	0.0	0.0
1802	91.0	30.0	60.0	1.0	273.6	0.0	0.0	0.0	17.7	0.0	0.0	3.9	0.0	2.0	0.0
1803	431.0	30.0	400.0	1.0	673.4	0.0	0.0	0.0	50.6	0.0	0.0	12.5	0.0	8.0	0.0
1809	121.0	30.0	90.0	1.0	161.2	0.0	0.4	0.0	14.4	0.0	0.0	1.1	0.0	0.0	0.0
1811	101.0	30.0	70.0	1.0	203.1	0.0	0.0	0.0	16.1	0.0	0.0	6.4	0.0	0.1	0.0
1812	176.0	30.0	145.0	1.0	160.1	0.0	0.0	0.0	36.8	0.0	0.0	5.7	0.0	1.0	0.0
1813	81.0	30.0	50.0	1.0	411.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
1822	141.0	30.0	110.0	1.0	536.1	50.0	1.0	0.0	16.4	0.0	0.0	9.0	0.0	1.0	0.0
Total	36629.8	4253.3	32149.0	227.5	273284.6	84075.9	1103.8	425.1	21418.0	2010.7	53.8	3463.6	1872.0	3403.2	477.6

Table 38.3 Quantities of small finds for Structures O75 and O68 by material and context number.

Object 75	Quantities of small finds per material (nos)													
Context	Chipped stone	Ground stone	Other stone	Worked bone	Unworked animal bone	Disarticulated human bone	Bone beads	Stone beads	Marine shell beads	Marine shell other	Other shell	Bitumen	Metal	Miscellaneous	Total small finds
85	0	6	1	0	0	0	0	0	0	0	0	0	0	0	7
87	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
89	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
104	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
116	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4
341	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
352	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2
355	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
358	4	1	1	1	1	0	0	0	1	0	0	0	0	0	9
361	0	0	0	0	0	0	0	2	3	0	1	0	0	0	6
364	0	1	1	2	0	0	0	4	2	0	0	0	0	0	10
365	0	2	0	1	0	0	0	1	0	0	0	0	0	0	4
399	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
686	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
689	1	0	0	0	0	0	0	0	2	0	0	0	0	0	3
692	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
693	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
701	0	1	1	0	0	0	0	0	1	0	0	0	0	0	3
707	1	0	0	1	0	0	0	0	1	0	0	0	0	0	3
715	0	0	0	1	0	0	0	3	0	0	0	0	0	0	4
716	0	1	1	1	0	0	0	1	0	0	0	0	0	0	4
735	0	2	1	3	0	0	0	1	0	0	0	0	0	0	7
738	0	2	1	1	0	0	0	2	9	1	0	0	0	0	16
739	0	0	0	0	0	0	0	1	1	1	0	0	0	0	3
740	0	1	0	0	0	0	0	1	1	0	0	0	0	0	3
741	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
742	2	0	1	0	0	0	0	0	0	0	0	0	0	0	3
745	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
749	0	1	0	2	0	1	0	1	0	0	0	0	0	0	5
750	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
752	0	1	0	1	0	0	0	2	3	0	0	0	0	0	7
753	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
757	0	1	0	0	0	0	0	1	0	0	0	0	0	0	2
759	0	3	0	0	1	0	0	0	0	0	0	0	0	0	4
923	0	2	0	0	1	0	0	0	4	14	0	0	0	0	21
1129	0	0	1	0	0	0	1	1	0	0	0	0	0	1	4
1208	3	6	3	0	0	0	0	1	2	2	0	0	0	0	17
1209	0	3	2	0	0	0	0	0	1	0	0	0	0	0	6
1213	0	3	0	1	0	1	0	0	1	0	0	0	0	0	6
1214	0	7	1	0	1	0	0	1	4	0	0	0	0	0	14
1220	0	1	2	3	0	0	0	3	1	1	0	0	0	0	11
1223	0	0	1	1	0	0	0	1	1	0	0	0	0	0	4
1224	4	0	0	2	0	0	1	5	1	2	0	0	1	0	16
1225	1	3	1	0	1	0	0	1	6	0	0	0	0	0	13
1226	1	0	0	0	0	0	0	0	3	0	0	0	0	0	4
1227	0	5	2	0	0	0	0	0	1	0	0	0	0	0	8
1228	1	0	0	0	0	0	0	0	2	0	0	0	0	0	3
1229	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
1232	0	0	0	1	0	0	0	0	1	0	0	0	0	0	2

Table 38.3 Quantities of small finds for Structures O75 and O68 by material and context number continued...

Object 75	Quantities of small finds per material (nos)													
Context	Chipped stone	Ground stone	Other stone	Worked bone	Unworked animal bone	Disarticulated human bone	Bone beads	Stone beads	Marine shell beads	Marine shell other	Other shell	Bitumen	Metal	Miscellaneous	Total small finds
1234	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
1235	0	1	1	3	0	0	0	2	1	0	0	0	0	0	8
1238	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
1243	0	1	1	1	0	0	1	3	0	0	0	0	0	0	7
1244	0	2	0	0	0	0	0	0	1	0	0	0	0	0	3
1250	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
1265	3	3	0	0	0	0	0	0	0	0	0	0	0	0	6
1276	0	1	0	0	1	0	0	1	1	0	0	0	0	0	4
1291	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
1292	0	0	0	1	0	0	0	0	1	0	0	0	0	0	2
1767	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
1793	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
1803	0	2	0	0	0	0	0	0	1	0	0	0	0	0	3
1813	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
1822	0	1	0	0	0	0	0	0	0	1	0	0	0	0	2
Total	22	73	24	31	7	2	3	46	61	23	2	1	1	1	297

pisé walls (399), (389), (563), (383=389), (557), (541=543), designated as defining Structures O75 and O68. The cut [90] of a burial, designated as Burial O6, truncating stone wall (383=389), was defined underlying overburden deposit (83). The cut was sub-rectangular, 0.70 m long x 0.50–0.70 m wide, 0.56 m deep, and contained a well-preserved juvenile skeleton (95), lying slightly on its right side, with the head to the east and the knees tucked up under the chin (Figure 38.6). The fill (89) contained *c.* 40% stones varying in size between 0.05–0.15 m placed over the body.

Another burial, Burial O8, was also revealed below overburden deposit (83). Burial O8 contained the bones of a badly preserved juvenile skeleton (98) in a semi-crouched position, with the head (88) to the east within a sandy silt matrix (87). The cut [106] truncated the fill (104) of an adjacent earlier and better-preserved burial, Burial O24, containing the skeleton (92) of juvenile lying on its left side in a crouched position, with the head to the northwest within cut [105]. A group of articulated ribs (108) were found immediately above skeleton (92), which was complete. It is possible that they belong to the same individual as disturbed skeletal remains (98) and (88) (Figure 38.7).

The cut [105] for Burial O24 truncated a sandy silt layer (361) and a deposit (364) comprised of pisé and rubble, including numerous sub-rounded and rounded stones probably eroded from the unexcavated pisé walls (563) and (383=398), which has numerous wadi cobbles set into it. A number of small finds was recovered from this deposit, including four stone beads (SF469, SF475, SF476, SF570) (Figure 38.8), two marine shell beads (SF474, SF489), and a possible unfinished limestone pendant SF464. Deposit (364) overlay midden (386), which was part of Midden O69 (Chapter 31). Deposit (364) was also truncated by a cut [86] (Figure 38.9). This had been lined with stones (368) around its eastern, northern and southern sides. Its fill (85) contained six hammerstones (SF212, SF213, SF215, SF217, SF219 and SF221) and a grooved stone (SF218) found around the edges of the deposit, as well as a group of articulated bird bones in the western edge of the feature.

Pits [372], 0.66 m x 0.54 m x 0.45m deep, and [373], 1.28 m x 0.56 m x 0.25m deep, were also excavated below deposit (83), both containing midden material (365). This was similar in composition and inclusions to the deposits of Midden O60, including the presence of burnt snail shells. It remained unclear whether these were a single feature, or two intercutting features with undifferentiated fills.

Two discrete unexcavated deposits were recorded immediately above a compact mud-plaster surface, which was later interpreted as an eroded bench (354=390=1821=1826) of Structure O75; an oval (396), 2.00 m x 0.60 m, of dark grey sandy silt and a sub-circle (394), 1.05 m x 0.95 m, of a grey sandy silt. A further area of mixed pisé and cobble (391) was exposed by the removal of overburden deposit (83) and pisé and rubble (364). It is possible that (391, Stratigraphic Block 4) is the core material of the platform at the northwest apex of Structure O75. Context (391) was truncated by the cut [786] for Midden O69, providing further stratigraphic links between these Objects.

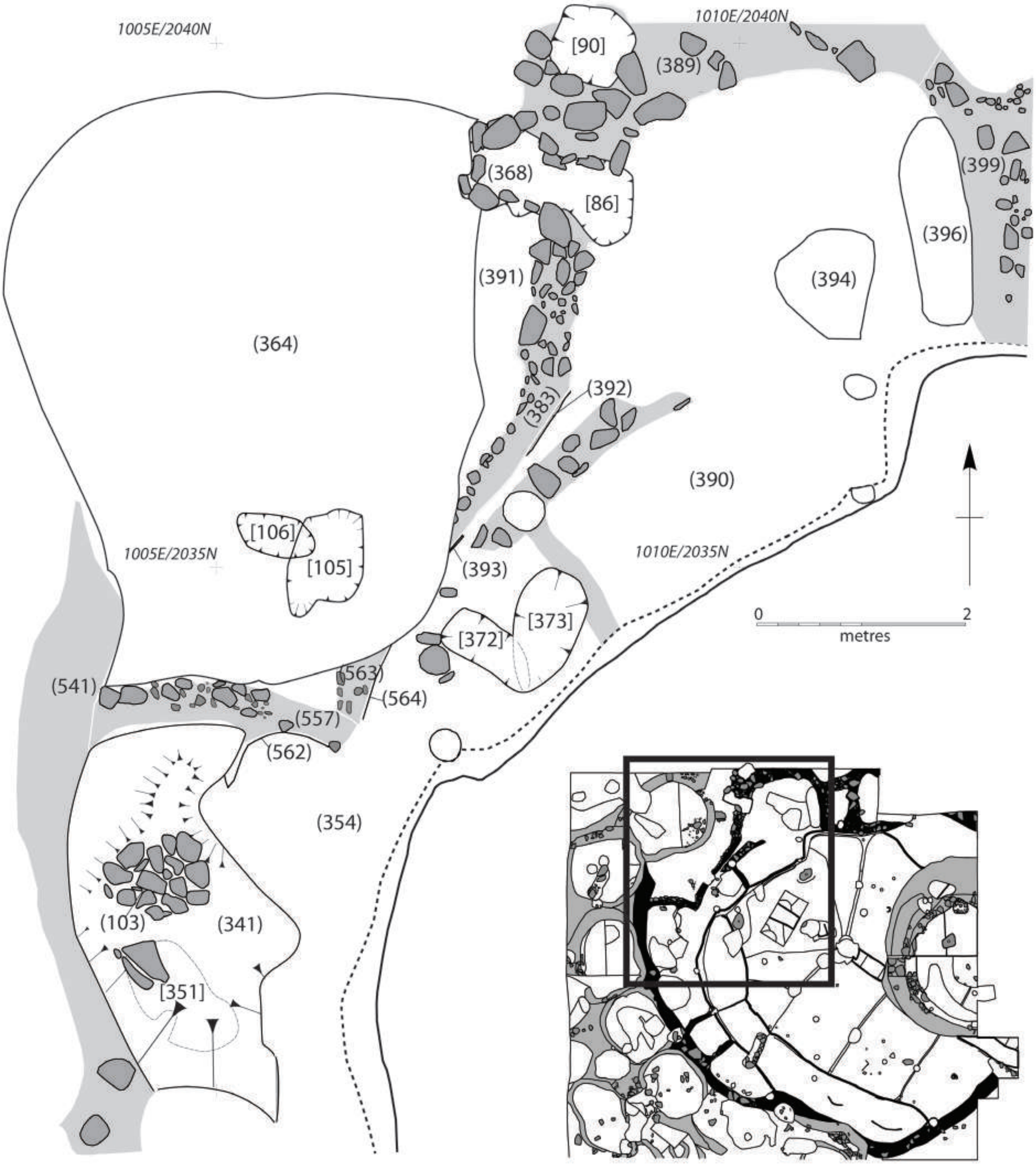


Figure 38.5 Plan of contexts assigned to Stratigraphic Block 1.

Below deposit (79) in the overburden Horizon O111, (Chapter 5), located to the south of wall (557), there was a stone surface (103) that contained two hammerstones (Figure 38.10). The surface was set into sandy silt (341) containing the re-deposited bones of an infant (378). Deposits below surface (103) were truncated to the south by an Antique Burial O25 [cut 451] of O99 (Chapter 6). Context (341) was partly within a wide shallow cut [374] into mud-plaster surface (354=390=1821=1826) of Structure O75.

Below context (341) at the base of cut [374] skeletal remains (350) were designated as Burial O47. The cut [351] of this burial contained an adult skeleton (350) lying in a crouched position on its right side with a flint blade

Figure 38.6 Child skeleton (95) of Burial O6. Scale 0.5 m.

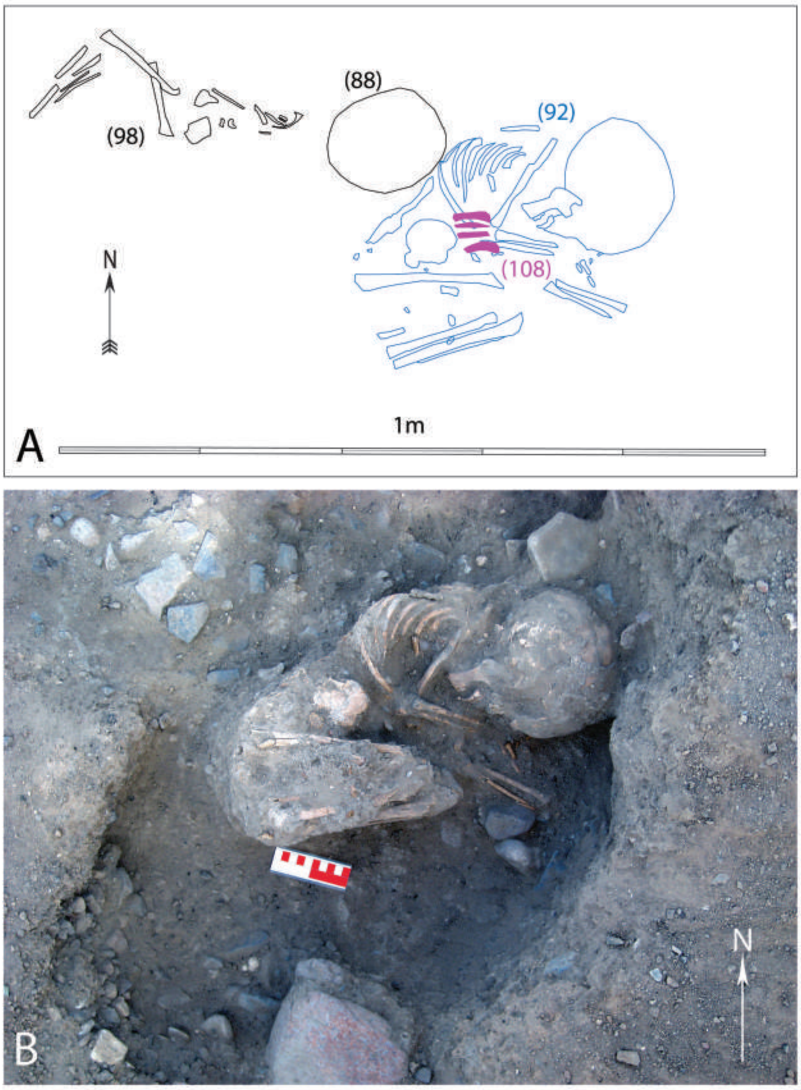


Figure 38.7 A — Burial O8 showing plan of human remains (98), (88), (108) and (92) in relation to each other; B — A photo of juvenile skeleton (92) from Burial O24 after removal of human remains (98), (88) and (108). Scale 0.1 m.

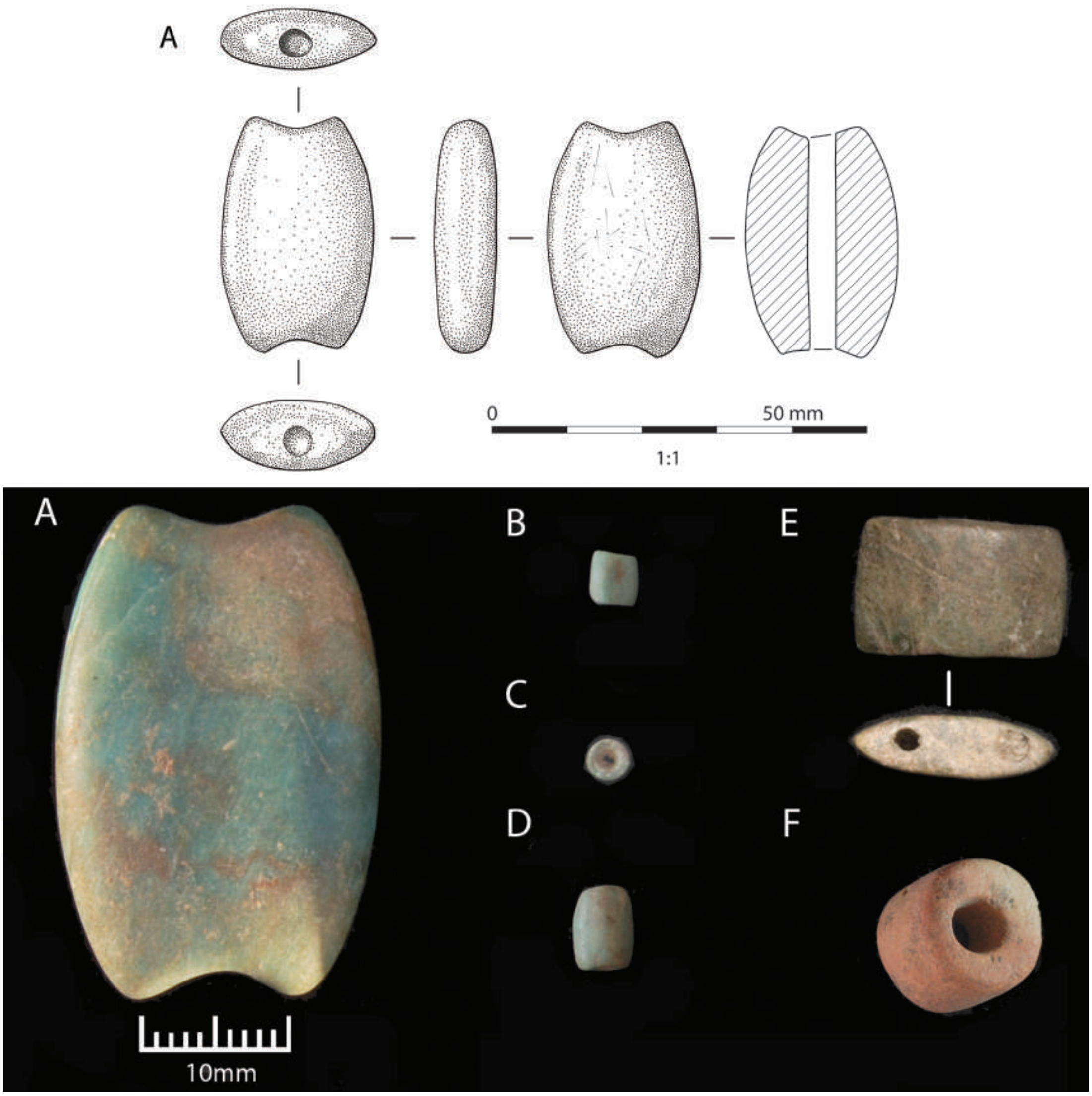


Figure 38.8 Stone beads from deposits in Stratigraphic Block 1 (A–E) and Block 2 (F) of Structure O75: A — SF476 (context 364); B — SF505 (365); C — SF457 (361); D — SF396 (341); E — SF570 (364); F — SF2359 (739).

(SF418) positioned over the ribcage (Figure 38.11). The skull was surrounded by a distinctive dark grey silt matrix (349) which overlay fragments of an infant cranium (366) in the primary brown silt fill (358). The burial cut [351] had truncated the upper bench (354=390=1821=1826) in Structure O75. Three other chipped-stone tools (SF413, SF419, SF420) were found in burial fill (349), together with a worked bone (SF412), a stone bead (SF2109), a marine shell bead (SF2095) and a grooved limestone object (SF411) that could be a figurine fragment. A deposit of grey-brown sandy silt fill (352) may relate to animal burrowing, which has disturbed the right knee of the burial.

Stratigraphic Block 2: accumulation of the infilling deposits and a burning event

Below the contexts of Stratigraphic Block 1, the basal deposits of O91 (Chapter 37), Structure O100 (Chapter 36), Midden O60 (Chapter 35), and Horizon O111 (Chapter 5), a horizon of contexts was exposed consisting of silt and midden deposits that had accumulated onto the constructed surfaces of Structure O75 (Figure 38.12). This material had primarily derived from the collapse and silting up of Structure O75. The excavation of these deposits was undertaken over two seasons in three horizontal spits (Figures 38.12, 38.13 and 38.14). Deposits which accumulated over the central floor area of Structure O75 were excavated in metre squares and, in some instances, different context numbers were given to the same deposit in different 5 m squares, or the strips previously occupied by baulk sections. The plans in Figures 38.12, 38.13 and 38.14 show these spatial differentiations while the context numbers belonging to a single deposit have been equalled in the text.

Removal of overburden (83) and (186) exposed a spread of stone rubble and pisé (1250) and a loose silt (1129),

Figure 38.9 Fill (85) and stone lining (386) of pit [86] from the north showing several of the hammerstones found within it. Scale 0.5 m.

Figure 38.10 Remains of stone surface (103). Scale 0.5 m.

both of which had accumulated over mud-plaster surface (354=390=1821=1826), the upper bench of Structure O75. A fragment of a stone bowl with carved decoration SF1857 (Figure 38.15) was found in silt (1129). Silt (1129) was truncated by a pit [1247], filled by loose sand (1246) and also by the cuts for burials belonging to O99 (Chapter 6). Pit [1247] also cut wall (543=541) and is interpreted as having been made after the collapse, to remove a post that had been set in the wall (543=541).

Where the infill contexts of O75 lay directly below the deposits of Midden O60, there was a relatively homogenous layer of pisé collapse mixed with silt (701=707), which contained chipped stone, animal bone, marine shell beads (SF1108, SF1181) and a pestle (SF1101). Adjacent to wall (543=541) of Structure O75, the collapse below Midden O60 was composed of layered mud plaster (716=735), interpreted as a remnant of the wall face that had previously been burnt and then collapsed into the accumulating deposit. The mud plaster (716=735) overlay a thin layer of more compact silt (715=739=741=752), which was directly above a stepped hard mud-plaster surface (713), which was later interpreted as the lower bench of O75, and, at a lower level, the floor (771=1824=1827) of O75. These basal silts contained a concentration of finds, especially worked animal bone objects (SF1305, SF1366 (Figure 38.16) SF1496, SF1504, SF1505, SF1603, SF2568), ground- and polished-stone tools (SF1368, SF1369, SF1495, SF1500, SF1501, SF1604), and beads made of stone (SF1358, SF1361, SF1503, SF1606, SF1607, SF1984, SF2359, SF2691) and marine shell (SF1605, SF1608, SF1633, SF1977, SF2386). Elsewhere loose silts (1238) below Midden O60 overlay wall (543=541) of Structure O75.

Some of the deposits in this stratigraphic block run below more than one of the overlying objects; for example silts (1208=1209=1210=1222) and (1223=1224=1225=1226=1227=1243=1244) ran under Midden O60, Structure O100 and Surface O91 (Figures 38.12, 38.13 and 38.17). These silts were equally rich in finds (Tables 38.2 and 38.3), most notably stone vessels (SF2210, SF2257, SF2308, SF2246, SF2545) and numerous beads made of stone (SF1836, SF2288, SF2290, SF2300, SF2456, SF2495, SF2520, SF2818), marine shell (SF2223, SF2286, SF2317, SF2319, SF2330, SF2440, SF2441, SF2461, SF2526, SF2579, SF2819), and bone (SF2804). Where the depth of deposits was shallower above bench surface (713), midden-rich silt (1213=1214) lay above a further thin layer of midden (1216) and then over surface (713). Some patches of silt, for example (1213=1214), immediately below Surface O91 were relatively compact, possibly as a result of trampling associated with the creation of Surface O91. Looser silt, containing sparse pisé rubble, (1208=1209=1210=1222) overlay further areas of floor (771=1824=1827) (Figure 38.17). This silt contained a burial, designated as Burial O126, which included a fragment of a human skull (1218) and a small group of human bones (1221) that contained another skull fragment and some long bones.

Silt (923) below Structure O100 and above floor (771=1824=1827) was cut by pit [925] that also cut the underlying floor (Figure 38.12). Pit [925] continued beyond the eastern limit of excavation, but the exposed part measured 1.20 m x 1.55 m x 0.35 m deep and contained a fill (926) with large pisé pieces. This is the only cut, other than Antique Burials O99, that truncates both the floor and its overlying silts. An additional silt deposit (1248) was excavated to the south of Structure O100 (Figure 38.14), where a small trench extension was created in order to identify the continuation of a central trough feature set into the floor of Structure O75 (Stratigraphic Blocks 3 and 4).

Context (738) was an extensive spread of sandy silt containing significant quantities of burnt pisé overlying (749), which had less pisé and fewer finds. Deposit (738) contained nine marine shell beads (SF1502, SF1601, SF1628, SF1629, SF1630, SF1631, SF1634, SF1638, SF2373) and two made of stone (SF2586, SF2695). A ground-stone vessel (SF1499) and a pestle (SF1508) were also found in this deposit. Deposit (738) was above compact silts (715=739=741=752). One area of silt (1219), below Surface O91, lay over a discrete layer of ash (1229), containing a discrete concentration of chipped stone. Below (1229) the deposits were composed from varying quantities of clay, sand, bone, shell and charcoal (1220=1228). These contained a wider variety of material culture, which apart from beads made of stone (SF2249, SF2302, SF2519) and marine shell (SF2251, SF2482, SF2498), included a ground-stone vessel (SF2241) and a

Figure 38.11 Burial O47: Skeleton (350) from the northeast showing flint blade (SF418) placed over the ribcage. Scale 0.5 m.

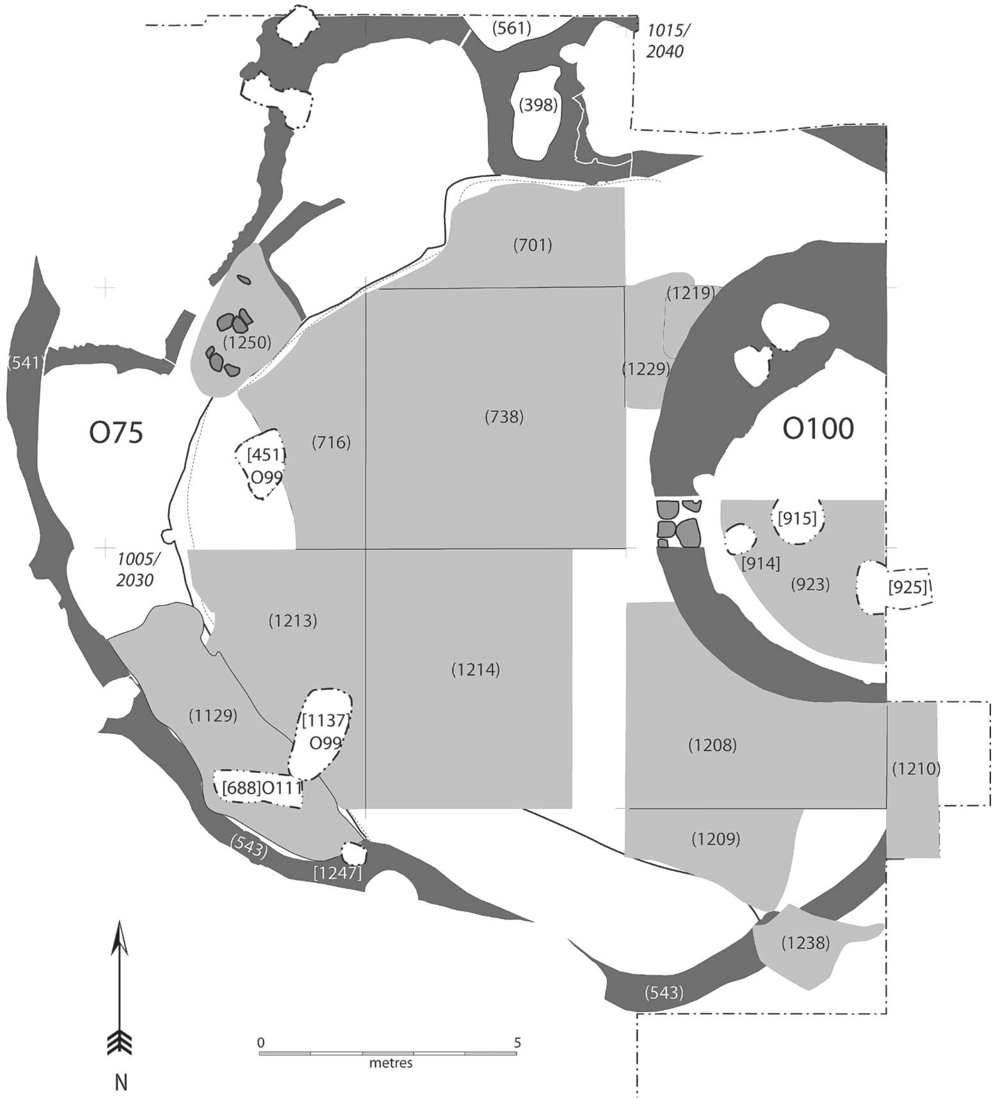


Figure 38.12 Plan of contexts in the first spit through the infilling deposits of Stratigraphic Block 2.

carved limestone pebble SF2310 (Figure 38.18). Deposit (1220=1228) lay over mixed silt deposits (1232=1236) containing multiple layers of ash and burnt pisé which lay on surface (771=1824=1827) of Structure O75.

Below this horizon of silts and midden deposits there was substantial evidence of a significant burning event that had occurred around the time that floor (771=1824=1827) of Structure O75 went out of use. Scorching on the walls (399) indicated that the fire had been more intense in the northern and western parts of the structure (Figure 38.19). Across parts of the floor surface there were thin layers of burnt material (1234) and (1235), containing silt and pisé fragments and significant quantities of charcoal. In front of the lower bench (713) on the west side was a dense concentration of charcoal (1233) overlying (1234). In some places the floor was blackened and cracked, apparently from heat. This evidence indicated a substantial fire had occurred within O75 (Figure 38.20). Either this, or another fire, had set alight wooden posts that had been within the walls of O75; the heat given off had scorched the mud-plaster moulding surrounding the posts. The fill deposits of these post pipes (1251), (1790), (1791), (1793) contained high frequencies of charcoal with the mud plaster around the post pipes being heavily scorched. Most of the post pipes had been moulded into the mud plaster of O75, and are therefore described in Block 4, except for [1792] (Stratigraphic Block 3), which was a post-hole cut into surface (390) and which contained (1791).

Stratigraphic Block 3: post-construction features

Below the deposits of Stratigraphic Block 2 a number of features were exposed, either on top of, or cut into, the architecture of Structure O75 (Figures 38.3, 38.21). Four hearths formed a stratified sequence in the central part of the floor area, overlying the junction of two westernmost moulded raised gullies in mud-plaster floor (771=1824=1827) and the central 'trough' (Figure 38.22). The uppermost hearth [746] was circular, 0.7 m diameter

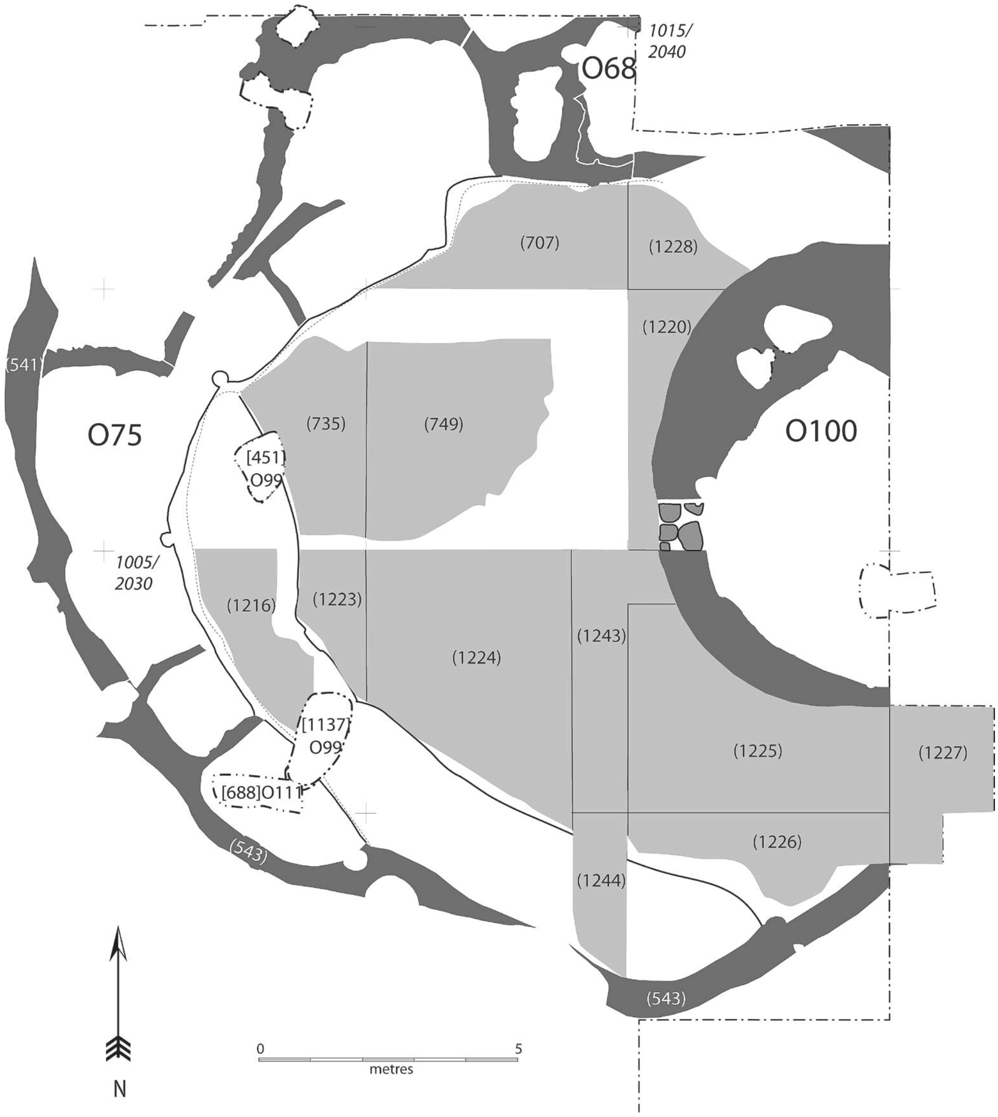


Figure 38.13 Plan of contexts in the second spit through the infilling deposits of Stratigraphic Block 2.

and 0.15 m deep, with a moulded mud-plaster rim on its southern side, filled with (745), an ashy silt, rich in wood charcoal (Figure 38.23). This cut a mid-orange-grey sandy silt with mud-plaster fragments (740), which overlay the dark silty fill (742) of an oval cut hearth [744] 0.7 m x 0.5 m x 0.13 m deep. The cut [746] also truncated the floor (771=1824=1827) of Structure O75 and damaged a raised gulley moulded into that floor. Hearth [744] truncated a third and smaller hearth, 0.15 m x 0.18 m x 0.08 m deep, which was constructed from fragments of recycled pisé or mud-plaster rubble (748) and filled with ashy silt (747), from which a sample of charcoal was taken for radiocarbon dating.

Immediately below hearth (748) was a hearth (762) moulded over the floor of Structure O75 and truncated by the subsequent series of hearths (Figures 38.24 and 38.25). This had a diameter of 1.30 m with a height of 0.30 m and a moulded rim 0.30 m thick, forming a concave interior that had been scorched by use. The primary fill (761) of the hearth (762) was 0.05 m thick and contained 20% burnt stones and 20% charcoal. The primary fill was sealed by stone-rich deposit (759) that included a number of broken worked stone fragments (SF1619, SF1642, SF1643) as well as large fragments of a goat horncore (SF1618) (Figures 38.24 and 38.25).

Northwest of this hearth sequence there was a separate hearth cut [770] truncating the floor surface (771=1824=1827) of O75, where the section of the cut for [770] revealed that more than one layer of mud-plaster flooring was present. Fragments of mud plaster (769) from the floor had been set on-edge to form a rectangular hearth lining approximately 0.30 m x 0.18 m x 0.10 m deep (Figure 38.26). The hearth was subsequently reduced in size by the use of additional mud plaster and stone blocks (768). It was filled with sandy silt (753) with very little charcoal, suggesting it had been cleaned out before final abandonment.

A number of the contexts relating to Stratigraphic Block 3 ran below Structure O100 and consequently were

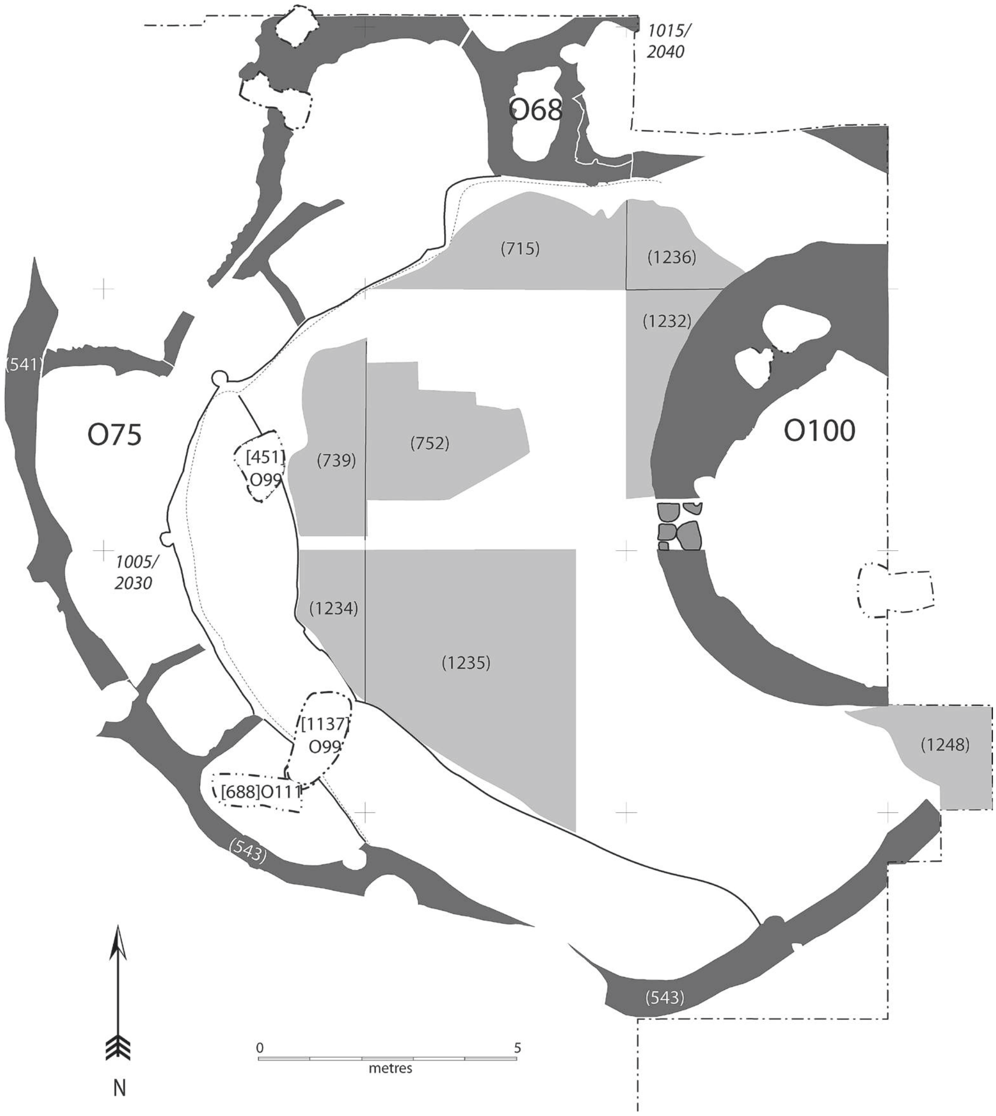


Figure 38.14 Plan of contexts in the third spit through the infilling deposits of Stratigraphic Block 2.

Figure 38.15 Carved stone bowl fragment SF1857 from deposit (1129).

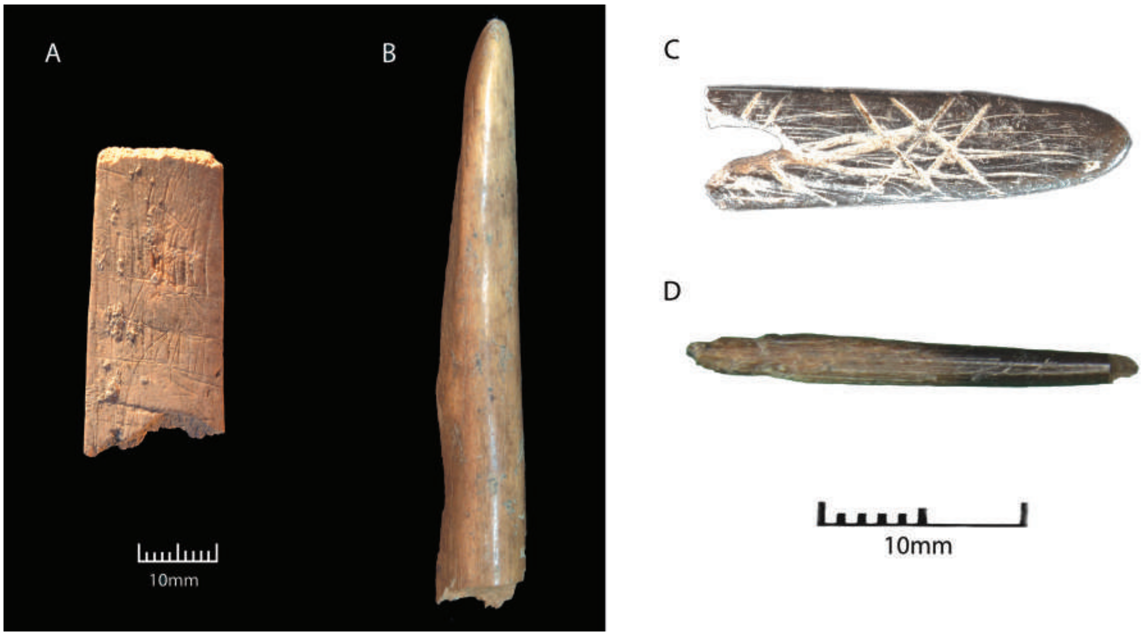


Figure 38.16 Bone objects found in Stratigraphic Block 2: A — SF1305 (context 715); B — SF1366 (716); C — SF2525 (1220); D — SF2455 (1224).

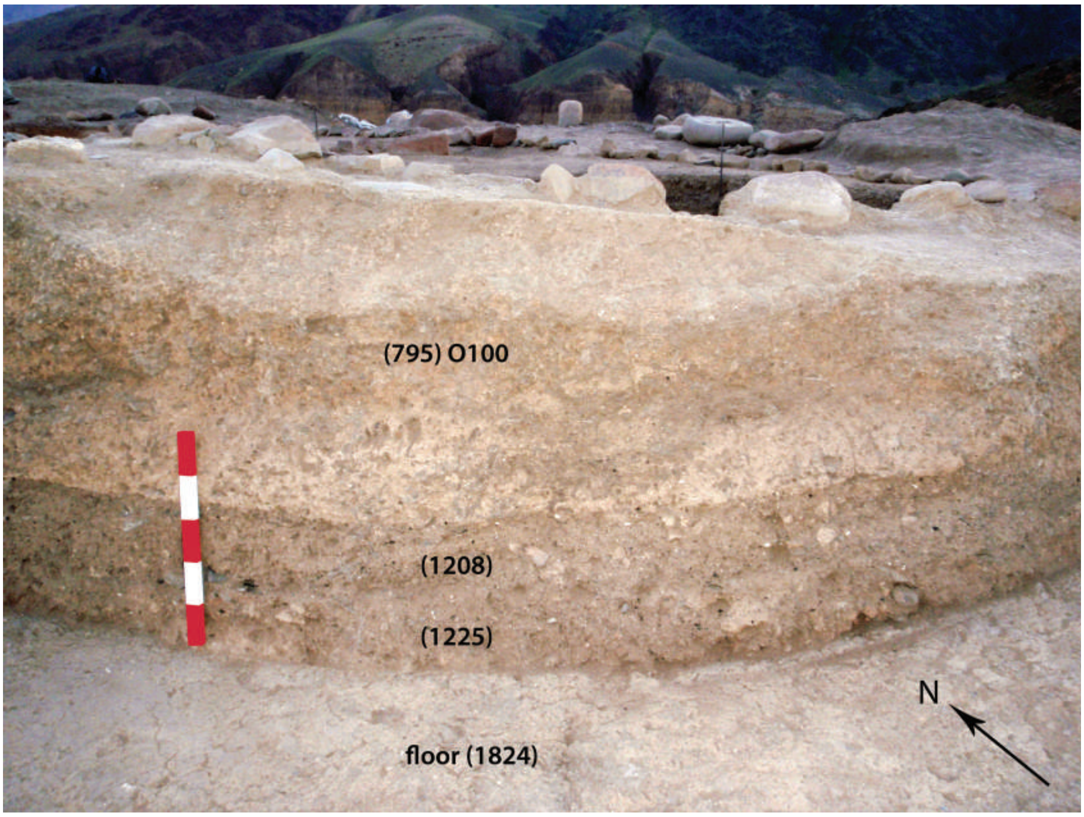


Figure 38.17 Infill deposit (1208) and (1225) that had accumulated on the floor of Structure O75 and below pisé and stone walls of Structure O100. View of the exterior of Structure O100 from the southwest. Scale 0.5 m.

Figure 38.18 Carved limestone pebble SF2310 from deposit (1220).

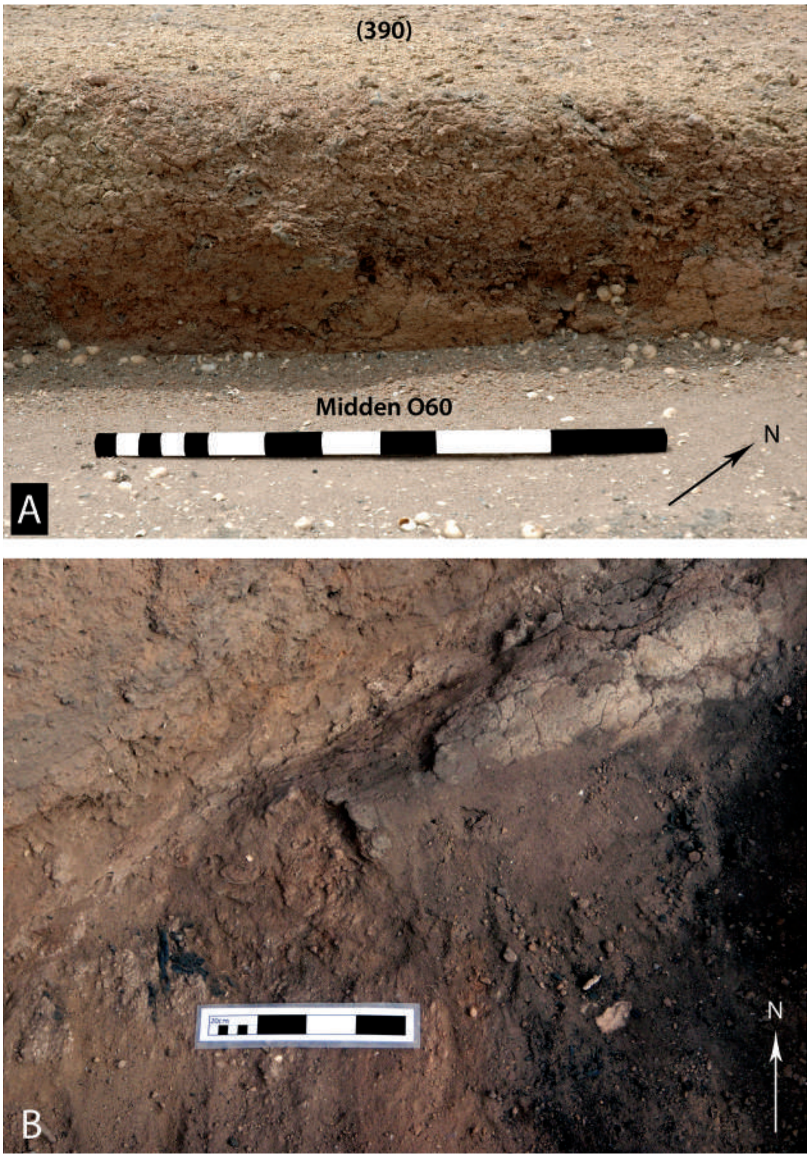


Figure 38.19 A — Heat damage to the face of Tier 2 bench shown during initial exposure when Midden O60 was under excavation, scale 0.5 m; and B — heat cracking of the floor surface and burnt layer above the northwest edge of floor (771). Scale 0.2 m.

not fully excavated. These include an irregular pit [935] containing dark grey silt (936) and a circular cut [1829], 0.22 m in diameter, and filled by a grey sandy silt (1828). Both were cut into surface (771=1824=1827), the floor in the central area of Structure O75.

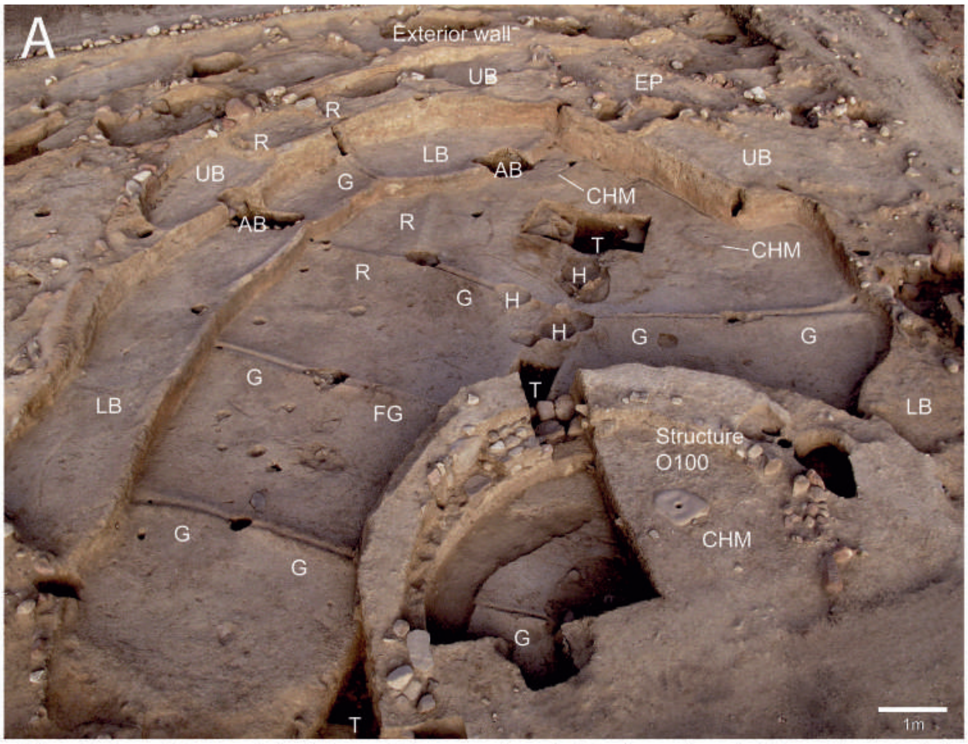
In a similar stratigraphic context, but directly below the infill deposits of Stratigraphic Block 2 (1223=1224=1225=1226=1227=1243=1244) and above floor (771=1824=1827) were additional cut features (Figures 38.3, 38.22): a sub-circular cut [1275] 0.33 m x 0.36 m x 0.25 m deep, filled by a loose brownish-orange silt (1274); an oval cut [1764] 0.20 m x 0.30 m x 0.12 m deep, filled by loose greyish-brown silt (1298); an irregular shaped cut [1766] 0.40 m x 0.22 m x 0.05 m deep, filled by a loose brownish-grey silt (1765); an oval cut [1773] 0.25 m x 0.15 m x 0.14 m deep, filled with loose grey-brown silt (1772).

In the central part of the structure the following were located: a circular cut [754], 0.26 m in diameter and 0.17 m deep, filled by (755), a loose grey sandy silt; a circular cut [756], 0.25 m in diameter and 0.25 m deep, filled with (757), a compact grey-brown silt; a circular cut [1280], 0.40 m in diameter and 0.05 m deep, filled with a light orange silt (1279); a sub-rectangular cut [1282], 0.15 m x 0.15 m x 0.2 m deep, filled with a light grey silt (1281); a sub-circular cut [1284], 0.18 m x 0.15 m x 0.05 m deep, with a stone lining at its base and filled by a loose grey-brown silt (1283); a sub-circular cut [1286], or depression caused by pressure on the floor, 0.16 m x 0.17 m x 0.02 m deep, filled by a loose grey-brown silt (1285), and an additional shallow depression (1288) 0.21 x 0.23 x 0.01 m deep, with no distinct fill, that may mark the location of a post pressed onto the surface of the floor.

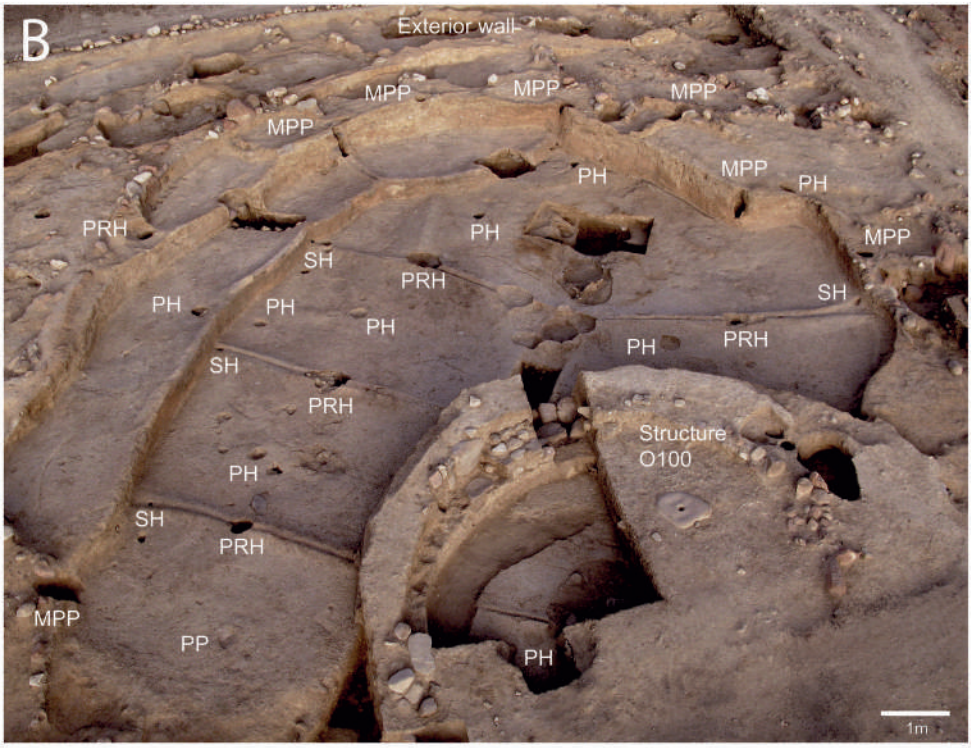
To the south of the central trough through Structure O75 there was an oval cut [1290], 0.18 m x 0.16 m x 0.15 m deep, filled by a loose light grey-brown silt (1289) and a sub-circular cut [1295], 0.26 m x 0.18 m x 0.06 m deep, filled with a loose grey-brown silt (1294). A sub-circular cut [1269], 0.35 m x 0.4 m x 0.05 m deep, filled with a loose brownish-grey silt (1268) was cut into bench surface (713). The distribution of post-holes is best seen in plan (Figure 38.3), noting that each raised gulley appears to have a post extraction pit located centrally [1271], [1273], [1275], [1282].

Numerous post-holes of different depths and diameters were present within the floor (771=1824=1827) of Structure O75, some of which were located at the ends of raised gullies, comprising [1832] filled with (1778), an oval cut [1775], 0.17 m x 0.09 m x 0.10 m deep, filled

Figure 38.20 Northwest part of Structure O75 after excavation in 2009 showing different areas of scorching: blackening of the floor surface (771), reddening of floor surface (1823) and wall and bench faces (713), (390) and (399). Scale 2.0 m.



Abbreviations: EP - eroded platform; UB - upper bench; LB - lower bench; AB - antique burial; CHM - cup-hole mortar; G - raised 'gully'; FG - filled 'gully'; R - ridge; H - hearth; T - trough;



Abbreviations: PRH - post removal hollow; MPP - moulded post-pipe; PH - post-hole; SH - stake-hole; PP - post-pad;

Figure 38.21 Annotated photographs of Structure O75 showing: A — surfaces with divisions and associated features; B — potential structural features.

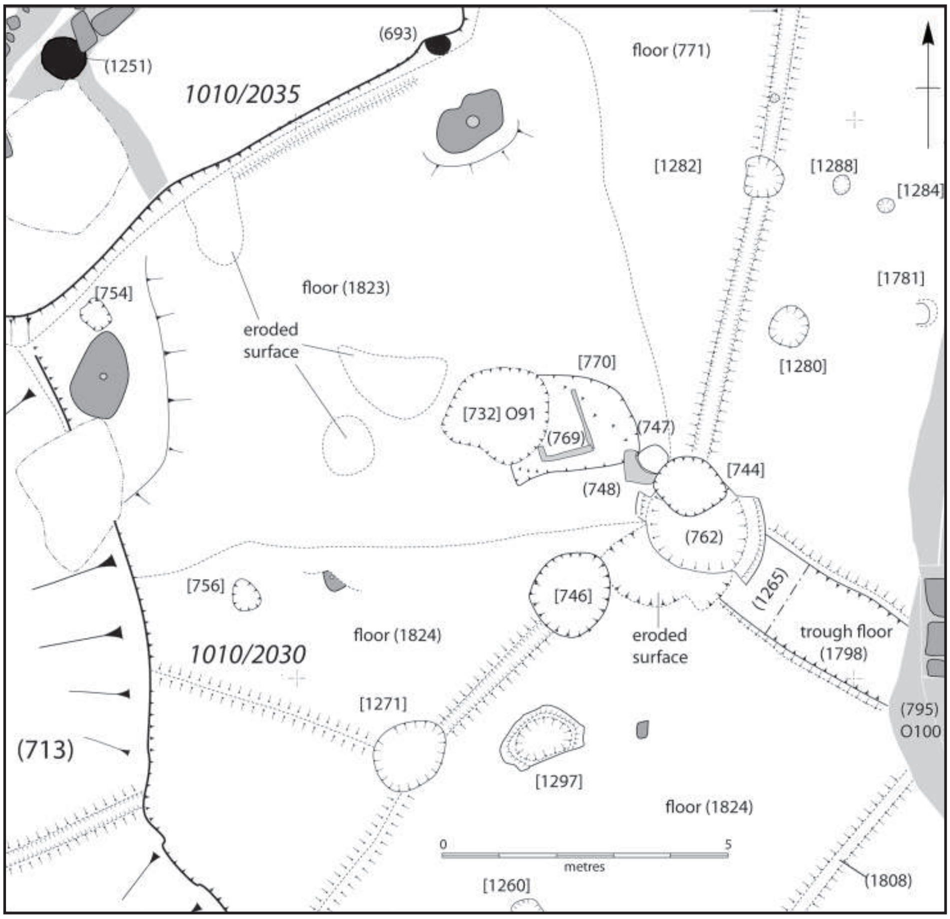


Figure 38.22 Plan of the northwest area of the central floor of Structure O75 showing hearth features and cup-hole mortars belonging to Stratigraphic Blocks 3 and 4.

Figure 38.23 Fill (745) of hearth [746] from the north. Scale 0.2 m.

Figure 38.24 Stony fill (759) of hearth [762] among which three mortar fragments SF1619, SF1642 and SF1643 were found. Scale 1.0 m.

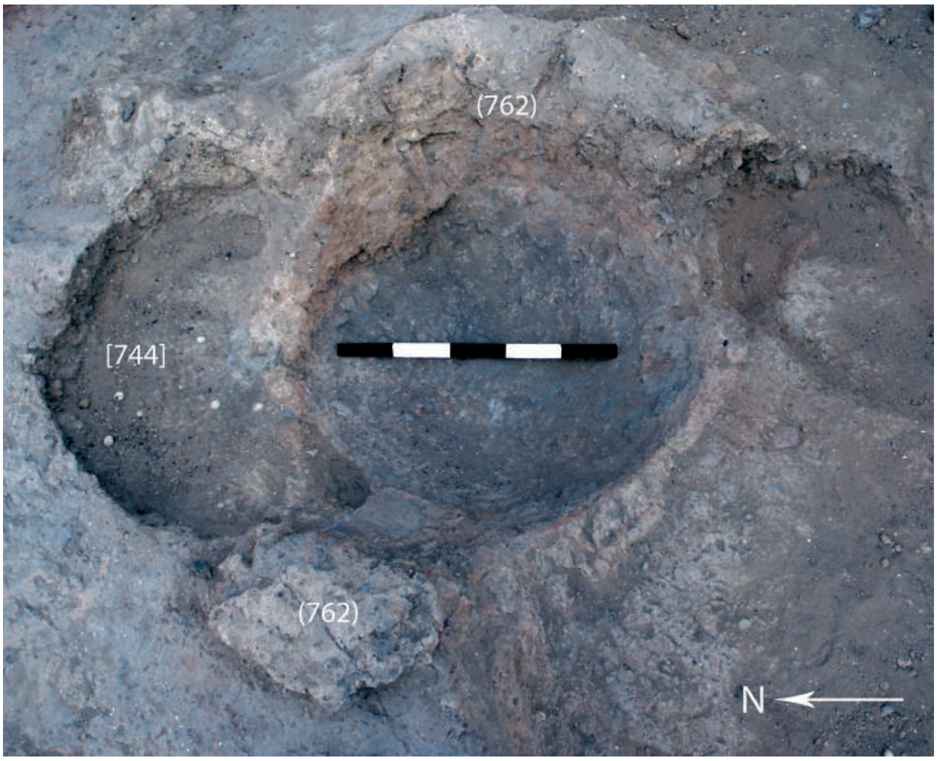


Figure 38.25 Moulded pisé hearth (762), showing scorching of the reddened sides and the blackened base. Scale 0.5 m.

by a loose grey-brown silt (1774); a small circular cut [1771], 0.06 m in diameter and 0.08 m deep, filled with loose grey-brown silt (1770); a triangular cut [1776], 0.21 m x 0.20 m x 0.13 m deep, was at the end of a ridge and filled with silt (1789); on the ridge adjacent to [1776] was an irregular cut [1777], 0.28 m x 0.33 m x 0.13 m deep, filled by a loose grey-brown silty sand (1786); an oval cut [1271], 0.60 m x 0.75 m x 0.30 m deep, cut into one of the raised gullies in the floor and filled by a loose grey silt (1270).

Figure 38.26 Hearth lining (769) from southwest. Scale 0.2 m.

There were a series of features lying below the infilling deposit (1235, Stratigraphic Block 2) and which cut the floor of Structure O75 (771=1824=1827) (Figure 38.3): a circular cut [1260], 0.31 m x 0.34 m x 0.07 m deep, filled with a loose grey sandy silt (1254); a circular cut [1267], 0.25 m x 0.25 m x 0.06 m deep, filled with a grey-brown silt (1266); a sub-circular cut [1273], 0.72 m x 0.50 m x 0.29m, filled with a yellow-grey silt (1272); a triangular shaped cut [1769], 0.26 m x 0.24 m x 0.13 m deep, filled by a loose grey-brown silt (1768); an oval cut [1783], 0.20 m x 0.14 m x 0.11 m deep, filled by a loose grey-brown silt (1782); and a triangular cut [1785], 0.12 m x 0.10 m x 0.03 m deep, filled with a loose grey-brown silt (1784).

Four shallow depressions, possibly post-pads, [1261], [1262], [1263] and [1264], 0.14 m to 0.22 m in length, 0.10 m to 0.18 m in width and 0.03 m to 0.07 m in depth, were found in the surface of the upper bench (1826) running parallel to the outer wall (543=541) (Figures 38.3 and 38.27). They were filled by (1255), (1256), (1257) and (1258), a series of similar silts containing charcoal and small stones. A flat stone at the base of [1262] suggests that stone post-pads might have been part of the construction. A small depression [1277], located near the other four, was so shallow that no distinct fill was identified.

Sediments within the 'trough'

Running along the long axis of Structure O75 is a 'trough', measuring 0.70 m in width and with vertical sides up to 1.20 m deep when excavated. Excavation was conducted in three sondages: Sondage A at its easternmost extent; Sondage B near the centre of Structure O75; and Sondage C in the northwest part of the central floor area (Figure 38.1). The mud-plaster floor of Structure O75 (771=1824=1827=1798) was continuous over the sides and the base of the 'trough' in Sondages A and B, indicating that in these parts of the Structure the 'trough' had been cut prior to the laying of the floor. In light of its same alignment, a probable continuation of the 'trough' was partially excavated in Sondage C (Stratigraphic Block 5), sealed below mud-plaster surfaces (1795). The stratigraphic sequence in Sondage C remains unconnected by excavation to the 'trough' sequences in Sondages A and B to the southeast. Thus, the full length of the trough at any one time in the history of Structure O75 could not be fully determined. It is clear, however, that the trough was an integral part of the architecture of Structure O75, and its construction is described in Stratigraphic Block 4. The sediments contained within the 'trough', however, are appropriately described as part of Stratigraphic Block 3.

Following the excavation of the infilling deposits of Stratigraphic Block 2 the 'trough' was intermittently visible for 9.6 m, running from beyond the eroded eastern edge of the excavation (Sondage A), underneath the walls of Structure O100, then reappearing on its western side (Sondage B) until it reached the moulded hearth (762) of Stratigraphic Block 3 described above (Figure 38.3). The moulded hearth (762) overlay the fills of the trough to the southeast and the mud-plaster floor surface (1823) to the northwest, (Stratigraphic Block 4, Figure 38.22), which sealed the sequence in Sondage C (Stratigraphic Block 5). Floor (1823) was not visible in the area of the central Sondage B.

Contained within the trough in Sondage B was a 0.15 m deep deposit of angular stones and pisé rubble (1265)

(Figures 38.28 and 38.29). At the base of this fill was a caprid cranium with horns (SF2460) placed upon another pisé rubble and stone rich layer up to 0.75 m deep (1276) (Figure 38.30). This lay upon mid-yellowish-brown silt (1291) that was above a series of laminated deposits of ashy silt (1292) *c.* 0.16 m deep (Figures 38.31 and 38.32). This appeared to be the result of occupation debris that had washed into the trough and which contained numerous fragments of charcoal that were sampled for possible radiocarbon dating (SA6034, SA6040, SA6041, SA6042). Within the confines of the sondage it was impossible to excavate the fine laminations individually, but a block sample (SA6122) was taken from the sondage section for later micro-morphological analysis. Below these laminations was a more compact layer (1767), interpreted as a secondary surface for the base of the trough, from which a sample of charcoal was taken for radiocarbon dating (Table 38.6). This was approximately 0.05 m thick and had been deposited above another mud-plastered surface (1798, Stratigraphic Block 4) of the trough. That surface (1798) was a continuation of the mud plaster (771=1824=1827) that formed the floor of Structure O75 and that had been spread over the sides of the trough. Excavation in this sondage stopped at this point.

An additional part of the trough was excavated to the east of Structure O100 in Sondage A. The sequence began below midden material (1248) belonging to Stratigraphic Block 2, with a firm mid-grey silt (1801) that filled the upper part of the trough. This lay above a loose silt with pisé fragments (1794) that filled a fragment of a post pipe [1797]. This was preserved largely intact within a large piece of burnt pisé (1813), which seems to have been dumped into the trough (Figure 38.33). The size of the post pipe is similar to the post pipes found in the walls around Structure O75. Charcoal fragments found in the fill of the post pipe, along with scorching, indicate that a fire may have occurred at some point. It appears to have been dumped into the trough and onto a pisé rubble and silt layer (1822) that contained an upturned cup-hole mortar (SF 2558). At this point excavation stopped.

Stratigraphic Block 4 — the architecture of O75

Most of the architecture of Structure O75 was exposed by the removal of the Midden O60, Surface O91 and the deposits of Stratigraphic Blocks 1, 2 and 3. The eastern extent of the architecture had been either severely eroded or remained sealed below the unexcavated parts of Structure O100. The surviving architecture is shown in Figures 38.2, 38.3, 38.21, 38.34 and 38.35. Structure O75 is approximately oval in shape, defined by walls (543=541) with its long axis orientated northwest–southeast and a degree of structural symmetry either side of this line. The dimensions of the oval shape are approximately 20 m x 18 m, with some uncertainty regarding the location of the eroded outer wall to the north (see Structure O68 below).

There is a double tier of benches, lower (713) and upper (1826=1821=390=354), along the south and southwest perimeters, and what is probably an eroded platform (391) above the benches at the northwest end, contained by walls (563), (383=389) and (557). The east and northeast sides of the structure were badly eroded, but suggested further

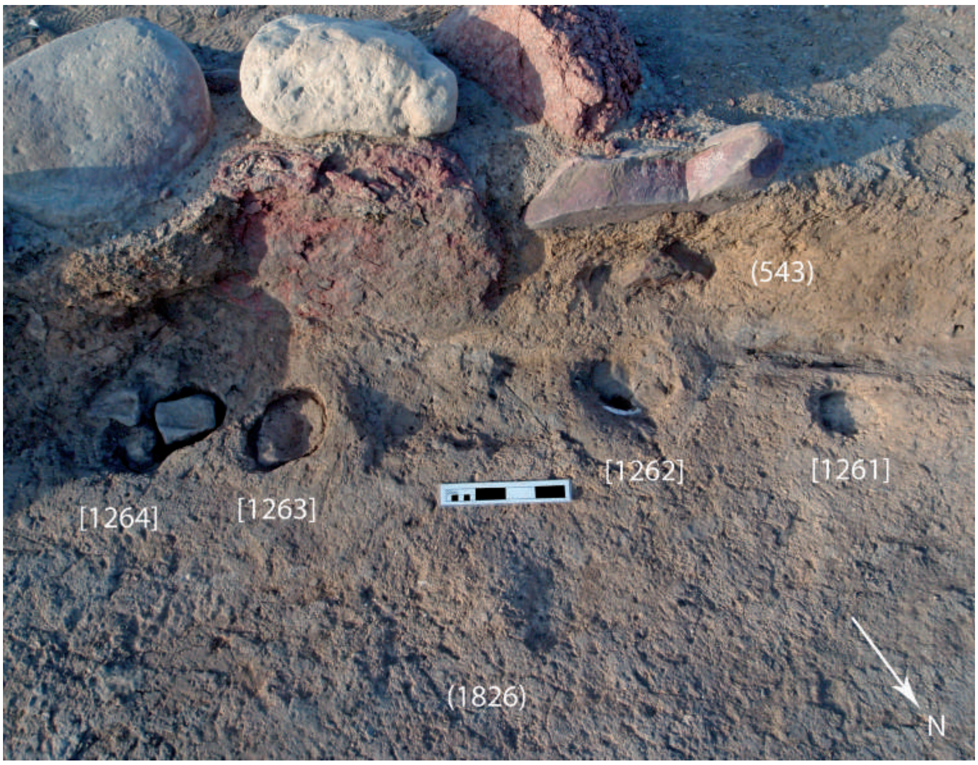


Figure 38.27 Shallow basins [1264], [1263], [1262] and [1261] in the surface of the upper bench (1826) just inside the outer wall (543=541). Scale 0.2 m.

benches (1831), and a possible segment of outer wall of the structure in the northeast corner of the 2010 trench extension. The floor (771=1824=1827=1798) and bench surfaces (713), (354=390=1821=1826), which were built as a single continuous surface, were also moulded into a number of features which we refer to as: raised gullies, post pipes, a 'trough', hearths, pits and installations containing cup-hole mortars. Although these mud-plaster surfaces contain multiple plastering episodes, we treat them as a single stratigraphic unit because in their final cumulative expression they represent a contiguous inner surface to Structure O75. Moreover, the floors, benches and other structural elements merge seamlessly thanks to the fluidity of mud plaster as a building material. Further excavation would be required to establish the detailed sequence of construction and repair. The context numbers for the mud plaster relating to different structural elements have been retained because they provide internal spatial information, as shown on the plans.

The walls, benches and floor

The interior surface of Structure O75 was primarily formed by a mud-plaster floor (771=1824=1827=1798). Where the floor had been damaged, traces of earlier horizons were evident and are described in Stratigraphic Block 5. The floor has at least one patch of repair (1823), which was located at its northwest end (Figures 38.22 and 38.36). Towards the northwest extent of the floor, two cup-hole mortars had been set within raised mud-plaster surfaces, one of which was blackened, possibly by the burning event described in Stratigraphic Block 2 (Figures 38.22 and 38.50).

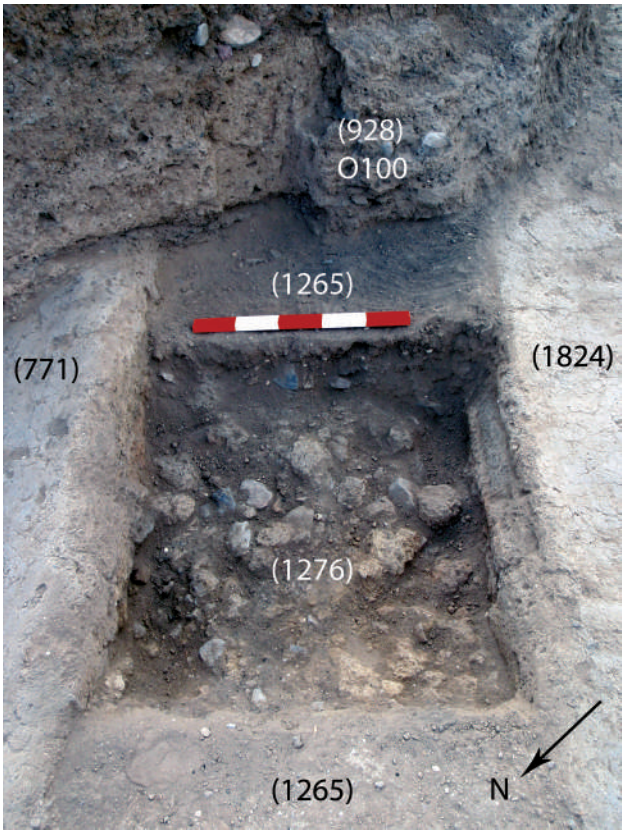


Figure 38.28 Fills (1265) and (1276) of trough during excavation within Sondage B, showing the relationship with the overlying wall of Structure O100. Scale 0.5 m.

The lowest bench (713) is *c*. 1 m wide and up to 0.5 m high, running around most of the south and southwest side of the structure. It is 16.5 m in length and forms a curved, slightly coroneted raised area. At each end, where the bench merges either into the main wall (541=543) or vertical face of the bench above (354=390=1821=1826), the mud plaster was moulded to form post pipes: (1793) in the southeast and (750) in the northwest. The vertical mud-plaster face of the lower bench (713) had been repeatedly re-plastered (1804), (1805) and (1806), with at least layers (1805) and (1806) having been decorated. The outermost plaster layer (1805) is mid-grey in colour and has one preserved area of moulded circular decoration (Figure 38.37). Below this mud plaster (1805) there was an orangish-grey mud plaster (1806) decorated with wavy lines, probably traced into wet plaster with two fingers (Figures 38.38 and 38.39). Mud plaster (1806) overlay the burnt, possibly original mud-plaster vertical face (1804) of the bench. Mud plaster (713) can therefore be assumed to be a composite of several plaster layers. In other areas of the bench face, the mud plaster was of notably fine texture with patches of red pigment. Lower bench (713) comes to an end at the location of post pipe (750), from which point a single vertical bench face (354=390=1821=1826) continues along the western perimeter of the floor (771=1824=1827=1798). The face of the bench continues along the north and northeast sides of the structure. The surface of the bench also continues along the western side, but in the north it had been interrupted by the pisé and stone walls of Structure O68. In the far northeast a deposit of pisé (1831) is likely to have been part of the original bench construction.

The lowest bench had been cut by two Antique Burials (Burials O118 and O25 which form part of O99, Chapter 6), but a number of other features across the bench appear to relate to use of the structure. On the surface (713) of the bench at its southeast end there were two semi-circular grooves. Flat stones have been placed in the centre of each semi-circular groove and plastered over. A similar, but more angular, groove was located on the floor (1824) immediately in front of the bench at this point (Figure 38.40). At one point, the surface of the bench had been moulded into a transverse gully that runs from the front to the rear of the bench. At the front of the bench, this gully marks a distinct change of direction of the bench face. At the back of the bench the gully ends with the post pipe (1217) that had been moulded into the face of the second tier bench, at the junction between surfaces (1821) and (354) (Figure 38.41). When in place the post would have been visible in the face of the upper bench, unlike the posts around the rest of the structure that would have been encased by mud plaster of the surrounding

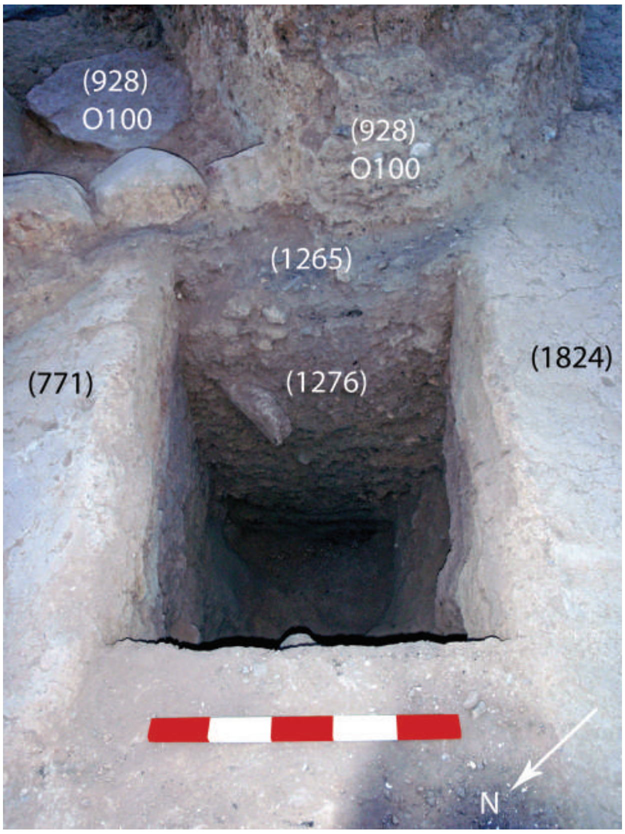


Figure 38.29 Section through fills of trough in Sondage B showing the relationship with the wall foundation (928) of Structure O100 and the continuation of mud-plaster surfaces (771=1824) along the vertical sides of the trough. Scale 0.5 m.

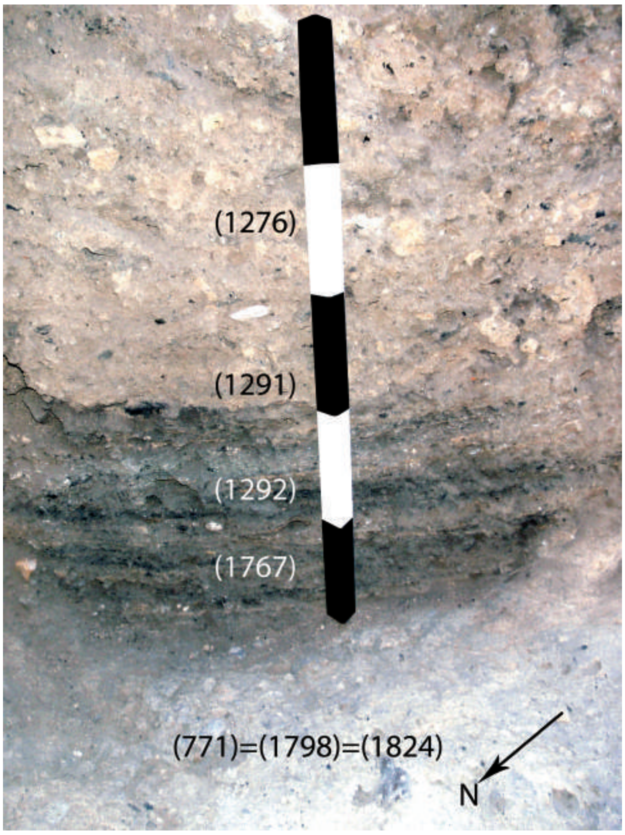


Figure 38.31 Lower part of section through trough in Sondage B showing finely laminated deposits (1292) and (1767) overlying mud-plaster lining (1798=771=1824). Scale 0.5 m.

Figure 38.30 Ibex/goat cranium with horn cores, SF2460, placed in fill (1276). Scale 0.1 m.

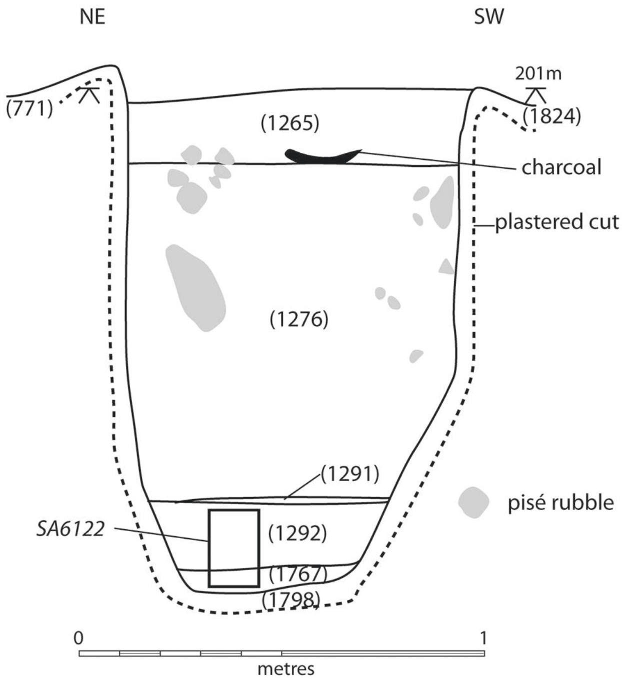


Figure 38.32 Northwest-facing Section S178 through trough deposits in Sondage B, showing the location of micromorphology sample SA6122.

wall. Erosion of the mud-plaster surface of the post pipe exposed remains of stone packing used in its construction. North of post pipe (1217) there is evidence for either remodelling, or a second stage of the initial construction of the surface (1253) of the upper bench, which included forming a post pipe at its northern end containing light orange silt (1259).

The upper tier of the benches (354=390=1826=1821) runs around the western side of the structure from the middle of the first tier of benches (Figure 38.42). Although eroded, the bench surface showed evidence of being divided into multiple bays by at least three narrow mud-plaster partitions perpendicular to the inner edge of the bench. Two of these were located at the southern part of the bench forming bays with mud-plaster floors (1826) and (1821). The third partition was located at the northwest side of the bench and was part of a T-shaped arrangement of two eroded partitions and post pipe (1251), which was located at their meeting point. These partitions might have formed two more bays at the point where the upper bench was protruding inwards. The mud plaster of bench surface (354=390=1821=1826) continues over the inner face of wall (543=541).

Within the outer wall (541=543) at the northwest apex of Structure O75 there were rubble and mud-plaster wall segments (557), (563) and (383=389), coming from either a low (surviving to *c.* 0.10 m) wall, or the face of a third tier of the structure (Figure 38.43A). These had patches of a mud-plaster coating (562), (564) and (392=393) facing the interior of Structure O75, while the other side was poorly defined by stone rubble (Figure 38.43B). The area between the wall segments (557), (563) and (383=389) and the outer wall of O75

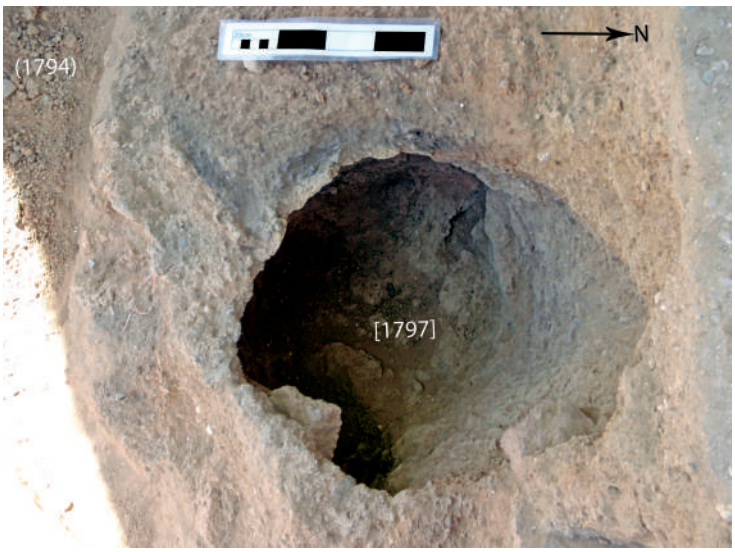


Figure 38.33 Excavated post pipe [1797] located within a loose pisé block found in fill (1794). Scale 0.2 m.

Figure 38.34 Overhead photo of Structure O75 from the east-southeast. Scales 2.0 m.

Figure 38.35 Overhead view of Structure O75 from the west-northwest. Scales 2.0 m.

(541=543) contained pisé rubble (391). Differing construction of the opposing faces of these walls indicates that they were built against soft core material to their north and northwest, respectively, with their rubble side pushed into the core sediment, while their plastered exterior faced the interior of Structure O75. This suggests that the wall segments and the pisé rubble (391) are the remnants of a raised platform, at the apex of the structure, positioned on the second tier bench.

Post pipes in the walls and benches of Structure O75

The walls and surfaces of O75 had been moulded to create at least seven post pipes (Figures 38.3, 38.21), these having fills (1790), (693), (750), (1259), (1217), (1251), (1793). A further post pipe may have been destroyed by a cut [1247] in Stratigraphic Block 3, possibly made to retrieve the post. The positioning of post pipes (1217), (1259), (750), (693) and (1790) along the face of the second tier bench of the structure, (1251) in front of the third tier platform and (1793) and [1247] at the meeting points of the benches with the outer wall, creates an internal oval arrangement that corresponds very well to the overall shape of Structure O75. Most of the post pipes appear to have gradually silted up. For example, the fill (1790) of the post pipe at the junction of Structures O75 and O68 was silt with charcoal, likely to have derived from the burning event described in Stratigraphic Block 2. A similar fill (1793) was excavated from the post pipe to the south of the structure where the lower bench (713) meets the outer wall (541=543). Post pipe fill (1251), loose ashy silt with frequent charcoal, was set at the meeting point of two raised partitions in surface (354=390) of the upper tier bench. The lower part of the post pipe containing silt fill (1217) was fully encased in the mud-plaster face of the upper bench (354=390=1821=1826). The upper part of this post pipe, which was only partially enclosed, where the post would have protruded though the front of the wall, was filled with infill (1213=1214) (Stratigraphic Block 2) showing that the post had been removed, or rotted away, before the deposits started to accumulate.

Two of the post pipes appear to have been deliberately filled with items of special significance. A fox skull (SF 1299) was recovered from within the fill (693) of a partially broken post pipe (Figure 38.44). It seems unlikely that this was an accidental inclusion as it was the only large fragment of bone within the fill. A broken stone bowl (SF1600) and stone slab (SF1602) sealed the fill (750) of

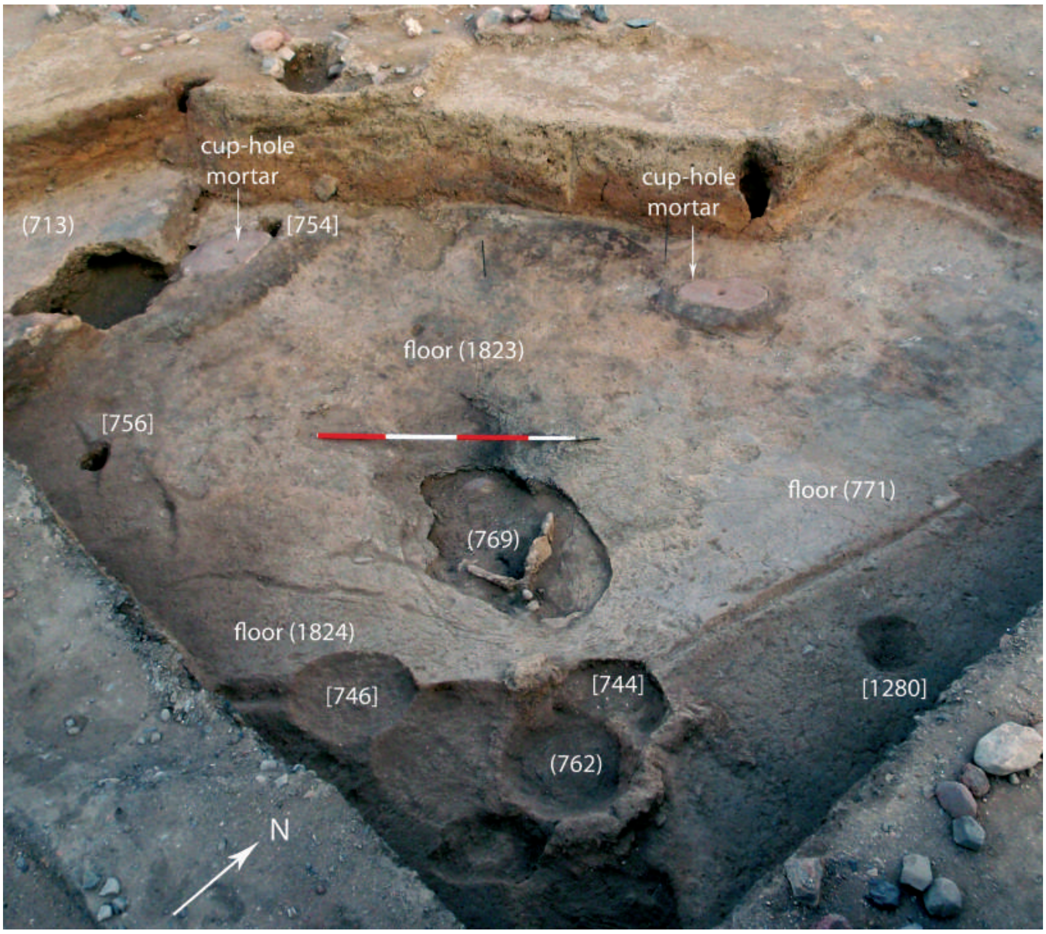


Figure 38.36 Area of possible floor resurfacing/repair (1823) stretching from hearth (762) in the foreground towards cup-hole mortars set in slightly raised blackened platforms. Scale 2.0 m.

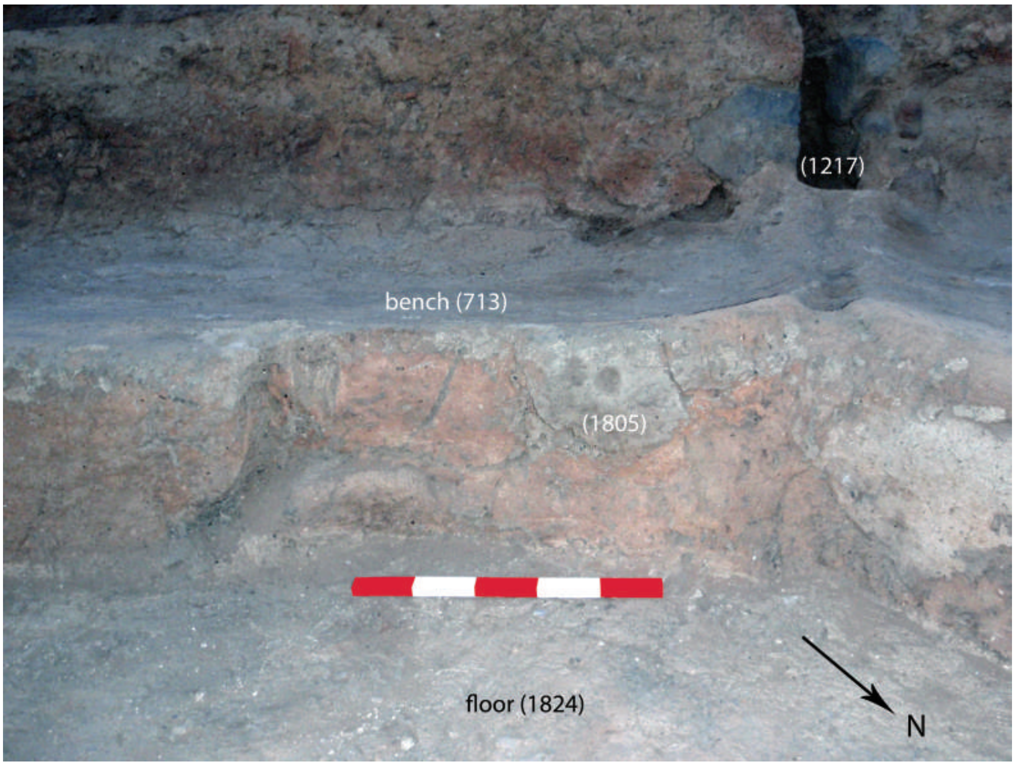


Figure 38.37 Moulded circular decoration on mud plaster (1805) on bench face (713). Scale 0.5 m.

Figure 38.38 Wavy lines in mud plaster (1806) on bench face (713). Scale 0.5 m.

the post pipe located where the lower platform meets the outer wall (Figure 38.45).

The raised gullies

There are several features built into the surface of Structure O75 that spatially relate to the central 'trough'. On each side of the trough there are three, approximately parallel, raised gullies running between the trough and the benches (Figures 38.3, 38.21 and 38.46), forming a pattern resonant with that incised on a stone object (SF2193) recovered from within Midden O60 (Figure 37.5). Each pair of raised gullies would have met the trough opposite one another. As with the term 'trough', the term 'gully' is potentially misleading, these being purely descriptive terms rather than implying any function. These raised gullies are raised moulded features in the plaster floor

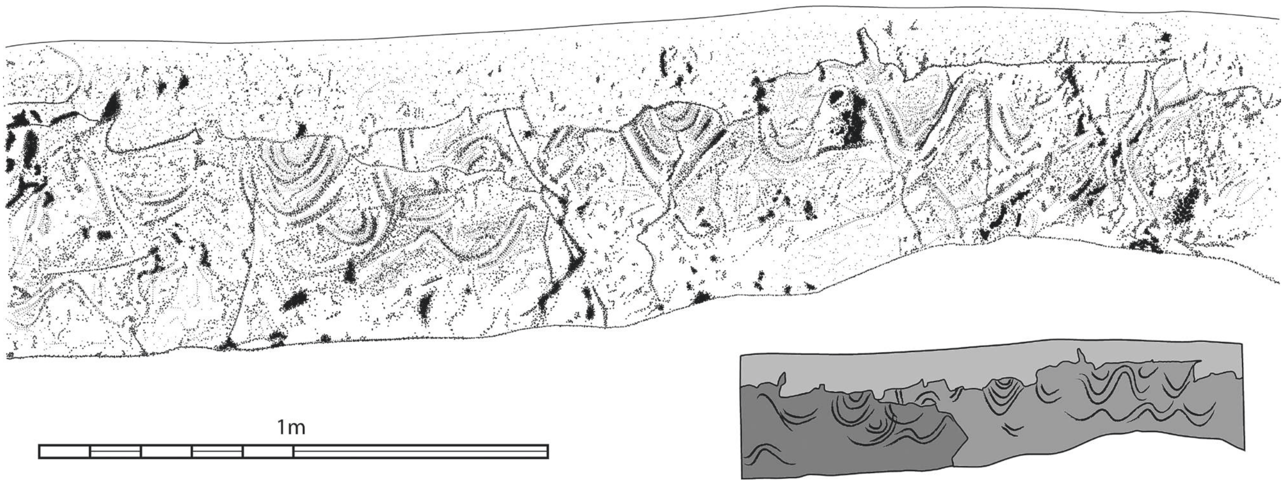


Figure 38.39 Drawing of wavy line decoration on bench face (713) and the schematic representation of the overlapping layers of plaster.

(771=1824=1827=1798). Most have a central groove that led to these features being described as gullies, although a few have no such groove, and in at least one case the groove has been filled with mud plaster (1808), (Figure 38.47A). Traces of red pigment have been found on the mud-plaster surface along the base of one of the gullies (Figure 38.47B).

The raised gullies have a slight concave form lengthways, their lowest point being the location for shallow pit [1271], [1273], [1275] and [1282] (Figure 38.42). These shallow (< 0.2 m) pits in the centre of each gully contained traces of mud-plaster mouldings that appear to have secured posts. Although these pits are likely to have been dug to remove the posts, such posts could not

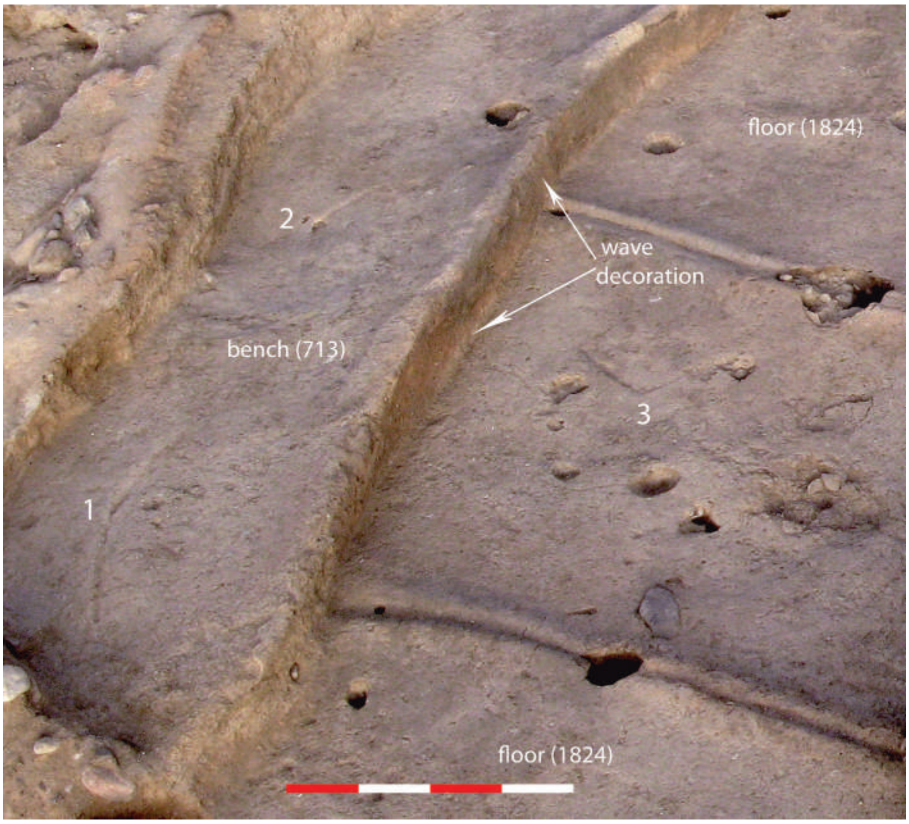


Figure 38.40 View of the southeast part of lower bench (713) and adjacent floor surface (1824) showing three crescentic grooves (1–3) with centrally positioned stones and the location of the wavy decoration in Figures 38.38 and 38.39. Scale 2.0 m.

have been deeply embedded into the floor. Excavation was unable to expose where the raised gullies converged with the trough, because of the position of the later Structure O100 and the sequence of hearths (Stratigraphic Block 3) that truncated the northwestern pair of the raised gullies and were sealing the northwest part of the trough. A similar single raised gully feature is found on the lower bench (713) running from, but not joining, post pipe (1217) (Figure 38.41). The shape of this gully is also concave. The westernmost gully bifurcates into two moulded ridges to the southwest and northwest of pit [1271], these both run to the vertical face of bench (713), (Figure 38.48).

Cup-hole mortars and other features

Figures 38.3 and 38.21 show all the postholes and moulded post features positioned on the main mud-plaster floor of Structure O75 (771=1824=1827=1798) which were exposed below the infill deposits of Stratigraphic Block 2. These included a mud-plaster moulded ring (1297) forming a hearth, with its base being the floor, filled with a sandy silt containing charcoal concentrations (1296) (Figure 38.49). A re-plastered lip of mud plaster (1781) on floor (771) looks like it may have supported a post. An arrangement of two flat stones (1779) set into the floor (1824) by additional mud-plaster moulding (1780) was not excavated, but may represent a post-pad.

Within the area of re-plastering (1823) of the surface in the northwestern part of Structure O75, two stone cup-hole mortars with flat surfaces, measuring 0.75 m x 0.50 m and 0.72 m x 0.45 m, were set into the surface, one on either side of the trough alignment. These were both set within raised and blackened areas of floor surface (Figure 38.50).

An extensive sampling programme was undertaken across the floor and this may provide some indication as to differing uses within the different segments of the structure.

Stratigraphic Block 5 — Early phases and construction

Construction of the walls and benches of Structure O75

Although Structure O75 has, for the most part, only been excavated down to its latest phase of use, the evidence gained from a sondage, archaic truncations and erosion, provide some evidence for the methods and materials used in its construction. In stratigraphic terms, the mud plaster that constitutes the floor (771=1824=1827) and the faces and surfaces of the trough (1798) and benches (713), (354=390=1821=1826), represents a single phase, albeit one with areas of renewal and repair. There are some breaks through the latest floor surface (771=1824=1827) where it can be seen to lie directly over an earlier floor. In other areas, a compact clay and stone makeup layer supported this final floor surface.

Figure 38.41 Post pipe (1217) moulded into the face of the Tier 2 bench (354=390=1821=1826) of Structure O75, showing raised moulded 'gully' in the Tier 1 bench (713). Scale 0.5 m.

Figure 38.42 The two tiers of benches along the south and west sides of O75, also showing the shallow 'ragged edged' pits located at the middle of the raised gullies.

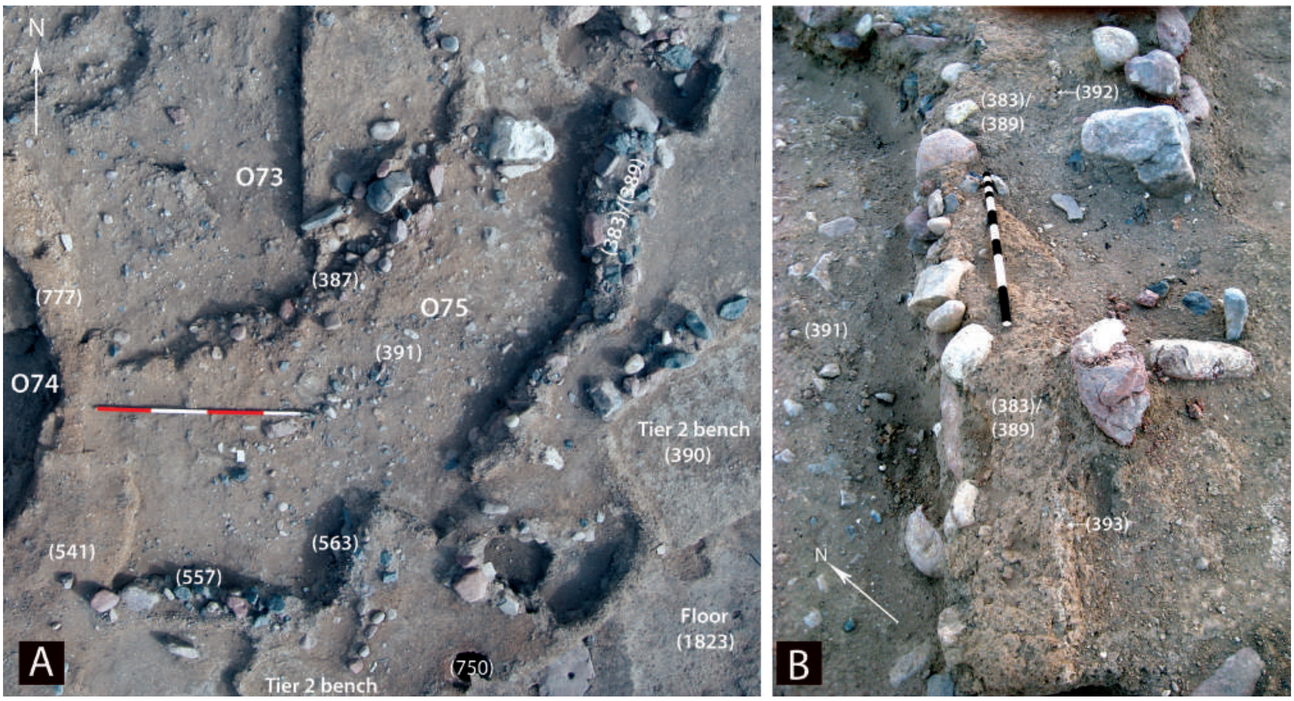


Figure 38.43 A — Aerial view of eroded platform walls (557), (563) and (383=389) butting against pisé rubble (391) at the northwest apex of Structure O75. Scale 2.0 m. B — Detail of retaining wall (383=389) from the southwest showing mud coating (392=393) on the southeast face of the wall and rough rubble construction on the opposite side of the wall. Scale 0.5 m.

The vertical face of the lower bench (713) is a layer of mud plaster (*c.* 0.02 m thick) over core material. Both benches were truncated by Antique Burial O118 (O99, Chapter 6) revealing that the core material of the lower bench is constructed from large boulders up to 0.50 m in size. These large boulders were covered with pisé prior to being plastered to form the bench surface (Figure 38.51).

Similar construction techniques were applied to the trough feature, as seen where the edge of the feature had eroded, exposing stones (1830) set into pisé and then plastered. As with the edges of the benches, the edge of the surface leading into the trough was raised so that it formed a raised rim with a rounded break of slope. Even with the wall having been eroded by an indeterminate amount, there is still a 2.40 m difference in height between the top of the outer wall and the base of the trough.

The fills of the post pipes within the outer wall could not be excavated down to the bases because of their depth and small diameter. This suggests that the posts around which the mud plaster of the wall was moulded were set very deep, in contrast to the ones in the floor.

Where the upper tier of the benches (354=390=1821=1826) runs around the western side of the structure, the higher level of the surface of the upper bench means that it has suffered more erosion in the western part of the structure. As a result of the erosion, part of the benches' interior, the make-up foundation layer (355) for the bench surface, was exposed and shown to be a compact mixed deposit containing silty sand, pisé lumps, sub-angular gravel, charcoal, animal bone and snail shell fragments.

Excavation of Sondage C through the latest floors of Structure O75

In the northwest of Structure O75, where the floor was less well preserved, a sondage measuring 2.50 m x 1.30 m on the projected line of the trough, was excavated (Figure 38.52). The floor in this area had cracked to form a hexagonal shape that retained moisture that potentially derived from features below (Figure 38.53). The mud-plaster floor patch (1823) was removed within the limits of the sondage, exposing a sequence of laminated floor deposits (1795). Four laminations were readily visible within (1795) and a micromorphology block was taken to examine this in more detail (SA6550). It is unclear whether any of the laminations that comprise (1795) equate to previously identified floor surfaces (771=1824=1827). Removal of the plastered surfaces (1795) exposed further patchy and burnt floor surfaces: (1796) in the southern part of the sondage and (1847) in the northern part of the sondage. There was also a cut [1810] filled with silt (1809). Below the surface (1796) there was a shallow cut [1818] filled by (1817), an additional silt deposit (1802), and a small stake hole [1800], 0.05 m x 0.05 m deep, filled with a yellow sandy silt (1799). Stake hole [1800] and pit [1810] were both cut into underlying sandy silt fills (1803=1811), which lay over plaster surfaces (1814)

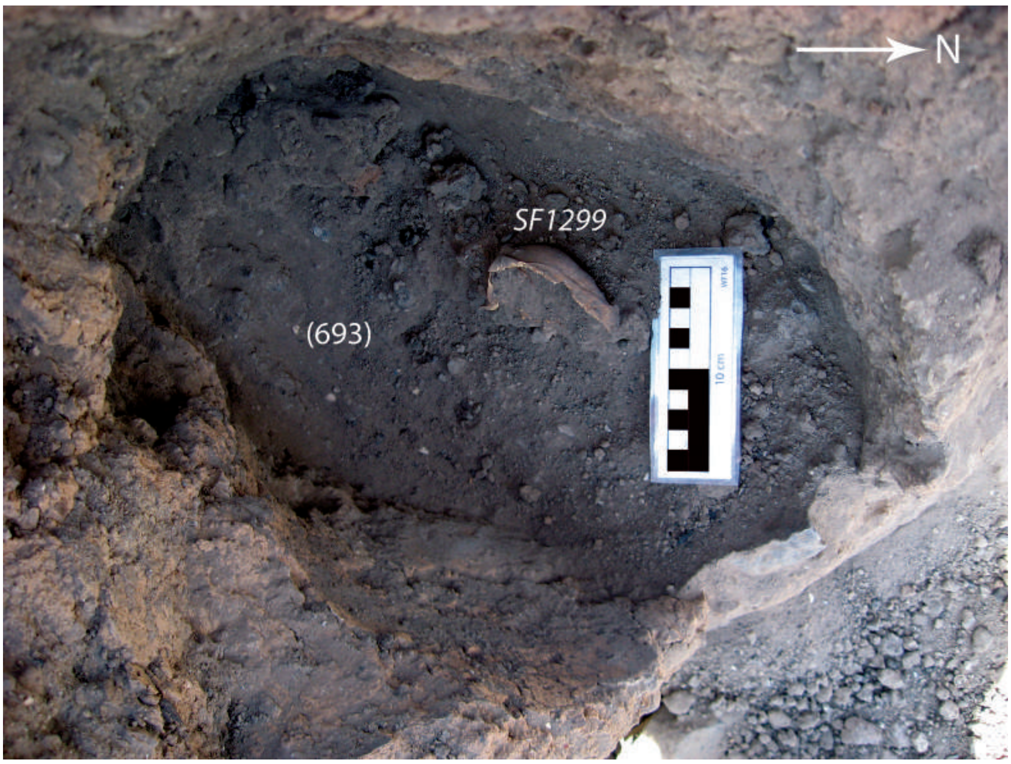


Figure 38.44 Fox skull, SF1299, in the infill (693) of post pipe moulded into the face of Tier 2 bench at the northwest side of the structure. Scale 0.1 m.

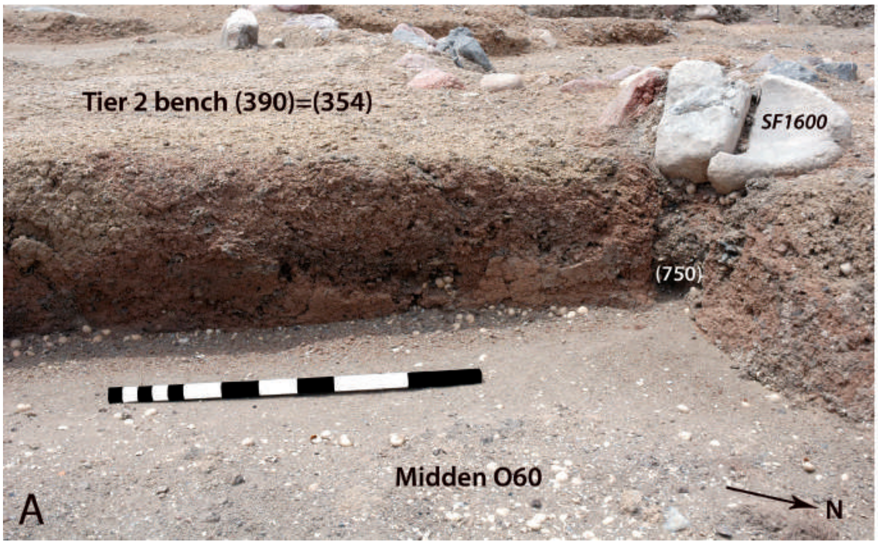


Figure 38.45 A — Stone bowl fragment SF1600 and stone slab sealing the infill (750) of a post pipe, scale 0.5 m; B — post pipe (750) under excavation showing burnt mud-plaster sides inside the post pipe, scale 0.2 m.

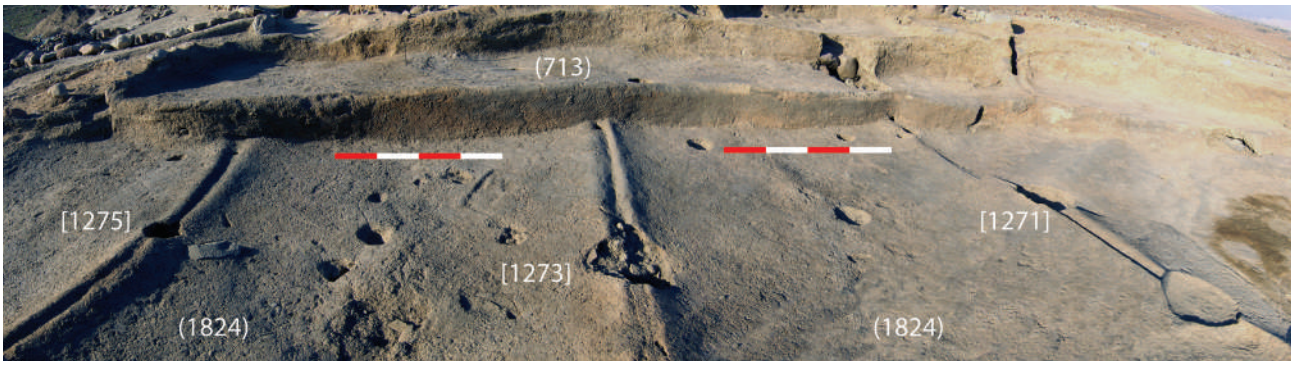


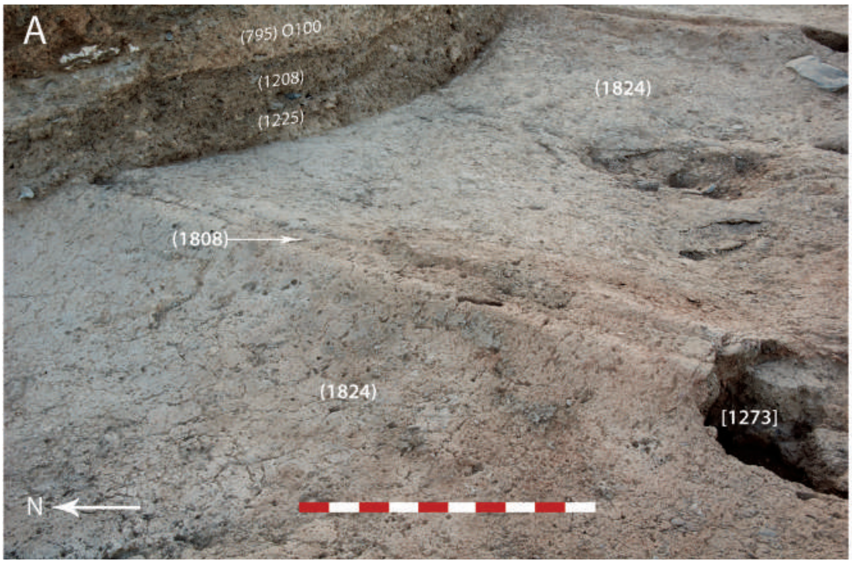
Figure 38.46 Three raised gullies moulded in mud-plaster floor surface (1824) of Structure O75, meeting the Tier 1 bench (713) and showing post-removal hollows [1275], [1273] and [1271] at their mid points. Scales 2.0 m.

and (1815) that were concave, blackened and appeared to form a surface of a basin cut through and divided by the trough [1846] (Figures 38.54, 38.55).

The fill (1803=1811) of the basin contained a number of broken stone bowl fragments, including SF2540 and SF2541 (Figures 38.55 and 38.56). Pit [1818] cut through the basin surface (1815) and into an underlying surface (1820), which was made of a compact silty clay. The black mud-plaster surface (1815) was directly over silty clay (1820), while (1814) was above surface (1816), which may represent the same context as (1820) on the other side of the trough. Surface (1819) exposed by cut [1818] formed an earlier surface within the centre of Structure O75, which was barely exposed in the sondage. Also below (1803=1811) was friable silt (1812) that filled the trough area. Overall, the sondage excavation demonstrated that there is a complex stratigraphic sequence below the main exposed floor of Structure O75 and highlights the need for further excavation.

38.3 Structure O68

Structure O68 is located below Midden O60 just inside the northeastern corner of the trench, with its eastern part extending outside the trench limits (Figure 38.1). It was defined by walls (1807) and (399) to form a sub-rectangular space approximately 4.0 m x 2.0 m with an internal dividing wall (Figures 38.57, 38.58). Sandy silt (398) covered the western part of Structure O68, which was not excavated. The interior deposits in the eastern part of the structure consisted of pisé and midden deposit (686) overlying midden (689) and pisé rubble (692), with no sign of any floor horizons (Figure 38.59). Wall (399), still standing up to *c.* 0.35 m, was formed of large stones (up to 0.55 m in diameter) and pisé. This may be a continuation of walls (563) and (383=389), which run along the northern edge of the excavation and which might be a truncated segment of the perimeter wall (543=541)



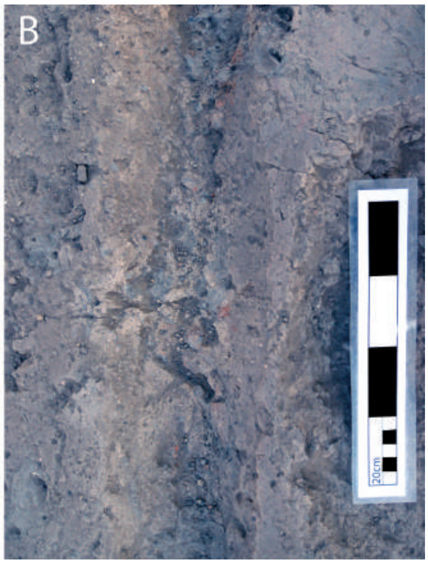


Figure 38.47 A — Mud-plaster infilling (1808) inside one of the raised gullies, changing the gully into a raised ridge, also showing wall (795) of later Structure O100 above the initial infill of Structure O75 (1225) and (1208), scale 1.0 m; B — Base of the northernmost gully in surface (771) showing traces of red pigment, scale 0.2 m.

of Structure O75. Wall (1807) was on the same alignment as the face of bench (354=390 =1821=1826). Unlike that face, it had no signs of burning, suggesting it was a later addition, separating Structure O68 from Structure O75, or a repair. The stratigraphic relationship of wall (1807) with pisé deposit (1831) is similarly ambiguous, but we note that (354=390), (1807) and (1831) are contiguous.

38.4 Sedimentary and micro-stratigraphic assessment

Seven sediment samples were analysed from Structure O75: four were from the surrounding wall (541=543); two were from the mud-plaster floor (771); and one is from the mud-plaster surface on lower bench (713). Data, results and interpretation are provided in Chapter 41.

Block sample SA6550

This block sample was taken from a section through contexts (1795) and (1847) (Figures 38.56 and 38.60) created by the sondage cut into the northwestern area of floor of O75. Analysis resulted in the block being split into 13 separate units (Table 38.4; Figure 38.60). The burnt horizon (1847), which appeared to be a single layer during excavation, was shown to be a series of micro-layers, appearing to consist of multiple 'crusts' within the layer itself (Figure 38.61). Seven of the identified units are classified as plaster layers, mainly floors and six are classified as occupation, or accumulation, layers. Some of the 'floor' layers are extremely thin and appear to be a thin 'wash' of re-plastering events. The pattern alternates for most of the sample between floor and occupation/accumulation.

Block sample SA6122

This block was taken through the laminated deposits (1292) exposed within the trough of Structure O75 by central Sondage B (Figures 38.32 and 38.62). Analysis split the block into 11 units (Table 38.5; Figure 38.62). Six of these are occupation/accumulation deposits, of which two appear to be water-laid, one is dominated by quartz sand, and two units consist primarily of pisé/plaster. The units contained pseudomorphic voids from plant temper, charred material, ash and parallel shell fragments within well-sorted silt embedded in a clay matrix coming from one of this pise/plaster units. The majority of units within this block have high frequencies of charcoal, and the uppermost units also have high frequencies of shell. Much of the charred material is degraded; there are numerous areas of ash and indications of bioturbation (Figures 38.63, 38.64).

38.5 Chipped stone

The sample examined (n=1559 pieces) includes material from four out of the 57 contexts with chipped stone in Structure O75. By weight, the sample (3055 g) constitutes *c.* 4% of the bulk find chipped stone from this structure. The composition of the sampled assemblage is provided in Chapter 39.11.

38.6 Radiocarbon dates

Four samples were selected for radiocarbon dating from contexts within O75 (Table 38.6). The analysis

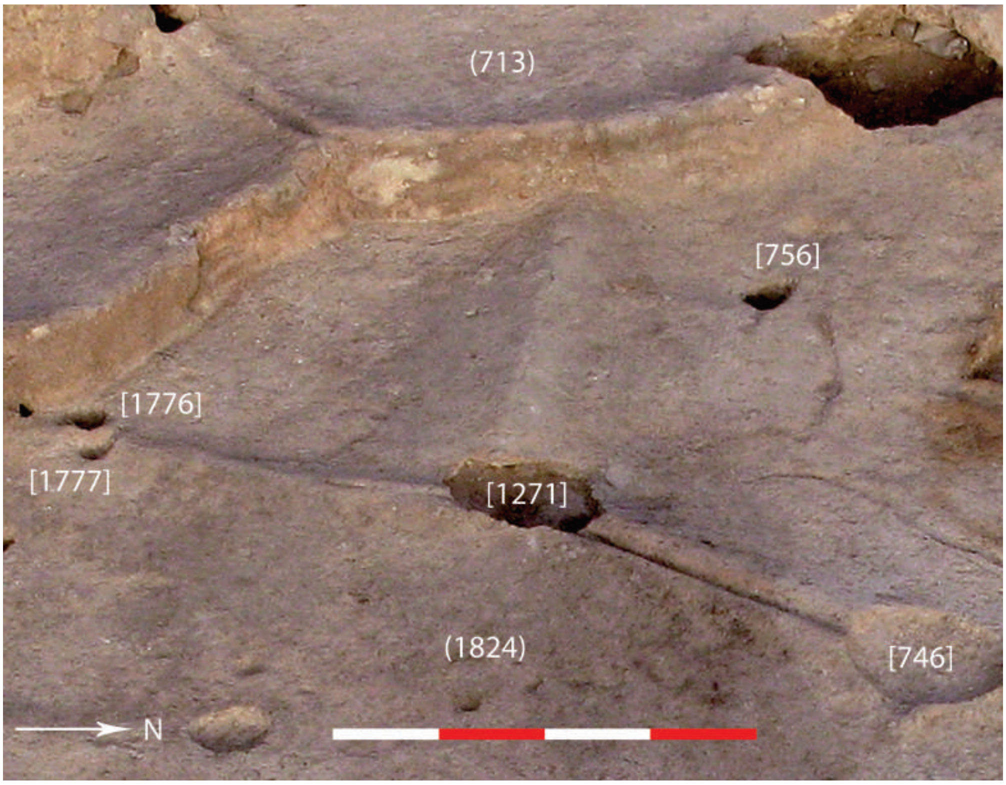


Figure 38.48 Westernmost raised gully in mud-plaster floor (771=1824=1827=1798) bifurcating into two ridges at the point where post removal hole [1271] truncates them. Scale 2.0 m.

Figure 38.49 Mud-plaster hearth lining (1297) from the southeast showing raised gullies, hearths and floor subsidence into the capped trough in the background. Scale 1.0 m.

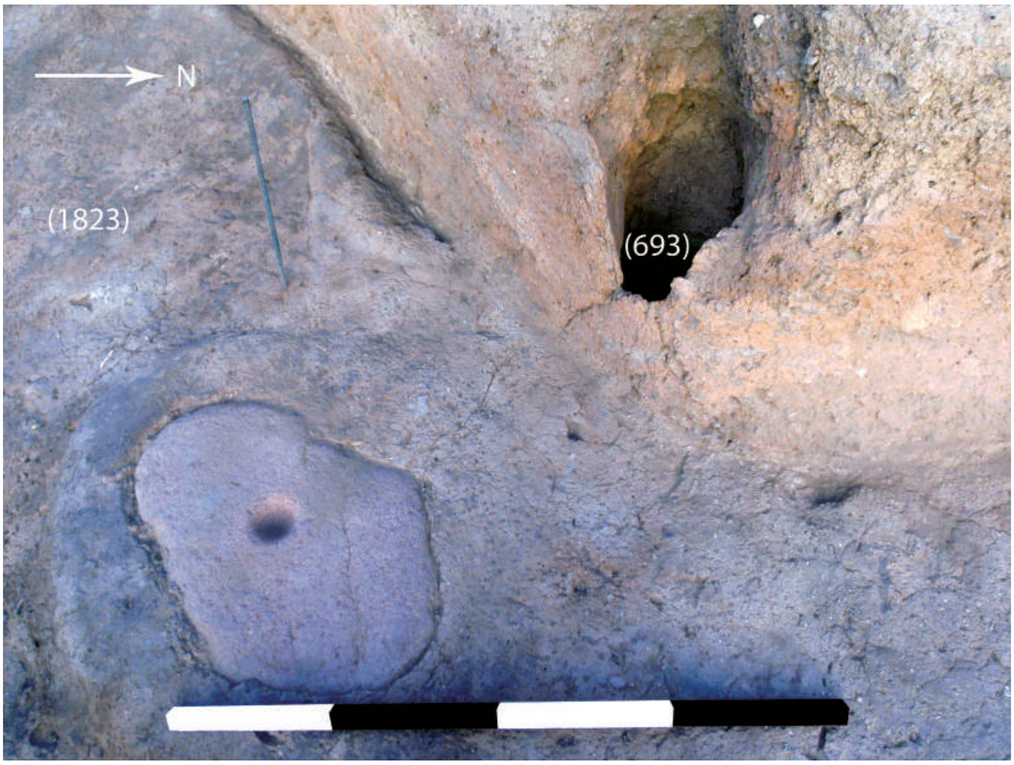


Figure 38.50 Cup-hole mortar in the northwestern part of Structure O75 showing, raised and blackened area of mud plaster in floor (1823) around one side of the mortar, and heat affected pisé surrounding post pipe (693) in the background. Scale 1.0 m.

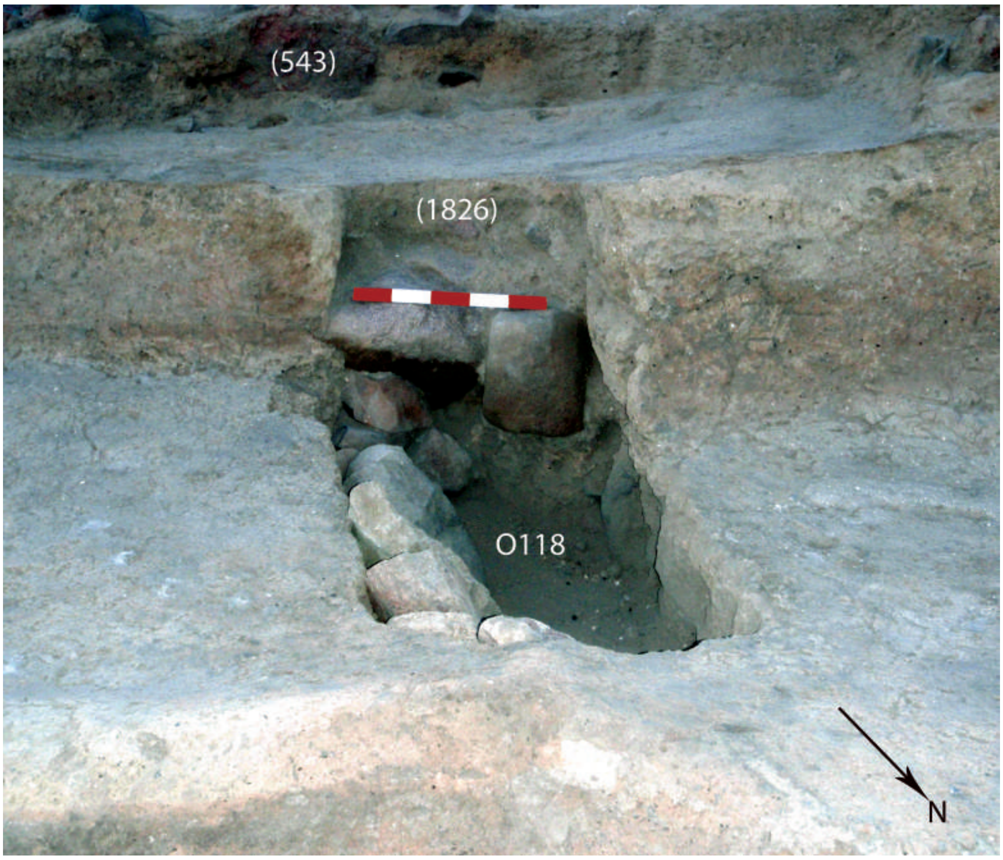


Figure 38.51 View of Antique Burial O118 showing large boulders built into the foundation of the Tier 2 bench (1826) seen at the back of the burial cut supporting the photo scale (0.5 m). The smaller stones in the foreground are part of the burial furnishing (see Chapter 6).

of these dates, with calibrated values, Bayesian model and chronological interpretation is provided in Chapter 40.5 (Tables 40.1, 40.2, 40.3; Figure 40.22).

In summary, the sum (SCPD) of a chronological model suggests a series of pulses of activity associated with the use of O75. Good agreement index values for the sequence of dates indicates that Beta-290711 and Beta-271680 are coherently stratified, suggesting — provided there are no old wood effects and sample re-deposition — that sediment within the trough (1767) accumulated sometime between *11.39–11.19 ka cal BP* and the wood burned within the hearth (747) *c.* 650 years later (Table 40.2).

We note that the isotope ratios for Beta-271680 are enriched with respect to $\delta^{13}C$ (-11.6‰), providing similar values to those recorded for Beta-253733 used to date Structure O33. As further considered in Chapter 40, this might be caused by the Salicaceae tree/shrub having grown in a localised area of aridity, or reflect contamination of the sample from fulvic and humic acids from the surrounding matrix.

Beta-271681 (757) returned a date statistically consistent with Beta-290711 (χ^2-test: df=1; T=1.1; 5% critical value=3.8) producing a calibrated combined date centred on 11.28 ka cal BP (Table 40.3). This provided the best estimate for the construction of the secondary floor and sediment accumulation within the trough of O75, especially as one of these samples (Beta-271681) came from twig wood, thus reducing the risk of an old wood effect. The remaining sample, Beta-290712, was derived from the fill of the trough (1803) as exposed via the sondage. This returned a date of *11.10–10.68 ka cal BP*, falling between the construction of O75 and the date of wood burned within the hearth dated by Beta-271680.

Posterior density estimates for the lower boundary, marking the start of activity associated with the use of this area, fall at *12.78–11.23 ka cal BP*, with the upper boundary suggesting this had ceased by *9.26 ka cal BP* (Table 40.2). We note, however, that O75 is stratigraphically below O100, for which we have two statistically consistent dates centred on 11.20 ka cal BP, with posterior density estimates for the lower and upper boundaries bracketing this construction activity at *12.55–11.13 ka cal BP* and *11.25–9.78 ka cal BP* respectively. Consequently, we are satisfied that a relatively

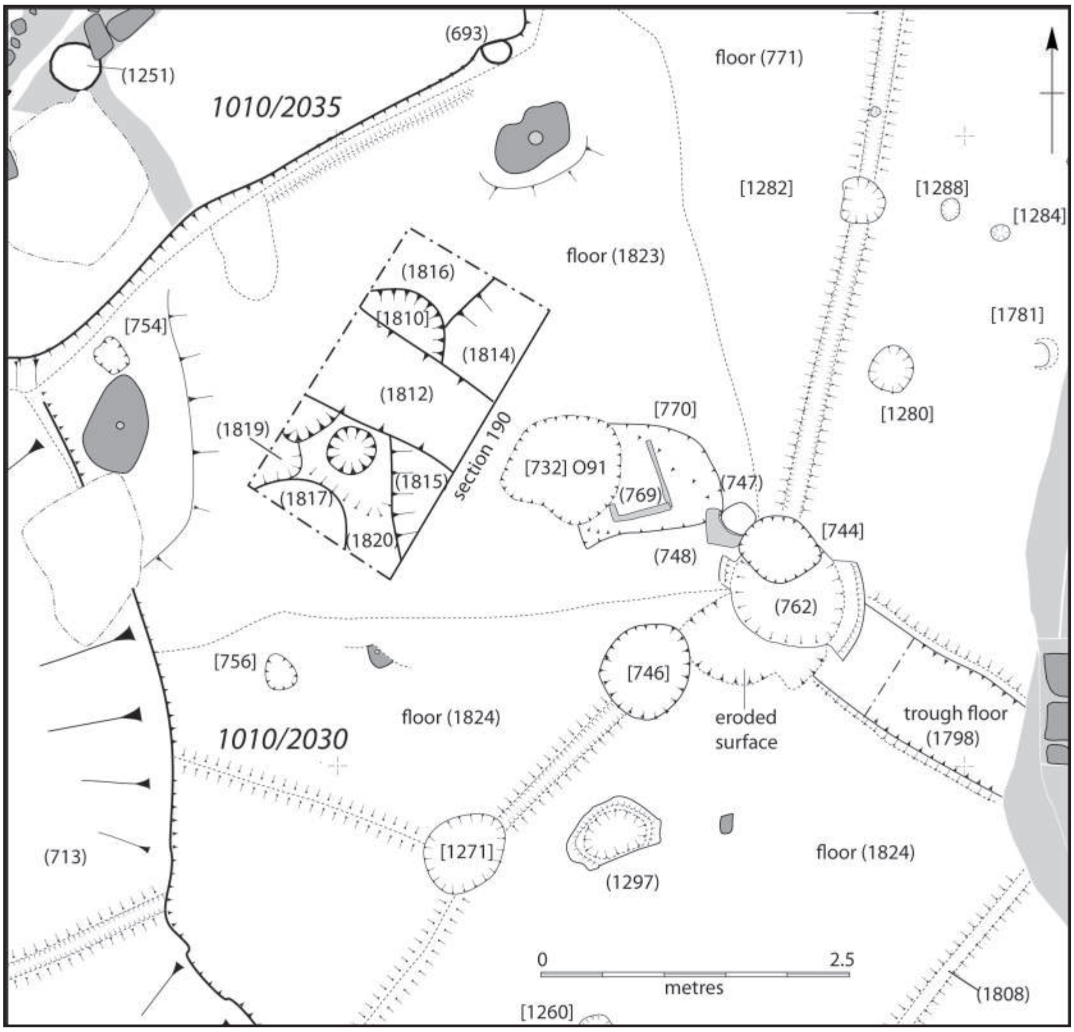


Figure 38.52 Multi-context plan of Sondage C in northwest of Structure O75.

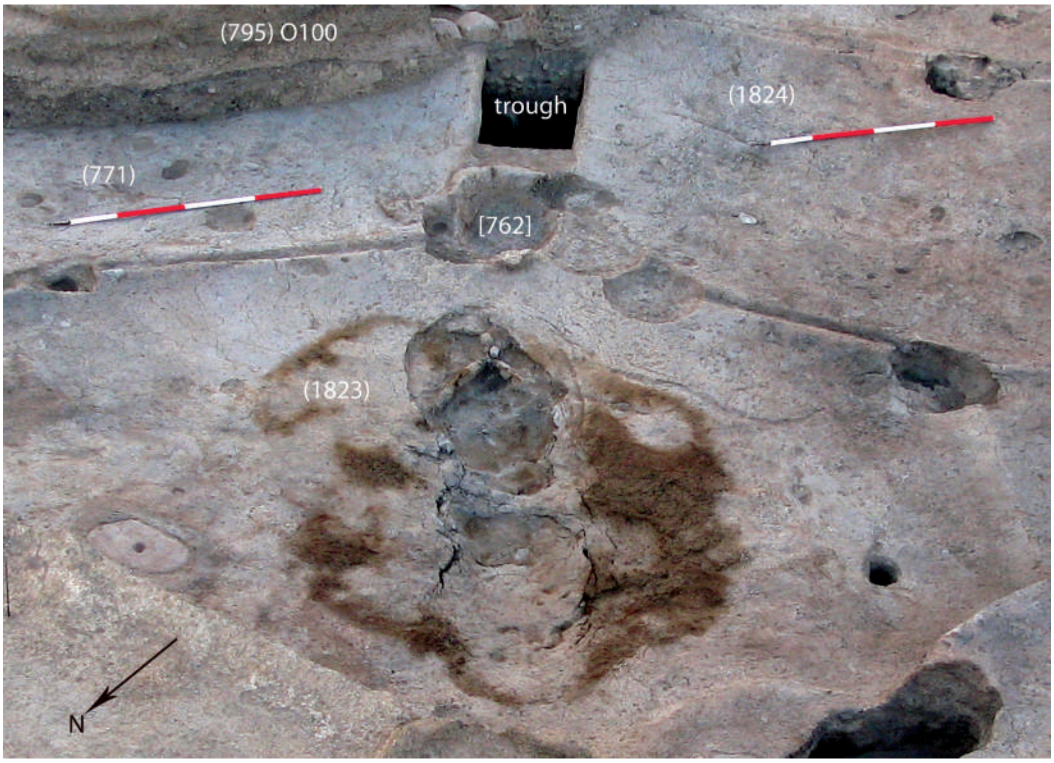


Figure 38.53 Cracking of floor surface (1823) in relation to the line of the trough lined with mud plaster (1798) contiguous with floor surfaces (771) and (1824) on either side. Also showing staining of mud-plaster surface (1823) in the form of a hexagonal shape that retained moisture. Scales 2.0 m.

Figure 38.54 Black plaster (1814) on base and side of probable basin feature truncated by trough cut [1846], which does not show evidence of having been lined with mud plaster. Scale 0.5 m.

short separation in time exists between the start of use of O75 with that of O100, as indicated by their stratigraphic relationship with one another.

38.7 Interpretation

Structure O75 is an impressive 20 m x 18 m structure, consisting of a mud-plaster floor with multiple surfaces surrounded by a bench over 1 m deep and up to 0.5 m high, part of which has a second tier of similar dimensions, with a probable platform at the northwest apex of the structure. Although some parts have been eroded and others remain concealed by a later PPNA building (Structure O100), the overall form appears clear. Our best estimate for the original construction of O75 is 11,320–11,240 cal BP (1σ), with activity resulting in the fill deposits of the troughs and hearths, constructed in O75, lasting for up to 800 years.

The sondage through the floor in the northwest part of the structure indicated a considerable complexity of deposits

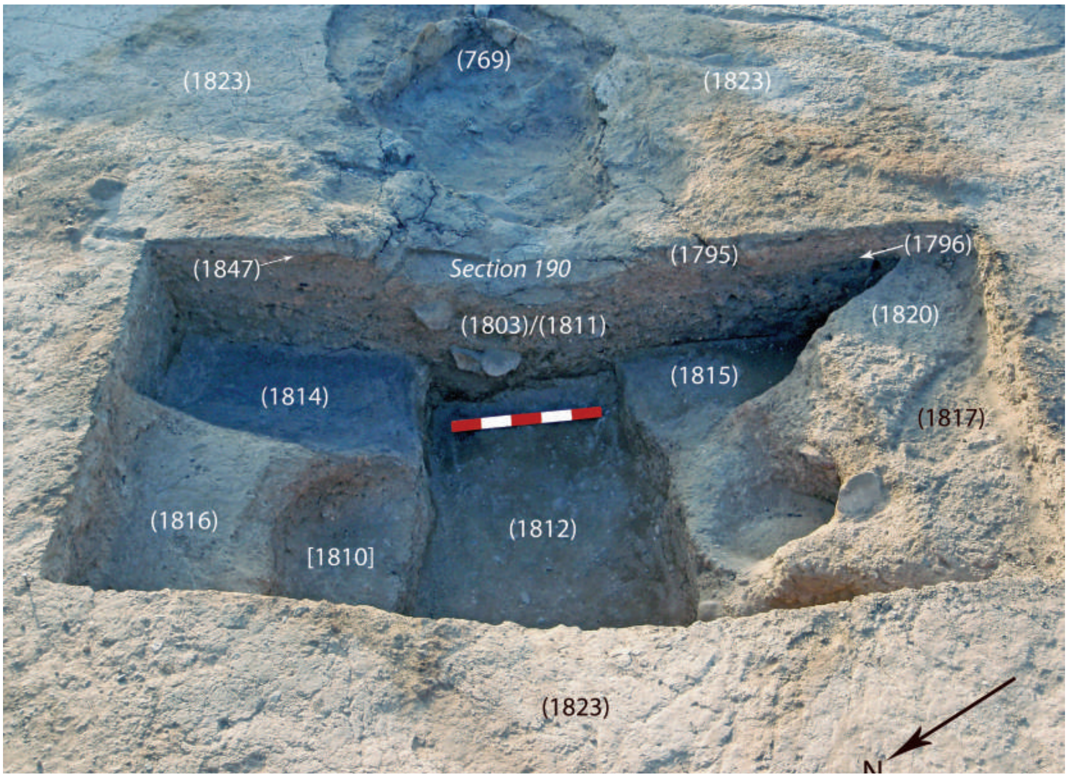


Figure 38.55 Sondage C in the northwest part of the central floor area of Structure O75 at the end of the excavation showing stone bowl fragments in deposit (1803=1811) visible in section. Scale 0.5 m.

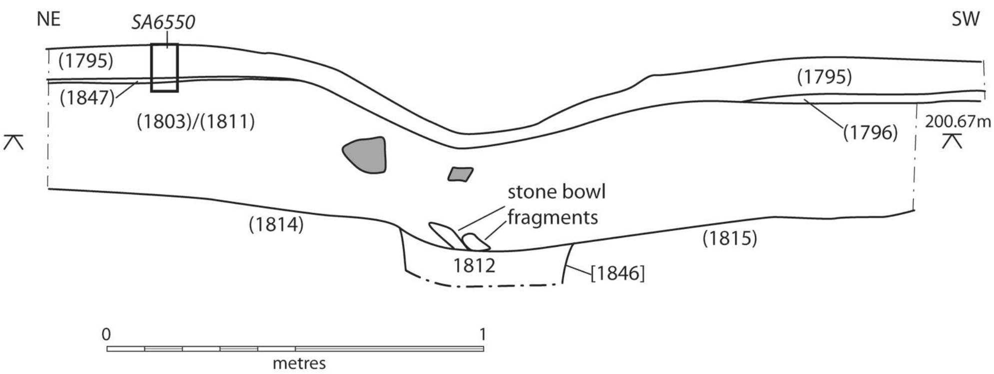


Figure 38.56 Northwest-facing Section S190 in Sondage C.

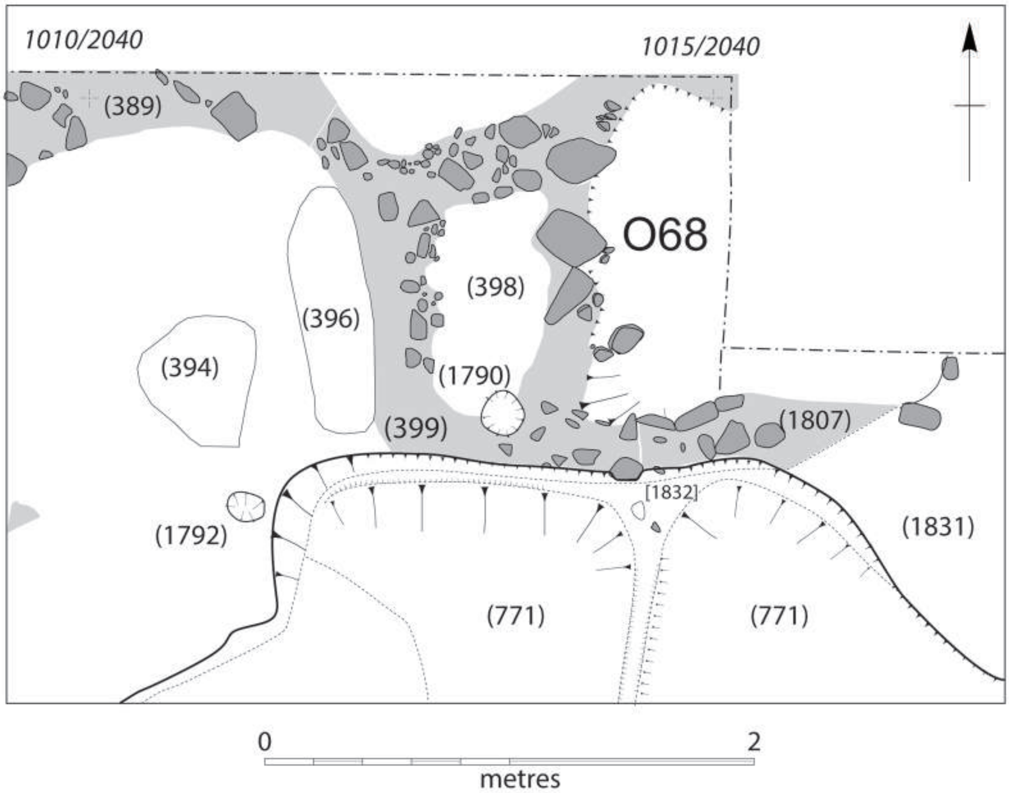


Figure 38.57 Plan of Structure O68 and the surrounding parts of Structure O75.

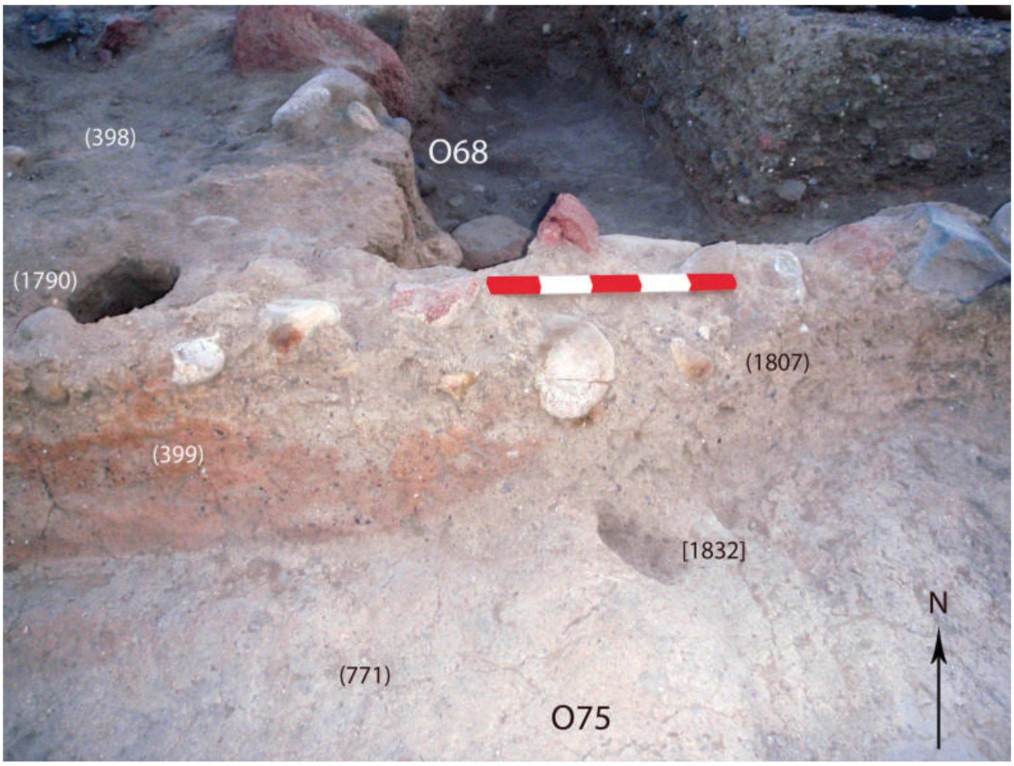


Figure 38.58 View of walls (399) and (1807) between Structures O68 and O75 showing burnt face of wall (399). Scale 0.5 m.

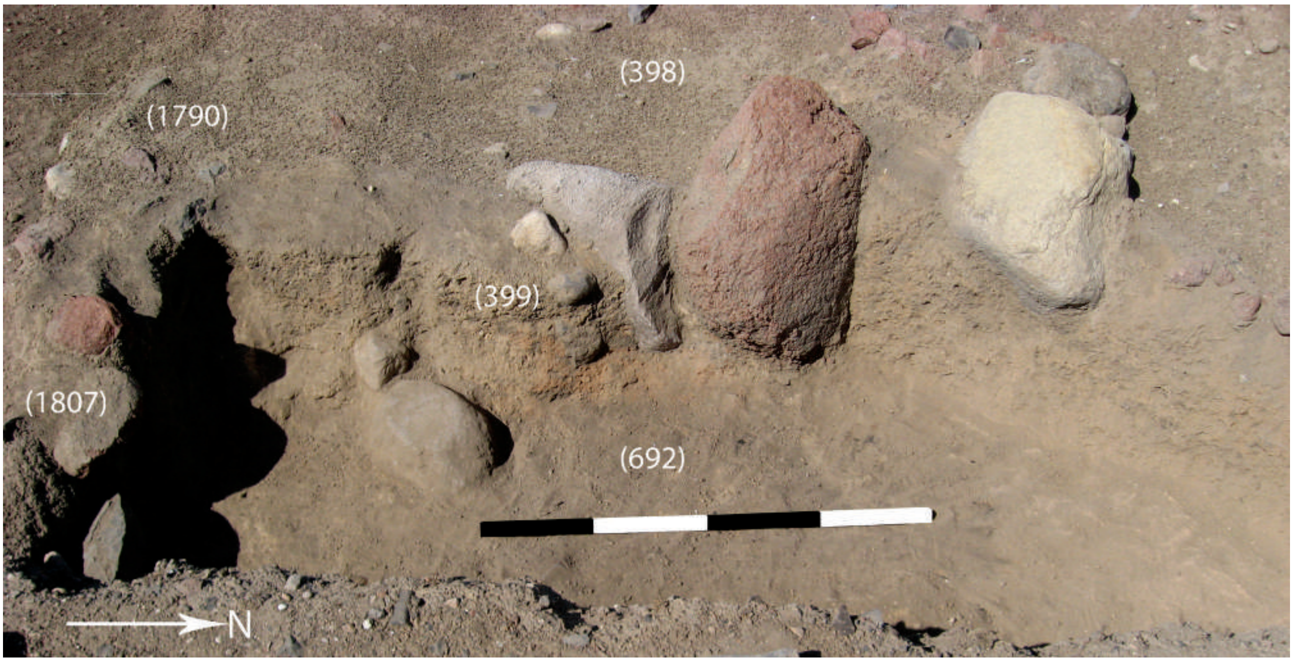


Figure 38.59 Eastern part of Structure O68 under excavation showing infilling deposit (692), large boulders used in construction of wall (399) and as yet unexcavated post pipe (1790). Scale 1.0 m.

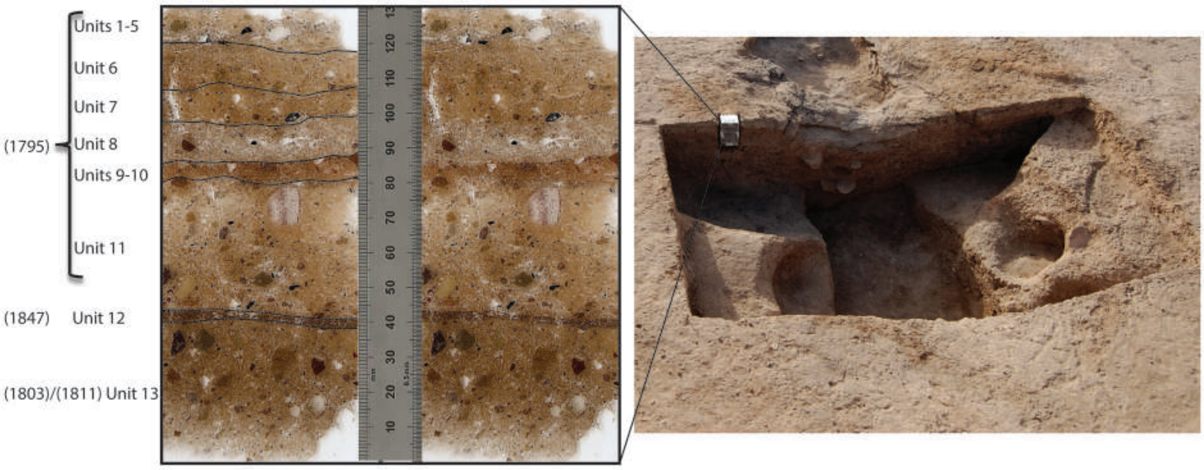


Figure 38.60 Block sample SA6550 during extraction in Sondage C and the corresponding thin section with interpretation.

prior to the creation of floor (1823), including a cut for an unlined trough on the same alignment as the lined trough further southeast, a basin with black plastered surfaces, numerous stone bowl fragments and a series of inter-cutting pits. The small size of the sondage prevents an adequate interpretation of these deposits: it remains unclear whether they derive from activity prior to the construction of floor (771=1824=1827=1798), the walls and platforms of O75, or that they were simply prior to the floor surface (1823) in this particular part of the central floor area.

There is a general bilateral symmetry to Structure O75 along an axis formed by the trough feature(s). Where fully excavated the trough was lined with mud plaster *c.* 0.75 m wide and 1.2 m deep. The micro-stratigraphic analysis of block sample SA6122 from the deposits within Sondage B showed a complex sequence of units, some of which are clearly water-laid, while most have high frequencies of charcoal and shell. These are most reasonably interpreted as the residues of material that had been washed into the trough from the floor of the structure, suggesting that at times the trough may have acted as a drain, although this may not have been its main purpose. The base of the trough was re-surfaced on at least couple of occasions, while its southeast end extends beyond the outer wall of Structure

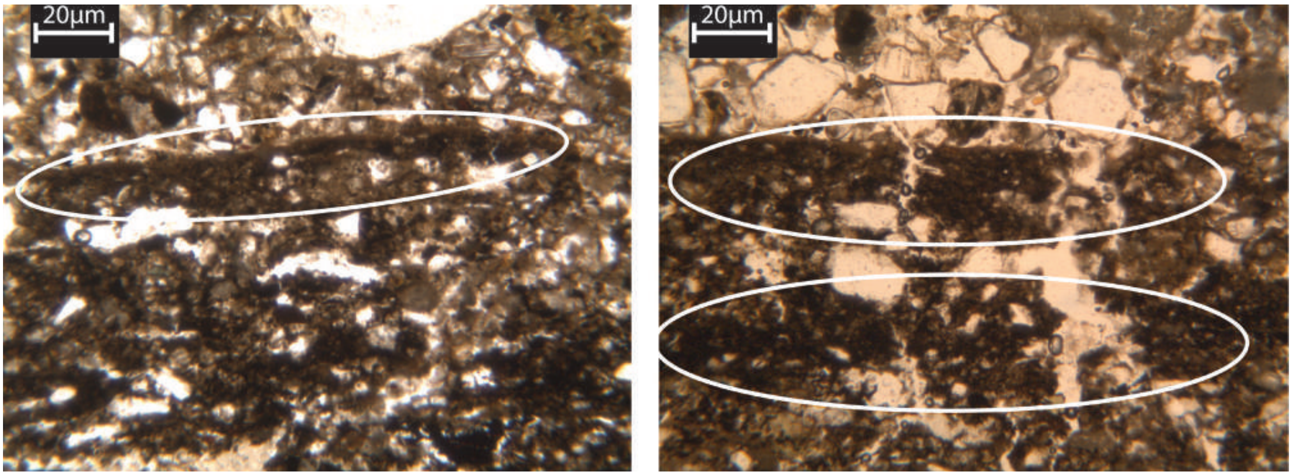


Figure 38.61 Microscopic images of multiple 'crusts' forming context (1847), Unit 12, within block sample SA6550.

O75. As such the trough could feasibly provide access in and out of the structure. However, quite how one might have accessed the trough itself remains unclear.

At the northwest end of the central floor area are cup-hole mortars, typical of the PPNA, set into slightly raised platforms on the floor. Three pairs of parallel raised gullies — smooth ridges with a central channel — are moulded into the floor, running from the edge of the benches to the central trough in a regularly spaced pattern. Each raised gulley has a small pit at its midway point from which it appears a large post has been removed, leaving a ragged hole. Although the raised gullies initially appeared to have been designed to carry liquids, they bow down in the centre of their course and the mud plaster is not stable when damp. Two of them are simply smooth ridges in the plaster floor, while the channel in a third has been deliberately filled with plaster, and the posts would also have blocked any flow.

The surrounding benches comprise a series of platforms above the main floor area, producing an amphitheatre-like form. The face of the lower bench on the southern side of the monument has been decorated with a wave pattern. There were multiple re-plastering events, indicating repair and modification of the structure: one of these covered the northwest end of the trough, leaving a part exposed but filled with rubble, plus a set of capra horns attached to a cranium prior to a hearth being moulded in the floor, into which a further set of capra horns was placed.

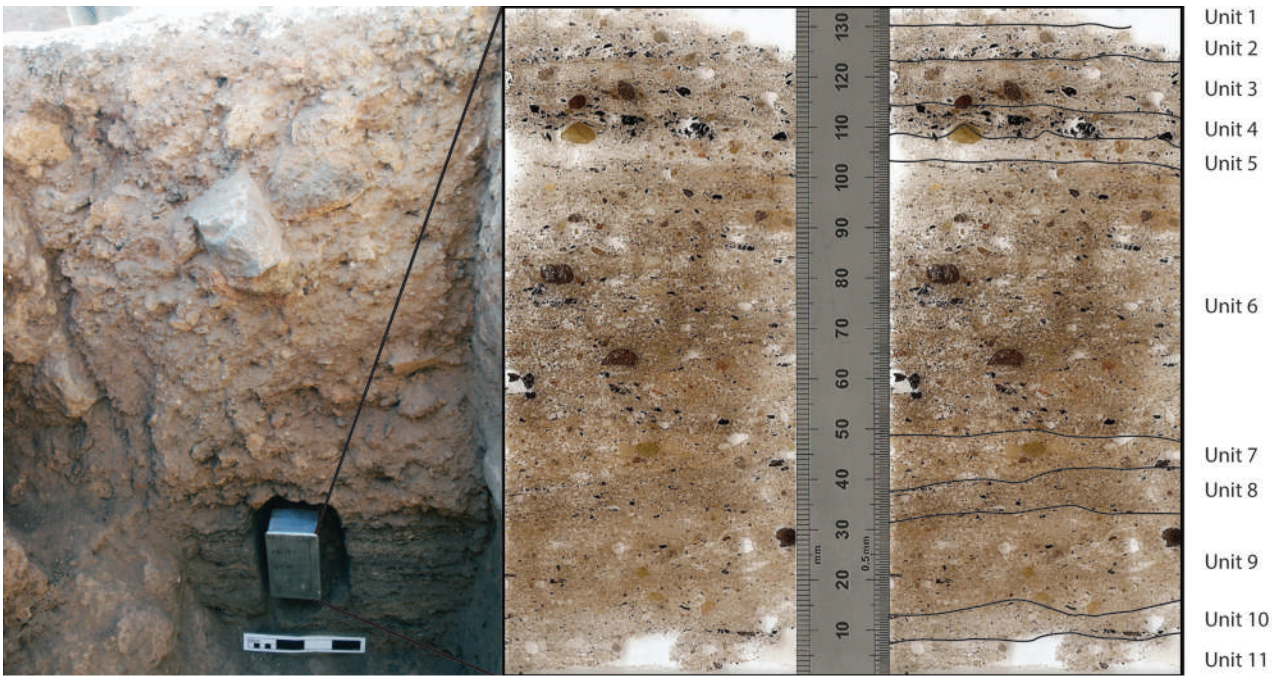


Figure 38.62 Block sample SA6122 during extraction in Sondage B (Section S178, Figure 38.32) and the corresponding thin section with interpretation. Photograph, scale 0.2 m.

Table 38.4 Unit descriptions within block sample SA6550.

Layer	Particle size/ sorting	Anthropogenic remains-Charred Material	Plant Impression	Shell	Plaster/Pisé type if applicable	Clean/Dirty	Other Comments
1	Silty clay	2–5%	10%		Plaster floor layer. Plaster/pisé type 3	Clean	Thin plaster floor or 'wash'
2	Silt loam	30–40%	<1%	<1%		Dirty	
3	Silty clay	2–5%	2–5%		Plaster floor layer, plaster/pisé 3	Clean	Thin plaster floor or 'wash'
4	Silty clay loam	20%	<1%	<1%		Dirty	
5	Silty clay	<1%	<1%		Re-plastering, floor layer, plaster/pisé 6	Clean	Thin plaster floor or 'wash'
6	Silt clay loam	10–20%	<1%	<1%	Mixture of plaster/pisé 2 and accumulation. This layer is the upper part of floor named as unit 7 but degraded and mixed with accumulation. So same as plaster/pisé 2 but with additional material — larger inclusions	Dirty	
7	Silty clay	5%	<1%	1%	Plaster/pisé 3	Clean	More substantial floor
8	Sandy silt loam	10%	5%	2–5%	Small lumps of plaster/pisé 3 — inclusions no plaster layer	Dirty	
9	Clay loam	10–15%	2%		Plaster/pisé 7	Clean	Small charcoal 'flecks' throughout but otherwise 'clean' from anthropogenic material. Compact plaster floor
10	Silty clay loam	40–50%		1%		Dirty	Very dirty-hearth rake-out?
11	Sandy silt loam	10–15%	5%	5%	Really burnt plaster aggregate within this layer, discard? Upper section similar to plaster/pisé 1, some fragments of plaster/pisé 3. Also some plaster/pisé 7/6.	Dirty	
12	Clay loam	10%		5%	Plaster/pisé 5	Clean	Burnt compact plaster floor but 'clean' appearance. Actually numerous 'episodes' — visual 'crusts'
13	Silty clay loam	10%	5–8%	2%	Plaster/pisé 2 inclusions	Dirty	

Massive post pipes are located in the structure's surrounding wall, cutting the second tier bench. Combined with those in the raised gullies, these suggest that at least part of the structure was covered, although the overall scale makes it unlikely this would have been by a solid roof. It is possible that the posts did not support a roof and the holes mark the location of 'totem-pole' like features.

There is evidence that Structure O75 was subject to some substantial re-modelling, in addition to potentially more frequent re-plastering episodes. At present, because excavation into the deposits of Structure O75 has only occurred in small sondages, it is not possible to correlate all of the remodelling episodes across the entire structure. The micro-stratigraphic analysis of the floor horizon (1795) that had been observed to contain a burnt layer, demonstrated a complex formation with multiple plastering events interspersed with the accumulation of charcoal-rich silt. Evidence for substantial re-modelling includes the removal of Structure O68 from within the Structure O75 perimeter, the plastering over of the complex of features at the northwest of the trough, including a number of basins and post-holes, the removal of posts from the raised gullies, and the plastering of the channel in some of the raised gullies.

During the use-life of Structure O75, but perhaps after its formal shape had ceased to be maintained, a sequence of basins and hearths were created in the centre of the structure, some of them formed by breaking up the mud plaster of the main floor. Only after this episode did Structure O75 begin to accumulate silt deposits before being covered with Surface O91.

Structure O75 was sealed by deposits containing charcoal radiocarbon dated to 11,700–10,422 cal years BP. The stratigraphic sequence is entirely PPNA, comprising an initial build-up of occupation debris, a secondary floor or surface (Surface O91) associated with the building of a freestanding PPNA building (Structure O100), and an organic-rich deposit full of faunal remains, shattered rock fragments, flints and a wide range of other PPNA artefacts.

Structure O75 is by far the largest structure found at WF16, and represents a major building effort. It is difficult to resist the idea that it had involved significant co-operative effort to construct, and was the focus for communal activity by the inhabitants of WF16, whether they were permanent

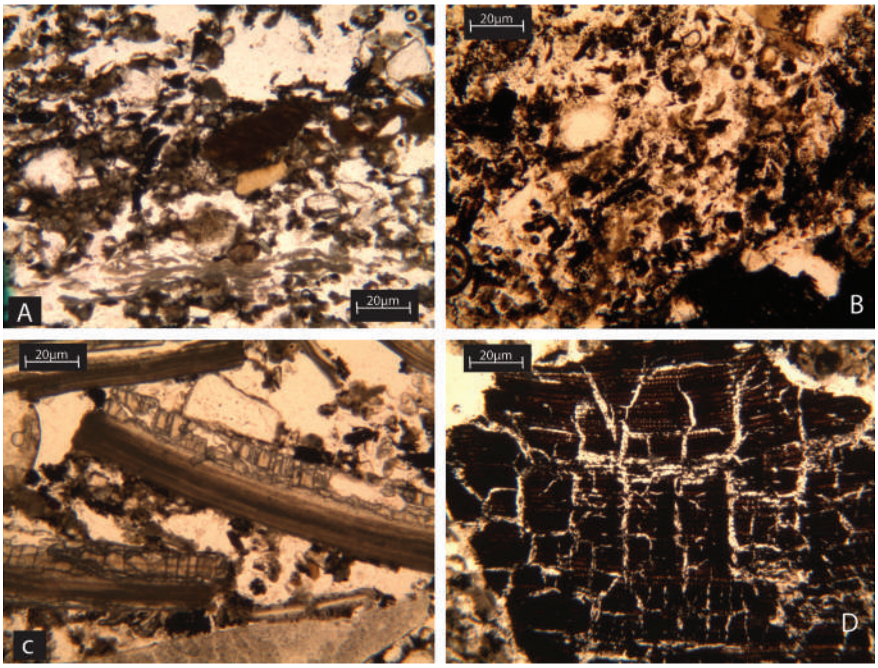


Figure 38.63 Micro images from block sample SA6122 showing: A — charred material and ash; B — 50% charred material; C — parallel shell fragments and D — degraded charcoal.

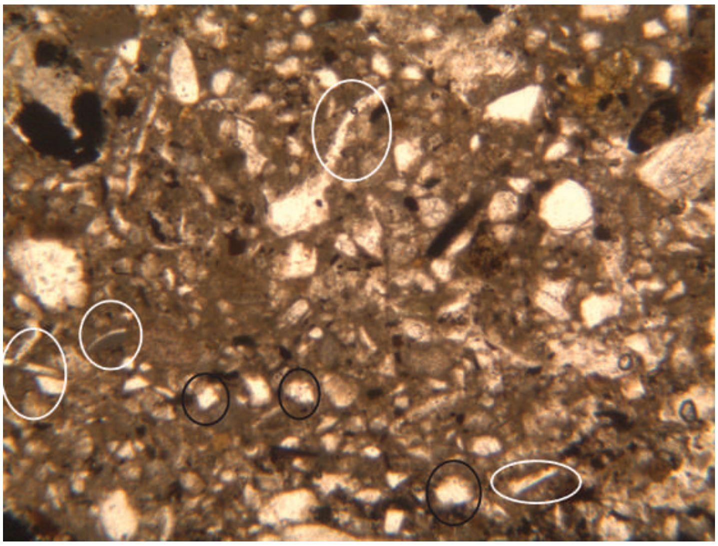


Figure 38.64 Example of a plaster layer from block sample SA6122. White circles show pseudomorphic voids from plant temper and the black circles show the silt embedded in a clay matrix.

residents or visitors. While the stone mortars embedded into the floor might initially suggest plant processing activity, these might have been used for pigment production for use in ritual activity, as indeed could whatever plants that may have been ground within the mortars. It is possible that some of the pits in the floor of O75 may be where additional mortars were previously located. The function of the raised gullies remain unclear: an initial impression would be that these were for the flow of liquids, but some are filled with mud plaster and the location of post-holes suggest that the raised gullies might have been spatial dividers within the structure. The central trough contains some water-laid sediment, but whether it had been constructed for drainage, or this was an unavoidable by-product, remains unclear.

The surrounding benches are wide, such that the term 'bench', implying somewhere to sit, may be misleading. The second tier bench has been subdivided by mud-plaster partitions into smaller areas, which might have been more

Table 38.5 Unit descriptions within block sample SA6550.

Layer	Particle size/ sorting	Anthropogenic remains-Charred Material	Plant Impression	Shell	Plaster/Pisé type if applicable	Clean/Dirty	Other Comments
1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2	Silty clay	60–70%		15–20%			
3	Silty clay	50%		50–60%			
4	Silty clay	70–80%		30–40%			
5	Sand	<1%		2–5%		Clean	Quartz sand — Quartz 90%
6	Silty clay loam	40–50%		Upper 2 cm — 20% Lower 3 cm — 1–5%	x3 lumps plaster/ pisé 3	Dirty	Two phases, upper shell rich.
7	Silty clay loam	5–10%	2%		Plaster/pisé 8	Clean	Some charcoal, rough plaster. Clear bondaries and large mineral inclusions
8	Silty clay	20–30%		2–5%		Dirty	
9	Silt loam	5–10%		<1%		Clean	Relatively clean layer compared with other layers in sample
10	Silty clay	20%		2–5%		Dirty	Very loose
11	Silty clay	5%	5%		Plaster/pisé 3	Clean	Fine matrix of silt in clay.

Table 38.6 Radiocarbon dates and calibrations from Structure O75.

						Chronological model Posterior density estimates cal BP	
Object and Laboratory Code	**Context**	**^{14}C yrs BP**	**Δ^{13}C ‰**	**Taxa**	**Form**	**68%**	**95%**
O75							
Beta-290712	1803	9530±50	-24.8	Salicaceae	Juvenile	*11,070–10,720*	*11,100–10,690*
Beta-271681	757	9940±60	-26.9	Unidentified	Juvenile	*11,390–11,240*	*11,600–11,220*
Beta-271680	747	9380±50	-11.6	Salicaceae	Juvenile	*10,700–10,570*	*10,750–10,500*
Beta-290711	1767	9860±50	-21.3	Cupressaceae	Juvenile	*11,300–11,210*	*11,390–11,190*

suitable for storage of goods than occupation by people. Nevertheless, the amphitheatre-like form of the structure suggests standing, seated, or reclining persons viewing activity being undertaken in the central area of the floor, with the presence of painted and moulded decoration reaffirming the idea that this was of a symbolic nature.

Part 3

Data Analyses

39. The chipped stone assemblages

39.1 Aims and rationale

Samples of chipped stone were taken from the assemblages of selected Objects recovered during the excavation to contribute towards an understanding of the stratigraphy and architecture of the site, and to help develop a chronology of the settlement. This objective did not require undertaking a detailed analysis of artefacts and, as such, neither metrical nor attribute data are systematically presented here. The samples taken from the selected Objects are referred to in the relevant chapter and fully described within section 39.11 below. In this chapter, we provide an overview of the whole of the sampled chipped stone assemblage, prior to combining our interpretation with that of the stratigraphy (Chapters 5–38) and radiocarbon dating (Chapter 40), to propose a chronological framework for activity at WF16 (Chapter 42) with general implications for the PPNA in the Southern Levant.

Previous attempts to develop a cultural history for the PPNA illustrate the challenges faced when attempting to interpret PPNA chipped stone assemblage variability (Sayej 2007). Early research suggested that the PPNA should be split chronologically into an early Khiamian followed by a later Sultanian phase (Crowfoot Payne 1976; Lechavallier and Ronen 1994), entities which were primarily defined on the presence/absence, or relative frequencies, of certain tool types, principally microliths, points, bifacials and bitruncations. This chronological schema is no longer acceptable (Garfinkel and Nadel 1989; Nadel 1990) and is particularly problematic in relation to assemblages from Southern Jordan where this simple subdivision conflates spatial, functional, taphonomic and chronological variability (Edwards *et al.* 2001; Sayej 2004; Kuijt 2001; Pirie 2004).

An alternative approach has recently proposed a 'Late PPNA' facies in the Southern Levant. This is defined not only on the basis of changing composition of chipped stone assemblages, but also on changing architectural styles and animal management strategies (e.g. Edwards *et al.* 2001; Smith *et al.* 2016; Finlayson *et al.* 2014; Finlayson and Makarewicz 2017). Regarding chipped stone, the Late PPNA in Southern Jordan appears to be marked by a lack of points, increasing use of relatively high quality chert and an increased concern for core maintenance (Smith *et al.* 2016). This scheme appears promising with regard to comprehending cultural change within the PPNA of Southern Jordan, but its development is currently hampered by a relatively small sample of sites, a limited number of absolute dates and a lack of technological analyses of relevant assemblages.

In contrast, our understanding of the development of the PPNA chipped stone assemblages from the Northern Levant is more developed. The detailed analyses of core reduction technologies at a range of sites have defined a final PPNA industry, based on the removal of predetermined blades from opposed platform cores, that is transitional between the northern region's PPNA and EPPNB industries (Stordeur and Abbès 2002; Abbès 2008). In contrast, the end of the PPNA in the Southern Levant is, in many areas, marked by a rather abrupt transition from the largely unidirectional and rather *ad hoc* PPNA core reduction techniques to the bidirectional Naviform focused MPPNB industries, or by the arrival of a fully-fledged EPPNB at Motza and possibly at Harrat Juhayra 202 in Jordan (Khalaily *et al.* 2007; Fujii pers. comm.). However, the emerging data from Southern Jordan shows some evidence for typological change, an increased attention to blade production, and possibly a developing use of opposed platform cores by the Late PPNA.

39.2 Sample

The present sample consists of 22,923 pieces (119.39 kg), approximately double that recovered and analysed during the 1997–2003 WF16 evaluation (Pirie 2007). This is, however, a mere 4% by weight of the *c.* 2,700 kg of chipped stone recovered during the 2008–2010 excavations. The present sample was drawn from 14 Objects, representing different proportions of the total recovered from each of those Objects (Table 39.1). The sample was selected to give a broad coverage of the site, concentrating on Objects that had been most fully explored through excavation. The sample comprises material collected through dry sieving (2 mm) and hand picked 'small finds', but excludes any chipped stone collected during flotation. It was catalogued following the methods used in the site evaluation (Pirie 2007), with a few minor modifications to encompass the wider range of material recovered.

39.3 Definitions/methodology

Cores were classified on the basis of the dominant removal type (flake, blade, bladelet or mixed), the number and orientation of platforms (single platform, change of orientation, opposed or multi-platform), shape (pyramidal, prismatic, irregular), and the raw material type (cobble, tabular, unknown/other). Items are described as core fragments where further classification is impossible due to breakage.

Core Trimming Elements (CTE) are classified on the basis of which part of the core they remove (Pirie 2007). These comprise: core face removals, which are flakes/ blades, which remove hinge and step fractures from the core face; platform rejuvenation flakes, which remove parts of the striking platform; and crested elements, which at WF16, are usually crested only on a single versant.

Flakes are defined as all removals that feature ventral faces and are greater than 10 mm in size, where the maximum length is less than twice the maximum width. In the present analysis this also includes flake fragments. Blades are defined metrically, having a length greater than twice their width. Bladelets are defined as blades where length does not exceed 50 mm and width does not exceed 12 mm. Spalls are removed from an edge of a debitage element and are triangular in cross-sectional shape (e.g. burin spall). Microburin products are classified as either proximal or distal microburin products. Primary elements are included in the general debitage counts (e.g. flake, blade or bladelet), although an estimate of the number of primary/cortical elements was made for each assemblage.

Debris is classified as either chunk or chip. Following Pirie (2007), chips have a maximum dimension of 10 mm. It should be noted that this differs from several other PPNA chipped stone reports (e.g. Nadel 1997) where the maximum size of chips was set at 15 mm. Chunks are debitage items with no identifiable ventral face.

All retouched pieces are also classified according to debitage element and included in debitage counts. The classification of retouched or used pieces broadly follows that employed by Pirie (2007), which is itself based on the system employed by Nadel (1997) at Netiv Hagdud. We do, however, employ some modifications to these schemes.

Non-Formal Tools (NFT) include retouched flakes, blades, bladelets, which feature retouch but are not classified under any of the formal tool categories. This differs from Pirie (2007) where retouched bladelets were included as microliths. In the present analysis microliths are defined as bladelets that feature backing and/or truncation. Microliths are further classified into simple microlith types

Table 39.1 Provenance, size and weight of chipped stone sample included in the present analysis.

Structure	N pieces	Weight (g)	Percentage (by weight) of chipped stone sampled from Object
O11	1034	3765	33
O12	2244	9475	34
O14	906	3055	88
O19	1012	5590	34
O33	1452	6950	77
O45	3102	12655	24
O56	1237	7052	83
O60	4640	30810	2
O64	403	1292	84
O66	688	3256	66
O73	661	3720	55
O75	1559	3055	4
O91	1489	13620	12
O100	2496	15090	24
All sampled objects	22923	119385	19

based on the shape and type and position of retouch (e.g. lunate, Helwan lunate, backed bladelet).

Used items include any debitage element with clear, macroscopically visible signs of use, such as edge wear/damage or rounding. The only exceptions to this are items with macroscopically visible polish, or gloss, which are classified as 'glossed piece'. Glossed pieces are further classified on the basis of blank type and any retouch.

Points are defined as having a generally straight, acutely angled tip, usually formed by convergent retouch of lateral margins. Points also feature basal modification through the removal of the butt and generally feature basal retouch or truncation. Commonly encountered point sub-types include El-Khiam (featuring basal notching), Salibiya (as El-Khiam without notches) and Jordan Valley (featuring a basal tang).

Perforators include both borers and awls. Borers feature elongated, parallel-sided tips formed by steep retouch. Awls are a less tightly defined category and include a wide range of pointed tools. Commonly, awls at WF16 feature a short and chunky tip, often formed by the convergence of two notches. Awls are further classified on the basis of blank type and tip morphology. In some instances it is difficult to differentiate between awls and 'projectile' points, and the present analysis includes several awls that are similar to Salibiya points, but lack the necessary basal modification. It is possible that several of these items, classified here as awls, may be unfinished or atypical Salibiya points.

The definition of scrapers, truncations, burins and notch/denticulates, follows Pirie (2007) and these are further classified on the basis of blank type and edge shape, as well as the type and location of retouch. Bitruncations, again following Pirie (2007) and Nadel (1997), include all bladelets with truncation at both distal and proximal ends and are further classified as either Hagdud or Gilgal (which feature basal notches) sub-types. Bifacial pieces include all items with significant bifacial shaping and are further classified according to regularity of form, degree of finishing, shape and by the presence/absence of tranchet sharpening scars.

Items were classified as 'retouched fragments' when breakage prevented the attribution to any of the above categories. The final tool category is 'varia', which is used to record isolated/rare examples of tool types not defined above, as well as irregular retouched items that do not belong to any formal typological category.

39.4 Raw materials and artefact condition

The most frequent chert types in the WF16 assemblage have been classified into five raw material types based on visual inspection of colour, grain size, translucency and cortex type (Table 39.2). This follows Pirie's (2007) system, although some modification was necessary because the use of the different types of brown flint appears to have chronological significance in the present analysis. Whilst Pirie's Types 1–3 were applicable to the present study, Pirie's fourth material type, a 'chocolate brown smooth flint' type has been subdivided into two types, a medium-grained opaque brown flint and a fine-grained, relatively translucent brown/caramel coloured type. Survey shows that both the wadi channel adjacent to WF16, and the gravel knoll on which the site lies, contain a wide variety of cherts, as battered cobbles, which have eroded from a range of primary contexts in the upper reaches of the wadi catchment and been transported downstream by flood water (Tipping 2007; Mithen *et al.* 2007). Given the diversity of chert present in the wadi channel, it is likely that our system for raw material classification homogenises some of the variation and that each of our chert types incorporates chert from more than one primary source, or indeed that variation within individual sources means that some of our types reflect single sources. As most of the material was probably collected from the wadi channel, we assume that any emic classification would not have referred to primary source properties.

The dominant raw material types in all sampled objects at WF16 are Types 2 and 3 (medium-grained, grey/grey-brown, opaque chert). Type 4 material (brown, medium-grained, opaque chert) also occurs, albeit usually in lower proportions, in most of the sampled sequences. These three chert types are currently abundant in the wadi channel and the battered state of cortex on many of the archaeological samples suggests that this was a source during the PPNA.

Table 39.2 Classification of chert raw material types.

Raw Material Type (this study)	Pirie (2007) type	Description
1	Smooth grey	Fine grained, translucent grey chert. Wadi cobble cortex. White patina. Can occur within cobbles of raw material Types 2 and 3.
2	Non-homogeneous	Variable in colour from white to dark grey. Opaque and medium grained. White patina. Battered Wadi cobble cortex. Similar to Type 3.
3	Grey brown	Medium grained, grey brown, opaque chert. Battered wadi cobble cortex. White patina. A variable raw material type
4	Chocolate brown	Medium grained dark-mid brown, opaque chert. White patina. Chalky white cortex on cobbles.
5	Chocolate brown	Fine grained caramel brown chert. Varies from moderately opaque to moderately translucent. Cream/yellow patina. Fresh, chalky cortex. Derives from flat (tabular) slabs/cobbles.

However, the occasional presence of chalky (non-battered) cortex suggests that primary sources may also have been exploited for the acquisition of these raw materials, although there are examples of surprisingly fresh cortex from wadi samples. Type 5 material (caramel brown, fine-grained, translucent chert) appears to have been collected from sources beyond the immediate environs of the site. Not only are cobbles of this material absent from the present wadi channel, the presence of fresh (non-battered), chalky cortex on this material suggests that it was collected from a primary setting. Whilst a primary source of this material has not yet been confirmed, nodules of similar material have been identified eroding from the hill slopes near the town of Shawbak (*c.* 10 km upstream from WF16). Type 1 material (smooth grey, fine-grained, translucent chert) also occurs in low proportions (<5%) in most of the sampled sequences. Small pockets of Type 1 chert occur within wadi cobbles that are primarily composed of other, lower quality, chert types (Type 2 and 3), reinforcing the point that our 'types' do not reflect primary sources.

A wide range of other (mainly medium-grained) chert types are also present in the assemblage, but, as these occur in low proportions they were not assigned specific material types. The assemblage from Midden O60 is markedly more diverse than that from other sampled Objects, including many pieces made on these atypical chert types. Chipped coarse stone, mainly basalt and limestone, is present in most Objects and is again more abundant in the contexts sampled from Midden O60. It is likely that the majority of the chipped coarse stone results from the onsite manufacture and repair of coarse stone objects. Although small quantities of obsidian are present in most Southern Levantine PPNA assemblages, and a single piece was identified in the WF16 sample described by Pirie (2007), no obsidian has been found in the present (larger) sample.

The degree of patination may potentially shed light on the age and depositional history of the chipped stone. As the degree of patination of the WF16 assemblage is variable we hoped that relationships might be identifiable between stratigraphic position and level of patination. Such patterning is not consistently evident within the present sample: most artefacts feature some patination, and both completely patinated and unpatinated pieces are present in almost all sampled contexts. In several Objects, contexts with heavily patinated artefacts were stratigraphically sandwiched between those with less patinated artefacts, suggesting either a complex relationship between the degree of patination and depositional environment, or the re-deposition of artefacts. A further observation is that blade/lets (and tools manufactured on these blank types) are consistently more patinated than other debitage elements. This suggests that the chemical composition(s) of raw materials selected for blade/let production differs from those most commonly used for the manufacture of flakes.

In terms of artefact condition, the majority of the assemblage is relatively 'fresh', with sharp edges and dorsal ridges, suggesting relatively stable post-depositional environments for the bulk of the sample. However, heavy edge damage and/or rounding is evident on occasional artefacts in all sampled sequences; indicating that small proportions of material have been subject to greater post-deposition movement, perhaps being recycled from earlier levels during the construction of chronologically later PPNA structures. Samples from certain Objects (e.g. O60, O64 and O73) contain far high proportions of artefacts with edge rounding and/or edge damage, indicating greater post-depositional disturbance (e.g. trampling, rolling) for these artefacts.

A small proportion of artefacts from most Objects are burnt. Evidence of burning is usually restricted to contexts where most other material is also burnt, presumably resulting from *in situ* PPNA burning, or the dumping of material from hearths. Again, Midden O60 is exceptional in this regard with high proportions of burnt material, often mixed with non-burnt material, recovered from most sampled contexts. This suggests either, or both, a higher incidence of burning in Midden O60 and that contexts (in this case arbitrary spits/grid squares) here contain mixed assemblages of artefacts removed from their primary contexts.

39.5 Three assemblage types

Analysis of the entire WF16 sample suggests that three distinct assemblage types are present, which are also stratigraphically ordered. Whilst there is some technological overlap between these assemblages, they are distinguishable in terms of raw material use, core reduction strategies and typological composition. The majority of the present sample belongs to what we have designated Assemblage Type A (total artefacts = 14,699). The material from O91, together with stratigraphically early material from Midden O60 (contexts (576), (684), (700) and (706)) and Structure O100 (contexts (906) and (907)), contain what appears to be a distinctive assemblage type we have designated as Assemblage Type B (total artefacts = 3730). A third assemblage, only recovered from Midden O60 (contexts (199), (203), (347), (353), (438) and (571)) and Structure O100 (contexts (801), (896), (897) and (898)) is quite different and belongs to what we have designated as Assemblage Type C (total artefacts = 4524). Where present, Assemblage Type B is always stratigraphically above Assemblage Type A, and below Assemblage Type C, while Assemblage Type C is always above both other assemblages. The following sections provide descriptions of raw materials and artefact condition, debitage, debris and tools for the three assemblage types — Assemblage Type A, Assemblage Type B and Assemblage Type C (Tables 39.3, 39.4).

39.6 Assemblage Type A

Assemblage Type A is fairly typical of the Southern Levantine PPNA and similar to that recovered from

Table 39.3 Summary of the sampled WF16 assemblages. Note that tool blanks are counted in debitage/debris statistics.

		Type A		Type B		Type C	
		n	%	n	%	n	%
debitage	cores	147	1.00	78	2.09	82	1.81
	cte	138	0.94	54	1.45	86	1.90
	flakes	7682	52.37	1791	48.02	2489	55.02
	blades	686	4.68	171	4.58	282	6.23
	bladelets	1823	12.43	440	11.8	660	14.59
	spalls	8	0.05	19	0.51	40	0.88
	mbt	41	0.28	0	0.00	0	0.00
	Total debitage (inc. tool blanks)	10525	71.75	2553	68.45	3639	80.44
debris	chips	2419	16.49	776	20.80	500	11.05
	chunks	1725	11.76	401	10.75	385	8.51
	Total debris (inc. tool blanks)	4144	28.25	1177	31.55	885	19.56
	Tools (retouched & used pieces)	1454	9.91	246	6.60	388	8.58
	Total assemblage	14669		3730		4524	

Table 39.4 Typological summary of sampled WF16 assemblages.

	Type A		Type B		Type C	
Tool type	**n**	**%**	**n**	**%**	**n**	**%**
NFT	513	35.28	87	35.37	199	51.29
used pieces	117	8.05	26	10.57	35	9.02
points	153	10.52	13	5.28	0	0.00
perforators	217	14.92	30	12.2	28	7.22
scrapers	47	3.23	10	4.07	22	5.67
bitruncations	31	2.13	0	0.00	0	0.00
truncations	25	1.72	3	1.22	4	1.03
bifacials	7	0.48	2	0.81	3	0.77
glossed pieces	19	1.31	5	2.03	3	0.77
burins	14	0.96	12	4.88	34	8.76
notch/ denticulates	97	6.67	20	8.13	14	3.61
microliths	59	4.06	1	0.41	1	0.26
backed blades	8	0.55	0	0.00	1	0.26
retouched frags	105	7.22	19	7.72	30	7.73
varia	42	2.89	18	7.32	14	3.61
Total (n)	1454		246		388	

evaluation Trenches 1 and 2 at WF16 (Pirie 2007). Tables 39.5 and 39.6 provide a breakdown of the assemblage by Object. This assemblage represents the majority of the sampled material and is manufactured mainly on wadi cobbles of medium-grained opaque chert (Types 2, 3 and 4). Artefacts on these material types are generally heavily patinated. Type 1 chert is generally rare, accounting for <5% of sampled assemblages, although it is present in higher proportions in some sequences such as O14 where it constitutes up to 40% of the material from some contexts (e.g. 495). Type 1 raw material is always heavily patinated and appears to have been preferentially used for the manufacture of microliths, although these are also made on other material types (Type 2 and 3) and other tool types (e.g. El-Khiam points) are sometimes manufactured on Type 1 chert. Type 5 material is absent from most Type A assemblages but occurs in low proportions (*c.* 5%) in the O12 sequence; where it is present, Type 5 material generally lacks patination.

Debitage is based around the rather *ad hoc* production of bladelets, small blades and flakes from a range of informal core types that show limited platform preparation and core maintenance. A total of 147 cores are present, accounting for 1% of the total assemblage, and the core:debitage ratio is 1:70.3. The most commonly found core type is the single platform core at 37% of the sample, irregular cores constitute 34%, and change of orientation cores 11%. Opposed platform cores are rare (2%). Core trimming elements (n=138, 0.94%) comprise platform rejuvenation flakes (13%), crested pieces (9.4%), and core face removals (77.5%). Most cores were used for mixed flake/bladelet production (38.7%). It is likely that the production of bladelets was the primary target of these cores and that many flake scars represent core preparation. However, the presence of numerous cores that were used solely for the production of flakes (these account for 30.6% of the core assemblage) indicates that flakes were also a desired product. Flake cores are usually extremely irregular in form, indicating an *ad hoc* approach to flake production. Cores that were used only for the production of bladelets are less common, accounting for just 6.8% of the assemblage. These are generally pyramidal/sub-pyramidal in form and feature a single platform, although change of orientation examples (usually with two platforms) and opposed platform types are also present. Blade cores are rare (1%) which, given the relative abundance of blades (4.97%) in the assemblage, suggests that blade cores were reduced beyond blade size (50 mm) and are thus present in the assemblage as other (bladelet) core types.

Flakes are the most common knapping product (52.37%), with blades at 4.68% and bladelets at 12.43%; the blade:flake ratio is 1:3.1. Blades are mostly rather small (max length *c.* 80 mm) and appear to form a metrical continuum with bladelets, as noted by Pirie (2007). Combined they form 17.11% of the assemblage. Blade/lets were almost exclusively produced by unidirectional debitage. Burin spalls are extremely rare at 0.05% of the assemblage. There is evidence that the microburin technique (Mbt) was occasionally employed as part of the microlith production process, and both distal and proximal microburins are present, forming 0.2% of the total assemblage.

In terms of typology, Assemblage Type A is dominated by NFT (35%), which comprise retouched flakes (47.2%), retouched blades (26.1%) and retouched bladelets (26.7%). Small, often symmetrical, pointed pieces form a substantial component of the tool sample, with perforators (awls and borers) (15%) and points (11%) present in substantial numbers. Perforators vary in terms of size, tip morphology and overall shape and blank types, and are manufactured on bladelets (46.8%), flakes (36.8%) as well as blades (16.4%). As with NFT, such morphological variability likely reflects the fact that this tool class includes a range of functional 'types' including both drill bits and other piercing tools. Detailed analysis of perforators, including attribute analysis and use wear, is presently being undertaken. Perforators are present in all sampled Objects and always form a substantial component of the assemblage ranging from 20.0% in O75 to 9.45% in O19. O56 has a high proportion of perforators (n= 23, 17.4%) which accords well with the presence of a small workbench, made from a sandstone slab which features multiple perforations (SF1171), within occupation deposit (676). Here it is notable that 18 (78.3%) of the perforators derive from just two of the six sampled contexts — collapse (658) and occupation horizon (666). The high proportion of perforators from 'collapse' context (658) suggests that this deposit may relate to the use of the workshop, perhaps representing the collapse of an above ground storage feature.

Points form 11% of the tool assemblage and are found in all sampled Objects. Points are dominated by the El-Khiam WF16-sub-type, which constitute 82.6% of the point assemblage. The majority of El-Khiam points adhere to the 'standard' WF16 form identified in previous analysis (Smith 2007). These feature straight bases and their tips (located at the distal end of the blank) are formed by inverse retouch. The only exception to this is a cluster (n=4) of El-Khiam points (recovered from O75 (752)) that have tips formed by direct retouch. Salibiya points are occasionally present (6% of the point assemblage) whilst Jordan Valley (0.5%) examples are rare.

Glossed pieces are present in all Objects containing Assemblage Type A, except for O64 and O66. Glossed pieces were not identified in Pirie's (2007) report, but are present here and account for 1.3% of the Type A tool assemblage. As is typical for the PPNA, glossed pieces generally take the form of unretouched blades and bladelets with bifacial gloss on a single lateral margin. Proportionally, glossed pieces are most abundant in O56 where they account for 3% of the assemblage. Given the interpretation of O56 as a possible bead-manufacturing workshop, the gloss (or polish) on these pieces may derive from non-harvesting tasks. This possibility is currently being explored through microscopic examination. Other tool types present include bitruncations (0.48%), including both Hagdud (87%) and Gilgal (13%) sub-types, microliths (4.06%) and backed blades (0.55%). Burins (0.96%) and bifacial tools (0.48%) are rare.

Microliths are consistently present in the Type A assemblages and were recovered from all Objects containing this assemblage type. Microlith types include both straight and arched backed bladelets (44.3% of microliths), lunates (23%), and fragments (16.4%), together with a range of other types. Microlith backing types include direct, inverse and alternate, and 18% of microliths feature bifacial Helwan backing. Microliths mainly appear to be manufactured on fine-grained Type 1 raw material, although small proportions are made on Types 2 and 3. No microliths were manufactured on brown raw materials (Types 4 or 5). The diversity of microlith types is striking, and different to most Epipalaeolithic assemblages in the region around Wadi Faynan that tend to be dominated by a more restricted range of forms.

Microliths form significant components of the tool assemblages in several Objects. They constitute 17% of the O64 assemblage, and feature prominently in the assemblages from O33 (8%), O14 (5%) and O73 (4%). There is some evidence that microliths are more concentrated in contexts with high proportions of pisé, e.g. collapse/infill contexts (357) and (348) from O33, and (432) and (434) from O14. But the ubiquity of pisé, which is found in most contexts, allied to the small sample of microliths, makes this a difficult proposition to test. Microliths tend to be heavily patinated, but there is no indication that these have suffered any more extreme post-depositional movement than other components of the assemblage. The presence of microliths in PPNA assemblages is controversial (e.g. Kuijt 1996; Gopher and Barkai 1997), and some researchers have argued that in PPNA contexts microliths are most likely to be recycled from earlier, underlying Epipalaeolithic contexts (Kuijt 1996). At WF16, based on the present evidence, there seems no reason to single out microliths as being intrusive, and it seems most straightforward to accept that microliths (and the microburin technique occasionally used in their manufacture) are integral parts of Assemblage Type A at WF16.

39.7 Assemblage Type B

In terms of raw material use, Assemblage Type B is generally dominated by Type 2, 3 and 4 raw materials, although there are increased proportions of Type 5, as well as both ‘unusual’ chert and coarse stone materials present (particularly in contexts from Midden O60). Type 4 material is present in higher proportions (*c.* 30%) than in most sampled Assemblage Type A contexts. More significantly, Type 5 material is present in higher proportions; accounting for *c.* 10% of both the assemblage from O91, and contexts (906) and (907) from O100. In contexts from O60 a similar story is revealed, and whilst Type 5 raw material is rare (<5%) in the earliest sampled context (706), it accounts for *c.* 30% of the assemblage from the immediately overlying context (700). Throughout, the Assemblage Type B material is less heavily patinated than most of that from Assemblage Type A. Tables 39.7 and 39.8 provide a breakdown of the Assemblage Type B by Object.

The sample of Assemblage Type B material is rather small and is mainly derived from Surface O91 (*c.* 40%) and Midden O60 (40%). As O91 has been interpreted as an outdoor knapping area (see chapter 37) and Midden O60 represents a midden, it is likely that at least some aspects that distinguish this material from that in Assemblage Type A relate to function and taphonomy. An example of this is that the Assemblage Type B material includes 78 cores which constitute 2% of the assemblage, and the core:debitage ratio is 1:31 (compared with 1:79 in Assemblage Type A). It is likely that the high proportion of cores reflects the limited number of contexts containing Assemblage Type B sampled in the present analysis, limiting the degree to which technological variability between these assemblages may be interpreted as being purely a reflection of diachronic change. The most commonly found core type continues to be single platform, at 35% of the assemblage. Core trimming elements (n=54, 1.5%) are more common

Table 39.5 Summary of the Assemblage Type A debitage by Object.

		O11	O12	O14	O19	O33	O45	O56	O64	O66	O73	O75	O100	Total Assemblage Type A
cores	**n**	5	24	5	15	17	19	21	1	8	10	20	2	147
	%	*0.48*	*1.07*	*0.55*	*1.48*	*1.17*	*0.61*	*1.70*	*0.25*	*1.16*	*1.51*	*1.28*	*0.54*	*1.00*
cte	**n**	8	31	5	10	17	24	3	4	8	8	17	3	138
	%	*0.77*	*1.38*	*0.55*	*0.99*	*1.17*	*0.77*	*0.24*	*0.99*	*1.16*	*1.21*	*1.09*	*0.81*	*0.94*
flakes	**n**	649	1216	468	582	764	1332	748	196	373	387	773	194	7682
	%	*62.77*	*54.19*	*51.66*	*57.51*	*52.62*	*42.94*	*60.47*	*48.64*	*54.22*	*58.55*	*49.58*	*52.29*	*52.37*
blades	**n**	43	143	37	62	86	114	64	19	22	35	59	2	686
	%	*4.16*	*6.37*	*4.08*	*6.13*	*5.92*	*3.68*	*5.17*	*4.71*	*3.20*	*5.30*	*3.78*	*0.54*	*4.68*
bladelets	**n**	121	347	115	126	175	403	95	69	89	103	140	40	1823
	%	*11.70*	*15.46*	*12.69*	*12.45*	*12.05*	*12.99*	*7.68*	*17.12*	*12.94*	*15.58*	*8.98*	*10.78*	*12.43*
spalls	**n**	1	2	0	1	0	0	1	1	0	1	1	0	8
	%	*0.1*	*0.09*	*0.00*	*0.10*	*0.00*	*0.00*	*0.08*	*0.25*	*0.00*	*0.15*	*0.06*	*0.00*	*0.05*
chips	**n**	127	279	139	42	195	863	184	55	75	32	343	85	2419
	%	*12.28*	*12.43*	*15.34*	*4.15*	*13.43*	*27.82*	*14.87*	*13.65*	*10.90*	*4.84*	*22.00*	*22.91*	*16.49*
chunks	**n**	79	198	129	168	192	340	120	55	111	84	204	45	1725
	%	*7.64*	*8.82*	*14.24*	*16.6*	*13.22*	*10.96*	*9.70*	*13.65*	*16.13*	*12.71*	*13.09*	*12.13*	*11.76*
mbt	**n**	1	4	8	6	6	7	1	3	2	1	2	0	41
	%	*0.10*	*0.18*	*0.88*	*0.59*	*0.41*	*0.23*	*0.08*	*0.74*	*0.29*	*0.15*	*0.13*	*0.00*	*0.28*
Total	**n**	1034	2244	906	1012	1452	3102	1237	403	688	661	1559	371	14669

Table 39.6 Summary of the Assemblage Type A retouched/used tools by Object.

		O11	O12	O14	O19	O33	O45	O56	O64	O66	O73	O75	O100	Total Assemblage Type A
NFT	**n**	38	112	21	66	70	62	33	16	29	20	39	7	513
	%	*33.63*	*42.75*	*25.93*	*51.97*	*40.00*	*27.19*	*25.00*	*27.12*	*39.19*	*31.75*	*32.50*	*35.00*	*35.28*
Used pieces	**n**	8	13	4	5	10	28	20	6	9	6	6	2	117
	%	*7.08*	*4.96*	*4.94*	*3.94*	*5.71*	*12.28*	*15.15*	*10.17*	*12.16*	*9.52*	*5.00*	*10.00*	*8.05*
points	**n**	18	24	14	9	9	35	15	6	7	8	7	1	153
	%	*15.93*	*9.16*	*17.28*	*7.09*	*5.14*	*15.35*	*11.36*	*10.17*	*9.46*	*12.7*	*5.83*	*5*	*10.52*
perforators	**n**	21	41	9	12	22	37	23	6	9	7	24	6	217
	%	*18.58*	*15.65*	*11.11*	*9.45*	*12.57*	*16.23*	*17.42*	*10.17*	*12.16*	*11.11*	*20.00*	*30.00*	*14.92*
scrapers	**n**	1	3	2	6	5	12	9	0	2	2	5	o	47
	%	*0.88*	*1.15*	*2.47*	*4.72*	*2.86*	*5.26*	*6.82*	*0.00*	*2.70*	*3.17*	*4.17*	*0.00*	*3.23*
bitruncations	**n**	2	4	2	2	2	9	2	1	2	0	5	0	31
	%	*1.77*	*1.53*	*2.47*	*1.57*	*1.14*	*3.95*	*1.52*	*1.69*	*2.70*	*0.00*	*4.17*	*0.00*	*2.13*
truncations	**n**	2	10	1	3	2	2	1	1	0	1	2	0	25
	%	*1.77*	*3.82*	*1.23*	*2.36*	*1.14*	*0.88*	*0.76*	*1.69*	*0.00*	*1.59*	*1.67*	*0.00*	*1.72*
bifacials	**n**	0	0	0	0	0	2	2	0	2	1	0	0	7
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.88*	*1.52*	*0.00*	*2.70*	*1.59*	*0.00*	*0.00*	*0.48*
glossed pieces	**n**	1	1	2	3	1	5	4	0	0	1	1	0	19
	%	*0.88*	*0.38*	*2.47*	*2.36*	*0.57*	*2.19*	*3.03*	*0.00*	*0.00*	*1.59*	*0.83*	*0.00*	*1.31*
burins	**n**	1	3	1	1	5	0	1	1	0	0	1	0	14
	%	*0.88*	*1.15*	*1.23*	*0.79*	*2.86*	*0.00*	*0.76*	*1.69*	*0.00*	*0.00*	*0.83*	*0.00*	*0.96*
notch/ denticulates	**n**	10	11	16	4	6	15	8	4	2	6	13	2	97
	%	*8.85*	*4.20*	*19.75*	*3.15*	*3.43*	*6.58*	*6.06*	*6.78*	*2.70*	*9.52*	*10.83*	*10.00*	*6.67*
microliths	**n**	3	6	4	4	14	7	2	10	3	3	3	0	59
	%	*2.65*	*2.29*	*4.94*	*3.15*	*8.00*	*3.07*	*1.52*	*16.95*	*4.05*	*4.76*	*2.50*	*0.00*	*4.06*
backed blades	**n**	2	1	0	0	1	0	0	1	1	0	2	0	8
	%	*1.77*	*0.38*	*0.00*	*0.00*	*0.57*	*0.00*	*0.00*	*1.69*	*1.35*	*0.00*	*1.67*	*0.00*	*0.55*
retouched fragments	**n**	5	27	3	7	22	4	10	3	8	5	9	2	105
	%	*4.42*	*10.31*	*3.70*	*5.51*	*12.57*	*1.75*	*7.58*	*5.08*	*10.81*	*7.94*	*7.50*	*10.00*	*7.22*
varia	**n**	1	6	2	5	6	10	2	4	0	3	3	0	42
	%	*0.88*	*2.29*	*2.47*	*3.94*	*3.43*	*4.39*	*1.52*	*6.78*	*0.00*	*4.76*	*2.50*	*0.00*	*2.89*
Total	**n**	113	262	81	127	175	228	132	59	74	63	120	20	1454

than in Assemblage Type A, possibly indicating greater concern with control over knapping products. This may also be reflected in a small decrease in the proportion of irregular cores to 31%. There is a marked increase in the proportion of change of orientation cores to 21% and opposed platform cores to 5%. Platform rejuvenation flakes (18.5%) and crested pieces (13%) are both more common, while core face removals are less frequent at 68.5%. Cores showing evidence for mixed flake/bladelet production are even more dominant (47.4%) than in Assemblage Type A. It is again likely that the production of bladelets was the primary target of these cores and that many flake scars represent core preparation. However, the presence of numerous cores that were used solely for the production of flakes (these account for 27% of the core assemblage) indicates that flakes were still a desired product. Flake cores are again irregular in form. Cores that were used only for the production of bladelets are slightly more frequent than in Assemblage Type A, at 9% of the assemblage. These are generally pyramidal/sub-pyramidal in form and feature a single platform, although change of orientation examples (usually with two platforms) and opposed platform types are also present. Blade cores continue to be rare (1%).

Flakes are the most common knapping product (48.02%), with blades at 4.58% and bladelets at 11.80%. The blade:flake ratio is 1:2.9. Blades are again mostly rather small (max. length *c.* 80 mm). Blades and bladelets combined form 16.38% of the assemblage. Burin spalls become more common, at 0.51% of the assemblage. There is no evidence for the use of the microburin technique in Assemblage Type B.

In terms of typology, Assemblage Type B has a lower proportion of retouched tools (6.6%) than Assemblage

Table 39.7 Summary of Assemblage Type B debitage by Object.

		O60	O91	O100	Total Assemblage Type B
cores	n	13	58	7	78
	%	*0.86*	*3.90*	*0.95*	*2.09*
cte	n	30	21	3	54
	%	*1.99*	*1.41*	*0.41*	*1.45*
flakes	n	901	580	310	1791
	%	*59.91*	*38.95*	*42.06*	*48.02*
blades	n	42	69	60	171
	%	*2.79*	*4.63*	*8.14*	*4.58*
bladelets	n	185	129	126	440
	%	*12.30*	*8.66*	*17.10*	*11.80*
spalls	n	7	4	8	19
	%	*0.47*	*0.27*	*1.09*	*0.51*
chips	n	192	433	151	776
	%	*12.77*	*29.08*	*20.49*	*20.80*
chunks	n	134	195	72	401
	%	*8.91*	*13.10*	*9.77*	*10.75*
mbt	n	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*
Total	n	1504	1489	737	3730

Type A (9.91%). However, as in Assemblage Type A, tools here are dominated by NFT (35%), which comprise a high proportion of retouched flakes (60.9%), together with lower proportions of retouched blades (18.4%) and retouched bladelets (20.7%). Perforators (12.2%) are also well represented, but the frequencies of both points (5%) and microliths (n=1, 0.4%) are sharply reduced. Conversely, the assemblage features a marked increase in the proportion of burins (5%). Other tool types present include glossed pieces (2%) and bifacial tools (0.8%). No bitruncations are present in Assemblage Type B.

The form and distribution of points is revealing. All of these (n=13) are El-Khiam points, six of which were recovered from O60 context (576) — a context rich in Type 5 raw material. This uneven distribution, mirroring that seen in Assemblage Type A, again suggests unusual depositional circumstances for these pieces. The El-Khiam points from Assemblage Type B are, however, less standardised in form than those from Assemblage Type A. For example, the point from O100 (906) and several of those from O60 feature tips formed by direct retouch (Figure 39.1g–h), often at the proximal end of a bladelet, whilst the two examples from O91 adhere to the 'standard' Assemblage Type A form. Assemblage Type A and Assemblage Type B, and in light of the absence of points in Assemblage Type C, the point types found in Assemblage Type B are unlikely to represent mixing of material, implying that Assemblage Type B probably represents a genuinely transitional phase.

39.8 Assemblage Type C

Assemblage Type C is similar to the material described from the stone structures of evaluation Trench 3 (Pirie 2007). Although sharing some general traits with Assemblage Types A and B, Assemblage Type C sees a sharp increase in the use of non-local Type 5 raw material. This is often used to manufacture blades and bladelets from more heavily prepared and maintained cores, including occasional examples of careful opposed platform blade/let production. The choice of raw materials marks one of the clearest differences between Assemblages Type A and Type C. Although all five raw material types are present in Assemblage Type C, this assemblage is clearly differentiated from Assemblage Type A by the extremely low proportions of Type 1 material, which is absent from most sampled contexts, and by the fact that Type 5 material constitutes *c.* 30% of the assemblage.

As noted above, some care must be taken in interpreting the causes of variability between assemblages. Although Assemblage Type C is stratigraphically later than Assemblage Types A and B, it has, so far, only been recovered from a restricted range of contexts. These are dominated by midden deposits from O60 and the fill of a large pit (801) in O100. Whilst these contextual differences are unlikely to account for all of the variability between these assemblages, it is possible that the small sample of context types creates a somewhat biased view of Assemblage Type C. Tables 39.9 and 39.10 provide a breakdown of the assemblage by Object.

Table 39.8 Summary of the Assemblage Type B retouched/used tools by Object.

Type		O60	O91	O100	Total Assemblage Type B
NFT	**n**	28	41	18	87
	%	*0.00*	*36.94*	*39.13*	*35.37*
used pieces	**n**	14	12	0	26
	%	*0.00*	*10.81*	*0.00*	*10.57*
points	**n**	9	2	2	13
	%	*10.11*	*1.80*	*4.35*	*5.28*
perforators	**n**	8	16	6	30
	%	*8.99*	*14.41*	*13.04*	*12.20*
scrapers	**n**	5	5	0	10
	%	*5.62*	*4.50*	*0.00*	*4.07*
bitruncations	**n**	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*
truncations	**n**	0	1	2	3
	%	*0.00*	*0.90*	*4.35*	*1.22*
bifacials	**n**	1	0	1	2
	%	*1.12*	*0.00*	*2.17*	*0.81*
glossed pieces	**n**	3	1	1	5
	%	*3.37*	*0.90*	*2.17*	*2.03*
burins	**n**	4	5	3	12
	%	*4.49*	*4.50*	*6.52*	*4.88*
notch/denticulates	**n**	5	12	3	20
	%	*5.62*	*10.81*	*6.52*	*8.13*
microliths	**n**			1	1
	%	*0.00*	*0.00*	*2.17*	*0.41*
backed blades	**n**	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*
retouched fragments	**n**	5	8	6	19
	%	*5.62*	*7.21*	*13.04*	*7.72*
varia	**n**	7	8	3	18
	%	*7.87*	*7.21*	*6.52*	*7.32*
Total	**n**	89	111	46	246

Assemblage Type C has 82 cores (1.81% of the assemblage) providing a core:debitage ratio of 1:42.9. The most commonly found core type is still the single platform core at 34%, but irregular cores decline to 28%, change of orientation cores rise to 23% and opposed platform cores increase to form 6% of the assemblage. As such, the changes in core type seen within Assemblage Type B continue to develop. Although many cores are regular in shape, there are several unusual examples, which resemble burins (e.g. Figure 35.25e in Chapter 35). Core trimming elements (n=86, 1.90%) increase in frequency. Platform rejuvenation flakes (36%) are more frequent, suggesting significantly more care with regard to core preparation in this phase. Crested pieces (11.6%) are approximately as common as in Assemblage Type B. Continuing the trend seen between Assemblage Type A and Assemblage Type B, core face removals become still less frequent at 52%. Cores used to produce a mixture of flakes and bladelets are marginally more common than in Assemblage Type B, at 48.7%, while there is a continued decline in cores used solely for the production of flakes (23%). Flake cores are again irregular in form. Cores that were used only for the production of bladelets are almost twice as common as in Assemblage Type A, accounting for 17% of the core assemblage. Although there are no blade cores, one of the opposed platform cores (now of a size to produce bladelets (Figure 39.1k) features scarring that suggests that it had previously been used for bidirectional blade production. Although analysis of core technology is ongoing, preliminary observations suggest that bladelet cores from Assemblage Type C are more standardised in form, targeting higher quality (Type 5) raw materials than those from other assemblages, with greater evidence for preparation and maintenance.

Flakes are the most common knapping product (55.02%), with blades at 6.23% and bladelets at 14.59%,

Table 39.9 Summary of the Assemblage Type C debitage by Object.

		O60	O100	Total Type Assemblage C
cores	**n**	52	30	82
	%	*1.66*	*2.16*	*1.81*
cte	**n**	56	30	86
	%	*1.79*	*2.16*	*1.90*
flakes	**n**	1759	730	2489
	%	*56.09*	*52.59*	*55.02*
blades	**n**	200	82	282
	%	*6.38*	*5.91*	*6.23*
bladelets	**n**	455	205	660
	%	*14.51*	*14.77*	*14.59*
spalls	**n**	36	4	40
	%	*1.15*	*0.29*	*0.88*
chips	**n**	322	178	500
	%	*10.27*	*12.82*	*11.05*
chunks	**n**	256	129	385
	%	*8.16*	*9.29*	*8.51*
mbt	**n**	0	0	0
	%	*0.00*	*0.00*	*0.00*
Total	**n**	3136	1388	4524

the blade:flake ratio is 1:2.6, continuing the trend for increasing production of lamellar items seen in Assemblage Type B. As in the other WF16 assemblage types, blades are mostly rather small (max. length *c.* 80 mm) and form a metrical continuum with bladelets. Blade/lets feature several pieces manufactured on opposed platform cores, consistent with the range of cores recovered from these contexts. Burin spalls continue to increase in frequency, and now constitute 0.88% of the assemblage. A single tranchet spall is also present. As with Assemblage Type B, there is no evidence for use of the microburin technique.

Tools are more strongly dominated by NFT (51.29%) than either Assemblage Type A or Assemblage Type B. These comprise a relatively low proportion of retouched flakes (49.8%), together with retouched blades (18.1%) and a high proportion of retouched bladelets (32.2%). Whilst the retouched flakes are generally large with irregular, chunky retouch, retouch on bladelets is often fine and irregular, which may suggest the possibility that the 'retouch' on these pieces is, in fact, unintentional edge damage. This is a plausible interpretation given the depositional context of much of the Assemblage Type C material.

Perforators are less frequent (7.22%) than in other WF16 assemblages and there are no points. Where present, perforators are generally more robust and less regular in form than those from Assemblage Type A, and there are few examples which resemble 'projectile' points. Together, this represents a significant departure from the general character of Southern Levantine PPNA assemblages that are usually dominated by slender, bilaterally pointed tools made on bladelets. Continuing the trend seen in the Assemblage Type B material, burins represent a significant component (8.8%) of the assemblage. Burins take a range of forms, including both single and multiple types with burin blows initiating on a range of surfaces. Burins are mostly manufactured on Type 5 material. As with points in both Assemblage Type A and Assemblage Type B, the distribution of burins is uneven. For example 10 of the 25 burins from O60 were recovered from (199), whilst 11 of the 16 burins from O100 were found in (801). It may be significant that (199) and (801) are both fills of stratigraphically late PPNA pits dug into earlier deposits.

Glossed pieces are relatively rare (n=3, 0.8%), and are often larger and feature far more developed gloss than is seen in other assemblage types at WF16. One of the glossed pieces (Figure 39.1i) is a possible Beit Tamir sickle. As with other WF16 assemblage types, Assemblage Type C includes a low proportion of bifacial pieces (n=3, 0.8%), and these are generally irregular in form, including several roughouts including examples made on basalt. No tranchet axes, four of which were identified in Pirie's (2007) report from evaluation Trench 3, are present in Assemblage Type C, although a tranchet sharpening spall from a small biface was recovered from O60. Scrapers are present (n=22, 5.7%), and are generally fairly large (>40 mm) and feature a range of, usually irregular and chunky, retouch types. Several scrapers retain cortex on their dorsal surfaces. A single microlith is present in the form of a rather battered lunate manufactured on Type 1 material. Both the raw material and condition of this piece

Table 39.10 Summary of Assemblage Type C retouched/used tools by Object.

Type		O60	O100	Total Type Assemblage Type C
NFT	**n**	148	51	199
	%	*55.64*	*41.80*	*51.29*
Used pieces	**n**	28	7	35
	%	*10.53*	*5.74*	*9.02*
points	**n**	0	0	0
	%	*0.00*	*0.00*	*0.00*
perforators	**n**	17	11	28
	%	*6.39*	*9.02*	*7.22*
scrapers	**n**	11	11	22
	%	*4.14*	*9.02*	*5.67*
bitruncations	**n**	0	0	0
	%	*0.00*	*0.00*	*0.00*
truncations	**n**	1	3	4
	%	*0.38*	*2.46*	*1.03*
bifacials	**n**	3		3
	%	*1.13*	*0.00*	*0.77*
glossed pieces	**n**	2	1	3
	%	*0.75*	*0.82*	*0.77*
burins	**n**	21	13	34
	%	*7.89*	*10.66*	*8.76*
notch/denticulates	**n**	11	3	14
	%	*4.14*	*2.46*	*3.61*
microliths	**n**	1	0	1
	%	**0.38**	**0.00**	**0.26**
backed blades	**n**	1	0	0
	%	*0.38*	*0.00*	*0.00*
retouched fragments	**n**	18	12	30
	%	*6.77*	*9.84*	*7.73*
varia	**n**	4	10	14
	%	*1.50*	*8.20*	*3.61*
Total	**n**	**266**	**122**	388

suggest that it has been recycled from earlier levels. There are no bitruncations in the assemblage.

39.9 Taphonomic observations

Identifying and interpreting assemblage variability is central to the analysis of chipped stone assemblages. Our main goal in this initial study has been to disentangle diachronic change from variability caused by other factors — such as changes in building function or spatial patterning produced by social organisation — to provide an independent data set to assess stratigraphic and chronological patterning, primarily at Object level. At WF16, the deflation of upper deposits and the complex nature of wall construction mean that it is rarely possible to develop robust stratigraphically-based chronological relationships between Objects (Chapter 42). In part this is a consequence of the stage of excavation, as the vast majority of wall deposits have not yet been excavated, and further excavation will be required to resolve these issues. Where we have begun to dismantle walls (e.g. the slots trenches through the walls of O11 and O12, O56 and O85, and the complex interleaving of walls surrounding O45, O53 and O84) it is clear that these are composite, fluid features and that the present wall lines are often only the latest phase in a complex sequence of construction and remodelling, with individual walls incorporating material from several architectural phases. Moreover, even were we able to define a reliable sequence of wall construction, it is not clear that this would have bearing on the relative ages of the deposits contained by these walls, again frustrating attempts to develop a relative chronological sequence of deposits from different Objects across the site and hampering attempts to interpret patterns of change in material culture.

In this situation, the sequence of Objects from the northwest area of the site provides a rare chance to explore diachronic change. Here it is clear that O100 and O91 post-date the abandonment of O75, and that O60 also post-dates O91 and the initial construction of wall (795) surrounding O100. This sequence appears to be reflected in the succession of chipped stone assemblages (Assemblage Type A, Assemblage Type B, and Assemblage Type C) that have been identified from these Objects.

An additional challenge in attempting to identify and interpret variability within the assemblage is to ascertain the extent to which assemblages from individual contexts (and Objects) represent *in situ* traces of PPNA activity. The stratigraphic analyses presented in this volume demonstrate that Objects have a range of varied and diverse life histories, and that the distribution of excavated artefacts is, in many cases, likely to be a consequence of a complex web of taphonomic and behavioural factors. In this light, the degree to which inventories of artefacts collected from specific Objects will reflect the spatial organisation of PPNA life is uncertain and is likely to vary on a case-by-case (and context by context) basis. As described in Chapter 40, analysis of the ^{14}C dates indicate that intrusive activities were frequent within Objects, such as digging, and perhaps more significantly, the reuse of wood from earlier structures, that led to significant recycling and stratigraphic mixing of earlier deposits, this also being evident at Mureybet (Bar Yosef 2009) — a process we describe as 'churn'.

While noting these challenges of limited stratigraphic relationships between Objects and disturbance of contexts within Objects, it is nevertheless possible to offer some preliminary observations at this juncture. The consistent association of specific raw materials, technological changes, and the presence or absence of specific retouched tool types has allowed us to identify three assemblage types. This distribution suggests that chipped stone has not been greatly affected by 'churn'.

At the Object level of analysis, clear patterns in the distribution of raw materials, artefact condition, technology and typology have been revealed, showing that in many cases Objects are a useful unit of analysis. For example, the distribution of Type 5 raw material is clearly patterned. This material is far more abundant in O60 and O100 than in other sampled objects, indicating that limited movement of materials between these and other objects has occurred. Similarly, the distribution of cores is uneven, and whilst some Objects (e.g. O11 and O14) have very low proportions of cores they are abundant in other sampled sequences (e.g. O91). There is also patterning in the distribution and form of certain tools, such as points and burins. Points are rare (and/or of unusual form) in some sequences (e.g. Assemblage Type B and Assemblage Type C from O100 and O60), yet common in most other Objects. Burins, on the other hand, show the opposite distribution. Taken together, these observations suggest that the distribution of assemblage traits at the Object level does, in some cases, reflect PPNA activity, even if the material is not in primary *in situ* positions. Given the varied life histories of Objects, this is perhaps surprising and indicates that in some cases PPNA use of certain spaces (e.g. O11) remained consistent over the period(s) during which deposits filled the space, generating a unique 'flavour' to some Object assemblages.

There are, however, several examples where it is clear that the material from an Object reflects a range of different activities/or periods, showing that the function of spaces changed over time. Here the O100 sequence is informative. The Assemblage Type A material that derives from the basal deposits of O100 (associated with the construction and earliest occupation) is typical of much of the site, whilst assemblages from later deposits (associated with pit cutting and filling) show clear differences in assemblage traits, yielding Assemblage Type B and Assemblage Type C material. In these cases it is clear that context is a more appropriate unit of analysis, even though the relationship between specific contexts and the behaviour that led to their formation is likely to be complex. Even at the present level of analysis it seems clear that, in some cases, contexts at WF16 reflect PPNA activity, even though the contexts are not always primary. Examples here include the Assemblage Type B knapping surfaces in O91 and Assemblage Type A contexts including occupation horizon (377) from O33, the occupation/collapse horizons (658) and (666) from O56, and the roof collapse (1012), (1026) and (1029) from O45.

The patterned distribution of assemblage traits revealed in the present analysis show that the WF16 excavation has yielded both contexts and Objects that retain spatial and stratigraphic integrity and thus may reflect the spatial structure of PPNA life and diachronic change within the period. However, it is certain that many contexts will represent secondary and tertiary deposits dislocated from their primary setting. A key focus of ongoing and future analyses is to tease out these stratigraphic complexities, using detailed studies of tool attributes, technology and material condition (combined with studies of other categories of material) to shed light on the taphonomic histories of specific contexts.

39.10 Discussion

The analysis of a sample of chipped stone from WF16 has described three main assemblages (Assemblage Types A, B and C) that, at least in part, represent diachronic change. Although all three assemblages share a range of technological and typological features, they are clearly distinguishable in terms of raw material use, core reduction strategies and tool manufacture. Stratigraphically, where Assemblage Type C has been identified it always overlies both Assemblage Type A and Assemblage Type B, indicating that that this aspect of chipped stone variability at WF16 has a strong chronological dimension. The present analysis has also identified technological and typological variability both between and within Objects, suggesting that the chipped stone at WF16 reflects the spatial structure of aspects of PPNA behaviour at the site. All three assemblage types contain elements which are diagnostic of the Southern Levantine PPNA, and there is no material which clearly derives from other periods.

All three assemblage types are characterised by the on-site reduction of cores focussed on the production of small flakes, blades and bladelets. Cores are generally *ad hoc* and, at the present level of analysis, it has not been possible to delineate clear reduction sequences in any detail, nor fully comprehend the full repertoire of techniques used in either blank production or tool manufacture. Retouched pieces, in all three assemblage types, are dominated by NFT and also include glossed pieces, scrapers and notches/denticulates. Despite these overarching similarities, there are significant differences between Assemblage Types A, B and C (Figure 39.1).

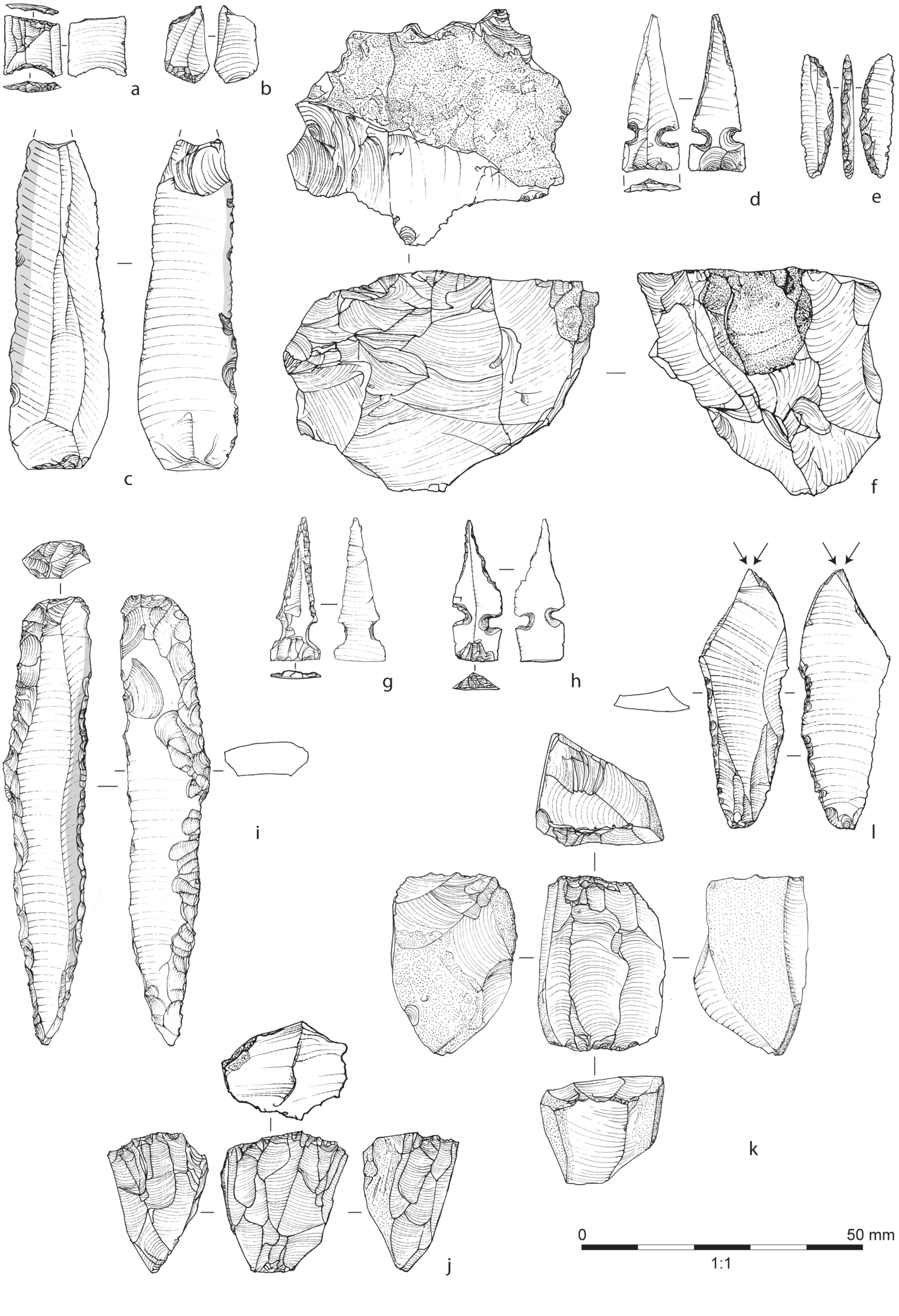
Assemblage Type A is characterised by the use of local wadi cobbles (Raw Material Types 2, 3 and 4), which are mostly used to produce a range of relatively simple cores. Higher quality Type 1 chert is present in varying proportions throughout the assemblage and is preferentially used for the production of more standard bladelet cores (often single platform). There is occasional use of the microburin technique, most frequently on debitage elements made on Type 1 chert. A high proportion of Assemblage Type A is heavily patinated. Retouched tools are broadly typical of the Southern Levantine PPNA and are similar to those described from WF16 evaluation Trenches 1 and 2 (Pirie 2007), with the addition of small proportions of glossed pieces. Excluding NFT, the dominant tools are a range of small, symmetrical, bilaterally retouched perforators and points, together with low proportions of microliths and bitruncations. Microliths are distributed throughout the assemblage where they are generally, but not exclusively, manufactured on Type 1 chert. The form of the vast majority of points, almost all of which are of the El-Khiam variety, is consistent with that described from previous work at WF16 (Smith 2007). Although clearly distinct from Assemblage Type B and Assemblage Type C, Assemblage Type A incorporates a range of variability in terms of raw material use, technology and typology as described above (section 39.9) and below (section 39.11). It is likely that more detailed analyses, drawn from larger samples, will delineate further assemblage types within this material. For example, within Assemblage Type A there are contexts and Objects (e.g. O14, O64, the infilling contexts from Structure O33, and the early levels of O12) which feature particularly high proportions of Type 1 raw material, appear to display subtle differences in core reduction strategies and include unusual proportions of specific tool types (e.g. microliths).

Assemblage Type B shares features with both Assemblage Types A and C. An incremental increase in Type 5 raw material and the proportions of burins in the early levels of O60 (and to a lesser degree O91), suggest affinities with the Assemblage Type C. Whilst the presence (albeit in small numbers) of points suggests affinities with Assemblage Type A, the form of points from Assemblage Type B is far less standardised than in Assemblage Type A, with many examples being highly atypical of those previously described from WF16 (Smith 2007). Assemblage Type B appears to represent a real example of cultural change and is unlikely to be a consequence of post-depositional mixing of Assemblage Types A and C. Firstly, the transition between the assemblage types seems gradual with incremental changes in raw material use, core reduction strategies and tool frequencies. Secondly, the unusual form of many of the El-Khiam points in Assemblage Type B indicates that these are not likely to derive from Assemblage Type A tool production techniques.

Assemblage Type C is characterised by a sharp increase in the use of Type 5 chert, which constitutes *c.* 30% of the sampled material, alongside a concurrent reduction in the use of other raw material types. Type 1 material is almost absent from Assemblage Type C and, where present, may have been residual/recycled from Assemblage Type A contexts. Type 5 material was brought to the site (probably from a source at the head of the wadi system) in the form of nodules with a chalky, non-battered cortex. Core reduction (especially on Type 5 material) in Assemblage Type C was more controlled than in Assemblage Type A, with increased evidence for core maintenance and preparation. Although most cores are unidirectional there is an increase in the use of both change of orientation and opposed platform, bidirectional reduction strategies. The microburin technique is absent from Assemblage Type C and, in general, Assemblage Type C is less heavily patinated than Assemblage Type A. In terms of typology the Assemblage Type C material shares affinities with the material from WF16 evaluation Trench 3 (Pirie 2007), key features being an absence of points, microliths and bitruncations coupled with a sharp increase in the proportion of burins.

The Assemblage Type C raw material also shares some affinities with WF16 evaluation Trench 3, such as an increase in the use of high quality brown raw materials, a reduction in the proportion of points and an increased concern for core maintenance/preparation (Pirie 2007). Given that in evaluation Trench 3, this material was

Figure 39.1 Chipped-stone artefacts from Assemblage Types A (a–f), B (g and h) and C (i–l) at WF16. Note different El-Khiam point stylistics between Assemblage Types A and B, and greater concern with core form in Assemblage Type C. a) Hagdud bitruncation O56 (676), b) Proximal microburin O33 (356), c) glossed blade O56 (676), d) El-Khiam point O12 (484) (SF 794), e) Helwan lunate O33 (357), f) single platform mixed flake/bladelet core O33 (377), g) El-Khiam point O100 (906), h) El-Khiam point O60 SF983 (576), i) glossed piece (Beit Tamir?) O100 (SF 2567) (896), j) single platform bladelet core O60 (438), k) opposed platform bladelet core O60 (438), l) dihedral burin O100 (801).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associated with stone-built (rather than pisé) structures, it is possible that the Assemblage Type C material may also be associated with the stone structures that survive in very fragmentary condition at the top of the stratigraphic sequence (O111). The chipped stone from Horizon O111 and other chronologically late Objects that were not included in the present sample may reveal additional Assemblage Type C material.

The observed intra- and inter-object variability in the distribution of Type 5 raw material (in the form of tools, cores, debitage and debris) has wider implications for our interpretation of WF16. Firstly this suggests that there is limited 'churn' of chipped stone within the O100 and O60 sequences and the internal stratigraphy of these Objects is relatively robust. Secondly, this indicates that there has been limited movement of chipped stone between Assemblage Type C contexts and those yielding Assemblage Type A material. This appears to confirm that contexts yielding Assemblage Type C material postdate the formation of sampled contexts from other Objects at the site.

While these three assemblage types demonstrate a clear change over time in the nature of the WF16 chipped stone manufacture and use, not all variability is likely to represent diachronic change. In addition to this chronological axis, there appears to be a spatial dimension to variability. Variation within the assemblages suggests that Objects fulfilled different functions during the PPNA, such as Structure O56 being a bead-making workshop, and Surface O91 being the site of intensive core reduction. The identification of such variability suggests that the WF16 assemblages have significant potential to shed light on both patterns of spatial organisation within a PPNA settlement and chronological developments during the PPNA.

Although the WF16 settlement includes both early (Assemblage Type A) and a late (Assemblage Type C) phases, these do not accord with the old notion of a short-lived, non-architectural Khiamian followed by a 'village Neolithic' based Sultanian (e.g. Byrd 2005a; 2005b). Although there are some similarities between the Khiamian and Assemblage Type A (presence of microliths, lack of bifacials, plenty of points) and between the Sultanian and Assemblage Type C (fewer points, no microliths) there are several areas where the WF16 assemblages identified here do not conform to this schema. For example, bitruncations, seen as a Sultanian tool (Nadel 1990), are only present at WF16 as part of Assemblage Type A, whilst the presence of burins (not generally identified as chronologically sensitive within the PPNA) are a defining typological feature of Assemblage Type C. More obviously, at WF16 contexts yielding Assemblage Type A material are clearly associated with architecture and appear to have a longer time depth than those associated with Assemblage Type C. Finally, at WF16 the transition between assemblage types occurs late in the period, perhaps reflecting a local dimension to wider regional patterns of change before the end of the PPNA. Indeed, WF16 Assemblage Type C shares many similarities with both the Late PPNA material from site of El Hemmeh (Smith *et al.* 2016) and (to a lesser degree) that from ZAD 2 (Sayej 2004). Overall, Assemblage Type C appears likely to date to the Late PPNA, a distinctive Southern Jordanian phase of the PPNA (Finlayson *et al.* 2011; Finlayson and Makarewicz 2017). At WF16 we have evidence for the gradual *in situ* development of the Late PPNA chipped stone industry, highlighting the potential of the WF16 sequence to shed light on PPNA cultural developments.

39.11 Chipped stone samples by Object

Structure O19 (Chapter 10)

The sample (n=1012 pieces) comprises material from nine out of the 18 contexts with chipped stone in Structure O19, Tables 39.11, 39.12. By weight, the sample (5590 g) constitutes 33.84% of the bulk finds chipped stone from this structure. In addition, SF1236 and SF1237 derive from sampled context (836) and are included in the analysis. As small quantities of chipped stone were recovered from most sampled contexts, more than half of the Structure O19 sample derives from upper infilling/abandonment context (142).

The sampled artefacts in Structure O19 are primarily composed of a range of medium-grained, opaque, grey and brown raw materials (Types 2, 3 and 4). Far smaller amounts (<5%) of translucent grey (Type 1) raw materials are also present. Translucent (Type 1) material is more prevalent in contexts below (833), whilst brown (Type 4) material mainly derives from contexts above (833). Patination is variable, and in contexts (833) and above there are generally low levels of patination, whilst in contexts below (833) the majority of sampled material is heavily patinated. As in other sampled Objects (e.g. O12), the degree of patination appears to relate to raw material type, with Type 4 material generally exhibiting low levels of patina. As is frequently the case at WF16, blade/lets are generally more heavily patinated than flakes. Material from most contexts appears fresh, with limited evidence for burning, rolling or trampling.

Both cores (1.48%) and CTE (0.99%) are present and the assemblage has a core:debitage ratio of 1:52. There are a total of 15 cores, comprising flake (n=8), bladelet (n=1) and mixed flake/bladelet (n=3) types, as well as core fragments (n=3). Flake cores, all of which derive from either (142) or (476), are dominated by irregular and single platform types, and range in size from *c.* 90 mm to *c.* 30 mm in maximum dimension. The flake cores, many of which appear exhausted, are predominantly manufactured on wadi cobbles of Type 2 or 3 material. Other cores from these contexts include a core fragment and a single platform mixed flake/bladelet core. The remaining cores derive from context (833) and are rather different to those from overlying contexts. Cores from (833) comprise a single platform, sub-pyramidal bladelet core, fragments of two bladelet cores and two mixed flake/bladelet core types. Cores from (833) are generally smaller,

Table 39.11 Chipped-stone debitage by context from Structure O19.

context		142	476	836	821	823	833	1059	857	854	O19
cores	n	8	2	0	0	0	5	0	0	0	15
	%	*1.53*	*1.45*	*0.00*	*0.00*	*0.00*	*2.65*	*0.00*	*0.00*	*0.00*	*1.48*
cte	n	4	2	0	1	0	2	0	1	0	10
	%	*0.76*	*1.45*	*0.00*	*9.09*	*0.00*	*1.06*	*0.00*	*1.56*	*0.00*	*0.99*
flakes	n	299	89	0	5	35	104	4	37	9	582
	%	*57.17*	*64.49*	*0.00*	*45.45*	*74.47*	*55.03*	*26.67*	*57.81*	*40.91*	*57.51*
blades	n	26	10	3	1	2	13	1	1	5	62
	%	*4.97*	*7.25*	*100.00*	*9.09*	*4.26*	*6.88*	*6.67*	*1.56*	*22.73*	*6.13*
bladelets	n	63	18	0	1	3	19	2	14	6	126
	%	*12.05*	*13.04*	*0.00*	*9.09*	*6.38*	*10.05*	*13.33*	*21.88*	*27.27*	*12.45*
spalls	n	1	0	0	0	0	0	0	0	0	1
	%	*0.19*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.10*
chips	n	23	0	0	0	0	14	4	1	0	42
	%	*4.40*	*0.00*	*0.00*	*0.00*	*0.00*	*7.41*	*26.67*	*1.56*	*0.00*	*4.15*
chunks	n	97	16	0	3	7	32	4	8	1	168
	%	*18.55*	*11.59*	*0.00*	*27.27*	*14.89*	*16.93*	*26.67*	*12.50*	*4.55*	*16.60*
mbt	n	2	1	0	0	0	0	0	2	1	6
	%	*0.38*	*0.72*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*3.13*	*4.55*	*0.59*
Total	n	523	138	3	11	47	189	15	64	22	1012

more regular and manufactured on more finely grained raw materials (e.g. Type 1) than cores from other contexts sampled in this structure. CTE are mainly core face removals (n=7) but also include platform rejuvenation flakes (n=2) and one crested piece. Only 20.75% of the entire assemblage is classified as debris.

Debitage is dominated by flakes (57.51%), many of which are fragments, with smaller numbers of blades (6.13%) and bladelets (12.45%) producing a blade:flake ratio of 1:3. There is one spall in the assemblage. Flakes from context (833) and above are generally larger and less regular, whilst flakes from below (833) are generally finer, show dorsal scarring indicative of bladelet manufacture and include many very small (<20 mm) pieces. This trend is mirrored in the blade/let assemblages. Material from (833) and above includes many irregular examples, often manufactured in Type 4 material. In contexts below (833) the (small) sample of blade/lets are generally smaller, more regular in form and are made on more finely grained raw material types (e.g. Type 1). There are six (0.59%) microburins in the assemblage deriving from contexts scattered throughout the sequence; these include both distal and proximal pieces. All the microburins are made on fine-grained (e.g. Type 1) raw materials, and those from basal contexts are heavily patinated.

Retouched/used pieces (n=127) are manufactured on a range of blank types with 16.26% of debitage retouched. The assemblage includes a wide range of both formal and NFT types (Table 39.12). In total 55.97% of the tool assemblage is made up of NFT, including retouched flakes (24.41%), blades (18.11%) and bladelets (9.45%). Small numbers of unretouched debitage have macroscopic use wear traces.

The most common formal tool types are perforators (9.45%) and ‘projectile’ points (7.09%). The perforators (n=12) are all awls, which are manufactured on a range of blanks and take a range of forms. All nine points were recovered from contexts (142) and (476). These comprise seven El-Khiam points and two non-diagnostic point tip fragments, the majority of which are heavily patinated and have tips formed by inverse retouch. The assemblage includes six scrapers (4.72%), all on flakes, with working edges formed by irregular retouch. There are also four notches/denticulates (3.15%) and four microliths. The microliths are distributed throughout the sequence and include three backed blades and an unusual microlithic point featuring Helwan backing from (833). All the microliths are made on fine-grained raw material (usually Type 1), although the extent to which these are patinated varies considerably. There are three (2.36%) glossed pieces (two bladelets and a blade), all of which have well developed bifacially distributed gloss on one lateral margin. Other tools include truncations (2.36%), Hagdud bitruncations (1.57%) and a single burin. There are five tools tabulated as varia, including a large bitruncated blade section (an exceptionally large Hagdud truncation?), retouched chunks and a notched pebble.

In summary, the sampled assemblage from O19 comprises a range of technological and typological elements typical of the PPNA. There is a low proportion of debris compared to other sampled Objects, perhaps suggesting that little knapping took place in this location.

Table 39.12 Retouched and used chipped-stone artefacts by context from Structure O19.

Type		142	476	836	821	823	833	1059	857	854	O19
retouched flakes	n	15	8	0	0	1	4	0	2	1	31
	%	*25.00*	*33.33*	*0.00*	*0.00*	*33.33*	*17.39*	*0.00*	*28.57*	*14.29*	*24.41*
used flakes	n	1	0	0	1	0	2	0	0	0	4
	%	*1.67*	*0.00*	*0.00*	*50.00*	*0.00*	*8.70*	*0.00*	*0.00*	*0.00*	*3.15*
retouched blades	n	10	3	0	1	0	6	0	0	3	23
	%	*16.67*	*12.50*	*0.00*	*50.00*	*0.00*	*26.09*	*0.00*	*0.00*	*42.86*	*18.11*
used blades	n	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
retouched bladelets	n	3	1	0	0	1	4	1	0	2	12
	%	*5.00*	*4.17*	*0.00*	*0.00*	*33.33*	*17.39*	*100.00*	*0.00*	*28.57*	*9.45*
used bladelets	n	0	1	0	0	0	0	0	0	0	1
	%	*0.00*	*4.17*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.79*
points	n	4	5	0	0	0	0	0	0	0	9
	%	*6.67*	*20.83*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*7.09*
perforators	n	7	2	0	0	1	0	0	1	1	12
	%	*11.67*	*8.33*	*0.00*	*0.00*	*33.33*	*0.00*	*0.00*	*14.29*	*14.29*	*9.45*
scrapers	n	5	0	0	0	0	1	0	0	0	6
	%	*8.33*	*0.00*	*0.00*	*0.00*	*0.00*	*4.35*	*0.00*	*0.00*	*0.00*	*4.72*
bitruntcations	n	0	1	0	0	0	1	0	0	0	2
	%	*0.00*	*4.17*	*0.00*	*0.00*	*0.00*	*4.35*	*0.00*	*0.00*	*0.00*	*1.57*
truncations	n	2	0	0	0	0	1	0	0	0	3
	%	*3.33*	*0.00*	*0.00*	*0.00*	*0.00*	*4.35*	*0.00*	*0.00*	*0.00*	*2.36*
bifacials	n	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
glossed pieces	n	2	0	0	0	0	0	0	1	0	3
	%	*3.33*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*14.29*	*0.00*	*2.36*
burins	n	1	0	0	0	0	0	0	0	0	1
	%	*1.67*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.79*
notch/denticulates	n	1	1	0	0	0	2	0	0	0	4
	%	*1.67*	*4.17*	*0.00*	*0.00*	*0.00*	*8.70*	*0.00*	*0.00*	*0.00*	*3.15*
microliths	n	2	0	0	0	0	1	0	1	0	4
	%	*3.33*	*0.00*	*0.00*	*0.00*	*0.00*	*4.35*	*0.00*	*14.29*	*0.00*	*3.15*
backed blades	n	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
retouched fragments	n	5	1	0	0	0	0	0	1	0	7
	%	*8.33*	*4.17*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*14.29*	*0.00*	*5.51*
varia	n	2	1	0	0	0	1	0	1	0	5
	%	*3.33*	*4.17*	*0.00*	*0.00*	*0.00*	*4.35*	*0.00*	*14.29*	*0.00*	*3.94*
Total	n	60	24	0	2	3	23	1	7	7	127

There appears to be a subtle chronological shift in the nature of the assemblage, with contexts below (833) featuring a higher proportion of both more regular debitage and fine-grained (Type 1) raw material than those above (833). The sample of retouched tools is too small to explore the possibility of a typological shift to mirror that observed in the debitage. The changing nature of the chipped stone assemblage may indicate that O19 was occupied/infilled over an extended period.

Structure O12 (Chapter 11)

The sample (n=2244 pieces) comprises material from 13 out of the 37 contexts with chipped stone in Structure O12, Tables 39.13 and 39.14. By weight, the sample (9475 g) constitutes 34% of the bulk finds of chipped stone from this structure. In addition, SF784 is from sampled context (484) and is included in the analysis.

The sampled artefacts from Structure O12 are primarily of medium-grained, opaque, grey and brown raw materials

(Types 2, 3 and 4) although there are small amounts (<5%) of translucent grey (Type 1) and caramel brown (Type 5) materials. There are also occasional pieces of flaked coarse stone (basalt and limestone) throughout the sequence. Both the degree of patination and the proportions of raw material types vary throughout the sequence and have no clear stratigraphic patterning. The majority of sampled material is relatively fresh, with limited evidence for burning, rolling or trampling.

Both cores (1.07%) and CTEs (1.38%) are present in varying proportions throughout the sequence, and the assemblage has a core:debitage ratio of 1:72. Cores (n=24) include flake (n=4), bladelet (n=1) and mixed flake/bladelet types (n=14) together with core fragments (n=5). Flake cores are generally made on cobbles and are irregular in form. The single example of a bladelet core is a small (30 mm max. dimension) irregular, exhausted example manufactured on Type 1 material. The mixed cores (max. size *c.* 60 x 30 x 30 mm) include many small exhausted examples with copious step and hinge termination scars and include irregular examples together with regular, single platform, sub-pyramidal examples. The more regular mixed cores commonly occur on more finely grained grey raw materials (Type 1), are often heavily patinated, and mainly derive from contexts located towards the base of the sampled sequence. CTE, which mainly derive from bladelet or mixed flake/bladelet core types, are dominated by core face removals (n=25) but also include platform rejuvenation flakes (n=4) and crested pieces (n=2). In total, 21.2% of the sample is classified as debris, with chips and chunks both present throughout the sequence.

The debitage assemblage is dominated by flakes (54.19%) with smaller numbers of bladelets (15.46%). Blades are relatively scarce and make up just 6.37% of the assemblage. The blade:flake ratio is 1:2. There are two burin spalls in the assemblage. As with raw materials and patination, the debitage is variable and, perhaps unsurprisingly, the nature of debitage appears to vary in line with raw materials. For example, contexts with high proportions of brown (Type 4) raw material (e.g. 171) tend to include larger flakes (>40 mm) alongside many smaller flakes. Conversely, contexts with more patination (e.g. 862) and higher proportions of grey material (Types 2 and 3) tend to have smaller proportions of larger flakes and are dominated by very small (<20 mm) flakes. The character of blades and bladelets from Structure O12 also varies by context, with higher proportions of regular blades occurring in contexts dominated by unpatinated brown (Type 4) material (e.g. 171). All examined blades and bladelets derive from unidirectional core reduction. Notably, context (484) features several blades manufactured on Type 5, translucent brown material. The assemblage includes four microburin products (0.18%), comprising both distal and proximal examples, all of which are manufactured on bladelets.

The retouched/used assemblage (n=262) is manufactured on a range of blank types, and in total 15.07% of debitage is retouched. The assemblage includes a wide range of both formal and NFT types. In total, 42.75% of the tool assemblage is made up of NFT including retouched flakes (16.41%), blades (12.6%) and bladelets (13.74%). Small numbers of unretouched debitage have macroscopic use wear traces.

Perforators are the most frequent formal tool type (15.65%) and include awls (n=38) and borers (n=3). Awls occur on bladelets (n=20), flakes (n=10) and blades (n=8). Many of the awls on bladelets feature elongated straight tips formed by bilateral retouch of lateral margins. In contrast, awls on flakes are less standardised, and feature a range of tip orientations and sizes. Points are the next most common formal tool type (9.16%). Points (n=24) include 22 El-Khiam points and two tip fragments that are unidentifiable to sub-type. Many of the El-Khiam points are base/notch fragments. Points are made on a range of raw material types and exhibit various levels of patination. Where present, the tips of all points from this structure are formed by inverse retouch. Points are distributed unevenly throughout the sequence, with 10 points recovered from context (484) where they constitute 17.54% of the tool assemblage. The points from (484) include SF784, which is composed of five El-Khiam points.

Notches/denticulates (n=11) constitute 4.2% of the tool assemblage; these are made on flakes, blades and bladelets and take a range of forms. There are 10 truncations in the assemblage (3.81%), including seven truncated flakes, two truncated bladelets and a truncated blade. The assemblage includes six microliths, which include three backed bladelets, a backed and truncated bladelet and two lunates. Notably, both the lunates and one of the backed bladelets feature Helwan backing. Microliths are exclusively manufactured on Type 1 material, although the degree of patination on these pieces is highly variable. Bitruncations (n=4) include both Hagdud (n=3) and Gilgal (n=1) types; the Gilgal example is manufactured on Type 1 raw material. Other tools present in the sequence include scrapers (1.15%), burins (1.15%), a backed blade and a flake with unusual gloss/polish on the dorsal surface. There are 6 (2.29%) pieces classified as varia, including an unusual microlithic point and several irregular bilaterally notched pieces. There is a high proportion of retouched fragments in the assemblage (10.31%), mostly fragments of flakes with retouch.

The Structure O12 chipped stone assemblage fits comfortably with a PPNA cultural designation, with the tools being dominated by pointed elements including perforators and El-Khiam points. As is commonly the case at WF16, points are unevenly distributed throughout the sequence. It is difficult to interpret the contextual variability in typology, raw material and artefact condition observed in the Structure O12 sequence; this may reflect the filling of the structure with dumps of material from other areas of the site.

Structure O11 (Chapter 12)

The sample (n=1034 pieces) includes material from 13 out of the 25 contexts with chipped stone in Structure O11,

Table 39.13 Chipped-stone debitage by context from Structure O12.

Context		171	478	492	484	847	809	853	861	862	803	1058	832	1055	O12
cores	n	3	0	2	7	2	1	2	3	0	0	3	1	0	24
	%	*1.31*	*0.00*	*0.97*	*1.64*	*1.53*	*6.25*	*1.07*	*0.72*	*0.00*	*0.00*	*3.16*	*0.75*	*0.00*	*1.07*
cte	n	4	0	1	2	3	0	10	6	1	2	1	0	1	31
	%	*1.75*	*0.00*	*0.48*	*0.47*	*2.29*	*0.00*	*5.35*	*1.45*	*0.49*	*3.92*	*1.05*	*0.00*	*1.04*	*1.38*
flakes	n	145	23	100	204	79	10	91	229	137	28	49	74	47	1216
	%	*63.32*	*42.59*	*48.31*	*47.89*	*60.31*	*62.50*	*48.66*	*55.18*	*67.16*	*54.90*	*51.58*	*55.64*	*48.96*	*54.19*
blades	n	12	16	22	33	17	0	9	12	8	2	4	3	5	143
	%	*5.24*	*29.63*	*10.63*	*7.75*	*12.98*	*0.00*	*4.81*	*2.89*	*3.92*	*3.92*	*4.21*	*2.26*	*5.21*	*6.37*
bladelets	n	26	8	25	73	22	4	26	69	29	8	15	21	21	347
	%	*11.35*	*14.81*	*12.08*	*17.14*	*16.79*	*25.00*	*13.90*	*16.63*	*14.22*	*15.69*	*15.79*	*15.79*	*21.88*	*15.46*
spalls	n	1	0	0	1	0	0	0	0	0	0	0	0	0	2
	%	*0.44*	*0.00*	*0.00*	*0.23*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.09*
chips	n	18	4	35	58	4	1	33	67	20	5	6	13	15	279
	%	*7.86*	*7.41*	*16.91*	*13.62*	*3.05*	*6.25*	*17.65*	*16.14*	*9.80*	*9.80*	*6.32*	*9.77*	*15.63*	*12.43*
chunks	n	19	3	22	47	4	0	16	29	8	6	17	21	6	198
	%	*8.30*	*5.56*	*10.63*	*11.03*	*3.05*	*0.00*	*8.56*	*6.99*	*3.92*	*11.76*	*17.89*	*15.79*	*6.25*	*8.82*
mbt	n	1	0	0	1	0	0	0	0	1	0	0	0	1	4
	%	*0.44*	*0.00*	*0.00*	*0.23*	*0.00*	*0.00*	*0.00*	*0.00*	*0.49*	*0.00*	*0.00*	*0.00*	*1.04*	*0.18*
Total	n	229	54	207	426	131	16	187	415	204	51	95	133	96	2244

Tables 39.15 and 39.16. By weight, the sample (3765 g) constitutes 33% of the bulk finds of chipped stone from this structure. No chipped-stone small finds were recovered from the sampled contexts.

The sampled artefacts from Structure O11 are primarily of various grey and grey-brown raw materials (Types 2 and 3). A small (generally <2%) amount of translucent grey material (Type 1) is also present. Some contexts (e.g. (1056)) also include a small proportion of medium-grained, brown raw material (Type 4). Patination is variable, with material from some contexts (e.g. (828), (155) and (817)) exhibiting a high level of patination whilst other contexts (e.g. (1057), the stratigraphically earliest sampled context) contain very few patinated pieces. In terms of condition, material from most contexts appears fresh, with limited evidence for burning, rolling or trampling. An exception to this is context (400), where a high proportion of pieces feature edge damage/batter, suggesting a different taphonomic history for these pieces.

Although both cores (0.48%) and CTE (0.77%) are present, these occur in low proportions and the assemblage has a core:debitage ratio of 1:164. There are only five cores; these comprise flake cores (n=3), a core fragment and an unclassified core. Flake cores are generally simple single platform types, with minimal signs of platform preparation and are manufactured on wadi cobbles. The core fragment appears to derive from a change of orientation bladelet core. CTE, which primarily occur in contexts that also feature cores, include platform rejuvenation flakes (n=3), crested pieces (n=2) and core face removals (n=2). In total, 19.9% of the sample is classified as debris, with chips and chunks both present throughout the sequence. The low frequency of cores, CTE and debris indicate that either Structure O11 was regularly cleaned to remove knapping debris, or very little core reduction took place in Structure O11.

The debitage assemblage is dominated by flakes (62.77%) with smaller numbers of blades (4.16%) and bladelets (11.70%); the blade:flake ratio is 1:4. There is one spall in the assemblage. Flakes are generally small (<30 mm) throughout the sequence with many fragments and pieces that are almost chip size. There are occasional primary elements throughout the sequence. Contexts (1056) and (1057) include a higher proportion of larger pieces, often made on a medium-grained brown raw material (Type 4). There is evidence, in the form of dorsal scar patterns, that many flakes derive from blade/bladelet cores. This is particularly apparent in context (817). Blades and bladelets (all of which derive from unidirectional core reduction) include many fragmentary/irregular pieces and are often made on medium-grained grey raw material types (Types 2 and 3). However, where more regular examples are present these are often manufactured on higher quality grey raw materials (Type 1). Context (817) contained a high proportion of small and regular blades and bladelets. A single microburin (distal) was recovered, from (817).

The retouched/used assemblage (n=113) is manufactured on a range of blank types. In total 13.75% of debitage is retouched, although the proportion of retouched debitage in occupation deposits varies from 6.45% in (400) to 20.59% in (348). The assemblage includes a wide range of both formal and NFT types. In total, 33.63% of the tool assemblage is made up of NFT. This includes retouched flakes (23.89%), blades

Table 39.14 Retouched and used chipped-stone artefacts by context from Structure O12.

Type		171	478	492	484	847	809	853	861	862	803	1058	832	1055	total O12
retouched flakes	**n**	6	1	3	6	5	0	3	11	2	1	2	2	1	43
	%	*18.75*	*16.67*	*10.71*	*10.53*	*21.74*	*0.00*	*13.64*	*28.95*	*14.29*	*16.67*	*15.38*	*15.38*	*11.11*	*16.41*
used flakes	**n**	3	0	0	0	0	0	0	0	0	1	0	0	0	4
	%	*9.38*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*16.67*	*0.00*	*0.00*	*0.00*	*1.53*
retouched blades	**n**	3	2	7	7	5	0	4	1	2	0	0	1	1	33
	%	*9.38*	*33.33*	*25.00*	*12.28*	*21.74*	*0.00*	*18.18*	*2.63*	*14.29*	*0.00*	*0.00*	*7.69*	*11.11*	*12.60*
used blades	**n**	0	0	1	5	0	0	0	0	0	1	1	0	0	8
	%	*0.00*	*0.00*	*3.57*	*8.77*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*16.67*	*7.69*	*0.00*	*0.00*	*3.05*
retouched bladelets	**n**	5	1	2	7	3	0	4	5	3	0	2	1	3	36
	%	*15.63*	*16.67*	*7.14*	*12.28*	*13.04*	*0.00*	*18.18*	*13.16*	*21.43*	*0.00*	*15.38*	*7.69*	*33.33*	*13.74*
used bladelets	**n**	0	0	1	0	0	0	0	0	0	0	0	0	0	1
	%	*0.00*	*0.00*	*3.57*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.38*
points	**n**	2	0	0	10	4	0	1	2	3	0	1	1	0	24
	%	*6.25*	*0.00*	*0.00*	*17.54*	*17.39*	*0.00*	*4.55*	*5.26*	*21.43*	*0.00*	*7.69*	*7.69*	*0.00*	*9.16*
perforators	**n**	3	2	7	10	1	0	7	6	0	1	3	1	0	41
	%	*9.38*	*33.33*	*25.00*	*17.54*	*4.35*	*0.00*	*31.82*	*15.79*	*0.00*	*16.67*	*23.08*	*7.69*	*0.00*	*15.65*
scrapers	**n**	1	0	0	0	0	0	0	0	1	0	0	1	0	3
	%	*3.13*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*7.14*	*0.00*	*0.00*	*7.69*	*0.00*	*1.15*
bitruntcations	**n**	0	0	0	2	0	0	0	0	0	1	0	0	1	4
	%	*0.00*	*0.00*	*0.00*	*3.51*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*16.67*	*0.00*	*0.00*	*11.11*	*1.53*
truncations	**n**	2	0	1	1	2	0	1	1	0	0	1	0	1	10
	%	*6.25*	*0.00*	*3.57*	*1.75*	*8.70*	*0.00*	*4.55*	*2.63*	*0.00*	*0.00*	*7.69*	*0.00*	*11.11*	*3.82*
bifacials	**n**	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
glossed pieces	**n**	0	0	0	0	0	0	0	0	0	1	0	0	0	1
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*16.67*	*0.00*	*0.00*	*0.00*	*0.38*
burins	**n**	2	0	0	0	0	0	1	0	0	0	0	0	0	3
	%	*6.25*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*4.55*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.15*
notch/ denticulates	**n**	0	0	1	2	2	0	1	1	1	0	1	1	1	11
	%	*0.00*	*0.00*	*3.57*	*3.51*	*8.70*	*0.00*	*4.55*	*2.63*	*7.14*	*0.00*	*7.69*	*7.69*	*11.11*	*4.20*
microliths	**n**	1	0	0	0	1	1	0	0	0	0	1	1	1	6
	%	*3.13*	*0.00*	*0.00*	*0.00*	*4.35*	*100.00*	*0.00*	*0.00*	*0.00*	*0.00*	*7.69*	*7.69*	*11.11*	*2.29*
backed blades	**n**	0	0	0	0	0	0	0	1	0	0	0	0	0	1
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*2.63*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.38*
retouched fragments	**n**	3	0	4	5	0	0	0	9	2	0	0	4	0	27
	%	*9.38*	*0.00*	*14.29*	*8.77*	*0.00*	*0.00*	*0.00*	*23.68*	*14.29*	*0.00*	*0.00*	*30.77*	*0.00*	*10.31*
varia	**n**	1	0	1	2	0	0	0	1	0	0	1	0	0	6
	%	*3.13*	*0.00*	*3.57*	*3.51*	*0.00*	*0.00*	*0.00*	*2.63*	*0.00*	*0.00*	*7.69*	*0.00*	*0.00*	*2.29*
Total	**n**	32	6	28	57	23	1	22	38	14	6	13	13	9	262

(7.08%) and bladelets (2.65%). Small numbers of unretouched debitage have macroscopic use wear traces.

Perforators (18.58%) and points (15.93%) are the most frequent formal tool types. Perforators (n=21) include 20 awls and one borer. Awls occur on flakes (n=10), bladelets (n=8) and less commonly on blades (n=2). Awls on flakes include several pieces with the tip formed by the conjunction of a break and a small notch. Awls on bladelets are generally more regular with fine bilateral retouch forming a slender, elongated tip. The 'projectile' points (n=18) include 16 of the El-Khiam sub-type together with two tip fragments. The points are typical of the WF16 assemblage featuring straight retouched bases, simply retouched notches and tips formed by inverse retouch. The majority of both points and perforators occur towards the base of the Structure O11 sequence. The next most common formal tool type is notches/denticulates that constitute 8.85% of the tool assemblage and comprise two large (>50 mm) flakes with irregular denticulate retouch, together with a range of notched pieces. In contrast to points and perforators, notch/denticulates primarily occur in the upper levels of the sampled sequence.

Table 39.15 Chipped-stone debitage by context from Structure O11.

Context		155	400	160	167	161	176	162	178	181	817	828	1056	1057	O11
cores	n	0	2	0	0	0	0	2	0	0	1	0	0	0	5
	%	*0.00*	*1.30*	*0.00*	*0.00*	*0.00*	*0.00*	*2.90*	*0.00*	*0.00*	*0.88*	*0.00*	*0.00*	*0.00*	*0.48*
cte	n	1	3	0	0	0	0	3	0	0	0	0	0	1	8
	%	*1.45*	*1.95*	*0.00*	*0.00*	*0.00*	*0.00*	*4.35*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.80*	*0.77*
flakes	n	39	98	47	23	28	30	36	36	17	55	64	91	85	649
	%	*56.52*	*63.64*	*87.04*	*52.27*	*80.00*	*61.22*	*52.17*	*83.72*	*58.62*	*48.25*	*74.42*	*55.83*	*68.00*	*62.77*
blades	n	1	7	2	4	2	1	2	2	1	1	4	9	7	43
	%	*1.45*	*4.55*	*3.70*	*9.09*	*5.71*	*2.04*	*2.90*	*4.65*	*3.45*	*0.88*	*4.65*	*5.52*	*5.60*	*4.16*
bladelets	n	7	16	3	7	2	4	1	2	2	17	13	23	24	121
	%	*10.14*	*10.39*	*5.56*	*15.91*	*5.71*	*8.16*	*1.45*	*4.65*	*6.90*	*14.91*	*15.12*	*14.11*	*19.20*	*11.70*
spalls	n	0	0	0	0	0	0	1	0	0	0	0	0	0	1
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.45*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.10*
chips	n	16	11	0	5	1	5	18	0	8	27	2	30	4	127
	%	*23.19*	*7.14*	*0.00*	*11.36*	*2.86*	*10.20*	*26.09*	*0.00*	*27.59*	*23.68*	*2.33*	*18.40*	*3.20*	*12.28*
chunks	n	5	17	2	5	2	9	6	3	1	12	3	10	4	79
	%	*7.25*	*11.04*	*3.70*	*11.36*	*5.71*	*18.37*	*8.70*	*6.98*	*3.45*	*10.53*	*3.49*	*6.13*	*3.20*	*7.64*
mbt	n	0	0	0	0	0	0	0	0	0	1	0	0	0	1
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.88*	*0.00*	*0.00*	*0.00*	*0.10*
Total	n	69	154	54	44	35	49	69	43	29	114	86	163	125	1034

There are three microliths (2.65%), including two backed bladelets (one with Helwan backing) and a geometric type. The example with Helwan backing is heavily patinated and is manufactured on Type 1 raw material. The assemblage also features two backed blades (1.77%), two truncated pieces (one flake and one bladelet) and two bitruncations (one Gilgal and one Hagdud). There is a single glossed piece in the assemblage in the form of a retouched flake fragment with weak gloss on one lateral margin. There is also a single burin (this is possibly a point tip fragment with burin scars formed as a consequence of use/impact) and an irregular end scraper on a flake. Varia are represented by a single piece, a bilaterally notched blade.

The sample of chipped stone from Structure O11 fits comfortably with a PPNA cultural designation and includes many diagnostic PPNA elements. The proportions of cores, CTE and debris are all low. There is some variability between the sampled contexts in terms of raw material type, patination and debitage composition. For example, floor (817) includes a higher proportion of finely grained raw materials, along with regular blade/lets and relatively fine flakes deriving from blade/bladelet cores. In contrast, contexts (1056) and (1057) include greater numbers of larger pieces, made on more coarsely-grained raw material types, much of which has no visible patination. The assemblage from (817) bears strong similarities to material from sampled structures located in the western areas of the trench (e.g. O14, O64 and infilling contexts from O33).

Structure O45 (Chapter 14)

The sample (n=3102 pieces) includes material from 17 out of the 49 contexts with chipped stone in Structure O45, Tables 39.17 and 39.18. By weight, the sample (12,655 g) constitutes 24% of the bulk finds of chipped stone from this structure. In addition, a total of 13 small finds derive from sampled contexts and are included in the analysis. Small finds are SF137, SF247, SF249, SF263, SF265, SF268, SF269 (all context (44)), SF298 (249), SF282, SF283 (251), SF2061 (1045), SF2075 (1308) and SF2423 (1318).

The majority of assemblages sampled in Structure O45 are dominated by medium-grained, opaque grey raw materials (Types 2 and 3). Small (<2%) proportions of translucent grey (Type 1) material are also present. There are also occasional pieces of flaked coarse stone (basalt and limestone) throughout the assemblage. Patination is variable throughout the sequence, with material from some contexts (e.g. (1017) and (1029)) exhibiting a low level of patination, whilst in other contexts (e.g. (1322) and (1328)) material is almost all heavily patinated. Small proportions of material are burnt in most contexts, with burning reaching a maximum in (1026) where *c.* 10% of the assemblage is burnt.

Although both cores (0.61%) and CTE (0.77%) are present, these occur in low proportions and the assemblage has a core:debitage ratio of 1:99. There are a total of 19 cores, comprising flake (n=7) and mixed flake/bladelet (n=10) core types, as well as core fragments (n=2). Flake cores are generally simple, single platform types; these show minimal signs of platform preparation and are manufactured on wadi cobbles. Mixed flake/bladelet cores are more regular in form, show greater emphasis on platform preparation, and include change of orientation and single platform sub-pyramidal types. Where it is possible to discern, mixed cores are primarily manufactured on small

Table 39.16 Retouched and used chipped-stone artefacts by context from Structure O11.

Type		155	400	160	167	161	176	162	178	181	817	828	1056	1057	O11
retouched flakes	n	3	2	5	0	3	0	2	1	0	1	4	4	2	27
	%	*37.50*	*25.00*	*71.43*	*0.00*	*75.00*	*0.00*	*28.57*	*16.67*	*0.00*	*9.09*	*40.00*	*25.00*	*10.00*	*23.89*
used flakes	n	0	0	1	2	0	0	0	0	1	0	0	0	2	6
	%	*0.00*	*0.00*	*14.29*	*28.57*	*0.00*	*0.00*	*0.00*	*0.00*	*33.33*	*0.00*	*0.00*	*0.00*	*10.00*	*5.31*
retouched blades	n	1	0	0	0	0	0	1	0	1	0	1	1	3	8
	%	*12.50*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*14.29*	*0.00*	*33.33*	*0.00*	*10.00*	*6.25*	*15.00*	*7.08*
used blades	n	0	0	0	0	0	0	1	0	0	0	0	1	0	2
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*14.29*	*0.00*	*0.00*	*0.00*	*0.00*	*6.25*	*0.00*	*1.77*
retouched bladelets	n	0	0	0	0	0	0	0	0	0	2	0	0	1	3
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*18.18*	*0.00*	*0.00*	*5.00*	*2.65*
used bladelets	n	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
points	n	2	0	0	1	0	1	0	1	1	2	3	3	4	18
	%	*25.00*	*0.00*	*0.00*	*14.29*	*0.00*	*16.67*	*0.00*	*16.67*	*33.33*	*18.18*	*30.00*	*18.75*	*20.00*	*15.93*
perforators	n	0	1	1	0	0	4	3	1	0	3	1	4	3	21
	%	*0.00*	*12.50*	*14.29*	*0.00*	*0.00*	*66.67*	*42.86*	*16.67*	*0.00*	*27.27*	*10.00*	*25.00*	*15.00*	*18.58*
scrapers	n	0	0	0	0	0	0	0	1	0	0	0	0	0	1
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*16.67*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.88*
bitruntcations	n	0	0	0	0	0	0	0	0	0	1	0	0	1	2
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*9.09*	*0.00*	*0.00*	*5.00*	*1.77*
truncations	n	0	0	0	0	0	0	0	0	0	0	0	2	0	2
	%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.50	0.00	1.77
bifacials	n	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
glossed pieces	n	0	0	0	0	0	0	0	0	0	0	0	1	0	1
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*6.25*	*0.00*	*0.88*
burins	n	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*5.00*	*0.88*
notch/denticulates	n	1	3	0	2	1	0	0	1	0	0	1	0	1	10
	%	*12.50*	*37.50*	*0.00*	*28.57*	*25.00*	*0.00*	*0.00*	*16.67*	*0.00*	*0.00*	*10.00*	*0.00*	*5.00*	*8.85*
microliths	n	1	0	0	1	0	0	0	0	0	1	0	0	0	3
	%	*12.50*	*0.00*	*0.00*	*14.29*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*9.09*	*0.00*	*0.00*	*0.00*	*2.65*
backed blades	n	0	1	0	0	0	0	0	1	0	0	0	0	0	2
	%	*0.00*	*12.50*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*16.67*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.77*
retouched fragments	n	0	0	0	1	0	1	0	0	0	1	0	0	1	5
	%	*0.00*	*12.50*	*0.00*	*14.29*	*0.00*	*16.67*	*0.00*	*0.00*	*0.00*	*9.09*	*0.00*	*0.00*	*5.00*	*4.42*
varia	n	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*5.00*	*0.88*
Total	n	8	8	7	7	4	6	7	6	3	11	10	16	20	113

(<50 mm) wadi cobbles of a wider range of raw materials, including Type 1. CTE are dominated by core face removals (n=18), but also include platform rejuvenation flakes (n=2) and crested pieces (n=4). The majority of cores and CTE derive from the upper parts of the sampled sequence. In total, 38.78% of the sample is classified as debris, a relatively high figure for structures sampled in this analysis. Moreover, in several contexts ((1012), (1026), (1029), and (1330)) debris, mostly in the form of chips, constitutes >50% of the sampled assemblage. The high proportions of debris may indicate the presence of *in situ* knapping episodes in these contexts

Debitage is dominated by flakes (42.94%) with smaller numbers of blades (3.68%) and bladelets (12.99%), giving a blade:flake ratio of 1:3. There are no spalls in the assemblage. Flakes occur in a range of sizes, ranging from >100 mm to <20 mm. Although most contexts include flakes of a range of sizes, the flake assemblages from

Table 39.17 Chipped-stone debitage by context from Structure O45.

Context		44	249	606	1017	1012	1026	1029	1308	1318	1319	1322	1328	1330	1337	1309	1321	1334	Total O45
cores	n	0	0	1	7	1	3	0	3	3	0	0	0	0	0	1	0	0	19
	%	*0.00*	*0.00*	*0.56*	*2.22*	*0.11*	*1.54*	*0.00*	*0.88*	*2*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.76*	*0.00*	*0.00*	*0.61*
cte	n	1	0	2	5	8	0	2	3	2	0	1	0	0	0	0	0	0	24
	%	*1.35*	*0.00*	*1.12*	*1.59*	*0.92*	*0.00*	*0.56*	*0.88*	*1.33*	*0.00*	*5*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.77*
flakes	n	42	3	72	215	278	76	138	191	82	73	6	10	44	3	65	25	9	1332
	%	*56.76*	*50*	*40.45*	*68.25*	*31.92*	*38.97*	*38.98*	*56.18*	*54.67*	*58.87*	*30*	*31.25*	*20*	*30*	*49.24*	*42.37*	*40.91*	*42.94*
blades	n	10	3	2	30	13	5	3	11	13	2	1	3	3	2	7	6	0	114
	%	*13.51*	*50*	*1.12*	*9.52*	*1.49*	*2.56*	*0.85*	*3.24*	*8.67*	*1.61*	*5*	*9.38*	*1.36*	*20*	*5.3*	*10.17*	*0.00*	*3.68*
bladelets	n	10	0	24	28	113	12	31	67	19	20	8	8	28	3	17	11	4	403
	%	*13.51*	*0.00*	*13.48*	*8.89*	*12.97*	*6.15*	*8.76*	*19.71*	*12.67*	*16.13*	*40*	*25*	*12.73*	*30*	*12.88*	*18.64*	*18.18*	*12.99*
spalls	n	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
chips	n	3	0	59	3	369	68	131	37	12	17	0	7	126	1	13	10	7	863
	%	*4.05*	*0.00*	*33.15*	*0.95*	*42.37*	*34.87*	*37.01*	*10.88*	*8*	*13.71*	*0.00*	*21.88*	*57.27*	*10*	*9.85*	*16.95*	*31.82*	*27.82*
chunks	n	8	0	18	26	86	31	49	26	19	12	4	4	18	1	29	7	2	340
	%	*10.81*	*0.00*	*10.11*	*8.25*	*9.87*	*15.9*	*13.84*	*7.65*	*12.67*	*9.68*	*20*	*12.5*	*8.18*	*10*	*21.97*	*11.86*	*9.09*	*10.96*
mbt	n	0	0	0	1	3	0	0	2	0	0	0	0	1	0	0	0	0	7
	%	*0.00*	*0.00*	*0.00*	*0.32*	*0.34*	*0.00*	*0.00*	*0.59*	*0.00*	*0.00*	*0.00*	*0.00*	*0.45*	*0.00*	*0.00*	*0.00*	*0.00*	*0.23*
Total	n	74	6	178	315	871	195	354	340	150	124	20	32	220	10	132	59	22	3102

Table 39.18 Retouched and used chipped-stone artefacts from Structure O45.

Type	Context	44	249	606	1017	1012	1026	1029	1308	1318	1319	1322	1328	1330	1337	1309	1321	1334	Total O45
retouched flakes	n	1	0	3	8	4	1	2	2	1	0	1	0	0	1	3	0	0	27
	%	*9.09*	*0.00*	*23.08*	*23.53*	*8.89*	*12.50*	*9.09*	*5.56*	*5.56*	*0.00*	*50.00*	*0.00*	*0.00*	*100.00*	*21.43*	*0.00*	*0.00*	*11.84*
used flakes	n	0	0	1	2	2	0	0	4	2	1	0	0	0	0	1	1	0	14
	%	*0.00*	*0.00*	*7.69*	*5.88*	*4.44*	*0.00*	*0.00*	*11.11*	*11.11*	*10.00*	*0.00*	*0.00*	*0.00*	*0.00*	*7.14*	*14.29*	*0.00*	*6.14*
retouched blades	n	1	0	0	3	1	1	1	2	1	1	0	0	0	0	0	2	0	13
	%	*9.09*	*0.00*	*0.00*	*8.82*	*2.22*	*12.50*	*4.55*	*5.56*	*5.56*	*10.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*28.57*	*0.00*	*5.70*
used blades	n	1	0	0	0	0	2	0	1	2	0	0	0	0	0	1	0	0	7
	%	*9.09*	*0.00*	*0.00*	*0.00*	*0.00*	*25.00*	*0.00*	*2.78*	*11.11*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*7.14*	*0.00*	*0.00*	*3.07*
retouched bladelets	n	0	0	2	3	6	1	0	4	2	0	1	0	0	0	3	0	0	22
	%	*0.00*	*0.00*	*15.38*	*8.82*	*13.33*	*12.50*	*0.00*	*11.11*	*11.11*	*0.00*	*50.00*	*0.00*	*0.00*	*0.00*	*21.43*	*0.00*	*0.00*	*9.65*
used bladelets	n	0	0	0	0	3	0	1	1	0	0	0	0	2	0	0	0	0	7
	%	*0.00*	*0.00*	*0.00*	*0.00*	*6.67*	*0.00*	*4.55*	*2.78*	*0.00*	*0.00*	*0.00*	*0.00*	*40.00*	*0.00*	*0.00*	*0.00*	*0.00*	*3.07*
points	n	1	0	3	3	9	0	8	5	0	2	0	0	2	0	1	1	0	35
	%	*9.09*	*0.00*	*23.08*	*8.82*	*20.00*	*0.00*	*36.36*	*13.89*	*0.00*	*20.00*	*0.00*	*0.00*	*40.00*	*0.00*	*7.14*	*14.29*	*0.00*	*15.35*
perforators	n	4	0	2	6	6	2	4	6	3	2	0	1	0	0	1	0	0	37
	%	*36.36*	*0.00*	*15.38*	*17.65*	*13.33*	*25.00*	*18.18*	*16.67*	*16.67*	*20.00*	*0.00*	*100.00*	*0.00*	*0.00*	*7.14*	*0.00*	*0.00*	*16.23*
scrapers	n	1	0	0	2	1	0	1	0	3	1	0	0	0	0	2	1	0	12
	%	*9.09*	*0.00*	*0.00*	*5.88*	*2.22*	*0.00*	*4.55*	*0.00*	*16.67*	*10.00*	*0.00*	*0.00*	*0.00*	*0.00*	*14.29*	*14.29*	*0.00*	*5.26*
bitruntcations	n	1	0	0	0	2	0	0	2	1	0	0	0	1	0	1	1	0	9
	%	*9.09*	*0.00*	*0.00*	*0.00*	*4.44*	*0.00*	*0.00*	*5.56*	*5.56*	*0.00*	*0.00*	*0.00*	*20.00*	*0.00*	*7.14*	*14.29*	*0.00*	*3.95*
truncations	n	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	2
	%	*0.00*	*0.00*	*0.00*	*0.00*	*2.22*	*0.00*	*4.55*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.88*
bifacials	n	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	2
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*2.78*	*0.00*	*10.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.88*
glossed pieces	n	1	0	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	5
	%	*9.09*	*0.00*	*7.69*	*2.94*	*0.00*	*0.00*	*0.00*	*2.78*	*5.56*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*2.19*
burins	n	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
notch/denticulates	n	0	1	0	4	3	0	1	4	0	1	0	0	0	0	0	1	0	15
	%	*0.00*	*100.00*	*0.00*	*11.76*	*6.67*	*0.00*	*4.55*	*11.11*	*0.00*	*10.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*14.29*	*0.00*	*6.58*
microliths	n	0	0	0	1	3	1	0	0	1	0	0	0	0	0	1	0	0	7
	%	*0.00*	*0.00*	*0.00*	*2.94*	*6.67*	*12.50*	*0.00*	*0.00*	*5.56*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*7.14*	*0.00*	*0.00*	*3.07*
backed blades	n	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
retouched fragments	n	0	0	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	4
	%	*0.00*	*0.00*	*7.69*	*2.94*	*2.22*	*0.00*	*0.00*	*0.00*	*5.56*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.75*
varia	n	0	0	0	0	3	0	3	3	0	1	0	0	0	0	0	0	0	10
	%	*0.00*	*0.00*	*0.00*	*0.00*	*6.66*	*0.00*	*13.64*	*8.33*	*0.00*	*10.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*4.39*
Total	n	11	1	13	34	45	8	22	36	18	10	2	1	5	1	14	7	0	228

several contexts, such as (1012), are almost exclusively formed by very small (<20 mm) flakes. Context (49), on the other hand, has a high proportion of flakes greater than 40 mm in size. Throughout the sequence there are many flake fragments and most contexts include primary elements.

All examined examples of blades and bladelets derive from unidirectional core reduction. These include many irregular pieces and fragments, and are commonly made on Type 2 and 3 raw materials. However, more regular blade/lets are also present, particularly in contexts (44), (249), (1308) and (1318). Context (249) included SF298, which was composed of six items, including a retouched notch, together with two unretouched flakes and three unretouched regular blades. Similarly, (44) included several unretouched chipped-stone small finds (SF137, SF247, SF249, SF263, SF265, SF268) including four relatively large (up to 90 mm) regular blades manufactured on Type 2 raw material. There are a total of seven microburins (0.23%) in the assemblage. These are mainly proximal microburins manufactured on bladelets of various medium-grained raw material types (e.g. Types 2 and 3).

The retouched/used assemblage (n=228) is manufactured on a range of blank types. In total 12.17% of debitage is retouched. The assemblage includes a wide range of both formal and NFT types. NFT make up 27.19% of the tool assemblage including retouched flakes (11.84%), blades (5.7%) and bladelets (9.65%). Small numbers of unretouched debitage have macroscopic use wear traces.

The formal retouched tool assemblage is dominated by perforators (16.23%) and points (15.25%). The 37 perforators include four borers and 33 awls of various types. Awls include types on flakes (n=14), blades (n=7) and bladelets (n=12). Awls on flakes take various forms, ranging from regular and fine, to chunky and irregular, and include one example in (44) which is a large (>150 mm) awl manufactured on a piece of flaked limestone. Awls on bladelets most commonly feature elongated tips formed by retouch of both lateral margins. Awls on blades include a wide range of types. Points (n=35) include El-Khiam (n=26) and Salibiya (n=2) sub-types together with several fragments (n=7) not attributable to sub-type. The points are typical of the WF16 assemblage, usually featuring straight retouched bases, simply retouched notches and tips formed by inverse retouch. Points are unevenly distributed throughout the sequence, and 26% (n=9) of these were recovered from (1012).

There are 15 notches/denticulates in the retouched assemblage (6.58%). These comprise five flakes with irregular denticulate retouch and 10 notches that take a range of forms. There are 12 scrapers in the assemblage (5.26%), all on flakes. Scrapers are usually large (>50 mm) and include SF2423 (1318), a massive (*c.* 120 x 60 x 50 mm) scraper on a primary flake. The assemblage includes both Hagdud (n=7) and Gilgal (n=2) bitruncations which together account for 3.95% of the tools. There are seven microliths in the assemblage (3.07%), all of which are backed bladelets of various kinds. These are manufactured on a range of both fine (Type 1) and medium-grained (Types 2 and 3) raw materials and exhibit varying degrees of patination. The next most abundant tool class is glossed pieces (2.19%), which includes three bladelets, a blade and a retouched flake. The glossed flake appears to have been intensively used as a kind of scraper. The glossed blades and bladelets have gloss on their lateral margins. The glossed bladelet from (1308) has a dark residue (bitumen?) adhering to the non-glossed edge.

Less frequently encountered tool types include truncations (0.88%) and bifacials (0.88%). The truncations are both on bladelets and may represent broken points or bitruncations. The bifacial pieces include SF2075 (1308) which is a pick manufactured on a wadi cobble, measuring *c.* 130 x 50 x 50 mm. The other bifacial piece is a fragment of a bifacially worked chisel. There are 10 tools tabulated as varia, comprising two (possibly bitumen) stained flakes, a used chunk, a bitruncated blade section (possibly an exceptionally large Hagdud bitruncation), together with several retouched pebbles.

The sampled assemblage from Structure O45 contains a range of diagnostic PPNA elements. Proportions of cores, CTEs and debris varies through the sequence, with particularly high concentrations of debris in several contexts (e.g. 1012), perhaps indicating *in situ* knapping or dumping of small elements of knapping waste in these contexts. Many of the microliths, points and awls sampled in Structure O45 are manufactured on the same range of medium-grained (Types 2 and 3) raw materials. This suggests that microliths should be regarded as an integral part of the PPNA typological repertoire at WF16. It is also notable that the sampled assemblage includes several glossed pieces and, whilst microscopic examination of these pieces has not been undertaken, the macroscopically visible characteristics of these suggest that they had been used as sickle elements. Neither sickles nor glossed pieces were described by Pirie in the analysis of chipped stone from evaluation trenches at WF16 (Pirie 2007).

Structure O56 (Chapter 17)

The sample (n=1237 pieces) includes material from six out of the 14 contexts with chipped stone in Structure O56, Tables 39.19 and 39.20. By weight, the sample (7052 g) constitutes 82.94% of the bulk finds of chipped stone from this structure. In addition, a total of four small finds (SF1172, SF1176, SF1315, SF1323) derive from sampled context (676) and are included in the analysis.

The sampled artefacts from Structure O56 are primarily of medium-grained, opaque grey and brown raw materials (Types 2, 3, and 4). Smaller (<2%) proportions of both translucent grey (Type 1) and brown (Type 5) materials are also present. The assemblage includes several pieces of flaked coarse stone and a single flake of rock crystal. Patination is variable throughout the sequence with all contexts containing both completely patinated and completely unpatinated pieces. Material from almost all contexts appears fresh, with limited evidence for burning, rolling or trampling.

Both cores (1.7%) and CTE (0.24%) are present, and the assemblage has a core:debitage ratio of 1:43. There are 21 cores, comprising flake (n=5), mixed flake/bladelet (9) and other (2) core types as well as core fragments (5). Flake cores, all of which are on wadi cobbles, are generally irregular and include two cores/tested cobbles with very few removals. Mixed flake/bladelet cores, again all on wadi cobbles, are more regular and include single platform and change of orientation types. The number of cores varies throughout the sequence, and (676) includes a high proportion of cores (n=6), giving a core:debitage ratio of 1:16. CTE are rare (n=3) and are all core face removals. In total, 24.58% of the sample is classified as debris, with chips and chunks present throughout the sequence. Notably, core-rich context (676) has low proportions of debris (10.53%).

The debitage assemblage is dominated by flakes (60.47%) with smaller numbers of blades (5.17%) and bladelets (7.68%), the blade:flake ratio is 1:4.7. There is one spall in the assemblage. Flakes include several large (>40 mm) examples, particularly in (676), where there are also many primary elements. There is evidence, in the form of dorsal scar patterns that many flakes derive from blade/bladelet cores and these flakes are generally more patinated than the chunkier, less regular examples. Blades and bladelets are all manufactured by unidirectional core reduction, and include many irregular pieces/fragments that are often made on medium-grained grey raw materials (Types 2 and 3). There are some examples of more regular blade/lets, many of which are manufactured on more finely grained raw material types (e.g. Type 1). A single microburin (distal) is present in the assemblage.

The retouched/used assemblage (n=132) is manufactured on a range of blank types. In total, 14.49% of debitage is retouched, although this proportion is variable and ranges from 23.96% (676) to 10% in (666). The assemblage includes a wide range of both formal and NFT types. NFT make up 25.01% of the tool assemblage, and include retouched flakes (10.61%), blades (10.61%) and bladelets (3.79%). Small numbers of unretouched debitage have macroscopic use wear traces.

Perforators (17.42%) and points (11.36%) are the most abundant formal tool types. Perforators include awls (n=21) and borers (n=2). Awls occur on flakes (n=12), blades (n=4) and bladelets (n=5) and take a range of forms, although most feature robust tips. Perforators are particularly common in contexts (658) and (666) which together yielded 78% of the awls from this structure. Points include El-Khiam (n=12) and Salibiya (n=3) sub-types, both of which have tips formed by inverse retouch. The next most abundant formal tool type is scraper (6.82%). Six of the nine scrapers from this structure were found in occupation (676). Scrapers take a range of forms and include both end and side scrapers. Several scrapers, particularly in (676), are large (>60 mm), including SF1172 (676), which is manufactured on a flake from a polished limestone vessel. A large (>100 mm) cortical 'tabular' scraper or 'tile knife' was found in context (605).

Notch/denticulates are also present (6.06%) and include four flakes with chunky denticulate retouch and three

Table 39.19 Chipped-stone debitage by context from Structure O56.

Context		605	655	658	666	676	1021	O56 Total
cores	n	2	3	6	4	6	0	21
	%	*1.83*	*1.50*	*1.90*	*0.86*	*5.26*	*0.00*	*1.70*
cte	n	0	0	2	1	0	0	3
	%	*0.00*	*0.00*	*0.63*	*0.22*	*0.00*	*0.00*	*0.24*
flakes	n	61	118	192	268	83	26	748
	%	*55.96*	*59.00*	*60.76*	*57.76*	*72.81*	*76.47*	*60.47*
blades	n	5	10	21	18	7	3	64
	%	*4.59*	*5.00*	*6.65*	*3.88*	*6.14*	*8.82*	*5.17*
bladelets	n	10	20	22	32	6	5	95
	%	*9.17*	*10.00*	*6.96*	*6.90*	*5.26*	*14.71*	*7.68*
spalls	n	0	0	0	1	0	0	1
	%	*0.00*	*0.00*	*0.00*	*0.22*	*0.00*	*0.00*	*0.08*
chips	n	19	27	33	101	4	0	184
	%	*17.43*	*13.50*	*10.44*	*21.77*	*3.51*	*0.00*	*14.87*
chunks	n	12	22	39	39	8	0	120
	%	*11.01*	*11.00*	*12.34*	*8.41*	*7.02*	*0.00*	*9.70*
mbt	n	0	0	1	0	0	0	1
	%	*0.00*	*0.00*	*0.32*	*0.00*	*0.00*	*0.00*	*0.08*
Total	n	109	200	316	464	114	34	1237

Table 39.20 Retouched and used chipped-stone artefacts from Structure O56.

Type		605	655	658	666	676	1021	Total O56
retouched flakes	**n**	2	3	5	0	4	0	14
	%	*13.33*	*12.50*	*15.15*	*0.00*	*17.39*	*0.00*	*10.61*
used flakes	**n**	2	2	2	3	2	0	11
	%	*13.33*	*8.33*	*6.06*	*9.38*	*8.70*	*0.00*	*8.33*
retouched blades	**n**	1	1	4	5	2	1	14
	%	*6.67*	*4.17*	*12.12*	*15.63*	*8.70*	*20.00*	*10.61*
used blades	**n**	1	2	1	3	1	1	9
	%	*6.67*	*8.33*	*3.03*	*9.38*	*4.35*	*20.00*	*6.82*
retouched bladelets	**n**	0	2	2	1	0	0	5
	%	*0.00*	*8.33*	*6.06*	*3.13*	*0.00*	*0.00*	*3.79*
used bladelets	**n**	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
points	**n**	3	6	3	2	0	1	15
	%	*20.00*	*25.00*	*9.09*	*6.25*	*0.00*	*20.00*	*11.36*
perforators	**n**	1	1	10	8	1	2	23
	%	*6.67*	*4.17*	*30.30*	*25.00*	*4.35*	*40.00*	*17.42*
scrapers	**n**	1	0	0	2	6	0	9
	%	*6.67*	*0.00*	*0.00*	*6.25*	*26.09*	*0.00*	*6.82*
bitruntcations	**n**	0	0	1	0	1	0	2
	%	*0.00*	*0.00*	*3.03*	*0.00*	*4.35*	*0.00*	*1.52*
truncations	**n**	0	0	0	0	1	0	1
	%	*0.00*	*0.00*	*0.00*	*0.0*	*4.35*	*0.00*	*0.76*
bifacials	**n**	0	0	1	0	1	0	2
	%	*0.00*	*0.00*	*3.03*	*0.00*	*4.35*	*0.00*	*1.52*
glossed pieces	**n**	1	1	0	1	1	0	4
	%	*6.67*	*4.17*	*0.00*	*3.13*	*4.35*	*0.00*	*3.03*
burins	**n**	0	1	0	0	0	0	1
	%	*0.00*	*4.17*	*0.00*	*0.00*	*0.00*	*0.00*	*0.76*
notch/ denticulates	**n**	0	3	1	3	1	0	8
	%	*0.00*	*12.50*	*3.03*	*9.38*	*4.35*	*0.00*	*6.06*
microliths	**n**	0	1	0	1	0	0	2
	%	*0.00*	*4.17*	*0.00*	*3.13*	*0.00*	*0.00*	*1.52*
backed blades	**n**	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
retouched fragments	**n**	3	0	2	3	2	0	10
	%	*20.00*	*0.00*	*6.06*	*9.38*	*8.70*	*0.00*	*7.58*
varia	**n**	0	1	1	0	0	0	2
	%	*0.00*	*4.17*	*3.03*	*0.00*	*0.00*	*0.00*	*1.52*
Total	**n**	15	24	33	32	23	5	132

notches. There are four (3.03%) glossed pieces; three on blades and one on a bladelet, these all have gloss on lateral margins. There are two microliths in the assemblage, both backed bladelets, together with two Hagdud bitruncations and two bifacial pieces. Bifacials include SF1315, a large core tool from (676) and a chopper formed on a nodule with bifacial retouch. The assemblage includes a single truncation and a burin. Tools tabulated as varia include a retouched spall and a trihedral pick.

The sampled chipped stone assemblage from structure O56 contains a range of technological and typological elements that are diagnostic of the PPNA. Context (676) features high proportions of cores, large flakes and primary elements, but low proportions of debris. The typological composition of sampled contexts is highly variable, and contexts (658) and (666) have high proportions of perforators, which are rare in the basal occupation (676). Conversely, (676) includes high proportions of scrapers, which are rare in overlying contexts. In this light it is perhaps difficult to interpret the various sampled contexts as resulting from a single specialist workshop. However, when the various separate contexts from Structure O56 are combined, the association of perforating tools and large scrapers has a strong similarity to previously described tool kits used for bead manufacture (e.g. Wright *et al.* 2008). Moreover, SF1171 (the stone workbench with perforating holes) clearly suggests that perforating activity took place in (676), making the dearth of perforators in this context puzzling. These factors raise several questions regarding the formation of deposits in this structure and may suggest that the assemblages from occupation contexts (676) and (658) and initial collapse (666) represent a single tool kit designed for bead manufacture. Indeed, it may be possible that wall/roof collapse (666) may include tools that had been stored in wall niches or baskets/bags suspended from the superstructure.

Structure O66 (Chapter 26)

The sample of material (n=688 pieces) includes material from nine out of the 11 contexts with chipped stone in Structure O66, Tables 39.21 and 39.22. By weight, the sample (3256 g) constitutes 66% of the bulk finds of chipped stone from this structure. A single small find (SF1440) from context (965) is included in the analysis.

The majority of assemblages sampled in Structure O66 are dominated by medium-grained, opaque grey raw material (Types 2 and 3). Small (<5%) proportions of translucent grey (Type 1) material are also present in most contexts. The degree of patination is generally high throughout the sequence, although some contexts (e.g. (518), (907) and (965)) have a significant number (up to 50%) of pieces with no patina. Material from almost all contexts appears fresh, with limited evidence for burning, rolling or trampling.

Both cores (1.16%) and CTE (1.16%) occur, and the assemblage has a core:debitage ratio of 1:62. Cores include four mixed flake/bladelet cores that are all similar in size with a maximum dimension of *c.* 40 mm. These are generally irregular in shape with several platforms, although the cores on fine-grained material are more regular and include change of orientation and opposed platform examples. The raw material used for the change of orientation core is revealing; this takes the form of a small nugget of fine-grained translucent material (Type 1) (targeted for bladelet removal) contained within a larger cobble of far coarser grey material (Type 3). If this is how the fine-grained material is usually brought to the site, it may account for the presence of many of the more coarsely grained flakes of grey material. There are two core fragments in the assemblage, one of which (from a flake core) is large (max. dimension of 80 mm). Core trimming elements include both core face removals (n=6) and platform rejuvenation flakes (n=2); these are generally small (max. 30 mm) and derive from bladelet cores. In total, 26.96% of the sample is classified as debris, with chips and chunks both present in varying numbers throughout the sequence.

Flakes dominate the debitage (54.06%), with smaller numbers of blades (3.19%) and bladelets (12.9%); the blade:flake ratio is 1:3. There are no spalls in the assemblage. Flakes are generally small (<30 mm), highly patinated and include many fragments, although some contexts (e.g.

Table 39.21 Chipped-stone debitage by context from Structure O66.

Context		228	496	498	500	518	885	959	965	987	O66
cores	n	1	1	2	0	2	1	0	1	0	8
	%	*2.08*	*3.03*	*1.59*	*0.00*	*1.53*	*0.81*	*0.00*	*1.05*	*0.00*	*1.16*
cte	n	3	0	0	0	2	0	0	3	0	8
	%	*6.25*	*0.00*	*0.00*	*0.00*	*1.53*	*0.00*	*0.00*	*3.16*	*0.00*	*1.16*
flakes	n	20	17	80	38	84	63	8	47	16	373
	%	*41.67*	*51.52*	*63.49*	*54.29*	*64.12*	*50.81*	*25.81*	*49.47*	*50.00*	*54.06*
blades	n	7	3	3	1	0	2	1	4	1	22
	%	*14.58*	*9.09*	*2.38*	*1.43*	*0.00*	*1.61*	*3.23*	*4.21*	*3.13*	*3.19*
bladelets	n	10	4	11	11	8	20	6	15	4	89
	%	*20.83*	*12.12*	*8.73*	*15.71*	*6.11*	*16.13*	*19.35*	*15.79*	*12.50*	*12.90*
spalls	n	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
chips	n	2	2	10	9	12	15	8	14	3	75
	%	*4.17*	*6.06*	*7.94*	*12.86*	*9.16*	*12.10*	*25.81*	*14.74*	*9.38*	*10.87*
chunks	n	5	5	20	10	22	23	8	10	8	111
	%	*10.42*	*15.15*	*15.87*	*14.29*	*16.79*	*18.55*	*25.81*	*10.53*	*25.00*	*16.09*
mbt	n	0	1	0	0	0	0	0	1	0	2
	%	*0.00*	*3.03*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.05*	*0.00*	*0.29*
Total	n	48	33	126	69	130	124	31	95	32	688

Table 39.22 Retouched and used chipped-stone artefacts from Structure O66.

Type		228	496	498	500	518	885	959	965	987	O66
retouched flakes	n	1	1	1	2	4	1	0	5	1	16
	%	*9.09*	*20.00*	*9.09*	*40.00*	*36.36*	*8.33*	*0.00*	*31.25*	*33.33*	*21.62*
used flakes	n	1	0	1	0	1	0	0	2	0	5
	%	*9.09*	*0.00*	*9.09*	*0.00*	*9.09*	*0.00*	*0.00*	*12.50*	*0.00*	*6.76*
retouched blades	n	3	1	0	0	0	0	0	0	0	4
	%	*27.27*	*20.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*5.41*
used blades	n	2	0	0	0	0	1	0	0	0	3
	%	*18.18*	*0.00*	*0.00*	*0.00*	*0.00*	*8.33*	*0.00*	*0.00*	*0.00*	*4.05*
retouched bladelets	n	1	—	—	2	1	3	—	—	2	9
	%	*9.09*	*0.00*	*0.00*	*40.00*	*9.09*	*25.00*	*0.00*	*0.00*	*66.67*	*12.16*
used bladelets	n	0	0	0	0	0	0	0	1	0	1
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*6.25*	*0.00*	*1.35*
points	n	0	1	3	1	0	1	0	1	0	7
	%	*0.00*	*20.00*	*27.27*	*20.00*	*0.00*	*8.33*	*0.00*	*6.25*	*0.00*	*9.46*
perforators	n	2	1	1	0	0	3	0	2	0	9
	%	*18.18*	*20.00*	*9.09*	*0.00*	*0.00*	*25.00*	*0.00*	*12.50*	*0.00*	*12.16*
scrapers	n	1	0	0	0	0	0	0	1	0	2
	%	*9.09*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*6.25*	*0.00*	*2.70*
bitruntcations	n	0	0	0	0	0	1	0	1	0	2
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*8.33*	*0.00*	*6.25*	*0.00*	*2.70*
truncations	n	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
bifacials	n	0	0	0	0	1	0	0	1	0	2
	%	*0.00*	*0.00*	*0.00*	*0.00*	*9.09*	*0.00*	*0.00*	*6.25*	*0.00*	*2.70*
glossed pieces	n	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
burins	n	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
notch/denticulates	n	0	0	1	0	0	1	0	0	0	2
	%	*0.00*	*0.00*	*9.09*	*0.00*	*0.00*	*8.33*	*0.00*	*0.00*	*0.00*	*2.70*
microliths	n	0	1.00	1.00	0	0	0	0	1.00	0	3.00
	%	*0.00*	*20.00*	*9.09*	*0.00*	*0.00*	*0.00*	*0.00*	*6.25*	*0.00*	*4.05*
backed blades	n	0	0	0	0	0	0	0	1	0	1
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*6.25*	*0.00*	*1.35*
retouched fragments	n	0	0	3	0	4	1	0	0	0	8
	%	*0.00*	*0.00*	*27.27*	*0.00*	*36.36*	*8.33*	*0.00*	*0.00*	*0.00*	*10.81*
varia	n	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Total	n	11	5	11	5	11	12	0	16	3	74

(518) and (965)) include larger examples, more primary elements and more pieces with no patination. Flakes made on Type 1 material are generally finer than those on more coarsely grained material, and the dorsal scarring on many of these pieces indicates that they derive from cores used for bladelet/blade production.

All blades and bladelets in the sample are unidirectionally produced and include both regular and irregular examples, as well as many fragments. Blades are unevenly distributed throughout the sequence, with seven examples (31.82%) recovered from upper occupation (228). Almost all the blades and bladelets are heavily patinated. The sample also includes two microburin products (0.29%) comprising a proximal as well as a distal example; one of these is manufactured on Type 1 material while the other is on raw material Type 3. Both microburin products exhibit a low degree of patination.

The retouched/used assemblage (n=74) is manufactured on a range of blank types. In total, 15.04% of debitage is retouched, although this proportion is variable, ranging from 0% in (959) to 27.5% (228). It may be significant that roof collapse layer (965) has a high proportion of retouched debitage (23.29%). The retouched assemblage includes a wide range of both formal and NFT types. In total, 33.78% of the tool assemblage is made up of NFT, including retouched flakes (21.62%), blades (5.41%) and bladelets (12.16%). Small numbers of unretouched debitage have macroscopic use wear traces. Notably contexts (965) and (518) include a high proportion of large and irregular retouched flakes, which make up 31.25% and 36.36% respectively of the retouched assemblages from these contexts.

Perforators are the most common formal tool type (12.16%); these are all awls, six of which are on bladelets, one is manufactured on a flake, and one on a blade. Awls include a range of types. Points constitute 9.46% of the sample and include six El-Khiam points and a tip fragment unidentifiable to sub-type. El-Khiam points are generally small (the smallest is *c.* 15 mm long) and heavily patinated and are made on Types 1, 2 and 3 raw materials. The tips of points are exclusively formed by inverse retouch. As is often the case at WF16, points are unevenly distributed, with three of the seven points in Structure O66 recovered from (498).

There are three microliths (4.05%), comprising backed bladelets, all of which are patinated and manufactured on Type 1 material. Other formal tool types in the assemblage include flakes with denticulate retouch (2.70%), scrapers (2.70%), as well as two heavily patinated Hagdud bitruncations (2.70%). There are two bifacial pieces (2.70%): an irregular pick measuring 90 x 40 x 30 mm (518) and a large (100 x 80 x 40 mm) cobble (SF1440) which has bifacial flaking over part of its surface. Although not included in the present analysis it is noteworthy that there are also several large, basalt bifacials in this structure, including SF2487: a massive (190 x 100 x 100 mm) bifacially worked basalt ‘maul’ or pestle roughout. The final retouched tool included in the present sample is a small backed blade.

Overall, the chipped stone assemblage from Structure O66 contains a range of technological and typological elements, which are diagnostic of the PPNA. Microliths and microburin products are represented and, as is often the case, are made on Type 1 raw material. However, this material is also used for the production of many other tool types.

Structure O64 (Chapter 29)

A small sample of material (n=403 pieces) was examined from Structure O64, encompassing 14 out of the 16 contexts with chipped stone, Tables 39.23 and 39.24. By weight, the sample (1292g) constitutes 84.02% of the bulk finds of chipped stone from this structure. No small find chipped stone was recovered from Structure O64.

The sampled artefacts from Structure O64 are primarily of medium-grained, opaque grey raw materials (Types 2 and 3). Translucent grey (Type 1) material is present in most contexts, although proportions are variable, ranging between *c.* 50% (504) to <5% (975). Some contexts, generally located towards the top of the sampled sequence (e.g. (975), (504)), also feature medium-grained brown (Type 4) material. The

Table 39.23 Chipped-stone debitage by context from Structure O64.

Context		975	545	550	553	504	501	505	512	521	311	336	870	871	879	O64 total
cores	n	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*2.70*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.25*
cte	n	3	0	0	0	0	0	0	0	1	0	0	0	0	0	4
	%	*3.75*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*2.33*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.99*
flakes	n	41	20	0	11	21	4	6	24	16	28	9	1	13	2	196
	%	*51.25*	*60.61*	*0.00*	*32.35*	*40.38*	*66.67*	*35.29*	*64.86*	*37.21*	*50.91*	*47.37*	*33.33*	*76.47*	*40.00*	*48.64*
blades	n	2	2	0	5	2	1	1	1	1	3	0	1	0	0	19
	%	*2.50*	*6.06*	*0.00*	*14.71*	*3.85*	*16.67*	*5.88*	*2.70*	*2.33*	*5.45*	*0.00*	*33.33*	*0.00*	*0.00*	*4.71*
bladelets	n	9	1	1	9	14	0	3	3	15	9	2	0	1	2	69
	%	*11.25*	*3.03*	*50.00*	*26.47*	*26.92*	*0.00*	*17.65*	*8.11*	*34.88*	*16.36*	*10.53*	*0.00*	*5.88*	*40.00*	*17.12*
spalls	n	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
	%	*0.00*	*3.03*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.25*
chips	n	7	3	1	5	10	1	5	3	5	8	5	1	0	1	55
	%	*8.75*	*9.09*	*50.00*	*14.71*	*19.23*	*16.67*	*29.41*	*8.11*	*11.63*	*14.55*	*26.32*	*33.33*	*0.00*	*20.00*	*13.65*
chunks	n	18	6	0	4	3	0	2	4	5	7	3	0	3	0	55
	%	*22.50*	*18.18*	*0.00*	*11.76*	*5.77*	*0.00*	*11.76*	*10.81*	*11.63*	*12.73*	*15.79*	*0.00*	*17.65*	*0.00*	*13.65*
mbt	n	0	0	0	0	2	0	0	1	0	0	0	0	0	0	3
	%	*0.00*	*0.00*	*0.00*	*0.00*	*3.85*	*0.00*	*0.00*	*2.70*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.74*
total	n	80	33	2	34	52	6	17	37	43	55	19	3	17	5	403

Table 39.24 Retouched and used chipped-stone artefacts from Structure O64.

Type		975	545	550	553	504	501	505	512	521	311	336	870	871	879	O64
retouched flakes	n	1	0	0	0	1	1	2	1	1	1	1	0	0	0	9
	%	*20.00*	*0.00*	*0.00*	*0.00*	*10.00*	*50.00*	*50.00*	*50.00*	*9.09*	*12.50*	*33.33*	*0.00*	*0.00*	*0.00*	*15.25*
used flakes	n	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*12.50*	*33.33*	*0.00*	*0.00*	*0.00*	*3.39*
retouched blades	n	0	1	0	1	0	0	0	0	0	1	0	0	0	0	3
	%	*0.00*	*50.00*	*0.00*	*9.09*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*12.50*	*0.00*	*0.00*	*0.00*	*0.00*	*5.08*
used blades	n	0	0	0	1	1	1	0	0	0	0	0	0	0	0	3
	%	*0.00*	*0.00*	*0.00*	*9.09*	*10.00*	*50.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*5.08*
retouched bladelets	n	0	0	0	0	0	0	0	0	3	1	0	0	0	0	4
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*27.27*	*12.50*	*0.00*	*0.00*	*0.00*	*0.00*	*6.78*
used bladelets	n	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
	%	*0.00*	*0.00*	*0.00*	*9.09*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.69*
points	n	0	1	0	2	1	0	0	0	2	0	0	0	0	0	6
	%	*0.00*	*50.00*	*0.00*	*18.18*	*10.00*	*0.00*	*0.00*	*0.00*	*18.18*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*10.17*
perforators	n	0	0	0	2	1	0	1	0	0	0	1	0	0	1	6
	%	*0.00*	*0.00*	*0.00*	*18.18*	*10.00*	*0.00*	*25.00*	*0.00*	*0.00*	*0.00*	*33.33*	*0.00*	*0.00*	*100.00*	*10.17*
scrapers	n	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
bitruntcations	n	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*12.50*	*0.00*	*0.00*	*0.00*	*0.00*	*1.69*
truncations	n	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*9.09*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.69*
bifacials	n	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
glossed pieces	n	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
burins	n	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	%	*20.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.69*
notch/ denticulates	n	0	0	0	2	1	0	0	0	0	1	0	0	0	0	4
	%	*0.00*	*0.00*	*0.00*	*18.18*	*10.00*	*0.00*	*0.00*	*0.00*	*0.00*	*12.50*	*0.00*	*0.00*	*0.00*	*0.00*	*6.78*
microliths	n	0	0	0	1	4	0	1	0	3	1	0	0	0	0	10
	%	*0.00*	*0.00*	*0.00*	*9.09*	*40.00*	*0.00*	*25.00*	*0.00*	*27.27*	*12.50*	*0.00*	*0.00*	*0.00*	*0.00*	*16.95*
backed blades	n	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
	%	*0.00*	*0.00*	*0.00*	*9.09*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.69*
retouched fragments	n	0	0	0	0	0	0	0	1	1	1	0	0	0	0	3
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*50.00*	*9.09*	*12.50*	*0.00*	*0.00*	*0.00*	*0.00*	*5.08*
varia	n	3	0	0	0	1	0	0	0	0	0	0	0	0	0	4
	%	*60.00*	*0.00*	*0.00*	*0.00*	*10.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*6.78*
Total	n	5	2	0	11	10	2	4	2	11	8	3	0	0	1	59

degree of patination varies between contexts, with upper levels, e.g. (975), generally having less patination than lower levels, e.g. (311). There is also variable patination within contexts, and all contexts include both completely patinated and completely unpatinated examples. Whilst much of the sampled material appears relatively fresh, there is some evidence of rolling (rounded edges and facets) in some contexts (e.g. (512), (521)), suggesting diversity in taphonomic processes in this structure.

There is only one core (a fragment) in the assemblage and only four CTE. The assemblage has a core:debitage ratio of 1:289. Three of the CTE derive from upper context (975) and include two core face removals and a crested piece. The final CTE (521), is a side-struck core face removal from a blade/bladelet core made on Type 1 raw material.

The debitage sample is dominated by flakes (48.64%) with smaller numbers of blades (4.71%) and bladelets

(17.12%); the blade:flake ratio is 1:2.23. There is a single spall in the assemblage. Flakes are generally very small (<20 mm) highly patinated and include many fragments. Flakes made on Type 1 material are generally finer than those on more coarsely grained materials and the dorsal scarring on many of these pieces suggests they derive from bladelet/blade production. Blades and bladelets (all deriving from unidirectional reduction) include both regular and irregular types and many fragments. Blades are often relatively short and wide, whilst many bladelets are particularly small (< 20 mm in length). Many of the more regular blade/lets were produced on the Type 1 raw material. In total, 27.3% of the sample is classified as debris, with chips and chunks present throughout. The assemblage also includes three microburin products (0.74%), which include two distal and one proximal example, all of which are made on Type 1 raw material.

The retouched/used assemblage (n=59) is manufactured on a range of blank types. A relatively high proportion (20.42%) of debitage is retouched in this structure, although this is highly variable and some contexts have no retouched/used tools, whilst others have as much as 44% of debitage retouched (e.g. 553). The assemblage includes a wide range of both formal and NFT types. In total, 27.12% of the tool assemblage is made up of NFT including retouched flakes (15.25%), blades (5.08%) and bladelets (6.78%). Small numbers of unretouched debitage have macroscopic use wear traces.

Microliths are the most common formal tool type (16.95%) and are present in a range of forms including backed bladelets (straight and arched) as well as backed and truncated examples. Backing is usually abrupt or semi-abrupt, with no Helwan backing present. Many microliths are fragmentary mid sections. Microliths are generally manufactured on Type 1 raw material and exhibit various degrees of patination. Significantly, microliths vary in proportion throughout the sequence and two contexts, (504) and (521), account for 70% (n=7) of the microliths recovered here. Perforators and points are the next most abundant tool classes, each constituting 10.17% of the tool assemblage. Perforators include examples on flakes (n=2), blades (n=2) and bladelets (n=2). All of the examples on blade/bladelets have fine straight tips and are reminiscent of 'projectile' points, whilst examples on flakes are less regular and more robust in nature. Perforators are made on a range of raw materials including Type 1. Points are all of the El-Khiam variety and are all made on bladelets. Points include two examples on Type 1 raw material and include both patinated and unpatinated examples. The tips of points are exclusively formed by inverse retouch.

Other tool types include notches/denticulates (6.78%); usually as small laterally notched flakes. Tool types represented by a single example include a backed blade (fragment), a Hagdud bitruncation, a burin and a truncated blade. Tools tabulated as varia include two retouched chunks and two very rolled, and presumably residual, retouched fragments.

The chipped stone from Structure O64 includes a range of technological and typological traits that are diagnostic of the PPNA. Material from Structure O64 is generally heavily patinated and dominated by small flakes made on a range of medium- and fine-grained grey materials. Only one core is present in the assemblage, suggesting this structure is not primarily associated with the production of chipped-stone tools. The formal retouched/used assemblage is dominated by microliths (n=10), with perforators and points (El-Khiam) also well represented. Most of the microliths and microburins are made on Type 1 material, although this is also used for the production of many other tool types (including points).

Pit O14 (Chapter 29)

The sample (n=906 pieces) from Pit O14 encompassed nine out of the 12 contexts with chipped stone, Tables 39.25 and 39.26. By weight, the sample (3055 g) constitutes 88% of the bulk finds of chipped stone from this structure. An additional seven small finds (SF1260, SF1407, SF1800, SF1801, SF1802, SF1803, SF1804) recovered from context (495) are included in the analysis.

The sampled artefacts from Pit O14 are primarily of medium-grained, opaque grey raw materials (Types 2 and 3). Translucent grey (Type 1) material is also present in significant quantity (>10%) throughout, and in some contexts, such as (495), this raw material constitutes as much as 40% of the assemblage. Patination is generally high throughout the sequence, although items with no patination are present in all contexts and on all raw material types. Material from almost all contexts appears fresh, with limited evidence for burning, rolling or trampling.

Although both cores and CTE are present, they each account for just 0.55% of the assemblage, which has a core:debitage ratio of 1:125. Cores include two single platform bladelet cores and a fragment of the same; these are small (max. 40 mm) and include two examples on Type 1 raw material and one on medium-grained grey flint. The cores show various levels of patination; for example one of the single platform bladelet cores is completely patinated and the other has <10% patination. The assemblage also includes an opposed platform mixed flake/bladelet core and an irregular core on a flake. CTE include four core face removals and a platform rejuvenation flake, these are all heavily patinated and derive from small (generally single platform) bladelet cores made on Type 1 raw material. Debris accounts for 29.6% of the sample, with chips and chunks both present throughout most of the assemblage. The proportion of chips is highly variable, however, ranging from 0% in context (456) to 32.69% in (434).

Debitage is dominated by flakes (51.66%) with smaller numbers of bladelets (12.69%); blades are relatively scarce and make up just 4.08% of the assemblage. The blade:flake ratio is 1:3. There are no spalls in the assemblage. Flakes are generally small (<30 mm), highly patinated and include many fragments, although most contexts include a few larger, often primary, examples. Flakes made on Type 1 material have

Table 39.25 Chipped-stone debitage by context from Pit O14.

Context		432	434	449	452	455	456	459	495	529	O14 total
cores	n	1	1	1	0	0	0	1	1	0	5
	%	*2.17*	*1.92*	*5.56*	*0.00*	*0.00*	*0.00*	*1.33*	*0.29*	*0.00*	*0.55*
cte	n	1	1	0	0	1	1	0	0	0	5
	%	*2.17*	*1.92*	*0.00*	*2.44*	*0.35*	*4.17*	*0.00*	*0.00*	*0.00*	*0.55*
flakes	n	25	18	11	16	157	14	42	171	14	468
	%	*54.35*	*34.62*	*61.11*	*39.02*	*55.28*	*58.33*	*56.00*	*50.44*	*51.85*	*51.66*
blades	n	0	0	0	2	19	0	2	13	1	37
	%	*0.00*	*0.00*	*0.00*	*4.88*	*6.69*	*0.00*	*2.67*	*3.83*	*3.70*	*4.08*
bladelets	n	7	9	3	7	33	5	10	39	2	115
	%	*15.22*	*17.31*	*16.67*	*17.07*	*11.62*	*20.83*	*13.33*	*11.50*	*7.41*	*12.69*
spalls	n	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
chips	n	5	17	2	7	41	0	6	56	5	139
	%	*10.87*	*32.69*	*11.11*	*17.07*	*14.44*	*0.00*	*8.00*	*16.52*	*18.52*	*15.34*
chunks	n	7	4	1	8	30	4	13	57	5	129
	%	*15.22*	*7.69*	*5.56*	*19.51*	*10.56*	*16.67*	*17.33*	*16.81*	*18.52*	*14.24*
mbt	n	0	2	0	0	3	0	1	2	0	8
	%	*0.00*	*3.85*	*0.00*	*0.00*	*1.06*	*0.00*	*1.33*	*0.59*	*0.00*	*0.88*
Total	n	46	52	18	41	284	24	75	339	27	906

dorsal scarring indicating that many of these come from cores used for bladelet/blade production. Blades and bladelets, all of which derive from unidirectional core reduction, include both regular and irregular types and many fragments. Almost all the blades and bladelets are heavily patinated. Blades are often relatively short, whilst many bladelets are particularly small (*c.* 25 mm in length). Many of the more regular blade/lets were produced on the Type 1 material, although regular blades/bladelets are also present on the other material types. The assemblage has a relatively high proportion of microburin products (0.88%, n=8), comprising both distal and proximal examples, all manufactured on bladelets. These are often patinated and primarily, although not exclusively, manufactured on Type 1 raw material.

The retouched/used sample (n=81) is manufactured on a range of blank types. In total, 12.96% of debitage is retouched, although this proportion is variable, ranging from 10% in (456) to 23.08% in (452). This level of variability is interesting given the fact that all sampled contexts are of the same type (feature fill). The assemblage includes a wide range of both formal and NFT types. NFT constitute 25.92% of the tool assemblage and include retouched flakes (13.58%), blades (3.7%) and bladelets (8.64%). Small numbers of unretouched flakes and bladelets have macroscopic use wear traces.

Notches/denticulate is the most common formal tool type (19.75%), these include four chunky flakes with rough denticulate retouch and 12 notched items. Notches are all small and fine and include three fine-grained flakes and two fine-grained bladelets with bilateral notches. Points constitute the next most abundant tool type (17.28%); these include 11 El-Khiam points and three point fragments unidentifiable to sub-type. All are made on bladelets manufactured on a range of raw materials and exhibit varying degrees of patination. Nine of the points (64.29% of those recovered from this structure) were found in context (495). This figure includes the six small find El-Khiam points recovered from this context (the remaining small find (SF1803) from this structure is a retouched bladelet). The tips of points are exclusively formed by inverse retouch. Perforators (11.11%) are the only other formal tool type to constitute more than 10% of the retouched assemblage; these include eight awls, seven of which are on bladelets, as well as one borer on a flake.

Microliths (n=4) account for 4.94% of the retouched tools and include three backed bladelets as well as a fragment of a Helwan backed lunate. All the microliths are manufactured on Type 1 raw material and three have no patination; all microliths derive from upper fill levels (432) and (434). The assemblage also includes two bitruncations (2.47%), both of the Hagdud variety, and two glossed pieces (one blade and one bladelet), both of which feature weak bifacial gloss and edge wear along one lateral margin. Two scrapers (2.47%), both end scrapers on flakes, are also present. The assemblage includes a single burin and a truncated bladelet. Varia comprise a backed flake and a heavily rolled/residual retouched fragment.

The chipped stone assemblage from Pit O14 includes a range of technological and typological traits that are diagnostic of the PPNA. The assemblage features a low number of cores and core trimming elements, but when present these include single platform, sub-pyramidal

Table 39.26 Retouched and used chipped-stone artefacts from Pit O14.

Type		432	434	449	452	455	456	459	495	529	Total
retouched flakes	n	1	0	1	1	7	0	0	1	0	11
	%	*14.29*	*0.00*	*33.33*	*16.67*	*28.00*	*0.00*	*0.00*	*3.85*	*0.00*	*13.58*
used flakes	n	0	0	0	0	2	0	0	1	1	4
	%	*0.00*	*0.00*	*0.00*	*0.00*	*8.00*	*0.00*	*0.00*	*3.85*	*33.33*	*4.94*
retouched blades	n	0	0	0	0	0	0	1	1	1	3
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*16.67*	*3.85*	*33.33*	*3.70*
used blades	n	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
retouched bladelets	n	0	1	0	1	2	0	1	2	0	7
	%	*0.00*	*33.33*	*0.00*	*16.67*	*8.00*	*0.00*	*16.67*	*7.69*	*0.00*	*8.64*
used bladelets	n	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
points	n	1	0	0	0	2	0	2	9	0	14
	%	*14.29*	*0.00*	*0.00*	*0.00*	*8.00*	*0.00*	*33.33*	*34.62*	*0.00*	*17.28*
perforators	n	0	0	0	2	2	2	1	2	0	9
	%	*0.00*	*0.00*	*0.00*	*33.33*	*8.00*	*100.00*	*16.67*	*7.69*	*0.00*	*11.11*
scrapers	n	0	0	0	1	0	0	0	1	0	2
	%	*0.00*	*0.00*	*0.00*	*16.67*	*0.00*	*0.00*	*0.00*	*3.85*	*0.00*	*2.47*
bitruntcations	n	0	0	0	0	0	0	0	1	1	2
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*3.85*	*33.33*	*2.47*
truncations	n	0	0	0	0	1	0	0	0	0	1
	%	*0.00*	*0.00*	*0.00*	*0.00*	*4.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.23*
bifacials	n	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
glossed pieces	n	0	0	0	1	1	0	0	0	0	2
	%	*0.00*	*0.00*	*0.00*	*16.67*	*4.00*	*0.00*	*0.00*	*0.00*	*0.00*	*2.47*
burins	n	1	0	0	0	0	0	0	0	0	1
	%	*14.29*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.23*
notch/denticulates	n	2	0	2	0	7	0	0	5	0	16
	%	*28.57*	*0.00*	*66.67*	*0.00*	*28.00*	*0.00*	*0.00*	*19.23*	*0.00*	*19.75*
microliths	n	2	2	0	0	0	0	0	0	0	4
	%	*28.57*	*66.67*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*4.94*
backed blades	n	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
retouched fragments	n	0	0	0	0	0	0	1	2	0	3
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*16.67*	*7.69*	*0.00*	*3.70*
varia	n	0	0	0	0	1	0	0	1	0	2
	%	*0.00*	*0.00*	*0.00*	*0.00*	*4.00*	*0.00*	*0.00*	*3.85*	*0.00*	*2.47*
Total	n	7	3	3	6	25	2	6	26	3	81

bladelet cores indicative of relatively structured production of bladelets.

The retouched assemblage includes notches/denticulates, points, perforators and microliths. Notably, most of the microliths and microburins are made on Type 1 raw material, although this is also used for the production of many other tool types. Context (495) has a high proportion of El-Khiam points (34.62%, n=9), perhaps representing a cache of these tools.

Structure O33 (Chapter 30)

The sample of chipped stone examined from Structure O33 (n=1452 pieces) includes material from 13 out of the 15 contexts with chipped stone in Structure O33, Tables 39.27 and 39.28. By weight, the sample (6950 g) constitutes 77% of the bulk finds of chipped stone from this structure. No small find chipped stone was recovered from the sampled contexts.

The sampled artefacts from Structure O33 are primarily of medium-grained, opaque grey raw materials (Types 2

Table 39.27 Chipped-stone debitage by context from Structure O33.

Context		109	117	118	119	339	348	356	357	362	367	369	371	377	O33 total
cores	n	0	1	3	3	1	0	1	0	0	0	2	0	6	17
	%	*0.00*	*1.28*	*3.75*	*1.88*	*0.63*	*0.00*	*0.87*	*0.00*	*0.00*	*0.00*	*4.26*	*0.00*	*3.02*	*1.17*
cte	n	1	1	0	0	3	1	3	3	0	2	0	1	2	17
	%	*0.70*	*1.28*	*0.00*	*0.00*	*1.88*	*1.02*	*2.61*	*2.05*	*0.00*	*1.83*	*0.00*	*1.56*	*1.01*	*1.17*
flakes	n	73	47	44	82	83	47	59	68	25	64	23	36	113	764
	%	*51.41*	*60.26*	*55.00*	*51.25*	*51.88*	*47.96*	*51.30*	*46.58*	*46.30*	*58.72*	*48.94*	*56.25*	*56.78*	*52.62*
blades	n	9	8	3	10	10	2	7	4	1	11	1	2	18	86
	%	*6.34*	*10.26*	*3.75*	*6.25*	*6.25*	*2.04*	*6.09*	*2.74*	*1.85*	*10.09*	*2.13*	*3.13*	*9.05*	*5.92*
bladelets	n	12	7	6	22	18	15	15	20	8	12	9	10	21	175
	%	*8.45*	*8.97*	*7.50*	*13.75*	*11.25*	*15.31*	*13.04*	*13.70*	*14.81*	*11.01*	*19.15*	*15.63*	*10.55*	*12.05*
spalls	n	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
chips	n	22	3	9	26	26	15	12	30	9	11	4	8	20	195
	%	*15.49*	*3.85*	*11.25*	*16.25*	*16.25*	*15.31*	*10.43*	*20.55*	*16.67*	*10.09*	*8.51*	*12.50*	*10.05*	*13.43*
chunks	n	24	11	14	17	17	18	16	21	11	9	8	7	19	192
	%	*16.90*	*14.10*	*17.50*	*10.63*	*10.63*	*18.37*	*13.91*	*14.38*	*20.37*	*8.26*	*17.02*	*10.94*	*9.55*	*13.22*
mbt	n	1	0	1	0	2	0	2	0	0	0	0	0	0	6
	%	*0.70*	*0.00*	*1.25*	*0.00*	*1.25*	*0.00*	*1.74*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.41*
Total	n	142	78	80	160	160	98	115	146	54	109	47	64	199	1452

and 3). Translucent grey (Type 1) material is also present in significant quantity throughout, often constituting >10% of the sample. Occupation horizons (371) and (377) also feature (>10%) medium-grained brown (Type 4) material. Patination is generally high throughout the sequence, although items with no patination are present in all contexts and on all raw material types. It may be significant that occupation horizons (371) and (377) have lower levels of patination, with *c.* 50% of pieces having no visible patina. Whilst much of the sampled material appears in relatively fresh condition, there are many fragmentary artefacts and the material from some contexts, such as (377), has a relatively high degree of edge damage, possibly caused by post-depositional batter/trampling.

Both cores (1.17%) and CTE (1.17%) are present, and the assemblage has a core:debitage ratio of 1:61. Cores are mostly irregular in form and are almost exclusively manufactured on wadi cobbles. Whilst most cores were used for the ad hoc production of flakes (n=6), more formal knapping is apparent in the form of several single platform sub-pyramidal bladelet/flakelet core types (n=7). CTE are dominated by core face removals (n=15), often side-struck or opposed, several of which derive from blade/bladelet cores. The majority of cores and CTE are on medium-grained grey material (Type 2), but two fragments of bladelet cores as well as several CTE are manufactured on fine-grained Type 1 material. The proportion of cores varies throughout the sequence and six contexts have no cores. Context (377) contained the greatest number of cores (n=6), giving a core:debitage ratio of 1:26. In total, 26.65% of the sample is classified as debris, with chips and chunks both present in varying numbers throughout the sequence.

Debitage is dominated by flakes (52.62%) with smaller numbers of blades (5.92%) and bladelets (12.05%); the blade:flake ratio is 1:3. There are no spalls in the assemblage. Flakes are generally small (<30 mm) and highly patinated and include many fragments, although some contexts, such as (377), include larger examples and many primary elements. Flakes made on Type 1 material are generally finer than those on more coarsely grained material, and the dorsal scarring on many of these pieces indicates that they come from cores used for bladelet/blade production. All blades and bladelets come from unidirectional core reduction, and include both regular and irregular types and many fragments. Blades are often relatively short and wide, whilst many bladelets are particularly small (*c.* 25 mm in length). Many of the more regular blade/lets were produced on the Type 1 raw material. Almost all the blades and bladelets are heavily patinated, although material from the occupation horizons (371) and (377) has a slightly different character than subsequent fill/abandonment contexts; these include some relatively large blades and bladelets manufactured on Type 4 raw material types, which are often not patinated. The assemblage also includes six microburin products (0.41%) all deriving from fill/abandonment contexts, comprising four distal and two proximal examples. Five of these pieces are manufactured on bladelets, with one on a blade. Four microburins are manufactured on Type 1 raw material type.

The retouched/used assemblage (n=175) is manufactured on a range of blank types. In total, 16.79% of the debitage is retouched, although this proportion is variable, ranging from 9.43% in (118) to 24.62% context (348). Occupation layer (377) has a high proportion (23.38%) of retouched debitage.

Table 39.28 Retouched and used chipped-stone artefacts from Structure O33.

Type		109	117	118	119	339	348	356	357	362	367	369	371	377	O33 Total
retouched flakes	n	3	2	0	2	2	3	7	3	1	1	0	2	10	36
	%	*21.43*	*22.22*	*0.00*	*11.11*	*13.33*	*18.75*	*46.67*	*15.00*	*20.00*	*9.09*	*0.00*	*33.33*	*27.78*	*20.57*
used flakes	n	0	0	0	0	0	1	0	2	0	0	0	0	3	6
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*6.25*	*0.00*	*10.00*	*0.00*	*0.00*	*0.00*	*0.00*	*8.33*	*3.43*
retouched blades	n	3	0	1	3	1	1	1	2	0	2	0	1	1	16
	%	*21.43*	*0.00*	*20.00*	*16.67*	*6.67*	*6.25*	*6.67*	*10.00*	*0.00*	*18.18*	*0.00*	*16.67*	*2.78*	*9.14*
used blades	n	0	1	0	1	1	0	0	0	0	0	0	0	0	3
	%	*0.00*	*11.11*	*0.00*	*5.56*	*6.67*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.71*
retouched bladelets	n	2	1	0	2	2	1	2	1	2	1	1	0	3	18
	%	*14.29*	*11.11*	*0.00*	*11.11*	*13.33*	*6.25*	*13.33*	*5.00*	*40.00*	*9.09*	*20.00*	*0.00*	*8.33*	*10.29*
used bladelets	n	0	0	1	0	0	0	0	0	0	0	0	0	0	1
	%	*0.00*	*0.00*	*20.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.57*
points	n	0	1	1	1	0	0	1	1	0	0	1	1	2	9
	%	*0.00*	*11.11*	*20.00*	*5.56*	*0.00*	*0.00*	*6.67*	*5.00*	*0.00*	*0.00*	*20.00*	*16.67*	*5.56*	*5.14*
perforators	n	4	2	0	2	2	3	0	1	0	1	1	1	5	22
	%	*28.57*	*22.22*	*0.00*	*11.11*	*13.33*	*18.75*	*0.00*	*5.00*	*0.00*	*9.09*	*20.00*	*16.67*	*13.89*	*12.57*
scrapers	n	0	0	0	1	0	0	0	0	1	1	1	0	1	5
	%	*0.00*	*0.00*	*0.00*	*5.56*	*0.00*	*0.00*	*0.00*	*0.00*	*20.00*	*9.09*	*20.00*	*0.00*	*2.78*	*2.86*
bitruntcations	n	0	0	0	1	1	0	0	0	0	0	0	0	0	2
	%	*0.00*	*0.00*	*0.00*	*5.56*	*6.67*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.14*
truncations	n	0	0	0	0	0	0	0	0	0	1	0	1	0	2
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*9.09*	*0.00*	*16.67*	*0.00*	*1.14*
bifacials	n	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
glossed pieces	n	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*2.78*	*0.57*
burins	n	0	0	1	0	0	2	0	0	0	1	0	0	1	5
	%	*0.00*	*0.00*	*20.00*	*0.00*	*0.00*	*12.50*	*0.00*	*0.00*	*0.00*	*9.09*	*0.00*	*0.00*	*2.78*	*2.86*
notch/ denticulates	n	0	2	0	1	0	0	0	2	0	0	0	0	1	6
	%	*0.00*	*22.22*	*0.00*	*5.56*	*0.00*	*0.00*	*0.00*	*10.00*	*0.00*	*0.00*	*0.00*	*0.00*	*2.78*	*3.43*
microliths	n	0	0	0	1	1	2	1	5	0	1	0	0	3	14
	%	*0.00*	*0.00*	*0.00*	*5.56*	*6.67*	*12.50*	*6.67*	*25.00*	*0.00*	*9.09*	*0.00*	*0.00*	*8.33*	*8.00*
backed blades	n	0	0	0	0	0	0	0	1	0	0	0	0	0	1
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*5.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.57*
retouched fragments	n	2	0	1	3	5	3	1	2	0	1	1	0	3	22
	%	*14.29*	*0.00*	*20.00*	*16.67*	*33.33*	*18.75*	*6.67*	*10.00*	*0.00*	*9.09*	*20.00*	*0.00*	*8.33*	*12.57*
varia	n	0	0	0	0	0	0	2	0	1	1	0	0	2	6
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*13.33*	*0.00*	*20.00*	*9.09*	*0.00*	*0.00*	*5.56*	*3.43*
Total	n	14	9	5	18	15	16	15	20	5	11	5	6	36	175

The sample includes a wide range of both formal and NFT types (Table 30.8). In total 40% of the tool assemblage is made up of NFT, including retouched flakes (20.57%), blades (9.14%) and bladelets (10.29%). Small numbers of unretouched debitage have macroscopic use wear traces. Notably, occupation (377) and infilling/abandonment layer (356) include a high proportion of retouched flakes, which make up 27.78% and 46.78% respectively of the retouched assemblages from these contexts. These tools are generally made on large flakes and have irregular, often chunky, retouch.

Perforators are the most common formal tool type (12.57%) and include one borer and 21 awls. Awls include a range of types, including straight awls on fine blades/ bladelets (very similar to points) and a range of more heavy-duty perforating tools made on flakes and chunky blades. Microliths constitute the next most common tool type (8%) amongst which are backed bladelets (n=9) and lunates (n=5). Backing on these pieces takes various forms and three examples feature Helwan backing. Nine of the microliths are manufactured on Type 1 material and most are heavily patinated. Microliths appear in seven of the 13 sampled contexts, including three from occupation layer (377). However, the distribution of these is uneven, with five (35.71%) recovered from infilling/abandonment context (356). The assemblage also includes several 'projectile' points (5.14%), including El-Khiam (n=7) and Salibiya (n=2) sub-types. Most of the points are heavily patinated and are made on medium-grained raw material types (Types 2 and 3), although two examples are made on Type 1 material. Points occur in both occupation and infilling contexts. The tips of points are formed by inverse retouch.

Less abundant tool types include notches/denticulates (3.43%), often in the form of small, notched bladelets, scrapers (2.86%) and a small range of burins (2.86%). Scrapers include a massive (140 x 100 x 40 mm) example, from context (377). The assemblage also includes a small number of Hagdud bitruncations (1.14%), as well as single truncations (1.14%). Tool types represented by a single example include a glossed (possibly sickle) blade and a fragment of a backed blade. Tools listed as varia (3.43%) include used and retouched chunks, a retouched pebble and three small backed flakes. Although there are no bifacial tools in the sample, it should be noted that SF1828 (382), which was not included in the sample, is a large (>300 mm in length) bifacially worked basalt 'maul' or pestle roughout.

The chipped stone from Structure O33 includes a range of technological and typological traits that are diagnostic of the PPNA. Here, as in many other structures, Type 1 material is primarily associated with more controlled production of bladelets. Occupation (377) has a rather different character to that of most of the subsequent infilling/abandonment contexts. This context (377) includes high proportions of both retouched tools and cores, and also features a range of larger and less patinated debitage items, together with a wider range of raw material types (including Type 4). The assemblage has a high proportion of microliths (n=14), featuring a range of backing types and taking a range of forms. Microliths are generally, but not exclusively, manufactured on Type 1 raw material, and, as in other Objects, this raw material is also used to manufacture more diagnostic PPNA elements including El-Khiam points.

Structure O73 (Chapter 33)

The small sample (n=661 pieces) includes material from two out of the three contexts with chipped stone in Structure O73, Tables 39.29 and 39.30. By weight, the sample (3720 g) constitutes 54.55% of the bulk finds chipped stone from this structure. In addition SF1013, SF1014, SF1015 (690), SF1103, SF1111 and SF1112 (702) came from sampled contexts and are included in the analysis.

The sampled artefacts are primarily of medium-grained, opaque grey raw materials (Types 2 and 3). Translucent grey (Type 1) material is present in small quantities (<5%) in both contexts. The degree of patination is high, and most pieces are heavily patinated. Material from both sampled contexts appears rather battered with significant edge damage, perhaps indicting post-depositional trampling/dumping.

Both cores (1.48%) and CTE (0.99%) are present, and the assemblage has a core:debitage ratio of 1:53. There

Table 39.29 Chipped-stone debitage by context from Structure O33.

Context		690	702	O73
cores	n	6	4	10
	%	*1.20*	*2.48*	*1.51*
cte	n	6	2	8
	%	*1.20*	*1.24*	*1.21*
flakes	n	312	75	387
	%	*62.40*	*46.58*	*58.55*
blades	n	28	7	35
	%	*5.60*	*4.35*	*5.30*
bladelets	n	63	40	103
	%	*12.60*	*24.84*	*15.58*
spalls	n	1	0	1
	%	*0.20*	*0.00*	*0.15*
chips	n	26	6	32
	%	*5.20*	*3.73*	*4.84*
chunks	n	58	26	84
	%	*11.60*	*16.15*	*12.71*
mbt	n	0	1	1
	%	*0.00*	*0.62*	*0.15*
Total	n	500	161	661

Table 39.30 Retouched and used chipped-stone artefacts from Structure O33.

Type		690	702	Total O73
retouched flakes	n	8	0	8
	%	*17.02*	*0.00*	*12.70*
used flakes	n	3	0	3
	%	*6.38*	*0.00*	*4.76*
retouched blades	n	5	2	7
	%	*10.64*	*12.50*	*11.11*
used blades	n	1	1	2
	%	*2.13*	*6.25*	*3.17*
retouched bladelets	n	4	1	5
	%	*8.51*	*6.25*	*7.94*
used bladelets	n	1	0	1
	%	*2.13*	*0.00*	*1.59*
points	n	3	5	8
	%	*6.38*	*31.25*	*12.70*
perforators	n	7	0	7
	%	*14.89*	*0.00*	*11.11*
scrapers	n	0	2	2
	%	*0.00*	*12.50*	*3.17*
bitruntcations	n	0	0	0
	%	*0.00*	*0.00*	*0.00*
truncations	n	0	1	1
	%	*0.00*	*6.25*	*1.59*
bifacials	n	0	1	1
	%	*0.00*	*6.25*	*1.59*
glossed pieces	n	1	0	1
	%	*2.13*	*0.00*	*1.59*
burins	n	0	0	0
	%	*0.00*	*0.00*	*0.00*
notch/ denticulates	n	5	1	6
	%	*10.64*	*6.25*	*9.52*
microliths	n	1.00	2.00	3.00
	%	*2.13*	*12.50*	*4.76*
backed blades	n	0	0	0
	%	*0.00*	*0.00*	*0.00*
retouched fragments	n	5	0	5
	%	*10.64*	*0.00*	*7.94*
varia	n	3	0	3
	%	*6.38*	*0.00*	*4.76*
Total	n	47	16	63

are 10 cores, comprising blade (n=1), flake (n=2), bladelet (n=2) and mixed flake/bladelet (n=3) types, as well as core fragments (n=3). Flake cores are generally irregular with several platforms, whilst blade, bladelet and mixed cores are more regular and include single platform and change of orientation examples. All cores appear to have been made on wadi cobbles, although raw materials vary; flake cores are generally made on medium-grained materials (Types 2 and 3), whilst bladelet cores tend to be manufactured on more finely grained material types (e.g. Type 1). CTE include three crested pieces, two platform rejuvenation flakes and four core face removals. In total, just 17.55% of the sample is debris, with chips and chunks both present in both sampled contexts.

The debitage assemblage is dominated by flakes (58.55%) with smaller numbers of blades (5.3%) and bladelets (15.58%); the blade:flake ratio is 1:3. There is one spall in the assemblage. Flakes include several large, often primary, pieces (up to 90 mm), but are dominated by medium sized (max. 30 mm) examples, with very few pieces smaller than 15 mm. Many of the medium sized flakes are fine and show dorsal scarring indicative of bladelet production. Blades and bladelets (all of which reflect unidirectional core reduction) are mainly regular in form, with blades generally relatively short and wide (*c.* 60 x 25 mm) and bladelets generally small. Blades and bladelets are mainly manufactured on more finely grained materials (Type 1) and exhibit a high degree of patination. There is a single microburin in the assemblage.

The retouched/used assemblage (n=63) is manufactured on a range of blank types. In total, 11.8% of debitage is retouched. The assemblage includes a wide range of both formal and NFT types. NFT comprise 31.75% of the tool assemblage and include retouched flakes (12.7%), blades (11.11%) and bladelets (7.94%). Small numbers of unretouched debitage have macroscopic use wear traces.

The most commonly encountered formal tool type is points (12.7%, n=8), including small finds SF1015, SF1103, SF1111 and SF1112. The majority (n=6) of the points, including all the small finds, are of the El-Khiam sub-type with tips formed by inverse retouch. The other points include a Salibiya point and an unusual point with a tip formed by an oblique truncation. Perforators are the next most abundant tool type (11.11%) comprising seven awls. These include examples on flakes (n=1), blades (n=3) and bladelets (n=3). The examples on bladelets are generally similar to points in form but lack basal modification. There are six (9.52%) notch/denticulates in the assemblage, including one flake with denticulate retouch and five notched pieces, most of which are on blade sections. There are three microliths (4.76%), all of which are backed bladelets, including one example with Helwan backing. All microliths are manufactured on Type 1 raw material. Other tool types present in the assemblage include two scrapers (both on cortical flakes), a truncated flake, and an irregular bifacially retouched small nodule/pebble. There is also a single glossed piece in the assemblage, a blade with weakly developed bifacial and bilateral gloss. The tools tabulated as varia include retouched chunks and pebbles.

The small chipped stone assemblage from Structure O73 includes a range of technological and typological traits diagnostic of the PPNA. Much of the assemblage is highly patinated, and many pieces show evidence of possibly post-depositional edge damage. Both sampled contexts include cores and CTE, although debris items, especially chips, are rare. There are very few small (<20 mm) pieces in the assemblage.

Midden O60 (Chapter 35)

The sample (n=4640 pieces) includes material from 10 out of 109 contexts with chipped stone in Midden O60, Tables 39.31 and 39.32. By weight, the sample (30,810 g) constitutes just 1.86% of the bulk finds of chipped stone from this structure. Additionally, 15 small finds SF841 (571), SF983, SF989, SF967, SF987, SF993, SF966, SF981, SF988 (all from 576), SF1011 (all from 684),

Table 39.31 Chipped-stone debitage by context from Structure O60.

Context		203	199	438	347	353	571	576	684	700	706	O60
cores	n	8	6	24	5	4	5	7	0	5	1	65
	%	*2.27*	*1.70*	*2.85*	*0.69*	*0.81*	*1.36*	*2.13*	*0.00*	*1.37*	*0.62*	*1.40*
cte	n	10	6	19	8	5	8	11	4	14	1	86
	%	*2.83*	*1.70*	*2.26*	*1.10*	*1.01*	*2.17*	*3.35*	*0.62*	*3.85*	*0.62*	*1.85*
flakes	n	188	179	508	379	270	235	171	399	224	107	2660
	%	*53.26*	*50.71*	*60.40*	*52.20*	*54.66*	*63.69*	*52.13*	*61.38*	*61.54*	*66.05*	*57.33*
blades	n	20	28	55	63	17	17	25	2	8	7	242
	%	*5.67*	*7.93*	*6.54*	*8.68*	*3.44*	*4.61*	*7.62*	*0.31*	*2.20*	*4.32*	*5.22*
bladelets	n	20	39	125	148	73	50	45	60	64	16	640
	%	*5.67*	*11.05*	*14.86*	*20.39*	*14.78*	*13.55*	*13.72*	*9.23*	*17.58*	*9.88*	*13.79*
spalls	n	6	3	13	7	6	1	4	1	2	0	43
	%	*1.70*	*0.85*	*1.55*	*0.96*	*1.21*	*0.27*	*1.22*	*0.15*	*0.55*	*0.00*	*0.93*
chips	n	70	70	39	60	52	31	38	117	24	13	514
	%	*19.83*	*19.83*	*4.64*	*8.26*	*10.53*	*8.40*	*11.59*	*18.00*	*6.59*	*8.02*	*11.08*
chunks	n	31	22	58	56	67	22	27	67	23	17	390
	%	*8.78*	*6.23*	*6.90*	*7.71*	*13.56*	*5.96*	*8.23*	*10.31*	*6.32*	*10.49*	*8.41*
mbt	n	0	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Total	n	353	353	841	726	494	369	328	650	364	162	4640

SF1106, SF1129, SF1190, 1137, 1130 (all from 700) come from sampled contexts and were included in the analysis.

The sampled artefacts from Midden O60 are manufactured on an extremely wide range of raw material types. These include a range of medium-grained, opaque grey and brown raw materials (Types 2, 3 and 4). The sample also includes rare examples of translucent grey (Type 1) material. Translucent brown (Type 5) materials and occasional pieces of flaked coarse stone (including limestone and basalt) are present in varying proportions throughout the sequence. The raw material composition of the assemblage (as in Structure O100) shows clear stratigraphic patterning. More specifically, the lowest sampled context (706), which immediately overlies Surface O91, has an assemblage made almost entirely on a range of medium-grained grey raw materials (Types 2 and 3). However, context (700), which immediately overlies (706), sees an increase in brown materials (Types 4 and 5), with

Table 39.32 Retouched and used chipped-stone artefacts from Structure O60.

Type		203	199	438	347	353	571	576	684	700	706	O60
retouched flakes	n	13	13	24	11	11	5	3	4	9	1	94
	%	*46.43*	*30.23*	*26.97*	*23.40*	*34.38*	*18.52*	*13.04*	*22.22*	*21.43*	*16.67*	*26.48*
used flakes	n	0	1	3	2	0	1	1	2	4	0	14
	%	*0.00*	*2.33*	*3.37*	*4.26*	*0.00*	*3.70*	*4.35*	*11.11*	*9.52*	*0.00*	*3.94*
retouched blades	n	4	8	9	7	1	3	2	1	0	0	35
	%	*14.29*	*18.60*	*10.11*	*14.89*	*3.13*	*11.11*	*8.70*	*5.56*	*0.00*	*0.00*	*9.86*
used blades	n	1	0	7	3	0	1	2	0	0	0	14
	%	*3.57*	*0.00*	*7.87*	*6.38*	*0.00*	*3.70*	*8.70*	*0.00*	*0.00*	*0.00*	*3.94*
retouched bladelets	n	3	3	11	11	10	1	1	1	5	1	47
	%	*10.71*	*6.98*	*12.36*	*23.40*	*31.25*	*3.70*	*4.35*	*5.56*	*11.90*	*16.67*	*13.24*
used bladelets	n	0	0	9	0	0	0	0	4	0	1	14
	%	*0.00*	*0.00*	*10.11*	*0.00*	*0.00*	*0.00*	*0.00*	*22.22*	*0.00*	*16.67*	*3.94*
points	n	0	0	0	0	0	6	1	2	0	9	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*26.09*	*5.56*	*4.76*	*0.00*	*2.54*
perforators	n	0	0	5	4	4	4	1	0	7	0	25
	%	*0.00*	*0.00*	*5.62*	*8.51*	*12.50*	*14.81*	*4.35*	*0.00*	*16.67*	*0.00*	*7.04*
scrapers	n	2	1	3	3	0	2	1	0	3	1	16
	%	*7.14*	*2.33*	*3.37*	*6.38*	*0.00*	*7.41*	*4.35*	*0.00*	*7.14*	*16.67*	*4.51*
bitruntcations	n	0	0	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
truncations	n	0	0	0	0	1	0	0	0	0	0	1
	%	*0.00*	*0.00*	*0.00*	*0.00*	*3.13*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.28*
bifacials	n	1	1	0	0	1	0	0	0	1	0	4
	%	*3.57*	*2.33*	*0.00*	*0.00*	*3.13*	*0.00*	*0.00*	*0.00*	*2.38*	*0.00*	*1.13*
glossed pieces	n	0	0	0	0	1	1	1	1	1	0	5
	%	*0.00*	*0.00*	*0.00*	*0.00*	*3.13*	*3.70*	*4.35*	*5.56*	*2.38*	*0.00*	*1.41*
burins	n	0	10	6	0	0	5	2	0	2	0	25
	%	*0.00*	*23.26*	*6.74*	*0.00*	*0.00*	*18.52*	*8.70*	*0.00*	*4.76*	*0.00*	*7.04*
notch/ denticulates	n	2	2	2	2	0	3	1	0	3	1	16
	%	*7.14*	*4.65*	*2.25*	*4.26*	*0.00*	*11.11*	*4.35*	*0.00*	*7.14*	*16.67*	*4.51*
microliths	n	0	1	0	0	0	0	0	0	0	0	1
	%	*0.00*	*2.33*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.28*
backed blades	n	0	0	1	0	0	0	0	0	0	0	1
	%	*0.00*	*0.00*	*1.12*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.28*
retouched fragments	n	2	3	6	3	3	1	0	3	1	1	23
	%	*7.14*	*6.98*	*6.74*	*6.38*	*9.38*	*3.70*	*0.00*	*16.67*	*2.38*	*16.67*	*6.48*
varia	n	0.00	0.00	3	1	0.00	0.00	2	1	4	0.00	11
	%	*0.00*	*0.00*	*3.37*	*2.13*	*0.00*	*0.00*	*8.70*	*5.56*	*9.52*	*0.00*	*3.10*
Total	n	28	43	89	47	32	27	23	18	42	6	355

translucent brown (Type 5) material accounting for *c.* 30% of the assemblage. Type 5 material is present (*c.* 30%) in all subsequent contexts. The diversity of raw material types in Structure O60 is noteworthy, and many contexts include a range of (often medium–coarse) grained material types seldom seen in other structures at WF16.

The extent of patination is generally very low throughout the sequence, although there are completely patinated pieces present in all sampled contexts. Patination is relatively high in contexts (347) and (353), where it is generally limited to blades and bladelets, with *c.* 20% of these heavily patinated. A significant proportion of the assemblage has traces of burning, particularly evident in contexts (706) and (684). Throughout the sequence many pieces, especially finer flakes and blades/bladelets, show evidence of edge damage/batter. This is likely to be a consequence of post-depositional factors including both PPNA activity and post-excavation/curation damage.

Both cores (1.4%) and CTE (1.85%) are present, and the assemblage has a core:debitage ratio of 1:56. Proportions vary by context, with cores absent from the relatively large sample (n=650) from context (684), whilst in context (438) cores (n=24) constitute 2.85%, giving a core:debitage ratio of 1:30. Debris makes up 19.48% of the sample, with chips and chunks both present in relatively low numbers throughout the sequence. This is amongst the lowest proportion of debris of all sampled structures at WF16. Significantly, debris accounts for only 11.53% of the assemblage from core-rich context (438). Unlike the Surface O91 assemblage, the high proportions of cores coupled with low proportions of debris in Midden O60 suggests that many of the cores were dumped in this area, with knapping taking place elsewhere.

Cores (n=65) include flake (n=19), bladelet (n=12) as well as mixed flake/bladelet (n=25) types. There are also core fragments (n=7) and ‘other’ cores (n=2) present. There are no blade cores. Bladelet and mixed cores, 19 of which derive from context (438), are dominated by regular, single platform, sub-pyramidal and change of orientation types. In context (571) and above, these are generally small (*c.* 30 mm max. dimension), regular, manufactured on the fine-grained grey (rarely) and brown (most often) (Types 1 and 4) material and feature heavily prepared platforms. Although many cores are regular in shape, there are several unusual examples that resemble burins. It is also noteworthy that there are two opposed platform cores in the assemblage. One opposed platform core (438; see Figure 39.1k) is wedge-shaped, with significant preparation on the back of the core. Many of the O60 cores and many of the bladelet/mixed cores have been heavily reduced, with frequent evidence for previously abandoned platforms and the prior removal of larger (blade) elements. This may explain the presence of blades, despite the lack of blade cores in the assemblage. Bladelet/mixed cores from below (571) are generally larger (*c.* 50 mm), less regular and are often made on medium-grained grey and brown raw material types. Flake cores are generally less regular than bladelet/mixed cores and include many irregular examples; these are more commonly manufactured on wadi cobbles of medium-grained, opaque material (Types 2, 3 and 4).

CTE include core face removals (n=47), platform rejuvenation flakes (n=27) and crested pieces (n=12). Platform rejuvenation flakes become more common towards the top the sequence, for example, in basal context (700) these account for only 21% of CTE, whilst in stratigraphically higher context (438) this figure increases to 36%. The general impression is that platform rejuvenation flakes are primarily, although not always, associated with the more controlled production of bladelets from cores manufactured on high quality materials. The preliminary nature of the present study precludes further comment on core reduction strategies in this sequence, however, it is clear that here (as in Structure O100) blade/let core reduction is highly structured, targeted on specific, high quality raw materials and is of a rather different nature to that observed in the majority of the assemblages examined in this study.

Flakes dominate the debitage sample (57.33%), with smaller numbers of blades (5.22%) and bladelets (13.79%); the blade:flake ratio is 1:3. Flakes are present in a range of sizes, with many large (*c.* 80 mm) pieces. Most flakes, however, are in the size range 30–40 mm, and there are few flakes <20 mm in size. Larger flakes, often retaining a high degree of cortex, are present in most contexts: for example, in (438) where these constitute *c.* 25% of the flake assemblage. Flakes are present on a range of materials, including basalt and limestone. Flakes manufactured on fine-grained (mainly Type 5) material (which include primary elements) are generally of higher quality than those on other raw materials and often show evidence (dorsal scarring) for the previous removal of blades/bladelets.

Blades and bladelets include both regular and irregular types, and many fragments. Blades from context (700) and above, roughly half of which are regular, reach a maximum length of *c.* 110 mm but are generally *c.* 60 mm in length. Bladelets from these contexts are generally large (45–50 mm in length) and are similar to the blades in most respects, although smaller (*c.* 15 mm length) examples are present throughout. Regular blades and bladelets are usually made on fine-grained grey (Type 1) or (far more commonly) brown (Type 5) raw materials, with more coarsely grained raw material types primarily accounting for less regular examples. The assemblage includes a few (<5%) blades and bladelets from opposed platform cores, which are rare in most other sampled areas of WF16. Notably, in the lowermost sampled context (706), blade/lets are rather different from those described above; these include mostly irregular examples manufactured on medium-grained raw material types (Types 2, 3 and 4). Throughout the sequence, blades and bladelets are usually more heavily patinated than most flakes, although the extent of patination is relatively low in all cases. No microburin products were identified in the sample.

Spalls (n=43) include burin spalls and several sharpening spalls detached from retouched items, perhaps suggesting that many of the burins in this assemblage started life as other tool types. The majority of spalls are manufactured on Type 5 material. A single tranchet spall was identified (context (203)).

The retouched/used tools (n=355) are made on a variety of blank types. In total, only 9.67% of debitage is retouched, although this proportion is highly variable, ranging from 4.58% in (706) to 16.86% in context (199). The overall proportion of retouched items (as well as the proportion of bladelets retouched) in Midden O60 is the lowest of all the structures sampled in this analysis.

The assemblage includes a wide range of both formal and NFT types. Overall, 49.58% of the tool assemblage is made up of NFT, including retouched flakes (26.48%), blades (9.86%) and bladelets (13.24%). Small numbers of unretouched debitage have macroscopic use wear traces. Retouched flakes are particularly common and often make up >20% of all assemblages, and in context (203) they make up 46.43% of tools. Retouched flakes generally feature irregular retouch, whilst retouch on bladelets is often fine and irregular. This suggests that some of the 'retouch' on bladelets is, in fact, unintentional edge damage.

Perforators (7.04%) and, unusually, burins (7.04%) are the most commonly found formal retouched tool types. Perforators include awls (n=20) and borers (n=5). Awls are mainly on flakes (n=13) but are also made on blades (n=3) and bladelets (n=4). Awls take various forms, including 'chunky' irregular awls on flakes and several examples that are similar to borers, with relatively thick convergent and elongated points formed by abrupt retouch of both lateral margins. There are relatively few of the fine straight awls on bladelets that dominate many of the assemblages from the WF16 structures. The borers, two of which are tip fragments, all appear to be made on bladelets and feature elongated parallel-sided tips formed by bilateral, abrupt retouch. Burins (n=25) mostly derive from upper levels of the sequence, particularly context (199), which featured 10 examples. Burins are primarily made on flakes (n=15) but also occur on blades (n=7), bladelets (n=2) and CTE (n=2). Burins include a variety of types including multiple and single burins with spalls removed in transverse and longitudinal directions. Burin removals are initiated on a range of both prepared and unprepared surfaces, including truncations and breaks. Burins are most commonly manufactured on Type 5 raw material. Notably, several burins appear to be manufactured on tools that had previously taken a different form (e.g. backed blade or scraper), which may suggest a desire to maximise the use of this raw material.

Notches/denticulates and scrapers constitute the next most common formal tool type, each accounting for 4.51% of the tool assemblage. There are 10 notches, nine of which are made on flakes except for one example on a blade. The six denticulates include five on flakes and one on a blade and are generally irregular in form. All except one of the notches/denticulates are made on medium–coarse grained raw material types (Types 2, 3 and 4). The 16 scrapers are all on flakes, except one example on a chunk, and one on a CTE. Scrapers are generally fairly large >40 mm and feature a range of, usually irregular and chunky, styles of retouch.

Points (n=9) constitute 2.54% of the assemblage and are all of the El-Khiam sub-type. All the points were recorded as small finds. Six of the points (SF983, SF967, SF987, SF993, SF966, and SF981) derive from context (576). The remaining points were recovered from near the base of the O60 sequence in contexts (684) and (700). The points from (576), three of which are base fragments, are interesting as they do not conform to the usual form of points at WF16 (Smith 2007). These points are all unpatinated, and where tips are present they are formed by direct retouch. All the points from (576) are manufactured on Type 4 brown raw material.

There are five glossed pieces in the assemblage (1.41%), including SF841 from context (571). These include three blades, a bladelet and a flake. The glossed blade from (684) is a medium sized (75 mm) blade mid-section, with semi abrupt retouch on one edge, whilst the other edge features edge wear and well-developed gloss. SF841 is a similarly sized blade with no retouch and well-developed, bifacial gloss on one edge. The assemblage includes four bifacial pieces (1.13%) all of which are irregular in form and may represent roughouts for bifacial axes. The assemblage also features a single microlith (a lunate manufactured on Type 1 raw material) as well as a backed blade and a truncated bladelet. There are no bitruncations in the assemblage. There are 11 tools tabulated as varia which include two possible roughouts on large coarse stone flakes, two trihedral picks, a further possible roughout for a biface, a pièce ésquillée, a small bilaterally notched flint nodule and a chopper with partial bifacial retouch. The varia class also includes two polished basalt axes (SF1130, SF1130), both from context (700).

The small proportion of the vast Midden O60 chipped stone assemblage sampled for the present evaluation precludes detailed discussion/interpretation of individual contexts within the midden. However, this preliminary analysis suggests that the Midden O60 sample, alongside that from Structure O100, reflects a marked change in raw material acquisition, core reduction techniques and tool typology towards the end of WF16's use as a settlement. The similarities between the material in Midden O60 and Structure O100 show that the Midden O60 deposits accumulated during the infilling of Structure O100.

The assemblage from Midden O60 is highly variable. The high proportions of cores, primary elements and NFT, coupled with low frequencies of formal tools and debris, indicate that the majority of the sample represents dumped deposits of knapping waste and discarded ad hoc tools. Whilst all sampled contexts include a high degree of variability, consistent with the interpretation of Midden O60 as a midden/dump/workshop area, it is possible to discern a degree of stratigraphic patterning in the sampled material from this structure. Although basal context (706) retains a high degree of affinity with underlying Surface O91, subsequent levels of Midden O60 are quite different to most of the sampled assemblages at WF16, yet show a striking similarity to the material sampled from the upper levels (e.g. 801) from Structure O100. In particular, the high percentage of the assemblage made on Type 5 material shows that the chipped stone dumped into Midden O60 did not derive from activity related to the occupation of most of the other sampled structures. This suggests that the upper levels of Midden O60 are broadly contemporaneous only with the upper levels of Structure O100.

The debitage from the Midden O60 assemblage appears to represent dumping of waste material, much of which represents initial reduction of cores and final discard of exhausted cores. There are large numbers of primary elements, including primary elements of Type 5 material, indicating that initial reduction of this, non-local, material occurred on site. Notably, the assemblage includes many flakes of coarse stone, indicating on site manufacture of ground-stone (basalt and limestone) items. Cores in Midden O60 take a wide range of forms, and include many very rough flake cores, together with some fine bladelet cores. Bladelet cores are often made on Type 5 material and are heavily reduced. Analysis of scar patterns suggests that many of these cores began life as larger blade cores. It may be significant that there are some regular opposed platform cores in this assemblage, and a higher than normal proportion of blades/bladelets is produced from opposed platform cores. The assemblage includes relatively high numbers of CTE, particularly platform rejuvenation flakes from bladelet cores; this suggests an increased concern to maximise the Type 5 material. Interestingly, despite the large numbers of bladelet cores in the assemblage, there are relatively few bladelets and very few tools (24%) manufactured on bladelets when compared to most of the sampled structures (e.g. 48% of tools are made on bladelets in Pit O14).

In terms of typology the Midden O60 assemblage, particularly from the upper levels, is unusual for WF16; featuring a high proportion of burins combined with low numbers of points, bitruncations and microliths. Where points are present, they are stylistically distinct from those recovered from most other areas of the site, with tips formed by direct retouch. There are several bifacial pieces in the assemblage, including polished basalt axes, which again is atypical of the general WF16 assemblage evaluated in the present study. In sum, the Midden O60 assemblage bears strong affinities to the assemblage from the upper levels of Structure O100 and, looking further afield, shows similarities to the assemblage recovered from late PPNA contexts at El Hemmeh (Smith *et al.* 2016). Moreover, the assemblage from Midden O60 shows similarities to the assemblage from WF16 evaluation trench 3, described by Pirie (2007), which was associated with Late PPNA ^{14}C dates (Mithen and Finlayson 2007b). As such, it is most likely that the Midden O60 material represents a Late PPNA chipped stone assemblage.

Structure O100 (Chapter 36)

The sample (n=2496 pieces) includes material from eight out of the 40 contexts with chipped stone in Structure O100, Tables 39.33 and 39.34. By weight, the sample (15,090 g) constitutes 23.87% of the bulk finds of chipped stone from this structure. In addition, five small finds SF1756, SF2567 (896), SF1762, SF1763 (898) and SF2267 (916) come from sampled contexts and were included in the analysis. Sampled contexts relate to spits of infilling/abandonment

Table 39.33 Chipped-stone debitage by context from Structure O100.

Context		801	896	897	898	906	907	916	917	O100
cores	n	27	1	0	2	4	3	0	2	39
	%	*4.25*	*0.26*	*0.00*	*0.68*	*1.35*	*0.68*	*0.00*	*0.57*	*1.56*
cte	n	17	10	1	2	3	0	0	3	36
	%	*2.68*	*2.58*	*1.39*	*0.68*	*1.01*	*0.00*	*0.00*	*0.85*	*1.44*
flakes	n	381	162	40	147	130	180	8	186	1234
	%	*60.00*	*41.75*	*55.56*	*50.17*	*43.77*	*40.91*	*40.00*	*52.99*	*49.44*
blades	n	49	17	3	13	6	54	1	1	144
	%	*7.72*	*4.38*	*4.17*	*4.44*	*2.02*	*12.27*	*5.00*	*0.28*	*5.77*
bladelets	n	80	73	4	48	47	79	2	38	371
	%	*12.60*	*18.81*	*5.56*	*16.38*	*15.82*	*17.95*	*10.00*	*10.83*	*14.86*
spalls	n	1	3	0	0	5	3	0	0	12
	%	*0.16*	*0.77*	*0.00*	*0.00*	*1.68*	*0.68*	*0.00*	*0.00*	*0.48*
chips	n	10	82	19	67	67	84	1	84	414
	%	*1.57*	*21.13*	*26.39*	*22.87*	*22.56*	*19.09*	*5.00*	*23.93*	*16.59*
chunks	n	70	40	5	14	35	37	8	37	246
	%	*11.02*	*10.31*	*6.94*	*4.78*	*11.78*	*8.41*	*40.00*	*10.54*	*9.86*
mbt	n	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Total	n	635	388	72	293	297	440	20	351	2496

(n=2), pit fills (n=2), occupation horizons (n=2) and floors (n=2). It should be noted that pit fill (801) occurs late in the O100 sequence and probably does not relate to occupation of the structure.

The sampled artefacts from Structure O100 are manufactured on a variety of raw material types and are highly variable in terms of patination. The stratigraphically earliest contexts included in the sample, (917) and (916), are similar to that from many other structures at WF16 (e.g. O75, O11, O12) with various medium-grained, opaque grey and brown raw material types (Types 2, 3 and 4) dominating the assemblage. This material is heavily patinated, with more than half the (917) assemblage completely patinated. The material from (917) also contains a few (<10) pieces of the translucent brown (Type 5) raw material. Contexts from above (916) see a marked increase in the proportion of artefacts manufactured on Type 5 raw material, which is preferentially used for the production of blades and bladelets. In the stratigraphically latest sampled context (801), Type 5 material accounts for *c.* 30% of the assemblage. Throughout the sequence, material manufactured on this raw material exhibits a higher degree

Table 39.34 Retouched and used chipped-stone artefacts from Structure O100.

Type		801	896	897	898	906	907	916	917	O100
retouched flakes	n	17	5	0	0	3	3	0	3	31
	%	*22.97*	*16.67*	*0.00*	*0.00*	*15.79*	*11.11*	*0.00*	*15.79*	*16.49*
used flakes	n	2	0	0	0	0	0	0	0	2
	%	*2.70*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*1.06*
retouched blades	n	2	2	0	0	3	3	0	0	10
	%	*2.70*	*6.67*	*0.00*	*0.00*	*15.79*	*11.11*	*0.00*	*0.00*	*5.32*
used blades	n	1	0	1	1	0	0	0	0	3
	%	*1.35*	*0.00*	*33.33*	*6.67*	*0.00*	*0.00*	*0.00*	*0.00*	*1.60*
retouched bladelets	n	16	5	2	2	6	0	0	4	35
	%	*21.62*	*16.67*	*66.67*	*13.33*	*31.58*	*0.00*	*0.00*	*21.05*	*18.62*
used bladelets	n	0	1	0	1	0	0	0	2	4
	%	*0.00*	*3.33*	*0.00*	*6.67*	*0.00*	*0.00*	*0.00*	*10.53*	*2.13*
points	n	0	0	0	0	2	0	1	0	3
	%	*0.00*	*0.00*	*0.00*	*0.00*	*10.53*	*0.00*	*100.00*	*0.00*	*1.60*
perforators	n	5	1	0	5	0	6	0	6	23
	%	*6.76*	*3.33*	*0.00*	*33.33*	*0.00*	*22.22*	*0.00*	*31.58*	*12.23*
scrapers	n	9	1	0	1	0	0	0	0	11
	%	*12.16*	*3.33*	*0.00*	*6.67*	*0.00*	*0.00*	*0.00*	*0.00*	*5.85*
bitruntcations	n	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
truncations	n	0	2	0	1	1	1	0	0	5
	%	*0.00*	*6.67*	*0.00*	*6.67*	*5.26*	*3.70*	*0.00*	*0.00*	*2.66*
bifacials	n	0	0	0	0	0	1	0	0	1
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*3.70*	*0.00*	*0.00*	*0.53*
glossed pieces	n	0	1	0	0	0	1	0	0	2
	%	*0.00*	*3.33*	*0.00*	*0.00*	*0.00*	*3.70*	*0.00*	*0.00*	*1.06*
burins	n	11	1	0	1	0	3	0	0	16
	%	*14.86*	*3.33*	*0.00*	*6.67*	*0.00*	*11.11*	*0.00*	*0.00*	*8.51*
notch/denticulates	n	1	1	0	1	0	3	0	2	8
	%	*1.35*	*3.33*	*0.00*	*6.67*	*0.00*	*11.11*	*0.00*	*10.53*	*4.26*
microliths	n	0	0	0	0	0	1	0	0	1
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*3.70*	*0.00*	*0.00*	*0.53*
backed blades	n	0	0	0	0	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
retouched fragments	n	4	7	0	1	3	3	0	2	20
	%	*5.41*	*23.33*	*0.00*	*6.67*	*15.79*	*11.11*	*0.00*	*10.53*	*10.64*
varia	n	6	3	0	1	1	2	0	0	13
	%	*8.11*	*10.00*	*0.00*	*6.67*	*5.26*	*7.41*	*0.00*	*0.00*	*6.91*
Total	n	74	30	3	15	19	27	1	19	188

of (a pale yellow) patination than is present on the other raw material types. However, it should be stressed that there are also unpatinated examples of this material throughout the sequence. Material from several contexts, most notably (801), is rather heavily battered/trampled, with significant amounts of edge damage. Material from context (896) often has carbonate adhering to its surface.

Both cores (1.56%) and CTE (1.44%) are present, and the assemblage has a core:debitage ratio of 1:46. The frequency of cores varies throughout the sequence, and 27 of the 39 cores included in the sample derive from pit fill (801). Context (801) also yielded 17 of the 36 CTE included in this analysis. Overall, cores were recovered from six out of eight sampled contexts, and where cores are present core:debitage ratios vary between 1:20 in (801) to 1:265 in infilling/abandonment context (896). Debris accounts for 26.44% of the sample, with chips and chunks both present in varying numbers throughout the sequence. Notably, core rich context (801) contains very little debitage, suggesting that this deposit does not represent *in situ* knapping, but more likely represents a dump or cached deposit.

Cores from (801) include bladelet (n=2), flake (n=3) and mixed flake/bladelet (n=19) types, as well as other core (n=1) and core fragments (n=2). Bladelet cores are single platform, sub-pyramidal in type (one of which is high quality raw material Type 5). The core tabulated as 'other' is an unusual bladelet core/multiple burin measuring 35 x 5 x 5 mm, manufactured on Type 5 material. Flake cores and mixed flake/bladelet cores are made on various raw materials including examples on Type 5 material; which are generally smaller, show more preparation and are more heavily reduced than cores on other raw materials. Mixed cores include amorphous (n=9), change of orientation (n=1), opposed platform (n=1) and single platform (n=8) types. Most of the single platform cores are sub-pyramidal in form, but these also include two examples where the transverse break facet of a large, broken flake has been used to remove flakes and bladelets. Cores generally show low patination, although Type 5 material is often more patinated than other raw material types. Cores from the remaining contexts include mixed flake/bladelet (n=6), bladelet (n=1), flake (n=2) and core fragments (n=2). Again, Type 5 materials were preferentially used for the production of the more regular and heavily reduced core types. Notably, cores from the earliest sampled context, floor (917), were made on wadi cobbles of raw material Types 2, 3 and 4.

CTE include core face removals (n= 24), and crested pieces (n=2) and platform rejuvenation flakes (n=10). Core face removals derive from both bladelet and flake/mixed cores and include side-struck and opposed examples. Platform rejuvenation flakes are generally small (30 mm), and where it is possible to discern, appear to derive mainly from bladelet cores. CTE are made on a range of raw material types.

The debitage assemblage is dominated by flakes (49.44%) with smaller numbers of blades (5.77%) and bladelets (14.86%); the blade:flake ratio is 1:2.4. The assemblage also includes spalls (0.48%). Flakes are present in a range of sizes and although some contexts are dominated by small (<20 mm) flakes, larger examples, often retaining a high degree of cortex, are present in most contexts, especially (801). Flakes are present in a range of materials, including several coarse stone (basalt) flakes in context (801). Flakes manufactured on Type 5 material (which include several primary elements) are generally finer than those on other raw materials and often show evidence (dorsal scarring) for the previous removal of blades/bladelets.

Blades and bladelets include both regular and irregular types and many fragments. Blades from context (897) and above, roughly half of which are regular, reach a maximum length of *c.* 70 mm. Regular blades are usually made on fine-grained, especially Type 5, raw materials, with other raw material types usually accounting for irregular examples. Bladelets from these contexts are generally large (45–50 mm in length) and are similar to the blades in most respects. These contexts contained a few (<5%) blades and bladelets from opposed platform cores. In contexts below (897) there are higher proportions of irregular blades, and bladelets in particular are smaller and include more examples made on medium-grained raw material types (Types 2, 3 and 4). Throughout the sequence, blades and bladelets are usually more heavily patinated than most of the assemblage, although patination is variable. SF176 (898) is a proximal fragment of an unretouched blade, manufactured on a translucent glass-like raw material (rock crystal/quartz crystal). No microburin products were identified in the sample.

Spalls include burin spalls and several sharpening spalls detached from retouched items (possibly retouched flakes/scrapers). The majority of spalls are manufactured on Type 5 material. A possible tranchet spall, made on patinated, medium-grained material was recovered from context (907).

Retouched/used tools (n=188) are made on various blank types. In total, 10.46% of debitage is retouched, although this proportion is variable, ranging from 7.14% (898) to 14.02% (801). The sample includes a wide range of both formal and NFT types. NFT constitute 40.43% of the tools; comprising retouched flakes (16.49%), blades (5.32%) and bladelets (18.62%). Small numbers of unretouched debitage have macroscopic use wear traces. The proportion of retouched bladelets is the highest of the sampled assemblages at WF16. Retouched flakes and bladelets are particularly prevalent in context (801), where they constitute 22.97% and 21.62% of the tool assemblage respectively. Retouched flakes are generally large, with irregular, chunky retouch. Retouch on bladelets is often fine and irregular, perhaps indicating that the 'retouch' on these pieces is, in fact, unintentional edge damage.

Perforators are the most abundant of the formal tool types (12.23%) and include both awls (n=20) and borers (n=3). Most awls (n=14) are manufactured on bladelets, with a few examples on flakes (n=5) and blades (n=1).

The majority of awls have straight, or slightly offset, tips. Awl tips are usually formed by concave retouch of two lateral margins, although other tip forms are also present. The next most abundant tool type is burins (8.51%); such a high proportion of burins is unusual for WF16, although similar proportions are present in the Midden O60 assemblage. Burins are made on flakes (n=9), blades (n=5) and bladelets (n=2). Burins include single and multiple types, and preliminary observation indicates the presence of dihedral burins, burins on truncations and burins on breaks. Burins are predominately made on Type 5 raw material. Burins are not present in the earliest sampled contexts, and most (68.75%) of the burins were recovered from stratigraphically late pit fill (801).

The next most frequent tool class are scrapers (5.85%), most of which (81.82%) were recovered from context (801). Scrapers on flakes (often cortical) are generally large, and feature a range of retouch types. Scrapers include SF1763 (898), which is a large (*c.* 100 x 70 x 40 mm) end-scraper on a primary flake. Several scrapers also show signs of use in the form of edge rounding and wear. Notches are also well represented in the assemblage (4.26%) and include five on flakes, as well as examples on blades (2) and a bladelet. Notches occur in various forms, including chunky Clactonian style notches, as well as finer examples featuring small, heavily retouched notches. Notches and scrapers are made on a range of raw materials, with occasional examples on Type 5 material. Five truncations are present (2.66%) including four on bladelets and one example on a blade.

Points (n=3) are present in the assemblage in low proportions (1.6%). All three are El-Khiam points manufactured on bladelets. Notably, two of them from (906), are highly atypical of the WF16 assemblages (Smith 2007), featuring tips formed by direct retouch located at the proximal end of the blank. There are two glossed pieces in the assemblage (1.06%), one on a bladelet and one on a blade. The example on a bladelet is a distal fragment made on Type 5 material; this features well developed gloss. The example on a blade is SF2567 from context (896) and is a possible example of a Beit Tamir sickle. This piece measures *c.* 85 mm x 15 mm and is a blade (from a unidirectional core) with bifacial truncation at the distal end, irregular bifacial backing on one lateral margin, and abrupt, direct backing/retouch on the opposite lateral margin. The lateral margin opposite the bifacial backing has well-developed gloss on the ventral surface, which is truncated by the abrupt backing/retouch. It seems most likely that this was a Beit Tamir sickle that was subsequently retouched/backed along the working edge. Other tool types in the Structure O100 sequence include a heavily patinated microlith (backed bladelet) made on Type 1 material (907) and a bifacial piece in the form of a rough basalt pick (907).

Tools tabulated as varia include two small (*c.* 60 x 30 x 30 mm) trihedral picks, a backed flake and a pièce ésquillée (801), two retouched spalls (896) as well as several sharpening spalls. Varia also includes two retouched pebbles, a roughout for a bifacial tool SF1762 (898) and a multiple tool (scraper/burin). SF2267 is a large unworked wadi cobble from context (916). There are neither bitruncations nor backed blades in the sample.

The Structure O100 sample appears to include three relatively distinct chipped stone assemblages. However, due to the relatively small number of sampled contexts, the nature and stratigraphic timing of the transition between these remains uncertain. The stratigraphically lowest phase, represented by contexts (916) and (917), is dominated by medium-grained, grey and brown raw material types (Types 2, 3 and 4) with much of the material exhibiting a high degree of patination. The tool assemblage from these contexts includes an El-Khiam point (917), that is stylistically typical of WF16, and the general technological nature of the assemblage is similar to most of the structures at WF16. The material from overlying contexts (906) and (907) is subtly different; featuring a slight increase in the use of Type 5 raw material and the presence of stylistically unusual (for WF16) El-Khiam points.

The material from contexts (801), (896), (897) and (898) (which are stratigraphically above (906) and (907)) witnesses further changes in terms of raw material use, technology and typology. Most obviously, these contexts show a sharp increase in the frequency of Type 5 raw material, which now accounts for up to 30% of the sample. Technologically, these levels include a range of carefully prepared bladelet/mixed cores, an increase in the regularity of blade/let form and the occasional presence of blade/lets produced from opposed platform cores. All these features indicate a greater concern with core form and maintenance than in earlier levels. This assemblage is also unusual (for WF16) in terms of typology, featuring a high proportion of burins and a dearth of typical PPNA elements such as points, bitruncations, microliths and bifacials. Despite these unusual features, the typological and technological character of this material is within the known range of PPNA assemblage variability (e.g. Sayej 2004, Pirie 2007, Smith *et al*. 2016). Moreover, several of the stratigraphically late contexts from Structure O100 include diagnostic PPNA elements, such as the Beit Tamir sickle from (896). In several cases such artefacts are manufactured on Type 5 raw material, strongly suggesting that this was the preferred material for tool manufacture during the PPNA. Taken together, these factors suggest that although the assemblages from the upper levels of Structure O100 are generally atypical of WF16, they most likely result from Late PPNA activity at the site.

Surface O91 (Chapter 37)

The sample (n=1489 pieces) includes material from four out of 12 contexts with chipped stone in Surface O91, Table 39.35 and Table 39.36. By weight, the sample (13,620 g) constitutes 11.76% of the bulk finds of chipped stone from this surface. No small find chipped stone was recovered from the sampled contexts.

The sampled artefacts from Surface O91 are primarily on medium-grained, opaque grey and brown raw materials (Types 2, 3 and 4). Brown material types (Type 4) are particularly common in this structure. The sample also includes a small amount (*c.* 5%) of translucent grey (Type 1) and, more commonly (*c.* 10%), translucent brown (Type 5) raw material types. There are occasional pieces of flaked coarse stone (usually basalt) throughout the sequence. Although occasional pieces are completely patinated, >90% of the assemblage exhibits no patination. Notably, in context (734) a high proportion of the assemblage is manufactured on medium-grained, brown (Type 4) material. Artefacts from almost all contexts appear fresh, with limited evidence for burning, rolling or trampling.

Both cores (3.9%) and CTE (1.41%) are present and the sample has a core:debitage ratio of 1:14. Although cores are absent from the small assemblage (n=40) from context (720), they occur in relatively high numbers in all other sampled contexts. In total 42.18% of the sample is classified as debris, with chips and chunks both present in relatively high numbers throughout the sequence. The high proportions of cores and debris suggest that this may have been an area of intensive knapping.

Cores (n=58) include blade (n=1), flake (n=17), bladelet (n=6) as well as mixed flake/bladelet (n=27) types. There are also core fragments (n=3) and 'other' cores (n=4) in the assemblage. The blade core (*c.* 55 mm x 20 mm x 55 mm) is on a small nodule of medium-grained brown flint and has two 'dihedral' platforms, as well as indications of previous platforms. This is clearly evidence for well-controlled knapping of small blades. Bladelet cores include single platform, sub pyramidal (n=3) and change of orientation (n=3) types, all of which are of a fairly standard size (max. dimension *c.* 50 mm). Bladelet cores are made on a range of materials including Types 2, 3, 4 and 5. Flake cores, 10 of which derive from context (731), include a similar range of core types but also feature amorphous cores. Although flake cores do occur on fine-grained raw materials (e.g. Type 5) they are generally manufactured on more coarsely grained materials (Types 2, 3, and 4). Flake cores range in size from a maximum of *c.* 80 mm to a minimum of *c.* 25 mm. Mixed cores (n=27) are the dominant core type in this assemblage and include regular, single platform, sub pyramidal types together with change of orientation and irregular examples. The sample includes a single opposed platform core. Many of the mixed cores appear to have been bladelet cores that were used for removing small flakes as they approached exhaustion, and include several examples on high quality raw materials (e.g. Types 1 and 5). CTE include core face removals (n=14), platform rejuvenation flakes (n=4) and crested pieces (n=3) that are made on a range of raw materials. The majority of CTE, especially the core tablets, appear to come from bladelet cores.

The debitage assemblage is dominated by flakes (38.95%), with smaller numbers of blades (4.63%) and bladelets (8.66%); the blade:flake ratio is 1:3. The assemblage also includes a small number of spalls (0.27%). Flakes occur on a range of materials, including several coarse stone (basalt) flakes. Flakes on fine-grained material (which also include several primary elements) often show evidence (dorsal scarring) for the previous removal of blades/bladelets.

All blades and bladelets are from unidirectional cores and include both regular and irregular types, as well as

Table 39.35 Chipped-stone debitage by context from Surface O91.

Context		**720**	**731**	**722**	**734**	**O91**
cores	**n**	0	23	7	28	58
	%	*0.00*	*3.07*	*3.20*	*5.82*	*3.90*
cte	**n**	0	4	2	15	21
	%	*0.00*	*0.53*	*0.91*	*3.12*	*1.41*
flakes	**n**	21	316	102	141	580
	%	*52.50*	*42.19*	*46.58*	*29.31*	*38.95*
blades	**n**	3	23	7	36	69
	%	*7.50*	*3.07*	*3.20*	*7.48*	*4.63*
bladelets	**n**	10	47	19	53	129
	%	*25.00*	*6.28*	*8.68*	*11.02*	*8.66*
spalls	**n**	0	1	0	3	4
	%	*0.00*	*0.13*	*0.00*	*0.62*	*0.27*
chips	**n**	2	257	62	112	433
	%	*5.00*	*34.31*	*28.31*	*23.28*	*29.08*
chunks	**n**	4	78	20	93	195
	%	*10.00*	*10.41*	*9.13*	*19.33*	*13.10*
mbt	**n**	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Total	**n**	40	749	219	481	1489

Table 39.36 Retouched and used chipped-stone artefacts from Surface O91.

Type		720	731	722	734	O91
retouched flakes	n	0	9	5	16	30
	%	*0.00*	*25.00*	*41.67*	*30.19*	*27.03*
used flakes	n	0	6	2	1	9
	%	*0.00*	*16.67*	*16.67*	*1.89*	*8.11*
retouched blades	n	0	2	2	3	7
	%	*0.00*	*5.56*	*16.67*	*5.66*	*6.31*
used blades	n	0	0	0	2	2
	%	*0.00*	*0.00*	*0.00*	*3.77*	*1.80*
retouched bladelets	n	1	1	0	2	4
	%	*10.00*	*2.78*	*0.00*	*3.77*	*3.60*
used bladelets	n	0	1	0	0	1
	%	*0.00*	*2.78*	*0.00*	*0.00*	*0.90*
points	n	2	0	0	0	2
	%	*20.00*	*0.00*	*0.00*	*0.00*	*1.80*
perforators	n	2	6	1	7	16
	%	*20.00*	*16.67*	*8.33*	*13.21*	*14.41*
scrapers	n	0	1	0	4	5
	%	*0.00*	*2.78*	*0.00*	*7.55*	*4.50*
bitruntcations	n	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
truncations	n	0	0	0	1	1
	%	*0.00*	*0.00*	*0.00*	*1.89*	*0.90*
bifacials	n	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
glossed pieces	n	0	1	0	0	1
	%	*0.00*	*2.78*	*0.00*	*0.00*	*0.90*
burins	n	0	0	0	5	5
	%	*0.00*	*0.00*	*0.00*	*9.43*	*4.50*
notch/denticulates	n	2	6	1	3	12
	%	*20.00*	*16.67*	*8.33*	*5.66*	*10.81*
microliths	n	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
backed blades	n	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
retouched fragments	n	3	1	1	3	8
	%	*30.00*	*2.78*	*8.33*	*5.66*	*7.21*
varia	n	0	2	0	6	8
	%	*0.00*	*5.56*	*0.00*	*11.32*	*7.21*
Total	n	10	36	12	53	111

many fragments. In most contexts, the majority of both blades and bladelets are irregular in form and are made on a range of raw materials. Where more regular examples are present, blades are often small (*c.* 60 mm) and bladelets often tiny (*c.* 20 mm). Generally the regular elements are manufactured on brown, often fine-grained (e.g. Type 5), raw materials. Unlike most other sampled structures at WF16, the blades and bladelets in Surface O91 generally exhibit very low levels of patination. The low numbers of regular blade/lets is also noteworthy, given the presence of a relatively high number of regularly shaped bladelet/mixed cores in the assemblage. This may indicate that contexts in Surface O91 were used to either dump waste material, or that they were involved in the production of blades, which were then removed from this structure. There are a total of four spalls, including both sharpening spalls and regular burin spalls. There are no microburin products.

Retouched/used tools (n=111) are manufactured on various blank types. In total, 13.82% of debitage is retouched, although this proportion varies and (734) has a particularly high proportion (21.37%) of retouched pieces. The sample includes a wide range of both formal and

NFT types. NFT constitute 36.94% of the tool assemblage and include retouched flakes (27.03%), blades (6.31%) and bladelets (3.60%). Although the proportion of pieces with macroscopic use wear traces is generally small (as in most contexts at WF16), in context (731) used flakes (n=6) account for (16.67%) of tools. Used flakes are generally large (<50 mm), show various forms of edge wear and include two examples with black (bitumen?) stained edges.

Perforators are the most abundant formal tool type (14.41%) and include both awls (n=13) and borers (n=3). Awls are equally made on flakes and bladelets (n=6) with a single example on a small blade. Burins (n=5) and scrapers each account for 4.5% of the tool assemblage. Burins, all from context (734), include single, dihedral and multiple types, and are made on all blank types and on varied raw materials. Scrapers are all on large (*c.* 40–80 mm) flakes and generally feature irregular retouch.

Two points (1.8%), both El-Khiam, occur in context (720). One point is complete, with a tip formed by inverse retouch, the other, is a basal fragment. One unretouched blade section shows well-developed gloss. The sample also includes one truncated flake. There are eight pieces tabulated as varia, which include retouched chunks, heavily rolled (residual Palaeolithic?) retouched fragments, a retouched spall and an unretouched flake with black (bitumen?) residue.

The chipped stone from Surface O91 includes various technological and typological traits that are diagnostic of the PPNA. The sample retains many of the characteristics of underlying Structure O75, albeit with some subtle differences. The assemblage includes a range of medium-grained raw materials, with a high proportion of brown (Type 4) material. Notably, Type 5 material is also present in this sample. The extent of patination is low in all sampled contexts. The sample includes a high proportion of cores, together with high proportions of CTE and debris, suggesting that this structure was the scene of knapping during the PPNA. Moreover, the presence of high percentages of primary elements in many contexts, such as (734), suggests that the initial phases of core reduction took place here. The low frequency of regular blades is notable, particularly given the number of regular bladelet/mixed cores in the assemblage. This suggests that many of the regular blades and bladelets produced here were removed to other areas of the site.

When compared to many of the structures at WF16, the tool assemblage from Surface O91 is unusual, being heavily dominated by NFT and other ad hoc tools. Although formal tools are present (and include perforators, burins and scrapers, together with low numbers of El-Khiam points), several typical PPNA tool types, such as microliths and bitruncations, are absent.

It is difficult to interpret the causes for the unusual nature of the Surface O91 assemblage, particularly given the relatively small sample of material. However, the reduced proportions of formal bladelet tools, such as points, microliths and bitruncations, coupled with the scarcity of the microburin technique in this assemblage appears to be part of a general chronological trend apparent in this area of the site (through Structures O75, O91, O100, O60). Preliminary indications are that the rather unusual assemblage from Surface O91 appears to be a consequence of both functional (intensive core reduction) and chronological factors, and that the Surface O91 assemblage represents a somewhat transitional aspect of the WF16 assemblage, sharing affinities with both stratigraphically earlier (Structure O75) and later (Midden O60, Structure O100) horizons at the site.

Structure O75 (Chapter 38)

The sample (n=1559 pieces) includes material from four out of the 57 contexts with chipped stone in Structure O75, Table 39.37 and Table 39.38. By weight, the sample (3055 g) constitutes 3.62% of the bulk finds of chipped stone from this structure. No small find chipped stone was recovered from the sampled contexts.

The majority of contexts sampled in Structure O75 are dominated by medium-grained, opaque grey and brown raw materials (Types 2, 3 and 4). A few pieces (*c.* 5%) are manufactured on translucent raw material types that are either grey (Type 1), or brown (Type 5) in colour. Context (738) also includes several (*c.* 20%) pieces on a fine-grained opaque, black raw material. There are occasional pieces of flaked coarse stone (usually basalt) throughout the assemblage. Where present, patination is usually limited to bladelets. Whilst most of the sampled material appears relatively fresh, there are many fragmentary artefacts, and the material from some contexts (e.g. (738)) includes many burnt pieces.

Both cores (1.28%) and CTE (1.09%) are present and the assemblage has a core:debitage ratio of 1:50. Cores include bladelet (n=2), flake (n=9), mixed flake/bladelet (n=5) types as well as tested cobbles (n=2) and core fragments (n=2). Bladelet cores are single platform and sub pyramidal in nature, made on small cobbles (*c.* 40 mm) of fine grey material (mainly Type 1). The mixed cores are generally small (*c.* 40 mm max. dimension), are made on a range of medium-grained grey and brown raw material types (cobbles of Types 1, 2, 3 and 4) and in all probability were primarily used for the production of bladelets. These include irregular examples together with more formal single platform and change of orientation examples. Flake cores are morphologically variable, including irregular examples together with a few single platform types. Flake cores are generally made on cobbles and range in size from *c.* 20 mm to *c.* 80 mm in maximum dimension. Core fragments include one shattered (burnt) example and a fragment of a bladelet core. CTE include core face removals (n= 12) and crested pieces (n=5). Core face removals appear to derive mainly from bladelet cores and include side-struck, opposed and regular examples. CTE are made on various raw material types, including several on Type 1. The proportion of cores varies throughout the sequence, and 14 of the 20 cores come from context (740). In total, 35.09% of the sample is classified as debris,

Table 39.37 Chipped-stone debitage by context from Structure O75.

Context		738	752	759	740	O75
cores	n	3	3	0	14	20
	%	*0.60*	*0.92*	*0.00*	*1.97*	*1.28*
cte	n	3	6	0	8	17
	%	*0.60*	*1.84*	*0.00*	*1.13*	*1.09*
flakes	n	289	119	12	353	773
	%	*58.27*	*36.50*	*44.44*	*49.72*	*49.58*
blades	n	5	19	0	35	59
	%	*1.01*	*5.83*	*0.00*	*4.93*	*3.78*
bladelets	n	29	52	2	57	140
	%	*5.85*	*15.95*	*7.41*	*8.03*	*8.98*
spalls	n	0	0	0	1	1
	%	*0.00*	*0.00*	*0.00*	*0.14*	*0.06*
chips	n	93	99	7	144	343
	%	*18.75*	*30.37*	*25.93*	*20.28*	*22.00*
chunks	n	74	27	5	98	204
	%	*14.92*	*8.28*	*18.52*	*13.80*	*13.09*
mbt	n	0	1	1	0	2
	%	*0.00*	*0.31*	*3.70*	*0.00*	*0.13*
Total	n	496	326	27	710	1559

with chips and chunks both present in varying numbers throughout the sequence.

The debitage assemblage is dominated by flakes (49.58%), with smaller numbers of blades (3.78%) and bladelets (8.98%); the blade:flake ratio is 1:4. There is a single burin spall. Flakes are generally small (<30 mm) and include many fragments, although small numbers (generally <5%) of larger pieces are also present throughout. Primary elements are present in low numbers in all contexts, with most examples from (740). Context (759) includes seven limestone flakes. All blades and bladelets come from unidirectional cores and include both regular and irregular types as well as many fragments. Blades are often relatively short (max. 60 mm in length) and wide, whilst many bladelets are particularly small (*c.* 30 mm in length). Many of the more regular blade/lets were produced on Type 5 raw material, with the more irregular examples usually made on more coarsely grained grey raw materials (Types 2 and 3). The assemblage also includes two microburin products (0.3%), both made on Type 1 raw materials.

Retouched/used tools (n=120) are manufactured on various blank types. In total, 7.7 % of debitage is retouched, although this proportion ranges from 5.92% in (740) to 22.45% in (752). NFT comprise 32.5% of the tool assemblage and include retouched flakes (14.17%), blades (8.33%) and bladelets (10.00%). Small numbers of unretouched debitage have macroscopic use wear traces.

Perforators are by far the most common formal tool type (20.00%) and include one borer and 23 awls. Most awls (n=19) are manufactured on bladelets and include fine, straight examples together with more robust examples. Context (740) has a particularly high proportion of perforators, which constitute 23.8% of this assemblage. Notches/denticulates constitute the next most abundant formal tool types (10.83%), comprising eight notches (six on flakes) and five large (*c.* 50 mm) flakes with denticulate retouch. Points are the next most common tool (5.83%) and include El-Khiam (n=4), Salibiya (n=2) as well as a single Jordan Valley example. All points are made on bladelets and are on a range of raw material types. No points are patinated. As is often the case at WF16, points are unevenly distributed through the sequence, and all except one of the points were recovered from context (752). Unusually for WF16, several points (n=4) have tips formed by direct retouch.

The assemblage also includes bitruncations (4.17%) all of which are of the Hagdud sub-type. Scrapers (4.17%), all on flakes, are often relatively large (>50 mm) and feature irregular chunky retouch. Four scrapers (80% of those from this structure) were recovered from context (740). Microliths (n=3), all of which are unpatinated, are present in low numbers constituting (2.5%) of the assemblage. Microliths types include a lunate and two backed bladelets. Other retouched tools include two backed blades (1.67%), two truncated bladelets and a burin. A single glossed piece is also present. This takes the form of a bladelet fragment with well-developed bilateral gloss and edge wear. Varia (n=3) are three bladelets retouched/backed into unusual concave forms.

The chipped stone assemblage from Structure O75 includes a range of technological and typological traits that are diagnostic of the PPNA. The comparatively small size of the Structure O75 chipped-stone sample precludes detailed consideration of variability within the

Table 39.38 Retouched and used chipped stone artefacts from Structure O75.

Type		738	752	759	740	O75
retouched flakes	n	5	7	0	5	17
	%	*15.63*	*15.91*	*0.00*	*11.90*	*14.17*
used flakes	n	1	0	0	4	5
	%	*3.13*	*0.00*	*0.00*	*9.52*	*4.17*
retouched blades	n	0	5	0	5	10
	%	*0.00*	*11.36*	*0.00*	*11.90*	*8.33*
used blades	n	0	0	0	1	1
	%	*0.00*	*0.00*	*0.00*	*2.38*	*0.83*
retouched bladelets	n	5	3	1	3	12
	%	*15.63*	*6.82*	*50.00*	*7.14*	*10.00*
used bladelets	n	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
points	n	1	5	0	1	7
	%	*3.13*	*11.36*	*0.00*	*2.38*	*5.83*
perforators	n	6	8	0	10	24
	%	*18.75*	*18.18*	*0.00*	*23.81*	*20.00*
scrapers	n	0	1	0	4	5
	%	*0.00*	*2.27*	*0.00*	*9.52*	*4.17*
bitruntcations	n	1	2	0	2	5
	%	*3.13*	*4.55*	*0.00*	*4.76*	*4.17*
truncations	n	1	1	0	0	2
	%	*3.13*	*2.27*	*0.00*	*0.00*	*1.67*
bifacials	n	0	0	0	0	0
	%	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
glossed pieces	n	0	0	1	0	1
	%	*0.00*	*0.00*	*50.00*	*0.00*	*0.83*
burins	n	0	1	0	0	1
	%	*0.00*	*2.27*	*0.00*	*0.00*	*0.83*
notch/denticulates	n	5	4	0	4	13
	%	*15.63*	*9.09*	*0.00*	*9.52*	*10.83*
microliths	n	2.00	1.00	0	0	3
	%	*6.25*	*2.27*	*0.00*	*0.00*	*2.50*
backed blades	n	1	1	0	0	2
	%	*3.13*	*2.27*	*0.00*	*0.00*	*1.67*
retouched fragments	n	4	2	0	3	9
	%	*12.50*	*4.55*	*0.00*	*7.14*	*7.50*
varia	n	0	3	0	0	3
	%	*0.00*	*6.82*	*0.00*	*0.00*	*2.50*
Total	n	32	44	2	42	120

Structure O75 sequence. The assemblage is dominated by a range of brown and grey-brown raw medium-grained material types, (Types 2, 3 and 4), generally exhibiting a low level of patination. Notably Type 5 material is present in this assemblage, albeit in very low proportions. Cores and CTE are present in several contexts, with the majority recovered from (740). There are relatively few microburin products in this assemblage when compared with several other structures (e.g. Pit O14, Structure O33) at WF16.

Typologically the chipped stone assemblage is dominated by perforators of various kinds. However, the tool assemblage differs in several ways from that of most other structures (e.g. Structures O33, O11) analysed in the present sample. Notably, the tool assemblage features relatively few points, but includes a greater diversity of point sub-types (El-Khiam, Salibiya and Jordan Valley). Technologically, the points in Structure O75 differ from those in most of the other structures, having tips formed by direct, rather than inverse, retouch.

40. The radiocarbon dates

with Karen Wicks

40.1 Introduction

In this chapter we undertake an analysis of the 25 dates acquired from the 2008–2010 excavation and re-analyse the 21 dates acquired from the 1997–2003 site evaluation (Mithen and Finlayson 2007a, Table 40.1). Sample selection followed the rationale and procedures described in Chapter 4. The resulting ^{14}C dataset consisted of 11 samples of charcoal from members of the Cupressaceae family, three samples of *Pistacia*, five samples of *Tamarix*, three samples from members of the Chenopodiaceae family, three samples of *Ficus,* and six samples from members of the Salicaceae (Table 40.1). Thirteen of the remaining ^{14}C charcoal samples were categorised as unidentified wood, and the remaining two ^{14}C samples were individual seeds. The 2008–2010 samples came from seven Objects: O11 (Chapter 12); O45 (Chapter 14); O33 (Chapter 30); O60 (Chapter 35); O100 (Chapter 36); O91 (Chapter 37); and O75 (Chapter 38). The 1993–2003 samples came from Trenches 1, 2 and 3 (Finlayson and Mithen 2007, Figures 6.5 and 6.6). For the purpose of this chapter these trenches are treated as Objects.

Although the total of 46 AMS dates acquired from WF16 is a sizeable number for a single PPNA site, they come from a restricted number of structures, middens and floors. None of the currently dated samples derive from the uppermost cultural horizons, these having been heavily disturbed by recent Bedouin activity and erosion. Nor have any dates come from the lowest cultural horizons because the excavation did not reach the base of the stratigraphy in any location. This was simply because of the extent of funding for the excavation, the depth of the stratigraphy, and the complexity of the archaeology. Its primary purpose was to expose a large spatial area rather than to make deep soundings. As such, the sample may not represent the entire chronological extent of PPNA activity at WF16. Nevertheless, as will become evident from the analysis, there appears to have been considerable re-deposition of sediment containing charcoal during the course of occupation.

The contexts and stratigraphy within the dated structures, middens and exterior surface, along with the stratigraphic relationships between these Objects, are fully described in the 1997–2003 evaluation report (Finlayson and Mithen 2007) and preceding chapters of this volume. For the purpose of this chapter we provide stratigraphic summaries for Trenches 1, 2 and 3, and will only refer to context numbers from which samples for dating were collected.

40.2 Methods

Radiocarbon calibration

Chronological analysis required the calibration of the ^{14}C dataset to produce probability frequency distributions (Stuiver and Reimer 1993) of their calendar date ranges using the recent refinements to the atmospheric (IntCal13) calibration curve (Reimer *et al.* 2013), accessible via the OxCal v. 4.2 ^{14}C plotting software (Bronk Ramsey 2009). All calibrated date ranges are given at 95% probability unless stated otherwise in the text.

Radiocarbon statistical consistency

Elementary chi-square tests (Ward and Wilson 1978) using the R_Combine command in OxCal were undertaken to test for statistically consistent ^{14}C determinations. This provided a measure of the minimum number of episodes of human activity required to account for the radiocarbon-dated record. Where statistical consistencies were identified, these were interpreted as representing a single ‘activity event’ (cf. Wicks and Mithen 2014, 250)

Table 40.1. Radiocarbon samples and modelled date ranges from the 1997–2003 evaluation and the 2008–2010 excavation of WF16.

						Chronological model		Stratigraphic model	
						Posterior density estimates			
						cal BP			
Object and Laboratory Code	**Context**	**^{14}C yrs BP**	**Δ^{13}C ‰**	**Taxa**	**Form**	**68%**	**95%**	**68%**	**95%**
O45									
Beta-253737	249	9730±50	-25.6	Salicaceae	Indeterminate	*11,220–11,130*	*11,250–10,880*		
Beta-271687	1012	9480±50	-25.9	Salicaceae	Juvenile	*11,080–10,710*	*11,100–10,600*	*11,070–10,960*	*11,080–10,590*
Beta-271688	1012	9560±60	-24.5	Pistacia	Juvenile	*11,130–10,930*	*11,170–10,750*	*11,080–10,750*	*11,110–10,700*
Beta-290714	1033	10,410±50	-20.5	Cupressaceae	Mature	*11,300–10,980*	*11,470–10,750*	*11,390–11,110*	*11,620–10,960*
Beta-290713	1033	9880±50	-21.2	Cupressaceae	Juvenile	*11,300–11,210*	*11,390–11,190*	*11,320–11,220*	*11,400–11,200*
O11									
Beta-253736	466	10,020±70	-26.7	Salicaceae	Indeterminate	*11,590-–1,320*	*11,750–11,250*		
Beta-290705	837	10,070±50	-23.9	Pistacia	Juvenile	*11,690–11,390*	*11,800–11,320*		
Beta-271683	824	9070±50	-23.9	Salicaceae	Juvenile	*10,260–10,190*	*10,410–10,170*		
Beta-290706	824	9790±50	-24.6	Ficus	Juvenile	*11,250–11,190*	*11,290–11,120*		
Beta-271684	828	9780±50	-25.7	Pistacia	Juvenile	*11,240–11,180*	*11,270–11,100*		
Beta-271685	1061	9830±50	-26.6	Chenopodiaceae	Mature	*11,270–11,200*	*11,340–11,170*		
Beta-271686	1061	9730±50	-26.8	Salicaceae	Mature	*11,230–11,130*	*11,250–10,870*		
O33									
Beta-253733	377	9670±50	-10.5	Chenopodiaceae	Indeterminate	*11,220–11,070*	*11,240–10,790*		
Beta-253734	377	9850±50	-25.6	Tamarix	Indeterminate	*11,270–11,200*	*11,340–11,170*		
Beta-253735	377	10,130±60	-21.7	Cupressaceae	Indeterminate	*11,280–10,820*	*11,370–10,400*		
O60									
Beta-253739	340	9660±70	-25.9	Tamarix	Juvenile	*11,220–10,880*	*11,260–10,790*		
Beta-253738	340	9950±70	-25.6	Tamarix	Mature	*11,470–11,230*	*11,700–11,200*		
O100									
Beta-290708	920	9760±50	-24.7	Cupressaceae	Juvenile	*11,230–11,170*	*11,250–11,120*		
Beta-290707	917	9770±50	-20.7	Unidentified	Juvenile	*11,240–11,180*	*11,260–11,130*		
O75									
Beta-290712	1803	9530±50	-24.8	Salicaceae	Juvenile			*11,070–10,720*	*11,100–10,690*
Beta-271681	757	9940±60	-26.9	Unidentified	Juvenile			*11,390–11,240*	*11,600–11,220*
Beta-271680	747	9380±50	-11.6	Salicaceae	Juvenile			*10,700–10,570*	*10,750–10,500*
Beta-290711	1767	9860±50	-21.3	Cupressaceae	Juvenile			*11,300-11,210*	*11,390-11,190*
O91									
Beta-290709	1207	9650±50	-23.0	Chenopodiaceae	Juvenile			*11,190-10,880*	*11,210-10,790*
Beta-290710	1211	10,100±50	-21.5	Unidentified	Juvenile			*11,800-11,400*	*11,970-11,350*
Trench 1 Northern Area									
Beta-192523	151	9920±40	-25.5	Ficus	Indeterminate			*11,300–11,240*	*11,350–11,220*
Beta-192522	148	9880±40	-25.5	Tamarix	Indeterminate			*11,330–11,250*	*11,400–11,240*
Trench 1 Central Area									
Beta-120205	111	9690±50	-27.2	Unidentified	Indeterminate	*11,210–10,890*	*11,230–10,790*	*11,190–10,870*	*11,210–10,780*
Beta-120206	111	9420±50	-25.8	Unidentified	Indeterminate	*10,720–10,590*	*11,050–10,510*	*10,740–10,580*	*11,070–10,520*
Beta-120207	112	9400±50	-12.1	Unidentified	Indeterminate	*10,700–10,580*	*10,760–10,510*		
Beta-192521	130	10,500±40	-21.5	Cupressaceae	Mature	*11,420–10,990*	*11,650–10,730*	*11,490–11,170*	*11,740–11,030*

Table 40.1. Radiocarbon samples and modelled date ranges from the 1997–2003 evaluation and the 2008–2010 excavation of WF16 continued...

						Chronological model		Stratigraphic model	
						Posterior density estimates			
						cal BP			
Object and Laboratory Code	**Context**	**^{14}C yrs BP**	**Δ^{13}C ‰**	**Taxa**	**Form**	**68%**	**95%**	**68%**	**95%**
Beta-192520	126	9900±40	-25.7	Ficus	Indeterminate	*11,320–11,240*	*11,390–11,220*	*11,330–11,240*	*11,400–11,220*
Trench 2									
Beta-192524	232	10,150±40	-21.2	Cupressaceae	Indeterminate	*11,050–10,600*	*11,350–10,390*		
Beta-120210	210	10,090±50	-23.9	Unidentified	Indeterminate	*11,950–11,640*	*12,050–11,400*		
Beta-208672	238 (210)	9430±40	-22.1	Bromus	Seed	*10,730–10,590*	*11,060–10,560*		
Beta-208671	239	9560±40	-23.6	Hordeum	Seed	*11,080–10,760*	*11,100–10,730*		
Beta-192525	239	10,350±40	-22.6	Cupressaceae	Mature	*11,410–10,830*	*11,690–10,610*		
Beta-120211	211	9890±50	-22.4	Unidentified	Indeterminate	*11,340–11,230*	*11,600–11,200*		
Beta-192536	241	10,420±40	-21.4	Cupressaceae	Mature	*11,480–10,900*	*11,740–10,650*		
Beta-192527	243	10,440±40	-22.1	Cupressaceae	Mature	*11,520–10,940*	*11,780–10,680*		
Trench 3									
Beta-192529	330	9870±40	-21.1	Unidentified	Indeterminate	*11,290–11,220*	*11,350–11,200*		
Beta-135111	332	10,220±50	-22.7	Unidentified	Indeterminate	*11,990–11,770*	*12,110–11,650*		
Beta-192530	332	10,340±40	-22.1	Cupressaceae	Mature	*11,530–11,250*	*11,760–11,220*		
Beta-209010	310(4)	9140±40	-23.0	Unidentified	Indeterminate	10,380–10,230	10,420–10,220		
Beta-192531	327	9950±40	-26.2	Tamarix	Indeterminate	11,410-11,250	11,610-11,240		
Beta-135110	329	9180±50	-26.7	Unidentified	Indeterminate	10,410-10,250	10,500-10,230		

or a series of episodes occurring in close succession that provided an evaluation of the contemporaneity in the timing of activity associated with the occupation and use of space across the site.

Bayesian chronological models

The Bayesian approach to ^{14}C date analysis has the potential to provide greater chronological precision than that obtained by calibration alone (see for instance Bayliss *et al.* 2007). This is likely to be achieved when large ^{14}C datasets from well-resolved archaeological stratigraphy are available. While 46 AMS dates from secure archaeological contexts is a relatively large number for the PPNA in the Southern Levant, the number of dates for each Object being dated is often relatively low. Nevertheless, each Object and area yielded ^{14}C datasets of a sufficient size to begin to model a preliminary chronology for associated activity at WF16.

Bayesian analytical devices available in OxCal were used to construct chronological models for individual Objects that, wherever possible, factored in stratigraphically constrained ^{14}C calibrations. Mithen and Finlayson's (2007a) analysis of the 1997–2003 AMS dates had demonstrated several stratigraphically-inverted ^{14}C determinations, most likely arising from the re-deposition of sediments containing charcoal from previous phases of occupation and/or the burning of wood from long-lived tree species. In constructing individual models, therefore, we dealt with these chronological reversals by:

EITHER: Constructing stratigraphic sequence models following the removal of clear outliers within a group of dates used to date individual Objects;

OR: Simplifying our *a priori* assumptions concerning stratigraphic ordering of radiocarbon-dated material. This was achieved by grouping dates from individual Objects into chronological single-phase models assuming a uniform-distribution of radiocarbon-dated events that could have occurred concurrently. Whilst such an approach inevitably reduces the resolution of the sequence of occupation overall, it does provide a realistic solution for sequences of ^{14}C dates containing several age reversals;

OR: Adjusting modelled estimates by factoring in an OxCal Offset command on ^{14}C dates obtained from mature and indeterminate forms of Cupressaceae. Estimation of the offset is discussed below.

Using this approach, chronological models were constructed for each of the three trenches from the 1997–2003 evaluation, one being divided into a northern and central area (treated as a total of four Objects), and seven Objects from the 2008–2010 excavation — these being referred to as Individual Object Models (IOMs). We then used the modelled lower and upper boundary posterior density estimates to anchor the timing for the human activity associated with each individual Object, noting that their use is limited in models containing low numbers (i.e. ≤2) of ^{14}C dates. In those instances, lower and upper boundary estimates tend to have wide distributions in the 95.4% probability range, a statistical problem arising from the use of a model with few *a priori* constraints (e.g. stratigraphy) or likelihoods (e.g. calibrated date ranges). Posterior density estimates follow the convention of being represented throughout the text using italicised values.

Model validation

The validity of these models can be measured by their agreement indices ([Amodel]; [A]) which should fall above 60% with convergence values [C] ideally greater than 95% (Bronk Ramsey 2011). All of the models utilised in this study produced acceptable agreement index values and reached in excess of 95% convergence in every instance, although we acknowledge that our chronological interpretations may be revised in light of new priors being added to existing chronological frameworks.

Measuring variability in the intensity of occupation

Interpretations of the WF16 chronology are challenged on several fronts, largely stemming from atmospheric carbon plateaus, sample re-working, old wood effects, and relatively low frequencies of ^{14}C dates obtained from individual Object Models. We used a mainstay of time-series analysis to overcome some of these difficulties by extracting a summed calibrated probability distribution (SCPD), from a single-phase chronological model containing the entire WF16 ^{14}C dataset (Bronk Ramsey 2009). This provided us with a time-series proxy, that we used to model the intensity of human activity at WF16 for comparison with SCPDs embedded in the IOMs, to evaluate their relative influence on the overall WF16 site model.

We are aware that the use of SCPDs as a proxy for human occupation can produce unreliable results when derived from an inadequate sample size (cf. Williams 2012). Whilst SCPD outputs have been shown to be sensitive to sample size, we are confident that Sum analysis of the WF16 dataset is likely to provide a statistically robust output, as its mean standard deviation (ΔT) and time series span are sufficiently low. Nevertheless we acknowledge that further explicit tests will be required to demonstrate unequivocally the validity of the correspondence between the size of the WF16 dataset, its uncertainties and the time-series thresholds bracketing activity at the site (see for instance Michczyńska and Pazdur 2004; Michczyńska *et al.* 2007; Williams 2012).

Another advantage of placing the summed WF16 ^{14}C dataset within a Bayesian framework, is that the resulting output provides boundaries that estimate likely calibrated date ranges for the start and ending of occupation at WF16, that otherwise would have remained less-well resolved (cf. Bayliss *et al.* 2007, 9).

40.3 Quantification of the old wood effect

Mithen and Finlayson (2007a) identified a probable old wood effect influencing the radiocarbon dating of Trenches 1, 2 and 3. This derived from the presence of charcoal coming from trees within the Cupressaceae family, which are renowned for their long life spans. Identification of the genera represented by the Cupressaceae charcoal — most likely *Juniperus* and *Cupressus sempervirens* — was not attempted due to the difficulties in separating the two anatomically (Fahn *et al.* 1986: 56). It is likely, however, that the dominant taxon identified within the Cupressaceae category of the WF16 ^{14}C assemblage derives from trees of *Juniperus*, this having been determined as the most abundant taxon on the basis of cellular (ray) arrangement in a previous analysis of the Cupressaceae assemblage from WF16 (Austin 2007, 414). Modern distributions of *J. phoenicea* provide a useful analogue for this genus, now found in localised pockets of evergreen needle-leaved woodland across the circum-Mediterranean zone (Boratyński *et al.* 2009). Known for their extended life cycles, individual trees have been shown to attain more than 1000 years in age (Vidakovic 1991). Assuming it provides a sufficient analogue for that of the archaeological samples, this indicates that the presence of mature forms of Cupressaceae might be delivering an old wood influence on the WF16 chronology.

This is most evident from Trench 2 for which there is a wide separation in age between a date from a seed (Beta-208671) and that from a mature Cupressaceae sample (Beta-192525), both contained within a sealed and deeply stratified context (239) (Table 40.1 and see Finlayson and Mithen 2007a, 175–190 for detailed stratigraphic information about Trench 2). By using OxCal, the separation in age of these samples was estimated by inserting a Difference command into the Individual Object Model for Trench 2 (as fully described below), which suggests an old wood effect in the order of 990–1590 years (95.4% probability; Figure 40.1). Whilst we cannot exclude the possibility that the seed was intrusive, it is at least feasible that the seed and Cupressaceae samples were deposited simultaneously and thus provide an indication of the over-estimation in age of associated activity with objects yielding mature forms of Cupressaceae used in the WF16 dating program.

We sought confirmation of this potential old wood effect by exploring the difference in age between Cupressaceae samples having derived from mature heart/branch wood (e.g. Beta-192521, Beta-192527, Beta-192536, Beta-290714, Beta-192525 and Beta-192530) against those from more juvenile branches and twigs (e.g. Beta-290713, Beta-290711 and Beta-290708; Table 40.1). When plotted as two phases within a contiguous sequence comprising a lower unit of mature wood, succeeded by an upper unit of juvenile wood, the model produced acceptable agreement index values (Amodel=101; Figure 40.2). This agreement suggested that our model provided a valid interpretation

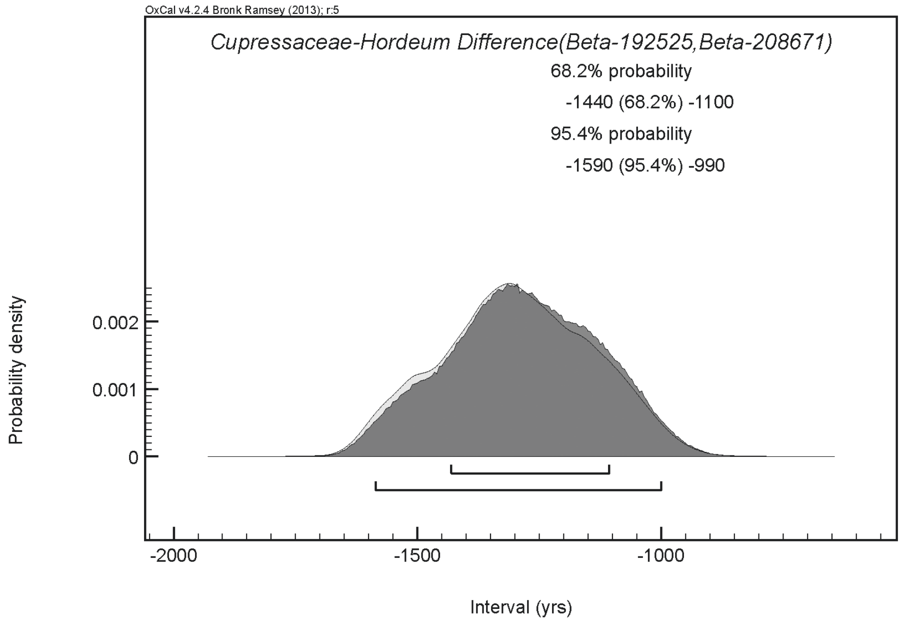

Figure 40.1 Results of Difference analysis providing estimates for the separation in age between short-lived and long-lived plant remains used to date the same sealed context (239) in Trench 2.

of the chronological separation in age of the two forms of Cupressaceae identified in the WF16 assemblage. While we must be cautious because we lack samples of juvenile branches/twig and mature heart/branch wood from the same context, we note that the three samples of juvenile branches/twig wood all come from the lowermost dated contexts within their respective Structures of O45 (Beta-290713), O75 (Beta-290711) and O100 (Beta-290708). As such, we believe it unlikely that the difference in age between the juvenile branches/twig and mature heart/branch wood can be explained on the grounds of site stratigraphy.

To support this interpretation we note that the six dates coming from Cupressaceae of mature form are statistically consistent (χ^2-test: df=5; T=11.0; 5% critical value=11.1), centred on 12.28 ka cal BP despite coming from four separate Objects (Trenches 1, 2 and 3, and Structure O45). Similarly, although we note small sample sizes, the two dates from Cupressaceae of indeterminate form (Beta-192524 and Beta-253735) are consistently (χ2-test: df=1; T=0.1; 5% critical value=3.8) centred on 11.81 ka cal BP, and the three dates from Cupressaceae of juvenile form are also consistent (χ2-test: df=2; T=3.3; 5% critical value=6.0), centred on 11.23 ka cal BP.

The most likely explanation for the statistical consistency of the six samples of mature forms of Cupressaceae is the plateau on the calibration curve over this time period (Figure 40.3), which produces calibrated dates that give a potentially false impression of contemporaneity. A feasible interpretation for the difference in the dates of the mature and juvenile forms is that most, if not all, of the Cupressaceae samples derive from wood acquired and used at a date denoted by the juvenile/twig wood, centred on 11.23 ka cal BP and possibly the indeterminate forms centred on 11.81 ka cal BP. In this explanation, the dates of the mature forms would derive from an old wood effect, while also continuing to be influenced by the calibration curve plateau to give a false impression of contemporaneity. The date of the indeterminate forms might also be influenced by an old wood effect; one of less magnitude than the mature forms if they are from branches younger than the heartwood, but older than the juvenile/twig wood.

We used OxCal Difference analysis between the youngest sample of mature wood (Beta-192530) and oldest sample of juvenile wood (Beta-290713) to estimate an old wood effect from Cupressaceae. This indicated that estimates for the old wood effect evident in WF16 Cupressaceae could range from 660–1150 years (95.4% probability; Figure 40.4). If we average the lower and upper limits of this 95.4% probability result, with the upper and lower limits from the Difference analysis between the seed and mature form Cupressaceae from Trench 2 (990–1590 years at 95.4% probability), we arrive at an estimate for the old wood effect as falling between 825–1370 years. This range encompasses what we would expect from modern analogues for Late Pleistocene/Early Holocene Cupressaceae such as *J. phoenicea*.

In addition to the age of the wood itself, this range might also encompass additional contributions to the old wood effect. It is possible that the occupants of WF16 had collected wood from trees that had been fallen in the local woodlands for a considerable period of time, perhaps several centuries if the wood had become desiccated. In addition, samples of Cupressaceae might have been re-deposited at WF16 from earlier horizons, which were not reached by the excavation. While the absence of clearly Epipalaeolithic artefacts suggests this it is unlikely that an Epipalaeolithic horizon has been reached, the architecture

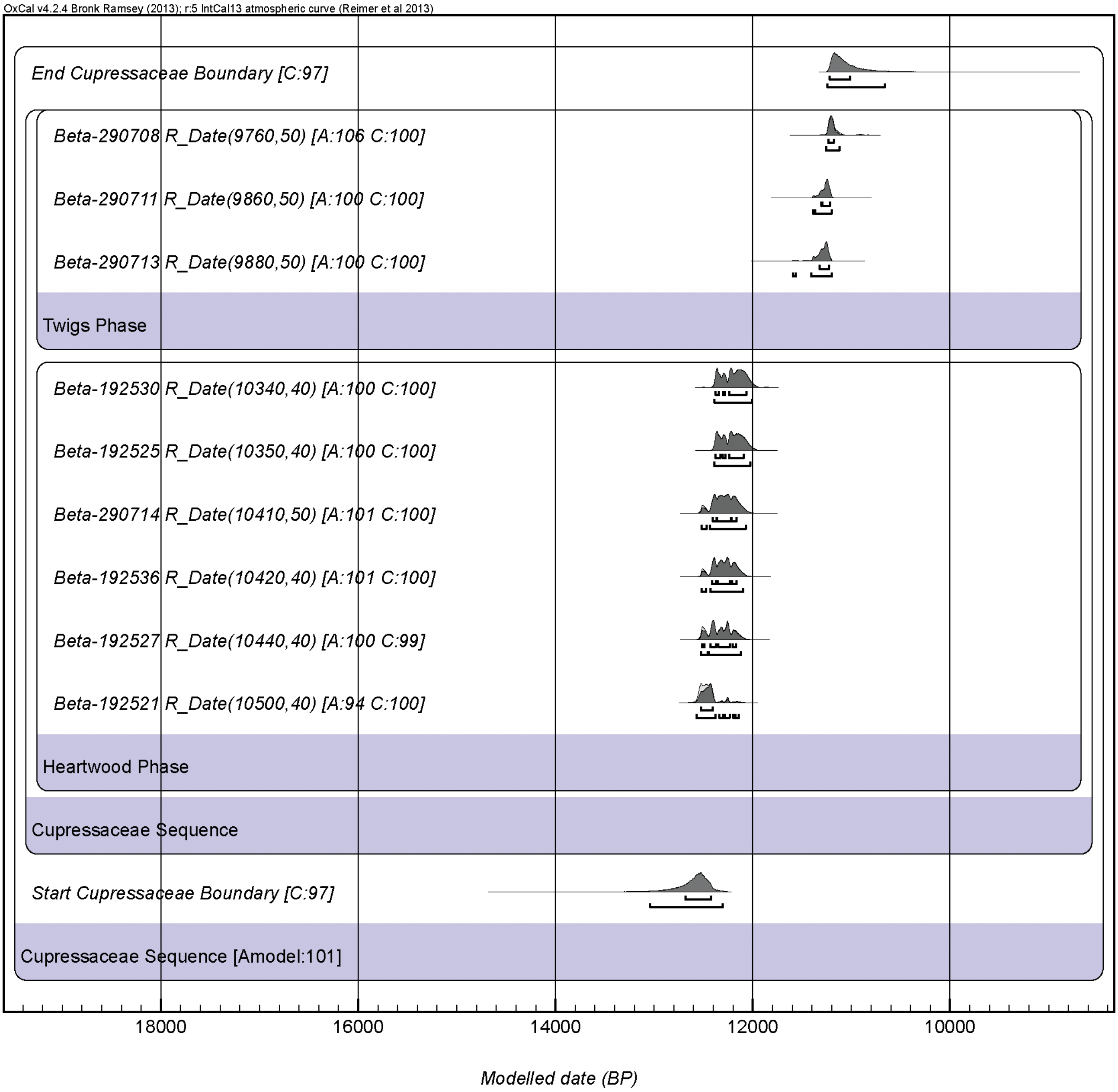

Figure 40.2 Posterior density estimates for mature (heartwood) and young (small/branch twig) wood of Cupressaceae wood charcoal from WF16.

of Trench 2 suggests that an early PPNA phase may have been present. It is possible, of course, that all three factors have played a role in the old wood effect: long-lived taxa, collection of dead wood and the re-deposition of samples.

To allow for the possibility of an old wood effect in the WF16 ^{14}C dataset, we incorporated an OxCal Offset command into those models containing dates derived from mature and indeterminate forms of Cupressaceae, using the mean and standard deviation (1098 ± 273 years) of the WF16 old wood effect estimate of 825–1370 years. We refrained from extrapolating an old wood offset specifically for indeterminate forms of Cupressaceae due to the low number of samples categorised within this group. The validity of applying a time-series constant offset to archaeological samples requires further explicit testing utilising modern ethnographic wood charcoal assemblages.

40.4 Site model and summed calibrated probability distribution

Site model

One objective of this chronological study was to obtain an estimate for the beginning and end of activity at WF16 as represented by the excavated deposits. We constructed a single-phase Site Chronological Model containing the

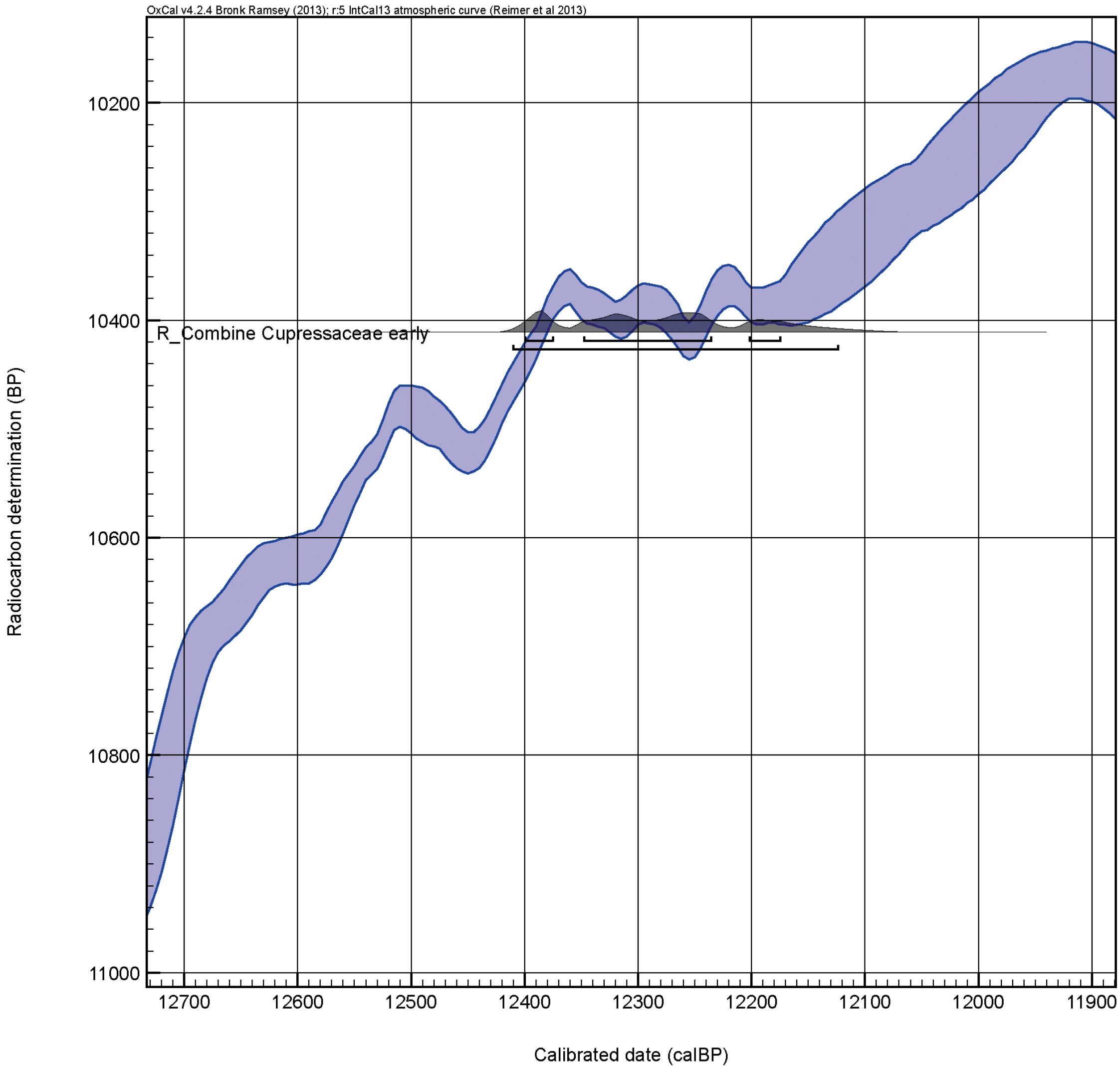

Figure 40.3 Calibrated radiocarbon dates from mature forms of Cupressaceae combined to show their position on a plateau in the calibration curve between c. *12.40–12.14 ka cal BP.*

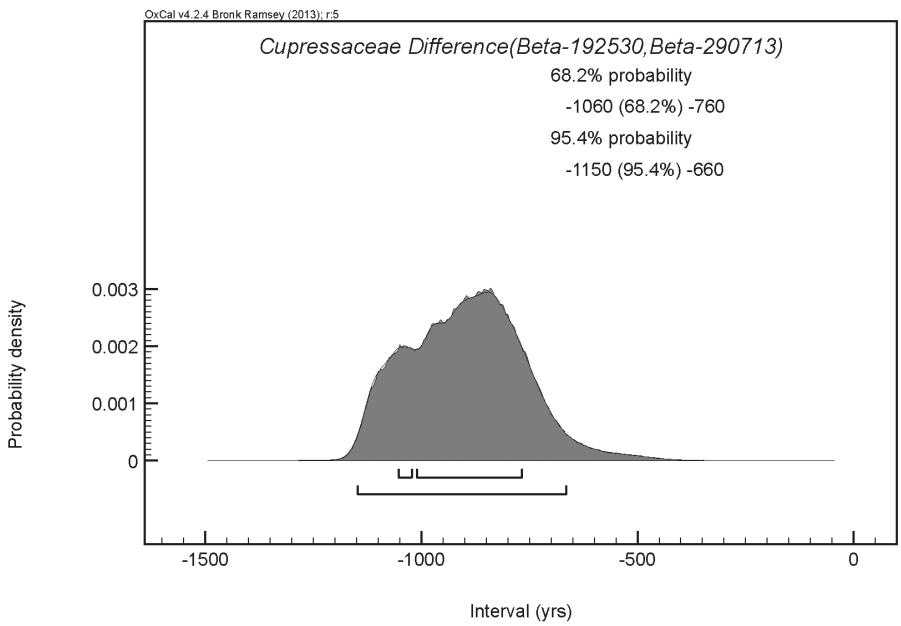

Figure 40.4 OxCal plot showing estimates for the difference in timing of calibrated dates obtained from mature and young wood of Cupressaceae.

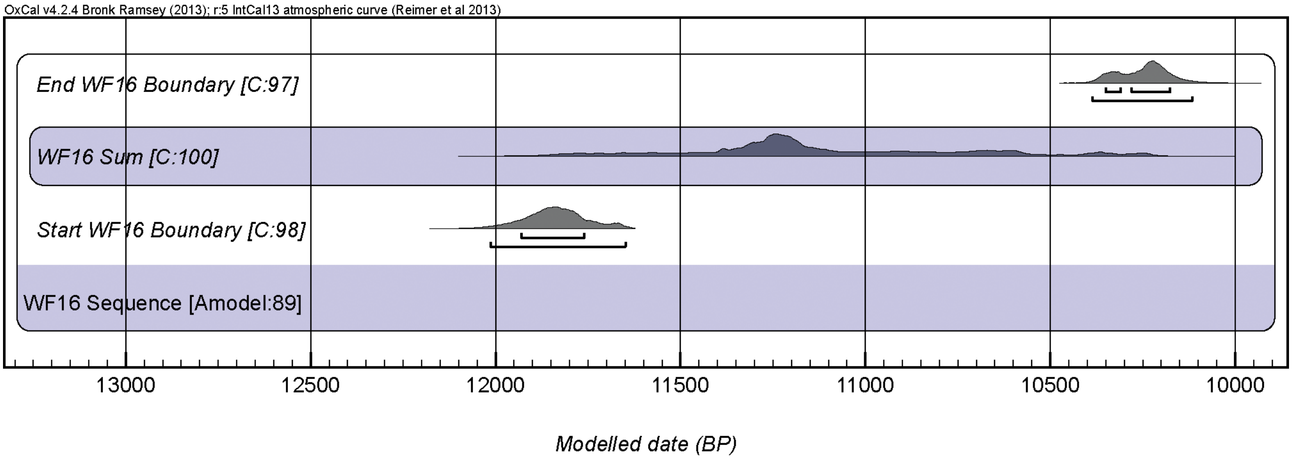

Figure 40.5 Summed calibrated probability distribution of modelled ^{14}C dates bracketed by posterior density estimates indicating the beginning and end of occupation at WF16.

Table 40.2 Lower and Upper boundary estimates for WF16 site, Objects (2008–2011) and Trenches (1997–2003).

	Posterior density estimate, cal BP			
	Lower boundary		Upper boundary	
Object	**68.2% probability**	**95.4% probability**	**68.2% probability**	**95.4% probability**
O45$_{\text{chron model}}$	*11,430–11,220*	*11,800–11,190*	*11,060–10,660*	*...10,320*
O45$_{\text{strat model}}$	*11,610–11,240*	*12,310–11,200*	*11,040–10,500*	*...9860*
O11$_{\text{chron model}}$	*11,920–11,470*	*12,440–11,360*	*10,260–9920*	*10,410–9440*
O33$_{\text{chron model}}$	*11,500–11,200*	*12,570...*	*11,220–10,610*	*11,250–9370*
O60$_{\text{chron model}}$	*12,110–11,210*	*13,850–11,180*	*11,260–10,350*	*11,260–8810*
O100$_{\text{chron model}}$	*11,370–11,180*	*12,550–11,130*	*11,230–11,030*	*11,250–9780*
O75$_{\text{strat model}}$	*11,740–11,280*	*12,680–11,240*	*10,680–10,260*	*10,970–9270*
O91$_{\text{strat model}}$	*14,200–11,420*	*14,210–11,410*	*11,170–8750*	*11,180–8750*
Trench 1 Northern Area$_{\text{strat model}}$	*11,470–11,250*	*12,390–11,240*	*11,320–11,120*	*11,360–10,550*
Trench 1 Central Area$_{\text{chron model}}$	*11,580–11,250*	*12,150–11,220*	*10,670–10,380*	*10,730–9860*
Trench 1 Central Area$_{\text{strat model}}$	*11,760–11,270*	*12,700–11,230*	*11,040–10,220*	*...9440*
Trench 2$_{\text{chron model}}$	*12,160–11,740*	*12,510–11,430*	*10,700–10,380*	*10,910–9860*
Trench 3CHRON MODEL	*12,310–11,810*	*13,090...*	*10,340–9920*	*10,410–9130*
Site	*11,930–11,760*	*12,020–11,640*	*10,350–10,170*	*10,390–10,110*

entire WF16 ^{14}C dataset (n=46), embedding dates derived from mature and indeterminate forms of Cupressaceae within an old wood offset. Figure 40.5 provides the posterior density estimates, for the lower and upper boundaries bracketing the WF16 ^{14}C dataset, that indicate that associated activity had commenced by *12.02–11.64 ka cal BP* (Table 40.2). This estimate is coincident with the terminal stages of the Younger Dryas/GS-1 cooling.

The upper boundary estimates show that activity at WF16, as represented by the excavated deposits, ended by *10.39–10.11 ka cal BP* (Table 40.2). We are confident that the upper boundary provides a reliable estimate of when the site fell into disuse as represented by the excavated deposits. We note that this might include intrusive charcoal from the very end of PPNA human activity at WF16, the archaeological horizons of which have been destroyed by erosion. This confidence is due to the constraint placed on the upper boundary estimate by ^{14}C dates obtained from relatively short-lived taxa.

Summed calibrated probability distributions

Summed calibration probability distributions (SCPD) are often used as proxies for the intensity of human activity (e.g. Weninger *et al.* 2006; Wicks and Mithen 2014). Their use in that regard require interpretation in light of the biases potentially imposed by the nature of the calibration curve.

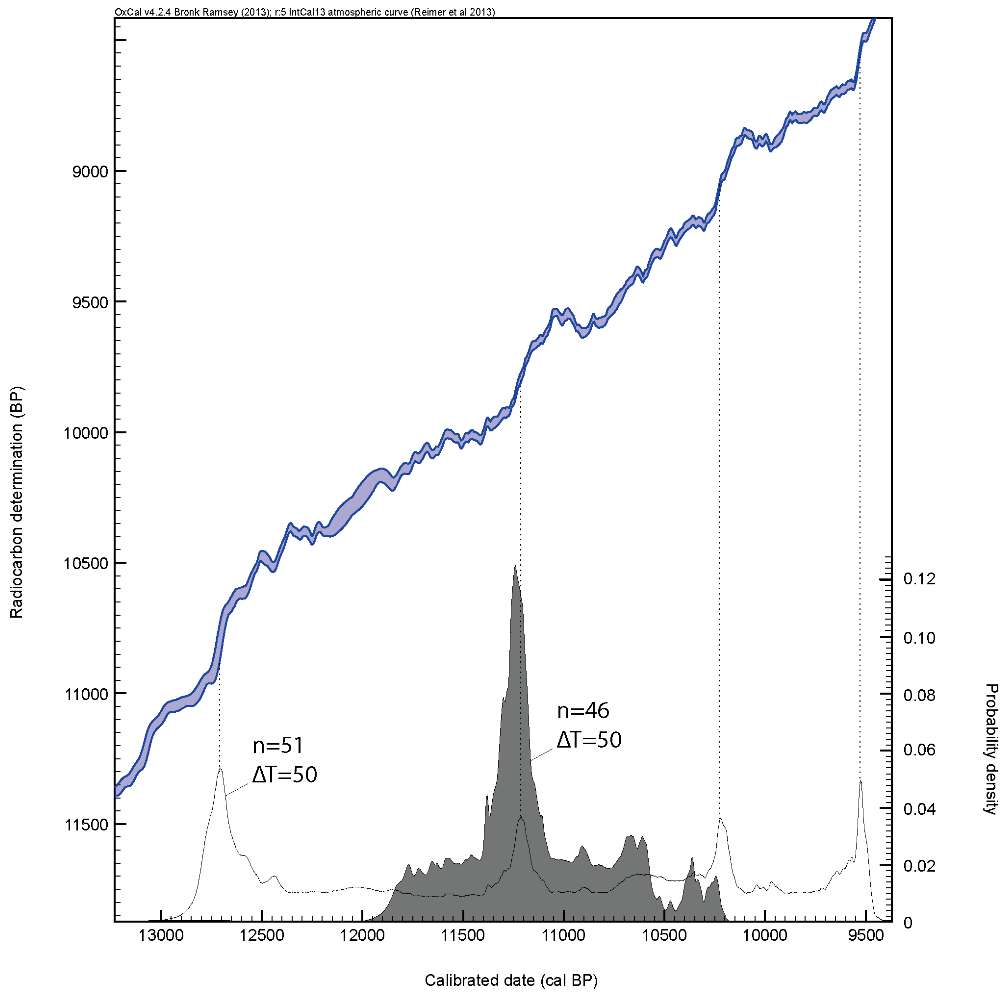

Figure 40.6 Posterior SCPDs extracted from the WF16 chronology (solid polynomial) and uniformly-distributed simulated dataset (hollow polynomial), plotted against changing gradients in the ^{14}C calibration curve between 13.0–9.5 ka cal BP. Notable plateaus in the calibration curve occur at c. *12.35–12.15 ka cal BP,* c. *11.10–10.80 ka cal BP and* c. *10.15–9.95 ka cal BP, immediately preceded by steep sections that correspond with tall narrow peaks in the posterior density function of pooled calibrated ^{14}C datasets. ΔT=average SD.*

Natural variation in concentrations of atmospheric carbon over time has resulted in significant plateaus in the calibration curve. A well-known consequence is the reduction in the precision of calibrated date ranges of ^{14}C determinations falling across flattened sections of the calibration curve. The plateaus occurring across the Late Pleistocene–Early Holocene transition are particularly pronounced, these increasing the gradient of the calibration curve immediately preceding the plateaus (Figures 40.3 and 40.6). Such slope steepening influences the post-calibration shape of posterior density functions (PDF) generated from pooled ^{14}C datasets, which can result in the generation of tall narrow peaks (Bartlein *et al.* 1995; Michczyński and Michczyńska 2006). To the inexperienced these can be misinterpreted as representing variability in the ^{14}C proxy for past human activity, particularly at times when changes in activity arising from climate and/or environment change are to be expected. To explore the potential correlation between calibration gradients and PDF enhancement, we followed Wicks and Mithen (2014) by comparing the WF16 SCPD against a simulated SCPD generated from a uniform distribution of ^{14}C dates (n=51; mean SD [AT]=50 years) spanning the period of occupation at WF16.

Figure 40.6 provides a comparison of the SCPDs extracted from the WF16 chronology and the simulated dataset of uniformly distributed dates, aligned against the corresponding section of the ^{14}C calibration curve. This shows a tall narrow peak, in both the real and simulated SCPDs, between *c.* 11.1–11.4 ka cal BP that corresponds with a steep gradient, that precedes a plateau in the section of the calibration curve that intercepts with the ordinate between 9500–9950 ^{14}C years BP. As such, the apparent concentration of human activity between *c.* 11.1–11.4 ka cal BP could be no more than an artefact of the calibration curve.

To further explore this we tested whether a tall peak at *c.* 11.25 ka cal BP, could be reproduced in groups of randomly distributed ^{14}C determinations, this providing a

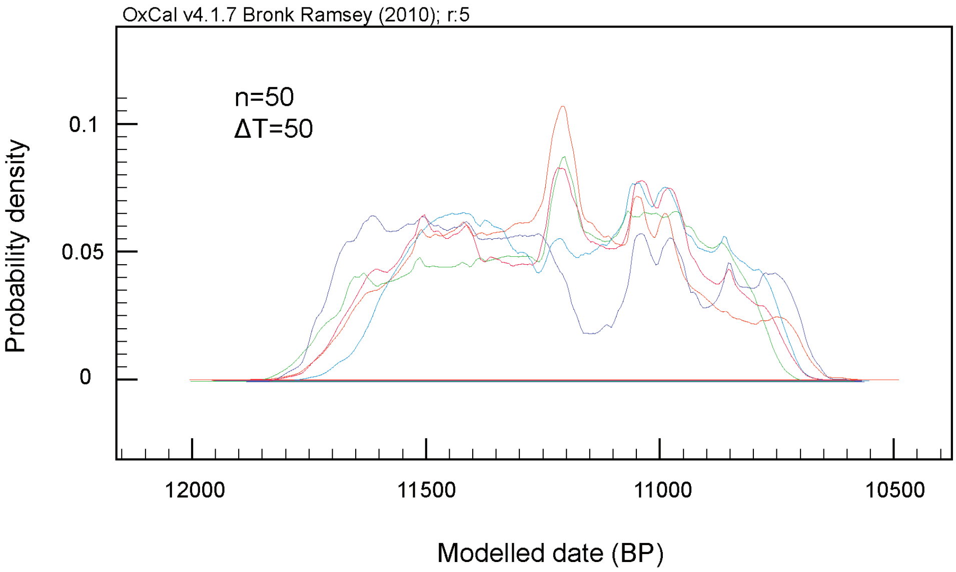

Figure 40.7 A selection of posterior SCPDs extracted from randomly distributed simulated ^{14}C datasets spanning the period of occupation at WF16. ΔT=average SD.

more effective simulation of the WF16 ^{14}C dataset than a uniformly distributed dataset.

A random number generator was used to generate values (n=50) with comparable uncertainties (ΔT=50yrs) falling within the range of ^{14}C determinations obtained for WF16. A Sum Command was used in conjunction with a single-phase model containing the randomly generated ^{14}C determinations, a procedure that we repeated ten times, five of which are illustrated in Figure 40.7. In 60% of cases a tall peak was evident in the randomly distributed simulated SCPD at *c.* 11.25 ka cal BP, indicating that there is a 60% probability that summed ^{14}C determinations calibrating to this date are likely to exhibit calibration curve influences. In light of this likelihood, we interpret the precise correlation of the WF16 11.25 ka cal BP peak, with a steep calibration gradient, as an indication that its SCPD is exhibiting strong calibration effects that to some extent may be masking the archaeological signal.

Whilst this calibration influence is present, we note that the height of the WF16 peak is much more pronounced than that resulting from the simulated datasets, suggesting additional causal factors are present. We also note that the uniformly distributed simulated SCPD produced three further peaks, with similar probability densities to its *c.* 11.25 ka BP peak. These are expected, being in concert with steep sections of the calibration curve intercepting with the abscissa at 10,950–10,600 ^{14}C years BP, 9180–8900 ^{14}C years BP and 8650–8000 ^{14}C years BP (Figure 40.6). The peak, at *c.* 10.2 ka cal BP in the SCPD of the uniformly distributed simulated dataset, is not evident in the WF16 SCPD, suggesting that calibration influences are not consistently obscuring archaeological patterns. Unfortunately, the range of the existing ^{14}C dataset for WF16 does not extend to the steep sections of the calibration curve, calibrating to *c.* 12.7 ka cal BP and 9.5 ka cal BP, which would enable further consideration of calibration curve effects.

In summary, given that the WF16 SCPD does not suggest a peak at *c.* 10.2 ka cal BP to coincide with that on the uniformly distributed simulated SCPD, and that the WF16 SCPF peak at *c.* 11.25 ka cal BP is significantly more pronounced than that on the uniformly distributed simulated SCPD, we suspect the latter is partly a true reflection of the intensity of human activity at WF16.

40.5 Calibration, Bayesian Analysis and chronological interpretation by Object

Structure O11 (Chapter 12)

Seven charcoal samples from five stratified contexts were selected for ^{14}C dating: two from the basal context (1061) (Beta-271685, Beta-271686), one from the degraded floor context (828) (Beta-271684), two from the overlying occupation debris context (824) (Beta-271683, Beta-290706), one from the mud-plaster floor context (837) (Beta-290705) and one from the overlying occupation debris context (466) (Beta-253736) (Table 40.1; Figure 40.8).

An initial chronological interpretation, drawing on the stratigraphic interpretations within Chapter 12, grouped the ^{14}C dates as a stratified sequence model comprising five contiguous phases of radiocarbon-dated events, each relating to a succession of single contexts. The OxCal output lacked posterior density estimates due to a null hypothesis, testing true (Amodel=0), this was caused by chronological reversals, indicated by the stratigraphic positions of Beta-253736, Beta-271683 and Beta-290705. The dates were re-modelled, grouping the five phases within a single-phase chronological model (Figure 40.9), which produced acceptable agreement index values. Posterior density estimates generated from the Bayesian analysis of the chronological model for O11 are provided in Figure 40.9 and in Tables 40.1 and 40.2.

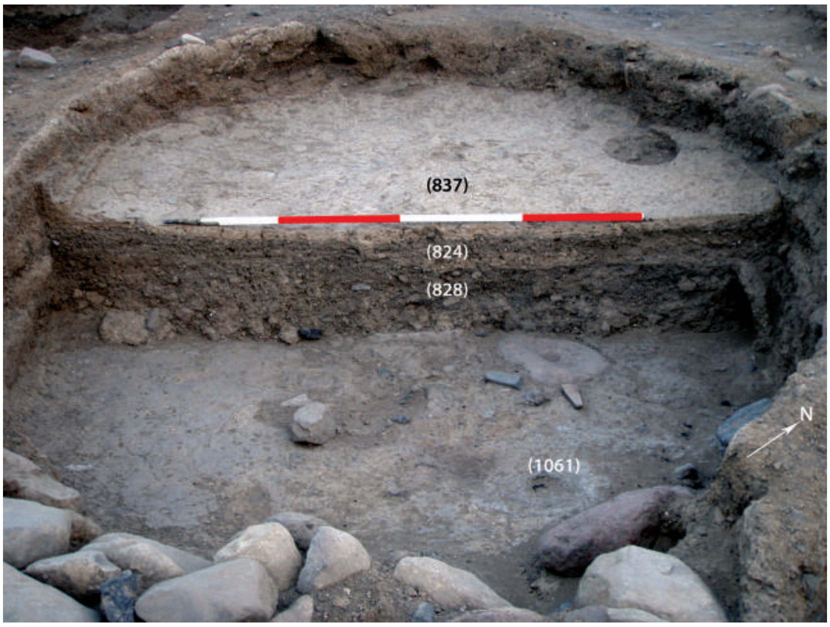

Figure 40.8. Section through Structure O11, showing basal floor containing cremation deposit (1061), section through (828) and (824) and upper floor surface (837). Scale 2.0 m.

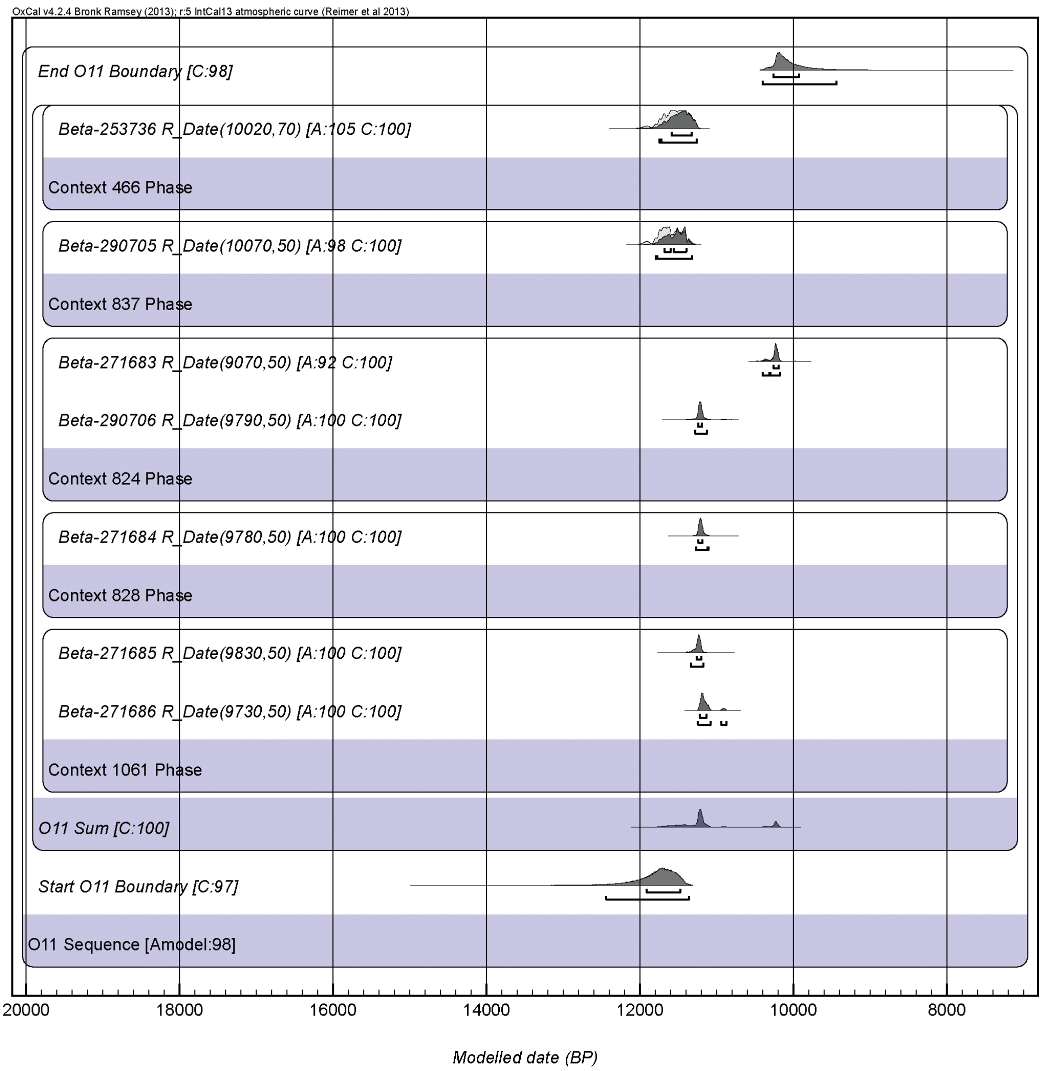

Figure 40.9 Posterior density estimates for ^{14}C dates from O11 grouped within a chronological model.

Table 40.3 Statistically consistent radiocarbon dates from WF16 Objects and trenches.

Object	Statistically consistent dates	T	Df	5% Critical Value
O45	Beta-271687, Beta-271688	1.1	1	3.8
O11	Beta-271684, Beta-271685, Beta-271686, Beta-290706	1.7	3	7.8
O11	Beta-253736, Beta-290705	0.3	1	3.8
O100	Beta-290707, Beta-290708	0	1	3.8
O75	Beta-271681, Beta-290711	1.1	1	3.8
T1 northern area	Beta-192522, Beta-192523	0.5	1	3.8
T1 central area	Beta-120206, Beta-120207	0.1	1	3.8
Trench 2	Beta-192525, Beta-192526, Beta-192527	2.8	2	6
Trench 2	Beta-192524, Beta-120210	0.9	1	3.8
Trench 3	Beta-192529, Beta-192531	2	1	3.8
Trench 3	Beta-135110, Beta-209010	0.4	1	3.8

The bimodal distribution of the sum (SCPD) produced by the chronological model, suggests at least one main pulse of activity associated with the use of O11, with possibly intrusive material giving the impression of later activity separated by a considerable hiatus in use (Figure 40.9). The uppermost dates (Beta-253736 and Beta-290705) come from two discrete contexts (466 and 837, respectively) separated by a combination of collapse and occupation deposits. Despite the stratigraphic separation, these dates provided statistically consistent ^{14}C determinations centred on 11.57 ka cal BP (χ^2-test: df=1; T=0.3; 5% critical value=3.8) (Table 40.3). These are the oldest of the seven samples from O11 and two of the oldest dates from the site as a whole. They are derived from Salicaceae and *Pistacia*, the latter sample being identified as twig wood. Consequently, we have no reason to believe that an old wood effect is present. Our interpretation is that the pisé used to construct the upper floors and walls of structure O11 had been made with re-deposited sediment that already contained charcoal, and hence resulted in this inverted stratigraphy. While the dates do not provide a useful estimate for activity at the upper surviving levels of O11, they nevertheless contribute towards our overall dating of the activity at WF16.

Beta-271683, from context (824) which was below (466) and (837) from which Beta-253736 and Beta-290705 had derived, provided the youngest date of the whole sequence, *10.41–10.17 ka cal BP*. Indeed, this is the youngest of the dates acquired from the samples taken during the 2008–2010 excavations. We have no reason to think that this sample may have been contaminated and conclude that it must be intrusive. We suspect that this charcoal had become re-deposited by insect or rodent burrowing activity that was evident during excavation. Again, although it fails to indicate a date for the activity represented by (824), we believe it is a useful date with regard to the span of activity at WF16, agreeing with dates coming from Trench 3 of the 1997–2003 evaluation (below).

Our best estimate for the date of the occupation debris of (824) comes from sample Beta-290706. This date is statistically consistent with three dates coming from contexts lower in the sequence, one from (828), a degraded floor surface, and two from (1061), an ashy deposit containing burnt bone. All four of these dates are statistically consistent, providing a calibrated combined value centred on 11.21 ka cal BP (χ^2-test: df=3; T=1.7; 5% critical value=7.8) (Table 40.3). We interpret these dates as indicating a relatively rapid accumulation of the stratigraphic sequence between (1061) and (824), although the calibrated date range encompasses a period of roughly two human generations.

We regard the posterior density estimates for the lower and upper boundaries shown in Figure 40.9 with caution (Table 40.2). Overall, posterior estimates place the start of activity associated with the excavated contexts of O11 at *12.44–11.36 ka cal BP*, although, as we noted above, the oldest samples within this structure may have been re-deposited from elsewhere at WF16. Estimates for the end of activity associated with the O11 excavated deposits indicate that this had ceased by *9.44 ka cal BP*, although this may be too young due to the potential intrusive nature of the dating sample that provided the youngest date.

Structure O45 (Chapter 14)

Five charcoal samples were selected for ^{14}C dating from contexts within O45: two from Phase 1 context (1033) (Beta-290713, Beta-290714); two from the Phase 2 rubble deposit (1012) (Beta-271687, Beta-271688), and one from the third phase, hearth fill (249) (Beta-253737) (Table 40.1; Figure 40.10).

An initial chronological interpretation grouped the ^{14}C dates as a stratified sequence model comprising three contiguous phases of radiocarbon-dated events. This produced unacceptable agreement index values, caused by an insufficient level of correlation between the calibrated ages for samples and their position within the stratigraphic

Figure 40.10 Structure O45: A — post-excavation photograph, scale 2.0 m; B — mud-plaster constructed hearth from the upper-most levels of O45 containing fill (249), scale 1.0 m; C — section through rubble deposit (1012), scale 2.0 m; D — charcoal rich deposit (1033) sealed between two stages of wall construction. Scale 1.0 m.

sequence, and hence was rejected. An alternative model grouped the three phases within a single-phase chronological model (Figure 40.11), whilst a third stratigraphic sequence model produced acceptable agreement index values having removed an outlier from the sequence (Figure 40.12). The outlier was the sample (Beta-253737) from within the hearth (249), representing the third stratigraphic phase of Structure O45. This date was significantly older than those from stratified contexts below — its posterior density estimate in the chronological model dating to *11.25–10.88 ka cal BP*, several centuries prior to the date of the underlying pisé rubble accumulation (Figure 40.11 and Table 40.1). This suggests that the Salicaceae wood burned within the hearth might have already been old, perhaps deriving from collapsed structures elsewhere at the settlement, from an old tree (its form was indeterminate), or a combination of these factors. As a result, the date could not represent the activity of the fire within the hearth itself and can be justifiably excluded.

Both the chronological and stratigraphic models incorporated the old wood offset, this applied to Beta-290714 that was derived from a mature form of Cupressaceae (Figures 40.11 and 40.12). Posterior density estimates for O45 are provided in Tables 40.1 and 40.2.

The bimodal distribution of the sum (SCPD) produced by the stratigraphic sequence model suggests at least two or three main pulses of activity associated with Stucture O45 (Figure 40.12). The two dates from context (1033) (Beta-290713 and Beta-290714) suggest that this deposit is an accumulation of material of similar ages forming between *11.62–11.20 ka cal BP* (stratigraphic model) and *11.47–10.75 ka cal BP* (chronological model). The two dates (Beta-271687 and Beta-271688) from context 1012 are statistically consistent (χ^2-test: df=1; T=1.1; 5% critical value=3.8), providing a calibrated combined value centred on 10.82 ka cal BP for the accumulation of the pisé rubble arising from destruction of the structure by fire (Table 40.3).

Overall, posterior density estimates generated from the stratigraphic model place the start of activity associated with the excavated deposits in O45 at *12.31–11.20 ka cal BP*; the lower limit produced from the chronological model

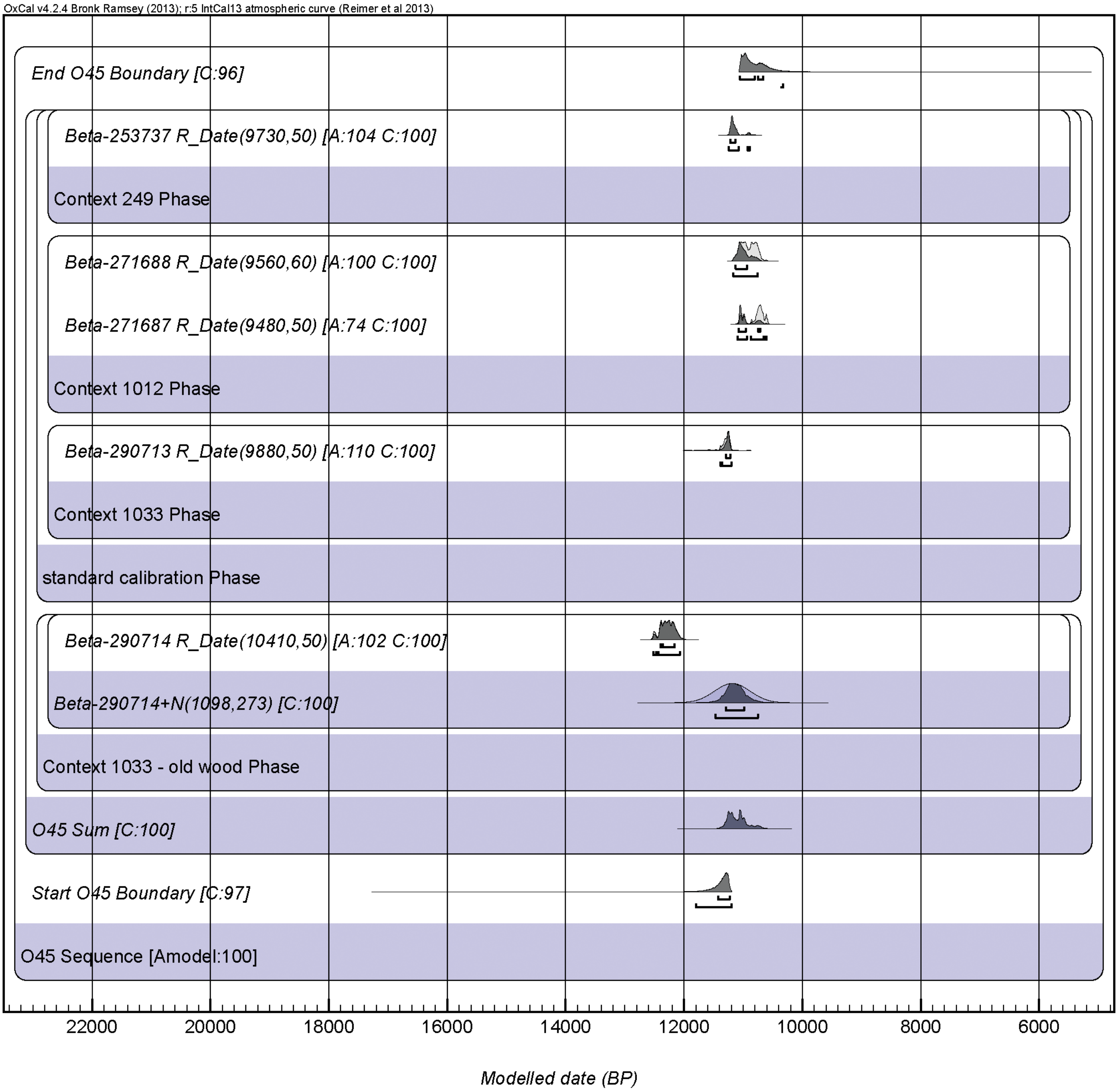

Figure 40.11 Posterior density estimates for ^{14}C dates from O45 grouped within a chronological model using an offset to counter the influence of the old wood effect on the lower boundary.

making that estimate several centuries younger (Figures 40.11 and 40.12; Table 40.2). Additional ^{14}C dates from context (1033) will be required to identify whether the stratigraphic or chronological model provides the most reliable lower boundary estimate, as acceptable agreement index values were produced by both the stratigraphic (Amodel = 10.3%) and chronological (Amodel = 100%) interpretations represented in Figures 40.11 and 40.12. Estimates for the end of activity associated with the O45 excavated deposits indicate that its use had ceased by *10.32 ka cal BP* (chronological model, including the third stratigraphic phase, context 249) or *9.86 ka cal BP* (stratigraphic model, excluding the third stratigraphic phase).

Structure O33 (Chapter 30)

Three charcoal samples were selected for ^{14}C dating from the occupation deposit (377) (Figure 40.13; Beta-253733, Beta-253734, and Beta-253735). The dates were grouped within a single-phase chronological model, incorporating an old wood offset being applied to Beta-253735 that was derived from an indeterminate form of Cupressaceae (Figure 40.14). Posterior density estimates generated from the Bayesian analysis of the chronological model

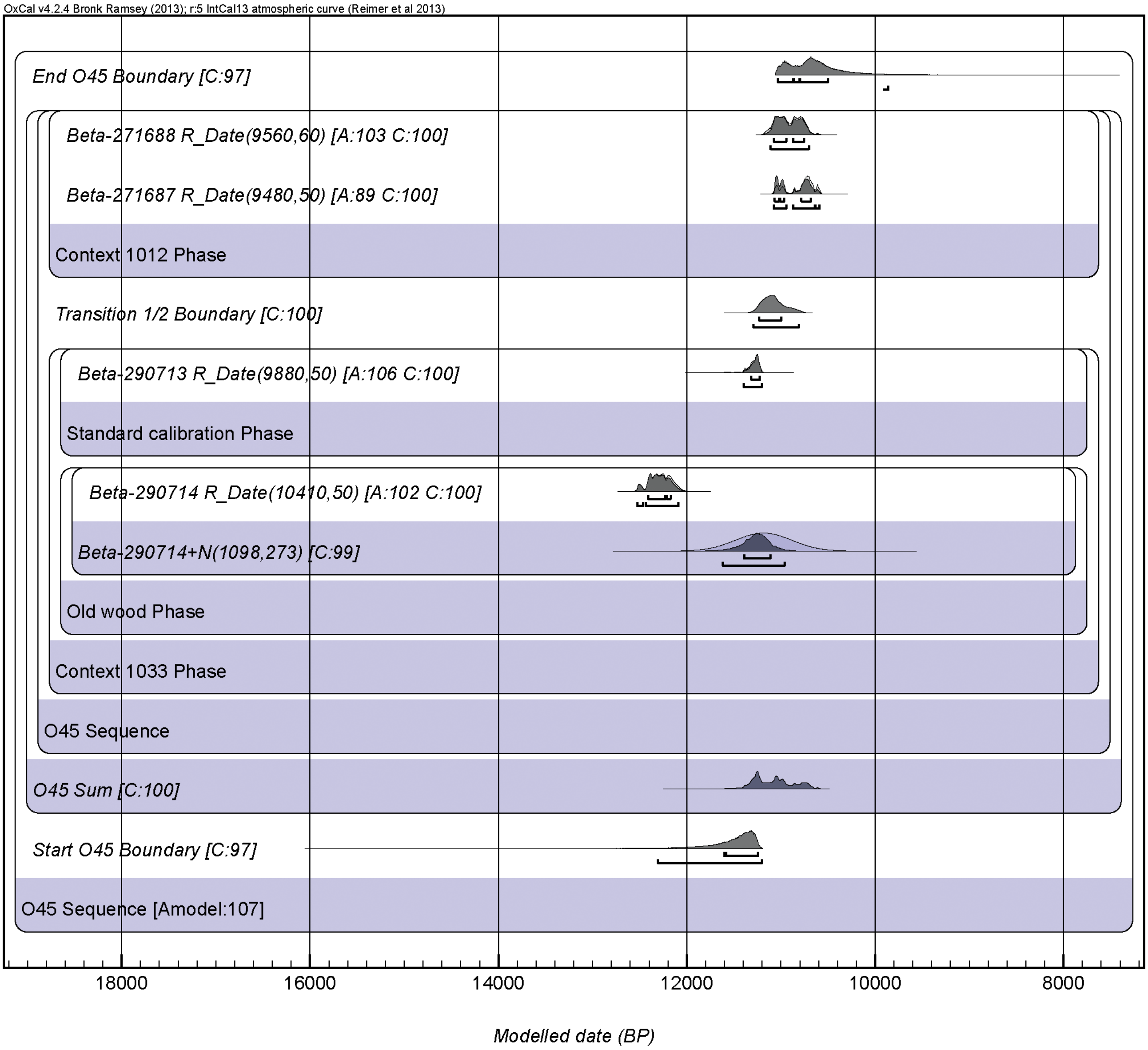

Figure 40.12 Posterior density estimates for ^{14}C dates from O45 grouped within a stratigraphic model using an offset to down weight the influence of the old wood effect on the lower boundary. Note that an acceptable agreement index value has been reached for the model as a whole following the removal of an outlier (Beta-253737).

for O33 are provided in Figure 40.14 and in Tables 40.1 and 40.2.

At face value, the unimodal distribution of the sum (SCPD) produced by the chronological model, suggests, at least initially, a marked pulse of activity contributing to the accumulation of deposits (377) on the floor of Structure O33 (Figure 40.14). Although coming from a well-defined, relatively thin and deeply stratified context, the three samples provided inconsistent values, separated by periods of up to *c.* 450 years between each radiocarbon-dated event. Three explanations, and combinations of these explanations, are possible. First, it may be the case that the thin occupation debris (377) accumulated across a period of more than 900 years (as indicated by the lower and upper limits of the 68.2% probability boundary estimates). Second, it might be the case that the material used to construct the underlying floor and/or the thick layer of fill immediately above the occupation deposit (377) on the floor, involved recycled pisé deposits of varying age from elsewhere within the site, from which charcoal of quite different ages had eroded into the occupation deposit. This may have arisen by rodent activity, evident from burrows within sediments. A third possibility is one of old wood because the three samples come from quite different types of wood: the oldest date (Beta-253735) on Cupressaceae, the second oldest (Beta-253734) on *Tamarix* and the youngest (Beta-253733) on a member of the Chenopodiaceae family. Of these the chenopod is the least

Figure 40.13 Structure Object O33 showing basal floor immediately below occupation horizon (377) from which AMS dating samples were acquired, and section revealing pisé block fill. Scale 0.5 m.

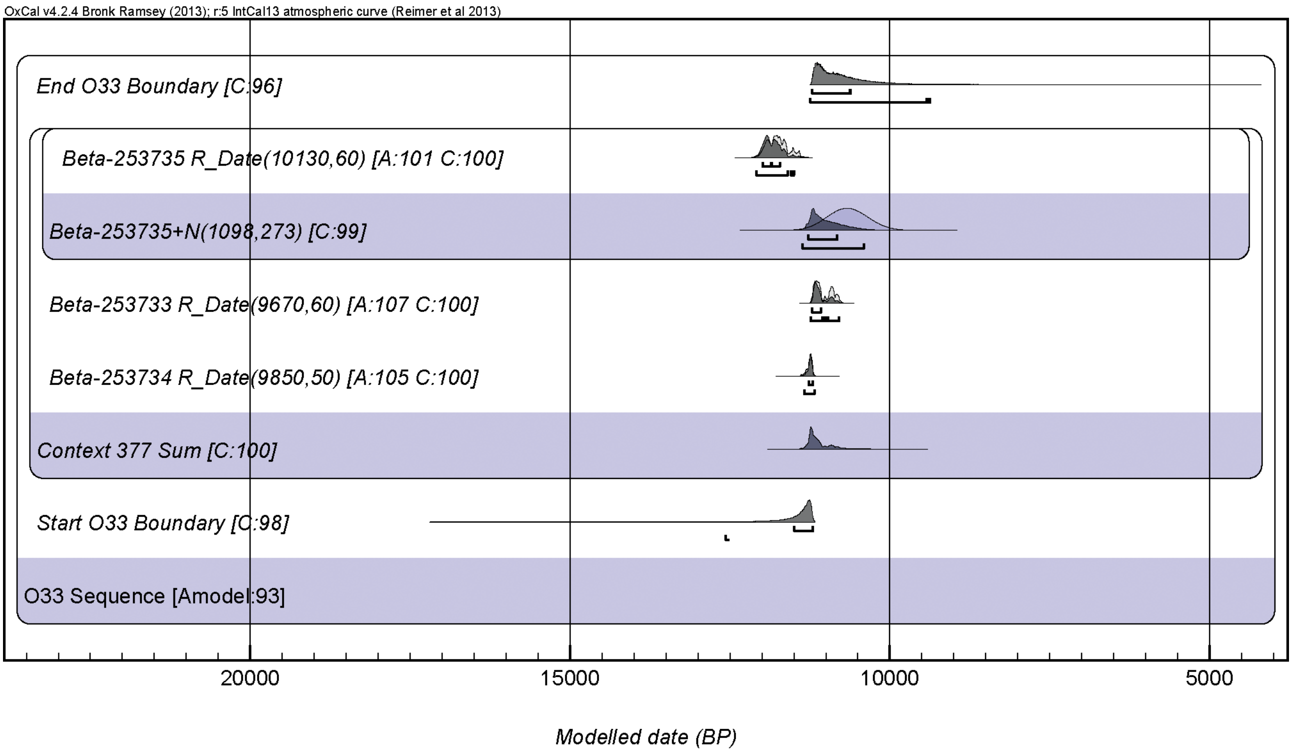

Figure 40.14 Posterior density estimates for ^{14}C dates from O33 grouped within a chronological model using an offset to down weight the influence of the old wood effect on the lower boundary.

likely to involve an old wood effect, and the Cupressaceae the type most susceptible. If this is the case, the most likely date for the horizon comes from Beta-253733, centred on 11.13 ka cal BP.

We note that sample Beta-253733 is enriched with respect to its $\delta^{13}C$ value (-10.5‰) when compared to the other two samples from O33. This is unlikely to be a consequence of plant type because all three samples derive from C_3 species. It might reflect contamination of the sample from fulvic and humic acids in the surrounding matrix. We also note that the $\delta^{13}C$ value (-10.5‰) is comparable to those reported for a variety of plant types when growing in conditions of increased aridity (e.g. McCarroll and Loader 2004; Leavitt 2007; Frumkin 2009). The date derived from sample Beta-253733 is not associated with a known regional arid event in the Southern Levant, but it might relate to a localised condition in the vicinity of WF16 from where the Chenopod was acquired.

In light of the statistically inconsistent dates, we regard the posterior density estimates for the lower and upper boundaries for the occupation horizon in Structure O33, as shown in Figure 40.14, with caution (Table 40.2). Overall, posterior estimates indicate that activity associated with this occupation as likely to have commenced by *12.57 ka cal BP* and to have ended by *9.37 ka cal BP*.

Midden O60 (Chapter 35)

Two charcoal samples were selected for ^{14}C dating from the fill of the hearth (340): Beta-253738 and Beta-253739 (Table Figure 40.15; Table 40.1). The dates were grouped within a single-phase chronological model (Figure 40.16), because it produced acceptable agreement index values. Posterior density estimates generated from the Bayesian analysis of the chronological model for O60 are provided in Figure 40.16 and in Tables 40.1 and 40.2.

At face value, the multi-modal distribution of the sum (SCPD) produced by the chronological model suggests at least two pulses of activity represented within this hearth situated in Midden O60, this confirmed by the inconsistency of the two dates that are potentially separated by at least *c.* 340 years. Two explanations appear possible. First, the older sample, Beta-253738, from the mature stem wood

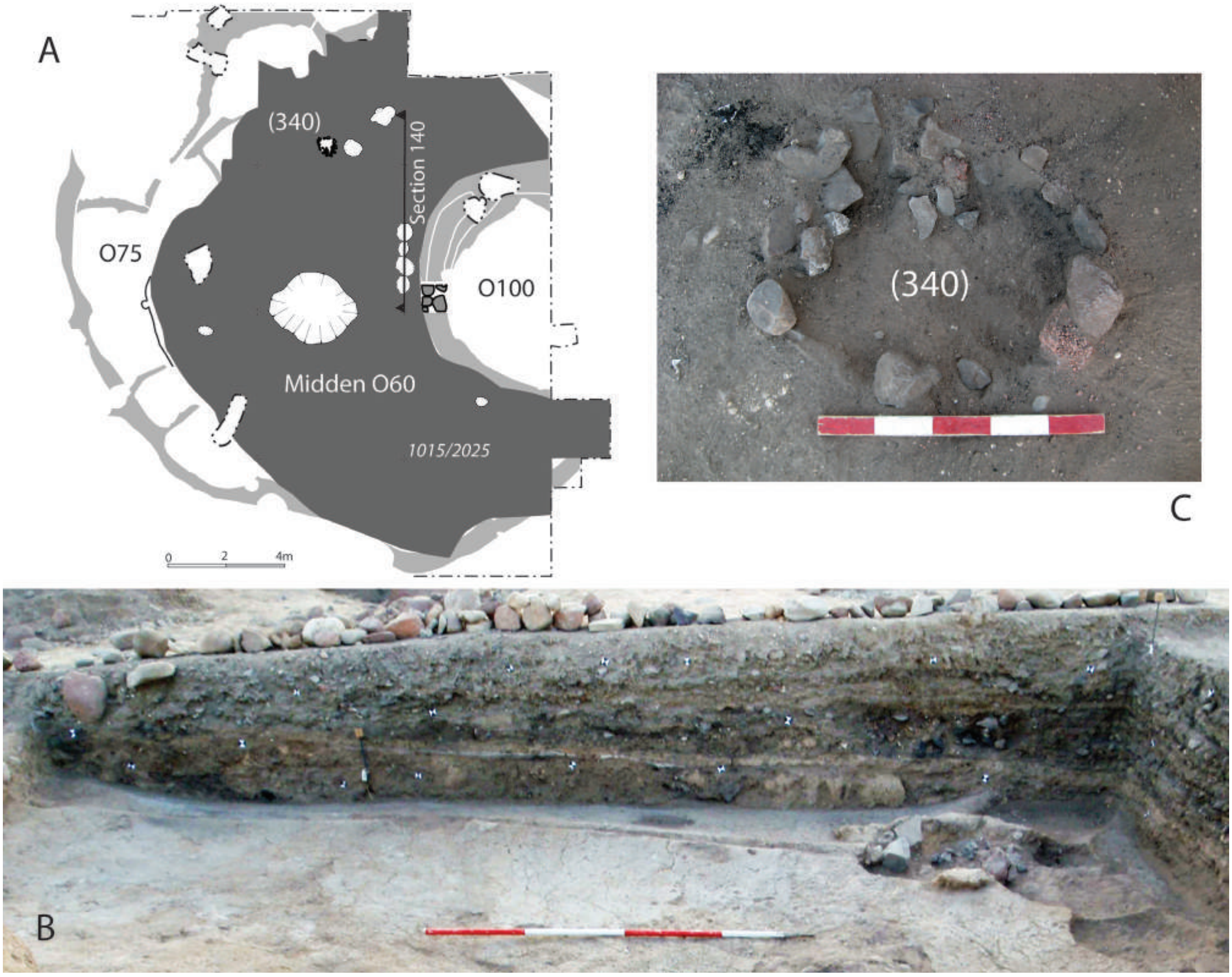

Figure 40.15 A — Spatial extent of Midden O60 showing the location of hearth [345](340); B — West-facing Section S140 through Midden O60, scale 2.0 m; C — Hearth [345] with fill (340). Scale 0.5 m.

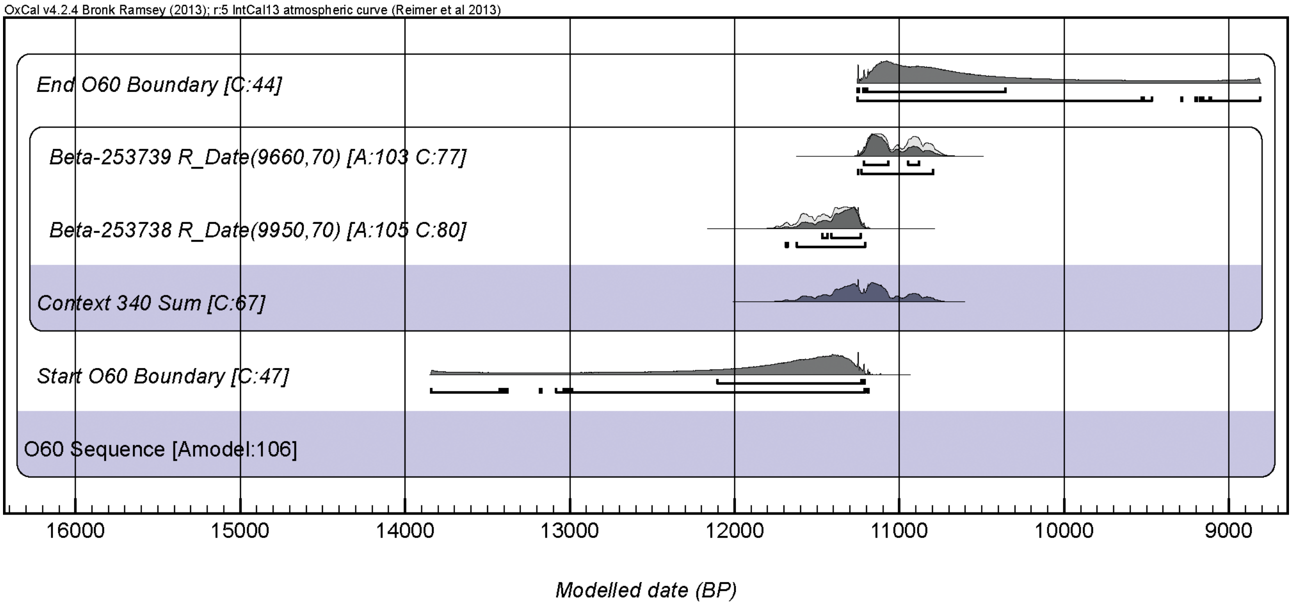

Figure 40.16 Posterior density estimates for ^{14}C dates from O60 grouped within a chronological model. Note the relative precision of the sum compared to the lengthy lead-in and tail of the boundary estimates in the 95.4% probability range.

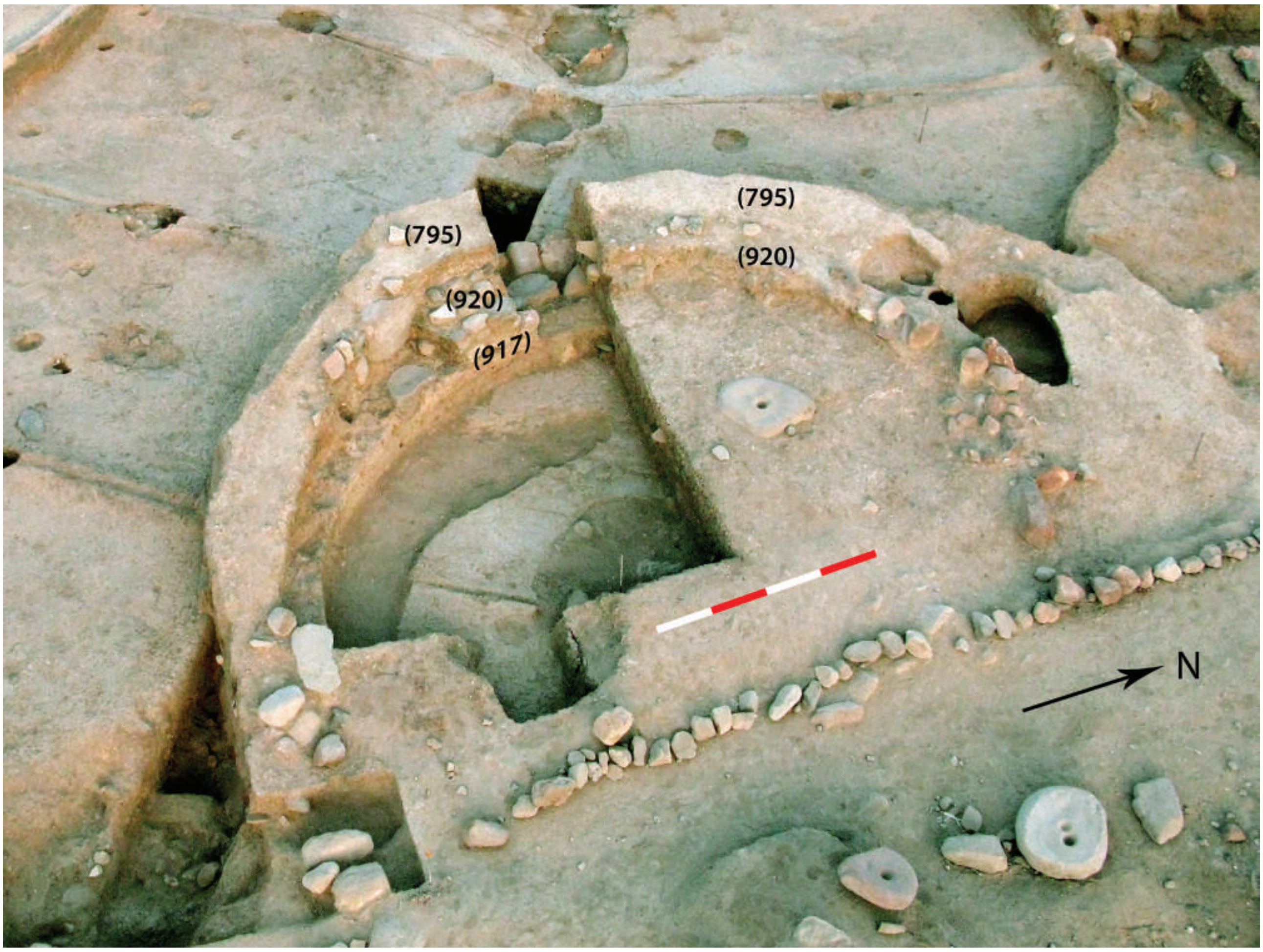

Figure 40.17 Post-excavation view of Structure O100, looking towards the west, showing pisé and stone constructed wall (920), and underlying mud-plaster floor (917). Scale 2.0 m.

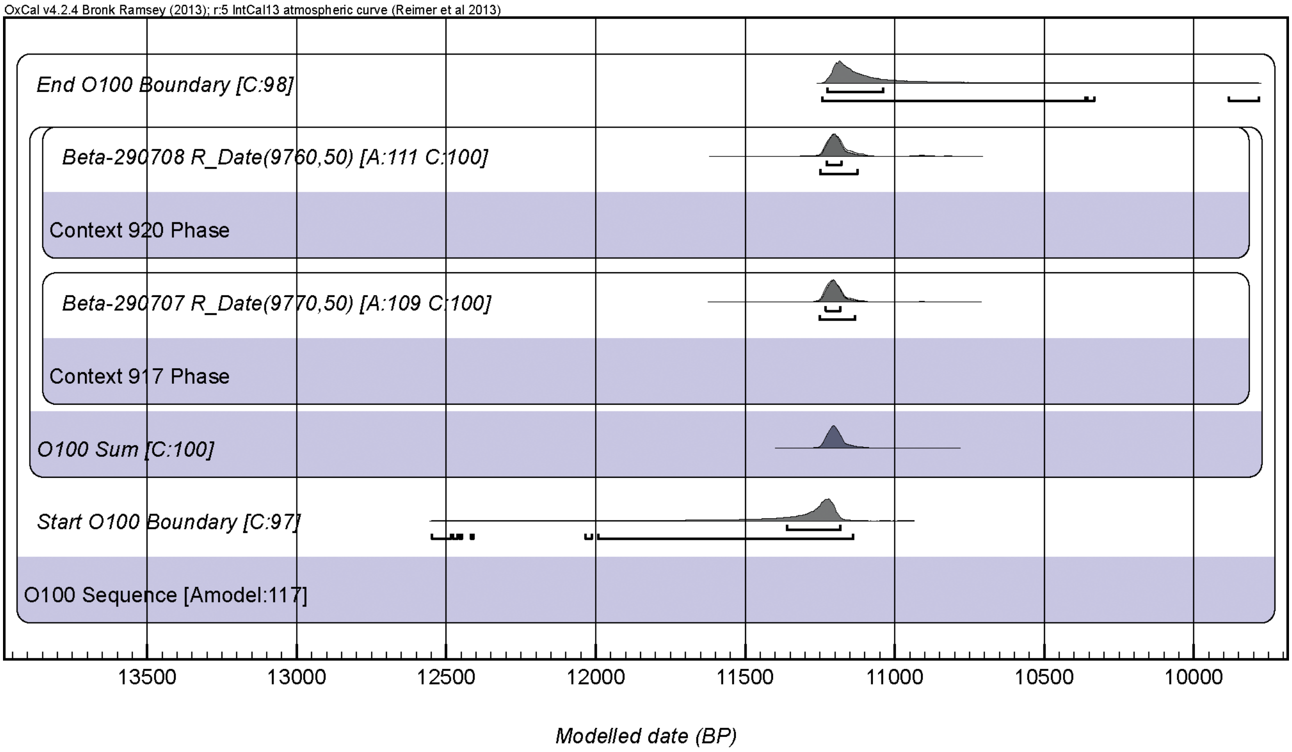

Figure 40.18 Posterior density estimates for ^{14}C dates from O100 grouped within a chronological model. Note the relative precision of the sum compared to the lengthy lead-in and tail of the boundary estimates in the 95.4% probability range.

of a *Tamarix* tree, might be more influenced by an old wood effect than the younger sample, Beta-253739, which derived from twig wood. The posterior density estimate for the younger determination, *11.26–10.79 ka cal BP*, is likely, therefore, to provide the most reliable estimate for the use of the hearth. Alternatively, all of the firewood used for the hearth in the midden might have been drawn from discarded wood found within the midden, perhaps from old structures or previous firewood. As such, it is possible that neither of the samples have yielded a ^{14}C determination that is contemporary with the actual use of the hearth.

Hence, we regard the posterior density estimates for the lower and upper boundaries shown in Figure 40.16 with caution (Table 40.2). Overall, posterior estimates place the age of the charcoal within the hearth at *13.85–11.18 ka cal BP*, with the end of associated activity estimated at *11.26–8.81 ka cal BP*.

Structure O100 (Chapter 36)

Two charcoal samples were selected to date activity associated with the construction of the base of O100: one from the basal floor surface (917) (Beta-290707), and one from the matrix of the wall (920), constructed directly above that floor (Beta-290708) (Figure 40.17; Table 40.1).

The dates were grouped within a single-phase chronological model (Figure 40.18), because it produced acceptable agreement index values. Posterior density estimates generated from the Bayesian analysis of the chronological model for O100 are provided in Figure 40.18 and in Tables 40.1 and 40.2.

The unimodal distribution of the sum (SCPD) produced by the chronological model suggests at least one pulse of activity associated with the construction of the base of O100, which was confirmed by the statistical consistency of the two dates contained in the model (χ^2-test: df=1; T=0.0; 5% critical value=3.8) that provided a combined calibrated value centred on 11.20 ka cal BP (Table 40.3). As such, activity associated with the construction of the base of Structure O100 appears to have occurred as a single event, or series of episodes in close succession. Posterior density estimates for the lower and upper boundaries bracketing this construction activity fall at *12.55–11.13 ka cal BP* and *11.25–9.78 ka cal BP,* respectively (Table 40.2).

Surface O91 (Chapter 37)

Two charcoal samples were selected to date activity associated with the construction of O91 (Figure 40.19; Table 40.1). The first sample was collected from within the floor surface itself (1211) (Beta-290710). The second came from a thin mud-plaster layer (1207) above this floor and immediately adjacent to the exterior wall face of O100 (Beta-290709). Our chronological interpretation grouped the ^{14}C dates within a stratified sequence model, comprising Beta-290710 at its base, succeeded by Beta-290709 (i.e. assuming two contiguously ordered radiocarbon-dated events associated with episodes of use of this Object; Figure

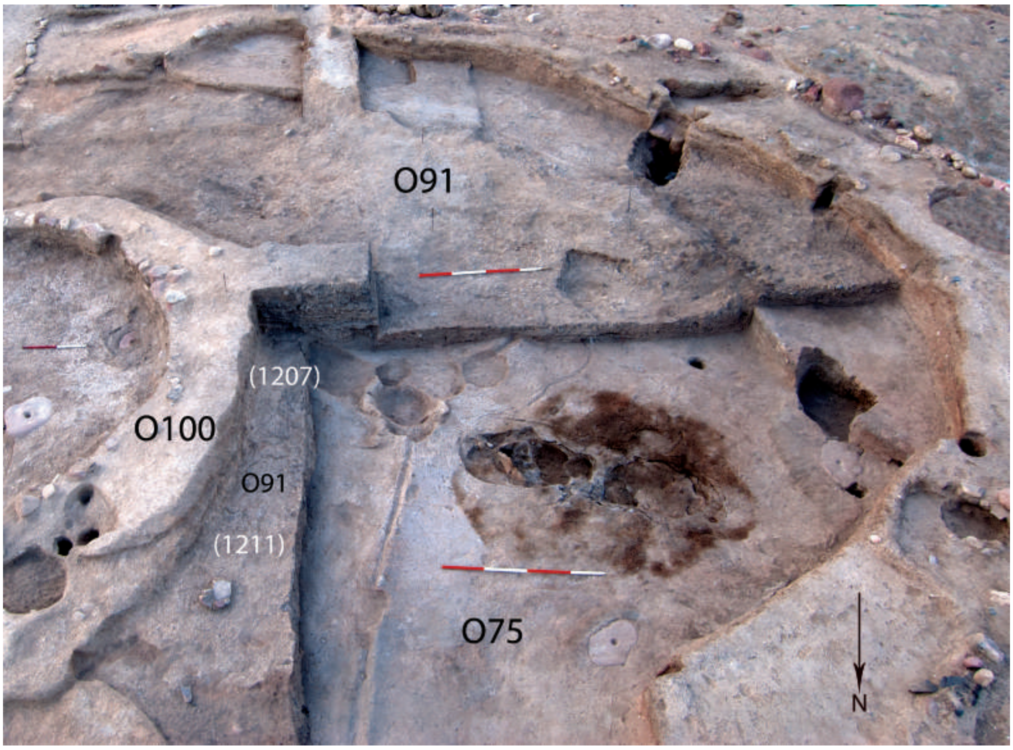

Figure 40.19 Surface O91, located to the exterior to Structure O100 and above the floor of Structure O75. Scale 2.0 m.

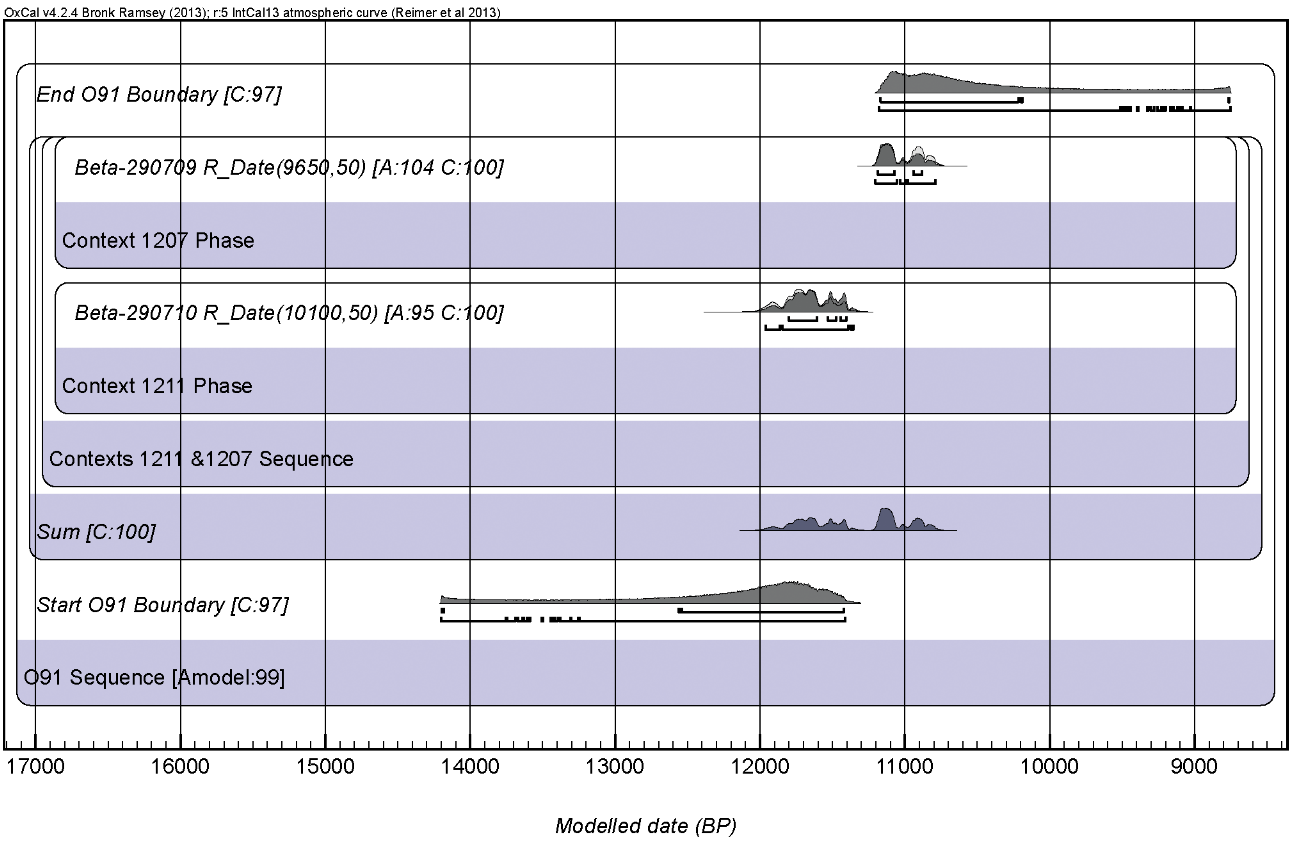

Figure 40.20 Posterior density estimates for ^{14}C dates from O91 grouped within a chronological model. Note the relative precision of the sum compared to the lengthy lead-in and tail of the boundary estimates in the 95.4% probability range.

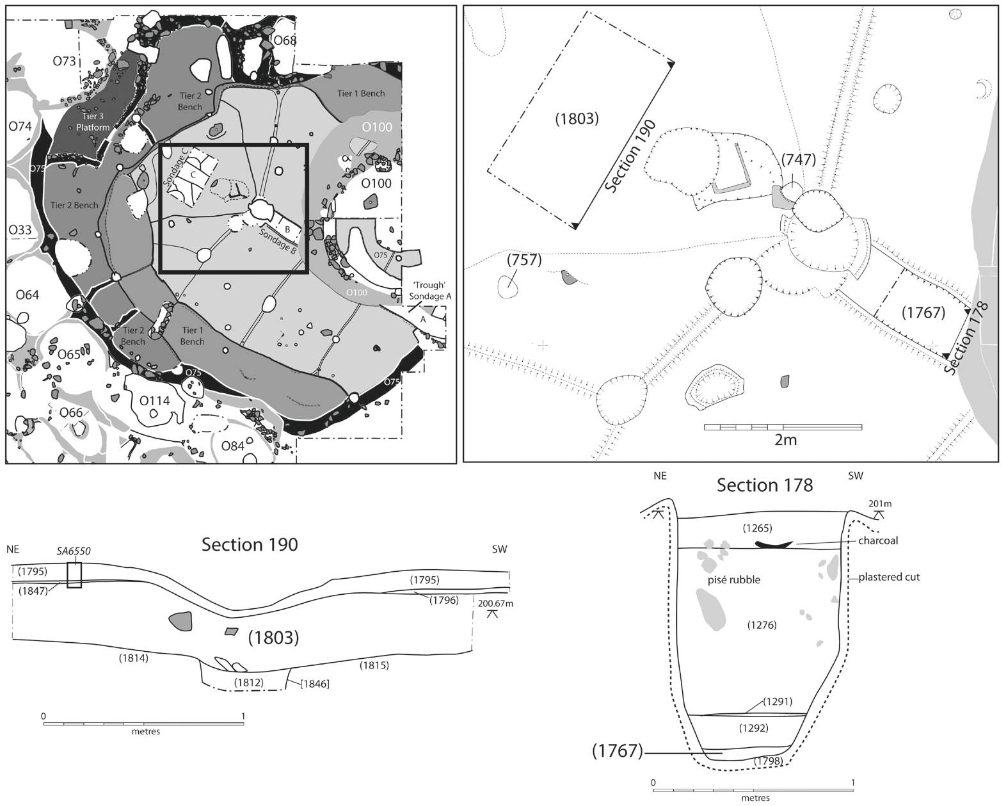

Figure 40.21 Plan of Structure O75 with the window showing the location of AMS dated contexts and the stratigraphic position of contexts (1767) and (1803) in Sections S190 and S178.

40.20). Posterior density estimates generated from the Bayesian analysis of the model for O91 (Amodel: 99.3%) are provided in Figure 40.20 and in Tables 40.1 and 40.2.

The bimodal distribution of the sum (SCPD) produced by the stratified sequence model, suggests a minimum of two pulses of activity associated with Surface O91.The dates form a coherently stratified sequence of events, although we should have more confidence in the younger date, Beta-290709, as this comes from Chenopodiaceae with a relatively lower risk of being susceptible to old wood effects, whereas the older sample, Beta-290710, is from an unidentified wood type, which was likely to have been a small branch. This latter sample provides one of the oldest dates from the site as a whole and is stratigraphically inconsistent with the dates coming from Structure O75, which are sealed below the Surface O91 deposits. Given that Beta-290710 has been identified as juvenile wood and is, therefore, unlikely to be substantially influenced by an old wood effect, it may derive from charcoal that had been reworked into a chronologically younger deposit. Although it may not date the construction of O91, it does contribute to the overall chronology of the site.

Posterior density estimates for the lower boundary, marking the start of activity associated with the use of this area, fall at *14.21–11.41 ka cal BP*, with the upper boundary suggesting this had ceased by *11.18–8.75 ka cal BP* (Table 40.2).

Structure O75 (Chapter 38)

Four charcoal samples were selected to date activity associated with the use of O75 (Table 40.21; Table 40.1). Three of these came from a stratified sequence of deposits within O75. The fill of a hearth (747) (Beta-271680) was stratigraphically the highest placed context of the three, placed within the sequence of hearths overlying both the fills of the trough, including context (1767) (Beta-290711) excavated in Sondage B, and the floor surface (1823=1795) which sealed (1803) (Beta-290712) in Sondage C. Deposit (1803) (Beta-290712) sealed the fills of the trough in Sondage C, but had no direct stratigraphic association with context (1767) (Beta-290711) in Sondage B (Chapter 38). The remaining sample came from the fill (757) of a posthole cut into the floor of O75 (Beta-271681), which had no direct stratigraphic association with any of the other dated samples in Structure O75.

Our chronological interpretation grouped the ^{14}C dates within a single phase model, comprising a stratified sequence containing a phase populated by Beta-290711 and Beta-290712 succeeded by Beta-271680, which was structured so that it overlapped with Beta-271681 (i.e. assuming an initial uniform distribution of two radiocarbon-dated events that occurred prior to a second event; all of which have an equal likelihood of occurring concurrently with a fourth radiocarbon-dated event associated with the use of O75; Figure 40.22). Posterior density estimates generated from the Bayesian analysis

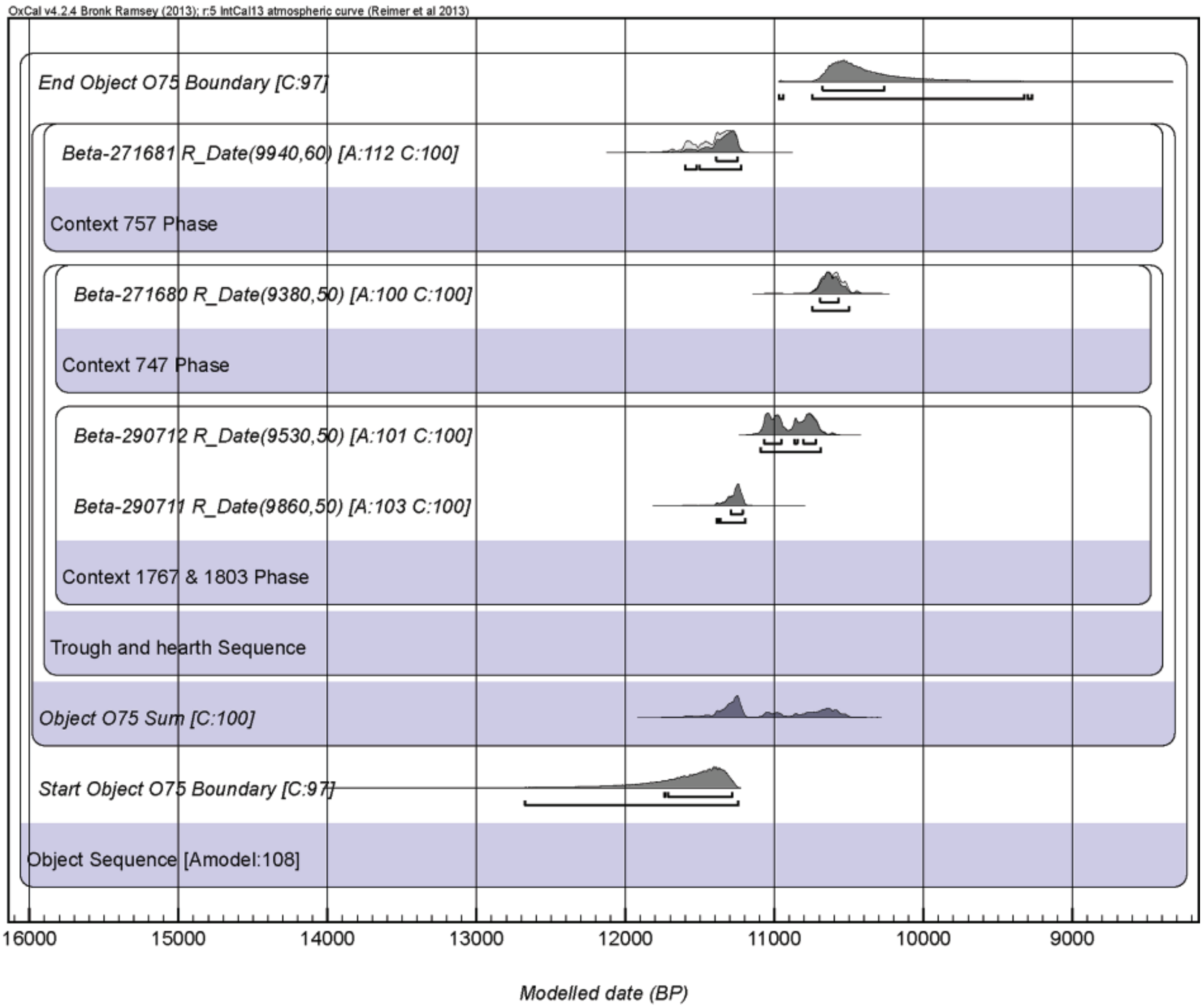

Figure 40.22 Posterior density estimates for ^{14}C dates from O75 grouped within a chronological model.

of the model for O75 (Amodel; 107.7%) are provided in Figure 40.22 and Tables 40.1 and 40.2.

The multi-modal distribution of the sum (SCPD) of the chronological model suggests a series of pulses of activity associated with the use of O75. Good agreement index values for the sequence of dates indicates that Beta-290711, Beta-290712 and Beta-271680 are coherently stratified, suggesting that — provided there are no old wood effects and sample redeposition — sediment within the trough accumulated sometime between *11.39–10.69 ka cal BP* (Table 40.2). Beta-271681 returned a date statistically consistent with Beta-290711 (χ^2-test: df=1; T=1.1; 5% critical value=3.8) producing a combined calibrated date centred on 11.28 ka cal BP. This provided the best estimate for the construction of the secondary floor and sediment accumulation within the trough of O75, especially as one of these samples (Beta-271681) came from twig wood thus reducing the risk of an old wood effect. The remaining sample, Beta-290712, was derived from the fill of the trough (1803) as exposed via the sondage. This returned a date of *11.10–10.69 ka cal BP*, indicating that the construction of O75 and the date of wood burned in the hearth dated by Beta-271680 could have been contemporaneous occurrences.

We note that the isotope ratios for Beta-271680 are enriched with respect to $\delta^{13}C$ (-11.6‰), providing similar values to those recorded for Beta-253733 used to date Structure O33. As noted above, this might be caused by the Salicaceae tree/shrub having grown in a localised area of aridity, or reflect contamination of the sample from fulvic and humic acids from the surrounding matrix.

Posterior density estimates for the lower boundary marking the start of activity associated with the use of this area fall at *12.68–11.24 ka cal BP*, with the upper boundary suggesting this had ceased by *9.27 ka cal BP* (Table 40.2). We note, however, that O75 is stratigraphically below O100, for which we have two statistically consistent dates centred on 11.20 ka cal BP with posterior density estimates for the lower and upper boundaries bracketing this construction activity at *12.55–11.13 ka cal BP* and *11.25–9.78 ka cal BP* respectively. Consequently, we are satisfied that a relatively short separation in time exists between the start of use of

Figure 40.23 East-facing section of Trench 1, WF16, September 1998, with midden layer (110) marked by a horizon of snail shells, the base of (112) indicated by a horizon of burnt angular rocks, and the basal stones used for the construction of Feature F1. Scale 2.0 m.

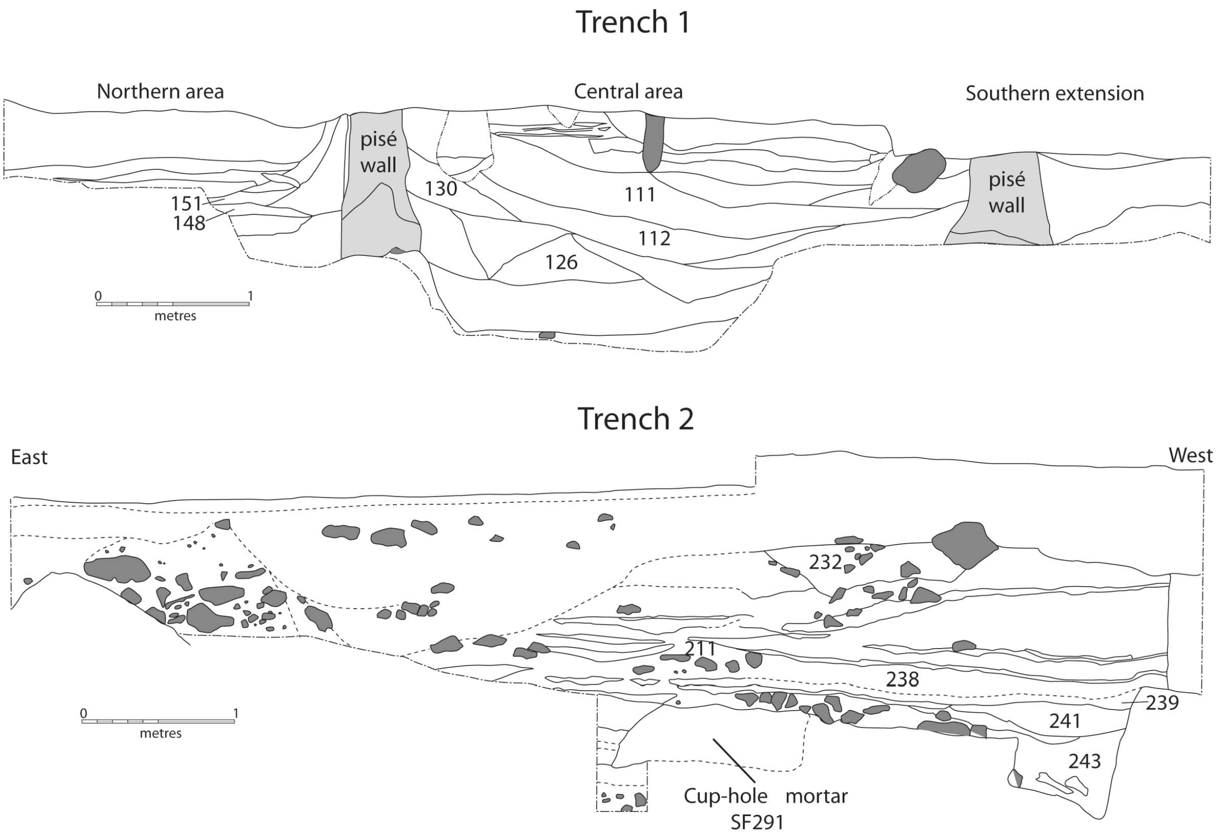

Figure 40.24 East-facing Section of Trench 1 and north-facing Section of Trench 2 showing AMS dated contexts.

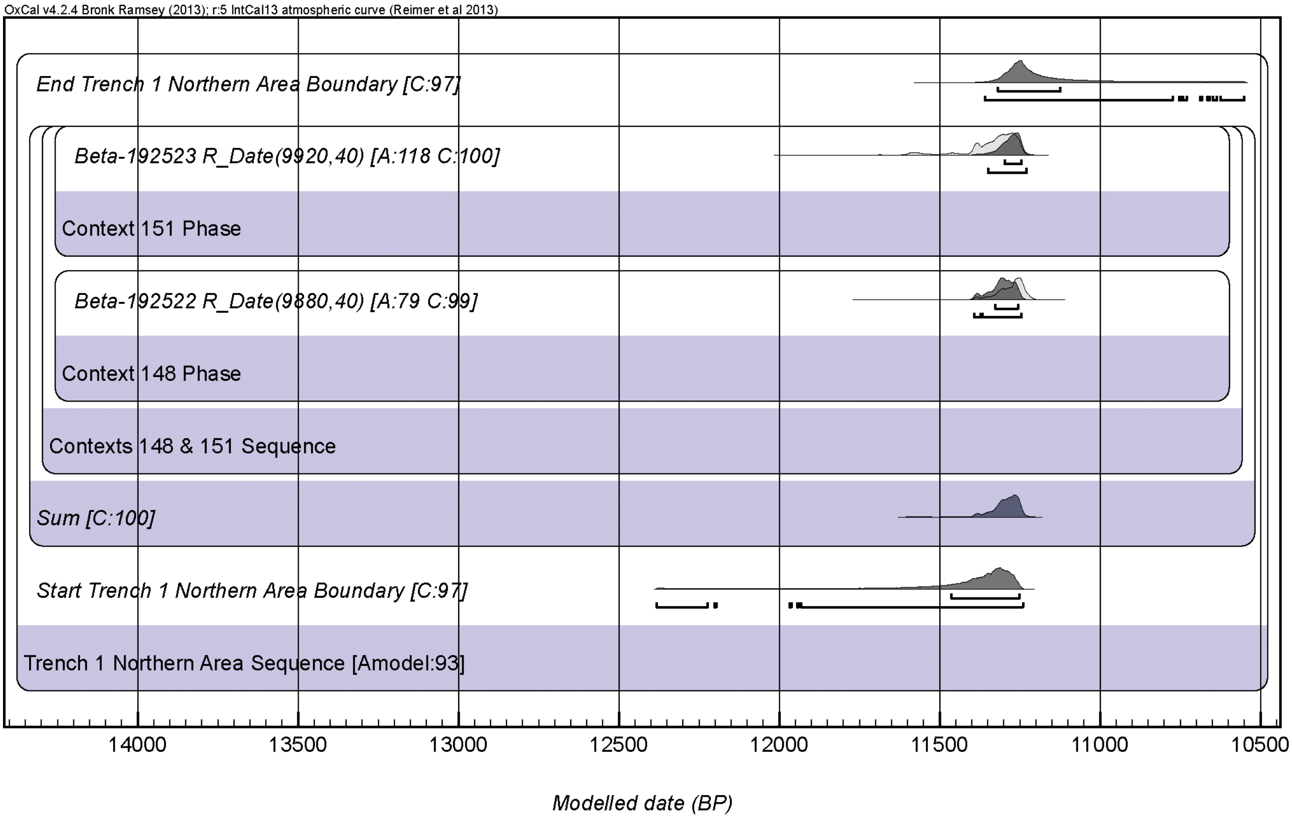

Figure 40.25 Posterior density estimates for ^{14}C dates from the northern area of Trench 1 grouped within a stratigraphic model. Note the relative precision of the sum compared to the lengthy lead-in and tail of the boundary estimates in the 95.4% probability range.

O75 with that of O100, as indicated by their stratigraphic relationship with one another.

Trench 1 (Finlayson and Mithen 2007, chapter 6)

Trench 1 was located at the southwest extent of the WF16 knoll and originally excavated in 1997 as a 2 m x 2.75 m trench to explore a ring of stones exposed on the surface, designated as Feature F1. The trench was extended in 1998 to an area of 2.5 m x 7.25 m, while in 1999 a 1 m wide box section was cut in an attempt to expose the entire depth of archaeological deposits in the west-facing section of the trench (Figure 40.23).

The archaeological sequence exposed within Trench 1 begins with a thick mud-plaster floor onto which a sub-circular pisé wall was constructed, which was bisected by the box section of the excavation (Figure 40.24). More than a metre depth of deposits had accumulated within the interior of this structure, referred to as the Central Area of Trench 1. These included (from the base) shell-rich and bone-rich midden (e.g. 126), pit fills (e.g. 130), another midden (e.g. 126), pit fills (e.g. 130), another midden (e.g. 112) and slope-wash deposits (e.g. 111), prior to the construction of Feature F1 as a circular stone structure embedded into these deposits. To the north of the pisé wall, referred to as the Northern Area of Trench 1, there was a similar sequence of deposits that was stratigraphically isolated from that in the interior of the pisé walled structure. These deposits included a mud-plaster floor (148), over which a midden (151) had accumulated.

Two samples were selected for ^{14}C dating from contexts within the Northern Area of Trench 1, from (148; Beta-192522) and (151; Beta-192523) (Table 40.1). Our chronological interpretation grouped the ^{14}C dates in a stratified sequence model, comprising Beta-192522 at its base succeeded by Beta-192523 (i.e. assuming two contiguously ordered radiocarbon-dated events associated with episodes of use of this area; Figure 40.25). Posterior density estimates generated from the Bayesian analysis of the model for the Northern Area of Trench 1 (Amodel: 92.7%) are provided in Figure 40.25 and in Tables 40.1 and 40.2.

The unimodal distribution of the sum (SCPD) produced by the stratified sequence model, suggests at least one pulse of activity associated with the use of the Northern Area in Trench 1, confirmed by the statistical consistency of the two dates contained in the model (χ^2-test: df=1; T=0.5; 5% critical value=3.8) that provided a calibrated combined value centred on 11.28 ka cal BP (Table 40.3). As such, the floor and midden appear to have been in use as part of a single event, or series of occupations occurring in close succession. Posterior density estimates for the lower and upper boundaries bracketing this activity fall at *12.39–11.24 ka cal BP* and *11.36–10.55 ka cal BP,* respectively (Table 40.2).

Five charcoal samples were selected for ^{14}C dating from contexts within the Central Area of Trench 1, from (126;

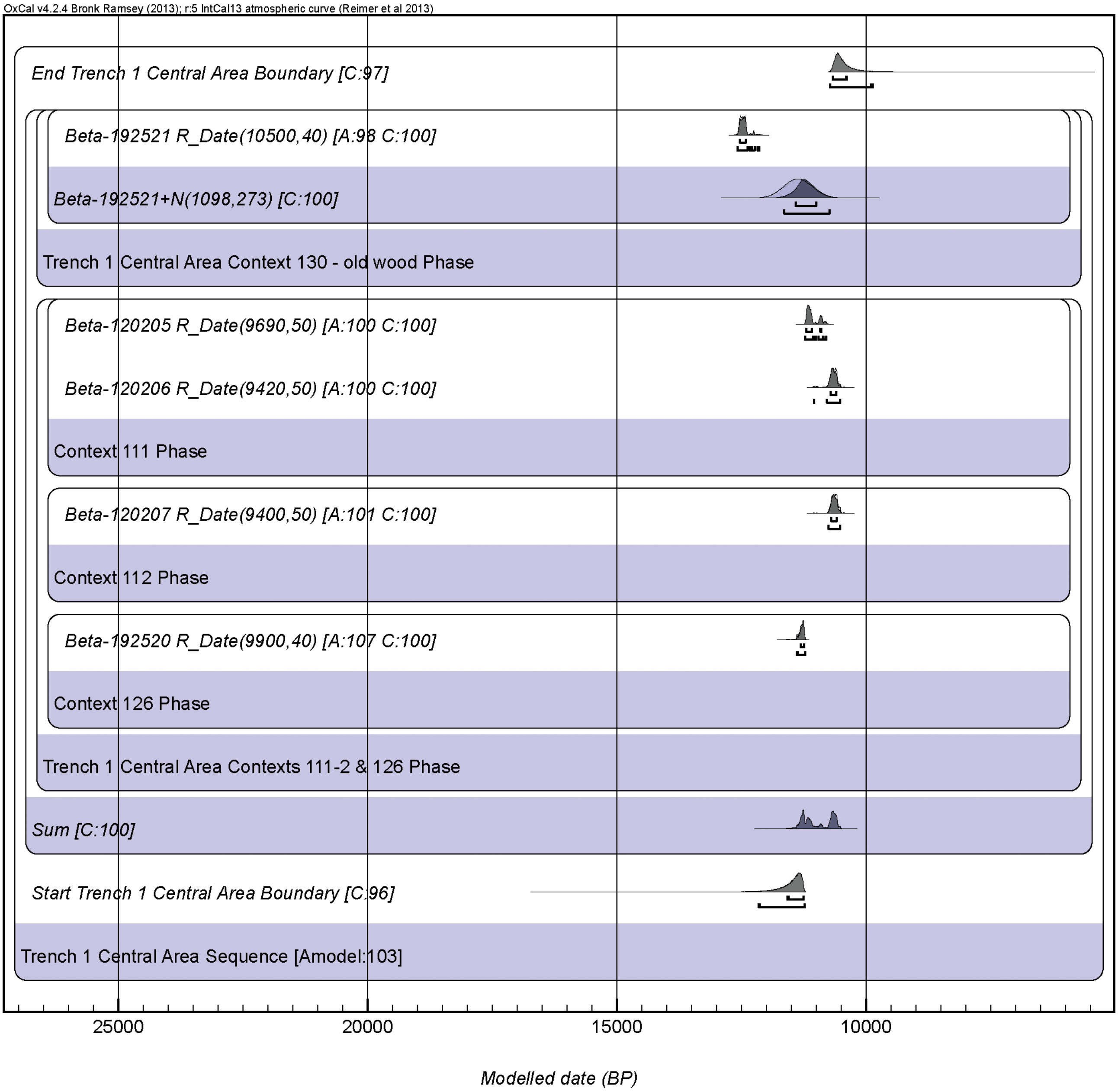

Figure 40.26 Posterior density estimates for ^{14}C dates from the central area of Trench 1 grouped within a chronological model. The model uses an offset to counter the influence of the old wood effect on the lower boundary.

Beta-192520), (130; Beta-192521), (112; Beta-120207) and (111; Beta-120205 and Beta-120206) (Table 40.1; Figures 40.23 and 40.24). An initial chronological interpretation grouped the ^{14}C dates as a stratified sequence model, comprising two contiguous phases of radiocarbon-dated events associated with the use of the Central Area, with the first phase consisting of the lowermost contexts of (126), (130) and (112), and the second phase the slope-wash deposits (111). This produced unacceptable agreement index values caused by an insufficient level of correlation between the calibrated ages for samples and their position within the stratigraphic sequence, and hence the model was rejected. An alternative model grouped the two phases within a single-phase chronological model (Figure 40.26), whilst a third stratigraphic sequence model produced acceptable agreement index values (Amodel=90.1%), with an outlier removed from the sequence to provide equally valid posterior density estimates (Figure 40.27) as those produced from the chronological model. Both of these models incorporated the old wood offset applied to Beta-192521 that was derived from a mature form of Cupressaceae. Posterior density estimates generated from the Bayesian analysis of both the chronological and stratigraphic models for the Central Area of Trench 1 are provided in Figures 40.26 and 40.27 and in Tables 40.1 and 40.2.

The multi-modal distribution of the sum (SCPD) produced by the stratigraphic sequence model, suggests a series of pulses of activity associated with the use of

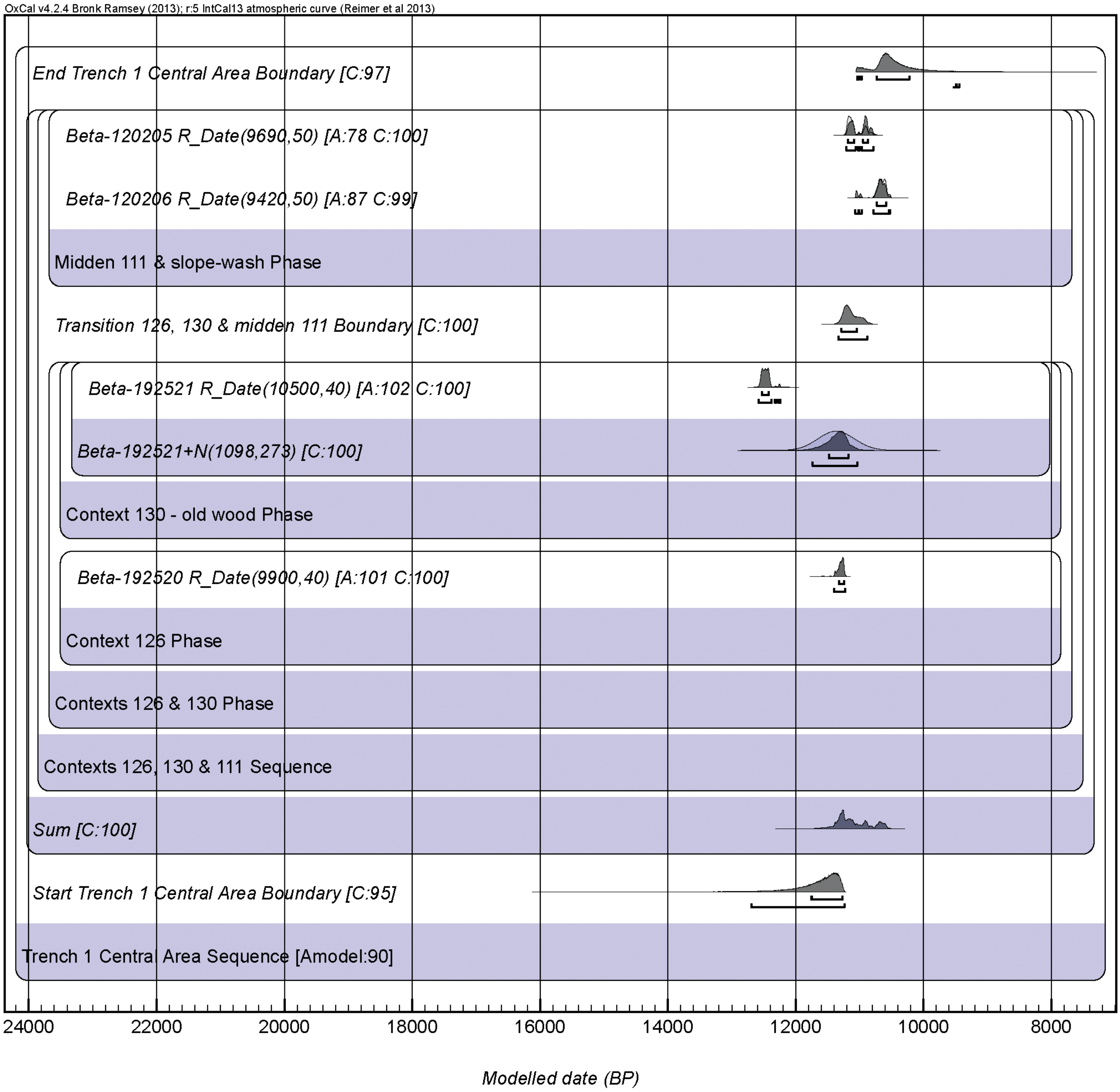

Figure 40.27 Posterior density estimates for ^{14}C dates from the central area of Trench 1 grouped within a stratigraphic model. The model uses an offset to counter the influence of the old wood effect on the lower boundary. Note that an acceptable agreement index value was reached for Beta-120205 and for the model as a whole following the removal of the outlier (Beta-120207).

the Central Area of Trench 1 (Figure 40.27). Statistically inconsistent date ranges were obtained from the middens (112) and (126), and the pit-fill (130), with posterior density estimates indicating that these activity areas were in use sometime after *12.15 ka cal BP* (chronological model) or *12.70 ka cal BP* (stratigraphic model) (Table 40.2). A degree of chronological continuity is suggested across the areas containing middens (111) and (112). Tests for statistical consistencies indicate that those deposits yielding Beta-120206 (111) and Beta-120207 (112) could derive from a close succession of separate episodes of deposition centred on *c.* 10.64 ka cal BP (χ^2-test: df=1; T=0.1; 5% critical value=3.8; Table 3), although the poor agreement value reached by Beta-120207 in an initial stratigraphic model suggests it could be intrusive in (112), having possibly been re-deposited from (111) by burrowing animals. Other difficulties are indicated by a disparity in $\delta^{13}C$ enrichment in the isotopic ratios for these two dates (-25.8‰ and -12.1‰ respectively), potentially reflecting contamination of Beta-120207, or that the (unidentified) plant from which this came had grown in an area of localised aridity.

Statistical inconsistencies in dates obtained from midden context (111) suggest that it could have remained

Figure 40.28 North-facing section through feature F8 within Trench 2, WF16, September 1998, showing burial pit (243) to the right of the picture.

in use, potentially, for at least *c.* 370 years, with activity associated across the central area estimated as having come to an end by *9.86 ka cal BP* (chronological model) or *9.44 ka cal BP* (stratigraphic model).

Trench 2 (Finlayson and Mithen 2007, chapter 6)

Trench 2 is located outside the 2008–2010 excavation area, on the northern slope of the knoll, to the immediate north of Structure O75. It was excavated between 1997 and 1999, initially to explore a ring of stones exposed on the surface of the knoll, referred to as Feature F8 (Finlayson and Mithen 2007, 175–190). The total excavated area was 7.5 m x 5.0 m, which revealed F8 as a circular stone-built structure, with further structures to its immediate east and west (Figure 40.28). An archaeological sequence was exposed that began with a wall constructed from large boulders, around a hollow within the underlying gravel (Figure 40.24). This contained a solid mud-plaster floor, within which a cup-hole mortar was embedded and through which a burial was cut with a charcoal-rich fill (243). The burial was sealed by a further horizon of mud plaster (241), prior to being cut for the deposition of more bones. Above these floors, a series of thinner mud-plaster floors, silts, and horizons of occupation debris (e.g. 210/238) accumulated, some of which may have been deliberate levelling deposits (e.g. 211), while others appear to derive from periods of abandonment (e.g. 239). A new circular wall was then constructed from uncut stone blocks and bound by mortar, the upper courses of which had been exposed on the surface of the knoll and designated as Feature F8. Thin mud-plaster floors (e.g. 232) had continued to be created within the structure and occupation debris accumulated; eventually, some of the stones from the wall slumped inwards, after which there was no further activity at this location.

Six samples of charcoal and two seeds were selected for ^{14}C dating: from (243; Beta-192527), (241; Beta-192536), (211; Beta-120211), (239; Beta-192525, Beta-208671), (210/238; Beta- 120210, Beta-208672) and (232; Beta-192524) (Table 40.1). An initial chronological interpretation grouped this succession of ^{14}C dates as a stratified sequence model, comprised of six contiguous phases of radiocarbon-dated events associated with the use of the area exposed in Trench 2. This model tested true for a null hypothesis (Amodel=0) due to chronological reversals indicated by the stratigraphic positions of Beta-120210, Beta-192524, Beta-208671 and Beta-208672, and hence was rejected. An alternative model grouped the dates within a single-phase chronological model (Figure 40.29) as the ^{14}C dataset obtained from Trench 2 lacked any clear outliers with which to attempt further refinements to the stratigraphic sequence model. Beta-192524 to Beta-192527 were also embedded within an old wood offset, coming from mature or indeterminate forms of Cupressaceae. Posterior density estimates generated from the Bayesian analysis of the models for Trench 2 are provided in Figure 40.29 and in Tables 40.1 and 40.2.

The multi-modal distribution of the sum (SCPD) produced by the chronological model suggests a series of pulses of activity associated with the use of the area in Trench 2. The earliest phase of activity relates to the use of a burial pit (243; Beta-192527) and a fragment of floor (241; Beta-192536); the model indicates that these could have occurred by *c. 11.74 ka cal BP*. Tests for statistical consistency indicate that these dates on Cupressaceae are consistent with stratigraphically

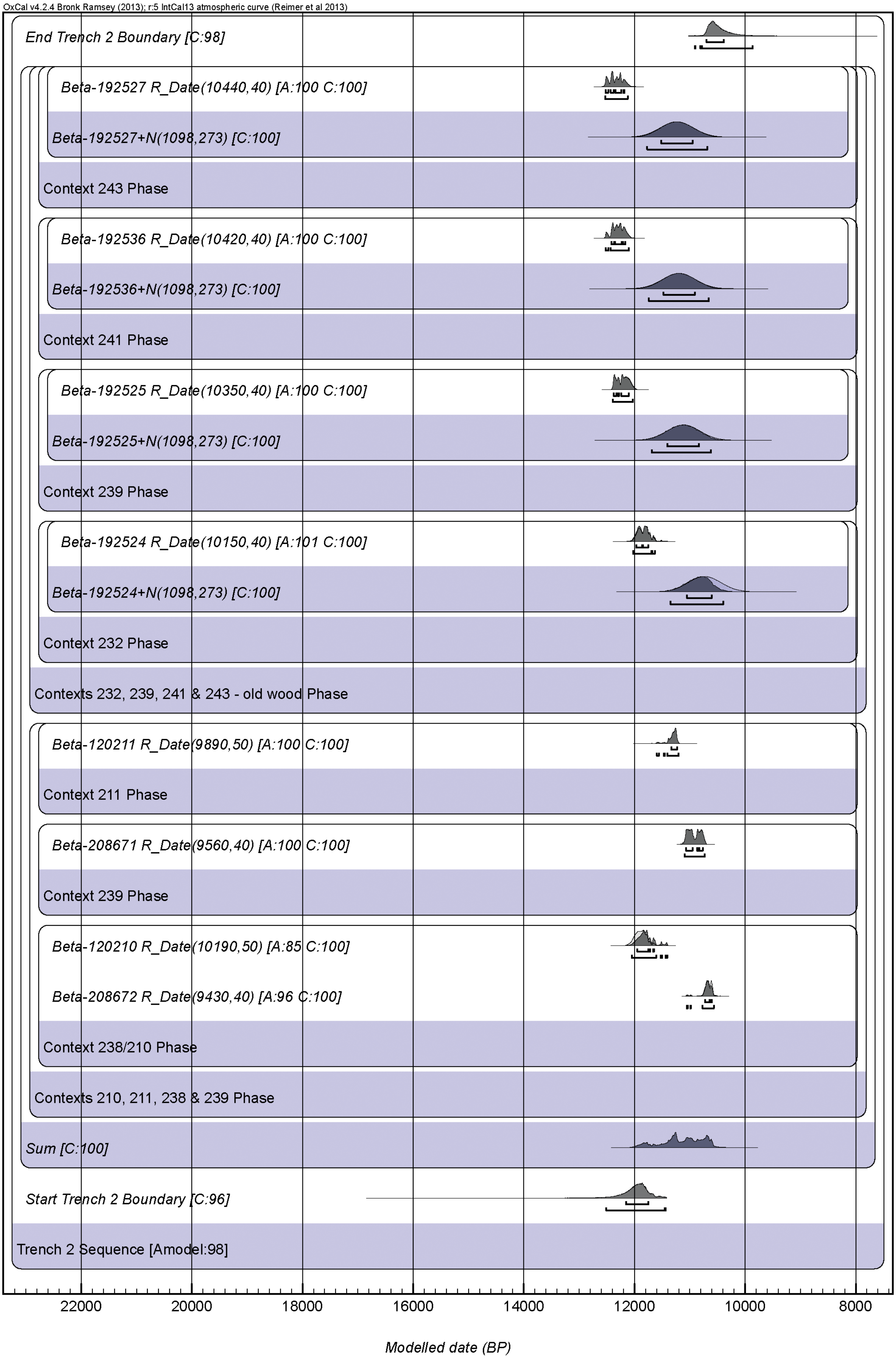

Figure 40.29 Posterior density estimates for ^{14}C dates from Trench 2 grouped within a chronological model using an offset to counter the influence of the old wood effect on the lower boundary.

later dates on Cupressaceae associated with an abandonment horizon (239), (Beta-192525; χ^2-test: df=2; T=2.8; 5% critical value=6.0; Table 40.3). An early date from (239) is significant because this level also produced a considerably younger date from a grass seed (*Hordeum*), Beta-208671. This date was similar to, although not statistically consistent with, a date obtained from another grass seed (*Bromus*) coming from within a trampled floor (238) immediately overlying (239) (Beta-208672).

We cannot discount the possibility that the seeds in (239) and (238) are intrusive and hence provide spuriously young dates for those contexts, although the contexts are deeply stratified within the trench. Contexts (239) and (238) are interpreted as a temporary period of abandonment, indicating that a viable interpretation is that the *Bromus* and *Hordeum* were growing as weeds. Overall, we are more confident that the seed dates, Beta-208671 and Beta-208672, provide a more reliable indication of the timing of occupation of the activity within Trench 2 than the dates obtained from Cupressaceae; this is likely to have occurred sometime after *c. 11.10 ka cal BP* (Table 40.2). Assuming this is correct, it is on this separation in time, between the short-lived and potentially long-lived plant remains, that we have been able to extrapolate a realistic old wood offset as discussed in the previous section.

Overall, estimates place the date of the charcoal at the base of the excavated areas within Trench 2 at *12.51–11.43 ka cal BP,* with final stages of associated activity estimated at having occurred by *10.91–9.86 ka cal BP*.

Trench 3 (Finlayson and Mithen 2007, chapter 6)

Trench 3 was located on the summit of a knoll, to the immediate east of the WF16 knoll, on which several arcs of stone walling were exposed on the surface. A 5 m x 5 m trench was excavated in 1998, which was extended by an adjoining 5 m x 5 m trench in 1999 (Figure 40.30). This knoll consisted of porphyry bedrock and provided shallow archaeological deposits with limited stratigraphy. The arcs of stone walling were shown to come from at least three adjoining structures, designated as F3992, F39911, and F3991, with F3991 the latest construction. They contained patchy, poorly preserved mud-plaster floor horizons (e.g. 310) surviving between rubble collapse, with a small area of occupation debris (330) found above this floor within one of the structures (F3992). Three pits had been cut into the degrading bedrock. One of these, F39910, was directly sealed by the occupation debris (330) and contained a human burial and a charcoal-rich fill (332). Charcoal for dating was also recovered from the fills of the other two pits (F3996 (327) and F3995 (329)). There was no stratigraphic relationship between the pits; it remained unclear whether these had been cut through the floor (310), cut prior to when that floor was laid, or were part of a single construction event — the third option is our preferred interpretation.

Six charcoal samples were selected for ^{14}C dating from Trench 3: from (329; Beta-135110), (327; Beta-192531), (310; Beta-209010), (332; Beta-135111 and Beta-192530) and (330; Beta-192529), Table 40.1. There was limited charcoal available for dating in Trench 3, and that present was of poorer quality than elsewhere at WF16. As a result, four of the six samples could not be identified to species, which constrains the analysis because of the possibility of old wood, while one other sample (Beta-192530) was from a mature Cupressaceae, which has been already been shown to return old wood effects.

Figure 40.30 Excavation of Trench 3, WF16, September 1999, looking north. F39910, which contained a human burial, is visible in the mid ground, adjacent to an arc of walling.

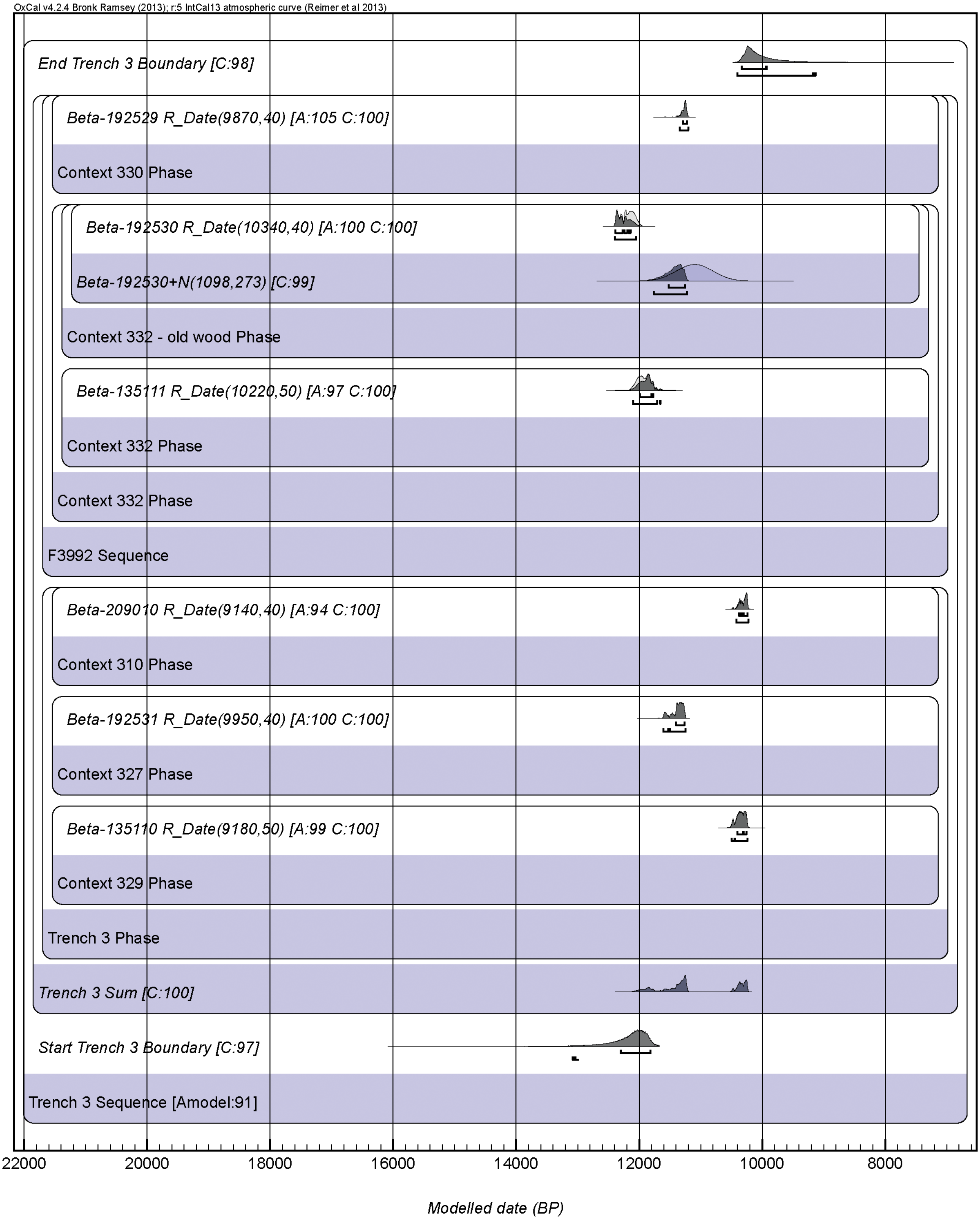

Figure 40.31 Posterior density estimates for ^{14}C dates from Trench 3 grouped within a chronological model using an offset to counter the influence of the old wood effect on the lower boundary.

Our chronological interpretation grouped the ^{14}C dates within a single-phase model comprised of one phase containing Beta-135110, Beta-192531 and Beta-209010. This overlapped with a sequence containing Beta-135111 and Beta-192530, grouped as a phase at its base, and an upper phase containing a single date (Beta-192529). This arrangement assumes that an ordered distribution of three radiocarbon-dated events were likely to have occurred concurrently alongside three uniformly distributed events associated with the use of the area in Trench 3 (Figure 40.31). This model also embedded Beta-192530 within an old wood offset, deriving from a mature form of Cupressaceae. Posterior density estimates generated from the Bayesian analysis of the model for Trench 3 are provided in Figure 40.31 and in Tables 40.1 and 40.2.

The multi-modal distribution of the sum (SCPD) produced by the chronological model suggests at least three pulses of activity could be associated with the use of the area in Trench 3. Tests for statistical consistency confirm this by indicating that activity associated with the excavated deposits falls into a minimum of four separate episodes. The first of these is centred on 11.88 ka cal BP and associated with the use of (332) in pit F39910 (Beta-135111). A second episode associated with the use of pit F39910 occurs *c.* 460 years later (Beta-192530). There then appears to be a change in activity marked by the deposition of the overlying occupation (330); this came into use by *c.* 11.26 ka cal BP (Beta-192529, *11.35–11.20 ka* cal BP). This date is statistically consistent with the estimated date for (327) from pit F3996 (Beta-192531; χ^2-test: df=1; T=2.0; 5% critical value=3.8; Table 40.3). The fourth episode of activity derives from the occupation debris (310) from within F39911 (Beta-209010) and the fill (329) of pit F3995 (Beta-135110), both of which yielded statistically consistent dates centred on 10.30 ka cal BP (χ^2-test: df=1; T=0.4; 5% critical value=3.8).

Posterior density estimates for the lower boundary marking the start of activity in this area indicate that this probably could have occurred by *13.09 ka cal BP*, with it coming to an end by *9.13 ka cal BP* (Table 40.2).

41. The sediments

Sam Allcock and Sarah Elliott

41.1 Introduction

As a contribution towards understanding the architecture and building methods at WF16, 54 of the 321 sediment samples taken during the course of the excavation were selected for analysis. All samples were given unique laboratory numbers and were analysed at the University of Reading under the supervision of Dr Sarah Elliott. Subsequent statistical analyses were carried out by Dr Samantha Allcock.

The 54 sediment samples came from five main context types (Table 41.1): pisé walls (n=25), floors (n=14), a mud-plaster pit lining (O14, n=4), roof (n=1), burnt pisé (n=4), and pisé (n=6, a fragment of structurally moulded pisé, a pisé block and three samples of pisé). Eight sediment samples were taken from off-site contexts to act as controls for the archaeological samples (see Figure 41.1; Tables 41.2 and 41.3). Because of the intense human use of Wadi Faynan through time, ranging from goat herding to mining and copper smelting, it is likely that these control samples have been influenced by post-Neolithic anthropogenic activities.

Seven types of sediment analysis were carried out on the archaeological sediment samples and eight control samples: colour; pH; organic matter; magnetic susceptibility; identification of any crystalline material; chemical composition; and particle size (Tables 41.1–41.3). Section 41.5 of this chapter describes the results of the analysis at the site level, while the results of the analysis for each individual Object can be found in Section 41.6.

41.2 Analytical methods

Context description and colour

The factors most influencing sediment colours are their source rocks, the conditions of weathering, the physical and chemical conditions at the site of deposition, and post-depositional changes (Rapp and Hill 1998). All samples were initially assigned a colour according to the Munsell colour system. This gives the sample a colour based on the hue, value and chroma (purity). Hue is the quality of colour described by the words red, green, blue, yellow and so forth; value is the quality of lightness or darkness of the colour; and chroma describes the degree of saturation (Rapp and Hill 1998). Data are reported using conventional methods as hue YR value/chroma.

Particle disaggregation and particle size distribution (PSD) by Laser Granulometry

Particle size analysis is a standard sedimentological technique used to characterise the physical properties of a soil or sediment. It provides clues to sediment provenance, transport history, and offers a means to 'fingerprint' soils and sediments for purposes of comparison (Blott *et al.* 2004). For those samples taken from consolidated sediment, such as walls and floors, a pestle and mortar was used to disaggregate the sediment particles. All samples were then passed through a 2 mm sieve in order to establish the <2 mm:>2 mm ratios.

The fraction below 2 mm was analysed for particle size distribution by Laser Granulometry (range=0.04–2000 microns). A representative 0.5 g sub-sample was added to a weak deflocculant solution (*c.* 2 ml 3.3% Calgon) in order to disperse the material (Blott *et al.* 2004), followed by physical disaggregation on a watch glass with a rubber pestle. Particle size distribution measurements for the size range 0.04 to 2000 microns were measured by Laser Granulometry using a Beckman Coulter Laser Granulometer. The GRADISTAT programme was then used for the rapid analysis of grain size statistics. Mean, mode sorting, skewness and other statistics were calculated arithmetically and geometrically (in metric units), and

Figure 41.1 Location of sediment control samples.

logarithmically (in phi units) using Folk and Ward graphical methods (Blott and Pye 2001).

X-ray diffraction (XRD)

X-ray diffraction (XRD) provides the most convenient and unambiguous method for determining mineralogical composition of the inorganic fraction of sediments (Bish 1994). XRD is a non-destructive technique that obtains elemental information by direct analysis of the specimen and allows retention of the unaltered specimen for other analyses (Amonette and Sanders 1994). Accurate X-ray diffraction intensities require that the grain size be 10 microns or smaller (Bish 1994). This was achieved by grinding each sample for ten minutes in a Tema and Fritch planetary ball mill using agate grinding elements. Each sample was then packed into the back of the mount and the crystals randomly orientated by 'riffling' the surface repeatedly, using the edge of a glass slide and removing excess material until the surface was flat. Once mounted on a plastic holder, the samples were analysed on a Siemens D5000 X-ray diffraction spectrometer. The results were then quantified by selecting the appropriate peaks for quantifying minerals, using only one peak per mineral, usually that with the smallest residual factor (the smaller the factor the better the correlation between observed data and mineral structure). The peak heights were measured above the background (mm), and these were multiplied by the appropriate factor chosen for that mineral, and then converted into frequencies for the samples.

For reporting in this volume, we have compared the relative presence of the five most frequent minerals: dolomite, quartz, calcite, chlorite and gypsum.

X-ray fluorescence (XRF)

X-ray fluorescence (XRF) was used to determine the elemental composition of samples. The samples were prepared for analysis by grinding for 10 minutes in a Tema and Fritch planetary ball mill using agate grinding elements. The ground samples were then compressed under 11–13 tonnes, with a boric acid binder, into durable powder pellets. The major elements and trace elements were then measured using a Philips PW 1480 X-ray fluorescence spectrometer with a dual anode Sc/Mo 100kV 3kW X-ray tube.

pH determination

An important characteristic of sediment samples is their base status, which refers to whether a sediment is acid (pH <6.5) or alkaline (pH >7.5) (Goldberg and Macphail 2006). For example, sediments derived from deposits that have been strongly weathered, such as fluvial sands, tend to produce acidic soils (pH 3.5–5.5), whereas soils on soft calcareous rocks, like chalk, are alkaline (pH 7.5–8.5) (Goldberg and Macphail 2006). pH determination is also important when looking at the preservation of artefacts and ecofacts in soils. For example, the loss of pollen above a pH of 6.5, macrobotanical remains above a pH of 7.5, and phytoliths above a pH of 8.5 (Goldberg and Macphail 2006). Anthropogenic processes can also alter the pH of an archaeological sediment; wood burning, for instance, raises the pH of a sediment (Rapp and Hill 1998).

To test the pH of the samples, 10 gm of the <2 mm fraction was added to 25 ml of ultra-pure water and placed on an end-over shaker set to 20–30 rpm for 15 minutes. Following calibration of the pH meter with 4.00 and 7.00 buffers, its electrode was placed in the soil suspension for 30 seconds. Calibration was checked with the buffers after every fifth sample for accuracy. All samples were run twice, with the average taken as the pH measurement.

Loss on ignition (LOI)

Low temperature sequential loss on ignition (LOI) can estimate the amount of organic matter in a sediment sample, as well as the carbonate content of the sample after further heating (Ball 1964; Dean 1974). Variation in LOI values can relate to changes in the intensity of human activity, or the degree of oxidation associated with soil formation (Goldberg and Macphail 2006). Approximately 10 g of the <2 mm fraction of each sample was placed into an oven, overnight, set to 105 degrees Celsius, to remove any moisture. On removal they were placed into a desiccator (to avoid taking on moisture) for at least 30 minutes to cool down, prior to being re-weighed. The samples were then oxidised to carbon dioxide and ash (Heiri *et al.* 2001) by placing them in a muffle furnace overnight set to 500 degrees Celsius. The samples were placed in a desiccator for a second time to cool down, prior to weighing, and the LOI calculated using the following equation:

$$LOI500=((DW105–DW500)/DW105)*100$$

Where: LOI500 represents LOI at 500 degrees Celsius (as a percentage);

DW105 represents the dry weight of the sample before combustion (in grams);

DW500 represents the dry weight of the sample after heating to 500 degrees Celsius (in grams).

The weight loss should then be proportional to the organic content in the sample (expressed as a percentage) (Heiri *et al.* 2001). As with the pH determination, all samples were run twice and the average taken to determine LOI values.

Magnetic susceptibility (Mag Sus)

Magnetic susceptibility is a measure of how prone a sample is to becoming magnetised (Dearing 1994), which reflects the amount of magnetic minerals that are present. Magnetic minerals can be produced, modified, transported and deposited by a range of environmental and anthropogenic processes (Thompson and Oldfield 1986). Low field susceptibility provides information about the total concentration of ferrimagnetic minerals, or the total concentration of paramagnetic and canted antiferromagnetic minerals, if the ferrimagnetic minerals are present in low concentrations (Dearing 1999). High field susceptibility gives information about the paramagnetic and canted antiferromagnetic mineral component (Dearing 1999).

The value of mass specific magnetic susceptibility is roughly proportional to the concentration of ferrimagnetic minerals within the sample, although in materials with little or no ferrimagnetic component and a relatively large anti-ferromagnetic component, the latter may dominate the signal. Measurements of low frequency mass-specific magnetic susceptibility are the most common measurement carried out in archaeology (Goldberg and Macphail 2006).

Mineral magnetic measurements were carried out using the Bartington MS2 susceptibility meter. The samples were packed into cylindrical plastic pots with a diameter and height of 25 mm and weighed. Two measurements were taken using the Bartington susceptibility meter, low field susceptibility and high field susceptibility. The instrument was zeroed before any measurements were taken. A background reading was taken before and after the readings, and two readings were taken per sample for both low and high field susceptibility. If the drift between background measurements was more than 2.0, the measurement for that sample was repeated. The sample reading was corrected for drift by subtracting the mean of the two background (air) measurements.

Single sample susceptibility is expressed on a basis of dry mass (Dearing 1999). The corrected k value is divided by the bulk density of the sample and then multiplied by ten, and presented here with units of 10–6 m3 kg-1. Measurements made at two frequencies can be further evaluated to detect the presence of ultrafine superparamagnetic ferrimagnetic minerals occurring as crystals produced by bacteria, or by chemical processes, mainly in soil (Dearing 1999). The frequency dependency is expressed as a percentage of the original low frequency (LF) value (Dearing 1999):

Percentage frequency susceptibility calculation:

$$\{(klf\text{-}Khf)/Klf\} \text{ x } 100$$

41.3 Numerical and statistical methods

Particle size and X-ray diffraction data

The sedimentological results partially consist of compositional data (sand, silt, and clay compositions and XRD data) in which data consists of vectors whose components are expressed as a proportion of, or percentage of, a whole. Compositional data have unique properties like constant-sum constraints, which need to be taken into account when statistically analysing data. Because conventional statistical procedures such as pairwise correlations and principal components analysis cannot be conducted using non-independent data points, it was necessary to first transform the constrained data. An appropriate method, established by Aitchison (1986) to deal with compositional data is to transform values using the centred log ratio transformation (clr). A clr transformation was conducted on the particle size and XRD data sets using a free downloadable application called CoDaPack v2 (Comas-Cufí and Thió-Henestrosa 2011). The transformed data were subsequently used in all further numerical work.

X-ray fluorescence data

The X-ray fluorescence (XRF) results were obtained in two different formats. The major oxides were expressed as percentages (%) whilst the minor elements were expressed in parts per million (ppm). To avoid comparing XRF samples with different units of measurement, the major oxide values were converted from % to ppm. To convert oxides to elements it was first necessary to establish the atomic weights of the individual elements within each oxide. Once the atomic weights for each element were noted, these values were then used to work out the weight of the component through the addition of the atomic values. A weight % of each individual element was calculated using the element's atomic weight, dividing this figure by the compound weight and multiplying by 100. A correction factor, which is the weight % divided by 100, was finally used to work out the ppm value by multiplying the correction factor number by 10000. The converted ppm values were added to the ppm values from the minor elements to create an XRF dataset that consisted of data expressed only in ppm.

The XRF data were then converted using a log10 transformation before any later analysis. A log10 transformation is a commonly used data transformation when working with geochemical data (McQueen 2009; Reimann *et al.* 2008). It was appropriate to do a log-transformation because geochemical data are not normally distributed, and to apply parametric statistics like a principal components analysis, a normal data distribution is needed. Log10 conversions result in a slightly negatively skewed data set and thus the transformed data only approximate normal, but they are much closer to a normal distribution than the arithmetic data (Govett 1983). The log-transformation can be valuable not only because it helps data meet the assumptions of most inferential statistics, but also because it can sometimes make patterns in data more visible by reducing very high values and spreading out smaller data values.

Descriptive statistics

To help describe and summarise some of the sedimentological data, descriptive statistics were used. The number of samples, the minimum value, the maximum value, the mean value and the standard deviation are presented in table format for five selected variables (pH, LOI, frequency dependent magnetic susceptibility, <2% and >2% particle size). These variables warranted additional numerical investigation because they possibly represented a large part of the differences between samples, and it was easier to see these patterns in the variables through exploratory statistical analysis. To find the mean, standard deviation, and minimum and maximum values, the variables were analysed in Microsoft Excel using appropriate Excel formulas and the data pasted into Excel tables. The data are presented by Object number and category type, to highlight distinctions between different structures and contexts (Table 41.1).

Correlation analysis

Correlation analysis was used to assess how the sedimentological variables co-varied and to establish if there were significant relationships between any two variables. Multivariate data, especially with different units of measurement, can be highly variable, which becomes a problem if two or more datasets are to be compared. Before any correlations could be conducted, it was, therefore, desirable to convert the adjusted variable values to some standard scale so that each variable could be compared alongside one another. Variables were transformed by a process known as standardisation (Kendall and Buckland 1976). Data were standardised by their z-scores, which eliminates the unit of measurement by transforming the original data into new scores, with a mean of 0 and a standard deviation of 1. As the data had been reduced to a near-normal distribution and normalised, a Pearson's Product Correlation Coefficient could be used as a measure of the degree of correlation (Clarke and Cooke 1998). Correlation analyses were carried out in PAST, a statistical software package with user selectable functions (Hammer *et al.* 2001). The strength of the correlation was measured using the r-value. Very strong positive and very strong negative relationships between variables will have an r-value between 1 or -1 and 8 or -8. Relationships which are only strong will have r-values between 0.79 or -0.79 and 0.6 or -0.6 respectively. A p-value of below 0.05 was seen as significant and therefore only values with strong relationships and suitable significance levels are published. Correlation results are presented here in table format for individual objects; only the results from objects with three or more samples have been shown.

Principal components analysis

Principal components analysis (PCA) is an indirect ordination technique used to reduce a number of variables into a smaller number of significant indices, that are linear combinations of the original variables (Manly 2004) — each linear combination will correspond to a principal component. It is largely a data reduction technique that groups variables, usually based upon some underlying structure in the data, and it is capable of discerning patterns in large environmental datasets. This technique has been used to understand variability in the sedimentological data set, which is too difficult to do through correlations analysis alone, especially considering there are many variable predictors compared to the number of samples. PCA analysis was performed in PAST (Hammer *et al.* 2001) on corrected values using a correlation matrix. Results are displayed as scatter plots with the 'sample' scores as coloured dots and the dominant 'species' scores as black text. There are scatter plots for the dataset as a whole, and scatter plots for individual objects where there are three or more samples and two or more category types. Only the first two PCA axes are displayed, but up to four PCA axes were retained because of their importance as assessed by the broken stick method (Frontier 1976; Legendre and Legendre 1998).

41.4 Visualisation of data

To aid the interpretation of the particle size data, the sand, silt and clay percentages (not clr transformed) were plotted on triangular (ternary) diagrams. In ternary plots, the proportions of three variables must sum to a constant, in this case 100%. Triangular diagrams, for both the whole dataset and individual Objects which warranted further investigation, were used to look at relationships between this tri-variate data for different category types. Standard software is unable to plot these parameters on three axes, so a free downloadable programme implemented through Microsoft Excel called 'Tri-plot' (Graham and Midgley 2000) was used for the preparation of all triangular diagrams.

41.5 Results

Control samples

The control samples (Tables 41.2, 41.3) have: the highest average pH value of all samples analysed; lower Loss On Ignition (LOI) values; mainly negative frequency dependent magnetic susceptibility readings. The off-site samples do not have a distinctive particle size signature but, like many of the archaeological samples, have a silty sandy fabric. There is, however, a significant degree of variation. For instance, control sample SA3639 from the wadi floor has much higher amounts of clay (31.9%) compared to the yellow terrace sample SA3637, which predominantly consists of sand (84.4%). The most distinctive feature of the off-site control samples is the absence of any gypsum, which is frequently found in the archaeological samples. This suggests that gypsum may have been deliberately introduced to the WF16 site from a non-local sediment source. One possible use of gypsum was in creating the wrappings around bundles of bones, as in Burial O39 (Chapter 21). The sediment analyses also suggest that another on-site use of gypsum could have been for coating wall surfaces, such as within Object O53 (Chapter 15).

Archaeological samples

The results of the Munsell colour investigations showed some variation between samples, but no significant patterns. The most common colours were yellowish-brown (n=13), brown (n=10), light yellowish-brown (n-9) and pale brown (n=8). Table 41.1 presents a range of descriptive statistics for categories analysed within each object. This table shows the results for the pH, LOI, magnetic susceptibility, and <2 mm:>2 mm ratio investigations. The results from x-ray diffraction, x-ray fluorescence and particle size distribution analyses showed some interesting patterns, which warranted further investigation beyond basic descriptive statistics and are discussed with the principal components results.

The averages presented for pH indicate that there is little variability within the archaeological samples: all the samples are alkaline. On average, the pH is between 7.8 and 8.5 for the archaeological samples, and 8.7 for the control samples. Generally, LOI values were low for all samples (4.6% average for archaeological samples) and varied only slightly between category types. The low LOI values suggest that samples are mostly minerogenic and have a low organic content. Magnetic susceptibility values vary more, with values ranging between -4.8 and 5.6%. These values are typical of sediments from arid regions. Some contexts revealed diamagnetic (negative) magnetic readings in contrast to the more common positive readings because of the presence of substances like calcite and quartz. There is also a large variation in the above 2 mm and below 2 mm values. On average, control samples are relatively fine grained (77.6% <2 mm average) as are the archaeological samples (71.8% < 2mm average); but there is a large range in the archaeological data from 56.8% to 92% for the below 2 mm fraction.

The results of the particle size analysis have been combined in Figure 41.2. The combined particle size ternary plot for all archaeological samples and controls indicates a clear variation in particle size distribution between the assigned categories. The control samples have a wide distribution across the graph because these samples are dissimilar with regards to grain size. Controls with coarser sediments, usually those originating from the elevated areas and agricultural terraces, plot to the left of the graph, whilst samples with typically finer matrixes, like those originating from the wadi floor, plot to the right of the graph. Due to the differences in particle size distributions for control samples, comparisons between the individual control samples and the archaeological samples could help indicate where the on-site sediments, such as floor sediments, may have been sourced.

Generally, the coarser grained material is found in the wall samples and some burnt deposits (Figure 41.2). Finer particle sizes appear to be associated with the plaster lining, floor, structural pisé and other categories. Roof samples have a particle size distribution that sit in between, even though they are mainly silt-dominated. Wall samples are the most varied with regards to particle size, with samples

Table 41.1. Descriptive statistics for selected variables by object and category. Minimum, maximum, mean and standard deviation values are shown for grouped data. N/A highlights where there is only one sample available in a group and consequently information cannot be provided.

			pH				LOI (%)				Frequency dependant magnetic susceptibility (%)				% <2mm				% >2mm			
Object number	**Assigned category**	**n**	**Min**	**Max**	**Mean**	**Stdev**	**Min**	**Max**	**Mean**	**Stdev**	**Min**	**Max**	**Mean**	**Stdev**	**Min**	**Max**	**Mean**	**Stdev**	**Min**	**Max**	**Mean**	**Stdev**
O11	floor	8	8.0	8.4	8.2	0.1	3.4	6.8	5.3	1.2	1.8	5.0	3.7	1.1	49.7	81.4	70.1	9.6	18.6	50.3	29.9	9.6
O11	wall	1	8.3	8.3	8.3	N/A	3.4	3.4	3.4	N/A	4.1	4.1	4.1	N/A	75.1	75.1	75.1	N/A	24.9	24.9	24.9	N/A
O12	wall	2	8.0	8.0	8.0	0.0	5.0	5.0	5.0	0.0	3.0	4.4	3.7	1.0	72.0	75.5	73.7	2.5	24.5	28.0	26.3	2.5
O14	plaster lining	4	8.2	8.4	8.3	0.1	4.4	5.5	4.7	0.5	1.4	3.0	2.4	0.9	82.1	95.8	86.9	6.2	4.2	17.9	13.1	6.2
33	other	1	8.5	8.5	8.5	N/A	4.1	4.1	4.1	N/A	4.1	4.1	4.1	N/A	75.0	75.0	75.0	N/A	25.0	25.0	25.0	N/A
33	wall	2	8.1	8.4	8.2	0.2	4.3	4.7	4.5	0.3	5.5	5.7	5.6	0.2	69.0	87.2	78.1	12.9	12.8	31.0	21.9	12.9
45	burnt	3	8.1	8.2	8.2	0.0	4.5	6.0	5.2	0.7	2.7	7.0	5.2	2.3	55.2	70.0	63.7	7.6	30.0	44.8	36.3	7.6
45	floor	1	8.2	8.2	8.2	N/A	4.2	4.2	4.2	N/A	3.7	3.7	3.7	N/A	68.2	68.2	68.2	N/A	31.8	31.8	31.8	N/A
45	roof	1	8.1	8.1	8.1	N/A	5.6	5.6	5.6	N/A	5.6	5.6	5.6	N/A	69.9	69.9	69.9	N/A	30.1	30.1	30.1	N/A
45	structural pisé	1	8.2	8.2	8.2	N/A	5.2	5.2	5.2	N/A	2.2	2.2	2.2	N/A	77.5	77.5	77.5	N/A	22.5	22.5	22.5	N/A
45	wall	9	8.0	8.3	8.2	0.1	3.7	5.5	4.5	0.6	-2.1	5.1	1.2	2.3	38.7	71.3	57.8	11.4	28.7	61.3	42.2	11.4
53	burnt	1	8.1	8.1	8.1	N/A	5.9	5.9	5.9	N/A	0.1	0.1	0.1	N/A	57.9	57.9	57.9	N/A	42.1	42.1	42.1	N/A
53	other	1	8.2	8.2	8.2	N/A	5.8	5.8	5.8	N/A	-0.5	-0.5	-0.5	N/A	64.8	64.8	64.8	N/A	35.2	35.2	35.2	N/A
53	wall	4	8.1	8.3	8.2	0.1	4.4	5.9	4.9	0.7	1.5	2.8	2.1	0.6	58.5	66.9	64.5	4.1	33.1	41.5	35.5	4.1
56	other	1	8.4	8.4	8.4	N/A	3.9	3.9	3.9	N/A	-2.4	-2.4	-2.4	N/A	74.0	74.0	74.0	N/A	26.0	26.0	26.0	N/A
64	floor	2	8.0	8.1	8.1	0.1	5.4	5.8	5.6	0.3	1.5	2.2	1.8	0.5	71.6	74.0	72.8	1.7	26.0	28.4	27.2	1.7
72	other	1	7.8	7.8	7.8	N/A	6.4	6.4	6.4	N/A	2.5	2.5	2.5	N/A	70.1	70.1	70.1	N/A	29.9	29.9	29.9	N/A
72	wall	2	8.1	8.1	8.1	0.0	4.6	4.7	4.6	0.1	1.5	4.3	2.9	2.0	52.7	75.1	63.9	15.9	24.9	47.3	36.1	15.9
75	floor	3	8.1	8.8	8.4	0.4	4.2	5.8	4.9	0.8	2.6	4.2	3.4	0.8	85.5	92.1	87.7	3.8	7.9	14.5	12.3	3.8
75	wall	4	8.1	8.2	8.2	0.1	5.1	6.9	6.0	0.9	2.2	5.9	3.8	1.6	73.3	86.4	78.3	5.8	13.6	26.7	21.7	5.8
85	wall	1	8.1	8.1	8.1	N/A	4.4	4.4	4.4	N/A	1.9	1.9	1.9	N/A	56.8	56.8	56.8	N/A	43.2	43.2	43.2	N/A
91	other	1	8.3	8.3	8.3	N/A	4.9	4.9	4.9	N/A	-4.8	-4.8	-4.8	N/A	92.0	92.0	92	N/A	8.0	8.0	8.0	N/A
Controls	control	8	8.3	8.9	8.7	0.2	0.6	6.7	2.5	1.9	-7.3	0.3	-4.1	3.6	50.5	100.0	77.6	19.6	0.0	49.5	22.4	19.6

Table 41.2 Sediment analysis results for control samples (not including X-ray fluorescence results).

Controls																	
				Magnetic Susceptibility (LF & HF = 10–6 $m^3 kg^{-1}$)			XRD: selected major minerals (%)					Summary of particle size analysis					
Sample no., category and description	**Munsel colour**	**pH**	**LOI (%)**	**Mass spec (LF)**	**Mass spec (HF)**	**Frequency dependant mag sus (%)**	**Chlorite**	**Quartz**	**Calcite**	**Dolomite**	**Gypsum**	**% <2mm**	**% >2mm**	**% Clay**	**% Silt**	**% Sand**
SA3636 gravel terrace	very pale brown	8.6	2.0	0.6	0.6	0.3	6.0	68.0	18.0	3.0	0.0	88.0	12.0	9.9	38.6	51.5
SA3637 yellow terrace	very pale brown	8.9	0.8	0.2	0.3	-6.0	1.0	74.0	21.0	3.0	0.0	91.8	8.2	5.2	10.5	84.4
SA3638 wadi floor	very pale brown	8.4	2.5	0.3	0.3	-7.1	4.0	42.0	46.0	4.0	0.0	100.0	0.0	14.8	46.5	38.8
SA3639 wadi floor	very pale brown	8.3	6.7	0.3	0.3	-6.7	3.0	20.0	68.0	8.0	0.0	100.0	0.0	31.9	53.8	14.3
SA3640 'pisé mountain'	very pale brown	8.8	0.6	0.3	0.4	-6.4	1.0	75.0	23.0	0.0	0.0	67.9	32.1	3.5	8.5	88
SA3650 by Bedouin tent	light yellowish brown	8.9	2.4	2.4	2.4	0.1	22.0	6.0	32.0	4.0	0.0	65.4	34.6	7.3	26.9	65.7
SA3651 1st ridge	pale brown	8.8	2.7	1.5	1.5	-0.1	11.0	26.0	28.0	1.0	0.0	57.4	42.6	13.6	31.7	54.7
SA3652 2nd ridge	brown	8.5	2.7	0.4	0.4	-7.3	16.0	15.0	53.0	1.0	0.0	50.5	49.5	17.1	47.1	35.9

Table 41.3 X-ray fluorescence results for control samples.

Controls																					
	XRF major elements (oxides converted to elements) (ppm)										XRF minor elements (ppm)										
Sample no, category and description	**Na**	**Mg**	**Al**	**S**	**P**	**K**	**Ca**	**Ti**	**Mn**	**Fe**	**V**	**Cr**	**Co**	**Ni**	**Cu**	**Zn**	**Pb**	**Rb**	**Sr**	**Y**	**Zr**
SA3636 gravel terrace	2374	17910	38529	91677	3535	9049	142009	4375	774	29865	92	96	14	44	49	81	20	34	375	27	285
SA3637 yellow terrace	0	7297	8521	102692	6677	1826	167381	1438	155	9162	44	43	6	18	17	42	11	6	280	13	211
SA3638 wadi floor	742	14473	23022	59339	6590	5645	284018	2817	465	19584	85	94	9	42	33	92	20	21	604	23	142
SA3639 wadi floor	0	11518	35460	43723	6721	6724	309318	3117	465	26858	132	172	9	77	47	151	24	29	789	27	117
SA3640 'pisé mountain'	371	5367	10109	109895	3186	2656	139865	1199	310	10002	32	29	6	6	17	30	15	8	153	10	189
SA3650 by Bedouin tent	9125	36906	60546	81318	5630	13448	107275	8810	1007	66515	208	125	28	53	39	129	17	46	452	38	425
SA3651 1st ridge	10683	39258	69596	72570	4233	12120	108562	9350	1084	80224	229	117	36	52	52	135	17	46	472	32	275
SA3652 2nd ridge	7122	26956	57265	60732	2182	11124	188821	8211	1317	65186	205	105	33	42	24	107	21	43	367	25	221

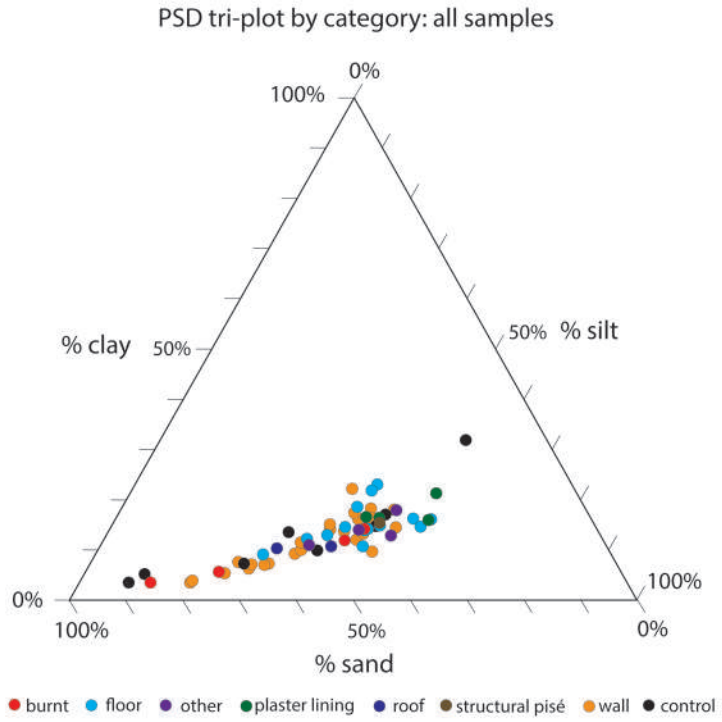

Figure 41.2 Tri-plot showing the tri-variate data of sand, silt and clay % for all objects. The different coloured dots correspond to the different categories the data has been separated into — see legend for category colours.

plotting with both moderate and high levels of sand. Floor samples are similarly widely distributed between the sand and silt fractions, but predominately, have higher proportions of silt particles. It is unsurprising that the plaster lining samples consistently indicate finer grain sizes as they all originate from the same context. The clear grouping of contexts with regards to particle size shows that there are slight anthropogenic selection pressures relating to material source and construction. Clearly, coarser materials were preferred for the construction of walls and finer materials were preferential over sandier sediments for use as pisé linings and floors. It is possible that the finer material used on-site originated from the wadi floor, and the sandier material originated from the surrounding terraces, as both provide suitable sediment sources within very short distances of WF16.

Principal component analysis

The results of the principal components analysis (PCA) are shown in three graphs highlighting differences by category and object (Figures 41.3, 41.4 and 41.5). This suggests that the three main drivers of variation between the sediment samples are mineralogy, geochemistry and particle size. The influence of particle size has already been summarised above. Annotated on these PCA graphs are some of the key sedimentary drivers for each principal component. Whilst four principal components were seen as significant based on the broken stick method (Frontier 1976; Legendre and Legendre 1998), only two principal components are shown because these represent over half of the variance in the data, whilst the other axes only show a smaller percentage of the variances. PCA axis 1, plotted here as principal component 1 (PC1), is driven by a suite of typically minerogenic elements at the positive end, notably aluminium (Al) and magnesium (Mg). At the negative end, PC1 is driven by samples higher in quartz and sulphur (S) and is likely heavily influenced by the higher proportions of quartz and calcite in the control samples. At the positive end of PC2 are the clay and silt variables, dolomite and calcite; while at the negative end of PC2 there is sand, sodium (Na) and gypsum. The principal components axes, whilst showing how the data group based on the variable values, can also reveal underlying variables that influence similarities in the data. For this dataset there is no apparent underlying variable for PC1, but the contrast between high and low quartz, and the presence of typically detrital material is important. PC2, however, has a very clear underlying variable, which is particle size and mineralogy; both are key drivers of the differences between categories and objects.

As illustrated by the PCA results (Figures 41.4 and 41.5), there is a clear difference between the controls (in black) and the archaeological samples (in colours). The data plotted by category type (Figure 41.4), compared to data plotted by Object (Figure 41.5), show that plotting by category alone results in more distinct clusters of samples from the same group. There are clear category groupings like those seen in the particle size results, but there are

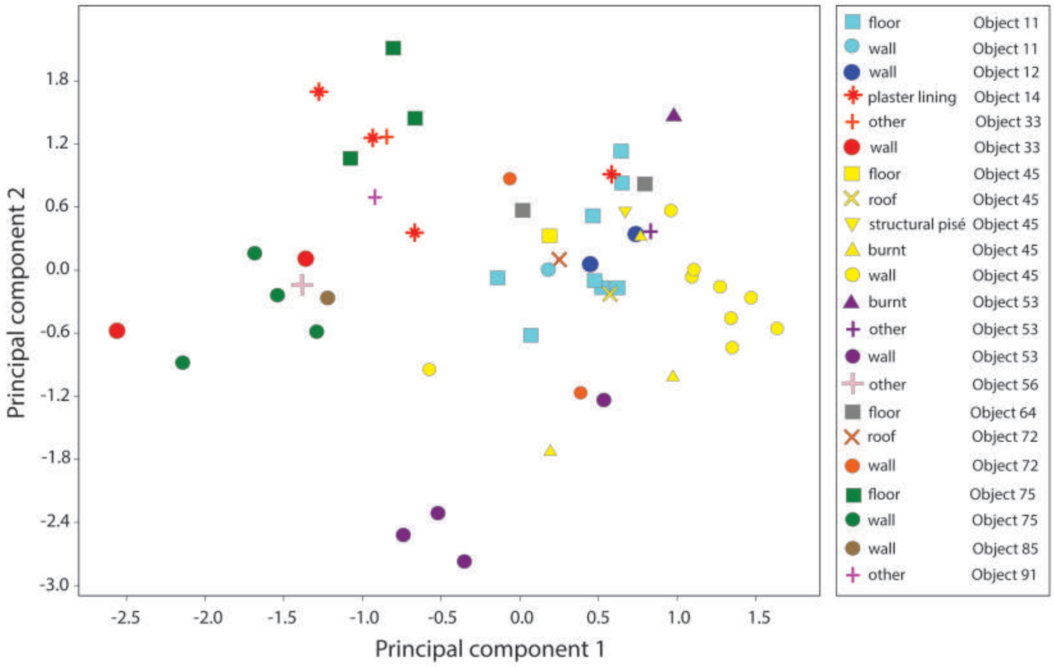

Figure 41.3 Scatter plot showing the principal component analysis results for the first two principal component axes, for all objects and all category types (note — control samples are not included in the analysis). PC1 represents 33.7% and PC2 represents 19.2% of the total variance in the data.

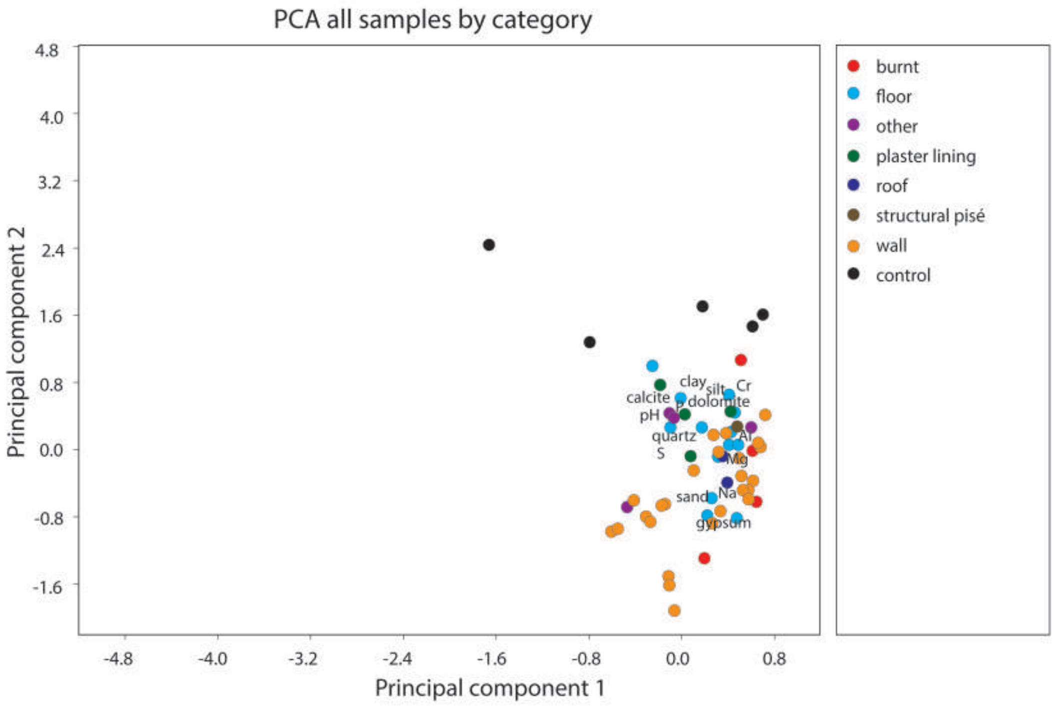

Figure 41.4 Scatter plot showing the principal component analysis results for the first two principal component axes, for all category types (note — control samples are included in the analysis). PC1 represents 43.1% and PC2 represents 14.3% of the total variance in the data.

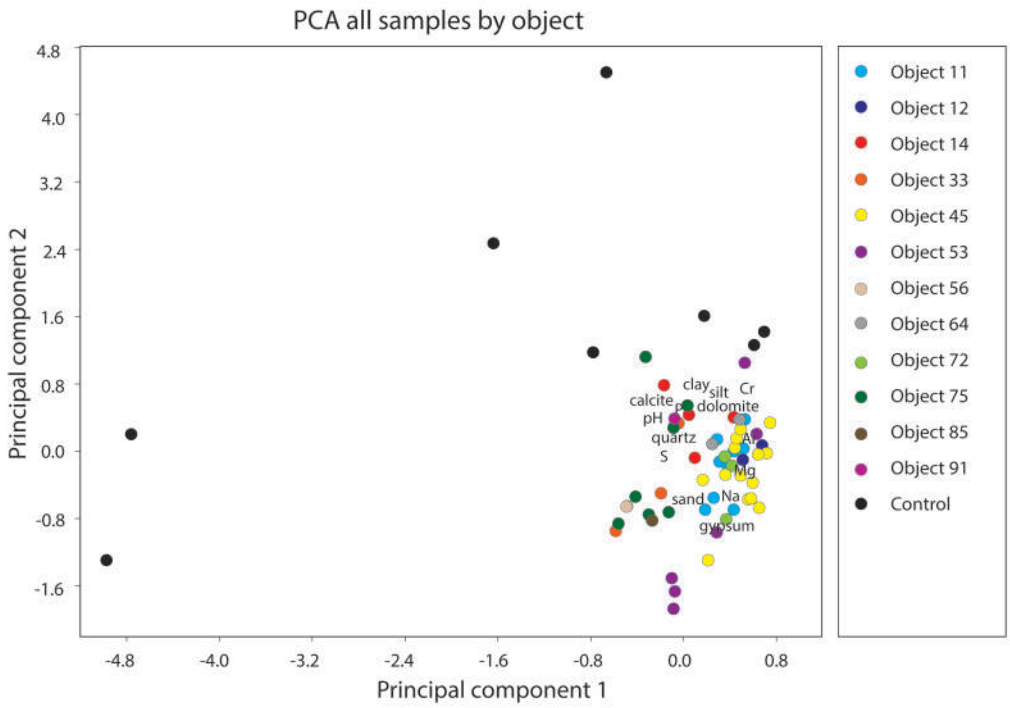

Figure 41.5 Scatter plot showing the principal component analysis results for the first two principal component axes, for all objects (note — control samples are included in the analysis). PC1 represents 43.3% and PC2 represents 14.0% of the total variance in the data.

also groupings within categories themselves. For instance, some wall samples (in yellow) group towards the negative end of PC2 where the % sand, gypsum and sodium (Na) variables plot, whilst other wall samples cluster closer to the % clay and silt, aluminium (Al), and magnesium (Mg) variables (Figure 41.5). It is likely that there is within category variation, mainly because of the variation in grain size (as evidenced in Figure 41.2), but also because of the higher levels of gypsum in some walls compared to others. As can be seen in Figure 41.5, wall samples also group by Object and therefore the variation must also relate to which structure the samples were taken from. This suggests that different wall construction practices occurred in different structures. It has already been noted that O53 wall samples are clearly distinct because of higher proportions of gypsum and this is evident in the PCA also (Figures 41.3 and 41.5). Walls from O33, O75 and O85 are distinct from walls from O45 because they have a slightly sandier matrix, more gypsum, and less minerogenic clastic material; walls from these objects are also different from O53 walls because they are all lower than O53 in gypsum. These differences could either represent temporal differences (e.g. changing practices and availability of source materials over time), differences in structure use (e.g. warranting different building practices), personal differences (e.g. in technique and access to source materials), or unrelated selections of different source materials.

The floor samples of O75 plot in a different location to most of the other floor samples (Figures 41.3 and 41.5). Whilst there is clearly a lot of interval variation amongst the floor samples, the fact that these three samples group together and are from the same structure is interesting. These three floor samples plot close to silt and clay %, phosphorus (P), and calcite. There are, therefore, two possible causes for the distinction in floor samples. Either O75 floors are made from a different source material, or anthropogenic activities on this floor surface (driving different phosphorus levels) are different. As O75 floor samples have slightly raised silt and clay levels (87.7% <2 mm average compared to 70.1, 68.2 and 72.8% (Table 41.1) and not very different phosphorus (P) and calcite values, then it is likely that source material is a driving factor for floor groupings, notably the particle size of the source material. O75 floors plot separately on the PCA chart (Figures 41.4 and 41.5) in comparison to other floor samples because of a distinction in grain size. It could be predicted that the material used for floor construction in O75 was different to the material used to construct other floors elsewhere. This may be because an alternative source material was deemed necessary or preferential for O75, or that more sandy particles, gravels and artefacts had become incorporated into the non-O75 floors, raising the percentage of material classed as larger than 2 mm in these other floor samples.

No other clear distinctions between category type and Object can be seen, apart from where all samples of the same category plot together because they are all from only one building, such as the plaster lining samples from O14 (Figures 41.4 and 41.5). It can be noted that most of the context types show modest degrees of internal variation, yet have an overall similarity with each other. This could be a partial reflection of the frequent re-modelling of the structures at WF16, implied by the low stratigraphic integrity of the radiocarbon dates and the presence of artefacts embedded within walls; that is, materials from floor surfaces were reused as building material for pisé walls or mud roofs, and vice versa.

41.6 Sedimentary analysis for individual structures

Structure O12 (Chapter 11)

Two samples were taken from wall (135) in O12, which are similar to each other in terms of their sedimentary characteristics (Tables 41.4 and 41.5). Table 41.1 indicates the minimum, maximum, mean and standard deviation values for pH, LOI, Mag Sus, and the <2 mm:>2 mm ratio for all categories analysed from O12. The low standard deviation values in Table 41.1, and the similarity in values for all the variables (Tables 41.4 and 41.5), suggests that the two wall samples are undistinguishable from each other and likely originate from the same material.

A principal components analysis was conducted for all Objects and categories together, incorporating most sedimentary variables (pH, LOI, Mag Sus, XRF, XRD and % sand, silt, clay) to identify possible distinct groupings between Objects and category types (Figure 41.3). O12 samples plot close together and plot alongside the wall samples from O11 and O45.

Structure O11 (Chapter 12)

Nine sediment samples were analysed from O11 (see Tables 41.6 and 41.7): one of these came from the surrounding wall (125); six samples were from the floor (837); and one sample was taken from each of the underlying floors (828) and (817). The multiple samples were taken from floor (837) to explore variation within a single context. Table 41.1 indicates the minimum, maximum, mean and standard deviation values for pH, LOI, Mag Sus, and the <2 mm:>2 mm ratio for all categories analysed from O11.

As is evident from Table 41.6, there is limited variation in the pH and LOI values among the nine samples, although there is some distinction in the average LOI values between floor and wall samples more generally. The wall (125) sample is unique, in that it has a negative frequency dependent magnetic susceptibility value compared to the floor samples. A negative value means this material is diamagnetic and could be influenced by calcite, quartz, organic matter and water content. The mineral composition of wall (125) is not notably different to the floor samples, besides perhaps slightly lower levels of chlorite and

Table 41.4 Sediment analysis results for samples from O12 (not including X-ray fluorescence results).

Object 12																	
				Magnetic Susceptibility (LF & HF = 10–6 m^3 kg^{-1})			XRD: selected major minerals (%)					Summary of particle size analysis					
Sample no., context no. and category	Munsell colour	pH	LOI (%)	Mass spec (LF)	Mass spec (HF)	Frequency dependant mag sus (%)	Chlorite	Quartz	Calcite	Dolomite	Gypsum	% <2mm	% >2mm	% Clay	% Silt	% Sand
SA3754 (135) wall	pale brown	8.0	5.0	1.5	1.4	3.0	5.0	37.0	20.0	2.0	29.0	75.5	24.5	15.5	45.6	38.9
SA3755 (135) wall	yellowish brown	8.0	5.0	1.7	1.6	4.4	5.0	31.0	25.0	5.0	21.0	72.0	28.0	15.1	38.2	46.7

Table 41.5 X-ray fluorescence results for samples from O12.

Object 12																					
	XRF major elements (oxides converted to elements) (ppm)										XRF minor elements (ppm)										
Sample no., context no. and category	Na	Mg	Al	S	P	K	Ca	Ti	Mn	Fe	V	Cr	Co	Ni	Cu	Zn	Pb	Rb	Sr	Y	Zr
SA3754 (135) wall	9051	31659	50120	69799	3186	14362	159590	6773	697	50638	190	92	31	45	33	90	19	39	624	31	299
SA3755 (135) wall	8754	31177	50120	70924	3710	16520	164450	6773	774	51757	178	95	33	46	48	99	27	41	637	28	359

Table 41.6 Sediment analysis results for samples from O11 (not including X-ray fluorescence results).

Object 11																		
				Magnetic Susceptibility (LF & HF = 10–6 m^3 kg^{-1})			XRD: selected major minerals (%)					Summary of particle size analysis				
Sample no., context no. and category	Munsell colour	pH	LOI (%)	Mass spec (LF)	Mass spec (HF)	Frequency dependant mag sus (%)	Chlorite	Quartz	Calcite	Dolomite	Gypsum	% <2mm	% >2mm	% Clay	% Silt	% Sand
SA3635 (828) floor	brown	8.2	5.9	1.6	1.6	2.7	6.0	37.0	24.0	1.0	15.0	81.4	18.6	13.0	38.8	48.2
SA3633 (837) floor	very pale brown	8.2	5.4	0.9	0.9	3.4	8.0	41.0	32.0	3.0	3.0	49.7	50.3	21.9	42.2	35.9
SA3634 (817) floor	greyish brown	8.0	4.6	1.7	1.7	1.8	6.0	35.0	22.0	2.0	23.0	73.2	26.8	14.2	45.3	40.5
SA6193 (837) floor	light brown	8.3	3.9	0.9	0.9	5.0	6.0	32.0	19.0	2.0	33.0	76.1	23.9	14.6	41.2	44.2
SA6195 (837) floor	brown	8.2	6.2	0.9	0.8	4.8	10.0	46.0	28.0	4.0	3.0	65.2	34.8	23.0	42.6	34.4
SA6197 (837) floor	light brown	8.4	6.3	1.0	1.0	4.6	7.0	20.0	30.0	0.0	32.0	67.8	32.2	12.2	35.6	52.2
SA6199 (837) floor	light brown	8.3	6.8	1.0	0.9	3.0	9.0	34.0	31.0	0.0	13.0	72.2	27.8	18.6	41.3	40.1
SA6201 (837) floor	brown	8.3	3.4	1.2	1.1	4.1	6.0	32.0	16.0	0.0	34.0	75.1	24.9	9.1	29.4	61.4
SA3753 (125) floor	pale brown	8.3	5.3	1.7	1.7	-0.2	4.0	39.0	21.0	2.0	23.0	63.2	36.8	16.4	44.9	38.7

relatively high quartz. Within floor (837) there is a limited variation in values. Average values (Table 41.1) suggest, in terms of category distinctions, that there are no clear differences.

A Pearson's Correlation Coefficient was calculated for the different sedimentological analyses (pH, LOI, Mag Sus, XRF, XRD and % sand, silt, clay) on all samples from O11 to determine if any components group together or influence each other. The positive and negative correlations are presented in Table 41.8. The very strong negative correlations suggest that for O11 samples, clay rich and sand rich samples are not linked with each other. There is also a clear negative relationship between samples with phosphorus (P), copper (Cu), potassium (K) and calcium (Ca), and samples with zirconium (Zr), lead (Pb), chromium (Cr), iron (Fe) and zinc (Zn). The very strong positive correlations show associations between clay deposits and typically minerogenic elements like magnesium (Mg) and rubidium (Rb), and some association between minerogenic elements, for example, between titanium (Ti) and iron (Fe); and chromium (Cr) and zirconium (Zr). The strong positive and negative correlations are complex and harder to decipher because there are many significant values. However, the most noticeable correlations are the strong positive correlations between typically minerogenic elements and strong negative correlations between these clastic components and calcium (Ca), strontium (Sr) and phosphorus (P).

The PSD ternary plot for samples analysed from O11 show a slight variation in particle size in the floor samples, although the floor samples are fairly well grouped (Figure 41.6). The particle size for the wall sample analysed from O11 is similar to the floor samples, but is slightly finer-grain in size. A principal components analysis was conducted for all Objects and categories together, incorporating most sedimentary variables (pH, LOI, Mag Sus, XRF, XRD and % sand, silt, clay) to identify possible distinct groupings between Objects and category types (Figure 41.3). O11 samples plot together and plot closely to O12, O64 and O72. A PCA was also produced for samples only from O11 to make patterns among category groupings clearer; this is presented in Figure 41.7. It is clear that the material for the wall sample is comparable to the floor samples, yet different with regards to PC1. The PCA results for O11 show that PC1 represents 36.6% of the variance in the data, and shows a distinction between the presence of calcite and quartz at the positive end and phosphorus (P), copper (Cu), lead (Pb) and gypsum at the negative end. PC2 represents 27.1% of the variance and is controlled by % sand, strontium (Sr), calcium (Ca) and pH at the negative

Table 41.7 X-ray fluorescence results for samples from O11.

Object 11																					
	XRF major elements (oxides converted to elements) (ppm)										**XRF minor elements (ppm)**										
Sample no. context no. and category	**Na**	**Mg**	**Al**	**S**	**P**	**K**	**Ca**	**Ti**	**Mn**	**Fe**	**V**	**Cr**	**Co**	**Ni**	**Cu**	**Zn**	**Pb**	**Rb**	**Sr**	**Y**	**Zr**
SA3635 (828) floor	8754	28825	47103	71948	3579	15109	139865	6773	774	50149	177	95	22	47	37	94	17	36	575	25	309
SA3633 (837) floor	8828	31117	52237	70622	2269	15856	146083	6952	774	49799	165	94	23	49	34	94	16	43	528	34	404
SA3634 (817) floor	8828	30634	48638	65266	3753	15026	142009	7132	697	53086	181	92	27	45	39	98	20	36	555	25	286
SA6193 (837) floor	6157	28825	47580	65753	1702	14777	166880	6533	774	44134	143	97	24	44	29	81	19	41	566	23	371
SA6195 (837) floor	11944	30936	52978	67700	1746	17433	150585	6952	852	46722	151	106	26	46	30	86	14	43	537	25	401
SA6197 (837) floor	12983	30212	50808	66357	1877	16686	150943	6952	774	47631	159	100	26	45	32	89	17	41	539	23	370
SA6199 (837) floor	12983	30393	50861	67801	1964	17350	150228	6833	774	46512	139	100	17	47	30	85	16	39	564	30	381
SA6201 (837) floor	4970	28946	48215	64728	2444	14528	159662	6653	774	46722	159	96	20	45	32	90	22	35	646	25	366
SA3753 (125) wall	8235	29308	46098	66239	3186	14528	146226	6833	697	50708	156	85	23	44	40	94	20	38	609	26	272

Table 41.8 Table summarising the strongest and significant (with p-values <0.05) variable associations as evidenced from the Pearson's product correlation coefficient results for O11.

Object 11			
Very strong negative correlations (r value between -1 & -0.8)	**Strong negative correlations (r value between -0.79- & -0.6)**	**Very strong positive correlations (r value between 1 & 0.8)**	**Strong positive correlations (r value between 0.79 & 0.6)**
LOI vs. Na	LOI vs. Pb	Freq dep mag sus vs. Mn/ Freq dep mag sus vs. Cr/ Freq dept mag sus vs. Zr	LOI vs. Calcite
Freq dep mag sus vs. P/ Freq dep mag sus vs. Cu	Freq dep mag sus vs Fe/ Freq dep mag sus vs Zn	Chlorite vs. Calcite	Chlorite vs. Al/ Chlorite vs. K/ Chlorite Vs. Cr/ Chlorite vs. Zr
Gypsum vs. % clay	Chlorite vs. % silt	Gypsum vs. % sand	Calcite vs. K
P vs. Zr	Quartz vs. Co	Na vs. K	Gypsum vs. Pb
K vs. Pb	Dolomite vs. Gypsum/ Dolomite vs. % sand	Mg vs. Al/ Mg vs. Ti	Mg vs. K/ Mg vs. % clay
Ca vs. Fe/ Ca vs. Zn	Na vs. Pb/ Na vs. Sr	Al vs. K	Al vs. Cr/ Al vs. Rb/ Al vs. Zr
Cr vs. Cu	Mg vs. Sr	S vs. Ni	K vs. Cr
Cu vs. Zr	Al vs. Sr	P vs. Fe/ P vs. Cu/ P vs. Zn	Ti vs. Fe
% clay vs. % sand	P vs. Ca/ P vs. Mn/ P vs. Cr/ P vs. Rb	Mn vs. Cr/ Mn vs. Zr	V vs. Cu
	Ca vs. Ti/ Ca vs. V/ Ca vs. Cu	Fe vs. V/ Fe vs. Cu/ Fe vs. Zn	Cr vs. Zr
	Mn vs. Cu/ Mn vs. Pb	V vs. Zn	Pb vs Sr
	Fe vs. Zr	Cu vs. Zn	Rb vs. % clay
	Pb vs. Rb/ Pb vs. % clay		
	Rb vs. Sr		
	Zr vs. % silt		

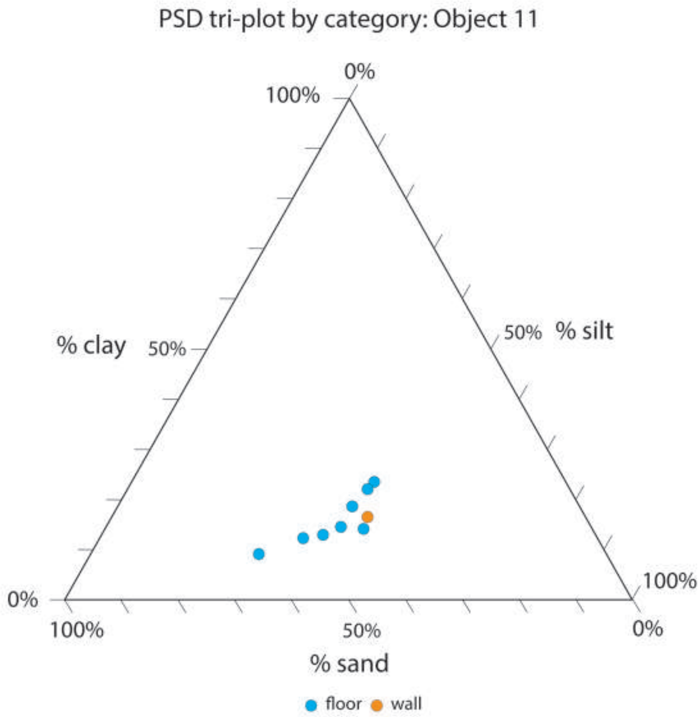

Figure 41.6 Tri-plot showing the tri-variate data of sand, silt and clay % by category type for O11.

end, and % silt and clay, dolomite, iron (Fe), magnesium (Mg) and titanium (Ti) at the positive end. The two axes primarily represent mineralogy and grain size respectively. The PCA value for the wall samples thus reflects a strong association with geology, particularly the presence of gypsum and higher levels of phosphorus (P), copper (Cu) and lead (Pb). PCA values for floor samples are varied and thus are not controlled by one underlying variable.

Structure O45 (Chapter 14)

Fifteen sediment samples were analysed from O45 (Tables 41.9 and 41.10): six of these were taken from the surrounding wall (245), including a transect across the inner, middle and outer face; one sample was taken from the internal wall (1016); three samples of burnt pisé (1012); three samples from a pisé collapse (1029), one indicating structural impressions; one sample from floor (1313); and one sample from roof collapse (1026). The fifteen samples have undergone basic numerical exploratory analysis according to their category type. Table 41.1 shows the minimum, maximum, mean and standard deviation values for pH, LOI, Mag Sus, and the <2 mm:>2 mm ratio for all category types analysed from O45.

As can be seen in Table 41.1, the measures of pH show limited variation among the samples from each of the category types. LOI is highest in the roof sample and lowest in the floor sample. There is a high frequency dependent magnetic susceptibility value for the roof sample and relatively lower values for the walls. The coarsest material is found in the walls (on average the highest % >2 mm) whereas the finest material is found in the structural pisé sample. The material used to mould the structural elements was, therefore, principally silty clay; the coarser material could have been removed or finer material specifically selected. The minerals measured by XRD also show limited variation and patterning in their presence (Table 41.9). One of the burnt pisé samples has no chlorite and another has reduced levels of quartz. The floor sample, one wall sample and one pisé collapse sample are notable for their lower gypsum values (SA5326, SA3644 and SA5249).

The particle size ternary plot produced for samples analysed in O45 shows an overlap between the particle sizes of different categories (Figure 41.8). The walls are particularly diverse in terms of particle size. The floor sample is one of the finer samples analysed from O45. Two of the burnt samples (SA3317 and SA3319) and the roof sample are amongst the coarser samples analysed from O45.

A Pearson's Correlation Coefficient was calculated for the different sedimentological analyses (pH, LOI, Mag Sus, XRF, XRD, and % sand, silt, clay) on all samples from O45 to determine if any components group together or influence each other. The positive and negative correlations are presented in Table 41.11. The very strong negative correlations suggest that for O45 samples the presence of calcium (Ca) is in direct opposition to the presence of more minerogenic and clastic elements such as titanium (Ti), iron (Fe), aluminium (Al) and zinc (Zn). The same is true of the particle size variables, which show that the

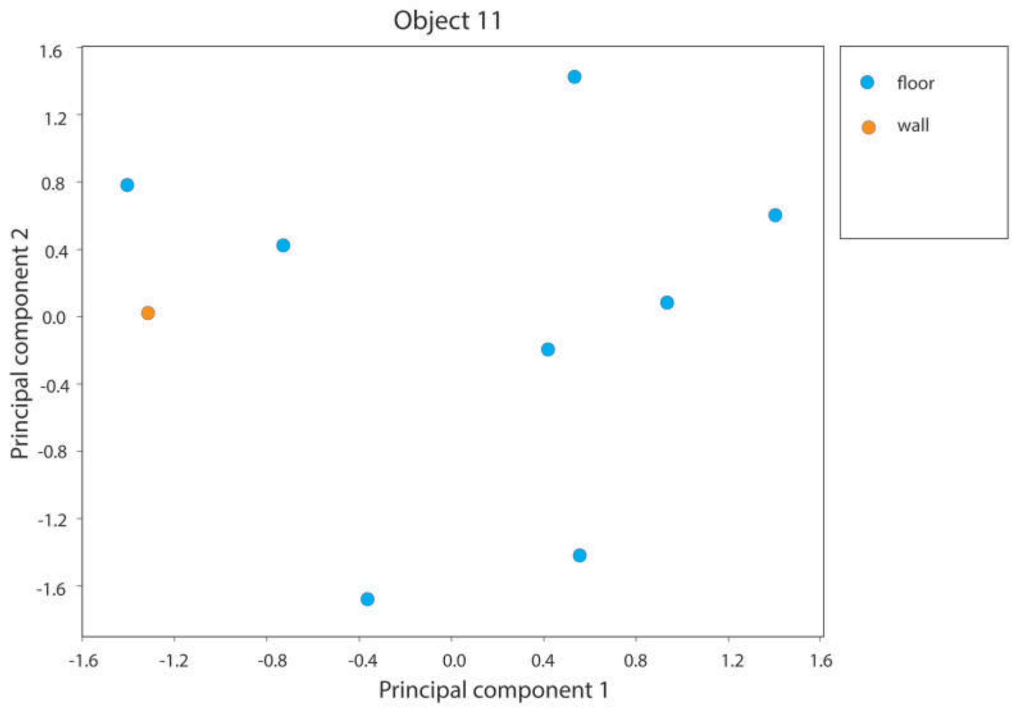

Figure 41.7 Scatter plot showing the principal component analysis results for the first two principal component axes, for O11 and its different category types. PC1 represents 36.6% and PC2 represents 27.1% of the total variance in the data.

presence of clay and silt is in opposition to the presence of sand, highlighting that, differences in grain size is an important sedimentological factor. The very strong positive correlations suggest that many of the elements besides Ca group together, probably because of their similar minerogenic origin. Elements such as magnesium (Mg), aluminium (Al), sulphur (S), titanium (Ti), iron (Fe), zinc (Zn), chromium (Cr), manganese (Mn), nickel (Ni) and vanadium (V) have strong affiliations with each other. Frequency dependent magnetic susceptibility values are negatively correlated to most of these minerogenic type elemental components. Strong positive correlations suggest that calcium (Ca) is closely linked to strontium (Sr) and potassium (K), as well as % sand, chlorite, gypsum and frequency dependent magnetic susceptibility.

A principal components analysis was conducted for all Objects and categories together, incorporating most sedimentary variables (pH, LOI, Mag Sus, XRF, XRD, and % sand, silt, clay) to identify possible distinct groupings between Objects and category types (Figure 41.3). O45 samples approximately plot together and particularly overlap with O11 and O12. A PCA was also produced for samples only from Object 45 to make the patterns among category groupings clearer, this is presented in Figure 41.9. It is evident that the majority of walls are similar in composition, but the burnt samples are very distinctive, plotting separately from each other, and generally from the other categories. The floor sample and structural pisé plot together and therefore are probably similar in composition and material type. Driving PC1 seems to be the distinction between silt-rich and minerogenic type samples at the positive end, versus calcium (Ca), strontium (Sr), sand-rich and magnetic susceptibility at the negative end. This is similar to the patterns seen in the correlation analysis. PC2 indicates that grain size and mineralogy are also major contributors to the distinction in samples, as clay, silt and chlorite deposits plot at the negative end of PC2, while sand, dolomite and gypsum deposits plot towards the positive end (Figure 41.3). Sodium (Na), strontium (Sr) and potassium (K) are also key drivers of positive PC2 values. The PCA results show that wall samples are characterised by typically finer grain sizes but also partially linked to sand, dolomite and gypsum, probably because of their more silty-sandy matrix. The question of whether the walls have a gypsum preparation cannot be ruled out. The burnt deposits typically plot towards the positive end of PC2 because of their burnt nature which makes them high in potassium (K) and strontium (Sr). The floor and structural pisé samples plot in areas that suggest they are very fine grained.

Structure O53 (Chapter 15)

Six sediment samples were analysed from O53 (Tables 41.12 and 41.13): four were taken from the lower wall (643) and two from collapsed material (641) assumed to have derived from either walls (56) or (643). One of the samples from (641) was visibly burnt (SA1901). Table 41.1 indicates the minimum, maximum, mean and standard deviation values for pH, LOI, Mag Sus, and the <2 mm:>2 mm ratio for all categories analysed from O53.

Table 41.9 Sediment analysis results for samples from O45 (not including X-ray fluorescence results).

Object 45																	
				Magnetic Susceptibility (LF & HF = 10–6 m³ kg-1)			XRD: selected major minerals (%)					Summary of particle size analysis					
Sample no., context no. and category	Munsell colour	pH	LOI (%)	Mass spec (LF)	Mass spec (HF)	Frequency dependant mag sus (%)	Chlorite	Quartz	Calcite	Dolomite	Gypsum	% <2mm	% >2mm	% Clay	% Silt	% Sand
SA3317 (1012) burnt	various, mainly pale brown	8.1	5.1	7.7	7.2	7.0	0.0	34.0	19.0	2.0	35.0	55.2	44.8	3.5	12.3	84.2
SA3339 (1012) burnt	brown	8.2	6.0	2.1	2.0	2.7	8.0	35.0	34.0	2.0	16.0	65.8	34.2	11.9	42.4	45.7
SA3319 (1012) burnt	very dark greyish brown	8.2	4.5	7.3	6.9	5.9	3.0	4.0	23.0	5.0	50.0	70.0	30.0	5.6	23.4	71.0
SA5326 (1313) floor	light brownish grey	8.2	4.2	1.5	1.5	3.7	8.0	32.0	36.0	4.0	3.0	68.2	31.8	10.8	46.2	43.0
SA4404 (1026) roof	dark brown	8.1	5.6	1.3	1.2	5.6	7.0	40.0	27.0	0.0	11.0	69.9	30.1	10.3	31.3	58.4
SA5249 (1029) pisé collapse	light brown	8.2	5.2	1.6	1.6	2.2	8.0	36.0	36.0	0.0	5.0	77.5	22.5	15.4	46.8	37.8
SA3644 (245) wall	reddish brown	8.0	3.7	1.1	1.1	-2.1	6.0	37.0	27.0	1.0	6.0	38.7	61.3	11.5	34.9	53.6
SA3643 (245) wall	yellowish brown	8.0	5.5	1.6	1.6	-1.3	6.0	29.0	23.0	1.0	26.0	66.8	33.2	18.3	43.9	37.9
SA3649 (1016) wall	yellowish brown	8.3	5.1	1.8	1.8	2.3	7.0	26.0	31.0	2.0	21.0	71.3	28.7	14.5	50.1	35.4
SA6260 (245) wall	brown	8.3	4.4	2.0	1.9	1.5	8.0	38.0	22.0	1.0	19.0	55.2	44.8	14.1	38.8	47.1
SA6261 (245) wall	pinkish grey	8.2	5.0	1.8	1.8	0.9	8.0	36.0	24.0	0.0	20.0	44.3	55.7	6.3	28.3	65.4
SA6262 (245) wall	brown	8.3	3.8	1.9	1.9	0.3	8.0	30.0	23.0	1.0	21.0	51.2	48.8	9.3	34.9	55.8
SA6263 (245) wall	pinkish grey	8.3	4.0	1.9	1.9	0.1	11.0	31.0	18.0	0.0	23.0	57.8	42.2	7.0	30.7	62.3
SA5244 (1029) pisé collapse	brown	8.1	4.5	2.0	1.9	3.7	9.0	20.0	28.0	0.0	22.0	66.0	34.0	7.3	31.3	61.4
SA5245 (1029) pisé collapse	brown	8.0	4.8	1.1	1.0	5.1	5.0	22.0	19.0	0.0	43.0	68.6	31.4	22.2	38.6	39.2

Table 41.10 X-ray fluorescence results for samples from O45.

Object 45																				
	XRF major elements (oxides converted to elements) (ppm)										XRF minor elements (ppm)										
Sample no, context no and category	**Na**	**Mg**	**Al**	**S**	**P**	**K**	**Ca**	**Ti**	**Mn**	**Fe**	**V**	**Cr**	**Co**	**Ni**	**Cu**	**Zn**	**Pb**	**Rb**	**Sr**	**Y**	**Zr**
SA3317 (1012) burnt	9273	24182	44933	61874	3099	21833	195611	6473	697	50499	169	89	29	42	37	92	19	32	1248	28	269
SA3339 (1012) burnt	9570	34373	49538	66659	2269	17931	172741	7072	774	51338	172	109	27	49	34	91	24	42	637	28	345
SA3319 (1012) burnt	11573	31237	49273	65047	3535	18927	163092	7132	852	54275	183	103	28	46	43	97	22	33	609	28	311
SA5326 (1313) floor	4229	30875	48532	62428	1397	15441	185748	7012	774	51058	192	108	22	43	35	90	20	38	659	27	335
SA4404 (1026) roof	7270	29066	48374	67230	3230	17018	161091	6833	774	48120	170	101	22	49	44	93	22	37	584	22	314
SA5249 (1029) pisé collapse	8086	30453	51179	64208	2008	16022	167381	7492	774	51688	184	104	25	43	34	100	21	40	559	28	328
SA3644 (245) wall	9347	34132	53348	70891	2968	16022	133361	7312	774	55954	204	102	24	45	37	100	17	41	612	28	303
SA3643 (245) wall	10089	35820	54566	70404	2662	17101	128859	7672	852	59521	215	101	26	49	33	104	20	40	690	26	266
SA3649 (1016) wall	8457	32504	52713	68003	2706	16188	167023	7492	774	56863	196	102	35	51	39	100	26	44	563	28	311
SA6260 (245) wall	7270	33951	55677	72654	2138	15773	130645	7971	929	57842	221	103	23	48	32	102	18	42	466	22	302
SA6261 (245) wall	8012	33649	56259	70689	2269	16271	134362	7732	929	56793	214	107	27	53	34	102	21	36	487	29	301
SA6262 (245) wall	8531	35338	57106	74601	2357	16603	124285	7971	929	59451	237	114	28	48	33	103	17	40	513	26	294
SA6263 (245) wall	10460	36001	56789	69564	2488	16769	120783	7971	929	57982	221	108	31	49	36	106	19	42	456	25	261
SA5244 (1029) pisé collapse	9867	31599	54777	64594	3360	16271	136363	7971	852	60081	224	104	25	48	35	105	13	39	538	25	288
SA5245 (1029) pisé collapse	6677	22976	38000	48995	2531	13282	181531	6053	774	45043	183	88	23	35	33	85	25	32	578	22	277

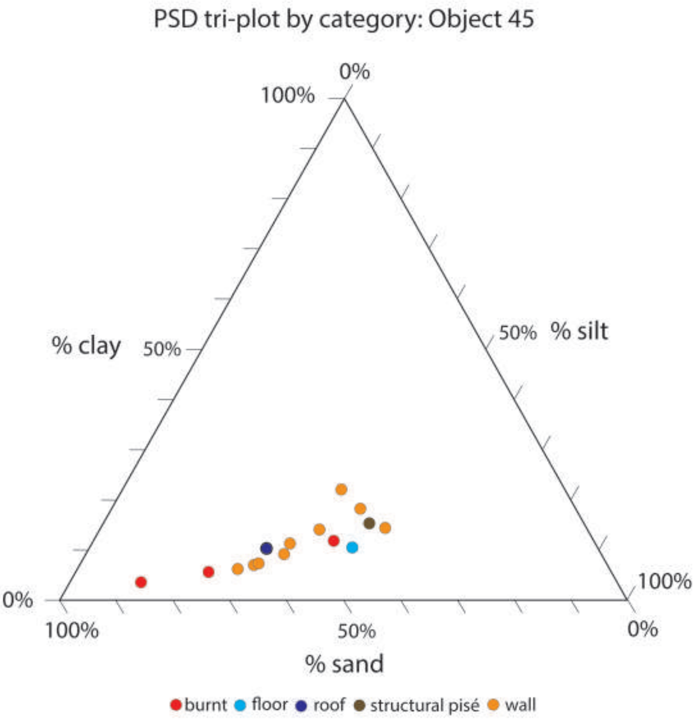

Figure 41.8 Tri-plot showing the tri-variate data of sand, silt and clay % by category type for O45.

Table 41.11 Table summarising the strongest and significant (with p-values <0.05) variable associations as evidenced from the Pearson's product correlation coefficient results for O45.

Object 45			
Very strong negative correlations (r value between -1 & -0.8)	**Strong negative correlations (r value between -0.79- & -0.6)**	**Very strong positive correlations (r value between 1 & 0.8)**	**Strong positive correlations (r value between 0.79 & 0.6)**
Al vs. Ca	LOI vs. V	Mg vs. Al/ Mg vs. S/ Mg vs. Ti/ Mg vs. Cr	Freq Dep Mag Sus vs. Ca
Ca vs. Ti/ Ca vs. Mn/ Ca vs. Fe/ Ca vs. V/ Ca vs. Zn	Freq Dep Mag Sus vs. Mg/ Freq Dep Mag Sus vs. Al/ Freq Dep Mag Sus vs. S/ Freq Dep Mag Sus vs. Ti/ Freq Dep Mag Sus vs. Fe/ Freq Dep Mag Sus vs. V/ Freq Dep Mag Sus vs. Zn/ Freq Dep Mag Sus vs. Rb	Al vs. S/ Al vs. Ti/ Al vs. Fe/ Al vs. Ni/ Al vs. Zn	Chlorite vs. Sr
% clay vs. % sand	Chlorite vs. Dolomite/ Chlorite vs. K	S vs. Ni	Gypsusm vs. P
% silt vs. % sand	Gypsum vs. Zr/ Gypsum vs. % silt	Ti vs. Fe/ Ti vs. V/ Ti vs. Cr/ Ti vs. Zn	Na vs. P
	Mg vs. Ca	Mn vs. V	Mg vs. Mn/ Mg vs. V/ Mg vs. Zn/ Mg vs. Rb
	S vs. Ca/ S vs. Ti	Fe vs. V/ Fe vs. Zn	Al vs. Mn/ Al vs. V/ Al vs. Cr/ Al vs. Rb
	K vs. % clay		S vs. Fe/ S vs. Cr/ S vs. Zn/ S vs. Rb
	Mn vs. Sr		K vs. Sr/ K vs. % sand
	V vs. Pb		Ca vs. Sr
			Ti vs. Mn/ Ti vs. Ni/ Ti vs. Rb
			Mn vs. Fe/ Mn vs. Zn
			Fe vs. Ni
			V vs. Zn
			Cr vs. Ni/ Cr vs. Rb
			Ni vs. Zn
			Rb Vs. % silt

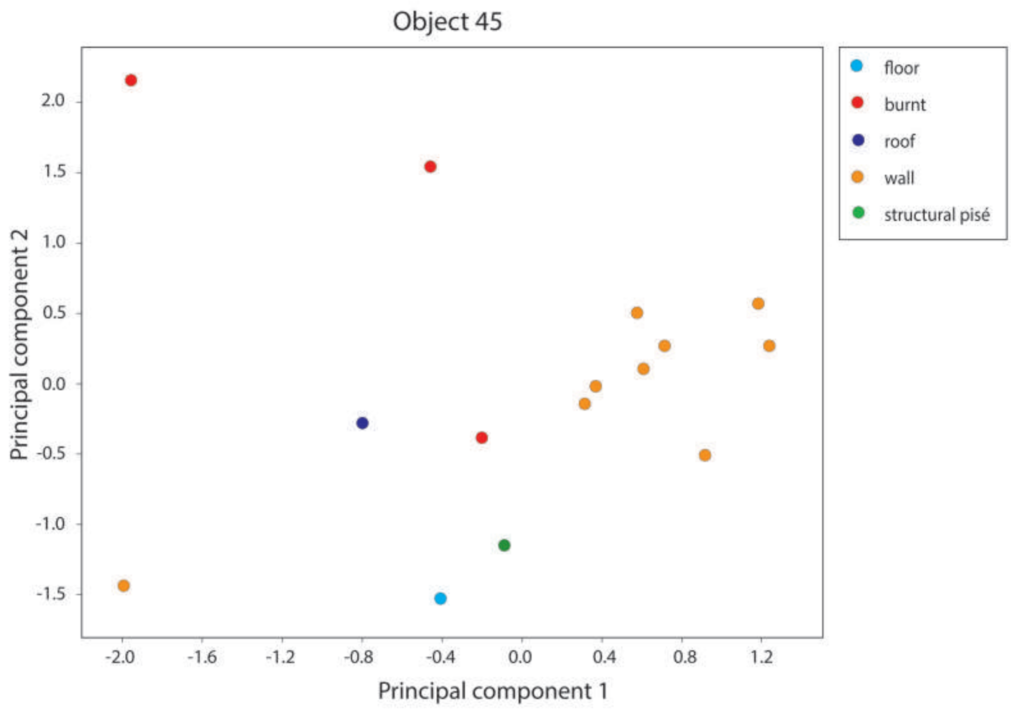

Figure 41.9 Scatter plot showing the principal component analysis results for the first two principal component axes, for O45 and its different category types. PC1 represents 35.9% and PC2 represents 18.9% of the total variance in the data.

Table 41.12 Sediment analysis results for samples from O53 (not including X-ray fluorescence result).

Object 53																	
				Magnetic Susceptibility (LF & HF = 10–6 m³ kg⁻¹)			XRD: Selected major minerals (%)					Summary of particle size analysis					
Sample no., context no. and category	Munsell colour	pH	LOI (%)	Mass spec (LF)	Mass spec (HF)	Frequency dependant mag sus (%)	Chlorite	Quartz	Calcite	Dolomite	Gypsum	% <2mm	% >2mm	% Clay	% Silt	% Sand
SA1901 (641) Burnt	Very Pale Brown, Reddish Brown	8.1	5.9	1.1	1.1	0.1	6.0	41.0	40.0	2.0	0.0	57.9	42.1	14.1	44.8	41.1
SA2253 (641) Other	Pale Brown	8.2	5.8	1.8	1.8	-0.5	6.0	34.0	28.0	2.0	20.0	64.8	35.2	14	43.9	42.1
SA6241 (643) Wall	Light Brownish Grey	8.5	4.5	1.7	1.7	2.0	7.0	19.0	13.0	0.0	50.0	66.2	33.8	7.6	25.8	66.6
SA6242 (643) Wall	Pale Brown	8.1	4.7	1.6	1.5	1.5	2.0	11.0	8.0	0.0	77.0	66.6	33.4	3.9	19.5	76.6
SA6243 (643) Wall	Pale Brown	8.3	4.4	1.6	1.5	2.0	3.0	15.0	8.0	0.0	70.0	66.9	33.1	3.5	19.3	77.2
SA6244 (643) Wall	Pale Brown	8.1	5.9	1.5	1.4	2.8	5.0	15.0	9.0	0.0	62.0	58.5	41.5	5.4	24.5	70.1

As documented in Tables 41.12 and 41.13, the samples from wall (643) are relatively consistent with each other. The burnt pisé from (641) is notably different from the wall samples (643) with regard to mineral composition because it has no gypsum and high levels of calcite and quartz. The frequency dependent magnetic susceptibility is highest in wall (643). The burnt pisé sample from (641) is coarser in comparison to the other samples from O53 (Tables 41.12 and 41.1).

A Pearson's Correlation Coefficient was calculated for the different sedimentological analyses (pH, LOI, Mag Sus, XRF, XRD, and % sand, silt, clay) on all samples from O53 to determine if any components group together, or influence each other. The very strong positive and negative correlations are presented in Table 41.14. There are no strong negative correlations and no strong positive correlations that were significant for O53. There are, however, many variables with both very strong positive or very strong negative correlations and associations. In terms of elemental composition, most of the elements correlate positively with each other besides strontium (Sr) and calcium (Ca), with calcium having close affiliations with LOI and % silt. The XRD variables are more complicated because, whilst quartz and dolomite are negatively correlated with gypsum, gypsum is positively correlated with calcite, and calcite is positively correlated with quartz and dolomite. The frequency dependent magnetic susceptibility readings are commonly negatively correlated with typically minerogenic elements like titanium (Ti) and rubidium (Rb), and they do not form any significant and strong positive correlations. Samples with higher clays and silts are unsurprisingly negatively correlated with those containing sands. Grain size seems to be a key part of the correlations, especially correlations between grain size and XRD results.

The PSD ternary plot for samples analysed from O53 shows a clear differentiation between wall samples (643) and the burnt/'other' samples from (641) in terms of particle size distribution (Figure 41.10). Based on the PSD results, it is likely that the burnt and 'other' samples represent part of the same original wall, but the material is different in composition to wall (643). The wall (643) samples indicate principally sandier matrices and the burnt and other samples indicate principally siltier matrices, but still with high proportions of sand.

A principal components analysis was conducted for all Objects and categories together, incorporating most sedimentary variables (pH, LOI, Mag Sus, XRF, XRD, and % sand, silt, clay) to identify possible distinct groupings among Objects and category types (Figure 41.3). O53 samples show more variability in comparison to some of the other samples and objects analysed from WF16. The burnt and 'other' samples plot alongside samples from Objects O11, O12 and O45, and the majority of the O53 wall samples (643) plot separately from all other Objects analysed. Although the wall samples (643) from O53 plot separately from other Objects, they are fairly consistent in terms of location on the PCA scatter plot, suggesting a distinct material source and/or building practice for the entirety of the wall (643). A PCA was also produced for samples only from O53 to make patterns between category groupings clearer (Figure 41.11). A similar pattern is exhibited with the wall samples from (643) plotting separately to the burnt and 'other' samples from (641) which, in turn, plot together. PC1 represents a large 67.9% of the total variance in the samples and PC2 presents a further 13.7% of the variance, indicating that 81.6% can be explained by the first two principal components alone. PC1 indicates the difference between sand, strontium (Sr) and gypsum type samples at the negative end and silt, clay, dolomite and quartz type samples at the positive end. The biggest distinction between the wall (643) and burnt/other samples therefore, is the difference in grain size and mineralogy. Wall samples group based on coarser-grained matrices and higher gypsum readings in contrast to non-wall samples, which are finer-grained and have little gypsum, higher dolomite values, and higher quartz values.

Structure O85 (Chapter 16)

One wall sample was analysed from O85, (647) (Tables 41.15 and 41.16). The results for this sample from O85 indicates that it has a coarse particle size in comparison to the other samples from WF16 (Table 41.1); 43% of the material is over 2 mm in size and almost 55% of the sediment matrix consists of sand particles. The sample is high in both quartz and gypsum, and particularly low in dolomite.

A principal components analysis was conducted for all Objects and categories together, incorporating most sedimentary variables (pH, LOI, Mag Sus, XRF, XRD, and % sand, silt, clay) to identify possible distinct groupings among Objects and category types (Figure 41.3). The wall sample from O85 plots with the wall samples from O75 and O33. As the O85 sample plots to the right of the O33 and O75 samples, it is likely that this sample is similar to other walls at WF16 but with a slightly coarser fabric.

Structure O56 (Chapter 17)

One sediment sample was analysed from O56, a comparative pisé sample from pisé rubble (658), categorised as 'other' (Tables 41.17 and 41.18). The sample has higher proportions of quartz and gypsum, and a negative frequency dependent magnetic susceptibility value, that is likely the result of the higher amounts of quartz. The sample has a silty-sandy matrix with little clay.

A principal components analysis was conducted for all Objects and categories together, incorporating most sedimentary variables (pH, LOI, Mag Sus, XRF, XRD, and % sand, silt, clay) to identify possible distinct groupings among Objects and category types (Figure 41.3). The sample from O56 plots very close to the wall samples from O33, O75 and O85. This sample is likely to be wall derived material as inferred from the PCA results and context (658) was interpreted as probable collapse of wall (256) (Chapter

Table 41.13 X-ray fluorescence results for samples from O53.

Object 53																					
	XRF major elements (oxides converted to elements) (ppm)										**XRF minor elements (ppm)**										
Sample no, context no and category	**Na**	**Mg**	**Al**	**S**	**P**	**K**	**Ca**	**Ti**	**Mn**	**Fe**	**V**	**Cr**	**Co**	**Ni**	**Cu**	**Zn**	**Pb**	**Rb**	**Sr**	**Y**	**Zr**
SA1901 (641) Burnt	9570	35338	52978	70051	2313	17516	178029	7012	774	51827	188	105	31	46	36	92	22	40	629	33	362
SA2253 (641) Other	9644	33046	51443	64712	3011	16271	181246	7252	774	54205	206	97	32	47	35	94	20	41	581	31	341
SA6241 (643) Wall	7864	31418	50226	68456	2531	15026	138293	6833	774	50429	160	103	28	40	36	91	19	33	615	23	275
SA6242 (643) Wall	6751	28584	43134	57978	2182	12867	154945	6173	697	43434	136	84	21	36	30	75	19	30	753	21	261
SA6243 (643) Wall	7196	30695	44828	58667	1877	12286	144725	6233	697	47141	145	73	24	40	27	81	16	31	976	18	225
SA6244 (643) Wall	8828	24905	35248	45620	2138	11871	166594	5454	697	42595	134	79	21	40	31	78	9	31	732	21	234

Table 41.14 Table summarising the strongest and significant (with p-values <0.05) variable associations as evidenced from the Pearson's product correlation coefficient results for O53.

Object 53			
Very strong negative correlations (r value between -1 & -0.8)	**Strong negative correlations (r value between -0.79 & -0.6)**	**Very strong positive correlations (r value between 1 & 0.8)**	**Strong positive correlations (r value between 0.79 & 0.6)**
Freq Dep Mag Sus vs. Dolomite/ Freq Dep Mag Sus vs. K/ Freq Dep Mag Sus vs. Ti/ Freq Dep Mag Sus vs. V/ Freq Dep Mag Sus vs. Rb/ Freq Dep Mag Sus vs. Y/ Freq Dep Mag Sus vs. Zr/ Freq Dep Mag Sus vs. % silt/ Freq Dep Mag Sus vs. % sand	None	LOI vs. Na/ LOI vs. Ca	None
Quartz vs. Gypsum		Quartz vs. Calcite	
Dolomite vs. Gypsum/ Dolomite vs. % sand		Calcite vs. Dolomite/ Calcite vs. Gypsum	
Gypsum vs. K/ Gypsum vs. Y/ Gypsum vs. Zr/ Gypsum vs. % silt/ Gypsum vs. % sand		Dolomite vs. K/ Dolomite vs. V/ Dolomite vs. Ni/ Dolomite vs. Rb/ Dolomite vs. Y/ Dolomite vs. Zr/ Dolomite vs. % clay/ Dolomite vs. % silt	
P vs. Sr		Na vs. Ni/ Na vs. Rb/ Na vs. Y/ Na vs. % clay/ Na vs. % silt/ Na vs. % sand	
K vs. % sand		Mg vs. Al/ Mg vs. S/ Mg vs. K/ Mg vs. Ti/ Mg vs. Fe/ Mg vs. V/ Mg vs. Co/ Mg vs. Pb	
Mn vs. Sr/ Mn vs. % sand		Al vs. S/ Al vs. K/ Al vs. Ti/ Al vs. Mn/ Al vs. Fe/ Al vs. V/ Al vs. Co/ Al vs. Zn/ Al vs. Pb	
Fe vs. % sand		S vs. K/ S vs. Ti/ S vs. Fe/ S vs. Co/ S vs. Pb	
V vs. % sand		K vs. Ti/ K vs. Mn/ K vs. Fe/ K vs. v/ K vs. Cr/ K vs. Co/ K vs. Cu/K vs. Zn/ K vs. Rb/ K vs. Y/ K vs. Zr/ K vs. % clay	
Cr vs. Sr		Ca vs. % silt	
Co vs. % sand		Ti vs. Mn/ Ti vs. Fe/ Ti vs. V/ Ti vs. Co/ Ti vs. Zn/ Ti vs. Pb/ Ti vs. Zr/	
Ni vs. % sand		Mn vs. Fe/ Mn vs. V/ Mn vs. Cr/ Mn vs. Co/ Mn vs. Cu/ Mn vs. Zn/ Mn vs. Rb/ Mn vs. YMn vs. Zr/ Mn vs. % clay	
Cu vs. Sr		Fe vs. V/ Fe vs. Co/ Fe vs. Ni/ Fe vs. Zn/ Fe vs. Rb/ Fe vs. % clay	
Rb vs. % sand		V vs. Co/ V vs. Ni/ V vs. Zn/ V vs. Rb/ V vs. Y/ V vs. Zr/ V vs. % clay/ V vs. % silt	
Sr vs. Y/ Sr vs. % clay		Cr vs. Cu/ Cr vs. Zn/ Cr vs. Y/ Cr vs. Zr/ Cr vs % clay	
Y vs. % sand		Co vs. Ni/ Co vs. Zn/ Co vs. Rb/ Co vs. Y/ Co vs. Zr/ Co vs. % clay	
Zr vs. % sand		Ni vs. Zn/ Ni vs. Rb/ Ni vs. Y	
		Ni vs. % clay/ Ni vs. % silt	
% clay vs. % sand			
		Cu vs. Y/ Cu vs. Zr	
% silt vs. % sand		Cu vs. % clay/ Cu vs. % sand	
		Zn vs. Rb	
		Zn vs. % clay/ Zn vs. % sand	
		Rb vs. Y/ Rb vs. Zr	
		Rb vs. % clay/ Rb vs. % silt	
		Y vs. Zr	
		Y vs. % clay/ Y vs. % silt	
		Zr vs. % clay/ Zr vs. % silt/	
		% clay vs. % silt	

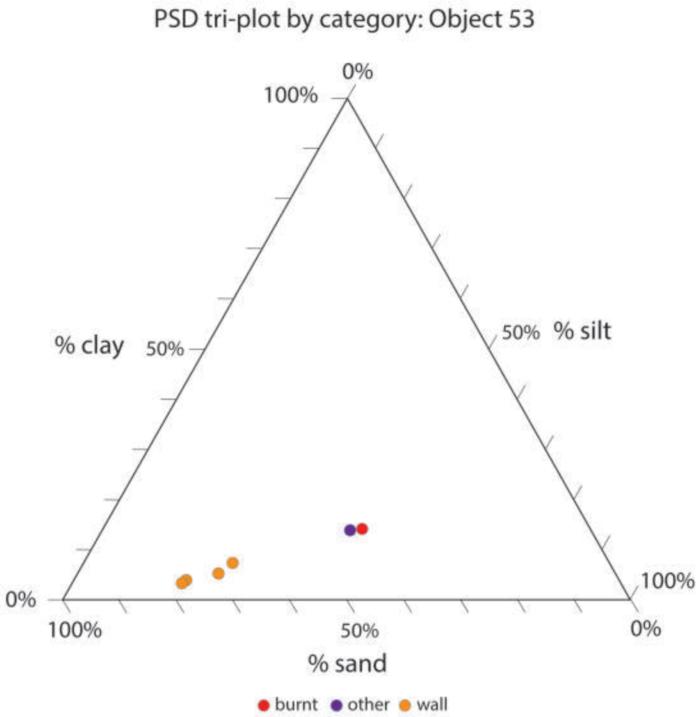

Figure 41.10 Tri-plot showing the tri-variate data of sand, silt and clay % by category type for O53.

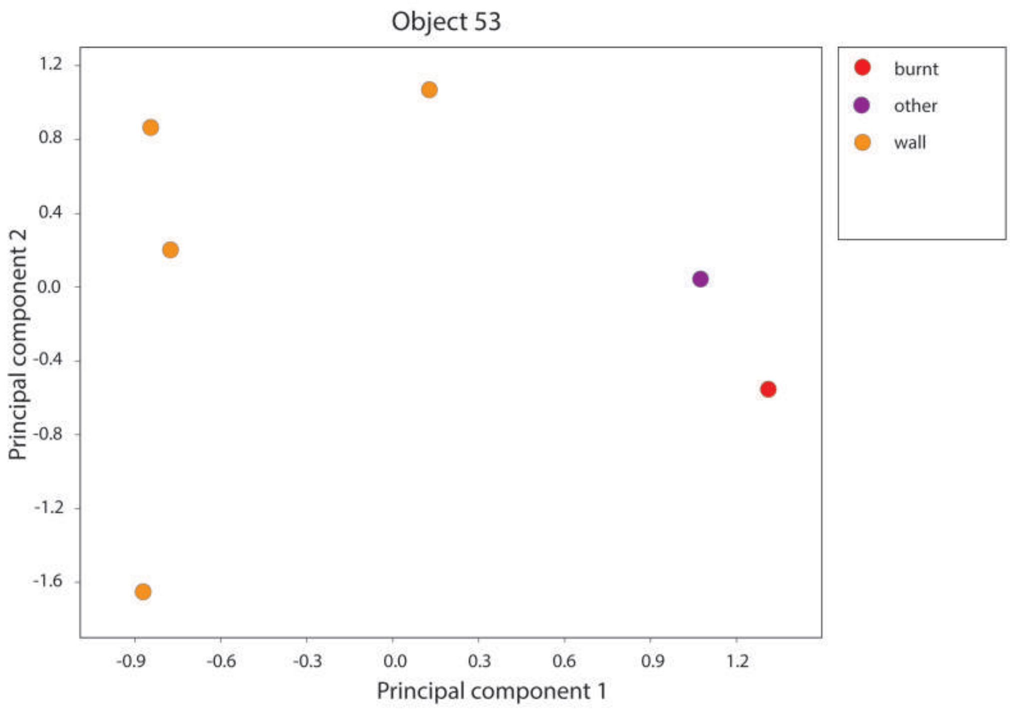

Figure 41.11 Scatter plot showing the principal component analysis results for the first two principal component axes, for O53 and its different category types. PC1 represents 67.9% and PC2 represents 13.7% of the total variance in the data.

Table 41.15 Sediment analysis results for samples from O85 (not including X-ray fluorescence results).

Object 85																	
				Magnetic Susceptibility (LF & HF = 10–6 m³ kg⁻¹)			**XRD: Selected major minerals (%)**					**Summary of particle size analysis**					
Sample no, context no and category	**Munsell colour**	**pH**	**LOI (%)**	**Mass spec (LF)**	**Mass spec (HF)**	**Frequency dependant mag sus (%)**	**Chlorite**	**Quartz**	**Calcite**	**Dolomite**	**Gypsum**	**% <2mm**	**% >2mm**	**% Clay**	**% Silt**	**% Sand**	
SA3642 (674) Wall	Yellowish Brown	8.1	4.4	1.7	1.7	1.9	4	38	16	3	33	56.8	43.2	10	35.7	54.3	

Table 41.16 X-ray fluorescence results for samples from O85.

Object 85																					
	XRF major elements (oxides converted to elements) (ppm)										**XRF minor elements (ppm)**										
Sample no. context no. and category	**Na**	**Mg**	**Al**	**S**	**P**	**K**	**Ca**	**Ti**	**Mn**	**Fe**	**V**	**Cr**	**Co**	**Ni**	**Cu**	**Zn**	**Pb**	**Rb**	**Sr**	**Y**	**Zr**
SA3642 (674) Wall	8531	23941	41070	77959	2008	13531	153730	4795	620	33642	121	82	16	33	31	62	25	37	570	26	316

Table 41.17 Sediment analysis results for samples from O56 (not including X-ray fluorescence results).

Object 56																
				Magnetic Susceptibility (LF & HF = 10–6 m³ kg⁻¹)			**XRD: Selected major minerals (%)**					**Summary of particle size analysis**				
Sample no, context no and category	**Munsell colour**	**pH**	**LOI (%)**	**Mass spec (LF)**	**Mass spec (HF)**	**Frequency dependant mag sus (%)**	**Chlorite**	**Quartz**	**Calcite**	**Dolomite**	**Gypsum**	**% <2mm**	**% >2mm**	**% Clay**	**% Silt**	**% Sand**
SA2304 (658) Other	Light Yellowish Brown	8.4	3.9	0.8	0.8	-2.4	4	43	15	2	28	74	26	11	36.6	52.4

Table 41.18 X-ray fluorescence results for samples from O56.

Object 56																					
	XRF major elements (oxides converted to elements) (ppm)										**XRF minor elements (ppm)**										
Sample no., context no. and category	**Na**	**Mg**	**Al**	**S**	**P**	**K**	**Ca**	**Ti**	**Mn**	**Fe**	**V**	**Cr**	**Co**	**Ni**	**Cu**	**Zn**	**Pb**	**Rb**	**Sr**	**Y**	**Zr**
SA2304 (658) Other	7864	22252	41917	83265	2095	13780	152086	5094	620	33572	125	73	18	31	31	59	21	28	490	28	351

17). The pisé matrix of (658) has sedimentary properties similar to those witnessed for the O33 and O75, the walls of which were characterised by their magnetic susceptibility, % sand, calcium (Ca), gypsum values and % silt fraction.

Structure O72 (Chapter 23)

Three samples were taken for sediment analysis from O72: one from the surrounding wall (1082); one from the dividing wall (988); and one from a midden and rubble accumulation (894) (Tables 41.19 and 41.20). Table 41.1 indicates the minimum, maximum, mean and standard deviation values for pH, LOI, Mag Sus, and the <2 mm:>2 mm ratio for all categories analysed from O72. The samples from (894) and dividing wall (988) are similar to each other, whilst the surrounding wall (1082) sample has a higher percentage of sand, a lower amount of quartz and calcite, and a high amount of gypsum compared to the other two samples.

A Pearson's Correlation Coefficient was calculated for the different sedimentological analyses (pH, LOI, Mag Sus, XRF, XRD, and % sand, silt, clay) on all samples from O72 to determine if any components group together, or influence each other. The very strong positive and negative correlations are presented in Table 41.21. There are no strong negative correlations and no strong positive correlations that were significant for O72. There are, however, many significant and very strong correlations involving the minerals for O72. Chlorite is negatively correlated with gypsum, as is quartz and calcite; dolomite on the other hand is positively correlated with gypsum, suggesting two distinct groupings of the minerals. Dolomite and gypsum are associated with manganese (Mn), whilst chlorite and calcite are negatively correlated with manganese (Mn); this confirms ideas that mineralogy plays a dominant role in the sedimentary characteristics of O72. Interestingly, some of the elements, which frequently positively correlate in other objects, are negatively correlated in O72: elements such as potassium (K) and titanium (Ti), and magnesium (Mg) and rubidium (Rb). However, there are some positive correlations between typically minerogenic components, such as between magnesium (Mg) and titanium (Ti), and potassium (K) and rubidium (Rb). As cobalt (Co) is positively correlated with

Table 41.19 Sediment analysis results for samples from O72 (not including X-ray fluorescence results).

Object 72																
				Magnetic Susceptibility (LF & HF = 10–6 m^3 kg^{-1})			XRD: Selected major minerals (%)					Summary of particle size analysis				
Sample no, context no and category	Munsell colour	pH	LOI (%)	Mass spec (LF)	Mass spec (HF)	Frequency dependant mag sus (%)	Chlorite	Quartz	Calcite	Dolomite	Gypsum	% <2mm	% >2mm	% Clay	% Silt	% Sand
SA3621 (894) Pise rubble	Light Yellowish Brown	7.8	6.4	1.3	1.2	2.5	5.0	42.0	21.0	2.0	17.0	70.1	29.9	10.7	40.6	48.7
SA3761 (1082) Wall	Brown	8.1	4.6	1.7	1.7	1.5	3.0	26.0	9.0	4.0	48.0	52.7	47.3	7.1	28.4	64.5
SA3760 (988) Wall	Yellowish Brown	8.1	4.7	1.0	0.9	4.3	6.0	47.0	23.0	2.0	15.0	75.1	24.9	17.4	41.4	41.2

Table 41.20 X-ray fluorescence results for samples from O72.

Object 72																					
	XRF major elements (oxides converted to elements) (ppm)										XRF minor elements (ppm)										
Sample no. context no. and category	Na	Mg	Al	S	P	K	Ca	Ti	Mn	Fe	V	Cr	Co	Ni	Cu	Zn	Pb	Rb	Sr	Y	Zr
SA3621 (894) pisé rubble	9051	29549	47527	68808	4059	15939	172383	6473	697	47631	154	95	23	45	36	89	24	41	624	25	351
SA3761 (1082) wall	8457	31177	48479	62411	3142	14445	152515	6713	774	51967	177	88	30	43	35	89	20	36	645	27	262
SA3760 (988) wall	6528	29006	49062	74685	2444	16437	170454	6413	697	43224	148	101	19	42	31	80	27	43	635	31	445

Table 41.21 Table summarising the strongest and significant (with p-values <0.05) variable associations as evidenced from the Pearson's product correlation coefficient results for O72.

Object 72			
Very strong negative correlations (r value between -1 & -0.8)	**Strong negative correlations (r value between -0.79 & -0.6)**	**Very strong positive correlations (r value between 1 & 0.8)**	**Strong positive correlations (r value between 0.79 & 0.6)**
Chlorite vs. Gypsum/ Chlorite vs. Mg/ Chlorites vs. Ti/ Chlorite vs. Mn/ Chlorite vs. V	none	Freq Dep Mag Sus vs. % clay	none
Quartz vs. Dolomite/ Quartz vs. Gypsum		Chlorite vs. K/ Chlorite vs. Rb	
Calcite vs. dolomite/ Calcite vs. Gypsum/ Calcite vs. Mn/ calcite vs. Fe		Quartz vs. Calcite	
Mg vs. K/ Mg vs. Rb		Dolomite vs. Gypsum/ Dolominte vs. Mn	
S vs. Co		Gypsum vs. Ti/ Gypsum vs. Mn	
K vs. Ti/ K vs. V		Na vs. Cu	
Ti vs. Rb		Mg vs. Ti/ Mg vs. V	
V vs. Rb		S vs. Cr/ S vs. Pb/ S vs. Zr	
Cr vs. Co/ Cr vs. % sand		K vs. Rb	
Co vs. Pb/ Co vs. Zr		Ti vs. V	
Pb vs. % sand		Cr vs. Pb/ Cr vs. Zr	
Sr vs. % silt		Co vs. % sand	
Zr vs. % sand		Pb vs. Zr	

the % sand fraction, and lead (Pb) negatively correlates with the % sand fraction, then cobalt (Co) and lead (Pb) are also negatively correlated. Similarly, because lead (Pb) and zirconium (Zr) are positively correlated, cobalt (Co) and zirconium (Zr) are negatively correlated. There are a number of correlations for O72 that have this natural opposition between positively correlated and negatively correlated variables.

A principal components analysis was conducted for all Objects and categories together, incorporating most sedimentary variables (pH, LOI, Mag Sus, XRF, XRD, and % sand, silt, clay) to identify possible distinct groupings between Objects and category types (Figure 41.3). The samples from Structure O72 plot some distance apart on the PCA scatter plot; this is especially true of the two wall samples. This distinction between the two wall samples has already been touched upon, but is made more visible on the PCA plot. Wall (1082) plots closer to the samples with higher proportions of sand, and close to wall 6241 from O56. Wall (988) plots in an area of the PCA graph that is controlled by higher proportions of silt and clay, with lower gypsum values, and is situated next to a floor sample from O64.

Structure O64 (Chapter 29)

Two samples were taken from O64; one from the upper floor (333) and one from the lower floor (335) (Tables 41.22 and 41.23). Table 41.1 indicates the minimum, maximum, mean and standard deviation values for pH, LOI, Mag Sus, and the <2 mm:>2 mm ratio for all categories analysed from Structure O64.

The two floor samples have similar pH, LOI, frequency dependent magnetic susceptibility and particle size readings. Many of the mineral values are also alike, except with regards to gypsum values; the sample from floor (333) contains relatively increased gypsum in comparison to floor (335) (Table 41.22). Elemental ppm values (Table 41.23) are comparable for both floor samples. The two floor samples analysed from two different floors have virtually identical sedimentological signatures, making it possible that they were formed from related source materials and were probably constructed in a similar way.

A principal components analysis was conducted for all Objects and categories together, incorporating most sedimentary variables (pH, LOI, Mag Sus, XRF, XRD, and % sand, silt, clay) to identify possible distinct groupings among Objects and category types (Figure 41.3). O64 samples plot close together and close to the floor samples of O11 and O45. Their location on the PCA graph suggests that the presence of predominately clays and silts, and to some extent calcite, and quartz in their matrix are key factors in how they group.

Pit O14 (Chapter 29)

Four sediment samples were analysed from O14, all were samples from the plaster lining (537) of the pit (O14) (Tables 41.24 and 41.25). Table 41.1 indicates the minimum, maximum, mean and standard deviation values for pH, LOI, Mag Sus and the <2 mm:>2 mm ratio for all categories analysed from O14.

Table 41.22 Sediment analysis results for samples from O64 (not including X-ray fluorescence results).

Object 64																
				Magnetic Susceptibility (LF & HF = 10–6 m^3 kg^{-1})			XRD: Selected major minerals (%)					Summary of particle size analysis				
Sample no., context no. and category	**Munsell colour**	**pH**	**LOI (%)**	**Mass spec (LF)**	**Mass spec (HF)**	**Frequency dependant mag sus (%)**	**Chlorite**	**Quartz**	**Calcite**	**Dolomite**	**Gypsum**	**% <2mm**	**% >2mm**	**% Clay**	**% Silt**	**% Sand**
SA3619 (335) Floor	Yellowish Brown	8.1	5.8	1.4	1.3	1.5	7.0	48.0	27.0	1.0	5.0	71.6	28.4	14.9	47.1	38.0
SA3768 (333) Floor	Yellowish Brown	8.0	5.4	1.3	1.3	2.2	3.0	50.0	25	1.0	13.0	74.0	26.0	13.9	45.0	41.1

Table 41.23 X-ray fluorescence results for samples from O64.

Object 64																					
	XRF major elements (oxides converted to elements) (ppm)										XRF minor elements (ppm)										
Sample no, context no and category	**Na**	**Mg**	**Al**	**S**	**P**	**K**	**Ca**	**Ti**	**Mn**	**Fe**	**V**	**Cr**	**Co**	**Ni**	**Cu**	**Zn**	**Pb**	**Rb**	**Sr**	**Y**	**Zr**
SA3619 (335) Floor	9199	30453	50967	77221	3710	16271	155660	6773	774	49659	169	102	29	46	42	95	12	42	576	29	345
SA3768 (333) Floor	8235	27559	46997	77674	3884	15524	156231	6113	697	43784	149	90	26	41	38	88	25	36	558	29	354

All four of these samples are consistent regarding their pH and LOI values, and to some extent their magnetic susceptibility percentage (Table 41.24). Sample SA3622 has an extremely high frequency dependent magnetic susceptibility value. The reliability of this measurement could not be confirmed without re-analysis, so this reading was removed from the results table and has been replaced with N/A. With regard to the mineral composition, the two samples of light yellowish-brown colour have relatively lower % sand values; they also have low values of gypsum compared to the other two plaster lining samples from the same pit feature.

A Pearson's Correlation Coefficient was calculated for the different sedimentological analyses (pH, LOI, Mag Sus, XRF, XRD, and % sand, silt, clay) on all samples from O14 to determine if any components group together or influence each other. The very strong positive and negative correlations are presented in Table 41.26. There are no strong negative correlations and no strong positive correlations that were significant for O14. There are very strong positive correlations between typically minerogenic elements, including titanium (Ti), iron (Fe), magnesium (Mg), aluminium (Al) and manganese (Mn). There are also very strong negative correlations between calcium (Ca) and typically minerogenic elements like cobalt (Co), nickel (Ni), copper (Cu) and zinc (Zn). Calcium (Ca) is negatively correlated with the % sand fraction and positively correlated with dolomite. Dolomite is therefore negatively correlated with the suite of minerogenic elements. The minerogenic type elements have no correlations with any of the other minerals. Phosphorus (P) shows positive correlations with many minerogenic elements and the % sand fraction.

A principal components analysis was conducted for all Objects and categories together, incorporating most sedimentary variables (pH, LOI, Mag Sus, XRF, XRD, and % sand, silt, clay) to identify possible distinct groupings among Objects and category types (Figure 41.3). O14 plaster lining samples plot close together on the PCA scatterplot but are not tightly clustered in one area: they

Table 41.24 Sediment analysis results for samples from O14 (not including X-ray fluorescence results).

Object 14																		
				Magnetic Susceptibility (LF & HF = 10–6 $m^3 kg^{-1}$)			XRD: Selected major minerals (%)											
Sample no., context no. and category	Munsell colour	pH	LOI (%)	Mass spec (LF)	Mass spec (HF)	Frequency dependant mag sus (%)	Chlorite	Quartz	Calcite	Dolomite	Gypsum	% <2mm	% >2mm	% Clay	% Silt	% Sand
SA3622 (537) Plaster lining	Light Yellowish Brown	8.3	4.5	0.9	0.5	N/A	5.0	55.0	30.0	4.0	2.0	82.1	17.9	21.3	53.9	24.8
SA3624 (537) Plaster lining	Yellowish Brown	8.2	5.5	0.9	0.9	2.8	4.0	37.0	21.0	2.0	28.0	85.8	14.2	16.4	46.3	37.3
SA3623 (537) Plaster lining	Pale Brown	8.4	4.4	1.4	1.3	1.4	6.0	45.0	26.0	1.0	14.0	83.9	16.1	16.6	43.9	39.6
SA3625 (537) Plaster lining	Light Yellowish Brown	8.2	4.6	0.7	0.7	3.0	4.0	46.0	32.0	3.0	8.0	95.8	4.2	16.0	55.2	28.9

Table 41.25 X-ray fluorescence results for samples from O14.

Object 14																					
	XRF major elements (oxides converted to elements) (ppm)										XRF minor elements (ppm)										
Sample no., context no. and category	Na	Mg	Al	S	P	K	Ca	Ti	Mn	Fe	V	Cr	Co	Ni	Cu	Zn	Pb	Rb	Sr	Y	Zr
SA3622 (537) Plaster lining	6232	23277	42340	69598	2531	14777	205474	5214	620	32034	120	87	17	35	29	66	27	39	517	31	444
SA3624 (537) Plaster lining	9347	25147	42181	68892	2968	14279	175742	5394	620	37139	125	90	23	40	34	73	21	39	619	28	348
SA3623 (537) Plaster lining	8828	29247	50332	74517	3273	16188	158733	6593	697	48051	172	113	27	47	44	87	18	41	555	31	375
SA3625 (537) Plaster lining	6603	24121	43663	75139	2793	14528	188321	5514	620	36020	133	85	22	36	34	70	27	36	552	34	402

mainly overlap with floors from O11, O64 and O75 and the 'other' samples from O33 and O91, which are a pisé block and red painted pisé respectively (Figure 41.3). The evident variation in the plaster samples could be because the four samples represent different re-plastering episodes of the same pit lining, and therefore differences in the selection of source material, construction and/or post-depositional alterations. The PCA eigenvalues for individual variables suggest that mineralogy and grain size are probable a driving force in the distinctions between the samples.

Structure O33 (Chapter 30)

Three sediment samples were analysed from O33, one from a pisé block coming from the infill of (117) (categorised as 'other') and two from wall (381=1083) (Tables 41.27 and 41.28). Table 41.1 indicates the minimum, maximum, mean and standard deviation values for pH, LOI, Mag Sus, and the <2 mm:>2 mm ratio for all categories analysed from O33.

The two wall samples are comparatively consistent in their sedimentary characteristics, apart from the <2 mm:>2 mm % ratio, which identifies more material above 2 mm for wall sample SA3766. In contrast to the wall samples, the pisé block sample categorised as 'other', which was identified in section and is similar to a mudbrick, has a lower percentage of sand particles, a higher presence of quartz, and a lower amount of gypsum (Table 41.27). Geochemically, the 'other' sample has similar elemental values compared to the wall samples (Table 41.28), but there are some dissimilarities between all three samples for certain elements like titanium (Ti) and manganese (Mn).

A Pearson's Correlation Coefficient was calculated for the different sedimentological analyses (pH, LOI,

Table 41.26 Table summarising the strongest and significant (with p-values <0.05) variable associations as evidenced from the Pearson's product correlation coefficient results for O14.

Object 14			
Very strong negative correlations (r value between -1 & -0.8)	**Strong negative correlations (r value between -0.79 & -0.6)**	**Very strong positive correlations (r value between 1 & 0.8)**	**Strong positive correlations (r value between 0.79 & 0.6)**
Quartz vs. Sr	None	pH vs. Chlorite	None
Calcite vs. Sr		Dolomite vs. Ca/ Dolomite vs. Pb	
Dolomite vs. Mg/ Dolomite vs. P/ Dolomite vs. Fe/ Dolomite vs. Co/ Dolomite vs. Ni/ Dolomite vs. Cu/ Dolomite vs. Zn/ Dolomite vs % sand		Mg vs. Ti/ Mg vs. Mn/ Mg vs. Fe/ Mg vs. Cr/ Mg vs. Ni/ Mg vs. Cu/ Mg vs. Zn	
Gypsum vs. Zr		Al vs. K/ Al vs. Ti/ Al vs. Mn/ Al vs. V	
Mg vs. Ca		P vs. Fe/ P vs. Co/ P vs. Ni/ P vs Cu	
		P vs. Zn/ P vs. % sand	
P vs. Ca			
		K vs. Mn	
Ca vs. Fe/ Ca vs. Co/ Ca vs. Ni/ Ca vs. Cu/ Ca vs. Zn/ Ca vs. % sand			
		Ti vs. Mn/ Ti vs. Fe/ Ti vs. V/ Ti vs. Cu/ Ti vs. Zn	
Ni vs. Pb			
		Mn vs. V/ Mn vs. Cr	
		Fe vs. V/ Fe vs. Ni/ Fe vs. Cu/ Fe vs. Zn	
		V vs. Cu	
		Cr vs. Ni/ Cr vs. Zn	
		Ni vs. Zn	
		Cu vs. Zn	
		Pb vs. % silt	

Table 41.27 Sediment analysis results for samples from O33 (not including X-ray fluorescence results).

Object 33																
				Magnetic Susceptibility (LF & HF = 10–6 $m^3\ kg^{-1}$)			**XRD: Selected major minerals (%)**					**Summary of particle size analysis**				
Sample no., context no. and category	**Munsell colour**	**pH**	**LOI (%)**	**Mass spec (LF)**	**Mass spec (HF)**	**Frequency dependant mag sus (%)**	**Chlorite**	**Quartz**	**Calcite**	**Dolomite**	**Gypsum**	**% <2mm**	**% >2mm**	**% Clay**	**% Silt**	**% Sand**
SA3767 (117) Other	Light Yellowish Brown	8.5	4.1	0.8	0.8	4.1	4.0	51.0	26.0	5.0	5.0	75.0	25.0	18.0	48.5	33.5
SA3766 (381) Wall	Yellowish Brown	8.4	4.7	0.7	0.7	5.5	3.0	27.0	18.0	2.0	45.0	69.0	31.0	13.7	41.4	44.8
SA3765 (1083) Wall	Strong Brown	8.1	4.3	0.6	0.6	5.7	2.0	24.0	14.0	3.0	52.0	87.2	12.8	12.1	44.4	43.5

Table 41.28 X-ray fluorescence results for samples from O33.

Object 33																					
	XRF major elements (oxides converted to elements) (ppm)										XRF minor elements (ppm)										
Sample no., context no. and category	Na	Mg	Al	S	P	K	Ca	Ti	Mn	Fe	V	Cr	Co	Ni	Cu	Zn	Pb	Rb	Sr	Y	Zr
SA3767 (117) Other	6603	26172	43610	78597	2269	15109	176100	5634	620	36650	116	81	19	40	36	74	25	40	560	29	398
SA3766 (381) Wall	6528	24785	41758	75743	2837	14279	170096	4615	542	32523	119	77	19	33	33	64	24	38	670	28	335
SA3765 (1083) Wall	5341	18453	37524	70135	1702	10626	184176	4435	465	28537	137	65	17	28	34	49	24	28	470	24	299

Mag Sus, XRF, XRD, and % sand, silt, clay) on all samples from O33 to determine if any components group together or influence each other. The very strong positive and negative correlations are presented in Table 41.29. There are no strong negative correlations and no strong positive correlations that were significant for O33. There are very strong negative correlations between the frequency dependant magnetic susceptibility values and quartz, gypsum and titanium (Ti). There are also negative associations between quartz and gypsum, and quartz and titanium (Ti). Gypsum is positively correlated with the % sand fraction and calcite with the % clay fraction. Very strong positive correlations exist for the typically minerogenic elements like titanium (Ti), magnesium (Mg), aluminium (Al), rubidium (Rb) and potassium (K), to name only some, creating a large group of clastic elements which all have very strong associations with each other. Negatively correlated with this suite of minerogenic elements is vanadium (V), which is usually seen positively associated with these elements in other objects. Calcium only appears once in the list of very strong correlations, here negatively correlating with phosphorus (P), which is unusual as calcium (Ca) is a key element in many of the other significant correlations for other Objects.

A principal components analysis was conducted for all Objects and categories together, incorporating most sedimentary variables (pH, LOI, Mag Sus, XRF, XRD, and % sand, silt, clay) to identify possible distinct groupings between Objects and category types (Figure 41.3). O33 samples plot close together. The wall samples overlap with the wall samples of O75 and O85. It is likely, therefore, that the walls from these three Objects were crafted in a similar fashion. The principal components eigenvalues for each variable suggest that the walls locations at the negative end of PC1 and central locations on PC2 is mainly driven by magnetic susceptibility values, % sand, calcium (Ca) and gypsum, but also the % silt fraction. The 'other' sample that plots with the floor samples of O75 and the plaster lining samples of O14 likely does so because it is finer-grained than the wall samples, and thus plots where the % silt fraction controls the PCA. The 'other' sample is also categorised differently compared to the wall samples on the PCA because it has much higher levels of quartz.

Surface O91 (Chapter 37)

One sediment sample was analysed from O91 from an external surface (734) (Tables 41.30 and 41.31). The results for this sample show that it has a very fine particle size compared to the other samples analysed in other objects; only 8% of the sediment is >2 mm (Table 41.1). A negative frequency dependent magnetic susceptibility reading for this sample is due to the fact that it has large amounts of quartz and calcite.

A principal components analysis was conducted for all Objects and categories together, incorporating most sedimentary variables (pH, LOI, Mag Sus, XRF, XRD, and % sand, silt, clay) to identify possible distinct groupings among Objects and category types (Figure 41.3). The O91 sample plots close to floor samples from O75, the pisé block from O33 and the plaster linings from O14. This sample is clearly similar to other samples with finer particle sizes, having predominately silt signatures.

Structure O75 (Chapter 38)

Seven sediment samples were analysed from O75 (Tables 41.32 and 41.33): four are from the surrounding wall (543); two are from the mud-plaster floor (771), and one is from the mud–plaster surface on lower bench (713). Table 41.1 indicates the minimum, maximum, mean and standard deviation values for pH, LOI, Mag Sus, and the <2 mm:>2 mm ratio for all categories analysed from O75.

All of the wall (543) samples have a higher percentage of sand than the floor (771) samples. One of the floor samples (SA3630) is distinct because of its especially high pH value of 8.8. On average, there is a higher pH in the floor compared with the walls (Table 41.1). The wall and floor from O75 are also significantly different from each other with regard to their mineral composition (Table 41.32); the floor has relatively high values of quartz and calcite, whilst the wall has relatively high levels of gypsum.

A Pearson's Correlation Coefficient was calculated for the different sedimentological analyses (pH, LOI, Mag Sus, XRF, XRD, and % sand, silt, clay) on all samples from O75 to determine if any components group together or influence each other. The positive and negative correlations are presented in Table 41.34. The negative correlations from O75 show that there are many elements that are negatively

Table 41.29 Table summarising the strongest and significant (with p-values <0.05) variable associations as evidenced from the Pearson's product correlation coefficient results for O33.

Object 33			
Very strong negative correlations (r value between -1 & -0.8)	**Strong negative correlations (r value between -0.79- & -0.6)**	**Very strong positive correlations (r value between 1 & 0.8)**	**Strong positive correlations (r value between 0.79 & 0.6)**
Freq Dep Mag Sus vs. Quartz/ Freq Dep Mag Sus vs. Gypsum/ Freq Dep Mag Sus vs. Ti	none	pH vs. Al/ pH vs. S/ pH vs. Zn	none
Quartz vs. Gypsum/ Quartz vs. Ti		Chlorite vs. Mn/ Chlorite vs. Fe	
Gypsum vs. Pb		Calcite vs. Zr/ Calcite vs. % clay	
Mg vs. V		Gypsum vs. % sand	
P vs. Ca		Na vs. Co	
K vs. V		Mg vs. K/ Mg vs. Cr/ Mg vs. Rb/ Mg vs. Y	
V vs. Rb/ V vs. Y/ V vs. Zr		Al vs. S/ Al vs. Cr/ Al vs. Zn	
		S vs. Zn	
		K vs. Cr/ K vs. Rb/ K vs. Y	
		Mn vs. V	
		Fe vs. Ni	
		Cr vs. Y	
		Ni vs. Zr	
		Rb vs. Y	

Table 41.30 Sediment analysis results for samples from O91 (not including X-ray fluorescence results).

Object 91																
				Magnetic Susceptibility (LF & HF = 10-6 m3 kg-1)			**XRD: Selected major minerals (%)**									
Sample no, context no and category	**Munsell colour**	**pH**	**LOI (%)**	**Mass spec (LF)**	**Mass spec (HF)**	**Frequency dependant mag sus (%)**	**Chlorite**	**Quartz**	**Calcite**	**Dolomite**	**Gypsum**	**% <2mm**	**% >2mm**	**% Clay**	**% Silt**	**% Sand**
SA2988 (734) Other	Greyish Brown, Dark Red	8.3	4.9	0.9	1.0	-4.8	4.0	40.0	22.0	2.0	23.0	92.0	8.0	12.9	50.1	37.0

Table 41.31 X-ray fluorescence results for samples from O91.

Object 91																					
	XRF major elements (oxides converted to elements) (ppm)										**XRF minor elements (ppm)**										
Sample no., context no. and category	**Na**	**Mg**	**Al**	**S**	**P**	**K**	**Ca**	**Ti**	**Mn**	**Fe**	**V**	**Cr**	**Co**	**Ni**	**Cu**	**Zn**	**Pb**	**Rb**	**Sr**	**Y**	**Zr**
SA2988 (734) Other	6603	24302	40805	75155	3099	15192	178244	5214	620	36160	128	87	19	36	42	73	47	37	594	24	360

Table 41.32 Sediment analysis results for samples from O75 (not including X-ray fluorescence results).

Object 75																
				Magnetic Susceptibility (LF & HF = 10–6 m^3 kg^{-1})			XRD: Selected major minerals (%)					Summary of particle size analysis				
Sample no, context no and category	Munsell colour	pH	LOI (%)	Mass spec (LF)	Mass spec (HF)	Frequency dependant mag sus (%)	Chlorite	Quartz	Calcite	Dolomite	Gypsum	% <2mm	% >2mm	% Clay	% Silt	% Sand
SA3630 (771) Floor	Light Yellowish Brown	8.8	4.2	0.8	0.8	4.2	3.0	59.0	28.0	3.0	0.0	92.1	7.9	16.1	55.6	28.3
SA3631 (771) Floor	Light Brown	8.1	4.6	0.9	0.9	3.5	5.0	55.0	26.0	2.0	2.0	85.5	14.5	14.7	54.4	30.9
SA3627 (713) Floor	Light Yellowish Brown	8.2	5.8	0.8	0.8	2.6	3.0	52.0	31.0	3.0	6.0	85.6	14.4	16.2	52.3	31.4
SA6155 (543) Wall	Light Brown	8.2	5.1	0.8	0.8	2.9	3.0	24.0	14.0	0.0	53.0	86.4	13.6	9.7	48.4	41.9
SA6156 (543) Wall	Brown	8.1	6.9	0.9	0.9	2.2	4.0	34.0	14.0	3.0	40.0	74.8	25.2	13.3	44.9	41.7
SA6157 (543) Wall	Light Brown	8.1	6.7	0.8	0.8	5.9	4.0	45.0	15.0	0.0	28.0	78.7	21.3	16.2	42.6	41.2
SA6158 (543) Wall	Brown	8.2	5.3	0.9	0.9	4.1	4.0	32.0	17.0	0.0	31.0	73.3	26.7	18.1	48.0	33.9

Table 41.33 X-ray fluorescence results for samples from O75.

Object 75																					
	XRF major elements (oxides converted to elements) (ppm)										XRF minor elements (ppm)										
Sample no., context no. and category	Na	Mg	Al	S	P	K	Ca	Ti	Mn	Fe	V	Cr	Co	Ni	Cu	Zn	Pb	Rb	Sr	Y	Zr
SA3630 (771) Floor	6009	23157	42605	75659	3011	15275	158018	5754	620	36860	115	82	17	41	36	76	14	40	486	27	428
SA3631 (771) Floor	5712	23941	44404	72788	2968	15690	162163	5933	620	39867	135	91	14	38	39	77	24	41	515	28	415
SA3627 (713) Floor	6454	23157	40276	70756	2444	14860	169024	5454	620	34831	118	84	16	34	48	69	19	41	547	24	381
SA6155 (543) Wall	6009	19357	33660	55359	2226	12120	180745	4795	542	30565	96	69	14	34	29	62	19	34	570	19	297
SA6156 (543) Wall	8457	23880	39958	60598	1964	13614	176171	5514	620	35811	131	71	15	35	32	70	16	33	578	22	312
SA6157 (543) Wall	7122	22915	42075	65182	1746	14611	172955	4675	542	29865	106	84	16	33	30	62	20	34	521	24	274
SA6158 (543) Wall	5712	21951	41546	68926	2008	14777	168167	4795	542	30285	107	70	11	35	30	65	15	37	516	24	321

correlated with the % sand fraction, including sulphur (S), potassium (K) and rubidium (Rb). In contrast, calcium (Ca), yttrium (Y) and strontium (Sr), are all strongly associated with the % sand fraction. Interestingly, calcium (Ca) and strontium (Sr) do not show positive correlations with calcite, which may be expected; instead calcium (Ca), which is positively correlated with strontium (Sr), is very strongly correlated with gypsum. Dolomite, which is very strongly negatively correlated with gypsum, relates more with typically minerogenic elements like titanium (Ti), iron (Fe), zinc (Zn) and zirconium (Zr). These elements, as well as aluminium (Al), manganese (Mn), vanadium (V) and nickel (Ni) are all positively correlated. Alongside the more minerogenic elements, % clay, and % silt correlations can suggest a positive association between clastic material and finer grain sizes.

The PSD ternary plot for samples analysed in O75 show that the particle size is similar in all samples, even

Table 41.34 Table summarising the strongest and significant (with p-values <0.05) variable associations as evidenced from the Pearson's product correlation coefficient results for O75.

Object 75			
Very strong negative correlations (r value between -1 & -0.8)	**Strong negative correlations (r value between -0.79- & -0.6)**	**Very strong positive correlations (r value between 1 & 0.8)**	**Strong positive correlations (r value between 0.79 & 0.6)**
LOI vs. Calcite/ LOI vs. P/ LOI vs. % silt	pH vs. Gypsum	pH vs. Ni	Mg vs. K/ Mg vs. Y/ S vs. Zr
Quartz vs. Sr	LOI vs. Ni	LOI vs. Na	P vs. Fe
Calcite vs. Sr	Calcite vs. Ca/ Calcite vs. % sand	Quartz vs. Calcite	Mn vs. Zr
Dolomite vs. Gypsum	Gypsum vs. K/ Gypsum vs. Rb/ Gypsum vs. Y	Dolomite vs. Ti/ Dolomite vs. Mn/ Dolomite vs. Fe/ Dolomite vs. Zn/ Dolomite vs. Zr	Cr vs. Y
Gypsum vs. P/ Gypsum vs. Ni/ gypsum vs. Zn/ Gypsum vs. Zr	Al vs. Ca	Gypsum vs. Ca	Sr vs. % sand
S vs. Ca/ S vs. Sr/ S vs. % sand	K vs. Sr	Mg vs. Al/ Mg vs. V	Y vs. % sand
K vs. Ca/ K vs. % sand	Zr vs. % sand	Al vs. S/ Al vs. K/ Al vs. Y/ Al vs. % clay	
Ca vs. Ni/ Ca vs. Rb/ Ca vs. Y/ Ca vs. Zr		S vs. K/ S vs, Rb/ S vs. Y/ S vs. % clay	
Rb vs. % sand		P vs. Ni/ P vs. Zn/ P vs. Rb/ P vs. Zr/ P vs. % silt	
Sr vs. Y		K vs. % clay	
Y vs. % sand		Ca vs. Sr/ Ca vs % sand	
Zr vs. % sand		Ti vs. Mn/ Ti vs. Fe/ Ti vs. V/ Ti vs. Zn/ Ti vs. Zr	
		Mn vs. Fe/ Mn vs. V/ Mn vs. Zn	
		Fe vs V/ Fe vs. Zn/ Fe vs. Zr	
		Ni vs. Zn/ Ni vs. Zr	
		Cu vs. Rb/ Zn vs. Zr	
		Rb vs. Zr	
		Zr vs. % silt	

though the wall and floor samples do cluster separately (Figure 41.12). The clearest distinction is that the wall (543) samples have a higher percentage of sand than the floor (771)/(713) samples, but this distinction is negligible.

A principal components analysis was conducted for all Objects and categories together, incorporating most sedimentary variables (pH, LOI, Mag Sus, XRF, XRD, and % sand, silt, clay) to identify possible distinct groupings between Objects and category types (Figure 41.3). O75 samples vaguely plot in the same graphical space and have some overlap with samples from O14, O33, O56 and O85. A PCA was also produced for samples only from O75 to make patterns among category groupings clearer; this is presented in Figure 41.13.

It is evident, based on the full suite of sedimentary characteristics, that there is a clear difference between the composition of the wall and floor samples in O75. Wall samples are situated to the far left of the graph, whilst the floor samples are situated to the right, suggesting the PC1 is a significant driver of the distinction between the samples. PC1 represents 52.1% of the total variance in the samples. The underlying properties driving PC1 are similar to those seen in both the correlation analysis and the tri-plot data. At the negative end of PC1, values are driven by higher levels of calcium (Ca), gypsum and % sand, whilst at the positive end, values are driven by a suite of minerogenic element types, % silt and clay, dolomite, and calcite. Both mineralogy and grain size are important in the distinctions seen in the PCA (Figure 41.13). PC2 represents 18.2% of the total variance in the samples. Magnetic susceptibility and chlorite values plot towards the negative end of PC2, and manganese (Mn), vanadium (V), sodium (Na) and strontium (Sr) plots towards the positive end. Whilst it is unknown what this axis represents in terms of sediment parameters, it is clear that wall sample SA6156 does not group with the other wall samples because of its higher strontium (Sr) and sodium (Na) values.

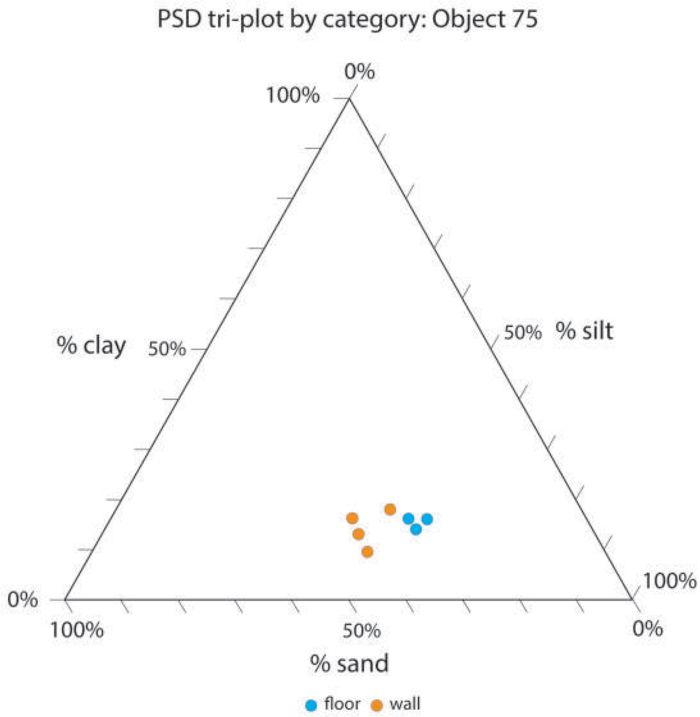

Figure 41.12 Tri-plot showing the tri-variate data of sand, silt and clay % by category type for O75.

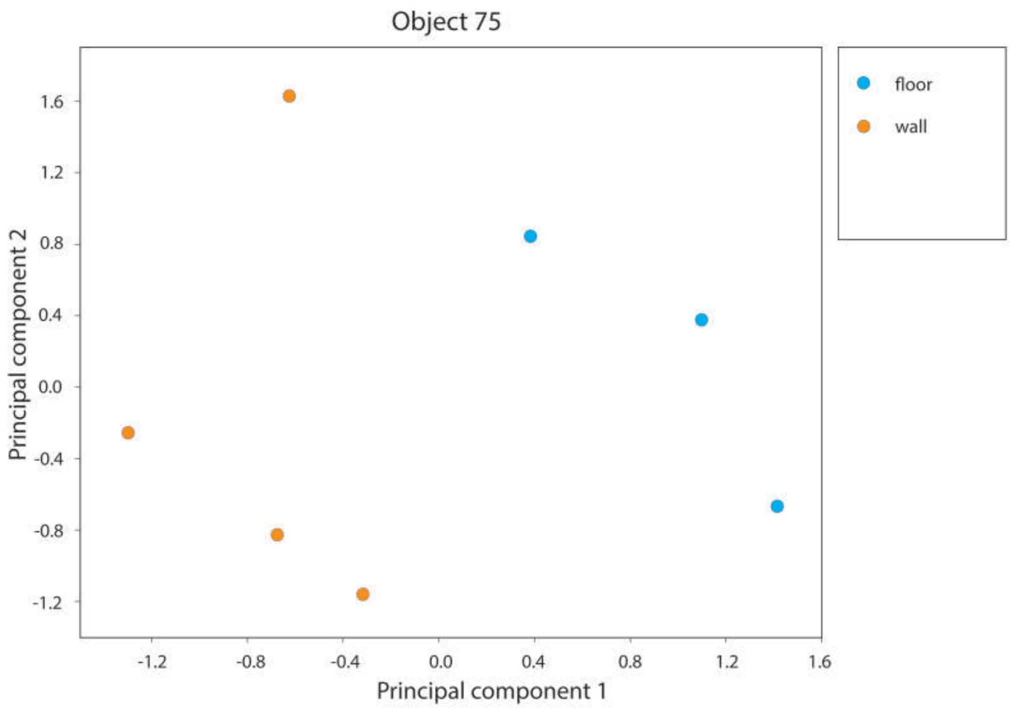

Figure 41.13 Scatter plot showing the principal component analysis results for the first two principal component axes, for O75 and its different category types. PC1 represents 52.1% and PC2 represents 18.2% of the total variance in the data.

Part 4

Conclusions

42. The chronology and cultural phases of WF16

In this chapter we draw on the stratigraphy (Chapters 5–38), the chipped stone (Chapter 39) and the radiocarbon dating (Chapter 40) to propose a chronology for the establishment, development and cessation of activity at WF16. We propose three broad phases of PPNA activity at WF16, representing the local evolution of the community within its regional context of cultural, economic and technological change. It is important to note that this phasing is a simplified model of what was probably a continuous process of change and development.

42.1 WF16 Phase 1: *c.* 11.84–*c.* 11.30 ka cal BP

The radiocarbon dating suggests that activity at WF16 is likely to have started by 11.84 ka cal BP. The chronological problems posed by old wood effects and the possibility of significant recycling of wood through reuse of timbers and the recycling of charcoal during construction processes are discussed in Chapter 40. We cannot discount the possibility of earlier activity, because the excavation did not reach the base of the cultural deposits, but we assume that any such activity would most probably simply push the start of the PPNA occupation earlier. A substantial Epipalaeolithic presence is unlikely given the absence of clearly Epipalaeolithic tool forms at the site and our understanding of the site's taphonomy, which suggests that some of these would have been recycled by construction activities during the PPNA. Similarly, no charcoal from Epipalaeolithic activity is represented within our radiocarbon sample. The size and diversity of microlith forms within the WF16 PPNA chipped stone assemblage are not typical of a Late Natufian assemblage (e.g. Grosman *et al.* 2016), and microlithic tool forms are a recognised component of several Southern Levantine PPNA assemblages (e.g. Gopher and Barkai 1997; Nadel 1997; Pirie 2007). Nevertheless, our assumption is that the PPNA at WF16 derived from a local Late Natufian without a sharp Epipalaeolithic–Neolithic division.

The Summed Calibrated Probability Distribution (SCPD) of the radiocarbon dates suggests that the first 500 years of activity at WF16 was relatively low intensity (Figure 40.5), while recognising that the SCPD might be biased due to the limited excavation of early layers and structures. Structure F8 in Trench 2 seems likely to be part of this early activity, given the radiocarbon evidence indicating that these had been established by *c.* 11.74 ka cal BP, and that they were cut into the gravel knoll itself, rather than into pre-existing structures (Finlayson and Mithen 2007, 175–190). This structure consisted of a circular pit lined with boulders and stones that were bonded by mud mortar. The initial floor incorporated a burial pit, apparently marked by a protruding skull, which had been reopened on at least one occasion. A cup-hole mortar had also been embedded into the floor. With the exception of the burial and the accumulation of secondary floor surfaces, the construction within Trench 2 is similar to those within the Late Natufian, notably within the Harifian of the Negev (Finlayson *et al.* 2011). The chipped stone associated with Structure F8 (Pirie 2007) is of Assemblage Type A (Chapter 39)

On stratigraphic grounds, another, potentially, Phase 1 structure is O73, which is below Structure O74 and Midden O69 in the northwest area of the Trench. The chipped stone from Structure O73 has been assigned to Assemblage Type A, featuring both El-Khiam points and microliths. As with Structure F8, the O73 wall consists of stone held together by mud mortar. While we cannot exclude the possibility that this is the stone core of a badly degraded pisé wall, Structures O73 and F8 suggest the initial use of a stone and mud mortar construction technique at WF16. If we are correct in assigning Structure

O73 to Phase 1 activity, this implies that the underlying Structure O90, represented by a small arc of walling, a remnant of floor and two small features, also derives from Phase 1 of the settlement. No samples of chipped stone from O90 have yet been analysed.

42.2 WF16 Phase 2: *c.* 11.30–*c.* 10.80 ka cal BP

Phase 2 incorporates the majority of the PPNA activity identified by excavation at WF16. This phase is characterised by architecture in the form of semi-subterranean, pisé-built structures which are associated with chipped stone assemblage of Type A. Identification of change within Phase 2 is not possible because, beyond Structures F8 and O73, it is difficult to identify any one structure, or group of structures, likely to be earlier than others. Although in the northern part of the trench we have a stratigraphic sequence of Structure O75 followed by Surface O91 and Structure O100, all prior to the accumulation of Midden O60, the radiocarbon evidence suggests that these structures were erected in quick succession: we have best estimates of *c.* 11.28 ka cal BP for construction of a secondary floor horizon in O75 and of *c.* 11.18 ka cal BP for the lower courses of the external wall of O100. Moreover, the manner in which Structures O74, O33, O64 and O65 are aligned with the exterior wall of O75, suggests contemporary design and construction during Phase 2. This notion is supported by the similarity of the pisé mix used to construct O75 and O33, and the most likely date for activity on the floor of O33 that is centred on *c.* 11.13 ka cal BP. However, in this context it is significant that excavation did not reach the earliest levels of Structure O75, and the sondage through the floor (1823) of Structure O75 identified a considerable complexity of underlying archaeological deposits including a series of intercutting pits and a basin with black plastered surfaces. The small size of the sondage prevented any insights as to whether these had simply preceded the laying of the floor horizon in O75 while being an integral part of that structure, or if they relate to a completely separate phase of activity.

The chipped stone associated with O75 deposits is Assemblage Type A. That from O91, and that from the lowest sampled levels of Midden O60, is Assemblage Type B, although we note that cultural and functional influences are especially hard to unravel within this small sample of contexts. The chipped stone assemblages from Structure O100 suggest a gradual transition during the course of its construction and use from Assemblage Type A to Assemblage Type C, via intermediary Assemblage Type B (Chapter 39). The full expression of Assemblage Type C does not appear until the final activity in this area, associated with pits cut into O100, suggesting the changes in architecture that characterise Phase 3 preceded chipped stone developments. On the basis of its dates, architecture and developing associated chipped stone technology we place the initial construction of Structure O100 at the end of Phase 2, associated with a continuing presence of Type A chipped stone, and with its occupation and modification falling within Phase 3. The transition from chipped stone Assemblage Type A to Type B is one of several indicators of development and change within the settlement during the WF16 Phase 2 time period of *c.* 11.30–10.80 ka cal BP.

The excavation did not allow stratigraphic relationships to be established between this cluster of structures at the northern end of the Trench and those in the central and southern area, notably the cluster of O45, O11, O53 and O12. Our best estimate for activity within O11 is *c.* 11.21 ka cal BP, and we estimate that the fire that destroyed O45 occurred at *c.* 10.82 ka cal BP. We suspect that O45, O11, O53 and O12 were in contemporary use, along with the cluster associated with O75, with all this activity falling within the intense 350-year period of activity centred on *c.* 11.25 ka cal BP as established by the SCPD (Figure 40.5). This activity is all associated with chipped stone Assemblage Type A (Chapter 40), showing continuity from Phase 1.

With the exception of Phase 1 structures (F8 and O73), Structure O100, those in Trench 3 (Finlayson and Mithen 2007, 190–200), and remnants of stone walls in the overburden, all of the WF16 structures were constructed on the basis of semi-subterranean pits, either cut or cleared between existing structures. These pits were lined with pisé, this extending above the ground to form free-standing walls with what we assume were flat roofs. These construction methods and resulting architecture are proposed as being distinctive to Phase 2 and fully described in Chapter 43. Structure O100 utilised a different construction method using stone foundations and free-standing pisé walls with stone facings. While the construction of O100 has dates that overlap with those from other structures within Phase 2, we remain cautious because of the possibility of re-deposited charcoal and chipped stone into its lower courses.

42.3 WF16 Phase 3: *c.* 10.80–*c.* 10.24 ka cal BP

Although the radiocarbon dating evidence is unable to draw a clear chronological succession within the architectural remains, on stratigraphic grounds the construction of the large circular Structure O100 certainly post-dates the construction of O75, even if by only a few decades. Nevertheless, this might have been a moment of significant cultural change, not only in light of the new architectural-style of a free-standing building, but because of a shift in chipped stone technology from Assemblage Type A to Type C (Chapter 39). This shift is recognisable from the chipped stone assemblages coming from three groups of contexts: those associated with the later contexts in O100; those within Midden O60, itself post-dating the initial construction of O100; and these within the 1997–2003 evaluation Trench 3 which are also associated with free-standing architecture; Structures

F3392 and F3991 (Finlayson and Mithen 2007, 190–200; Pirie 2007).

The chipped stone from these contexts, designated as Assemblage Type C, shares a distinctive set of characteristics that differentiate them from assemblages in other contexts designated Assemblage Types A and B. Type C assemblages contain significantly higher frequencies of non-local raw material, which was often used to manufacture blades and bladelets from more heavily prepared and maintained cores. El-Khiam points are absent in Type C assemblages; tools in Type C assemblages include burins, sickles, bifacials and scrapers. On stratigraphic grounds and in light of similarities with PPNA assemblages coming from relatively late PPNA sites elsewhere, notably ZAD 2 and El Hemmeh (Sayej 2004; Smith *et al.* 2016), Type C assemblages most likely represent a chronologically defined phase of activity at WF16. Their shared and distinctive characteristics might reflect a change in the activities undertaken, the social composition of people at WF16, PPNA cultural change in the broadest sense of the term, or (most likely) a combination of multiple factors. As such, we associate Type C assemblages with WF16 Phase 3, Type A assemblages with WF16 Phases 1 and 2, and Type B assemblages with the transition from WF16 Phases 2 to 3.

As noted above, we suspect there was a gradual transition between Phase 2 to Phase 3 centred on *c.* 10.80 ka cal BP. The chipped stone (Assemblage Type C) and other material within the later contexts of O100 and Midden O60 would, therefore, come from the final *c.* 400 years of activity of WF16 prior to its cessation at *c*. 10.24 ka cal BP. As indicated by the SCPD (Figure 40.5), this appears to have been a phase of relatively low activity, not dissimilar to that of Phase 1. This might, however, be a reflection of differential preservation: erosion might have destroyed the majority of post-10.80 ka cal BP cultural remains, including charcoal for radiocarbon dating, and hence this final phase of PPNA activity at WF16 might have extended beyond *c.* 10.24 ka cal BP.

Old wood had been burned and deposited in Midden O60, most likely from recycling of timbers from abandoned buildings that had been constructed in Phases 1 or 2 at the settlement. The extent to which the Midden O60 also contains other material — animal bones, decorated artefacts, beads and so forth — re-deposited from Phases 1 and 2 at WF16 remains unclear. However, in light of the distinctiveness of the chipped stone from Midden O60 in comparison with that from Phase 2 Structures, the extent of re-deposition of material culture from Phases 1 and 2 at WF16 into Midden O60 appears to have been limited. We note, however, that only a small sample (2% by weight, n=4640) of the chipped stone from Midden O60 has been catalogued.

Phase 3 activities are likely to be represented in the upper horizons of several WF16 structures in addition to O100. The cobbled surface, moulded mud-plaster hearth (O92) and floor that sealed the destruction deposits in O45 must be later than the fire that destroyed the structure, estimated to have occurred at *c*. 10.82 ka cal BP. As in Midden O60, Hearth O92 contained old wood, potentially coming from abandoned earlier structures. However, the chipped stone from Hearth O92 contexts yielded several El-Khiam points, did not feature Type 5 raw material, and has been has been assigned to Assemblage Type A, suggesting that this feature must lie within our Phase 2 or, as with the construction of O100, late Phase 2. In contrast, Structure O31, represented by a silt layer, a pit and a floor surface that sealed Burial O7 might relate to Phase 3 activity. This might also be the case for the stone wall (116), stone surface (103), and underlying sandy silt (341) that were above Midden O60 and other structural remains within the overburden (Chapter 5).

On stratigraphic grounds, Midden O69 is either late in Phase 2 or a Phase 3 midden. The midden accumulated within a cut that had truncated Structures O73, O90 and O75, and entirely sealed Structure O74. The chipped stone from within the midden has yet to be catalogued: if our assignment to Phase 3 is correct, it should contain a Type C assemblage.

Another likely candidate for Phase 3 is the combination of Structures F3992 and F3991 from Trench 3, which also had free-standing stone walls using a combination of stone courses and orthostats. Structure F3992 survived as two courses of stone walling, but is likely to have had additional courses in light of the collapsed stone rubble within its interior, some of which appeared to preserve courses that had fallen inwards.

The construction methods of the Trench 3 structures have similarities to those used at ZAD 2 and El Hemmeh, both of which date to the end of the PPNA period (Edwards *et al.* 2001; 2002; Makarewicz *et al.* 2006). The chipped stone assemblages associated with these sites also have commonalities with the WF16 Type C assemblage. There appears to be a distinctive Late PPNA Phase in the south of Jordan, that may correspond to the PPNA to Early PPNB transitional phase in the Northern Levant, and may also explain the scarcity of an Early PPNB in Southern Jordan (Finlayson *et al*. 2014; Finlayson and Makarewicz 2017; Smith *et al*. 2016). Following this interpretation, the WF16 Type C assemblage should be understood as a characteristic Late PPNA assemblage. This interpretation is compatible with the radiocarbon evidence suggesting a final pulse of activity at Trench 3 centred on *c*. 10.30 ka cal BP, although an association between the two samples of charcoal providing this date and the free-standing walls could not be formally established. WF16 is so far unique in that it is the only site where the process of transition between Early and Late PPNA can be seen.

It seems likely that the majority of Phase 3 structures have been lost to erosion, with their collapsed and heavily disturbed remnants contributing to the overburden deposits of O111 (Chapter 5). This hypothesis could be tested by analysing the chipped stone from O111. If Phase 3 structures were generally free-standing, they would have been more susceptible to erosion than Phase 2 semi-subterranean structures. In addition to erosion by wind and rain, these deposits have been burrowed into by rodents and insects, trampled by goats and disturbed by a variety of human activities including Nabataean burials, recent Bedouin tents, fireplaces and the digging of pits. Virtually all stratigraphy has been lost, with pre-existing structures only being suggested by short stretches of wall and mortars, some of which had been incorporated into walls. These are most likely to derive from Phase 3 Structures, although we must be cautious because excavation has shown that the walls of F8 (Trench 2) that had also been exposed on the surface of the knoll, relate to Phase 1. Trench 2 was located towards the edges of the knoll where erosion is likely to have been most severe, potentially removing all of the Phase 3 collapse and debris, along with the upper horizons of Phase 2 settlement exposing Phase 1 architecture. The small stone settings, rubble-filled depressions and pits, and midden dumps within the overburden, are all likely to date to the PPNA and may indicate the former presence of stone architecture as found in Trench 3. There is nothing in their content that distinguishes them from better preserved contexts below.

As described in Chapter 44, the majority of human burials at WF16 are likely to come from late Phase 2 and Phase 3. During excavation, the burials were exposed as soon as the overburden had been removed. Although it cannot be entirely discounted, it seems unlikely that burials were placed within cuts made into walls and floors of buildings that were still occupied and which, the excavation suggests, were frequently re-modelled. A more likely scenario is that the later occupants at WF16 made cuts for burials into the underlying walls of the earlier Phase 2 Structures.

42.4 Post-PPNA activity

Other than the Late Antique burials (Chapter 6) and features that are probably the product of relatively modern Bedouin activity, traces of post-PPNA activity at WF16 are scarce. The 1997–2003 evaluations produced three radiocarbon dates, ranging between 5300–4870 cal BP, from disturbed contexts in Trench 3 indicating Early Bronze Age activity (Mithen and Finlayson 2007a), but no diagnostic artefacts of this period were recovered from Trench 3. Similarly, all of the diagnostic artefactual material within the overburden of the 2008–2010 excavations was PPNA. The only signs of possible later prehistoric activity were a few sherds of pottery coming from the fill of a small pit, within the overburden, in the vicinity of Structure O45 and associated with Burial O110, which appears to have been a later Bronze Age intrusion into deposits of Structure O75.

42.5 Summary

We have proposed three broad phases of PPNA activity at WF16:

- Phase 1, *c.* 11.80–11.30 ka cal BP, is poorly represented, but may denote an early PPNA phase showing continuity from a Late Natufian/Harifian type culture.
- Phase 2, 11.30–10.80 ka cal BP, containing the majority of archaeological remains primarily in the form of semi-subterranean, pisé-built structures;
- Phase 3, *c.* 10.80–10.24 ka cal BP, with free-standing circular stone-walled structures, Midden O60 and burials that had been cut into the Phase 2 deposits.

We suspect that the majority of Phase 3 structures have been destroyed by erosion, with some of their collapsed and heavily disturbed remains contributing to the overburden, along with unstratified debris from the earlier phases. WF16 Phases 1 and 2 are generally associated with chipped stone Assemblage Type A, WF16 Phase 3 with Assemblage Type C, while the transitionary period from WF16 Phase 2 to 3, as represented by activity on Surface O91, the lowest levels of Midden O60 and the stratigraphically lower activity within Structure O100, is associated with chipped stone Assemblage Type B. The association of Type A material with the construction of O100 indicates a time lag between, architectural and tool technologies, with the pace of change in chipped stone technology appearing to increase in Phase 3.

43. The architecture of WF16

with Pascal Flohr

The majority of structures at WF16 were semi-subterranean, this having been achieved by either excavating pits, or by using the honeycomb of existing walls to create semi-subterranean cells. The interior faces of these pits and cells were lined with pisé, while floors were created using mud plaster. On the basis of the sparse evidence that survives, it appears that the pisé walls had extended above ground level, and that roofs had been made from mud laid on reeds and brushwood supported by timbers. The exceptions were the Phase 1 structures of F8 and O73 that appear to have been constructed as pits lined with rubble stone walls and mud mortar, and Structures O100, F3329 and F3991, that had free-standing walls of either pisé and stone (O100) or stone alone (F3329, F3391) without using semi-subterranean foundations. As described in Chapter 41, we interpret this free-standing architecture as one element of the cultural transition from WF16 Phase 2 to Phase 3, tentatively dated to *c.* 10.80 cal BP.

While the architecture may be summarised in the above manner, one of the most striking features of WF16 is the immense diversity of structures. One can characterise the design of each structure as being selected from a menu of construction techniques and architectural plans to result in a unique building, either intended for a specific function, reflecting the preferences of those undertaking the construction, and/or having been constrained by the availability of space, raw materials and architectural possibilities.

In this chapter we draw on the archaeological evidence (Chapters 7–38) and sedimentary analysis (Chapter 41) to describe this menu and how it was drawn upon to create the diverse range of buildings at WF16. We are aided in this task by our experience of constructing a generic replica (i.e. not attempting to replicate one specific structure) on the adjacent knoll to WF16 in 2010 (Flohr *et al*. 2015). Primarily based on the excavated evidence from Structures O11 and O45, constructing this generic replica provided insights into the construction methods and architectural issues that supplement the evidence from the excavation itself. One of the most striking lessons was simply to appreciate the huge amount of labour and materials, notably sediment and water, required for even one of the smaller structures excavated at WF16. Even with metal digging tools, plastic buckets, jerry cans and a pick-up truck, the generic replica required 562 person-hours to construct.

43.1 Excavating the foundations

One of the most demanding tasks for building the generic replica was digging the semi-subterranean pit into the gravel substrate (Figure 43.1). This oval pit, 2.5 m x 3.5 m x 1.2 m deep required 73 person-hours with pick axes to excavate, the pit being an average size for the PPNA structures of WF16. During the PPNA such digging might have been undertaken using stone mauls and must have required a longer period of time than when working with metal pick axes, even allowing for greater expertise in the Neolithic. Several potential stone mauls have been recovered during the excavation of WF16 (e.g. from within O33 (SF1828, Figure 30.12)), although whether this is actually a maul or a roughout for a pestle remains contentious.

The challenge of excavating semi-subterranean pits into the geological substrate using stone mauls and other non-metallic tools might partly explain why the settlement of WF16 appears so spatially confined: re-modelling existing structures is likely to have involved considerably less effort than excavating new structures into the gravel knoll. As such, the settlement as a whole became more

Figure 43.1 Digging of the pit for the experimental construct at WF16, October 2010. The PPNA site can be seen in the background to the left.

stratigraphically complex through time, rather than more expansive in its spatial extent.

For the PPNA semi-subterranean structures, the sides of the subterranean circular or sub-circular pits were lined with pisé as the first stage of building walls. Cuts for making the pits into the geological substrate, and hence for wall constructions, were only identified in a few cases, such as cut [1840] for wall (125) of O11, cut [1834] for wall (598) of O83, and cut [1844] for wall (542) of O65. While the absence of identified cuts for other walls might be explained by the limited extent of excavation, where box sections were made through walls to examine their construction (e.g. O56, O84, O12), they revealed a complex history of wall reuse. This indicated that buildings were often constructed by the reuse of existing spaces rather than excavating pits *de novo*. The complexity of the underlying stratigraphy indicated by the box sections suggests considerable construction activity on the knoll before the WF16 Phase 2 structures explored by excavation.

43.2 Building pisé walls

Sedimentary analysis (Chapter 41) indicated that the composition of the pisé used at WF16 varied both between, and within, structures, with regard to the proportions of silt, sand and gravel, the extent of plant material used as temper, and the inclusion of cultural material arising from the recycling of sediment. Although a considerable degree of variation is present, walls tend to have coarser grained matrix than do mud-plaster floors, while the mud-plaster lining of the possible storage Pit O14 was made from a notably fine grained sediment mix (Chapter 41). Although Structure O11 is stratigraphically later than Structures O12 and O45, the similarity of the composition of the pisé used in the walls of these adjacent structures suggests they might have been constructed, or at least renovated, as a single project, although in a sequence. Gypsum appears to have been frequently added to the pisé, possibly to create a white-wash over the surface of the wall which then penetrated into the pisé matrix, as in Structure O11.

Trial mixing of sediment, water and plant material during the construction of the generic replica, found that the ratio of two parts sediment and one part water provided pisé of a suitable consistency for wall construction. Pisé of this nature could be applied relatively quickly and did not have a tendency to crack on drying (Flohr *et al*. 2015, 151). The contours of the mud deposit (1374) on the floor (1376) within Structure O12, suggest the dumping of pisé of a similar consistency (Figure 11.12A), perhaps because surplus had been mixed for the construction of a nearby structure while O12 was temporarily abandoned.

The excavation of the northern wall (56) of O53 indicated that it had been built from three successive layers of pisé (56, 1009, 1013) (Figure 15.17). The pisé within each band had a different composition and colour, suggesting piecemeal mixing of pisé and a relatively long pause between each successive pisé band, allowing time for each to dry out prior to the application of the next band. A similar construction method of three pisé layers (919, 921, 927) was evident for wall (795) of Structure O100 (Figure 43.2).

This method of using pisé bands was adopted when constructing the generic replica structure. It proved to be more time consuming than expected, because of the waiting time for each band of pisé to dry to a sticky consistency,

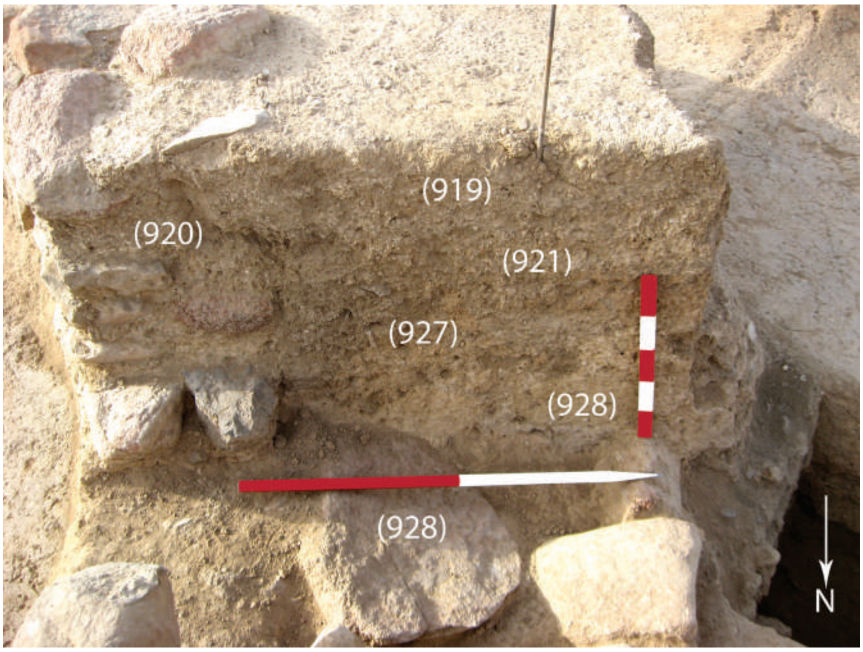

Figure 43.2 North-facing Section S185 through walls of Structure O100 showing different pisé bands in the construction of wall (795). Scale 1.0 m x 0.5 m.

prior to the next band of pisé being applied. When new pisé bands were added before the bands below had dried sufficiently, the wall started to bulge under the weight of material being added. However, because of the need for the wall to dry as it was being built, the horizontal bands clearly represent a very practical technique. Also, because the sides of the excavated pit sloped inwards, towards the base, rather than being absolutely vertical, the thickness and hence weight of the pisé increased with height when used to create a vertical wall. To avoid undue bulging and possible collapse, it was decided at about one meter from the base to step the wall in, creating a flat step above which the next band of pisé was added (Flohr *et al*. 2015, figure 12). Two such steps were made in the wall on the west side of the replica that remained in prolonged shade and hence had a slower drying time.

Similar steps were identified in the wall of Structure O11 during excavation (Figure 43.3). They had initially been interpreted as arising from the realignment of the wall but now seem a consequence of pragmatic decisions made during the construction process. The pisé wall (589) of Structure O83 provided another solution. This simply followed the shape of the cut [1834] itself, flaring out from the base to the top of the structure, maintaining a vertical interior face.

Only limited sections of selected pisé walls at WF16 were dismantled, but these often contained a surprising quantity of additional material. Several large stones, 20–50 cm in diameter, were embedded into the pisé of wall (56) of Structure O53, presumably to provide strength, while a boulder had been incorporated into wall (170) of Structure O21. Whether the horn core (47) and fragment of stone platter (SF291) embedded into wall (256) of O56, and the cup-hole mortars (SF386, SF387, SF388) and ground-stone artefact (SF389) embedded into the wall (116) of O111 (in this case a stone built wall), were also for functional purposes rather than representing some form of ritual deposition remains unclear. One of the moulded post pipes (693) in the wall of O75 contained a complete fox skull (Figure 38.44), presumably placed there after the post had been removed, and appearing to support the notion of ritual deposition within walls.

While applying multiple horizontal bands of pisé appears to have been a common construction method, some walls had been developed by adding additional skins of pisé and stone to an existing vertical face, as within Structures O100, O12 and O56. In the case of O100 a stone facing (929, 920) had been added to the existing pisé (795) (Figure 43.2). In the case of O12, a section through a presumed singular pisé wall (1394=135) revealed additional skins of pisé: firstly (1392), which was applied internally onto the face of (1394=135), and then (1372), which was applied onto the vertical face of (1392) (Figure 11.19). Both phases of added walling were related to the re-organisation of the structure, whether in the form of the blocking of the entrance in the original wall, or in the construction of a dividing internal wall. A similar relationship was observed in the excavation between Structures O56 and O84, where pisé wall (256) of Structure O56 had an additional internal skin of mud plaster (1047) that was added at the same time and was contiguous with the mud-plaster floor (995) (Figures 17.16A and 17.17).

Surfaces containing organic materials have also been noted adhering vertically onto pisé walls, or within pisé, suggesting frameworks for construction. In Structure O19 an organic-rich deposit (858) between the face of a pisé

Figure 43.3 A — stepping in the southern wall of the generic replica and B — stepped sides on both sides of wall (125) of Structure O11.

wall (134) and what appears to have been a fine silt lining adhered to plaster (857), suggests a wattle backing to a plastered wall (Figure 10.3). The internal domed structure O117, built inside Structure O45, was constructed by coating a wicker frame with pisé to form the shape of this free-standing structure that was internally lined with mud plaster. The wickerwork impressions from this frame had been revealed as a result of wall (1016) of Structure O117 collapsing after a major fire (Figure 14.33). Such impressions were also found on numerous blocks of pisé from rubble deposits (see Structures O12, O45, O57, O66, O84 and O91).

The plastering of pisé walls with thin coats of mud plaster to give them a smooth finish has been noted on the interior of a number of structures. The plastering effects varied in their smoothness and colour. The likelihood of the use of gypsum for whitewashing the walls has already been mentioned in reference to the sedimentary analysis of the pisé samples. Occasionally these were clearly visible, as in Structure O53, where a coarse white plaster (1005) was applied across the face of a rebuilt structure (Figure 15.17) following a repair to wall (56) that had also involved an inserted angled post. The new plaster had been applied across two different phases of walling after the structure had been rebuilt on the same footprint reusing the old walls as a foundation, thus masking the two phases. The same method was used on the interior of the adjacent Structure O45 after this had been rebuilt at the same time, and in the same manner as Structure O53. A much smoother mud-plaster finish (392, 393, 562, 564) had been applied on the walls (383, 563, 557) of the truncated third tier platform in Structure O75, which had been built against a rubble core infill (Figure 38.43).

The upper courses of walls might have been constructed from pre-dried pisé blocks. When building the generic replica the use of such blocks provided substantial savings of time and eased the construction process. We found evidence of shaped blocks, too irregular in form to be described as bricks, within various pisé rubble deposits, such as that associated with Surface O91 and within rubble deposit (1030) of Structure O84. Most notable is the block-like rubble (109 and successive spits) that formed the interior fill of O33, which gave the impression of collapse from walls built from pisé blocks (Figure 30.9).

Structure O100, the building that may be transitional between WF16 Phases 2 and 3, is the only example in which a pisé-walled structure was built without using the foundation of a semi-subterranean pit. For O100 a stone foundation was constructed and used as the base and scaffold for a free-standing above ground pisé wall built up from a number of discrete layers of pisé (795). A stone face was applied to this stone wall, with up to six courses surviving (920, 929). The wall itself was up to 2.0 m thick in places (Figures 36.2 and 36.3), reminiscent of subsequent Middle PPNB walls of circular buildings in Southern Jordan at Beidha and Shkarat Msaied (Byrd 2005b; Jensen in press). The thickness of such walls might not only have been for structural stability, but also to achieve the insulation properties, and perhaps the other sensory experiences, of a semi-subterranean building.

43.3 Building stone walls

In both Phase 1 and Phase 3 there is evidence for walls built entirely with stone. For the Phase 1 Structure, F8, a line of unmodified boulders (229) provided the basis for a wall, these having been positioned around a cut made into the gravel knoll (Figure 43.4). It is possible that they were simply the largest stones within the pit, just dragged to the edges of the cut itself, or at least not moved a significant distance. A second course of unmodified stones (245) was attached to the top of this wall using a mud mortar, but on a slightly different alignment. The stone wall of Structure F1 in Trench 1 appears to be of similar construction to wall (245), but had been positioned within a trench cut into a midden that had accumulated within a pisé -walled structure that is attributed to WF16 Phase 2 (Figures 40.23 and 40.24). Consequently, we interpret the Structure F1 as either late Phase 2 or Phase 3 that had been cut into a Phase 2 midden.

Structure O21 also appears to have a stone wall (132, 173), broadly constructed on the alignment of an underlying pisé-wall (170, 134), again suggesting the possibility of an increased use of stone in the later stages of Phase 2 (Figure 9.2). Alternatively, the use of stone might have been a specific technique for the construction of small cellular spaces and have no chronological significance. Stone walls/settings resting on underlying pisé walls, similar to that within Structure O21, were found within Structures O70 and O113 (Figures 24.5 and 25.7).

The stone wall (314/334) of Structure F3992 in Trench 3, assigned to Phase 3 settlement, was constructed in a quite different manner with multiple courses of smaller stones and no evident use of a mortar bond. The wall (344) of the connecting Structure F39911 was different again; this featured orthostats within the multiple courses of stones (Figure 43.5). Further examples of stone walls were evident

Figure 43.4 Trench 2, September 1999. Showing Structure F8 with wall (229) of unmodified boulders on the excavated northern side of the trench.

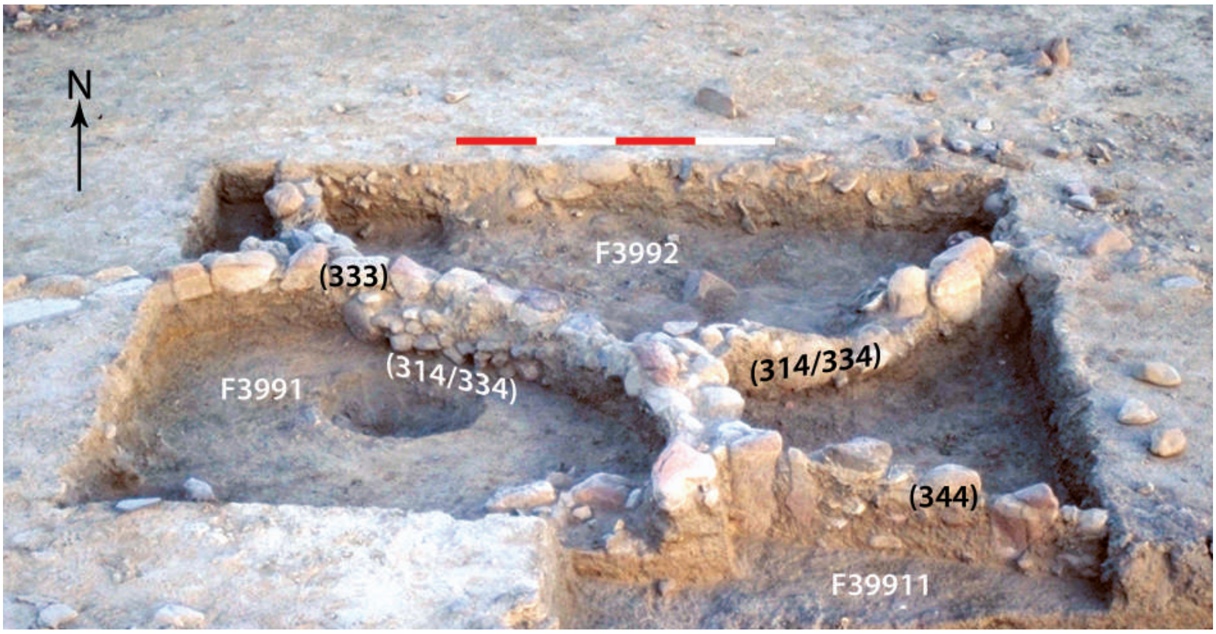

Figure 43.5 1999 extension of Trench 3 showing Structures F3991, F3992 and F39911, and the walls mentioned in the text. Scale 2.0 m.

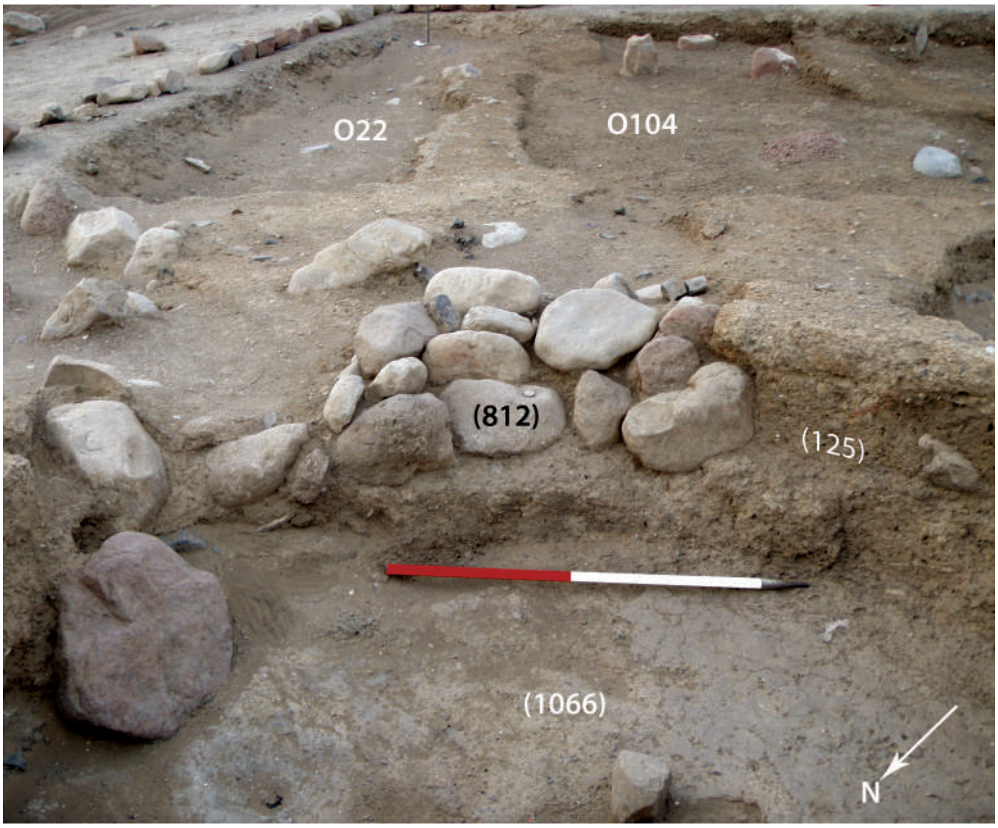

Figure 43.6 Stone-built ramp (812) in the gap in pisé wall (125) of Structure O11. Scale 1.0 m.

in the overburden (Horizon O111) and most likely relate to Phase 3 activity. These were fragments of walls from structures that had otherwise suffered from collapse and erosion. Wall (2), for example, was a straight alignment of stones built in two courses without any visible signs of bonding, while walls (1838) and (70) were curved arcs of stones, possibly the remnants of circular structures *c.* 5.0 m in diameter. Wall (116) was similar and had incorporated fragments of cup-hole mortars and a ground-stone object into its construction (Figure 5.11).

43.4 Entrances and exits

Evidence for entrances and exits through walls was strikingly limited at WF16. Those that did exist were often ambiguous. It remained unclear, for instance, whether a gap formed between the ends of wall (134) and (170) in Structure O21 was deliberate and intended as an opening, or simply a consequence of collapse and poor preservation (Figure 9.2). Similarly, wall (1392), identified within the sondage in the space between O11 and O12, had a butt end that might have once been part of an entrance at the eastern end of O12, one that was blocked by a later wall (Figure 11.19), but, given the limited exposure within the small space of the excavated area, this interpretation remains contentious. A termination of wall (245) of Structure O45 was identified; while this was probably one side of an entranceway, the cut of Burial O63 had removed the PPNA deposits that might have defined the opposing side (Figure 14.2). With regard to Structure O33, a cluster of large stones (382) might have been used to block what had once been an entrance in the circular pisé wall (381) (Figure 30.7).

More substantial evidence for an entrance came from the excavation of Structure O11. Here a spread of stones (O20, O23) was exposed immediately below the overburden, positioned in a stone-walled corridor adjacent to an opening in the pisé wall (125) of O11 on its southeast side (Figure 43.6). This was interpreted as a ramp, leading down from the ground surface into the semi-subterranean structure, and shown to be both feasible and practical by experimental construction in the generic replica (Flohr *et al*. 2015, figure 14). A similar arrangement was evident from Structure O66. Access into this semi-subterranean structure appears to have been down a slope (1098) (Figure 26.8) and through a 1.0 m wide gap between the structure's walls (1091, 216).

In light of the sparse and ambiguous evidence for entrances through walls, one possibility is that this primarily occurred from above — by ladders through openings in the roofs. Possible evidence for this comes from O12, a structure with excavated floors at 1.5 m below the current surface and with the likelihood that further floors were located at greater depths. Three niches that had either been cut (1080) or moulded (1071, 1068) into the south-facing wall of O12 (Figure 11.20) might have been used to support a ladder, or simply provided hand and footholds to climb in and out. A small shallow depression (1398) located on the floor immediately below niche (1071) might have held the foot of such a ladder.

43.5 Laying and constructing floors

Two types of floors were identified at WF16: mud-plaster floors often containing embedded cup-hole mortars and raised floors represented by notched stones that we assume would have held wooden beams. At least two structures had both types within a sequence: in Structure O45 a mud-plaster floor (1837) had preceded a raised floor, while the converse sequence was evident from Structure O12.

The mud-plaster floors were established using a mud mixture similar to that of the walls, but which tended to have lower proportions of coarse-grained sediment and less plant temper (Chapter 41). For the construction of the generic replica, a higher proportion of water was used within the mud mix than was used for the walls, meaning that it could be more easily spread over a surface to form a floor (Flohr *et al*. 2015, 152). The floor created inside the generic replica cracked substantially after drying in a manner not observed for the PPNA floors of WF16. We suspect that this was because the generic replica used a single thick layer of mud plaster to create the floor, whereas those at WF16 had been constructed with multiple thin layers of mud plaster placed over make-up deposits. Alternatively, or perhaps in addition, the cracking of the floor in the generic replica might reflect an inadequate quantity of temper in the mud-mixture, one that would have to be refined by further experimental work.

In some cases, surfaces appear to have been levelled by deposits of silt, pisé rubble and domestic waste prior to a mud-plaster floor having been laid: the deposits (862) and (861) in Structure O12 appear to have served this function prior to the laying of floor (809), as did deposits (821) and (822) for floor (811) in Structure O19. While layers of silt, rubble and occupation debris often separated successive mud-plaster floors within structures, in other cases they were directly above each other. In Structure O64, for instance, there appear to have been 11 mud-plaster surfaces (including 505, 521, 523, 311, 326) separated by only ephemeral horizons of occupation (309, 512, 320).

Mud-plaster floors were constructed using sediment mixes of similar composition to the pisé walls, although a tendency towards a fine matrix is evident. The floor samples from Structure O75 all clustered together with regard to their composition, and were distinct as a group from those of other floors with regard to grain size. Mud-plaster floors at WF16 were of various thickness, with those exposed in Structure O84 (floors 1022 and 1325) being notably thick and seemingly carefully made, while fragments of relatively thin sheets of mud plaster from Structure F8 appear to be remnants of rather finer surfaces. In some cases, such as floor (837) in Structure O11, the mud plaster overlapped the base of the wall indicating its later construction (Figures 12.8 and 43.3B), which is the opposite of O84, where a thick floor (1022) was laid across the base of the cut and the walls built on top (Figure 19.22). Floor (837) is also a good example of how a small basin was constructed as an integral part of the floor. In other cases, such as floor (606) in the uppermost stratigraphic horizon of Structure O45, the mud plaster was moulded to form a hearth (Hearth O92, Figure 14.6). Several other moulded mud-plaster hearths were excavated above the floor surfaces in Structure O75 (Figures 38.25 and 38.49), and externally on Surface O91 (Figure 37.6).

Several of the mud-plaster floors contained embedded cup-hole mortars, none of which appeared to be in the precise centre of the floors. These must have been positioned when the mud-plaster floors were still wet and pliable, potentially on the surface of underlying levelled deposits, prior to the creation of the floors around them. In the case of Structure O100 the mortars were particularly massive (SF1753 and SF1757; Figure 36.10). It appears that several re-flooring episodes occurred while they remained *in situ* resulting in laminated surfaces (898) accumulating around them. Elsewhere, such as in floor (1022) in Structure O84, depressions and cuts within the floors suggest that mortars had been removed (Figure 19.18).

Surface O91 appears to have functioned as a mud-plaster floor created externally to Structure O100. Micro-stratigraphic analysis suggested that the formation of this surface involved several events involving the deposition of mud-plaster horizons, possibly as a by-product of constructing the pisé wall of O100, the accumulation of occupation debris, and the in-wash of sediments. That one of these horizons, (734), was constructed as a deliberately laid floor seems evident because part of its surface had been moulded into a hearth. A number of other features were cut into the surface around the hearth (Figure 37.7), together with a stone arrangement (1246) indicating that the surface was used as a work area, an interpretation supported by the chipped stone analysis.

Other floors had also been moulded to contain features. In Structure O84, for instance, one of the floors (1022) was especially thick and dense. The southeast end had been elevated with a groove bordering the inner face of the wall of the structure and a raised lip immediately before the break of slope to the slightly lower northwest part of the floor. The shape and size of a circular feature [1043] located centrally in the elevated part of the floor, suggested that a cup-hole mortar might have been removed, with the resulting pit filled with pisé rubble (1038), while another smaller pit [1042] might have been used for storage, finally becoming filled with animal bone and other debris (Figures 19.16 and 19.19).

The most extensive mud-plaster surface was that within O75. When O75 is viewed as a whole (Figure 43.7), it appears that a single mud-plaster floor had been draped over an infrastructure of rubble and pisé constructs to create an amphitheater-like structure, with its surrounding wall, tiered benches, embedded mortars, raised gullies and central trough. Indeed, given how much of O75 is an interior surface (benches, bench faces, floors) as opposed to the pisé lining of a construction pit, it seems more appropriate to regard it as a mud-plaster construction, rather than one of pisé. The structure had been re-plastered at various times, as can be seen in the coatings applied to the bench faces, with at least three layers of decoration (Figure 38.39). A substantial repair, or re-modelling, of the central part of the floor was evident from the mud-plaster surface (1823) that covered an earlier surface and into which two, cup-hole mortars were embedded (Figure 38.36).

Several structures provided evidence for raised floors in the form of notched stones that are likely to have held beams. The most detailed evidence comes from O45 (Figure 43.8) where construction trenches [1329, 1331, 1323, 1338] appear to have held notched stones of variable shape and size (SF2079, SF2430, SF2698, SF2425, SF2062, SF2426, SF2428) and interpreted as supporting timber beams to provide a raised floor around the internal sub-structure (O117) (Figures 14.28, 14.41 and 14.42). A recess in pisé wall (1342) and additional stone-holes within construction trench [1331] are also interpreted as having been made to receive stone uprights, most likely used to support a floor. A ledge running along the interior of the northeast section of wall (245) corresponds to the height at which the raised floor abutted the wall (Figure 14.43). The remaining *in situ* stone upright SF2428 sits at the end of the ledge where wall (245) terminates (Figure 14.29). The main beams would have required overlying cross-laid beams and most likely a layer of brushwood or reeds to provide a framework for a mud-plaster surface (Figure 43.8). Nothing of the timber framework survived because the fire that destroyed the structure did not spread to the floor support. As a result, any timbers that may have been present did not become charred, unlike those from the roof. However, sheets of the mud-plaster floor, caved in by the collapsing roof, were preserved (Figure 14.23).

Notched stones were also identified within Structure O12, where they protruded through mud-plaster floor (1376) to suggest an earlier raised floor (Figure 11.13). These were also present in Structures O113 (Figure 25.7) and O104 (Figures 8.2 and 8.4), although in both cases they are likely to have been in a secondary position.

43.6 Superstructure and roofs

Other than in association with Structure O75, post-holes are surprisingly rare at WF16. This suggests that superstructures and roofs were primarily supported directly by the pisé walls. Nevertheless, some post-holes were discovered within both walls and floors of the smaller structures. In Structure O19, for instance, three post-holes [1076, 1077 and 1078] had been either cut or moulded into the face of its pisé wall (Figure 10.13) and seem likely to have held posts supporting a roof. Similarly, in Structure O53 a post pipe [255] had been moulded into its wall at the western end at an angle of 45°, most likely to partially support a roof. In this case the post pipe was surrounded by whitish pisé (1003) that seems likely to have been packed around the timber post, while a short row of stones (1007) immediately below the post pipe had probably acted as a counter-weight to the post (Figure 15.14). The insertion of pisé (1003) and the post it held seem to be either a replacement or possibly an addition to a similarly angled post represented by post pipe [263] (Figure 15.15) set into pisé wall (56) and 0.5 m to the south from [255]. A similar 45° angled post pipe [991] was found in the wall

Figure 43.7 View of Structure O75 from the southeast illustrating the extensive and continuous mud-plaster floor, also showing Structure O100 inside it on the right.

of Structure O56, also located at its western end (Figure 17.14A). A further post-hole [1300] had been cut through a band of pisé (1050) in the wall which preceded the construction of Structures O56 and O84 at either side of it, but was then sealed by the next band of pisé (1049) after the post-hole had filled with silt (Figure 17.16). Post-holes were also found cut into the pisé walls within Structures O104 and O100 (Figure 36.8).

Post-holes had also been cut into floors. In Structure O12, for instance, three post-holes [1377, 1379 and 1381] had been cut into floor (1376) (Figures 11.3, 11.4), while a deep and narrow post-hole [1340] had been cut into deposit (1335) in Structure O45, situated flush against the interior face of its wall (Figure 14.22). Whether these had been used to contain posts that supported a superstructure or roof remains unclear.

The best evidence for the roof construction comes from O45 (Figure 43.8). Linear arrangements of charcoal within burnt rubble collapse (1029), suggest that a latticework of timber beams (Figure 14.17) had collapsed as the pisé walls of the structure fell into the interior of the structure during a fire. The timber beams had, in turn, supported a flat mud roof, slabs (1026, 1048) of which were adhered to by dense clusters of chipped stone debris (Figure 14.15). The lattice nature of the timbers suggests that the roof had been flat rather than pitched, while the debitage suggests that it had been sufficiently strong to bear the weight of at least one individual during flint knapping. Evidence for the combined use of plant material with mud for the superstructure of WF16 structures, also comes from lumps of pisé found in rubble deposits that contained plant impressions, coming from Structures O12, O45, O57, O66, O84 and O91.

An O45-type of roof was constructed for the experimental generic replica (Flohr *et al*. 2015; Figure 43.9). Three days were required for the pisé walls to become sufficiently dry to support the timber beams. Tamarisk was chosen for the timbers, although the wood used within O45 is yet to be identified. Tamarisk is a species local to Wadi Faynan, represented within the WF16 wood charcoal (Austin 2007) and available from a local supplier as timbers between 8 cm and 14 cm in diameter, a size that matched the wood used in O45 as evident from the charred remains. Four larger and three small diameter beams were placed parallel to each other across the walls of the replica structure. Thin beams, long branches and reeds were then placed across these beams. A mud mix was then applied over the branches and reeds to create a slightly domed surface to allow rainfall to run off. Construction of this roof required two days by five persons, not including the acquisition and preparation of the tamarisk timber, which was purchased rather than procured from the wild (an essential procedure as trees are protected by law in Jordan). Once fully dry, the roof was able to sustain the weight of not only a person, but also a herd of goats. It has continued to do so — for the person at least — during annual inspections since 2010.

The post-holes that indicate angled posts in Structures O53 and O56 are unlikely to have supported a mud roof. Their association with smaller structures suggests that they may have held organic tent-like covers. Similarly, the rubble walls of Phase 1 structures seem unlikely to have been able to take the weight of a timber and mud roof, suggesting a cover of hides or reeds.

A further consideration about superstructure, whether made from pisé, mud blocks or wickerwork, and roofs, is the provision of light into the interior of the structures. Some structures, such as O12, had floors 1.5 m below the ground surface meaning light would have had to have entered from above, while in others, light through entrances, and perhaps the gaps of wickerwork, might have been sufficient, as was the case for the generic replica where there was sufficient sunlight outside. Structure O56 appears to have been a workshop for bead making within a tightly enclosed semi-subterranean space. We assume that could only have been possible if the upper courses of the

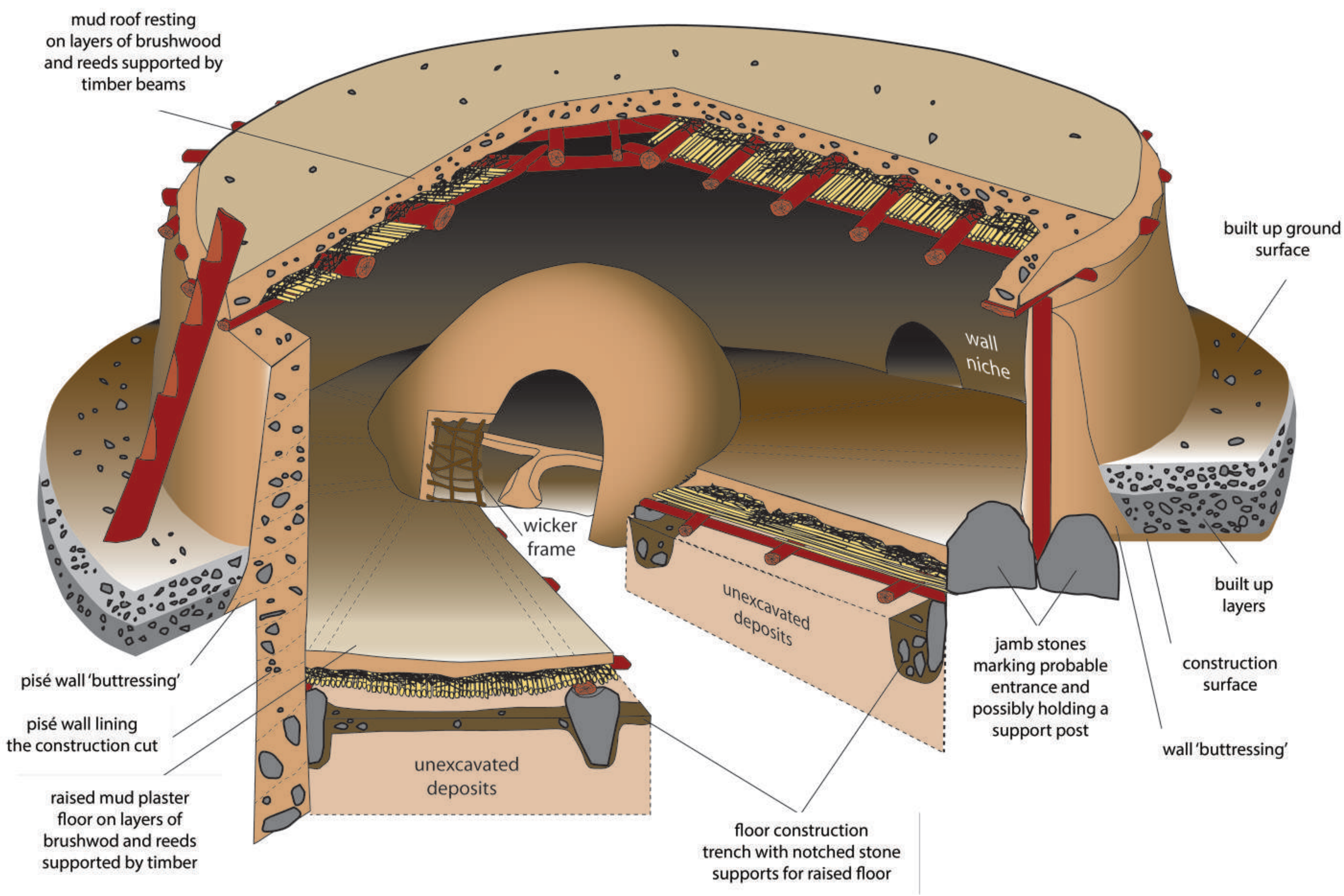

Figure 43.8 Reconstruction of Structure O45 showing construction methods used for building semi-subterranean pisé walls, raised floor, roof and the internal structure (by Darko Maričević).

Figure 43.9 A — Exterior and B — interior views of the experimental roof based on evidence from O45 constructed for the experimental generic replica.

wall and the roof had been designed to let sufficient light penetrate, what would otherwise have been a dark interior, which might have been easier to provide with a flexible tent-like cover, rather than with a solid timber and mud clay roof.

Structure O75

At the other end of the architectural scale the roofing of Structure O75, with its *c.* 20 m x 18 m span, would have posed a considerable challenge. Unlike the other structures at WF16, which would have been possible to roof by means of a horizontal timber frame, spread across the top of the load bearing pisé walls, Structure O75 is both far too large and far too complex in terms of its multi-tier design for this type of roof construction. Perhaps unsurprisingly, this is where we find the most substantial evidence for internal posts, which by their arrangement follow the overall shape and internal design of the structure.

As described in Chapter 38, O75 was an elliptical, or perhaps an egg-shaped, structure, the exact extent of which we were unable to confirm across its northern and eastern perimeter due to the limits of the excavation, erosion and intrusion by later structures, such as O100. Nevertheless, enough evidence survived to extrapolate a broadly symmetrical layout of internal divisions formed by moulded raised 'gullies' and ridges in the lowest central part of the floor space, two tiers of mud-plaster-lined benches and a platform at the northwest apex of the structure. The symmetry of the layout is realised in relation to the mud-plaster-lined trough, which creates the long axis (east) of the structure (Figure 43.10).

On either side of the central trough, the two tiers of benches echo the elliptical shape of the outer wall, with a notable deviation at the northwest apex of the central floor space, where the face of the Tier 1 bench was brought inward, diagonally, in relation to the line of the central axis provided by the trough. The northeast facing face of the Tier 2 bench (B) was moulded to create at least five post pipes (1217), (1259), (750), (693) and (1790), post pipe (1259) being a later addition. Post-hole [1792] was cut into the bench surface, thus it is also not part of the original mud-plaster construction.

The original post pipes are all in excess of 0.5 m deep and were not fully excavated because it was impossible to reach their bases without destroying their mud-plaster lining. Another post pipe of this depth is (1251), located in front of the Tier 3 platform, providing a meeting point of two low mud-plaster bench divisions (Figure 43.10). Another post pipe of corresponding depth could be seen at the base of post retrieval cut [1247], located at the meeting point of the Tier 2 bench and the outer wall, thus matching the location of post pipe (1793) at the meeting point of the Tier 1 bench and the outer wall. The overall arrangement created by the construction of the benches and the post pipes within them corresponds to the overall shape of Structure O75.

The floor of O75 contains a number of post pipes, post-holes and probable post extraction holes of varying depths and dimensions. Different types of features form radiating arcs (C) and (D). Together with the arcs of the original post pipes (B) they all converge in post pipe (1251), located in front of the Tier 3 platform (Figure 43.10). Axis (E) does not reflect the symmetry of these arcs perfectly. Instead it is an alternative axis (E'), formed by post pipe (1251) and the line of the eastern section of the trough only, that acts as the central axis for these structural alignments.

Thus, two different central axes can be observed relevant to the design of Structure O75. Axis (E) reflects the overall alignment of the central trough, including both its eastern extent and the section revealed under the latest floors in Sondage C, although it remains unknown how these two trough sections relate to each other stratigraphically (Chapter 38). Axis (E'), on the other hand, corresponds to the layout of the structural features, which were in use in the latest phase of Structure O75, namely arcs of features (B), (C) and (D). It is possible that the different axes reflect

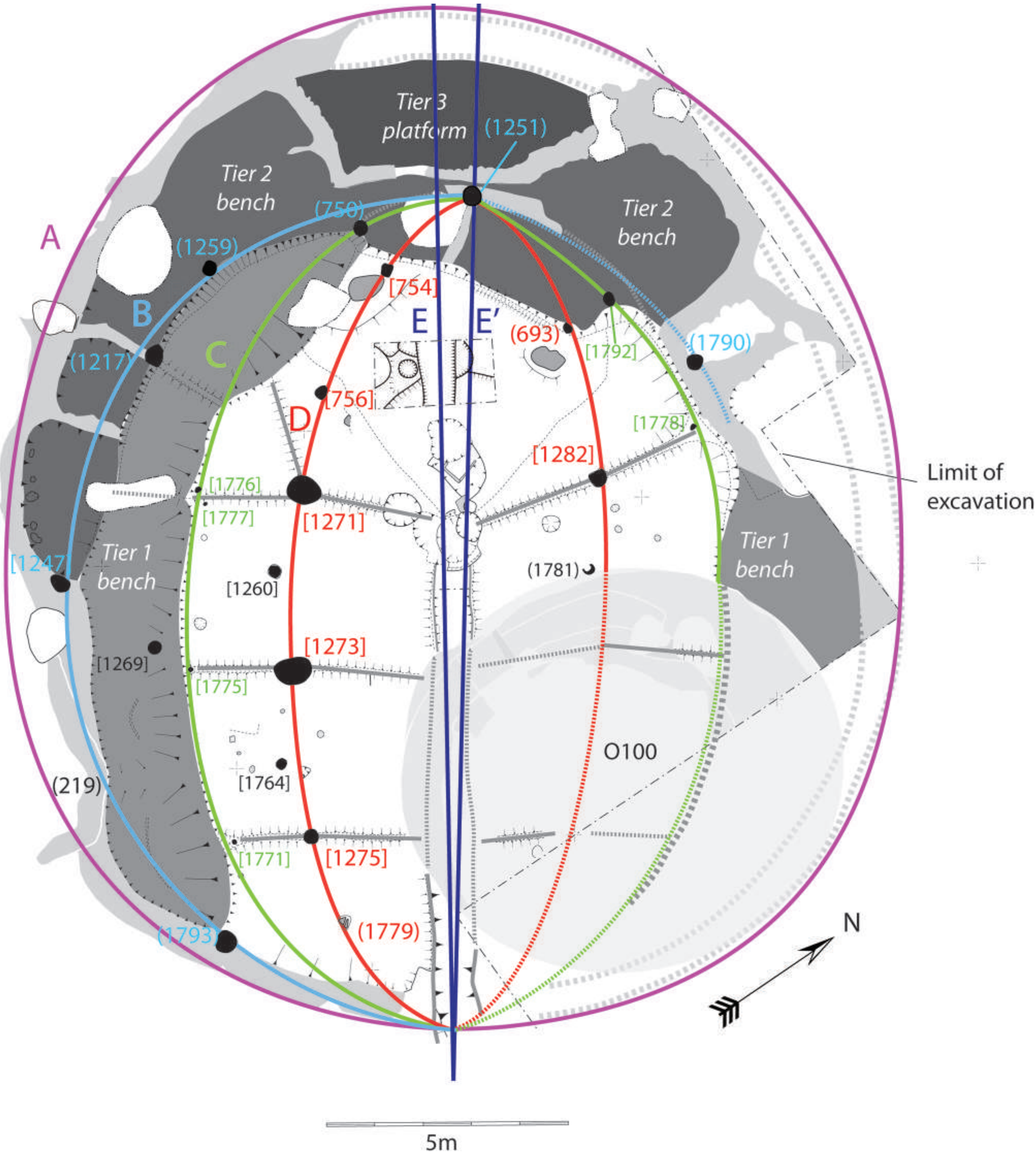

Figure 43.10 Plan of Structure O75 showing excavated structural elements and projected extent beyond the limit of the excavation and over the area obscured by Structure O100. Central axes and radiating arcs of features for holding posts as described in the text are shown marked A–E.

the changing design of the structure, which at some point included filling in and capping the western section of the trough and other features revealed during the excavation in Sondage C (Chapter 38).

Arcs (B), (C) and (D) (Figure 43.10) are formed from features of different type and size, but are all interpreted as having held posts. Arcs (C) are comprised of smaller moulded post pipes and cut post-holes [1771, 1775, 1777, 1776, 1778], which could not have held posts of more than 0.10 m in diameter, and which are located at the end of each raised 'gully'/ridge division and immediately in front of the bench face. The inner arcs (D) are comprised of more substantial post-retrieval pits ([1275], [1273], [1271] and [1282]) cut through the mid-point of each raised 'gully'/ ridge. It is likely that the original post pipes would have also been moulded from the mud plaster that formed the raised gullies. Judging by their depth, the posts that they presumably once contained could not have been set to any great depth — 0.20 m–0.30 m at most. Other shallow post-holes and possible post-pads (754, 756, 1260, 1764, 1779) were either cut, or set, into the mud-plaster floor surface and appear to compliment the elliptical arrangements formed by the moulded features. Overall, their distribution continues to echo the elliptical shape of the outer wall (A), creating equidistant arcs of post-holding features (B–D). In this light, Structure O75 can be seen as a partly two-aisled and partly three-aisled structure, and the most likely purpose of such design is to enable the roof construction over the best part of, if not the entire structure.

The additional difficulties in constructing a roof over Structure O75 are, on one hand, in the differing elevations of the respective arcs of post-holding features due to the tiered construction of the structure and, on the other, their size and the ability to hold posts of suitable load-bearing capability. Figure 43.11 illustrates this in a schematic way and shows how different roof solutions would have affected the way the weight of the roof was distributed across the structure. The tiered character of Structure O75 meant that the strongest load-bearing features, which were the outer wall 'A' and the arc of deeply set posts 'B', were also the most elevated. Having found no evidence for structural posts in the trough and the middle part of the central floor area, this space, flanked on either side by arc of posts 'D', would have been the widest and most challenging span to roof, if indeed roof covered the whole structure.

The inward sloping roof shown in Profile 1 (Figure 43.11) would have kept the average height of the ceiling at a comparable level at every tier of the structure and could potentially explain the function of the central trough as a water drain. Water-laid laminations were found at the lower profile of the trough infilling sequence, but these could have accumulated in other ways too. Crucially, the inward sloping roof would have diverted the stress of the load onto the weaker inner posts (C and D), which may not have been able to withstand the weight. In other words, the construction design of the structure argues against the inward roof construction. Furthermore, the height of the outer wall required in Profile 1 would have been considerably beyond anything else built on site, with no sign of the thickness of wall that would have been required for stability, nor indeed of the quantities of pisé rubble likely to have been left behind when the wall collapsed.

A flat roof, as shown in Profile 2, would have been in keeping with the roof construction that was probably by far the most common at WF16, as exemplified by the evidence from Structure O45. The generic replica demonstrated that this method works well with structures that do not require roof supports other than the pisé walls of the structure. However, it is doubtful whether such a method would work as well on a structure as large as O75, not least because the load of the roof would be equal at all points, regardless of the relative strength of the internal post supports, which in general would not be as strong as the curved pisé walls. In fact, it is questionable, and perhaps unlikely, that Structure O75 would have been roofed with the heavy mud roofing seen in O45 and probably many other structures. A lighter cover made of reeds and other vegetation, or even skins, may have been an altogether more plausible solution.

Profiles 3 and 4 illustrate, more-or-less, the same way of constructing a pitched roof using truss construction. The web of the truss would strengthen the weak points of the structure by tying the posts together and the pitched roof would redirect a substantial part of the load outwards, where the strongest load bearing supports were located (A and B). Thus, as far as the load bearing capabilities are concerned, the pitched roof construction is probably the best fit for the structural design of O75. However, there are possible limitations too. Firstly, the central span between the opposing arcs of posts 'D' may have been too large to roof completely over and the truss construction may have been too heavy without the central supports. Secondly, the pitch of the roof works in the opposite direction to the tiered floor elevation making the space at the top of Tiers 2 and 3 relatively low in comparison to the central floor area (Figure 43.12).

The first of these issues might be an indication that there was an opening in the central part of the roof, introducing light, but also some rain. The second consideration is open to interpretation and largely depends on activities taking place in the structure as whole, and in different parts of the tiered interior. One possibility is that the lighter open central area was used for communal activities, whether in terms of everyday tasks such as food processing and craft production, or some form of ceremonial performance, or both, while the low-tiered benches served as dormitories and/or storage spaces. Finally, there is yet another possible scenario in which Structure O75 may not have been roofed at all. The posts might have had no structural value but been of a totem pole-like nature, related to whatever activities occurred within O75.

Reconstructions of O75 also have to take into account that the mud-plaster surface exposed is only one phase of what appears to have been only one phase of a structure that underwent occasional — perhaps frequent — remodelling. At present we know that there are features (including post-holes) below the floor, as exposed in Sondage C. We know that the floor itself was re-plastered, and that raised gullies were filled in, so no single reconstruction may be correct.

43.7 Internal features

Features other than post-holes and pits internal to the structures at WF16 fall into five categories.

(1) First, there are those that appear to relate to specific activities, in which we include mortars, hearths and workbenches

(2) Second, are those that most likely relate to specific activities, but which are more ambiguous as

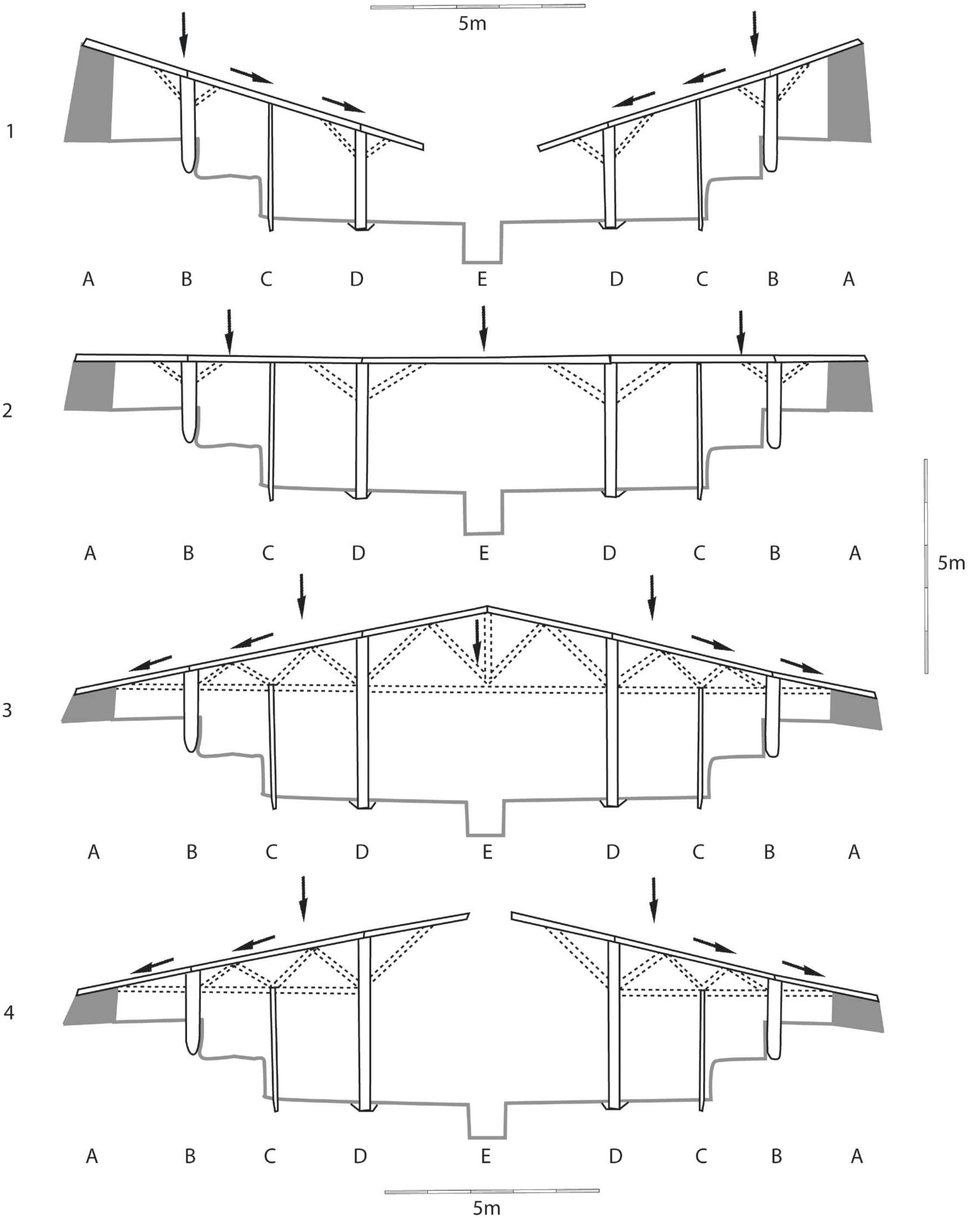

Figure 43.11 Different examples of possible roof construction shown in four schematic profiles based on scaled structural evidence from Structure O75. Arrows mark the predominant direction of stress according to the shape of the roof. The letters correspond to the arcs shown on plan in Figure 43.9.

to the nature of those activities: for these we include what we term constructions, installations, benches and the trough of O75

(3) Dividing walls

(4) Wall niches

(5) Burials

With regard to the first category, reference has already been made to the frequent position of mortars as internal features of structures, these often being set within mud-plaster floors. We assume that the cup-hole mortars and grinding stones that were present on the surface of WF16 prior to excavation (Finlayson and Mithen 2007, figures 6.5 and 11.7) had once been set within floors of late Phase 2 and Phase 3 structures, the floors having since been entirely lost by erosion.

Hearths had also been moulded into mud-plaster floors inside structures, such as Hearth O92 (Figure 14.6) in the

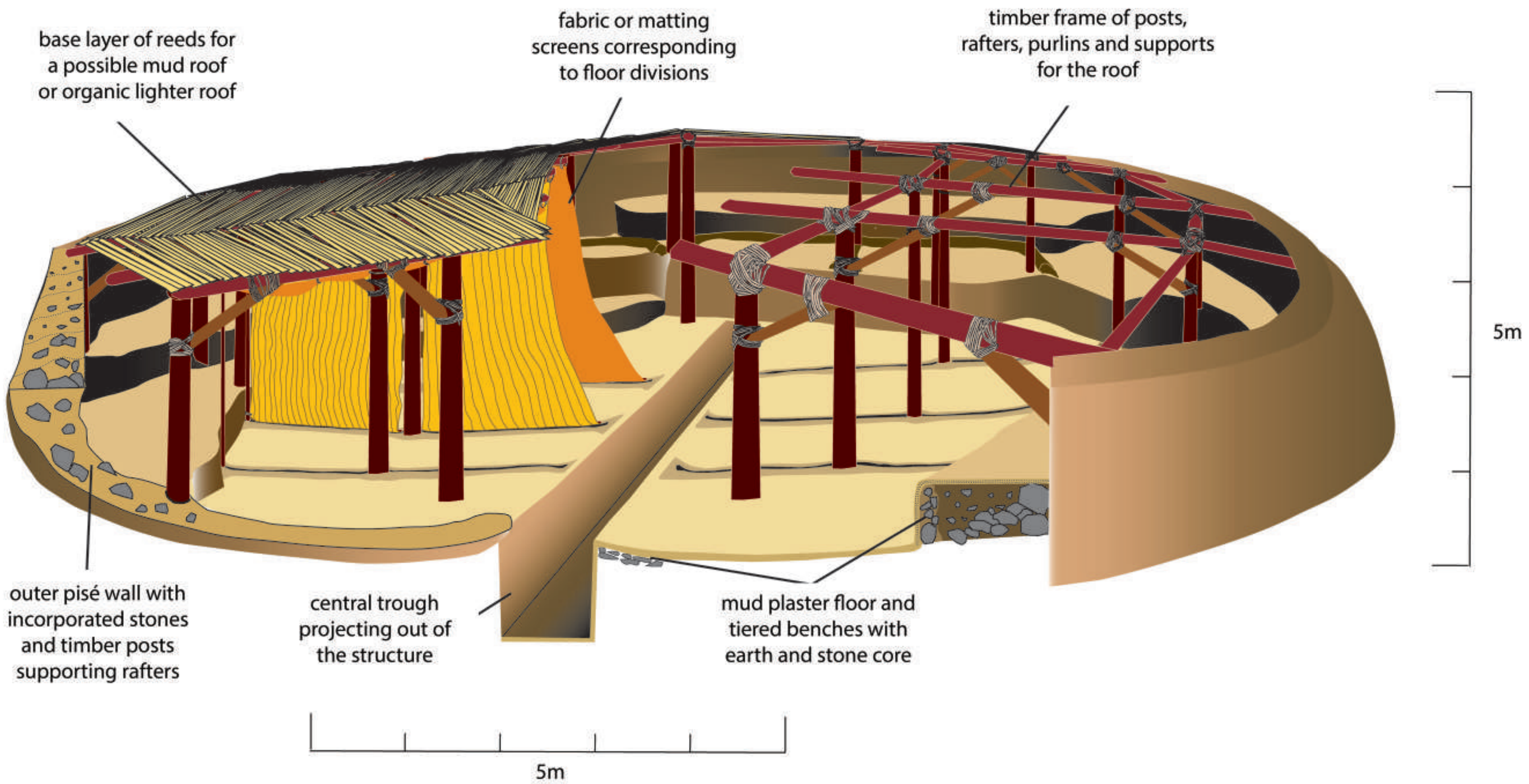

Figure 43.12 Partial reconstruction of Structure O75 showing construction methods used in the construction of the walls, benches and mud-plaster surfaces, and possible roof construction based on Profile 4 in Figure 43.11 (by Darko Maričević).

upper horizon (floor, 606) of O45, or Hearth O13 within Structure O52, where the floor itself had eroded away. The floors of Structure O75 had several hearths, either moulded onto the surface of the floor, or placed into the cuts made into the floor, suggesting possible change of use of the interior after the central trough was filled in (Figure 38.36). The post-O75 mud-plaster surface (734), which was part of Surface O91, featured a hearth moulded from the same fabric as the surface (Figure 37.6).

A possible stone-built hearth was located on mud-plaster floor (1066) in Structure O11. This consisted of four medium sized stones (1065) arranged in a semi-circle against the eastern wall of the building and which showed signs of scorching. A stone-built hearth had also been constructed within Midden O60, consisting of a small circle of stones (345), containing a charcoal-rich fill (340) and showing signs of cracking by heat (Figure 35.13). A steep-sided pit [1015] that had been either cut into, or moulded by, a mud floor (1018) in intramural space O114 (Figure 20.2) also appears to have been a hearth in light of the ashy silt and charcoal (651) it contained and the scorching of the surrounding mud floor (1018).

In general, however, hearths are surprisingly scarce within the structures. Scorching of a mud-plaster floor (804) below ash-rich silt (864) in Structure O19 suggests that hot items, and perhaps a fire itself, might have been placed directly on the floor without use of a constructed hearth. This may have been the cause of scorching on mud-plaster floor (853, 809) in Structure O12.

Another type of internal feature is a ‘workbench’, represented by stone slabs (SF1171, SF1173) located on the floor of Structure O56 (Figure 17.9). One of these (SF1171) may have been the recycled fragment of a cup-hole mortar; a series of perforations indicates that it had been used for drilling beads, an interpretation supported by the artefacts within this structure. In the adjacent Intramural Space O57 a workbench, made from elongated stone slab SF2853 (Figure 22.2), which was positioned 0.5 m away from the cup-hole mortar SF124, was associated with surface (620) and multiple pestles and other ground-stone objects. An even more complex concentration of flat stones, pestles and other ground-stone tools (901) was revealed in Structure O100 surrounding cup-hole mortar SF1753, which was flanked by two large flat stone slabs that probably acted as workbenches (Figure 36.12).

A further type of possible workbench consisted of a combination of a flat stone slab and half of a stone bowl. The most striking example (39) was discovered below the overburden and above a silt horizon (277) within Structure

Figure 43.13 Stone slab and half bowl combinations at WF16: A — SF121 and SF255 in Structure O83; B — SF943 and SF944 in Structure O45; C — SF1600 in Structure O75. Scales 0.5 m.

O83 (Figure 43.13). This was constructed from a fragment of a ground-stone bowl (SF121), that may have been either accidently broken or deliberately cut, and a flat slab (SF255), which had been shaped by chipping around its edge to produce an elongated sub-rectangular shape. The slab lay flat with one long edge pressed against the open side of the bowl. The slab was wedged at one side with a fragment of a worked stone (SF124). The bowl contained a mid-grey silt (37), with small fragments of bone, shell, charcoal and chipped stone. That this installation may have been designed for a specific function is suggested by the discovery of two near identical constructions, one of which was fitted into a wall niche (663) in Structure O45 and the other capped the filled in moulded post pipe (750) in the face of the second tier bench of Structure O75 (Figure 43.13).

With regard to internal features of a more ambiguous nature we have three examples of what we term constructions. The most notable is that from Structure O45, the fully, or partly, domed mud clay structure, O117 (Figures 14.31 and 43.8). This had been constructed by plastering mud over a wickerframe. Low (<10 cm) ridges of mud divided its interior floor (1313) into three or more compartments, one of the ridges having been levelled. There was no evident entrance into this internal structure, although one might have been destroyed by the cut of a later burial (Burial O63). A greater degree of wear on the floor around this cut and the direction in which rubble had fallen into the structure, supports the idea of an entrance at this location. Alternatively, this internal structure might not have been a complete dome and may have had an opening from above. The extent of collapsed rubble into the interior of O45, much of it falling onto and into O117, precluded the possibility of establishing the overall structure of O117. Its function remains an enigma.

Structure O85 has the poorly preserved remnants of an internal, thin, semi-circular mud-plaster wall (612, Figure 16.2). Although poorly preserved and unexcavated, this might be the footprint of an internal structure similar to that of O117 in Structure O45. It dominated the interior of O85, leaving little space between it and the interior face of the surrounding pisé walls (674, 999=61).

A different form of internal construction was exposed in Structure O66: a moulded ring of mud plaster (1085) raised above the surface of a floor, approximately 1.0 m in diameter with a central 'hole' of *c.* 0.5 m diameter (Figure 26.9). In light of pestles and mauls on the floor, this feature might have been the setting for a stone mortar that had been later removed. Structure O66 also had the complete skeleton of a wading bird located close to a wall (Figure 26.7), its complete preservation suggesting a deliberate deposition.

One further example of an internal construction is the circular stone structure F1 from Trench 1 excavated during the evaluation (Finlayson and Mithen 2007, figures 6.29, 6.32). The stones of this wall (106) were placed into a shallow cut [104] made into a sequence of midden deposits and silts that were contained within mud pisé walls (131 and 165). Further midden deposits had then accumulated against the interior of this circular walled structure. It remains unclear whether wall (106) was inserted to remodel the interior of a still active structure defined by pisé wall (131 and 165), or whether wall (106) had been constructed after that pisé walled structure had been abandoned.

Benches can also be considered as a type of internal feature, although those of Structure O75 might be considered part of its infrastructure rather than internal features. Possible internal benches were also found within the smaller structures. In Structure O19, for instance, there was a stub of wall (1079, Figure 10.2) that projected from the main wall (134) of the structure into its interior, with its end covered in a smooth plaster facing (Figure 10.11).

The trough in the floor of Structure O75 provides a different type of internal feature. As described within Chapter 38 and the previous section in this chapter, the trough provides the axis of bilateral symmetry to this large structure, providing a central termination for the arrangement of raised gullies. Where fully excavated, the trough was *c.* 0.75 m wide x 1.2 m deep, and lined with mud plaster. Micro-stratigraphic analysis of the deposits within one of the sondages (SA6122; Sondage B) showed the presence of some water-laid sediments, suggesting that one of the functions of the trough might have been a drain. The spatial extent and structural analysis of O75 suggests that it might not have been entirely covered by a roof, and with floors made from mud plaster there might have been a need to remove rainwater as quickly as possible from their surface. A sondage demonstrated that the trough extended beyond the outer westward wall of Structure O75 and hence may have drained water away from the settlement, although the laminations and lack of slope to the base of the trough suggest that this was not its primary function.

The third category of internal feature is the dividing wall. These were found within several structures at WF16: Structure O70 had two inserted internal walls (1093 and 1094) that created three discrete spaces (Figures 41.1, 24.2); an internal wall (1080) divided O12 into two distinct rooms that contained quite different sequences of deposits (Figure 11.20); and Structure O72 appears to have been divided into two spaces by an inserted wall (988), although this was not explored by excavation (Figure 23.2). The gullies within ridges that run in a herring bone pattern across the floor of Structure O75 might have once demarcated internal divisions, perhaps closed off from each other by drapes or wickerwork frames supported by posts (Figure 43.12), although any such reconstruction must take account of the fact that some of the gulleys were constructed as simple ridges on the floor.

Wall niches provide a fourth category of internal feature. Three niches were located close to wall (35=1394) of Structure O12 (Figure 11.20), two in its eastern room (1068, 1397) and one in its western (1071). Two of these (1071, 1397) appear to have been moulded into the pisé, while one (1068) had been cut into it. These were substantial niches, *c.* 0.3 m deep. They might have been used for storage, or alternatively, they might have been supports for a ladder, or simply provided hand and foot holds to enter and exit O12; also drawing on a post pad (1398) immediately below the niches and a post-hole within the wall.

A rather larger niche, which we have described as a chamber (1025), was found in wall (256) of Structure O56 (Figure 17.11, 17.13). The remarkable thickness of this wall at this point, suggests that it might have been designed to contain this chamber, which had an entrance of 0.3 m x 0.5 m and ran for more than 0.8 m into the wall. Finds near the entrance of the chamber included a piece of bitumen SF1533, a hammerstone, a sheep/goat mandible and impressed clay mouldings SF1537, SF1542, and SF1543. A niche (663) of similar dimensions was found in wall (245) of Structure O45 (Figure 14.28). This had an entrance 0.55 m wide and extended for at least 0.65 m into the wall, reaching entirely through (245) and penetrating the adjacent wall (674) of Structure O85. This contained a stone platter (SF944) and fragment of stone bowl (SF943), forming a similar construction to that (39) found on a floor in Structure O83 (Figure 14.30). Towards the rear of the niche a stone piercer (SF1169) was retrieved, possibly having been a stored and then forgotten item. A second larger opening in wall (245), located lower and to the west of [663], was exposed but remained unexcavated (Figure 14.23).

Burials provide the fifth and final type of internal feature. These are reviewed in the following chapter (Chapter 44) and consequently only summary comments will be provided here relating to their potential role within the architecture of the settlement. Some of the burials appear to have been designed so that the skull from an interred body was exposed above the surface of an internal floor, such as in Structure F8 (Trench 2) and F3992 (Trench 3). In the cases where secondary burials appear to have been accessed on repeated occasions, such as the burial in F8 (298), one must assume that the floor had been marked in some manner so that the underlying primary/secondary burial could be located. We have been unable to establish where these floors would have been in Phase 3 structures that have been lost to erosion. The position of below-floor burials might have also been marked within those floors because of the rarity of any intercutting of burials. It is striking for instance that the tight cluster of Burials O39, O89, O37 and O38 within the wall of Structure O83 had avoided any inter-cutting.

Even if the specific positions of below floor burials were not marked, one should assume their presence was sustained within human memory, and hence formed an integral element of the architecture and experienced environment within the structures and settlement in general.

43.8 External features

The excavation only exposed one example of what appears to have been an external feature associated with a structure: Pit O14 immediately to the south of Structure O64. We recognise, however, that this reflects our own classification and that some of our Structures, such as O113, and the three small cells that we combined together as Structure O70, might equally represent features external to adjacent and larger structures. Pit O14 was of an irregular shape, measuring at maximum 1.45 m north–south and 1.68 m east–west, and 0.80 m deep (Figure 29.8). Its sides were undercut to varying degrees, up to 0.18 m, and the base had a distinct central ridge. Its interior had been lined with relatively fine mud plaster (537), which had evidently been patched and perhaps entirely replaced on several occasions. This pit had cut Burial O81 such that the left foot of the skeleton (984) intruded through the side of the pit where the lining had fallen away.

Two middens O60 and O69 (Figure 31.2, 35.3) should also be considered as external features to Structures at WF16. Both of these have been assigned to Phase 3 in light of them overlying, and in the case of O69 cutting into, pisé walled structures and being immediately below the overburden. As discussed in Chapter 45, the size of these middens suggests they may have functioned as a centralised disposal area for the Phase 3 community.

Surface O91 (Figure 37.2) might also be considered as an external feature, in this case an exterior floor for Structure O100. Whether or not this was entirely an intentionally constructed surface, or initially a by-product from constructing the massive walls of O100, remains unclear. But several signs of activity on the floor (734) of Surface O91, including a hearth (722, 723) that had been moulded into its surface, an adjacent stone setting (1246), small pits [726, 721] and distinctive chipped stone assemblage, suggest it had been the locus for activities.

A final type of external feature is the *c.* 1.0 m high standing stone (336) that was set within a niche formed by the intersection of walls (313, 314) of the Trench 3 structures (Finlayson and Mithen 2007, figure 6.63).

43.9 Decoration and display

The evidence for the use of pigment and incised designs on walls and floors was not extensive at WF16, most likely as a consequence of preservation rather than original occurrence. The preparation of pigment may be evident from mortar (SF124) set in floor (620) within intramural space O57 because of its association with pestles that were stained with pigment (Figure 22.7). Two separate concentrations of possible pigment stones and ground-stone tools were discovered in Structure O45: one associated with the collapsed raised floor and the other with Hearth O92 in the rebuilt structure.

As noted above, several of the pisé samples taken from walls indicated the presence of gypsum, a mineral absent from the control samples. It seems likely that this had been added to the wall as a whitewash following construction, rather than being added directly to the pisé mix. Within Structure O64 an amorphous area of red pigment (Figure

29.5) suggested ochre decoration on the surface of a fine grey mud-plaster surface (326). No discernible pattern was evident, but the discrete nature of the ochre markings suggested that this was more than just an area where ochre had been worked.

The most striking examples for decoration come from Structure O75, more specifically from the vertical face of the lower bench (713). This had evidently been repeatedly re-plastered, with at least two of the plaster surfaces having been decorated. The outermost surface (1805) preserved circular motifs, moulded into the plaster (Figure 38.37), while the underlying plaster (1806) had been decorated with wavy lines (Figures 38.38 and 38.39), appearing as if they had been incised into wet plaster using two fingers. The plaster across the whole of this surface has patches of red pigment suggesting it had once been completely decorated.

Several lines of evidence indicate that human skulls had been displayed within WF16 structures. The skull of the primary burial in Structure F8 (Trench 2) had been made into a visible feature within the floor of the Phase 1 structure (i.e. pre-11,200 cal BP, Finlayson and Mithen 2007, figures 6.47, 6.48). Its display appears to have continued even after the secondary burial of multiple human remains and the laying of the new floor. A similarly exposed skull from a burial was evident within the Trench 3 stone-walled circular Structure F3992, most likely dating to Phase 3 of the WF16 activity (i.e. post-10,800 cal BP). The burial (F39910) contained a complete primary interment of an adult in a crouched position, with its skull positioned on a ‘pillow’ stone, requiring it to have been raised and disarticulated from the neck (Finlayson and Mithen 2007, figures 6.61, 6.62). It seems likely that the skull had once protruded through the floor level to be exposed within the interior of the structure.

The possibility that isolated skulls were displayed within structures, perhaps in niches or suspended, is suggested by the scatters of cranial and dental fragments O129, O128 and O44 found among the rubble of collapsed or demolished Structures O45, O33 and O12.

Within Structure O45 a group of such fragments was found amidst the rubble that had collapsed into the structure during its destruction by fire: loose teeth, small cranial fragments and one mandible (O129, Figure 14.26). The mandible was crammed between pisé blocks in the southernmost part of the interior, where the highest concentration of teeth and cranial fragments was also found (Figure 14.27), some of which were partly burnt and blackened. Although burrowing animals had affected the distribution pattern, it seems reasonable to assume that the teeth and cranial fragments belong to the same skull as the mandible. One possible interpretation is that the flames from the fire that destroyed Structure O45 reached and partly charred a human skull (or head) that had been either hanging from the roof, resting in a niche high up in the southeast part of the wall, or built into the wall itself. When the structure collapsed, the skull shattered into pieces and became dispersed in the rubble.

A similar concentration of human mandible, teeth and cranial fragments (O44) was found in Structure O12. These were concentrated within a discrete layer of pisé rubble (109, and successive spits) that is likely to have derived from the collapse of a superstructure, possibly also bringing down a displayed skull.

A third possible example of skull display is the maxilla and cranium fragments O128 found among pisé rubble in Structure O33 in the north part of the site, the accumulation of which has been interpreted as deliberate backfill of an abandoned structure. These remains appear to have been deposited as part of the rubble, suggesting that they may have once been attached to the walls, or roofs, from which this rubble derived.

Within the backfill of Antique Burial O71, an isolated piece of human cranium (SF558) was recovered that had been polished and pierced (Figure 6.12). The rim of the hole had been worn smooth suggesting it had once been suspended from a cord. Antique Burial O71 was cut through Midden O60 and backfilled with the same material, making it likely that the pierced cranium fragment originally derived from that midden. A second pierced bone object (SF572) was found in the same backfill and a third (SF566) in the surrounding midden; whether these are animal, or human, has yet to be determined. The shape and the size of the piercings were similar in all three pieces; it is possible that they might have been pendants, or hung for display within one or more of the structures.

A final possible example of displayed material within the interior of a structure are the raptor bones, contained within a dense spread of burnt stone (181) in the upper horizons of Structure O11 (Figure 12.5). These were below the final surviving floor (130) in the stratified sequence. Although the quantity and identification of the bones within (181) have yet to be ascertained, field observations suggested a large number of raptor bones, some of which remained articulated. Their deposition, forming a single horizon within Structure O11 suggests they were intentionally placed spread over the surface.

43.10 Intramural spaces

While this chapter has focused on the construction and internal design of the structures, the intramural spaces between structures would have also been a key architectural aspect of the settlement. There was only limited investigation of such spaces during the 2008–2010 excavation and these must remain a priority for future work.

Without the removal of the enclosing walls, interpretation of the deposits within intramural spaces was difficult. Within Intramural Space O57, for instance, it was not possible to fully determine whether its deposits represented the remains of a previous structure into which the surrounding walls, (256), (598) and (610) had been cut, or the later use of this space once those buildings had been constructed. When a wall sequence (245) within Structure O45 was excavated, it suggested that a mud-plaster lining (1032) might have been applied to its exterior surface, to create the interior face for the wall of Intramural Chamber O116.

Similarly, Intramural Space O55 could only be partially investigated because it extended beyond the limits of the excavation. Excavation demonstrated that the walls built for Structures O53, O56 and O85 had defined the space. The space with its cup-hole mortar (SF277) set within a silt (246) may have been an intramural working area. Alternatively, there may have been an earlier structure at this location with its floor levels remaining buried below (246) and its walls either entirely deflated prior to the construction of Structures O53, O56 and O85, or destroyed by their construction. As such, the cup-holed mortar would relate to floors of this earlier structure, rather than having been positioned into the intramural space following construction of Structures O53, O56 and O85.

The intramural space between O45, O85 and O53, the base of which was a mud-plaster surface (1341), was deliberately filled with rubble (601), thus raising the outer ground level in this triangular area. A similar rubble deposit (648) was also found to the exterior of wall (245) of Structure O45, above surface (1333), which is a probable equivalent to (1341), to the southeast of O45 and which was laid on top of filled-in Intramural Chamber O116. A likely scenario is that rubble was piled in between the walls of the structures immediately after their construction, accumulating on the clean mud plaster of (1341) and (1333), and over the outward buttressed pisé of walls (245) and (56). This raises the probability that sediments accumulated, perhaps by deliberate deposition, within the intramural spaces, so that as internal floor layers increased in height so too did the external surface, hence maintaining the essential semi-subterranean nature of the structures (Figure 43.8).

In some cases small gaps between walls appear to have been used as rubbish dumps. The space O105 created between the northern extent of wall (143) of Structure O19 and the southern wall (135) of Structure O12 might have remained a void, or been used for discard, its interpretation depending upon the finds coming from within its dark silty fill (137).

43.11 Summary

The excavations at WF16 have exposed a significant proportion of the settlement, revealing a dense complex of architectural remains. WF16 Phase 1 (*c*. 11.80–11.30 ka cal BP) and Phase 2 (*c*. 11.30–10.80 ka cal BP) appear to have been based on closely packed semi-subterranean structures, some with flat mud roofs that were sufficiently robust to provide a working space, while others had tent-like covers, probably from hide or brushwood. WF16 Phase 3 (*c*. 10.80–10.24 ka cal BP) activity involved a move to free standing, stone walled above ground constructions, unfortunately with no surviving evidence for roofing.

Although the architectural remains share a menu in their components and style, the overwhelming impression is one of flexibility in how those components are assembled, producing a great diversity of structural forms. The interpretation of this diversity is still evolving as post-excavation analyses continue. At present we can see a combination of functional and chronological factors contributing to this diversity, but the sheer range of variation indicates a fluid approach to construction, suggesting there was no hard and fast accepted functionally-specific design, and that personal choices must also have played a significant role.

44. The Neolithic burials at WF16

In this chapter we provide an overview of the PPNA burials from WF16. The evidence and stratigraphic details of each burial have been described in the Chapter (5–38) of the Object within which they were located. The complete set of burials is summarised in Table 44.1. Within this chapter, we also cover collections of human remains that are likely to be significantly associated with each other but were not excavated from a burial context.

44.1 Spatial and stratigraphic considerations

The spatial distribution of burials at WF16 suggests two main concentrations in the central and the northern parts of the 2008–2010 excavation trench (Figure 44.1). Burials O41, O43 and O93 are outliers to the south and scatters of disarticulated human remains have been found within Structures O45, O12 and O33. Burials in Structures F8 (Trench 2) and F3392 (Trench 3) were located immediately to the north of the 2008–2010 excavation and on the adjacent knoll to the east, respectively.

Given that different parts of the site have been excavated to different degrees it is difficult to ascertain whether this spatial patterning of burials is meaningful. Even those burials that occur in the same stratigraphic horizon immediately below the overburden might do so superficially: we cannot tell how many cultural horizons have been lost through erosion at different points across the site, and hence whether such burials had been cut from the same or different levels.

Our interpretation is that the majority of burials derive from either late Phase 2 or Phase 3 activity: they were cut into Phase 2 PPNA denuded walls, and a variety of deposits within abandoned and then buried semi-subterranean structures. With around 50% of the burials cutting into Phase 2 walls, such walls might have been specifically targeted; implying that knowledge of past structures had been sustained. Another possibility is that the Phase 2 walls might have been encountered during the construction of the Phase 3 structures and were either formally, or informally, referenced by the positioning of Phase 3 burials, thus providing a symbolic link between the PPNA past (Phase 2) and PPNA present (Phase 3). Alternatively, the position of Phase 3 burial cuts into Phase 2 walls might have happened by chance and be of no significance.

Burials that were cut into the deposits bounded by the walls of structures and those of intramural spaces that were then sealed by further deposits, are especially difficult to assign to a chronological phase because the infilling of Phase 2 structures may have overlapped with the construction of Phase 3 structures. Finally, a small number of burials had been positioned under either the floors or the walls of partly deflated Phase 3 structures.

Burials that can be demonstrated as belonging to Phase 1 and 2 are in the minority. Burial (298) contains a primary burial within the floor of Structure F8 located in Trench 2 and confidently assigned to Phase 1 activity at WF16 (Finlayson and Mithen 2007: figure 6.47). The secondary burial activity in Trench 2, during which bones appear to have been removed from and added to the original primary burial, might relate to either Phase 1 or Phase 2 activity.

The burials likely to be Phase 2 rather than Phase 3 are those that were sealed by either floors or other deposits, related to the occupation of semi-subterranean pisé-walled structures. Multiple floors and occupation deposits sealed Burial O81 in Structure O64 indicating that it belongs to Phase 2. Similarly, Burial O89 in Structure O83 (Chapter 21), containing an infant (possibly a neonate), had been sealed by sediment accumulations within the structure itself. This was in

Table 44.1. List of all Neolithic burials and human remains with the summary of their stratigraphy, description, context, preservation and associated finds.

Key:
Δ Summary of context and stratigraphy
§ Field observations of position, orientation, or placement
ǂ Field observations of bone preservation or surface modification
Field observations of small finds coming from burial fill (these are likely to include a mix of deliberate deposition and those pre-existing within sediment used for the burial fill; further artefacts will be recovered from sieve residues of the fills)

F8, Context 298, *Structure F8, Evaluation Trench 2*
Δ Cut into redeposited gravel, with the skull protruding through the floor of a PPNA structure and stratigraphically sealed by two PPNA floors and associated occupation. § A northeast—southwest orientated arrangement of articulated and disarticulated bones, with disarticulated skull placed on a 'pillow' stone. ǂ Fragile: especially in the upper part of the inhumation. At least two adults and a juvenile appear to be present. # Chipped-stone artefacts including bladelets, a microlith and an awl.
F39910, *Structure F3992, Evaluation Trench 3*
Δ With its skull probably protruding through the floor of a PPNA structure and positioned on a 'pillow' stone; stratigraphically sealed by a PPNA floor. § A northeast–southwest orientated crouched inhumation on its right side with the skull facing northwest. The skull was disarticulated but in position by appearing to have been stretched from the body and then placed on a 'pillow' stone. ǂ Appears to be a complete but fragile adult skeleton. # Chipped-stone artefacts.
O3, *Structure O31*
Δ Cut through the infill and wall of a disused PPNA structure and sealed by deflated overburden. § Undetermined. ǂ Fragmentary remains, appearing to consist of only two hand or foot bones, one long bone and several ribs.
O4, *Midden O60*
Δ Cut into PPNA midden deposits and sealed by deflated overburden. § Probably a crouched inhumation; a mortar fragment had been set on an edge appearing to form one side of the burial. ǂ Fragmentary — only some hand and feet bones survive. # Fragment of a mortar stone.
O6, *Structure O75*
Δ Cut through the wall of a PPNA structure and sealed by deflated overburden. § A northeast–southwest orientated crouched inhumation, lying on its back with legs bent to the right and head facing to the left. ǂ Appears to be a complete, well-preserved juvenile skeleton. # Fragment of a possibly worked animal bone.
O7, *Structure O31*
Δ Cut through PPNA infill inside the structure and sealed by a PPNA floor. § A north–south orientated crouched inhumation on its left side, facing east. ǂ Appears to be a complete but poorly preserved adult skeleton. # A hammerstone, an El-Khiam point and a chipped-stone pick.
O8, *Structure O75*
Δ Cut through the infill of a disused PPNA structure and sealed by deflated overburden. § A semi-crouched inhumation, orientated east–west with its head at the east end facing northeast. ǂ A fragmentary and poorly preserved juvenile skeleton appearing to have the lower right arm, complete left arm, hand and unfused epiphyses missing. # A green stone bead.
O9, *Structure O65/Intramural Space O114*
Δ Cut through the wall of a PPNA structure and sealed by deflated overburden. § A crouched inhumation on its right side, orientated east–west and facing north, with its left hand under the skull. ǂ A fragmentary juvenile skeleton appearing to have only the skull, arms, hands and feet present. # Four chipped-stone artefacts and a caprine pelvis.
O10, *Structure O84/Intramural Space O114*
Δ Cut through the infill of a disused PPNA structure and sealed by deflated overburden. § A north–south orientated crouched inhumation on its right side, with its head to the south facing east. ǂ Fragmentary remains with, at least, both scapulae, left side of the rib cage, hands and feet missing; bones in a poor condition with the inhumation having been affected by animal burrowing. # A chipped-stone artefact and a grooved ground-stone object.
O17, *Midden O60*
Δ Cut into and sealed by PPNA midden deposits. § A northwest–south orientated crouched inhumation on its right side, with the head probably originally facing west, but cranium moved post-depositionally in front of the mandible to face south. ǂ An incomplete and poorly preserved adult skeleton.
O24, *Structure O75*
Δ Cut through the infill of a disused PPNA structure and cut by Burial O8. § A northwest–southeast orientated crouched inhumation on its left side, with its right hand underneath the skull facing southeast. ǂ A slightly crushed juvenile skeleton. # A marine shell bead.
O26, *Structure O84*
Δ Cut through the infill of a disused PPNA structure and sealed by deflated overburden. § A northwest–southeast orientated crouched inhumation on its right side with two large stones placed on top of the body, one on the pelvis and one over the ribcage. ǂ An adult

Table 44.1. List of all Neolithic burials and human remains with the summary of their stratigraphy, description, context, preservation and associated finds continued...

skeleton which appears to have been truncated above its lower ribs by deflation. # Two chipped-stone artefacts, a ground-stone pestle and a fragment of red ochre.

O27, *Intramural Space O114*

Δ Cut through the infill of a disused PPNA structure and sealed by deflated overburden. § A north–south orientated crouched inhumation on its right side, facing west. ǂ A poorly preserved juvenile skeleton, appearing to have some of its cranium missing. # Two marine shell beads and a marine shell.

O28, *Structure O109*

Δ Cut through the infill of a disused PPNA structure and sealed by deflated overburden. § A northeast–southwest orientated crouched inhumation on its left side, facing southeast. ǂ A crushed and fragmentary juvenile or young adult skeleton, with at least its right ribs and foot missing, and both humeri in a fragmentary condition. # Four chipped-stone artefacts and a large stone.

O32, *Structure O72*

Δ Cut through the infill of a disused PPNA structure and sealed by deflated overburden. § A north–south orientated primary crouched inhumation on its right side, disturbed by the secondary deposition of multiple cranial fragments after the re-arrangement of some of the original bones. ǂ The secondary cranial fragments have been truncated at the crown; the primary adult burial is in poorly preserved condition. # Seven chipped-stone artefacts (core, blades or bladelets and El-Khiam points), two animal bones, stone bead.

O35, *Structure O113*

Δ Cut through the infill of a disused PPNA structure and cut by a robber pit, then sealed by overburden. § A north–south orientated crouched inhumation on its left side, facing east. ǂ Although truncated and crushed by the robbing activity, the juvenile skeleton appears reasonably well-preserved, with gypsum-like concretion on its right ribs.

O36, *Structure O83*

Δ Cut through the wall of the PPNA structure and sealed by PPNA deposits. § A northeast–southwest orientated crouched inhumation on its right side facing southeast, skeleton encased in mud lining and capping. ǂ A well-preserved adult skeleton with occasional black staining visible on the bones. # A green stone bead, a serrated blade and a possible phallic object.

O37, *Structure O83*

Δ Cut through the wall of the PPNA structure and sealed by deflated overburden. § A northwest–southeast orientated crouched inhumation on its right side with its head facing northwest and tilted downwards. ǂ A well-preserved juvenile skeleton apart from a truncation of the crown of the skull. # Two chipped-stone bladelets and a marine shell bead.

O38, *Structure O83/Intramural Space O57*

Δ Cut through the wall of the PPNA structure and cut by an Antique burial. § A primary inhumation appearing to have been originally crouched on its right side and orientated southwest–northeast, facing northwest with a hand below the skull. ǂ A fragmentary infant cranium on top of a heavily truncated primary burial of which only the skull, lower arm and hand appear to have survived; the skull of the primary burial has a gypsum-like residue and black linear markings. # A fragment of possibly worked animal bone.

O39, *Structure O83/Intramural Space O57*

Δ Cut through the wall of a disused PPNA structure and cut by a probable PPNA pit, then sealed by overburden. § Secondary burial of semi-articulated remains. Not clear whether of one or more individuals. Some of the bones placed in gypsum-lined woven basket or cloth. 'Excess' gypsum found next to the skull. ǂ Relatively well-preserved skeletal remains but in a jumbled arrangement. The bones were lifted in blocks, some of which were coated in a gypsum-like substance. # Three blades or bladelets, an El-Khiam point, a borer and a greenstone bead.

O41, *Structure O53*

Δ Cut through the wall of a PPNA structure, cut by a PPNA pit and then sealed by overburden. § An east–west orientated primary inhumation crouched on its right side with the head originally to the west. ǂ An adult skeleton truncated across its upper body by a cut interpreted as an exhumation pit used to remove the skull and upper body parts. # Four blades.

O43, *Structure O19*

Δ Cut through the wall of the PPNA structure and Burial O93, and probably sealed by the infill of a disused PPNA structure. § A northwest–southeast orientated crouched inhumation on its right side, with the head end to the northwest. ǂ Poorly preserved and crumbly, probably, adult skeleton. Possible gypsum-like substance noted adhering to the bones. # A fragment of animal bone.

O44, *Structure O12*

Δ Disarticulated teeth, mandible and skull fragments scattered among the collapsed rubble of the PPNA structure and sealed by further PPNA infilling. § Scattered fragments of a cranium and mandible. ǂ Well preserved.

O47, *Structure O75*

Δ Cut into a PPNA structure (mud-plaster bench) and sealed by PPNA make up deposits for an eroded structure. § A northeast–southwest orientated crouched inhumation on its right side, with its left hand under the skull and infant cranium fragments scattered around the body, perhaps deriving from an earlier and disturbed inhumation. ǂ A well-preserved adult primary burial, with fragments of an infant cranium. # A chipped-stone blade placed on the chest and a stone object.

O76, *Structure O72*

Table 44.1. List of all Neolithic burials and human remains with the summary of their stratigraphy, description, context, preservation and associated finds continued...

Δ Cut through the wall of a PPNA structure and sealed by PPNA deposits. § A north–south orientated crouched inhumation on its left side facing east, with both hands partially under the skull. ǂ Appears to be a complete but fragile adult skeleton. # A chipped-stone blade and two marine shell beads.

O77, *Intramural Space O114*

Δ Cut through the infill of a disused PPNA structure, possibly cut by burial O27, and then sealed by overburden. § A group of disarticulated long bones with articulated unfused epiphyses. ǂ Reasonably well preserved remains of a juvenile skeleton.

O78, *Structure O72*

Δ Human mandible within the infill of a disused PPNA structure and sealed by PPNA deposits. § A disarticulated mandible. ǂ Well preserved.

O79, *Structure O72*

Δ Cut through the infill of a disused PPNA structure and sealed by PPNA deposits. § A north–south orientated crouched inhumation on its left side facing east. ǂ An almost complete but very fragile infant skeleton, with a truncated skull and its lower left arm and hand missing.

O80, *Structure O113*

Δ Cut through the infill of a disused PPNA structure and sealed by PPNA deposits. § A north–south orientated crouched inhumation on its back with its head to the north and facing east, and with its legs bent eastwards. ǂ A well-preserved adult skeleton. # Chipped-stone artefacts, including four blades, an animal bone and a lozenge-shaped stone object.

O81, *Structure O64*

Δ Cut through a PPNA sequence inside a structure and sealed by multiple PPNA floors and occupation deposits. § Probably a north–south orientated crouched inhumation on its left side facing east. This was only partially exposed, being observed through a later pit cut that had allowed access to the burial. ǂ A well-preserved adult skeleton (unexcavated).

O82, *Structure O65*

Δ Cut through a possible floor inside a PPNA structure and sealed by PPNA deposits. § A west-northwest–east-southeast orientated crouched inhumation on its right side, with its right hand under the skull facing west. ǂ Appears to be a well-preserved juvenile skeleton apart from a truncated left side of the skull. # Six chipped-stone artefacts, including five blades, two stone objects, two bone beads, a bone point and a probable fox ulna.

O89, *Structure O83*

Δ Cut through the infill of a disused PPNA structure and cut by an Antique burial. § A north–south orientated and probably crouched inhumation, on its left side facing west. ǂ A well-preserved, but truncated, infant skeleton.

O93, *Structure O19*

Δ Cut through the wall of a PPNA structure and cut by Burial O43. § A northwest–southeast orientated crouched inhumation on its left side, with its right hand partially under the skull. ǂ Appears to be a complete but fragile adult skeleton. # Two chipped-stone blades, a green stone bead and a worked animal bone.

O101, *Midden O60*

Δ Placed within and sealed by PPNA midden deposits. § A northwest–southeast orientated crouched inhumation, possibly on its right side. ǂ A fragmentary juvenile skeleton, with its leg bones in a disturbed position. # A stone bead.

O122, *Structure O84*

Δ Cut through the infill of a disused PPNA structure and sealed by deflated overburden. § Skeletal remains which are either disarticulated or heavily disturbed. ǂ Fragments of a cranium, mandible and ribs.

O123, *Midden O60*

Δ An articulated human foot found within and sealed by PPNA midden deposits. § Isolated. ǂ Articulated foot.

O124, *Structure O85*

Δ No visible cut and so either placed within the infill of a disused PPNA structure or suffering from severe deflation; sealed by overburden. ǂ Fragmentary remains of an infant cranium.

O125, *Structure O72*

Δ No visible cut and so either placed within the infill of a disused PPNA structure or suffering from severe deflation; sealed by overburden. ǂ Only right scapula, two right ribs and pelvis fragments present.

O126, *Structure O75*

Δ Found within the rubble filling a disused structure and sealed by PPNA midden. ǂ Fragmentary remains of at least one cranium and possibly associated leg bones.

O128, *Structure O33*

Δ Disarticulated maxilla and skull fragments found within the rubble infill of a PPNA structure and sealed by further PPNA backfill, floors and structures. § Isolated finds at two different levels of infill. ǂ Fragments of a maxilla and cranium.

O129, *Structure O45*

Δ Disarticulated teeth, mandible and skull fragments scattered within the collapse rubble of a burnt PPNA structure and sealed by PPNA levelling and occupation deposits. ǂ Scattered fragments of a cranium and mandible.

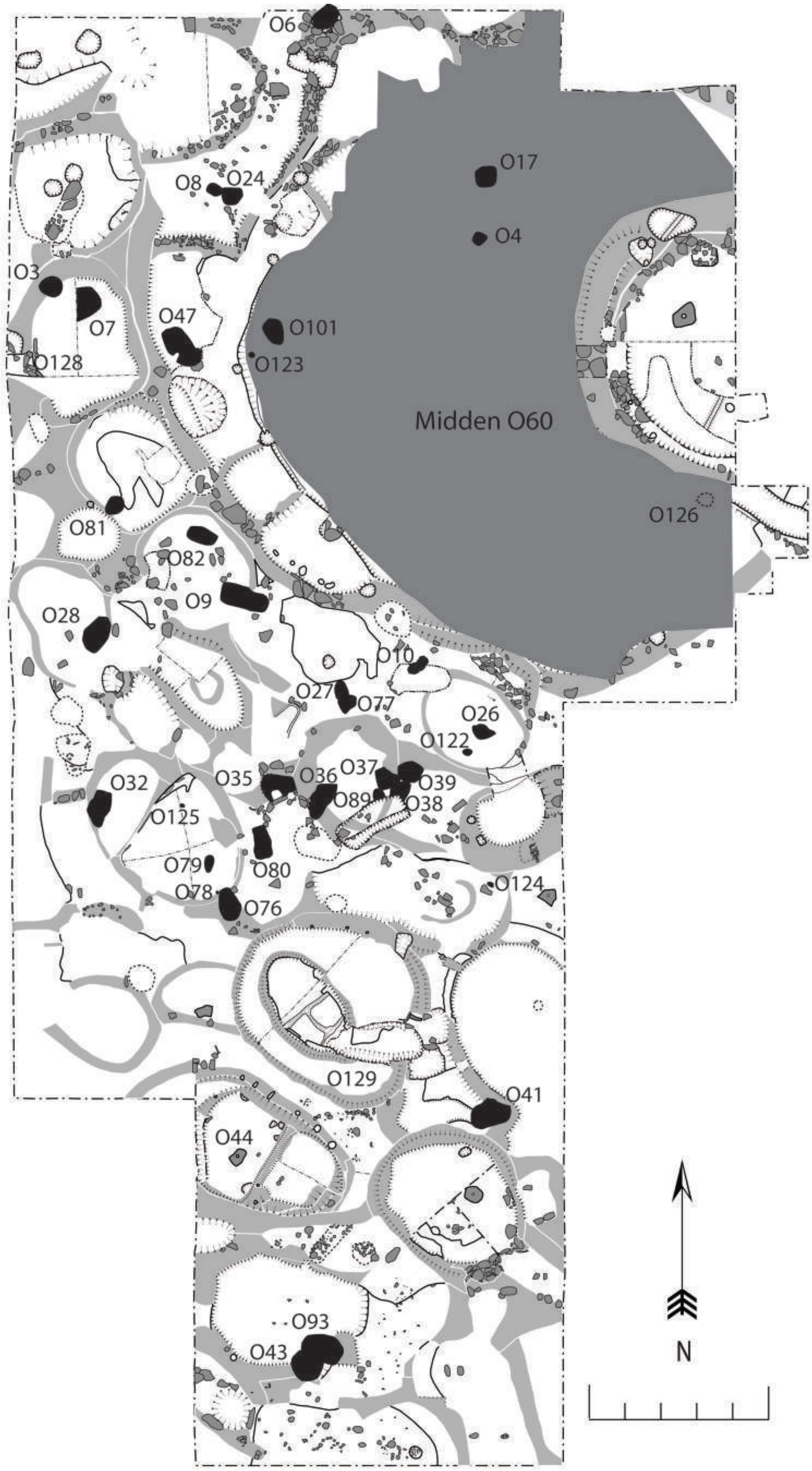

Figure 44.1 Plan of the site showing distribution of all Neolithic burials from 2008–2010 excavation.

contrast to the other burials within Structure O83 (Burials O36, O37, O38 and O39) that appear to have been cut into the walls from a higher level.

Burial O93 was cut through the wall of Structure O19 and sealed by a sequence of infilling and abandonment deposits, which were, in turn, cut by the construction of Structure O11 (Chapter 12). Burial O43 was then cut in almost exactly the same place and sealed by further infilling deposits. Burial O82 in Structure O65 was a crouched inhumation (Chapter 28). This had been placed in a cut in a floor, which had been sealed by a compacted horizon of pisé and mud plaster, thought to represent a floor horizon. Similarly, Burial O7 in Structure O33, a crouched adult inhumation, was sealed by a floor that might have been from either a later Phase 2 or a Phase 3 Structure O31 (Chapter 30).

Several other burials can be stratigraphically and spatially related to the ephemeral remains of the Phase 3 structures. Burials O27 and O77 were found directly below stone rubble and the arc of a stone wall, which was all that was left of a circular free-standing structure in the overburden, Horizon O111 (Chapter 5). Another arc of wall representing a stone-built structure in this horizon overlay a concentration of disarticulated and partly articulated bones (O123) in the underlying midden. An adjacent cobbled surface overlay Burial O47 (Chapter 5).

44.2 Primary burials

The majority of burials at WF16 were primary interments containing intact, articulated skeletons. Bodies with sufficient skin and sinews to maintain skeletal articulation were typically positioned into tightly fitting graves in a crouched position, often with one arm flexed so that its hand rested below the skull, providing the impression of sleeping (Figure 44.2). The tightly flexed bodies may have been bound or wrapped to maintain their posture, as they were apparently squeezed into the burial cuts. Infants, juveniles and adults had been treated in the same manner. There appears to have been no preference for resting the body on its left or right side, or its orientation.

It seems appropriate to interpret some of these as foundation burials, established when the structures were being initially constructed to form a link between the present and the past. Burial O47 is a good example of an association between the Phase 2 and the Phase 3 architecture. Its cut had truncated a disused Phase 2 plastered wall and a bench surface of Structure O75 (Chapter 38). The burial remained sealed by the make-up layer and an overlying stone surface that were located at the north end and in line with the plastered wall. Due to erosion at this level it remained unclear whether the surface and the wall were related parts of the same Phase 3 Structure. Burial O47 itself contained a semi-crouched adult inhumation lying on its right side, with the left hand placed under the head (Figure 38.11). A flint blade was positioned on its chest and another stone object within the grave fill. The cut of the Burial O47 disturbed an earlier infant burial that was within the make-up for the floor, its cranial fragments being scattered in the fill around the Burial O47 adult skeleton (Chapter 38).

Burial O7 provides another example of a primary crouched adult inhumation (Figure 30.5). Unlike Burial O47, Burial O7 was located centrally in the backfill of Structure O33, rather than cutting into a wall and seems likely to relate to late Phase 2 activity, or even possibly Phase 3 (Chapter 30). The backfill of O33, composed almost entirely of pisé rubble from a demolished structure, contained fragments of a maxilla and a cranium (O128). The reason for Burial O7 being located between, rather than cutting into, the walls of Structure O33 might have been because remains of these walls were reused as the foundation for the construction of the over-lying Structure O31, which shared the same footprint. At some later stage, Burial O3 was cut into the floor and wall of Structure O31, presumably from an overlying Phase 3 structure that has been entirely lost by erosion.

Burial (298) within Structure F8 (Finlayson and Mithen 2007, figures 6.47 and 6.48) appears to have been a foundation burial that had been an integral part of the primary floor constructed within Phase 1 activity at WF16. The structure consisted of a wall made from large boulders backed by re-deposited gravel and a solid mud-plaster floor into which a quern stone had been set. The burial pit was located immediately adjacent to this quern stone.

Part of the burial pit had been sealed by a second floor, through which a pit had been cut from a higher level, suggesting the location of the burial had been marked and then later re-opened for the addition, or the removal, or both, of bones. The radiocarbon dates from Trench 2 (Chapter 40) suggest this secondary burial activity is likely to have occurred during Phase 2 activity.

A similar and perhaps more poignant case of prolonged knowledge of earlier burials was found in Structure O64, where Burial O81 was sealed by at least ten successive mud-plaster floor surfaces (Chapter 29). Because this burial appears to have been relatively early in the Structure O64 and O14 sequence, we suspect that it should be assigned to Phase 2 activity. Burial O81 was accessed via a small oval pit that was positioned immediately above it (Figure 29.7). The excavated pit exposed parts of the pelvis, the ribcage, the right elbow and upper legs of a crouched adult skeleton lying on its left, with feet to the south and skull, presumably, to the north. The rest of the burial, including the skull and foot bones, was sealed by the sequence of floors and occupation, which represents not only the repeated re-surfacing of the interior, but also the time elapsed between the act of the burial and its re-visiting via the pit, which might be Phase 3 activity. Unlike the case of the primary burial in Structure F8, there had been no attempt to remove or rearrange bones.

Immediately to the southwest of Structure O64 a mud-plaster lined pit (O14) was constructed, apparently with

Figure 44.2 Primary burials: A — O36; B — O82; C — O80; and D — O93. Scales 0.2 m.

full knowledge of the presence of Burial O81 in the side of adjacent Structure O64. Pit O14 undercut older Structure O64 in the exact place where Burial O81 could be accessed (Figure 29.8) and its lining shows evidence for repeated re-plastering events, perhaps due to the repeated exposure of the burial for an, as yet, unknown purpose (Chapter 29). The burial, sealed by the later sequence inside Structure O64, remains unexcavated.

In some cases Phase 3 burials were positioned almost directly above earlier burials. This seems unlikely to have occurred by chance, as illustrated by Burial O43 (Figure 10.6) being positioned directly over Burial O93 (Figure 44.2) within Structure O19 (Chapter 10). These burials are typical for WF16, consisting of cuts made through the floor and wall of a structure to create pits into which crouched primary burials were placed. Burial O93 contained a crouched skeleton whose right arm was bent across the body and tucked under the left humerus, with the right hand partially under the skull. The left arm was flexed with the hand up to the chest. Both legs were tightly bent with the knees together and feet slightly apart. The fill contained a greenstone bead and two flint blades, interpreted as deliberately placed grave goods. Burial O93 was sealed by a sequence of deposits, some of which extended to the west of abandoned Structure O19 and were shown to pre-date the construction of Structure O11 (Chapter 12).

A second cut had been made directly above Burial O93 into which a primary, crouched body had been placed, constituting Burial O43. Unfortunately the skeleton was poorly preserved. Lenses of light grey sediment adhering to the better-preserved bones are interpreted as deliberately placed gypsum deposits; on account of better-preserved instances of such practice being found elsewhere on the site (see below). Burial O43 was sealed by further infilling deposits and in Structure O19 (Chapter 10).

44.3 Secondary burials

At least five of the WF16 burials — F8 (298), O32, O38, O39 and O77 — contain groups of disarticulated bones that are judged to have arisen from deliberate (re-) burial rather than post-depositional disturbance. The burial (298) within F8 appears to have begun as a (Phase 1) primary foundation burial and then had bones removed and

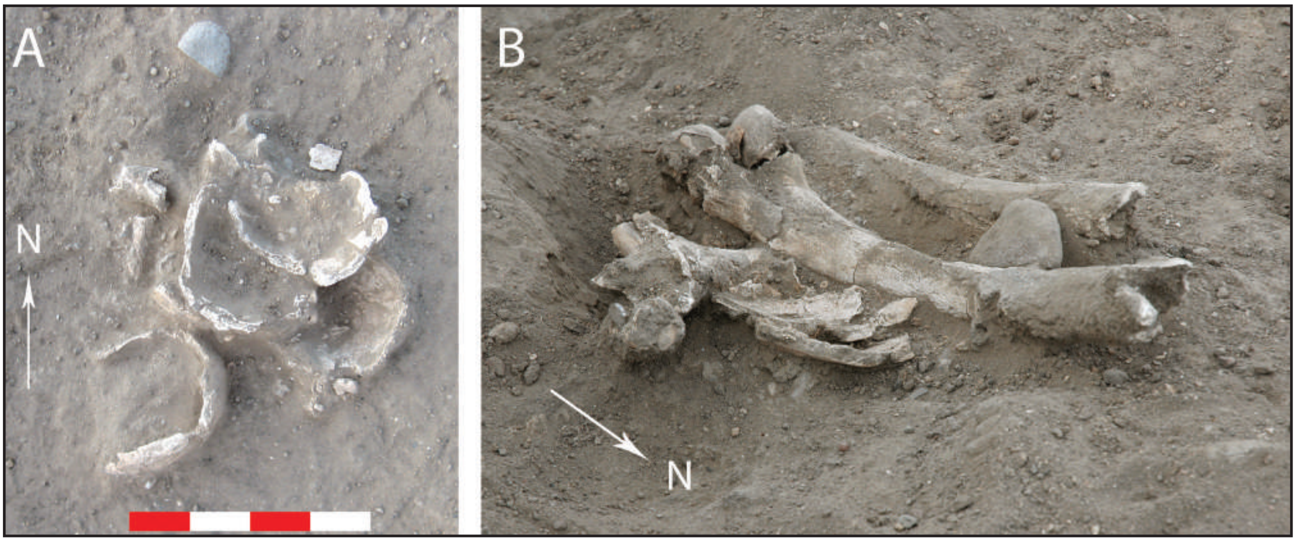

Figure 44.3 Two stages of excavation of the secondary interments in Burial O32: A — top group of cranial fragments, scale 0.5 m; B — underlying long bones.

inserted through a cut made from an upper floor horizon (Finlayson and Mithen 2007). As far as can be deduced from the excavation, this later intrusion was a single (Phase 2) event, resulting in the burial containing bones from multiple individuals.

Burial O32 (Figure 44.3) is the most striking example of secondary burial, providing further evidence for a particular concern with skulls at WF16 (Chapter 23). The burial cut, identified immediately below the overburden, was north–south orientated. It had cut the interior face of the pisé wall that formed Structure O72, and the silts within the interior of this structure.

We interpret Burial O32 (Figures 44.3, 23.7 and 23.8) as having been cut from a Phase 3 into an underlying Phase 2 Structure, O72, and representing a primary burial that was later disturbed by secondary deposition and possibly removals. The remains of a single human cranium immediately below the overburden deposit provided the initial evidence for the burial. Excavation revealed this to be the first of at least ten substantial cranial fragments, which had been stacked inside each other. The upper four crania were in a better state of preservation than those below and almost certainly represent four different individuals.

As fully described in Chapter 23, the excavation of these cranial fragments revealed that Burial O32 had begun as a primary crouched burial of an adult — with or without its skull. This was developed by later activity that re-arranged the bones, and is likely to have removed some bones while adding those from other individuals, culminating in the stacked collection of ten cranial fragments.

Despite its similarities to Burial (298) in Structure F8, Burial O32 has notable contrasts. The similarity resides in the intrusion into a primary crouched burial, the re-arrangement of the bones of that individual, and the introduction of bones from other persons. The contrasts are in the different treatment of the original skull inside the primary burial, which in F8 remained *in situ* and in Burial O32 was either removed or not present to start with, and in the content of the secondary interments, mainly long bones in F8 and skull fragments in Burial O32. Moreover, we interpret the primary burial in (298) of F8 to be Phase 1 and that in Burial O32 to be Phase 3. Nevertheless, in both cases there is an over-riding concern with skulls and long bones.

Another variation in the secondary treatment of human remains was observed in Burial O39, which was cut into the eastern wall of Structure O83 (Chapter 21). It formed a tight cluster of four adjacent burials with Burials O89, O37 and O38, the latter two of which were cut through the same wall (Figures 25.1, 44.1). Burials O37 and O38 are interpreted as either late Phase 2 or Phase 3. It seems likely that there was a deliberate avoidance of intercutting between these burials and, hence, knowledge of their relative positions was sustained. Burial O39 was cut across its northeast extent by a pit, filled with mid-yellowish-grey silty sand containing a high concentration of small stones.

As fully described in Chapter 21, the skull was the highest placed element of the human remains within Burial O39 (Figure 21.17), located adjacent to a bowl-like container filled with a compact silt (Figure 21.18) and a bundle of bones wrapped inside a white material that include gypsum, calcite and quartz (Figures 21.20, 44.4). It is possible that Burial O39 had been cut into an underlying primary burial from which the bones had been exhumed, transformed, wrapped and reburied in almost exactly the same place.

Burials O38 and O77 provide two more examples of secondary burials. Burial O38 cuts into Structure O83 and contained a child's skull that appears to have been placed directly above an earlier interment of an adult (Figure 21.13; Chapter 21). Burial O77 (Figure 20.5), which consisted of a group of disarticulated long bones that may

Figure 44.4 Human remains in Burial O39 showing the position of the skull next to the pelvis and the long bones wrapped in gypsum-based wrap with weaving or basketry impressions.

have been from a single individual, was found within a cut immediately below the pile of rubble and stone wall, and hence might also be a Phase 3 foundation burial (Chapter 20). For the complete details of these burials, as with the others, we must await the osteological analysis.

44.4 Removal of body parts from the primary burials

Having reviewed some of the intact primary burials and the secondary interments, it is apt to ask from where the human remains in the secondary burials, and those that might have been displayed within Structures O45, O12 and O33, (Chapter 43) derived. Only some of the disarticulated bones in Burials (298, F8) and Burial O32, for example, can be related to their primary burials; in both cases additional bones were added from elsewhere. Some attention should, therefore, be given to the incomplete primary burials within which the remaining bones are articulated, suggesting a once complete inhumation. The poor preservation of numerous burials makes it difficult to assess whether missing bones were caused by erosion or deliberate removal. Burials O41 and O26 were both missing the upper elements of the skeleton. We strongly suspect that these had been deliberately removed, perhaps in the process of specifically targeting the skull and the upper body.

Burial O41 appears to provide a robust example in which a secondary pit had been excavated over the burial for the removal of the skull, with the upper torso also having been either deliberately removed, or destroyed, during this process (Figure 15.6; Chapter 15). This burial was located on the outside of Structure O53 at the eastern edge of the excavation trench. It was exposed immediately below the deflation horizon, with its eastern end cut into the wall of Structure O53. As such, we attribute both the burial itself, as well as the secondary pit excavated to remove some of its bones, as Phase 3 activity.

Interpretation of this evidence is that a small rectangular inhumation (Burial O41), containing a tightly flexed inhumation, had been made when Structure O53 was already out of use. The burial clipped pisé walls, as has happened with numerous other burials excavated at WF16. At a later date, a pit was dug into the western half of the burial, the skull and some of the bones of the upper torso were removed, and the pit was backfilled with stone rubble.

Burial O26 (Figure 44.5) contained a skeleton within light grey-brown loose silt, located within Structure O84 (Chapter 19). Its fill was almost indistinguishable from the overburden, suggesting that it had been cut into underlying deposits from a late Phase2/Phase 3 activity. As fully described in Chapter 19, the upper part of the body was missing, although whether as a result of erosion or deliberate removal was unclear.

The somewhat unusual position of the remaining part of the spine in Burial O26, pressed against the northeast side of the cut in a near-vertical position, might provide an indication of the post-depositional disturbance. From the

Figure 44.5 Burial O26 showing upward position of the torso in relation to the legs. Scale 0.5 m.

position of the tightly flexed legs, lying flat on the left side, it seems likely that the rest of the skeleton would have also been positioned on its side, like the majority of primary burials at WF16. The position of the spine suggests that the skeleton had either been laid with its upper body raised, or that this position was post-depositionally acquired, perhaps as a result of pulling the upper part of the body out of the cut: this could only have happened if the skeleton was still held together by some of the flesh and sinews. The positioning of large stones on top of the body of the individual in Burial O26 was a unique occurrence among the WF16 burials, and seems to have happened at the time of the primary interment.

44.5 Midden burials

Three sets of human remains were found in Midden O60 (Chapter 35) with an additional Burial (O4) located in the overlying disturbed Horizon O111 (Chapter 5). We have described these as 'burials' although the extent of formal deposition remains unclear. Two of these, Burials O17 (Figure 44.6) and O101 (Figure 35.15), are probably remains of complete body interments and are confidently attributed to Phase 3. Burial O123 (Figure 35.12) could be the re-deposited remnant of a Phase 2 burial that was re-deposited into the midden, although its possible association with the overlying stone wall cannot be discounted. As we have seen elsewhere, however, the foundation burials at WF16 tend to be primary inhumations.

Burial O4 (Figure 5.13) was cut into the disturbed weathered deposits overlying the midden and, hence, is likely to be one of the most recent PPNA burials (Chapter 5). The remaining three burials were sealed within the midden deposits and were, to varying degrees, fragmentary. Burials O17 and O101 appear to have started as crouched inhumations of an adult and a juvenile respectively but were disturbed post-depositionally. The adult in Burial O17 (Figure 44.16) was incomplete but had, evidently, been lying on its right side, facing west (Chapter 35). As a result of some later activity, the cranium had moved forwards in front of the mandible and was facing south. It is unclear whether the incompleteness of the skeleton was also due to this disturbance, or whether the initial interment had been of a partial skeleton. Burial O101 comprised the bones of a child in a crouched position with the right arm lying by the body, the left arm extended and the legs bones disarticulated within a sandy silt (Chapter 35). It was not possible to detect a cut for this burial, which may have simply been placed within the accumulating midden.

The remaining collection of human bones from Midden O60, Burial O123, consisted of an articulated human foot and some other disarticulated bones. Once again, there was no visible cut associated with these bones, and the likelihood is that they represent remains of a heavily disturbed burial, whether inside a cut or loose in the midden. Such remains could represent midden discard from a burial disturbed elsewhere on the site (potentially from a Phase 2 structure): a PPNA version of so-called trash burials of the PPNB (Rollefson 1983). Alternatively, the remains could have been brought from elsewhere and placed in the midden prior to the construction of the Phase 3 stone structure on top of it.

It remains unclear whether the burials from Midden O60 should be interpreted differently to burials elsewhere at WF16. Burials O17 and O101 do not differ greatly from

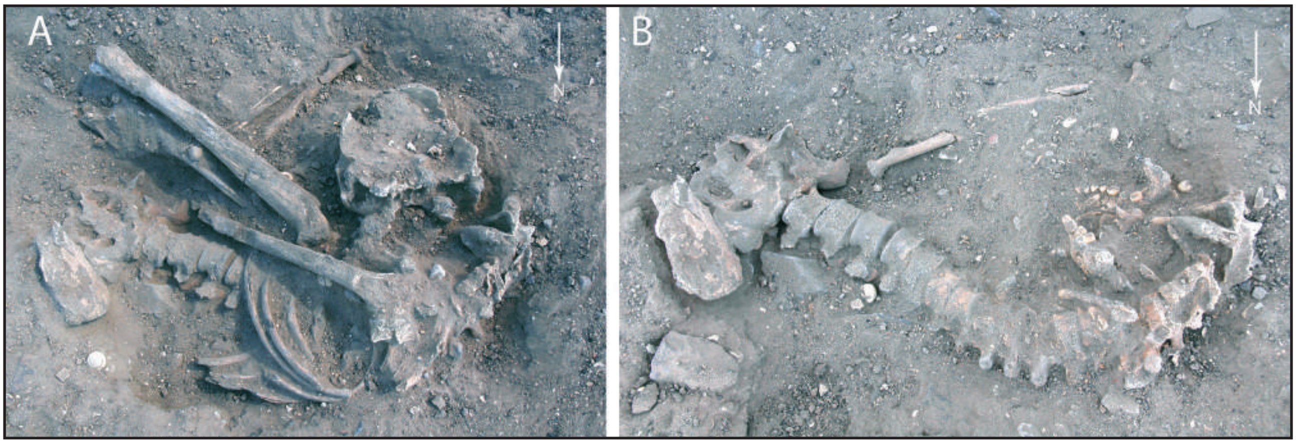

Figure 44.6 Two stages of excavation of Burial O17 showing: A — complete burial and B — burial after the removal of the cranium, the leg bones and the ribs. Note the opposing directions of two radia in two photos representing crossed over lower arms.

many of the burials in other contexts on the site, while the practice of partial secondary interments has been attested elsewhere at WF16. Furthermore, the evidence from WF16 shows that middens cannot be viewed simply as dumping grounds for unwanted discard. Consequently, there appears no *a priori* reason to consider the burials within Midden O60 as less meaningful than burials elsewhere at WF16, or necessarily associated with a particular social class.

44.6 'Decoration' of skulls and other bones

Several of the burials contained patches of white sediment, either as flecks within the burial fill or, in some cases, adhering onto bones. Preliminary analysis indicates that this is not a naturally occurring precipitate but a deliberately manufactured paste, primarily of gypsum, that had been applied to the bones. The most striking example is what appears to wrap a bundle of disarticulated bones in secondary Burial O39 and which had been encased in a woven fabric, or basket, that left an impression on its surface (Figure 44.4; Chapter 21). Other instances of similar white sediment occurring in association with human remains were observed in Burials O35, O38 and O43 (Figure 44.7).

Burial O35 (Figures 25.5 and 25.6) was located in Structure O113, a poorly defined structure appearing to consist of two cells (Chapter 25). A pit, most likely of relatively recent origin, had cut the burial, destroying the southern portion of the cell in which the burial was placed. The burial contained a juvenile skeleton, in dark brownish-grey silt, in a crouched position on its left side, facing eastwards. A gypsum-like white concretion was present on the ribcage of the skeleton, spanning the gaps between the individual ribs on its right side. If we are correct, that this was a deliberate deposition rather than natural precipitate, it could have only been applied post-mortem. Either the skin and flesh had sufficiently decayed prior to burial to enable the application of this 'paste' onto the ribcage, or the grave was re-opened after soft tissue decay for its application. In light of the fragility of infant bones, the second scenario appears more plausible.

A similar white sediment was found adhering to the top and left-hand side of the adult skull within Burial O38 (Figure 44.7), which was immediately adjacent to Burials O39 and O37. Burial O38 was a late Phase 2/Phase 3 burial that had been cut into the remains of a Phase 2 structure (Chapter 21). Its southwest extent had been cut by a large Antique burial (O87). The first human remains exposed within its sandy silt fill were the front teeth of a maxilla, facing upwards. A fragmentary skull had been placed on top of a group of large stones contained in the fill of the burial. This skull belonged to a young infant and had been placed in the burial pit after the placement of an adult skeleton, contained deeper in the fill.

The skull of the adult faced north and had been severely damaged by an animal burrow. The burial fill contained white flecks, possibly gypsum, and the skull had traces of a white residue on its top and the left side, possibly a gypsum-based paste. A series of linear black marks were present on the back of the skull. These might be stains from a basket on which the skull had been resting or deliberately applied pigment. It is possible, therefore, that this skull had been decorated with both a plaster-like substance and a black pigment. It remains unclear whether the decoration (if this is what it is) on the adult skull had been applied to the partially decayed body prior to burial, or within the grave itself after the soft tissues had decayed.

Black staining was observed on most of the bones of the skeleton in primary Burial O36, which had cut the wall of Structure O83, another example of a Phase 3 burial (Figures 21.7, 21.8). As fully described in Chapter 21, the skeleton

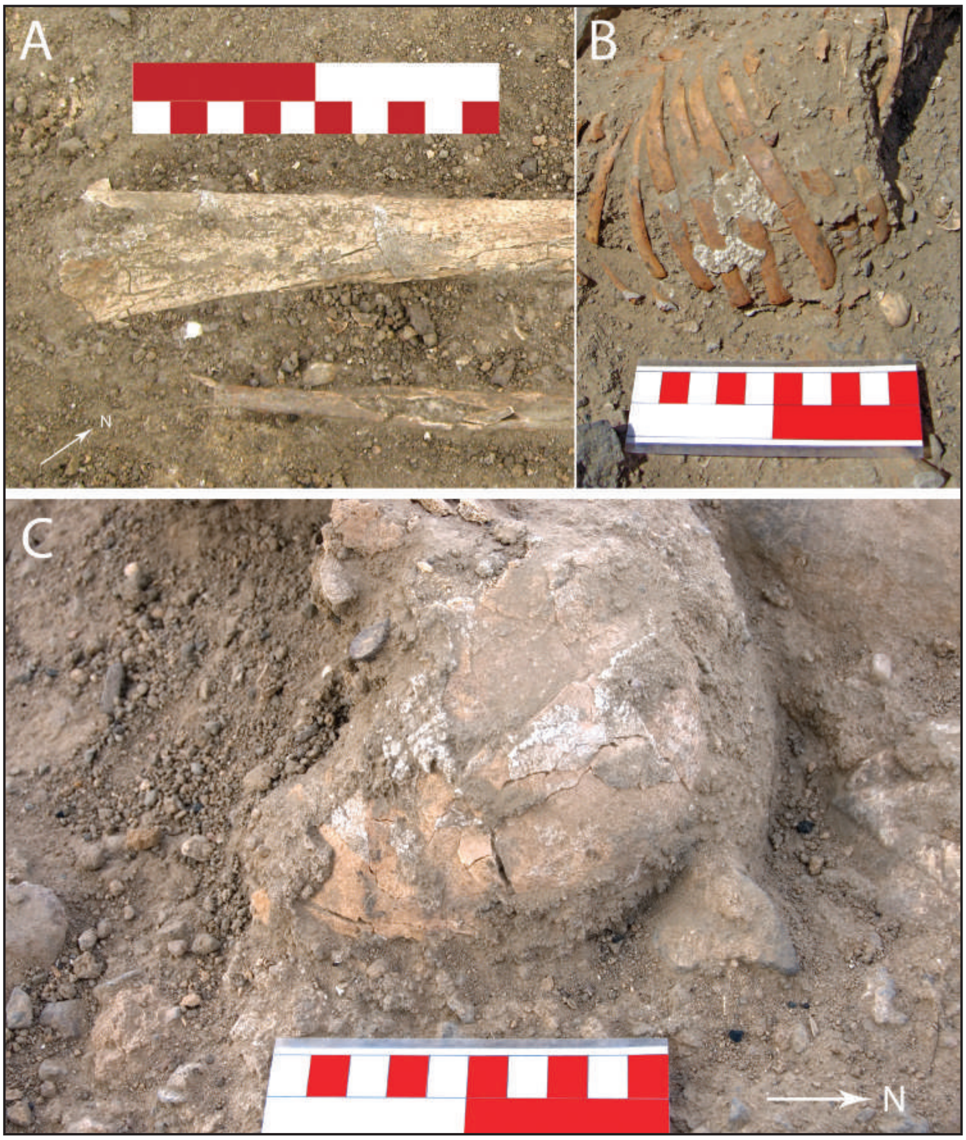

Figure 44.7 Occurrences of gypsum-based paste on the human remains at WF16: A — tibia in Burial O43; B — ribcage of skeleton in Burial O35; and C — skull in Burial O38 with gypsum and black stain/paint marks. Scales 0.1 m.

lay on its right side in a crouched position facing eastwards and appeared to have been crammed into the burial cut.

The skeleton was set into compacted light grey silt, which lined the sides and the base of the burial pit and formed a ledge, 0.10 m thick, at the northeast end. This mud lining made the available space within the burial even smaller. The same deposit was found around and between the bones, suggesting that it had been poured in after the soft tissue had decomposed. The bones were in a good state of preservation with the aforementioned black staining visible on most of the bones, but with no obvious pattern to it.

Overall, the evidence for the decoration or the embalming of bones at WF16 can be divided into two categories — one concerning white paste, and the other concerning black staining or possible paint. Most of these instances are much more ephemeral than the famous examples from the PPNB. Nevertheless, it is significant that we can document possible pre-cursors to such practices in the PPNA, something not seen before in the southern Levant. The gypsum, quartz, and calcite paste found wrapped around some of the bones in the Burial O39 is especially intriguing, not only for the practice itself, but for the recipe involving three different white materials. These must have been sought and collected and mixed for this purpose, indicating that the colour was the most important quality of this material.

44.7 Grave goods

Numerous artefacts were recovered from within the fills surrounding the skeletal remains, including bone, greenstone and marine shell beads, animal bones, bone objects, chipped-stone tools, and ground-stone objects. When the cranial scatters and otherwise loose bones in broader deposits are excluded, 36 cut burials remain in different states of preservation, with the majority containing finds within their fills (a ratio of 25:11). Chipped-stone artefacts were the most numerous. This might not be thought significant, were it not for the fact that most of these were blades or bladelets, rather than the knapping debris that is abundant throughout the site. In several burials the intentional placement of blades in relation to the body of the individual appears highly likely. Thirteen burials contained blades or bladelets: ten were burials containing adult skeletons, while three were juveniles. Various types of bead were the next most numerous category of finds within ten burials (five adults and five juveniles). Seven burials contained both beads and blades or bladelets. The infant burials were all without finds. What these preliminary quantifications show is that the distribution of different types of grave goods was not random and this further supports their deliberate inclusion, although it is doubtful that all of the objects found within the burials were deliberate grave goods, as some mixing and inclusion of residual finds is to be expected on a site as densely stratified as WF16.

44.8 Summary

WF16 provides a unique sample of burials and human skeletal remains from the PPNA. Although osteological analysis is yet to be undertaken, it appears to represent a demographic profile ranging from young infants to mature adults and we suspect that both genders are represented. As we have described a range of mortuary practices are also represented including, primary burial, secondary burial, manipulation of skeletal elements, skull display and the ‘decoration’ of bones using gypsum plaster and pigment.

45. WF16 overview, prior to the post-excavation project

This report, together with its digital archive (the WF16 IADB), completes the first stage of the WF16 Excavation Project: to describe the contexts, stratigraphy, chronology, architecture and the burials at WF16, as ascertained from excavations undertaken in 2008, 2009 and 2010, and drawing on the results of the 1997–2003 evaluation (Finlayson and Mithen 2007). The analysis of the bulk finds and samples from the 2008–2010 excavations (Table 45.1), and the small finds (Table 45.2), will constitute stage 2 of the project. Prior to the completion of that analysis, any attempt to provide a comprehensive interpretation of WF16 and the role it played in the Neolithisation process in Southwest Asia would be premature; the provision of that interpretation will constitute stage 3 of the project. Nevertheless, some form of preliminary overview to conclude this volume, written within the constraints of available information, is appropriate.

45.1 Three phases of activity

The archaeological evidence from both the 1997–2003 evaluation and the 2008–2010 excavation have been assigned to three broad phases of activity. Phase 1, tentatively dated to between 11.84–11.30 ka cal BP, is the least represented, having just two structures assigned to it, F8 and O73. This is unlikely to reflect the entire extent of Phase 1 activity simply because, with these two exceptions, the depth of excavation was insufficient to penetrate below the Phase 2 stratified deposits. The majority of the stratified deposits and finds have been assigned to the two later phases of activity: Phase 2, *c.* 11.30–10.80 ka cal BP and Phase 3, *c.* 10.80–10.24 ka cal BP.

45.2 The Phase 1 settlement *c.* 11.84–11.30 ka cal BP

In light of the limited evidence available we have little further comment on the Phase 1 settlement. The architecture of Structure F8 is considerably less complex than that of the structures found in Phases 2 and 3. This structure appears to have been a pit cut into the gravel knoll, with an irregular wall made from boulders, perhaps derived from the pit itself. The wall was extended upwards by the addition of stones with a mud mortar and may have risen slightly above the pit edges, although it appears too irregular to have supported a solid flat roof construction. Any cover would presumably have been of organic material, possibly tent-like in form. The interior contained a sequence of thin mud-plaster floors. With the exception of the initial floor, these were all very slight, consisting of little more than a coating of mud over the underlying deposits, which ranged from occupation debris to evidence for abandonment. The initial floor incorporated a cup-hole mortar and a burial pit, marked by a skull protruding through the floor. The burial pit had been reopened on at least one occasion, possibly during Phase 2 activity. In Chapter 43 we noted the similarity of F8 to Late Natufian Harifian structures in the Negev, which is compatible with the radiocarbon dating. If the comparison has substance, it suggests a local, smooth transition from the Epipalaeolithic to the Pre-Pottery Neolithic A.

Interpretation of Structure O73 is unable to proceed beyond stating that its stone walls are not dissimilar to the wall of Structure F8. While Structures O73 and F8 might not be typical of Phase 1 in general, they provide the only evidence available and suggest that the Phase 1 settlement may have been more temporary in nature than it became during Phase 2. The thin mud floors of Structure

Table 45.1 Summary of the bulk finds and sample volumes from the 2008–2010 excavations at WF16.

WF16	Volume of sediment (l)				Weight of bulk finds per material (g)														
Object no.	**Total volume**	**Flot. sediment**	**Dry-sieved sediment**	**Archive and other**	**Chipped stone**	**Ground stone**	**Other worked stone**	**Unworked stone**	**Animal bone**	**Human bone**	**Unidentified bone**	**Marine shell**	**Other shell**	**Pottery**	**Plaster/Pisé**	**Textile**	**Wood**	**Charcoal**	**Misc.**
O111	5473.0	1170.0	4243.0	60.0	190998.4	87218.1	1207.7	724.9	12782.9	92.9	0.0	176.1	2414.4	63.0	0.0	0.0	0.0	220.0	743.0
O99	5192.0	1007.0	4151.0	34.0	40818.78	6573.6	149.5	0.0	4014.2	45.0	0.0	30.6	1719.7	0.0	0.0	10.0	100.0	39.1	190.6
O103	2178.0	336.0	1829.0	13.0	9216.4	2104.0	23.8	0.0	1228.8	0.0	190.1	0.0	155.9	0.0	0.0	0.0	0.0	20.0	0.0
O22&O104	649.0	430.0	212.0	7.0	1478.7	156.0	21.2	0.0	0.0	0.0	157.5	0.0	71.6	0.0	0.0	0.0	0.0	10.0	0.0
O21	49.0	33.0	15.0	1.0	283.6	0.0	0.1	0.0	0.0	0.0	32.5	0.0	53.0	0.0	0.0	0.0	0.0	0.0	0.0
O19	3850.0	988.0	2831.0	31.0	25891.2	3779.0	141.7	0.0	2391.2	2.4	1327.1	0.7	761.5	0.0	0.0	0.0	0.0	33.3	50.0
O12	10431.0	1127.0	9249.0	55.0	38333.4	1113.0	95.4	40.0	2996.7	123.0	2183.3	1.1	1391.1	0.0	1800.0	0.0	0.0	223.6	166.8
O11	4617.0	1493.0	3046.0	98.0	17885.3	4024.6	48.0	3146.8	2.9	2705.5	0.0	0.0	0.0	0.0	300.0	0.0	0.0	243.4	27.1
O52	350.5	99.0	248.0	3.5	6756.6	560.0	30.2	0.0	31.0	0.0	117.7	0.0	192.4	0.0	0.0	0.0	0.0	20.0	0.0
O45	11487.0	1925.0	9438.0	124.0	61262.0	21147.3	197.0	371.0	8590.3	0.2	0.0	33.6	2035.5	0.0	2530.0	0.0	0.0	3621.5	132.1
O53	3939.3	661.0	3241.0	28.3	48415.2	2293.7	156.0	0.0	5564.3	11.0	0.0	10.3	1924.1	0.0	4900.0	0.0	0.0	58.6	160.0
O85	1025.0	195.0	825.0	5.0	5309.3	0.0	42.2	0.0	355.8	0.0	0.0	11.0	351.5	0.0	0.0	0.0	0.0	0.3	20.0
O56	1395.0	467.0	908.0	20.0	11068.0	2678.4	395.2	30.0	1143.3	0.0	0.0	21.0	270.5	0.0	2730.0	0.0	0.0	92.6	11.0
O55	45.0	20.0	23.0	2.0	89.3	0.0	0.0	0.0	12.0	0.0	0.0	0.0	21.5	0.0	0.0	0.0	0.0	0.0	0.0
O84	4226.0	487.0	3717.0	22.0	10699.3	964.4	42.3	0.0	6128.7	0.0	0.0	0.0	72.0	0.0	450.0	0.0	0.0	256.7	160.2
O114	300.5	95.5	199.0	6.0	2333.8	310.0	32.6	0.0	2171.2	0.0	20.8	0.0	80.0	0.0	0.0	0.0	0.0	40.8	0.0
O83	558.1	326.1	222.0	10.0	1787.1	0.0	12.3	0.0	21.8	0.0	176.7	1.5	335.2	0.0	0.0	0.0	0.0	73.5	30.0
O57	174.0	62.0	110.0	2.0	2214.4	186.6	3.3	10.0	57.3	0.0	6.2	0.0	19.0	0.0	0.0	0.0	0.0	10.0	0.0
O72	3277.5	648.5	2608.0	21.0	21025.4	2933.0	60.1	20.0	3200.8	4.0	0.0	0.0	283.4	0.0	0.0	0.0	0.0	91.9	0.0
O70	1045.0	412.0	618.0	15.0	11301.3	3355.0	42.4	20.0	682.6	0.0	0.0	0.4	1339.0	0.0	500.0	0.0	0.0	10.6	0.0
O113	978.5	383.5	585.0	10.0	7849.6	423.5	16.9	0.0	0.0	13.0	239.9	0.0	269.8	0.0	0.0	0.0	0.0	11.4	0.0
O66	2077.0	579.0	1464.0	34.0	8877.8	2528.0	5.0	10.0	811.4	0.0	0.0	0.0	380.9	0.0	7190.0	0.0	0.0	5.4	10.0
O109	635.0	150.0	477.0	8.0	2782.9	0.0	31.6	0.0	89.0	0.0	26.9	0.0	245.5	0.0	0.0	0.0	0.0	10.0	0.0
O112	594.0	105.0	485.0	4.0	8762.9	735.0	50.0	0.0	174.4	0.0	42.0	0.0	86.3	0.0	0.0	0.0	0.0	20.0	0.0
O65	2823.4	743.5	2041.0	38.9	17624.9	4203.3	31.0	770.0	2140.8	4.0	0.0	0.3	699.4	0.0	10250.0	0.0	0.0	52.8	503.9
O64&O14	2559.0	959.5	1497.0	101.5	9845.3	4333.0	20.1	0.0	997.6	0.0	0.0	166.0	2186.0	0.0	174.0	0.0	0.0	17.0	0.0
O31&O33	3341.0	494.0	2827.0	20.0	20851.9	2268.9	54.7	360.0	1575.4	0.0	0.0	0.3	744.4	0.0	0.0	0.0	0.0	220.5	110.0
O69	8803.0	410.0	8320.0	73.0	77914.7	5919.3	285.1	80.0	6314.1	0.0	0.0	49.1	1710.2	0.0	0.0	0.0	0.0	31.8	101.0
O74	1087.0	180.0	900.0	7.0	10435.6	2880.2	31.0	0.0	576.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.3	0.0
O73	413.0	90.0	330.0	3.0	8208.8	0.0	12.0	0.0	663.7	0.0	0.0	0.0	131.7	0.0	0.0	0.0	0.0	10.3	0.0
O90	743.0	60.0	680.0	3.0	1953.1	291.2	0.0	0.0	193.1	0.0	0.0	0.0	274.9	0.0	0.0	0.0	0.0	0.1	0.0
O60	78079.0	7299.0	70637.0	143.0	1584142.9	341874.9	14649.5	2535.0	457478.3	41.0	0.0	390.2	19346.39	0.0	4455.0	0.0	0.0	7535.8	1333.6
O100	7078.5	888.0	6147.5	43.0	63230.1	18819.3	744.3	0.8	7491.1	0.0	0.0	5.0	284.3	0.0	0.0	0.0	0.0	60.7	11.0
O91	6962.0	1247.0	5609.0	86.0	128373.5	42180.2	210.4	190.0	27239.3	0.0	0.0	16.0	676.4	0.0	2501.0	0.0	0.0	1989.1	1.0
O75&O68	36629.8	4253.3	32149.0	227.5	273284.6	84075.9	1103.8	425.1	21418.0	2010.7	0.0	53.8	3463.6	0.0	1872.0	0.0	0.0	3403.2	477.6
Total	**213065.1**	**29823.9**	**181881.5**	**1359.7**	**2731306.0**	**649929.4**	**19946.4**	**8733.6**	**578538.0**	**5052.7**	**4520.7**	**967.0**	**43993.3**	**63.0**	**39652.0**	**10.0**	**100.0**	**18434.3**	**4238.9**

Table 45.2 Summary of the small finds from the 2008–2010 excavations at WF16.

WF16	Quantities of Small Finds per material (nos.)																				
Object	**Chipped stone**	**Ground stone**	**Other stone**	**Worked bone**	**Unworked animal bone**	**Disarticulated human bone**	**Bone beads**	**Stone beads**	**Marine shell beads**	**Marine shell other, coral**	**Other shell**	**Bitumen objects**	**Clay objetes**	**Plaster/Pisé**	**Plant matter**	**Basketry, textile**	**Glass**	**Metal**	**Wood**	**Pottery**	**Miscellaneous**	**Total small finds**
O111	10	77	12	1	0	0	0	12	9	7	0	0	0	0	0	0	0	1	0	0	0	129
O99	1	27	6	8	0	4	0	8	14	3	0	1	0	1	0	4	2	2	1	1	0	83
O103	1	14	3	1	0	0	1	1	5	2	0	0	0	0	0	0	0	0	0	0	0	28
O22&O104	1	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	4
O19	2	8	0	2	1	0	0	4	8	0	0	0	0	0	0	0	0	0	0	0	0	25
O12	5	39	5	7	3	11	0	12	18	7	0	0	0	1	0	0	0	0	0	0	0	108
O11	3	17	4	1	1	4	0	6	5	2	0	0	0	0	0	0	0	0	0	0	0	43
O52	0	5	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	8
O45	13	73	34	15	9	17	0	12	24	11	1	3	2	0	0	0	0	0	0	0	1	215
O53	8	29	4	7	2	1	1	10	8	1	0	0	0	0	0	0	0	0	0	0	0	71
O85	0	17	3	2	1	1	0	2	8	0	0	0	0	0	0	0	0	0	0	0	0	34
O56	4	35	6	6	2	1	1	7	1	0	0	2	3	0	0	0	0	0	0	0	0	68
O55	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2
O84	3	18	6	5	0	0	0	5	9	0	1	1	0	0	0	0	0	0	0	0	0	48
O114	1	0	0	1	1	0	0	0	1	2	0	1	0	0	0	0	0	0	0	0	0	7
O83	9	4	1	1	0	0	0	4	3	0	0	0	0	0	0	0	1	0	0	0	0	23
O57	0	13	3	0	1	1	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	22
O72	16	15	3	6	1	2	1	5	11	5	0	2	0	0	0	0	0	0	0	0	0	67
O70	1	20	2	0	1	1	0	3	1	0	0	0	0	1	0	0	0	0	0	0	0	30
O113	4	2	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	11
O66	5	18	1	0	7	0	0	3	2	0	0	0	0	2	0	0	0	0	0	0	0	38
O109	5	1	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	8
O112	0	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	4
O65	16	16	8	5	1	1	2	1	4	0	0	0	0	0	0	0	0	0	0	0	0	54
O14&O64	9	9	0	2	0	0	2	4	5	0	2	0	0	0	1	0	0	0	0	0	0	34
O31&O33	1	17	5	3	1	0	0	3	5	0	0	0	0	2	0	0	0	0	0	0	0	37
O69	32	11	6	21	1	0	0	17	13	4	0	0	0	0	0	0	0	0	0	0	0	105
O74	16	0	5	7	0	0	0	2	11	3	0	0	0	0	0	0	0	0	0	0	0	44
O73	7	0	3	0	0	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	15
O90	2	1	1	0	1	0	0	8	0	2	0	0	0	0	0	0	0	0	0	0	0	15
O60	61	164	98	69	15	0	10	217	145	82	7	1	0	2	1	0	0	1	0	0	0	873
O100	15	34	2	1	1	1	0	9	10	18	0	0	0	0	0	0	0	0	0	0	0	91
O91	0	12	5	6	1	0	0	4	5	3	0	0	0	0	0	0	0	0	0	0	0	36
O75&O68	22	73	24	31	7	2	3	46	61	23	2	1	0	0	0	0	0	1	0	0	1	297
Total	273	770	253	209	60	48	21	415	393	176	13	13	5	9	3	4	3	5	1	1	2	2677

F8 and the investment in building its stone walls suggests the locality was repeatedly used, perhaps on an annual basis. We suspect that the confluence of Wadis Faynan and Ghuwayr provided a reliable water supply, while the easy access to both the plateau and the plains made WF16 an attractive locality for hunting and gathering activities. Such ecotonal locations have been seen as typical of Natufian economic strategies that try to maintain residence in a single location for as long as possible, by maximising access to a wide range of resources (Bar-Yosef 1983). The foundation of Structure F8 was marked by the placement of a burial, and this association of structures with foundation burials has been seen to provide an indication of permanent family or lineage association, reflecting a development in concepts of ownership (both of the structure and perhaps the resources around it) and the significance of an emergent built landscape (e.g. Watkins 2006).

45.3 The Phase 2 Settlement, *c.* 11.30–10.80 ka cal BP

From *c.* 11.30 ka cal BP there appears to have been a substantial increase in the intensity of activity at WF16 (Figure 40.5). This resulted in a dense cluster of semi-subterranean, pisé-walled structures. The more substantial, permanently roofed, architecture suggests the settlement was occupied over a greater part of the year than within Phase 1, with possible storage structures, such as within Structure O45 and Pit O14, indicating both how and why such incipient sedentism was possible.

The truncated remains of Phase 2 structures were preserved by a combination of their sub-surface construction and their burial beneath debris and the collapse from their own walls and roofs and those of Phase 3 structures. That collapse did not, however, protect the whole of the Phase 2 settlement with severe erosion around the edges of the knoll, resulting in relatively poor preservation. In the southwest corner of the trench, it seems likely that the walls encompassed by Structures O104 and O22 are a palimpsest of eroded walls representing a number of Phase 2 construction events, rather than defining distinct buildings. Nevertheless, although truncated by erosion, stratified Phase 2 deposits had survived within these areas, while in the central region of the WF16 knoll deeper stratified sequences were preserved — although quite how deep has yet to be ascertained.

The WF16 Phase 2 settlement appears to have been under continual development, with constant re-design, re-building, repair and renovation of structures, some coming into use as others were temporarily abandoned and used as rubbish dumps. F8 in Trench 2 suggests that this fluid process of development reaches back into Phase 1, while Structure O100 suggests it continues into Phase 3 without any sharp breaks within our tripartite phasing. Sedimentary material — that used for floors and walls, the debris from human activity and that from windblown and water-lain accumulation — appears to have been frequently recycled for new purposes, carrying within it cultural material. This is how we explain the frequent stratigraphic inversions of radiocarbon dates and, potentially, the presence of artefacts within the body of walls and floors.

The stratified deposits from excavated structures represent sequences of use, abandonment and reuse, often involving a change of design and function. In several cases a deliberate re-modelling of the design occurred. The west room of Structure O12 is illustrative of this process of change. Although excavation did not reach the base of the deposits, the earliest documented activity was a raised floor represented by notched stones, perhaps indicating that Structure O12 was used as a storage location. A change in function is suggested by the creation of a mud-plaster floor. The dumping of a thick mud deposit over this floor, interpreted as surplus pisé from wall building elsewhere, and then further pisé rubble and gravel, indicates that O12 was next used as a dump. This was in turn followed by a period of abandonment, represented by the accumulation of silt, and then the creation of new mud-plaster floors. A charcoal-rich silt on these floors represents the final activity within O12, before it was once again used as a dump, indicated by the deposit of burnt stones and ashy lenses, possibly representing the cleaning out of hearths within occupied structures elsewhere. Structure O12 then appears to have been deliberately backfilled with pisé rubble, although this might have accumulated from collapsing walls and roofing material after the structure had been temporarily abandoned.

Differentiating between deliberate backfill and natural collapse is not easy. It seems most likely that Structure O33 had been deliberately backfilled in light of the thick, but relatively homogenous, deposit of pisé blocks that filled its interior prior to levelling and the creation of a mud-plaster floor. Whether the pisé rubble in the upper levels of O12 was deliberately deposited remains more contentious, as is the case for the pisé rubble deposits within Structure O84 that might have derived from collapsed superstructure prior to being levelled. It is difficult to demonstrate if such collapse was intentional, or the result of wear and tear.

Structure O45 provides another instance of a changing interior, in this case the replacement of a mud-plaster floor, with a raised floor. This had been built around an internal domed structure (O117). The raised floor was represented by an infrastructure of trenches and pits for notched stones providing support for the joists of a raised floor with a mud-plaster surface. A flat mud roof supported on a horizontal latticework of timbers had enclosed the interior. A fire had destroyed the whole structure, but whether the fire had been deliberate or accidental remains unclear. Attempts to burn timber and mud roofs in experiments at Beidha indicate that it is very hard to burn such structures, as the organic material is encased in mud, suggesting that an accidental conflagration is unlikely (Dennis 2005).

A possible indication of deliberate intent for the O45 fire is that the raised flooring had been dismantled in the southern area of the structure before the fire, as indicated by the apparent robbing of notched stone supports, the discard of the other notched stones, and the absence of surviving remains of the floor surface itself. Artefactual finds were less numerous in this part of the interior, suggesting they may have been cleared out. The deliberate demolition of the internal Structure O117 might have also occurred; indicated by the scouring away of one of its floor ridges. The contents of a pit, located immediately outside the entrance and directly sealed by the burnt collapse, included a range of ground-stone objects, some of which were broken into several pieces before they were discarded (Figure 14.45), as well as the bones of young caprid that might indicate feasting as part of an event that involved the destruction of the structure. Considering that the interior appears to have been made unusable, it is feasible that the fire had been a deliberate act to destroy the building.

A rather less dramatic means of re-modelling individual or groups of structures comes from small pieces of evidence that pervade the excavated deposits. Examples include: the blocking of an entrance in Structure O19; the replacement of a floor with a mortar by a floor without a mortar in Structure O11; the placement of a cup-hole mortar over what had been an internal dividing wall in Structure O72; and the insertion of dividing walls into Structure O70.

With such complexity, our ability to confidently establish contemporaneity between any of the horizons within different structures is limited. Even when walls of separate structures, such as of O12 and O19, appear to be of the same build, this does not necessarily imply that activity within these structures was contemporary. Nevertheless, we strongly suspect that a significant proportion of the structures evident in the post-excavation plan, Figure 4.17, were in broadly contemporary usage, while recognising the dynamic life histories of individual structures and their frequent change of function.

If so, one of the most striking conclusions about this PPNA settlement is simply the diversity in the size, design, and by implication, the functions of the structures. At one extreme we have Structure O75: in light of its amphitheater-like appearance and the labour that must have been invested into its construction, it is difficult to interpret O75 as anything other than a consequence of co-ordinated building activity by a community. Equally, it is difficult to resist the interpretation that it was the locus for communal activities that involved some element of performance. At the risk of imposing our own perceptions, it is appealing to imagine people seated on the surrounding benches watching activities taking place within its interior, activities likely to include a ceremonial and symbolic dimension. While the embedded cup-hole mortars might initially suggest domestic plant preparation activities, their use for grinding pigments, or for making potions for use in display, is just as tenable — although the seasonal grinding of plant materials could well have had symbolic significance. Similarly the multiple layers of incised and painted decoration would appear to support the notion of the structure as a locus for symbolic activity and performance.

It is perhaps needless to reiterate that there is much we do not understand about Structure O75. We have previously suggested that the raised gullies may have acted as spatial dividers, perhaps where screens were once hung, that the post-holes might have been for wooden pillars rather than for structural supports for the roof, and that the trough might have acted as a sump, although if so it was rather elaborately constructed for that purpose.

If Structure O75 had been constructed for group activity, at the other end of the spectrum are small, semi-subterranean structures in which it is difficult to imagine more than a single person engaged in individual tasks. Most notable is Structure O56. This was no more than 1.8 m x 1.3 m internally and appears to have had a light tent-like cover, suggested by an angled post-hole constructed into the wall at its western end. It had evidence for floor repairs and a chamber constructed into the wall, presumably to store items regularly used for activities within the structure. One of those activities — perhaps the primary activity — appears to have been the manufacture of beads, as evident from two stone work benches, one that had several drilled holes on its top surface, and a series of artefacts and debris that are reasonably interpreted for carving and perforating beads. Moreover, the spatial distribution of the artefacts suggests that a person might have sat, or squatted, to the east of the workbenches while undertaking this work — leaving very little room for anyone else (Figure 17.9).

Structure O84 was larger than O56 at 3 m x 2.05 m internally and also appears to have been used for some type of specialised activity. Its most substantial floors were moulded to form a higher and lower end, with a lip between the two that might have functioned to keep the lower area clean from the materials and residues associated with activities in the higher area.

Between the extremes of the large O75 (20 m x 18 m) and the small O56 (3 m x 2 m), the Phase 2 settlement had a range of medium-sized structures that showed considerable diversity in their form, internal organisation and, we assume, function. These include: Structure O12 (3.5 m x 2.4 m) with its internal division and possible entrance from above; Structure O45 (5.5 m x 4.5 m) with its domed internal construction, possibly used for storage; as may have been the mud-plaster-lined Pit O14 (1.7 m x 1.45 m) associated with Structure O64 (3.10 m x 2.6 m). Strikingly, very few buildings appear to have had the potential to serve as simple residential structures; in terms of available internal space, or even the presence of hearths, often seen as a key defining feature of a residence.

The diversity of structures in Phase 2 of WF16 is open to various interpretations. One possibility is that this diversity reflects the distribution of different activities within a planned settlement, with each structure designed for specific activities that contributed to the settlement as a whole. This implies a significant degree of co-ordination and co-operation in the members of the WF16 Phase 2 community, as already suggested by the nature of Structure O75. An alternative interpretation for the diversity of structures is that there was a strong degree of personal/family/group preference in how to design and build a structure in which a wide range of different activities took place. If so, this might reflect a process of experimentation in not only the construction of pisé-walled structures, but also in living with a greater degree of sedentism and in closer proximity to others. Indeed the symbolic activities and performance activities that we suggest took place within Structure O75 might have functioned to relieve the inevitable social tensions that would have arisen from living — and all that involves — in such constant spatial proximity.

Another potential influence over the diverse range of structures in Phase 2 is social status and competition. Increased social differentiation, or alternatively forced egalitarianism to resist emerging hierarchies, has often been argued to be at the heart of the Neolithic process (e.g. Kuijt 2000). It is possible that the variation between the size of buildings, their interior and exterior designs, such as the use of a gypsum-based whitewash and their type of interior features, reflect either the social status or the social aspirations of whoever built the structure. However, the conventionally accepted indicators of hierarchy, represented by a mass of structures of similar size, complexity and wealth of material culture content, set against one or a few larger, more complex and richer buildings, is simply not present. The presence of burials might be a separate indicator of social variability, because they were not excavated from all Phase 2 buildings. But this might simply reflect the limited extent of excavation, exacerbated by the difficulty in determining whether burials should be allocated to Phase 2 or Phase 3.

The distribution of artefact types might also be indicative of variation in social status. Until the artefact analyses have been undertaken, we are unable to address this matter beyond noting the presence of artefacts that are likely to have been of high cost to manufacture and hence might have functioned as symbols of power, for example, a particularly large greenstone bead (SF328) from Structure O72 and the polished stone implement (SF351) recovered from the floor of Structure O33. The rarity of such artefacts in truly primary contexts will provide a challenge to future interpretation.

The extent to which people remained at Phase 2 WF16 all year remains uncertain. Although the structures reflect evident investment in place, they appear to have been periodically abandoned, resulting in the accumulation of wind blown and water-laid sediments, collapse of superstructures, or their use as rubbish dumps, presumably indicating that other structures were still being occupied. Debris — animal bones, hearth contents, waste from tool use and their manufacture, and so forth — appears to have been either discarded in small pits, crevices and crannies throughout the settlement, such as spaces between walls (e.g. Space O105), used as levelling deposits prior to the laying of floors (as in Structures O12 and O45), or simply left to accumulate on the floors of structures.

We are currently unable to identify whether WF16 was seasonally, or permanently, occupied using botanical and faunal evidence from the 2008–2010 excavations: post-excavation analysis is required. However, the animal bones excavated during the 1997–2003 evaluation, which was for then a large sample for a PPNA site but is now dwarfed in size by newly available material, are primarily from Phase 2 contexts, notably midden deposits in Trench 1. That assemblage was interpreted as reflecting the hunting of *Capra* sp., which may have targeted groups of females and their young because of the small size of the bones. It provided evidence for some hunting in the spring, and some in the autumn/winter, along with the hunting of other species including *Bos* and *Vulpes* (Carruthers and Dennis 2007). Bird bones indicated the possibility for year-round activity, with the possible exception of the winter months (Rielly 2007). Overall, there was no compelling evidence for year-round sedentism. In some regards this seems compatible with the patterns of periodic structure usage and abandonment evident from the 2008–2010 excavations and informal rubbish disposal, however, the huge investment in constructing not only O75 but, other structures, such as O45, would imply that even if the settlement was seasonal, it was a site of recurrent activity. Moreover, a degree of medium range contacts, that may imply mobility for at least some of the occupants of WF16, was evident from the shells and shell beads excavated in the 1997–2003 evaluation (Cerón-Carrasco 2007). These indicated both Red Sea and Mediterranean sources.

Whatever the intensity and tempo of occupation, the Phase 2 settlement appears to have been a location for a whole panoply of PPNA activities. Those directly evident from the archaeological remains include the manufacture, use and discard of tools and other objects from a diverse range of materials including chipped stone, coarse stone, bone, shell and bitumen; the butchery of animals and processing of plant foods; discard of waste; burial of people and occasionally animals or animal parts; and the use of pigment. Although requiring some interpretation of the remains, we are also confident that feasting and ritual deposition occurred during Phase 2 at WF16; we assume that people lived at the settlement for extended periods of time, with all of the concomitant activities including sleeping, eating, socialising, sex, childbirth, child rearing and rites of passage through puberty, into old age, death and post-mortuary ritual.

At a more interpretative level we suspect that WF16 may also have acted as a location for periodic aggregations of people from an extended region, during which trade and exchange occurred, information, knowledge and skills were shared, social groups altered their composition, and competition for power and prestige took place. The Phase 2 settlement at WF16 was, we contend, a 'happening place' for the early Neolithic with regard to both the routines of daily life and the development of economy, society and culture that ultimately established fully-fledged farming societies that provided the foundations for the earliest civilisations.

How might one account for a significant increase in the intensity of activity at WF16 between *c.* 11.30–10.80 ka cal BP, as indicated by the SCPD (Figure 40.5)? We have already noted caution that the peak in the SCPD might be a consequence of the calibration curve itself, although we are confident this cannot account for the entirety of the peak. We have also cautiously noted that limited excavation of the lower stratigraphic units and erosion of much of the Phase 3 and probably upper Phase 2 horizons are likely to have biased the chronological distribution of available charcoal samples of radiocarbon dating. Nevertheless, while noting these caveats, we find the idea compelling that there were more people living at WF16 for longer periods of time during Phase 2 than there had been in Phase 1.

45.4 The Phase 3 settlement, *c.* 10.80–10.24 ka cal BP

Evidence from the chipped stone assemblage and dating of Structure O100 suggest gradual transition from Phase 2 to Phase 3, centred on *c.*10.80 ka cal BP. The increased frequency of non-local (Type 5) raw material suggests higher degrees of selectivity as knapping practices changed. It is difficult to imagine that the local wadi cobble supply of raw material had been exhausted, and the attraction of Type 5 raw material appears to be its quality. The increased diversity in form and eventual disappearance of El-Khiam points suggests socio-economic change. It might imply their manufacture by people from a wider range of backgrounds, each with their own micro-traditions of how to manufacture such artefacts, or, with the declining frequency of points, a decrease in the symbolic significance of the type and a consequent decline in standardisation.

Midden O60 has been assigned to Phase 3. In light of the incised and carved finds it contained, this phase of activity appears to have been especially prolific with regard to the production and use of symbols. It is also likely that a significant proportion of the incised and carved artefacts from the overburden relate to Phase 3. We assume these all had symbolic content, while also recognising that even the most utilitarian appearing objects are likely to have also had symbolic value.

Primary and secondary burial activity appears to have assumed considerable significance in the Phase 3 settlement, involving a concern with the manipulation of body parts, notably skulls, one that appears to anticipate the complex mortuary practices of the PPNB.

With such evidence for extensive symbolic activity, it is especially unfortunate that, other than Structures O100, F3329 and F33911 (Trench 3) and remnants within the overburden, there is no surviving evidence for the architecture of WF16 Phase 3. The three structures that survived did so by virtue of either, being constructed within a depression (O100, constructed within the semi-subterranean area of O75, and probably with at least its early construction stages belonging to Phase 2) or, having well built, robust double-skinned stone walls (F3329), or the use of orthostats (F33911).

Despite significant differences, O100, F3329 and F33911 are all free standing circular structures with either entirely, or partially, stone-built walls. Our assumption is that structures of this type had once covered much of the WF16 knoll as the characteristic Phase 2/Phase 3 transition and Phase 3 architecture, from where burials were cut into underlying Phase 2 structures. Millennia of wind and rain, trampling by humans and animals, and possible robbing of stone for use in later prehistoric and historic buildings elsewhere, led to the destruction of the Phase 2/3 and Phase 3 buildings other than O100, F3329 and F33911, and the remnants of structural remains in the overburden. While the loss of such buildings is regrettable, this had a beneficial consequence: the thickness of the collapsed structures and weight of the overburden protected the fragile pisé walled structures of WF16 Phase 2 from themselves being eroded.

Without a range of architectural remains our knowledge of Phase 3 at WF16 will always be constrained. It would be surprising if all of its structures had been as large as that of Structure O100. Its size, protected position within the depression, and its prominence at the northern end of the knoll overlooking, and most visible from, the wadi below, suggests that Structure O100 may have been of particular significance.

The required investment of labour and materials to construct a building the scale of Structure O100, and the type of walls evident from Structures F3229 and F33911, suggest a increase in the permanency of the occupation at WF16 during Phase 3. As with Phase 2, this need not imply complete sedentism — even in recent periods substantial buildings might only be used on a seasonal basis. But it certainly suggests occupation during a significant portion of the year on a recurrent basis.

If correct, this might explain the accumulation of such large quantities of debris within Midden O60, interpreting this as a dedicated area not only for the deposition of waste, but as a workshop within a settlement that had a high degree of internal spatial structure. With a volume of *c.* 83m^3 Midden O60 produced over 1760 kg of chipped stone and 520 kg of animal bone, along with a variety of small finds including concentrations of beads, stone vessels, bone objects, stone plaques with geometric patterns and carved figurines. The presence of trampling, burials, ephemeral surfaces, artefact concentrations and so forth, indicate activities taking place within the midden area, while tip lines also indicate the formal deposition of waste, probably sweepings from the floors of Phase 3 buildings.

We cannot discount the possibility that there is some degree of mixing with the discard from WF16 Phases 1 and 2, and this is evidently the case from the dates on charred wood from within hearth (340) constructed in the midden. But the distinctiveness of the chipped stone assemblage from within Midden O60 and the upper levels of Object O100, suggests that the extent to which material culture became mixed between phases 2 and 3 was limited. Indeed, by the time of Midden O60's accumulation it seems likely that the Phase 2 structures are either abandoned, or covered by the Phase 3 occupation.

Midden O69 may also relate to Phase 3 activity, this having accumulated within a cut that truncated the Phase 1/Phase 2 structures O73, O90 and O75. If so, the midden in Phase 3 would provide additional evidence for a more structured deposition of rubbish within the Phase 3 settlement, contrasting to what appears to be the case during Phase 2.

The contents of Midden O60, supplemented by the finds from the overburden (O11), contexts within Structure O100, and Midden O69, provide us with an outstanding opportunity to explore the material culture and economy of a later phase of a PPNA settlement. The animal bones provide an especially important opportunity to explore development in the economic base, from the inferred predominance of hunting of *Capra* sp. during Phase 2, although that is based on evidence from the 1997–2003 evaluation.

Equally important is the human osteological sample relating to Phase 3 activity from the majority of the WF16 burials. Field observations suggest that a demographic range from young infants to mature adults is present. The degree of bone preservation is variable and it seems doubtful that collagen, which would enable isotopic analysis, will have survived within such arid conditions; isotopic analysis may, however, be possible via dental remains. The assemblage provides a unique opportunity for demographic and palaeopathological analyses for the early Neolithic.

In summary, the evidence from WF16 Phase 3 provides us with limited evidence for architecture, but substantial evidence for mortuary practices, material culture, economy and the human population. We suspect that during this phase of settlement a series of free-standing circular structures were constructed on the knoll. Symbolic activity appears to have been significant, most likely as a means to mediate social relations within the WF16 community and with visiting persons. We suspect that there was a relatively high degree of spatial organisation within the Phase 3 settlement, with the Midden O60 area acting as a centralised, formal discard and workshop area for the settlement. If these inferences are correct, we should conclude a high degree of permanency of occupation at WF16 Phase 3.

45.5 WF16 within the Southern Levant

The evidence from WF16 makes a significant contribution towards understanding the chronology and cultural change within the PPNA of the Southern Levant and its relation to the PPNB.

While WF16 Phase 1 shows architectural similarities to Harifian sites to the west, the Phase 2 settlement is more locally distinct. The site of Dhra', *c.* 60 km to the north of WF16 and located beside the Dead Sea, is the only other site in Southern Jordan that dates to the same period as WF16 Phase 2 (Finlayson *et al.* 2003). There are significant parallels between the two sites. They have similar flint industries, both characterised by an abundance of El-Khiam points, although the El-Khiam points from the two sites are different in form. Both sites are characterised by an apparently dense spread of architectural remains and substantial midden deposits. There are architectural details that are similar, such as the presence of cup-hole mortars set in mud-plaster floors and the apparent shared tradition of supporting raised floors on upright notched stones. However, there are considerable differences between the buildings at the two settlements. There are only three different types of building so far known from Dhra', interpreted as shared granaries, food processing structures and residences (Finlayson *et al.* 2003). None are truly semi-subterranean, although one type (the possible residences) is constructed into the face of midden material. This surface construction means that, although there is variation in building types over time, the structures are not constrained by a semi-subterranean cell. As such, unlike at WF16 where structures frequently change use on exactly the same footprint, the buildings at Dhra' move horizontally as they are modified. While at WF16 every building seems to be virtually unique, at Dhra' the three types recur multiple times.

Phase 3 at WF16 has affinities with the two other Late PPNA sites in the south of Jordan, Zahrat edh Dhra' 2 and El Hemmeh, but so far the transition between Phase 2 and Phase 3 is only known from WF16 (Finlayson and Makarewicz 2017). The chipped stone assemblages from all three sites are similar, indicating that the transition took place across Southern Jordan. There are architectural commonalities, in particular the use of stone in curvilinear construction, but the structures at ZAD2 seem both larger and more ephemeral than at the other sites. The Late PPNA in Southern Jordan appears to represent a development parallel to that of the PPNA to Early PPNB in the Middle Euphrates, at sites such as Jerf Al Ahmar. Other than at Harrat Juhayra, there is no known found PPNB in Southern Jordan. Recent excavations at Harrat Juhayra 202, a site on the Jordanian plateau, have produced a flint assemblage that includes naviform cores and Helwan points, but is not associated with Jericho/Byblos points. The excavator believes this site should be assigned to the EPPNB rather than the PPNA or MPPNB (Sumio Fujii, pers. comm.). We are sympathetic to the view that there might have been Late PPNA communities (e.g. WF16 Phase 3, ZAD2, El Hemmeh) and Early PPNB communities (e.g. Harrat Juhayra) living contemporaneously within the southern Levant at this key period of cultural transition. But this is a topic that requires dedicated research and a substantial programme of rigorous radiocarbon dating.

In the absence of a definitive Early PPNB in Southern Jordan, it appears that the Late PPNA is followed directly by a chronologically early Middle PPNB at Beidha and

Shkarat Msaied (Finlayson and Makarewicz 2017). The continued use of circular architecture is a distinctive local trait and it appears that the Southern Jordanian early Neolithic development trajectory continues at these sites, although the independent chipped stone tradition is replaced by the naviform bipolar knapping tradition that is typical of the Middle PPNB throughout the Levant. This southern Middle PPNB is further differentiated from the Middle PPNB in the rest of the Southern Levant in that, despite the precocious developments seen in WF16, no plastered skulls, one of the archetypical finds of the Middle PPNB, have been found. There is still some evidence of mortuary practices that involve special treatment of skulls at Shkarat Msaied, but no traces of decoration have survived.

Ghuwayr 1, the PPNB site that neighbours WF16, is a little problematic. Radiocarbon dates from Ghuwayr 1 appear to overlap with Phase 3 of WF16, suggesting that Ghuwayr 1 may represent nearly continuous occupation within Wadi Faynan into the PPNB. However, the architecture of Ghuwayr 1, with large densely packed two-storey buildings, looks more typical of a Late PPNB settlement in the south of Jordan. Naviform chipped stone technology is present at Ghuwayr 1, but this technology continues to be used in the Late PPNB, and does not provide precise chronological resolution. Post-excavation analysis continues at Ghuwayr 1, but at present it seems safer to assume that this site is not an immediate successor to WF16.

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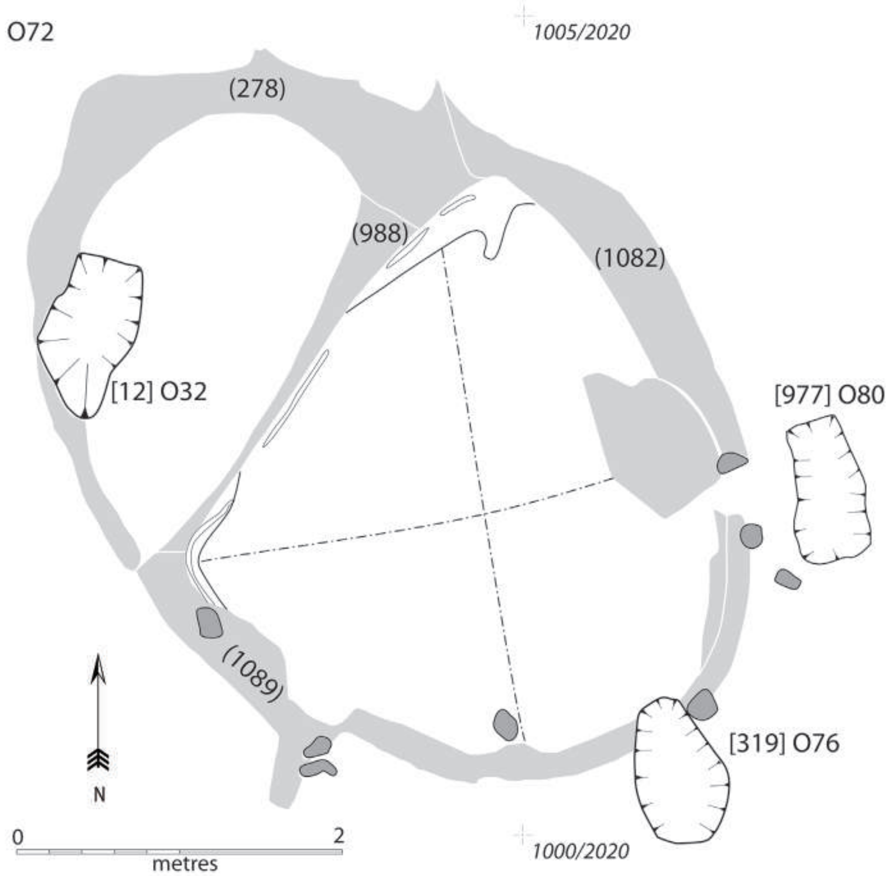
شكل 46.10 مدافن أولية



شكل 46.9 المدافن في مبنى رقم 72

والمدافن التي يمكن أن تنسب الى المرحلة المعمارية الاولى (مدفن 298 على سبيل المثال) والثانية، لا تشكل الا نسبة ضئيلة من العدد الاجمالي للمدافن، وقد نسبت الى المرحلة المعمارية الثانية جميع المدافن التي كانت موجودة تحت أرضيات أو تحت الطبقات في داخل الابنية الطينية الدائرية. وتوزعت محتويات المدافن من البقايا العظمية التي تم الكشف عنها وعددها يصل الى 45 الى مجموعات من المدافن الأولية (أي تلك التي احتوت على هياكل عظمية في وضعها التشريحي الصحيح) ومدافن ثانوية (تلك التي احتوت على أجزاء من هياكل عظمية غير مترابطة)، بالإضافة الى تلك الأجزاء من الهياكل العظمية التي تمت إعادة دفنها بعد أن كانت قد اسنخرجت من المدافن الأولية واستخدمت لأغراض ما زالت محط جدال بين الباحثين قبل إعادة دفنها مرة أخرى. وفي المحصلة فإن وادي فينان 16 قد زودنا بمجموعة مميزة من المدافن والبقايا العظمية وعينة هامة من مجموعة سكانية تضمنت أطفالا صغارا وبالغين من الجنسين مما سيشكل مادة خصبة للدراسات السكانية في المستقبل.

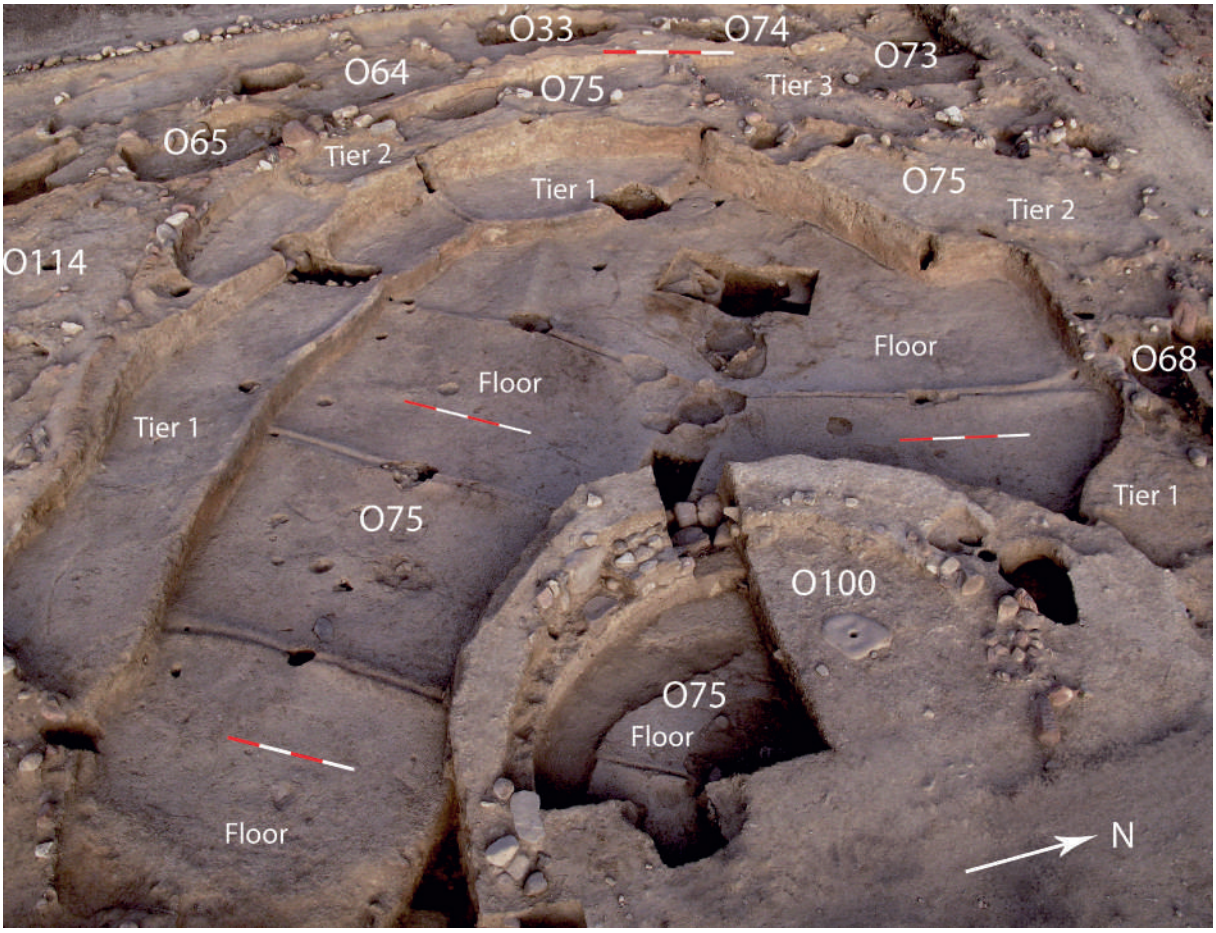
ش- المدافن

تتركز معظم مدافن العصر الحجري الحديث ما قبل الفخاري في منطقتين رئيسيتين من الموقع: الشمال والوسط ومن الصعب حاليا معرفة اذا كان لهذا التوزيع الجغرافي معنى في ضوء اندثار العناصر المعمارية للفترة الختامية من عمر الموقع، بالاضافة الى التفاوت في مساحة المنطقة التي تم تنقيبها بين جزء واخر من الموقع، وقد تم التعرف على نوعين رئيسيين من المدافن الاول وهو الذي يحتوي على هياكل عظمية ما زالت مكوناتها مترابطة، وبوضعها التشريحي الطبيعي اتخذت وضع القرفصاء على جانبها الأيمن او الايسر، بينما احتوى النوع الاخر على أجزاء من هياكل عظمية (في الغالب هي جماجم ولكن في أحيان أخرى ترافقت مع بعض عظام الأطراف) وعلى الارجح تم اخذها من مدافن النوع الاول واستعملت لاغراض غير معروفة لدينا لفترة زمنية، ومن ثم تمت اعادة دفنها اما في قبور النوع الاول أو في قبور خاصة.

وما نستطيع قوله الآن هو أن معظم المدافن التي تم الكشف عنها حتى الان، تعود الى نهاية المرحلة المعمارية الثانية او الى المرحلة المعمارية الثالثة، فقد لوحظ بأن اكثر من 50% منها قد تقاطع مع جدران الابنية المهجورة من المرحلة المعمارية الثانية ولا ندري عما اذا ما كانت هذه الجدران مستهدفة من قبل السكان عن قصد عند انشاء المدافن لإيجاد رابط حسي او شعائري بين المرحلتين أم لا.

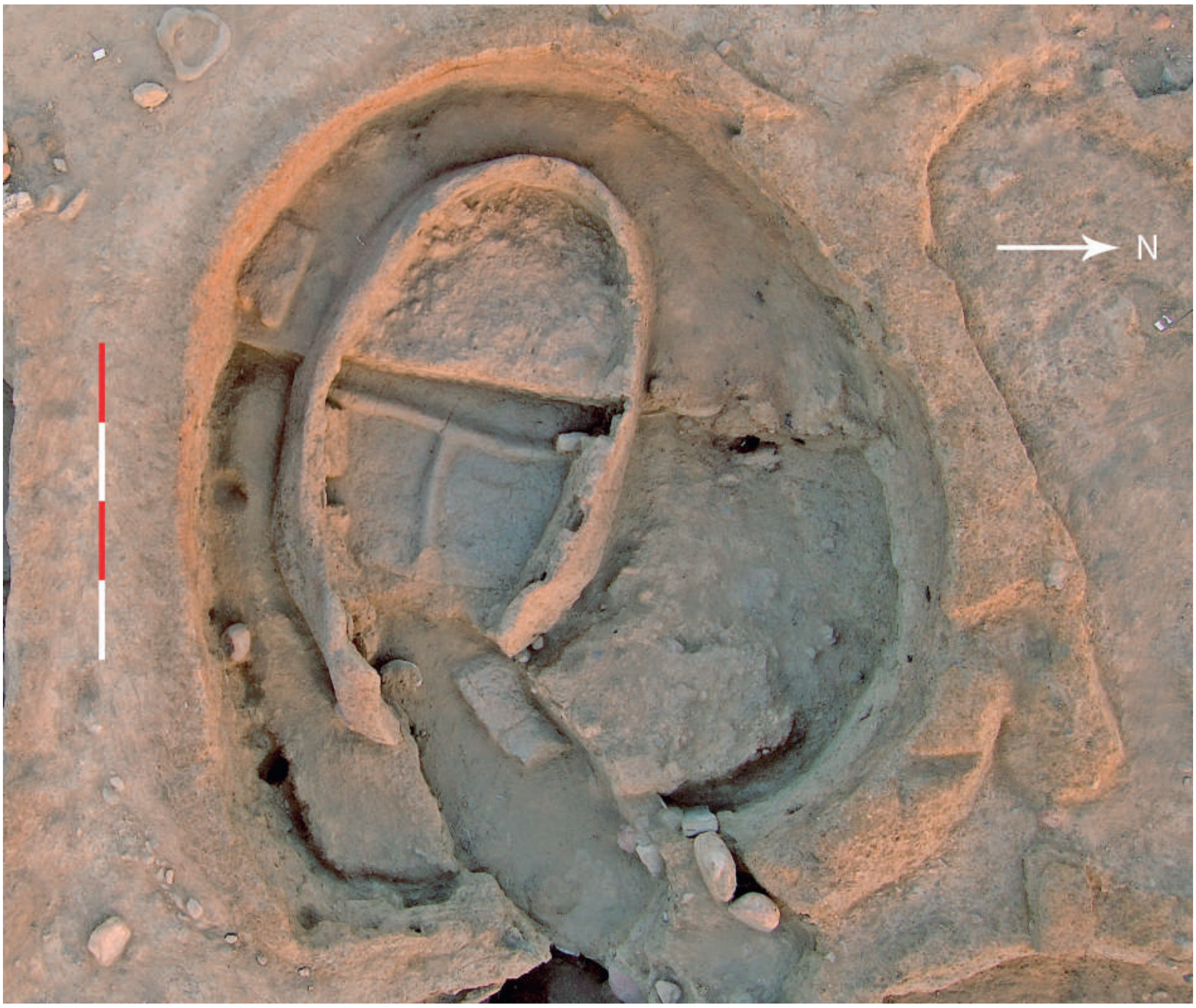
شكل 46.8 بقايا نسيج لفت به العظام

ولعل المبنى رقم 75 ونظرا لتميزه من حيث الحجم والنمط المعماري يستحق منا بعض الاهتمام الخاص حتى في هذه المقدمة القصيرة. فهذا المبنى البيضاوي الشكل بلغت مساحته ابعادا غير مسبوقة (20*18 متر) مقارنة بغيره من المباني ليس فقط في جنوب الاردن بل وفي عموم الهلال الخصيب. وقد تمحورت تقسيماته الداخلية بشكل متناسق على الجانبين من خندق يمتد من الغرب الى الشرق ويقطع المبنى الى نصفين متساويين، وقد زود المبنى بمصطبتين مزخرفتين تعلو احداهما الاخرى بما يشبه المدرج الذي يحيط بالساحة المتوسطة للمبنى، وتظهر في ارضية المبنى وبشكل واضح الحفر التي كانت معدة لتثبيت الركائز الخشبية التي كانت تدعم السقف. وهذا يظهر بأن هذا المبنى كان مسقوفا ولو بشكل جزئي على الاقل.



شكل 46.7 مبنى رقم 11

ولعل التطور الرئيسي في تقنيات البناء قد جاء في المرحلة المعمارية الاخيرة من عمر الموقع (10240-10800 سنة من الان) عندما تم الانتقال الى بناء البيوت ذات الجدران الحجرية فوق سطح الارض مباشرة، ولكون الاجزاء العلوية لهذه البيوت قد تعرضت للاندثار بشكل كامل فإن المعلومات عن جدرانها واسقفها غير متوفرة وكل ما نستطيع قوله الان هو أن ارضياتها كانت مبنية من الطين وأدمجت فيها (رحى) جواريش حجرية كما هو الحال في المراحل المعمارية السابقة، ويبدو بأن ارضيات الابنية المستخدمة للخزين كانت معلقة (أي مرفوعة على اعمدة حجرية قصيرة) واستخدمت في بنائها جذوع الاشجار والقش والطين كما في بناء الاسقف، وقد عثر في الموقع على بعض الركائز الحجرية الذي شذبت أطرافها العلوية بطريقة تسمح بارتكاز جذوع الشجرعليها بشكل ثابت.
إجمالا وفي النهاية، فإنه وعلى الرغم من تشارك هذه الابنية في المفردات والعناصر المعمارية فإن استخدام هذه العناصر والمفردات وتجميعها بهذا الشكل أو بأي شكل اخر، كان يخضع في الغالب للذوق والقرار الشخصي، ومع فهمنا بأن الشكل النهائي لأي منشأة كانت تحدده وظيفة هذا البناء وسياقه الزماني فإننا نستطيع القول بأن هذه الابنية لم تتبع نمطا معماريا ثابتا وهذا يفسر التنوع المعماري الذي يظهر جليا في الموقع.



شكل 46.6 مبنى رقم 75

س- العمارة

لقد كشفت التنقيبات الاثرية في فينان 16 عن جزء كبير من الموقع مبنية بذلك عددا كبيرا من المخلفات والبقايا المعمارية المتراصة، وقد تم أثناء عمليات التنقيب وفي الفترة التي تلتها من خلال البحث والتحليل التعرف على ثلاثة مراحل معمارية في تاريخ الموقع. وقد تميزت المرحلتان الاولى (11800-11300 سنة من الان) والثانية (11300-10800 سنة من الان) بوجود ابنية بيضاويه وشبه دائرية متراصة تقع الاجزاء السفلية منها تحت مستوى سطح الارض المحيطة ، وكانت المداخل مزودة بمنحدر تم رصفه بالحجارة يصل ما بين السطح الخارجي وارضية البيوت الواقعة على عمق متر واحد منه، وفد كانت اسقف هذه البيوت والتي ترتفع بمقدار متر واحد ايضا عن السطح الخارجي، مبنية من دعائم خشبية ترتكز على الجدران المبنية من الطين التي غطيت بالقصب ومن ثم بطبقة سميكة من الطين، وقد كانت هذه الاسقف مسطحة وقوية بما يكفي لاستعمالها كمنطقة عمل اضافية وتخزين خارج الابنية، وخصوصا في ظل عدم وجود مساحات بين البيوت كافية لاستخدامها كمناطق عمل اضافية. وفي الوقت نفسه فقد كانت اسقف بعض الابنية مصنوعة من مواد خفيفة كأغصان الشجر والقصب وربما الجلود ايضا. وكانت ارضيات البيوت مبنية من الطين المدكوك الذي وضع على شكل طبقات متتالية وكانت هذه الارضيات مزودة برحى (جاروشة) حجرية مدمجة في الارضية. وزودت الجدران الدائرية التي بنيت عن طريق اضافة كتل من الطين الى الدائرة التي كانت تميل الى الخارج قليلا، وقد زودت هذه الجدران أيضا بكوات صغيرة (فتحات غير نافذة) من الداخل فكانت تستخدم على ما يبدو لتخزين بعض الادوات المنزلية الصغيرة.

شكل 46.5 مبنى رقم 45

بظهور تقنيات جديدة في طريقة صنع الادوات الصوانية وظهور انواع جديدة من هذه الادوات، في حين اختفت بعض انواع الادوات القديمة. فمن الملاحظ ان النويات الصوانية قد تم تحضيرها بشكل دقيق من مادة غير متوفرة محليا في المنطقة، هذا بالاضافة الى اختفاء ما يعرف بالرؤوس الخيامية واختفاء الادوات الدقيقة ايضا.

وتشترك هذه المرحلة سواء من حيث المفردات المعمارية او الادوات الصوانية وتقنيات صناعتها مع مواقع اخرى في جنوب الاردن من نفس الفترة التاريخية نذكر منها هنا كل من مواقع الذراع، ظهرة الذراع والحمة.

شكل 46.4 منطقة التنقيبات مع نهاية موسم عام 2010

التأريخ

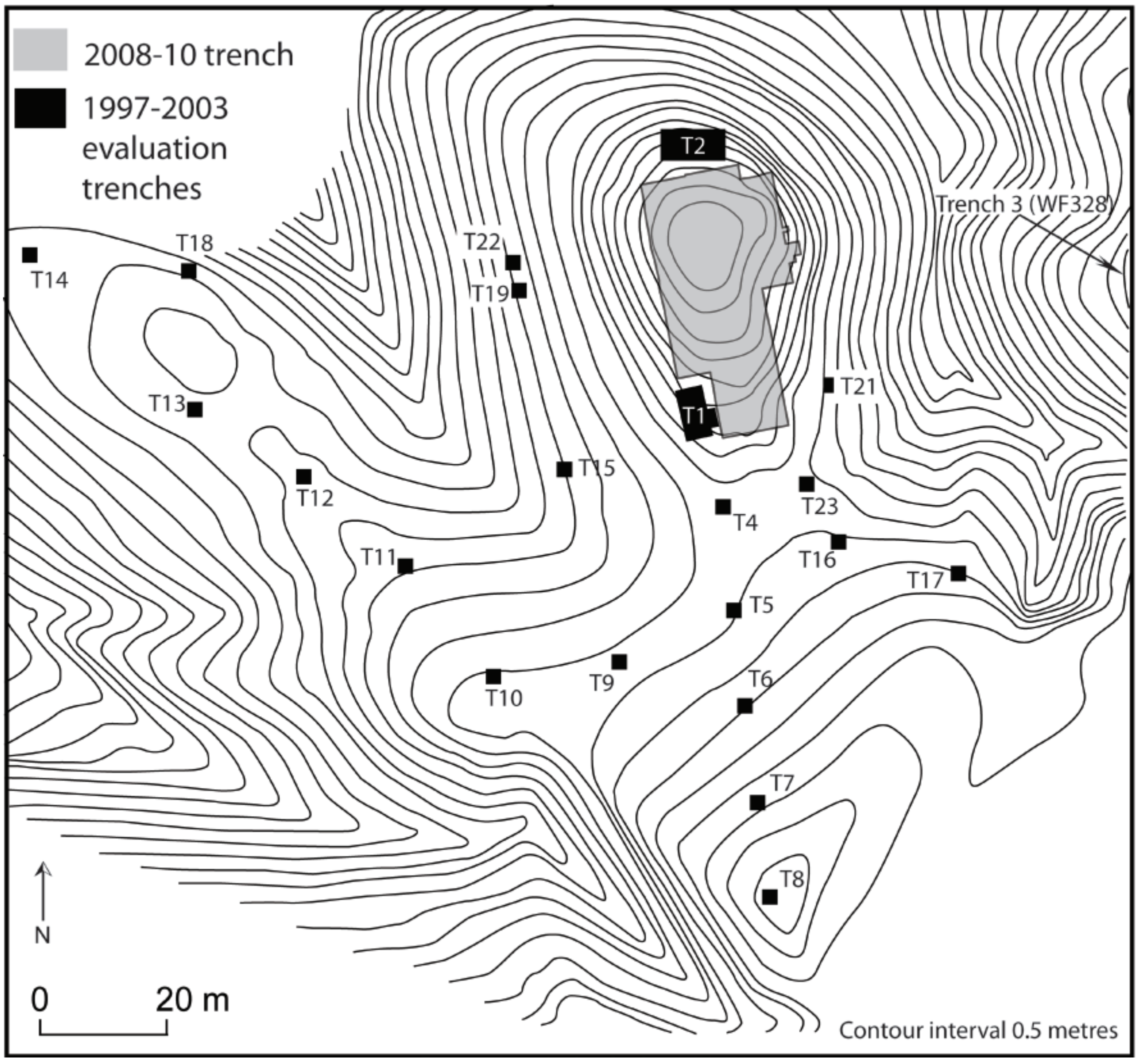
لقد تم من خلال دراسة هذا المشروع تحليل 46 عينة من المواد الخشبية المتفحمة من اجل تحديد عمر الموقع مراحل الاستيطان فيه، وقد جاء 21 من العينات من المواسم التقييمية الاولى في اعوام ما بين 1997-2003 بينما جاءت العينات المتبقية وعددها 25 من المواسم الثلاثة الاخيرة 2008-2010.
واما بخصوص انواع شجر العينات فقد جاءت على الشكل التالي: 11 من عائلة الصنوبريات، 3 من البطم، 5 من أشجار الطرفا، 6 من الصفصاف، 3 من التين، ثلاثة من الشجيرات العشبية، واخيرا 13 نوعا لم يتم التعرف عليها. وقد جاءت جميع هذه العينات من حيث موقعها الترثيبي من الطبقات الوسطى حيث انه لم تكن هناك عينات من الطبقات السطحية والعليا نتيجة لتلوثها عبر السنين من جراء عوامل طبيعية وبشرية ولم تتوفر لدينا عينات من الطبقات الاعمق في الموقع لأن التنقيب في الموقع لم يصل اليها بعد وبذلك فإن النهايات العظمى والصغرى من تأريخ الموقع ستبقى قابلة للتغيير زيادة ونقصانا على الترتيب.
وإعتمادا على نتائج التحليل للتسلسل الطبقي في الموقع، ولدراسة الادوات الصوانية، وأخيرا على دراسة نتائج تحاليل الكربون المشع 14 والتي اخذت من الموقع، تم التوصل الى التعرف على ثلاثة مراحل مختلفة في عمر الموقع تعكس النشاطات الاقتصادية والاجتماعية والحضارية خلال فترة 1600 سنة من عمر الاستيطان فيه:

المرحلة الاولى 11300-11840 سنة من الان (معدلة لسنة تقويمية)
الى هذه الفترة يعود البناء الذي تم الكشف عنه في المربع 2، وباستثناء وجود مدفن مدمج ضمن ارضيته (تميز بوجود الجمجمة في وضع اعلى من مستوى الارضية مما جعلها مرئية) بالاضافة الى هاون حجري ادمج في الارضية، فإن المبنى يشبه مباني الفترة السابقة النطوفية وخصوصا المباني التي عرفت بمباني الفترة الحريفية التي كانت سائدة في منطقة النقب من حيث انها كانت مبنية داخل حفرة بواسطة الحجارة الكبيرة التى تم تثبيتها الى بعضها باستخدام الملاط الطيني، والى هذه الفترة يمكن ايضا نسبة المبنى 73 الذي استخدمت الحجارة المثبتة بالملاط في بنائه ايضا. والى هذه الفترة ايضا تعود بقايا المبنى 90. وتشير هذه الابنية مجتمعة الى ان المرحلة المعمارية الاولى من عمر موقع فينان 16 تميزت بكون ابنيتها جاءت مبنية باستخدام الحجارة ومادة رابطة من الطين بغرض تثبيت الحجارة الى بعضها.

المرحلة الثانية 10800-11300 سنة من الان (معدلة لسنة تقويمية)
وتتضمن هذه المرحلة غالبية الابنية التي تم الكشف عنها في الموقع وغالبية النشاطات المصاحبة لهذه الابنية. وقد تميزت هذه المرحلة بأن الجزء السفلي من بيوتها جاءت مبنية في حفرة بحيث ان ارضيات البيوت كانت تنخفض بحوالي متر واحد عن السطح المحيط، وبنيت جدرنها الدائرية باستخدام الكتل الطينية ، وقد وصل ارتفاع الجزء الظاهر على السطح من هذه الابنية الى متر واحد ايضا وكانت اسقفها المستوية تبنى باستخدام جذوع الاشجار التي كانت ترتكز على الجدران الطينية الدائرية والتي كانت بدورها تغطى بطبقة من القصب تعلوها طبقة سميكة من الطين.

المرحلة الثالثة 10240-10800 سنة من الان (معدلة لسنة تقويمية)
وتتميز هذه الفترة ليس فقط بكون بيوتها كانت قد بنيت على السطح مباشرة مما جعلها مختلفة عن بيوت المرحلتين السابقتين التي بنيت الاجزاء السفلية من بيوتها في حفر تحت مستوى سطح الارض، بل أيضا

ويشير عدم وجود مواقع ممثلة لما يعرف بالمرحلة المبكرة من العصر الحجري الحديث ما قبل الفخاري ب في الاردن الى أن الانتقال في الاردن من الفترة ا إلى الفترة ب كان مباشرا كما أن هذا الانتقال في جنوب الاردن قد اتخذ مسارا مختلفا عما كان عليه في المناطق الشمالية من الهلال الخصيب، وهذا قد يفسر استمرار وجود العمارة الدائرية (المميزة للفترة ا) في كل من موقعي البيضاء وشكارة مسيعد بالتزامن مع تقاليد صناعة النصال الطويلة من النويات المعروفة "بالبحرية"(المميزة للفترة ب من نفس العصر)، ولعل عدم التطابق هذا قد انسحب على الفترة اللاحقة المعروفة بالفترة الوسيطة) حيث انه وعلى الرغم من التطورات الكبيرة التي شهدها موقع فينان 16 فإنه لم يتم العثورفي جنوب الاردن على أي من الجماجم المجصصة (وهي العلامة الفارقة لهذه الفترة) في المناطق الاخرى من الهلال الخصيب. وبالرغم من وجود بعض المؤشرات بأن بعض الجماجم قد خضعت لمعالجة خاصة فلم يتم العثور، حتى الان على الاقل على اية دلائل تشير الى تزيين هذه الجماجم كما كان الحال في عموم المنطقة خلال هذه الفترة.

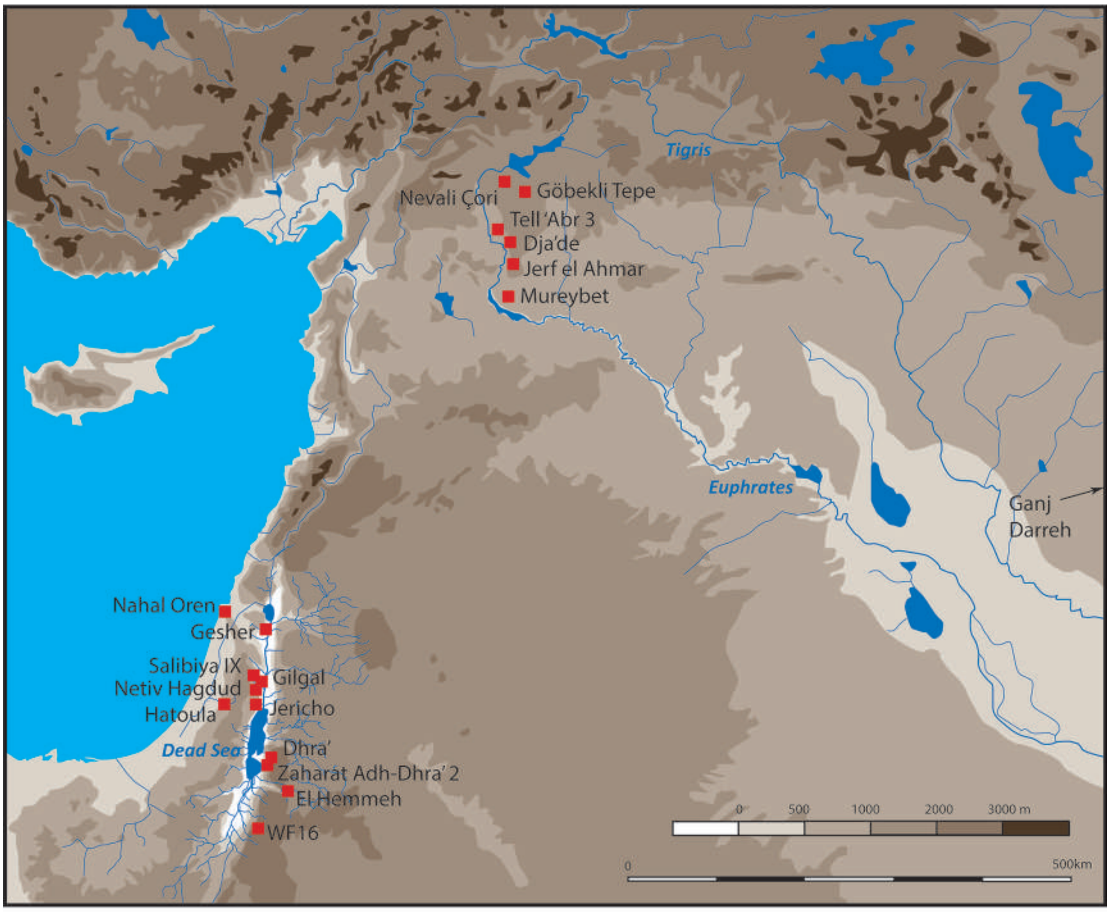


شكل 46.3 مناطق التنقيبات الاثرية في موقع وادي فينان 16

ولكن وفي الوقت نفسه، هناك ايضا اختلافات جوهرية بين الموقعين. ففي موقع الذراع هناك ثلاثة انواع من الابنية: صوامع الخزين، اماكن تحضير الطعام (المطابخ) واخيرا هناك ما يبدو على انها حجرات سكنية، ولا يوجد بين هذه الابنية ما هو محفور تحت مستوى سطح الارض مما يعني بأن امكانية التوسع الافقي للبيوت الجديدة في اماكن جديدة كانت دائما قائمة، وعلى العكس من ذلك ففي فينان 16 تطورت الابنية من حيث الوظيفة، مما تطلب إضافة جدران داخلية جديدة تتماشى والوظيفة الجديدة وفي نفس المكان بالضبط فإن بيوت الذراع خلال تطورها كانت تتوسع افقيا. ولهذا فإن انماط الابنية في الذراع كانت تتكرر بينما بقي كل بيت في فينان 16 فريدا من نوعه.

والتشابه الاكثر وضوحا مع مواقع اخرى في جنوب الاردن (ظهرة الذراع والحمة) يبدأ بالظهور في نهاية المرحلة المعمارية الختامية من عمر الموقع. فمجاميع الادوات الصوانية من المواقع الثلاثة متشابهه جدا مما يشير إلى أن التحول الى المرحلة الثالثة في جنوب الاردن كان متزامنا، وهناك تشابه في بعض التقنيات المعمارية كاستخدام الحجارة في الابنية المنحية ولكن الابنية في ظهرة الذراع تميل الى كونها اضخم وبشكل أكثر وضوحا.

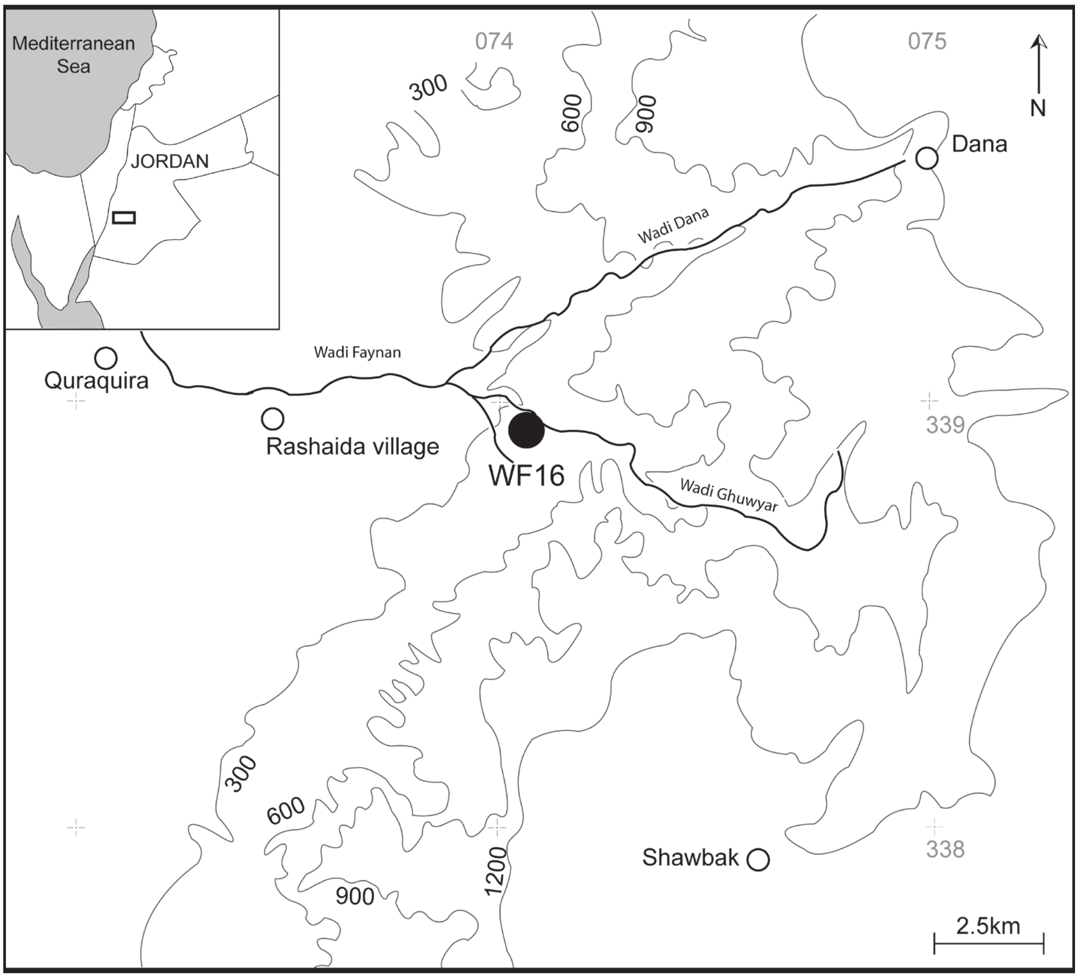
ويبدو من الواضح بأن الفترة الختامية من العصر الحجري الحديث ما قبل الفخاري في جنوب الاردن تزامنت مع الانتقال الى المرحلة المبكرة من العصر الحجري الحديث ما قبل الفخري الفترة ب في حوض الفرات (جرف الاحمر) وفي موقع موتزا الى الغرب. وبهذا فإن المرحلة الختامية من هذا العصر في جنوب الاردن تغطي الفترة اللاحقة مباشرة في أماكن أخرى من الهلال الخصيب.



شكل 46.2 مواقع الفترة المبكرة من العصر الحجري الحديث ما قبل الفخاري في منطقة الهلال الخصيب

وادي فينان 16 والعصر الحجري الحديث ما قبل الفخاري في جنوب الاردن والهلال الخصيب

تسهم المعلومات المستقاة من الابحاث الاثرية في موقع فينان 16 بشكل كبير في تعميق فهمنا لتاريخ ولمضمون التغير الثقافي في جنوب بلاد الشام في الحقبة المبكرة من العصر الحجري الحديث وما سبقها وتبعها من فترات. فبينما تظهر المرحلة المعمارية الاولى تشابها واضحا مع ما يعرف بالحضارة الحريفية في النقب وسيناء، تتصف المرحلة المعمارية الثانية بخصائص محلية مميزة. وموقع الذراع على مسافة 60 كم الي الشمال من فينان هو الموقع الوحيد في جنوب الاردن والذي يعود الى نفس الفترة التاريخية. ويتشابه الموقعان في امور اساسية كثيرة. فالصوانيات في كلا الموقعين تتشابه من حيث غلبة ما يعرف بالرؤوس الخيامية مع ان رؤوس السهام الخيامية فيهما مختلفة. ويتشابه الموقعان ايضا من حيث كثافة العناصر المعمارية وكمية المخلفات المنزلية. وتتشابه ايضا بعض المفردات المعمارية كوجود الجواريش الحجرية مدمجة في ارضيات البيوت، والارضيات المعلقة باستخدام الطين وجذوع الاشجار المثبتة على ركائز حجرية تدعم الارضيات.



شكل 46.1 وادي فينان 16 والعصر الحجري الحديث في جنوب الاردن

معلومات ، واعادة دفنها بنمط معين من الطقوس شائعا. وفي حالات متعددة دفنت بعض العظام الحيوانية مع العظام البشرية وتصاحبت هذه الاخيرة بتقدمات جنائزية صغيرة تم الكشف عنها في المدافن. وقد كان الاتجاه السائد لدى الباحثين بأن عدد ونوعية هذه اللقى الاثرية الصغيرة قد يكون مؤشرا على التميز الاجتماعي او الطبقي من حيث كونها قد تعكس مكانة الفرد في المجتمع اثناء حياته. ولكن الامور قد تكون أعقد من ذلك، فهذه اللقى الصغيرة قد تعكس علاقة الاحياء بالاموات اكثر من علاقة الميت بحياته على وجه الارض. ففي رأي عدد متزايد من الباحثين أن الاحياء هم من يقررون، في النهاية طبيعة وعدد الاشياء التي ستصاحب الميت.

ز- الاستقرار

عادة ما تجري مناقشة موضوع الاستقرار من خلال مؤشرات تتضمن مدى تطور البقايا المعمارية، وعدد ونوعية الادوات المستخدمة في تحضير الطعام واخيرا كمية المخلفات المنزلية التي يتم التخلص منها. ولكن وفي كل الاحوال فإن احد المؤشرات القاطعة على الاستقرار في أي موقع يتألف من حزمة من المؤشرات الموسمية المختلفة التي تدل على وجود استيطان فيه على مدار العام.

وعودة الى موضوع العمارة التي تعتبر بعض انواعها، أحد المؤشرات على السكن الدائم في موقع ما. فالعمارة تعكس بالاضافة الى أشياء اخرى وبشكل واضح مستوى الجهد المجتمعي المستثمر في عملية البناء وفي استعمالات المباني. وهذا الجهد، عادة ما يغلف بإطار طقسي وعلى الرغم من كونه جزءا لا يتجزأ من عملية التحول النيوليثي فإن الاستقرار يمكن ان ينشأ ويتطور بمعزل عن نوع النشاط الاقتصادي السائد سواء كان الجمع والصيد او الزراعة. فبرج اريحا وسورها الذي كان لفترة طويلة المعلم والمؤشر الوحيد على عمارة مجتمعية لم يعد كذلك بعد اكتشاف منشئات مجتمعية ضخمة ليس فقط في مواقع أخرى في شمال الهلال الخصيب (غيوبكلي تبه وجرف الاحمر وغيرها) بل في جنوبه ايضا (المبنى الدائري ذو المصاطب المزخرفة في فينان 16).

الدراسات الحديثة بأن هذه الادوات كانت تستخدم كمثاقب. وقد بدأت بالظهور خلال هذه الفترة رؤوس سهام من نوعين جديدين هي رؤوس غور الاردن وما يعرف برؤوس الاسهم الصليبية (نسبة الى موقع الصليبية 9) وتتضمن التقاليد السلطانية كذلك النصال الطويلة المسننة والفؤوس المصقولة ورؤوس حلوان والنويات الشائعة في هذه الفترة كانت النواة المعروفة بالمنشورية ولكن في المراحل الختامية بدأت نواة جديدة بالظهور (النواة البحرية) والتي لاقت رواجا واسعا في الحقبة الثانية من العصر الحجري الحديث ما قبل الفخاري.
بالإضافة إلى ذلك، لاقت الجواريش (ادوات الطحن) في مجتمع اعتمد على النباتات والحبوب بشكل متزايد رواجا كبيرا. وفي العموم فقد كانت هذه الادوات ضحلة مما جعلها مختلفة عن ادوات الحقبة السابقة وكان بعضها مزينا بزخارف هندسية في استمرارية لما كان شائعا في الفترة النطوفية السابقة.

ذ- المعتقدات الدينية والفنون

لعل موقع غيوبكلي تبه في حوض الفرات الاوسط يعطي المثال الافضل على الحياة الطقسية وما ارتبط بها من فنون خلال الحقبة المبكرة من العصر الحجري الحديث ما قبل الفخاري. وما زال معنى الدوائر الحجرية والاعمدة الحجرية ووظيفة الموقع واستعمالاته مدارا للجدل بين الباحثين.
وتتمحور التعبيرات الفنية في كل من غيوبكلي تبه وجرف الاحمر حول التمثيل المحاكي للطبيعة فيما يخص الحيوانات، في حين أن هناك ميلا واضحا للتجريد عند الانتقال الى تمثيل البشر. ومن غير المعروف حتى الان فيما اذا كانت هذه الظاهرة تعكس نشوء نوع جديد من الانماط الفكرية او انها كانت تكريسا وتجسيدا ماديا لأنماط من حقب سابقة. ولا يزال موقع غيوبكلي تبه في جنوب تركيا المثال الاوضح لما وصلت له فنون النحت في العصر الحجري الحديث ما قبل الفخاري من مستوى رفيع، فقد تم خلال هذه الفترة بناء دوائر حجرية تتراوح اقطارها بين 30-10 مترا باستخدام أنصاب حجرية على شكل حرف التاء بالانجليزية. وتم زخرفة اسطح هذه الانصاب برسومات لحيوانات وطيور بالحجم الطبيعي. وقد تضمنت هذه الرسومات حيوانات وطيور وزواحف من البيئة المحيطة مثل الاسود، الثيران، الثعالب، والغزلان والخنازير البرية بالاضافة إلى اللقلق والبط والثعابين والسحالي وما يعتقد انه ذراعي انسان ومناظر طبيعية.
ويشترك الهلال الخصيب شماله وجنوبه في انتشار المنحوتات التي تمثل العضو الذكري ولكن وكما ذكر سابقا فإن هناك ميل واضح للتمثيل الواقعي في الشمال.
وانتشرت الدمى البشرية المصنوعة من الحجر او الطين بشكل واسع، وتضمنت هذه الدمى تمثيلا لنساء جالسات كما في نتيف هاغدود، الذراع، والصليبية. وتميزت التماثيل الانثوية بعدم وجود الاثداء والسرة والاعضاء التناسلية (باستثناء حالة واحدة من الصليبية 9) وكان هناك تركيزا واضحا على منطقة الأرداف.

ر- المدافن

تشير المعلومات الخاصة بالدفن وطقوسه المختلفة التي تم الحصول عليها من مواقع هذه الفترة بأن الدفن الاولي تحت ارضيات البيوت وازالة الجمجمة في مرحلة ما كان هو الاكثر شيوعا. وليس من المعروف حسب ما هو متوفر من معلومات الان فيما اذا كانت عملية الدفن تحت ارضيات المنزل قد مورست خلال الاستعمال الفعلي لهذه المساكن او ان الدفن تحت الارضيات كان يتم بعد التوقف عن استعمالها كمنازل للسكن. وبالتالي فإن العثور على المدافن تحت ارضيات البيوت قد يكون نتيجة لبناء بيوت جديدة مع اعادة استخدام اساسات البيوت القديمة. وكان فصل الجمجمة عن بقية الهيكل العظمي واحيانا فصل بعض اجزاء الجسم كالعظام الطويلة واستعمالها لطقوس لا نعرف ماهيتها في ضوء ما نملكه من

والمنشئات الخاصة بمعالجة النباتات في جرف الاحمر في المنطقة الشمالية من الهلال الخصيب. وعلى الرغم من عدم وجود حبوب مدجنة فإن ما يهم هنا هو الدلائل القوية على ممارسة السكان لنوع من الزراعة البدائية التي تؤهلهم ليكونوا منتجين بدائيين للطعام كما يشير العديد من الباحثين.
وما قيل عن النباتات هنا يمكن أن يمتد ليشمل المصادر الحيوانية. فكما تشير الدراسات على عظام الحيوانات في المواقع المختلفة الممثلة لهذه الحقبة التاريخية فإن الغزال كان الاكثر شيوعا في تلك المواقع بين حيوانات أخرى كالحصان وحمار الوحش والخنزير البري والماعز والطيور. وعلى الرغم من عدم وجود مؤشرات واضحة لحيوانات مدجنة (تغييرات في الحجم، في حجم الاسنان، في شكل وحجم القرون) فإن هذا قد يفسر بطول المدة الزمنية، كما هو الحال في النباتات. ولكن العظام تشير الى انماط معينة فيما يتعلق بعمر الحيوانات مما قد يشير الى أن قطيع الحيوانات وحتى البرية منها كانت تدار وتراقب بصورة حثيثة وحتى قبل ان تدجن بالكامل.

خ- الحضارة المادية/ العمارة

لقد تم الكشف في السنوات الاخيرة عن بقايا معمارية للاستخدامات السكنية بالاضافة الى منشئات معمارية عامة (غير سكنية).
وعبر كل منطقة الهلال الخصيب اظهرت عمارة الحقبة المبكرة من العصر الحجري الحديث ما قبل الفخاري أنماطا معمارية تشترك في كثير من الصفات مع عمارة الفترة السابقة (النطوفية)، فالبيوت في غالبيتها العظمى بيضاوية او شبه دائرية ويقع الجزء السفلي منها تحت مستوى سطح الارض المحيطة. وهناك ايضا تشابه واضح في طريقة الدفن وفي التقنيات المستخدمة وفي غياب اية مظاهر للتمايز الطبقي كما هو واضح من البيوت والمدافن وما تحتويه من معثورات وتقدمات جنائزية. وبقيت اريحا بأنماط عمارتها المتميزة (البرج والجدار المحيط) وباللقى الاثرية المصنوعة من مواد مستوردة، عبر شبكة من العلاقات التجارية، تقف متميزة بين مواقع هذه الحقبة التاريخية حتى التسعينيات من القرن الحالي. فقد تم خلال هذه الفترة اكتشاف العديد من المواقع المميزة بعمارتها ومعثوراتها الاثرية في كل من شمال سوريا وجنوب الاناضول (جرف الاحمر، جعدة، تل عبر، غيوبكلي تبه، نيفالي تشوري وغيرها). وقد شكل نشر المعلومات من المواقع التي كانت مكتشفة سابقا اضافة جديدة الى فهمنا لعملية التحول وخصوصا المرحلة الانتقالية بين الفترة ا والفترة ب من العصر الحجري الحديث ما قبل الفخاري.

د- الحضارة المادية/الادوات

لقد أكدت الاكتشافات الجديدة على ان الحضارة المادية لهذه الحقبة التاريخية وعلى الرغم من التفاوتات الاقليمية تشترك في كثير من الصفات التي تميزها عن الحقب التاريخية السابقة واللاحقة على السواء وخصوصا فيما يتعلق بانتاج الأدوات الحجرية. فما يعرف برؤوس الخيام كان القاسم المشترك بين شمال المنطقة وجنوبها في حين ان الشمال تميز بعمارته الضخمة وبتعبيراته الفنية، على الاقل في حدود ما نعرفه الان.
ومن الملاحظ وجود تنوع كبير في مجاميع الادوات الحجرية المشظاة في المواقع المختلفة ضمن المنطقة الجنوبية. ولكن وعلى الرغم من ذلك يتفق معظم الباحثين وبدرجات متفاوتة على اختزال هذه التقاليد في مرحلتين او تقنيتين اساستين: الخيامية والسلطانية.
وهناك انتشار واسع للصوانيات الدقيقة ضمن التقليد الخيامي وتتضمن هذه الادوات الهلاليات والنصال الدقيقة المسننة، ولكن الفؤوس ذات الوجهين كانت نادرة. والادوات الدقيقة شائعة ايضا في التقاليد السلطانية وتتضمن ما يعتقد بأنه رؤوس سهام خيامية من الفترة السابقة وفي هذا الصدد، أشارت بعض

الحقبة المبكرة من العصر الحجري الحديث أو في احيان اخرى العصر الحجري الحديث ما قبل الفخاري . وتحاشيا لأية اشكالات وأي لبس يكتنف التسمية، لجأ بعض الباحثين الى اطلاق تسميات اكثر حيادية على هذه الفترات (بمعنى تسميات لا ترتبط بمكان جغرافي او بوجود عنصر محدد او عدمه في الحضارة المادية الممثلة للحقبة التاريخية) من قبيل ما استخدمه بريدوود وغوفين على سبيل المثال لا الحصر. ومع ذلك ما زالت التسميات القديمة كالخيامية (للمرحلة المبكرة من هذه الفترة) والسلطانية والمريبطية والأسوَدية للمراحل اللاحقة شائعة. وقد لوحظ وجود بعض الثقافات المميزة في المناطق الصحراوية (الحريفية وابو ماضي) ، ومناطق جنوب الاردن (الذراع، ظهرة الذراع، وفينان 16) والتي هي في حضارتها المادية تتماشى مع المميزات والخصائص التي تعود للحقبة المبكرة.

ويجمع العديد من الباحثين الان بأن الحضارة الخيامية لم تكن الا فترة انتقالية قصيرة بين النطوفية والسلطانية في منطقة جنوب بلاد الشام.

ث- السياق الجغرافي

على الرغم من أن مواقع الحقبة المبكرة من العصر الحجري الحديث من حيث العدد ليست بتلك الكثرة كما هو الحال في الفترة السابقة (النطوفية) الا انها افضل توزيعا من الناحية الجغرافية بحيث انها تغطي، تقريبا جميع منطق الهلال الخصيب. فقد تم توثيق مواقع من هذه الحقبة على جانبي نهر الاردن (اريحا، جلجال، صليبية، ناتيف هاغدود، الحمة وعراق الدب) وفي حوض دمشق (تل صبي اسود) وعلى نهر الفرات (مريبط، تل عبر، وجرف الاحمر). هذا بالاضافة الى بعض المواقع الهامة في البادية الاردنية الشرقية وفي حوض البحر الميت. ولا بد هنا من الاشارة الى تجمع اقليمي اخر وهو الاناضول (تشايونو، غيوبكلي تبه وحلّان تشيمي).

ج- السياق الزمني (التواريخ المستخدمة هي تواريخ معدلة من سنوات عمر المادة المستخدمة في التحليل الاشعاعي الى سنوات تقويمية نقطة نهايتها هو الوقت الحاضر)

وعلى ضوء ما نعرفه الان فإننا نستطيع القول بأن عملية التحول النيوليثي قد بدأت قبل 20 ألف سنة من الان وانها قد تطورت في فترة ما يعرف ب"ما بعد العصر الحجري القديم" وخصوصا مرحلته الختامية (المعروفة باسم "النطوفية المتأخرة"12000-15000 سنة من الان) ومرورا بما يعرف ب"الفترة ا من العصر الحجري الحديث ما قبل الفخاري" 10500-12000 سنة من الان، و"الفترة ب من العصر الحجري الحديث ما قبل الفخاري" (8400-10500 من الان)، حتى بلغت مراحلها النهائية في "العصر الحجري الحديث الفخاري" (7600-8400 سنة من الان).

ح- الاقتصاد

على الرغم من اطلاق تسمية العصر الحجري الحديث ما قبل الفخاري على الفترة الممتدة زمنيا ما بين 12000 و 10500 سنة من الان، فإن الشواهد الاثرية تشير الى ان عملية التحول النيوليثي لم تكتمل خلال هذه الحقبة التاريخية بعد. ففي حين أن عدد وتنوع واحجام الادوات الحجرية المستخدمة في إعداد الطعام تشير الى زيادة ملحوظة في استخدام المصادر النباتية كالطعام، إلا أنه وحتى الان لم يتم العثور على حبوب او بقوليات مدجنة تختلف في اشكالها وتركيبتها عن الانواع البرية المعروفة بشكل قاطع وهذا قد يعود الى ان التحول من الاشكال البرية الى المدجنة قد تستغرق الاف السنين ولكن ما يمكن قوله استنادا الى ما نعرفه حتى اللحظة عن هذه الحقبة التاريخية هو ان هناك تسارعا ملحوظا وزيادة كبيرة في جمع النباتات وإعدادها (تصنيعها عبر عمليات متلاحقة) وتخزينها عما عرفناه في الحقبة النطوفية السابقة. يدل على ذلك المنشئات التخزينة في المواقع المختلفة وخصوصا في الذراع في جنوب الاردن

الحقبة المبكرة من العصر الحجري الحديث

ا- السياق الحضاري

لعل العالم البريطاني غوردون تشايلد كان اول من حاول التعمق في فهم هذه الحقبة التاريخية معتمدا على ما توفر لديه من معلومات حينها والتي استسقاها من دراسته عن التاريخ الاوروبي. فقد قام تشايلد بتحديد الخصائص الرئيسية وحصرها في عشر خصائص تظهر كحزمة واحدة وهي :الاقتصاد الزراعي المعتمد على تدجين الحيوانات وتقسيم النباتات، النمو السكاني المطرد، التخزين والدورات الزراعية الطويلة، الاستقرار، التجارة بالمواد غير الاساسية، التنظيم الاجتماعي اللامركزي، الديانات وطقوس الخصوبة، الفخار، ادوات تحضير الطعام الحجرية، واخيرا الادوات الخاصة بصناعة النسيج. وبحسب تشايلد فأن وجود هذه العناصر في أي حضارة ما، يعني نسبتها الى العصر الحجري الحديث. وكان تشايلد اول من اطلق على عملية التحول هذه اسم الثورة النيوليثية اي بمعنى ثورة العصر الحجري الحديث لينبه بذلك بأن هذه التغييرات لم تحدث تغييرات جوهرية في المجتمعات البشرية فقط، بل ان هذه التغييرات حدثت بوتيرة سريعة جدا أ إلى ما يمكن اعتباره إنقلابا حدث بين ليلة وضحاها. ولكن الابحاث الاثرية اللاحقة في القارة الاوروبية وفي منطقة الهلال الخصيب ما لبثت ان اظهرت بأن المسألة اكثر تعقيدا من ذلك. فقد تبين بأن الخصائص التي حددها تشايلد يمكن ان تظهر مستقلة عن بعضها البعض ويمكنها الظهور ضمن اطر زمانية مختلفة في الاقاليم المختلفة. وبالاضافة الى ذلك فإن هذه التغييرات اخذت وضعها ليس بشكل مفاجئ وسريع كما اعتقد تشايلد بل عبر الاف السنين. وبذلك اصبحنا ننظر الان الى ما يعرف بعملية التحول النيوليثي على أنه عملية تدريجية ثورية في مضمونها ولكنها بطيئة من حيث البعد الزمني.

ب-السياق البيئي

يعتقد معظم الباحثين بأن الحياة القروية قد ازدهرت في الفترة التي تلت حقبة الجفاف المعروفة ب يونغر-درياس التي كانت سائدة في الفترة النطوفية المتأخرة. وقد تميز مناخ هذه الفترة بكونه ميالا اكثر للرطوبة والحرارة أكثر مما هو الان في المناطق الصحراوية وشبه الجافة من منطقة الهلال الخصيب. وقد كان لهذا التغير المناخي نتائج انعكست ايجابيا على البيئة بشكل عام وعلى الغطاء النباتي بشكل خاص. فزيادة الهطول المطري في موسم الامطار ادت الى توسع رقعة غابات البحر المتوسط والى توسع السهوب العشبية. وبالاضافة الى ذلك فأن زيادة رقعة البحيرات والمسطحات المائية خلقت فرصا جديدة للمجموعات البشرية التي أتت فيما بعد عن وجود متزايد لمصادر بيئية جديدة سهلة الاستخدام.

ت- تاريخ البحث والتسميات

لقد تم التعرف على مخلفات أثرية تعود لهذه الفترة في موقع تل السلطان (اريحا) في الثلاثينيات من القرن الماضي في فترة سبقت الدراسة الممنهجة لهذه الحقبة التاريخية وما تبعها من مسميات اطلقت عليها فيما بعد. وكانت كاثلين كنيون اول من أطلق تسمية ما قبل العصر الحجري الحديث على المخلفات الاثرية التي تم الكشف عنها في موقع اريحا في الخمسينيات من القرن العشرين. وخلال هذه الفترة المبكرة من البحث تم التعرف على مادة اثرية تعود للحقبة المبكرة من العصر الحجري الحديث ما قبل الفخاري في موقع الخيام وعرفت بعدها بالثقافة الخيامية. لقد اظهرت الدراسات اللاحقة للمعثورات الاثرية في الموقعين وهي في معظمها من الصوانيات بشكل واضح بأن هذه الادوات تعود الى الحقبة الاولى من العصر الحجري الحديث ما قبل الفخاري. وبالنتيجة فإن الغالبية العظمى من الباحثين في هذه الفترة التاريخية استبدلت التسمية القديمة (ما قبل العصر الحجري الحديث) بالتسمية الجديدة وهي

يتألف كتاب "وادي فينان 16 من أربعة فصول: التنقيبات الاثرية في أحد مواقع العصر الحجري الحديث الأول في وادي فينان جنوب الاردن، التسلسل الطبقي، التأريخ، العمارة، والمدافن" .
يتحدث الفصل الاول عن نتائج الابحاث الاثرية خلال ثلاثة مواسم ميدانية قصيرة في الاعوام 1997، 1998، و 2003 التي تم فيها تقييم الموقع من حيث المحتويين التاريخي و الفيزيائي وخصوصا ما يتعلق بامتدادات الموقع وعمق الطبقات الاثرية فيه، هذا بالاضافة الى التعرف على السياق الجيولوجي للموقع.
ويتحدث هذا الفصل أيضا عن فترة العصر الحجري الحديث في منطقة الهلال الخصيب بالكامل وعن موقع وادي فينان 16 ضمن الصورة الأكبر لهذه الحقبة التاريخية . وتم في هذا الفصل ايضا مناقشة مدى امكانية الإستفادة من نتائج البحث الآثاري في الموقع في ملء الفراغات البحثية التي تعاني منها الابحاث العلمية المتعلقة بهذه الحقبة التاريخية على المستويين الوطني والاقليمي. وقد تم تخصيص جزء من هذا الفصل لمناقشة النتائج المتوخاة من الابحاث الاثرية في الاعوام ما بين 2010-2008.
وأخيرا وليس اخرا تم في هذا الفصل مناقشة استراتيجيات التنقيب الاثري وطرق جمع العينات والتوثيق والتحليل.
وأما الفصل الثاني من الكتاب، وهو الاكبر حجما من حيث عدد الصفحات فقد تم تكريسه بالكامل لاستعراض عناصر الموقع المختلفة والتسلسل الطبقي (التأريخي) له. وقد اشتمل هذا الفصل على مناقشة الطبقة السطحية من الموقع التي تعرضت لتغييرات كثيرة خلال العشرة الاف سنة الاخيرة من عمر الموقع سواء منها التي حدثت بفعل الطبيعة وعامل الزمن او التغييرات التي حدثت نتيجة للنشاطات البشرية قديما وحديثا. وقد احتوت هذه الطبقة السطحية على مخلفات اثرية لفترتين زمنتين تعود الاولى منهما الى الفترات النبطية والرومانية/البيزنطية والممثلة بعدد من المدافن والتي هي كما يبدو امتداد للمدافن من تلك الفترات التاريخية الواقعة الى الغرب والجنوب الغربي من وادي فينان 16. والجدير بالذكر ضمن هذا السياق هو الاشارة الى أن هذه المدافن (الكائنة خارج نطاق موقع العصر الحجري) قد تعرضت للكثير من عمليات التخريب خلال العقد الاخير على يد لصوص المدافن حيث ان سطح المنطقة مغطى بشكل شبه كامل بالأشكال الحجرية التي كانت تغطي حجرات الدفن والكسر الفخارية والعظام.
وأما الفترة الزمنية الاخرى التي احتوت الطبقة السطحية على العديد من بقاياها الاثرية فهي المرحلة الاخيرة من عمر الموقع خلال فترة العصر الحجري الحديث ما قبل الفخاري الإول. وقد تمثلت هذه البقايا ضمن الطبقة المذكورة بالأجزاء السفلية (ارضيات الحجرات) من عناصر معمارية، وعدد من المدافن التي تعود الى فترة العصر الحجري الحديث ما قبل الفخاري هذا بالاضافة الى بعض المكتشفات الاثرية الصغيرة التي تعود الى نفس الفترة. ويبدو بأن هذه المعثورات كانت جزءا من الطقوس الجنائزية التي وضعت في المدافن الموجودة تحت ارضيات الحجرات. ومن الواضح أن الأجزاء العلوية لهذه البيوت قد اندثرت تماما بفعل الزمن وبفعل عوامل الطبيعة. ويستعرض هذا الفصل كل على حدة عناصر الموقع بما فيها الوحدات المعمارية التي تم الكشف عنها خلال مواسم التنقيبات الاثرية المختلفة وسنعود لمناقشة عمارة الموقع في نهاية هذه المقدمة.
ويستعرض الفصل الثالث التأريخ والعمارة والمدافن ويركز على عدة مواضيع كمجاميع الادوات المشظاة ونتائج تحليل الكربون المشع 14 ومراحل تطور الموقع ونتائج دراسة مواد البناء المستخدمة ضمن أشياء أخرى كثيرة.
وأما الفصل الاخير من الكتاب فيحتوي على حصيلة جميع الابحاث التي أجريت في الموقع.

46. وادي فينان 16

بدا لي ان هذا الملخص بحاجة الى مقدمة توضح لماذا قررت هيئة التحرير تزويد هذا الكتاب الذي خصص لدراسة نتائج ستة مواسم من العمل الميداني الآثري في وادي فينان 16، الموقع الذي يعود بتاريخه الى الحقبة الاولى من العصر الحجري الحديث ما قبل الفخاري.

لعل الاعتبار الاول كان لاتاحة الفرصة للقارئ العربي وخصوصا الطلبة الجامعيين في كليات الآثارمن أجل الاطلاع على ملخص سريع لنتائج ستة مواسم ميدانية من الابحاث الاثرية بمنطقة فينان في جنوب الاردن، دون أن يكونوا مضطرين لقراءة الكتاب بالكامل نظرا لحجمه الكبير وللكم الهائل من المعلومات التفصيلية التي سيترك خيار الرجوع اليها للاستزادة. ولعل الاعتبار الثاني والمرتبط بالاول مباشرة وفي نفس الوقت لا يقل عنه في الاهمية هو تمكين القاريء و الباحث على حد سواء وخصوصا الذين لا يجيدون اللغة الإنجليزية بشكل كاف من الاستفادة من نتائج هذه الابحاث الميدانية وتوظيفها في ابحاثهم الخاصة.

ولعل الاعتبار الثالث والاخير يتركز حول وضع نتائج الابحاث الاثرية في وادي فينان 16 ضمن سياقها التاريخي على المستويين المحلي (الاردني) والاقليمي (منطقة الهلال الخصيب) بشكل يظهر أهمية كل المواقع من العصر الحجري الحديث إلى ما قبل الفخاري وان المعلومات عن كل موقع مهما كان كبيرا او صغيرا وفي اي منطقة ستشكل اضافة هامة لما نعرفه سابقا عن مواقع هذه الفترة التاريخية الهامة وستساهم في تشكيل الصورة العامة لها.

ويجدربالقول بأن هذا الملخص بالعربية لن يكون بديلا للنص الاصلي بالانجليزية وأن الباحثيين وخصوصا الطلبة منهم مدعوون للعودة للنص الاصلي للاستزادة والاطلاع على المعلومات التفصيلية التي لن تتسع لها اية مقدمة مهما عظمت.

د. محمد النجار

وادي فينان 16
ألتنقيبات في موقع العصر الحجري الحديث المبكر
في وادي فينان، جنوب الاردن

التسلسل الطبقي، التأريخ، العمارة، المدافن

تأليف و إعداد
،ستيفن ميذين، بيل فنليسون، داركو ماريتشيفيتش
سام سميث، ايمما جنكينز، محمد نجار

مع مساهمات من

كارين ويكس، سام الكوك، سارة اليوت، بسكال فلوهر

وادي فينان 16
التنقيبات في موقع العصر الحجري الحديث المبكر في جنوب الأردن

التسلسل الطبقي، التأريخ، العمارة، المدافن

ستيفن ميثين، بيل فنليسون، داركو ماريسوفتش،
سام سميث، ايما جنكينز، محمد النجار

إرث فينان
FAYNAN HERITAGE

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